P001 PANCREATIC CYST FLUID VEGF-A AND CEA: A HIGHLY ACCURATE TEST FOR THE DIAGNOSIS OF SEROUS CYSTIC NEOPLASM Rosalie A Carr, MD, Michele T Yip-Schneider, PhD, Scott Dolejs, MD, Bradley A Hancock, BS, Huangbing Wu, BS, Milan Radovich, PhD, C. Max Schmidt, MD, MBA, PhD; Indiana University Department of Surgery

BACKGROUND: Accurate differentiation of pancreatic cystic lesions is important for pancreatic cancer early detection and prevention as well as avoidance of unnecessary surgical intervention. Serous cystic neoplasms (SCN) have no malignant potential, but may mimic premalignant mucinous cystic lesions: mucinous cystic neoplasm (MCN) and intraductal papillary mucinous neoplasm (IPMN). We recently identified vascular endothelial growth factor (VEGF)-A as a novel pancreatic fluid biomarker for SCN. We hypothesize that combining cyst fluid carcinoembryonic antigen (CEA) with VEGF-A will improve the diagnostic accuracy of VEGF-A.

METHODS: Pancreatic cyst/duct fluid was collected from consenting patients undergoing surgical cyst resection with corresponding pathologic diagnoses. Pancreatic fluid VEGF-A and CEA levels were detected by ELISA. Sensitivity and specificity of VEGF-A and CEA alone and in combination were determined. Multivariable logistic regression analysis was performed and receiver operator characteristic (ROC) curve analysis was used to evaluate the diagnostic accuracy of the biomarkers.

RESULTS: One hundred forty-nine patients with pancreatic cystic lesions met inclusion criteria. Pathologic diagnoses included pseudocyst (n=14), SCN (n=26), MCN (n=40), low/moderate grade IPMN (n=34), high grade IPMN (n=20), invasive IPMN (n=10) and solid pseudopapillary neoplasm (n=5). VEGF-A was significantly elevated in SCN cyst fluid compared to all other diagnoses (p<0.001). With a threshold of >5,000 pg/ml, VEGF-A alone has 100% sensitivity and 83.7% specificity to distinguish SCN from other cystic lesions. With a threshold of ≤10ng/ml, CEA alone identifies SCN with 95.5% sensitivity and 81.5% specificity. Sensitivity and specificity of the VEGF-A/CEA combination are 95.5% and 100% respectively. Likelihood ratio testing demonstrated significant improvements in the model when CEA and VEGF-A were combined compared to either individually. The c-statistic increased from 0.98 to 0.99 when CEA was added to VEGF-A alone in the ROC analysis.

CONCLUSIONS: In high risk patients with pancreatic cysts, there is an urgent need for an accurate and reliable diagnostic test to stratify and improve clinical management. Although VEGF-A alone is a highly accurate test for SCN, the combination of VEGF-A with CEA approaches the gold-standard of pathologic diagnosis, thus importantly avoiding false positives. Patients with a positive test indicating benign SCN can be spared a high risk surgical pancreatic resection.
**P002 ARE BRCA2 GENE MUTATION PATIENTS INAPPROPRIATELY UNDER-SCREENED FOR PANCREATIC ADENOCARCINOMA?**

*Alexandra M Roch, MD, MS, Michael E Johnston II, BS, Justine Schneider, JoAnna L Hunter, MD, William P Lancaster, MD, Michael G House, MD, Nicholas J Zyromski, MD, Attila Nakeeb, MD, C. Max Schmidt, MD, PhD, MBA, Eugene P Ceppa, MD; Indiana University School of Medicine*

**Background:** BRCA2 mutations account for the highest proportion of hereditary causes of pancreatic adenocarcinoma with a 3-6-fold increased risk. However, screening is currently recommended only for patients with one first-degree relative or two family members affected with pancreatic adenocarcinoma. We hypothesized that screening all BRCA2 patients would identify a higher rate of pancreatic abnormalities.

**Methods:** All patients with genetically confirmed BRCA2 mutations at a single academic center were retrospectively reviewed (2005-2015). Pancreatic abnormalities were defined on cross-sectional imaging as pancreatic neoplasm (cystic/solid) or main duct dilation.

**Results:** Among 117 patients with BRCA2 mutation, 98% were asymptomatic. Only 47 (40%) had abdominal imaging (20 CT and 27 MRI) for review. Ten of those 47 patients (21%) had pancreatic abnormalities (adenocarcinoma (n=2), IPMN (n=7), simple cyst (n=1)). The prevalence of pancreatic abnormalities and IPMN was higher in BRCA2 patients than in the historical general population (21% vs. 8% and 17% vs. 1%, p=0.0007 and <0.0001, respectively). No statistical difference was seen in rate of pancreatic abnormalities or IPMN according to family history of pancreatic adenocarcinoma. Furthermore, all pancreatic adenocarcinomas developed in patients without a positive family history.

**Conclusions:** In this series, 4% and 17% of BRCA2 patients developed pancreatic adenocarcinoma and IPMN, respectively, which is higher than previously reported. Under current recommended screening, 60% of BRCA2 patients had incomplete pancreatic assessment. With no influence of family history status, this study suggests all BRCA2 patients should undergo a high-risk screening protocol that will identify a higher rate of precancerous pancreatic neoplasms amenable to curative resection.
PREDICTORS OF EARLY RECURRENCE AND OMISSION OF ADJUVANT THERAPY AFTER PANCREATECTOMY FOR PANCREAS CANCER: A CASE FOR NEOADJUVANT THERAPY IN HIGH RISK PATIENTS

Brent T Xia, MD¹, Daniel E Abbott, MD², Ali H Al Humaidi, MD¹, Dennis J Hanseman, PhD¹, Cecilia G Ethun, MD³, Shishir K Maithel, MD³, David A Kooby, MD³, Ahmed Salem, MD², Clifford S Cho, MD⁴, Sharon M Weber, MD², Susan J Stocker, RN³, Mark S Talamonti, MD⁵, David J Bentrem, MD⁵, Syed A Ahmad, MD¹; ¹University of Cincinnati, ²University of Wisconsin, ³Emory University, ⁴University of Michigan, ⁵NorthShore University HealthSystem, ⁶Northwestern University

Introduction: A significant portion of patients with resected pancreatic cancer demonstrate early recurrence (ER) or fail to receive multimodal therapy altogether, negatively impacting survival. We sought to determine if an at-risk patient population can be identified preoperatively to select patients who would particularly benefit from neoadjuvant therapy.

Methods: Perioperative data for patients who underwent pancreatectomy for pancreatic ductal adenocarcinoma from five academic institutions (2005-2015) were assessed. Early failure – omission of adjuvant therapy (OAT) and ER (within six months from the date of surgery) – were the primary endpoints. Multivariate analysis was used to identify predictors of early failure, and survival analysis was performed using the Kaplan-Meier method and compared using the log-rank test.

Results: Pancreatecduodenectomy (n=674, 85.6%) was the most common resection performed, followed by distal pancreatectomy (n=89, 11.3%). Of 787 patients, 236 (30%) experienced early failure post resection. This was associated with a significant survival disadvantage compared to patients who did not have ER/OAT (median overall survival 13.4 vs. 27.5 months, P<0.0001). Advanced age, race, age adjusted Charlson comorbidity index, Eastern Cooperative Oncology Group (ECOG) performance status, and elevated preoperative carbohydrate antigen 19-9 (CA 19-9) were associated with increased likelihood of ER/OAT post resection (all P<0.05). Race (Black vs. White; odds ratio [OR] 1.81; P=0.03), ECOG score (≥2 vs. 0; OR 2.91; P=0.02), and CA 19-9 (≥180 vs. <180; OR 2.02; P=0.01) persisted as preoperative predictors of ER/OAT on multivariate analysis.

Conclusion: Nearly one-third of patients with resected pancreas cancer demonstrate early recurrence or omission of adjuvant therapy. This cohort of vulnerable patients may be better served by neoadjuvant therapy to ensure completion of multimodal therapy, as well as to select out patients with poor tumor biology and occult metastatic disease at the time of diagnosis. Further research should be focused on developing a prognostic nomogram for prediction of early failure post pancreatectomy to aid in sequence of therapy decisions.

Cecilia G Ethun, MD, MPhil, PhD; Alexandra G Lopez-Aguiar, MD, MPH, PhD; George Poultides, MD; Kamran Idrees, MD; Ryan C Fields, MD; Sharon Weber, MD; Clifford Cho, MD; Robert Martin, MD, PhD; Charles Scoggins, MD; Perry Shen, MD; Carl Schmidt, MD; Ioannis Hatzaras, MD; David Bentrem, MD; Syed Ahmad, MD; Daniel Abbott, MD; Hong J Kim, MD; Nipun Merchant, MD; Charles A Staley, MD; David A Kooby, MD; Shishir K Maithel, MD.

Division of Surgical Oncology, Winship Cancer Institute, Emory University, Department of Surgery, Johns Hopkins University, Department of Surgery, Stanford University, Department of Surgery, Vanderbilt University, Department of Surgery, Washington University, Department of Surgery, University of Wisconsin, Department of Surgery, University of Louisville, Department of Surgery, Wake Forest University, Department of Surgery, Ohio State University, Department of Surgery, New York University, Department of Surgery, Northwestern University, Department of Surgery, University of Cincinnati, Department of Surgery, University of North Carolina

Background: Pancreatic ductal adenocarcinoma (PDAC) and distal cholangiocarcinoma (DC) are often managed as one entity, yet direct comparisons are lacking. Our aim was to utilize two, large, multi-institutional databases to assess treatment, pathologic, and survival differences between these diseases.

Methods: Patients with PDAC and DC who underwent curative-intent pancreaticoduodenectomy from 2000-2015 at 13 institutions comprising the Central Pancreas Consortiums and US Extrahepatic Biliary Malignancy were included. Primary endpoint was disease-specific survival (DSS).

Results: Of 1463pts, 1239(85%) were PDAC and 224(15%) were DC. Compared to DC, PDAC patients were more likely to be margin-positive (25% vs 19%; p<0.001), lymph node (LN)-positive (69% vs 55%; p<0.001), and receive adjuvant therapy (71% vs 57%; p<0.001). Of DC patients treated with adjuvant therapy, 57% got gemcitabine alone and 18% got gemcitabine/cisplatin. PDAC was associated with worse median-DSS (22mos) compared to DC (40mos; p<0.001; Figure 1A), which persisted on multivariable analysis (HR, 1.54; 95%CI, 1.19-2.00; p=0.001). LN-involvement was the only factor independently associated with decreased DSS for both PDAC and DC. PDAC/LN-negative patients had similar DSS as DC/LN-positive (p=0.74; Figure 1B). Adjuvant therapy (chemotherapy+/radiation) was associated with improved median-DSS for PDAC/LN-positive patients (21 vs 13mos; p=0.001) but not for DC patients (38 vs 40mos; p=0.62), regardless of LN status.

Conclusion: Pancreatic ductal adenocarcinoma and distal cholangiocarcinoma are distinct entities. Distal cholangiocarcinoma has a favorable prognosis compared to pancreatic ductal adenocarcinoma, yet current adjuvant therapy regimens are only associated with improved survival in pancreas cancer, not distal cholangiocarcinoma. Thus, treatment paradigms utilized for pancreatic ductal adenocarcinoma should not be extrapolated to distal cholangiocarcinoma, despite similar operative approaches, and novel therapies for distal cholangiocarcinoma should be explored.
P005 IMPACT OF PERIOPERATIVE CHANGES IN CA19-9 LEVELS IN PATIENTS WITH RESECTABLE AND BORDERLINE RESECTABLE Pancreatic Cancer

David Wittman, Mohammed Aldakkak, Eunice P Rajamanickam, Kathleen K Christians, MD, Murad Aburajab, MD, Ben George, MD, Paul S Ritch, MD, William A Hall, MD, Beth Erickson, MD, Douglas B Evans, MD, Susan Tsai, MD, MHS; Medical College of Wisconsin

Introduction/Background: Changes in CA19-9 values during treatment may have important prognostic implications. We examined the impact of perioperative changes in CA19-9 values in patients with pancreatic cancer (PC).

Methods: CA19-9 values were classified as normal or elevated based on a cutoff of 35 U/mL. Patients with localized PC who received neoadjuvant therapy were grouped by the change in CA19-9 status from preop to postop: normal/normal, normal/elevated, elevated/normal, or elevated/elevated.

Results: Of the 205 patients, 89 (44%) were normal/normal, 4 (2%) were normal/elevated, 58 (28%) were elevated/normal, and 54 (26%) were elevated/elevated. Median postop CA19-9 for normal/normal, normal/elevated, elevated/normal, elevated/elevated groups were 10, 68, 19, and 67, respectively. Median overall survival (OS) was 39 months; 48, not reached, 43, and 20 months in the normal/normal, normal/elevated, elevated/normal, and elevated/elevated groups, respectively (p<0.001). In an adjusted hazards model, patients with elevated/elevated CA19-9 had a 2.82-fold (95%CI:1.68-4.73) increased risk of death as compared to patients with normal/normal CA19-9.

Discussion/Conclusions: Following neoadjuvant therapy and surgery, the postoperative CA19-9 value is highly prognostic in patients with localized PC. If the preop CA19-9 is normal, it will likely remain normal postop. In contrast, only 50% of patients with elevated preop CA19-9 will normalize after surgery – valuable information for investigators exploring alternative treatment sequencing for PC.
Background: Radiation therapy (RT) for pancreatic ductal adenocarcinoma (PDAC) is optimally suited for patients harboring a molecular predisposition for local tumor progression. Molecular classification in PDAC is challenging due to limited malignant tissue from FNA specimens. Radiomic metrics from diagnostic imaging that correlate with PDAC molecular profiles could help to identify those patients most likely to benefit from RT.

Methods: Patients with PDAC enrolled on a prospective phase II molecular profiling study with pretreatment MRI and CT scans suitable for radiomics were analyzed. Patients were considered eligible with resectable or borderline resectable PDAC, at least 18 years of age, ECOG performance status of 2 or less, with acceptable laboratory values per study. Tumor radiomic metrics measured included: percentage of T1 enhancement, peak height, time to peak contrast enhancement, uptake rate, apparent diffusion coefficient (ADC), and CT number. Tumor molecular markers measured by immunohistochemistry (IHC) included: Ribonucleotide reductase M1 (RRM1), Equilibrative nucleoside transporter (ENT1), thymidylate synthase (TYMS), topoisomerase1 (TOPO1), excision repair cross complementation group 1 (ERCC1), secreted protein acidic and rich in cysteine (SPARC), and deleted in pancreatic cancer locus 4 (DPC4/SMAD4). Percentage staining was measured on FNA pre-operatively and on surgical specimens in those who went on to resection after neoadjuvant therapy. Radiomic and molecular profiling metrics from both FNA and surgical specimens were correlated using a Spearman’s correlation (Rs).

Results: 30 patients met inclusion criteria. Percentage of T1 enhancement was found to correlate with % TOPO1 staining on FNA (Rs = 0.399, p = 0.029). Peak height was negatively associated with the % ERCC1 staining in the surgical specimen (Rs = -0.441, p = 0.04). Time to peak contrast enhancement was negatively associated with the %TYMS staining on the surgical specimen (Rs = -0.431, p = 0.04). Uptake rate was negatively associated with the %ENT1 from specimen FNA (Rs = -0.369, p = 0.045). The uptake rate also correlated with %TOPO1 staining from specimen FNA (Rs = 0.417, p = 0.022). The ADC value was found to correlate with the %RRM1 from the surgical specimen (Rs = 0.440, p = 0.036). The %SPARC staining on FNA was found to correlate with CT number (Rs = 0.656, p = 0.002). A statistical trend was observed between % DPC4/SMAD4 staining on FNA and percent of T1 enhancement (Rs = 0.371, p = 0.089).

Conclusions: MRI and CT radiomic metrics correlate with the presence of certain PDAC molecular characteristics. If validated, these radiomic metrics could provide a minimally invasive technique to aid in selecting an optimal treatment strategy for patients with PDAC.
Background: Gemcitabine-taxane combination chemotherapy has demonstrated a survival benefit in metastatic pancreatic cancer (PC). We present our experience with gemcitabine/docetaxel (gem/tax) based adjuvant treatment (Rx) following curative intent surgery.

Methods: Patients with upfront resectable PC from January 1, 2010 to December 31, 2015 were identified from our institutional database and tumor registry. We included resected patients who received gem/tax as initial Rx administered exclusively at our institution with or without chemoradiation (CRTx). Patients were excluded if they died or recurred prior to Rx or received neoadjuvant Rx. Survival was estimated by Kaplan-Meier methods and prognostic factors identified by Cox regression.

Results: Of 185 eligible patients, 58 met study criteria. Characteristics included: median age of diagnosis 64.9 years, female gender 56.9%, Whipple procedure 69% and R1 resection in 55.2%. Tumour characteristics included: median size 28.0mm, poor differentiation 53.5% and AJCC stage 2A/2B 27.6%/67.2%. Patients completing ≥ 80% of 24 week Rx was 89.7% (n = 52). Of those patients, 71.2% received post gem/tax CRTx. With a 51.2 month median follow-up (95%CI: 37.1-55.7), median disease-free survival (DFS) and overall survival (OS) were 35 months (95%CI: 20.7-NR) and 52.3 months (95%CI: 27.4-NR), respectively. Five year OS was 49.5% (95%CI: 33.7-63.4). Patients receiving CRTx (n = 37) had a superior OS compared to patients who only completed gem/tax Rx (n = 15)(61.5 vs. 26.7 months, p = 0.04). Prognostic variables impacting OS on multivariate analysis (HR, 95%CI) included: margin status (4.55, 1.46-14.2, p = 0.01), AJCC stage (10.9, 2.46-47.9, p = 0.002) and administration of CRTx (0.08, 0.03-0.24, p < 0.000). Variables impacting DFS included: AJCC stage (3.29, 1.15-9.41, p = 0.03), tumour size (2.59, 1.11-6.04, p = 0.03) and administration of CRTx (0.23, 0.09-0.56, p = 0.001).

Conclusions: In this select cohort of resected PC patients with adverse pathologic features, adjuvant gem/tax with or without CRTx is feasible with favorable DFS and OS. These findings support further prospective studies of gem/taxane-based adjuvant Rx in PC.
P008 THE EFFICACY OF PERIOPERATIVE FLUID RESTRICTION FOR POSTOPERATIVE COMPLICATIONS AFTER PANCREATODUODENECTOMY Atsushi Shimizu, MD, PhD, Manabu Kawai, MD, PhD, Seiko Hirono, MD, PhD, Ken-ichi Okada, Motoki Miyazawa, MD, PhD, Yuji Kitahata, MD, PhD, Hiroki Yamaue, MD, PhD; Second Department of Surgery, Wakayama Medical University, School of Medicine, Japan

Introduction/Background: Overload of intraoperative fluid had been often caused to subclinical edema followed by decreased tissue oxygenation. It results in increasing the postoperative complications including ileus and anastomosis leakage. Recently, Goal-directed fluid therapy (GDT) has been developed, which may restrict and optimize intraoperative fluid volume. The aim of this study was to evaluate how GDT affects postoperative complication after pancreateoduodenectomy (PD).

Methods: GDT has been introduced since 2013 at Wakayama Medical University. Two hundred patients underwent PD were enrolled. One hundred patients were classified into liberal fluid management (LFM) group and 100 patients were classified into GDT group. In this study, the following parameters to evaluate the edema of tissue were used; subtraction of thickness of jejunal wall at the pancreatojejunostomy (PJ), ventral wall and body trunk, which were measured by preoperative and postoperative (POD4) CT.

Results: Intraoperative fluid volume was significantly reduced in GDT group compared to LFM group. There was no difference of the rate of overall complications between both groups (25% v.s. 35%; P=0.123), however, the rate of developing postoperative pancreatic fistulae (POPF) gradeB/C was significantly low in GDT group (7% v.s.16%, P=0.046). The difference of thickness of jejunal wall and body trunk were significantly thinner in GDT group than that in LFM group (+1.8mm v.s. +2.5mm, P=0.008; +0.6mm v.s. +7.8mm, P=.001). The thickness of jejunal wall at PJ was marginally larger in patients with POPF grade B/C than those without it (+3.3mm vs+2.0mm; P=0.101), and the thickness of body trunk was significantly larger in patients with any complication than those without it (+7.5mm vs+1.9mm; P=0.013), indicating that patients with postoperative tissue edema might have the higher risk to develop Grade B/C POPF and any complications.

Conclusion: The restricted fluid management by GDT may reduce the complications including POPF by preventing the postoperative tissue edema.
P009 NATIONWIDE PROSPECTIVE AUDIT OF PANCREATIC SURGERY: DESIGN, ACCURACY, AND OUTCOMES OF THE DUTCH PANCREATIC CANCER AUDIT

L B van Rijssen, MD, B Groot Koerkamp, MD, PhD, M J Zwart, BSc, B A Bonsing, MD, PhD, K Bosscha, MD, PhD, R M van Dam, MD, PhD, C H van Eijck, MD, PhD, M F Gerhards, MD, PhD, E van der Harst, MD, PhD, I H de Hingh, MD, PhD, K P de Jong, MD, PhD, G Kazemier, MD, PhD, J Klaase, MD, PhD, C J van Laarhoven, MD, PhD, I Q Molenaar, MD, PhD, G A Patijn, MD, PhD, C G Rupert, MD, H C van Santvoort, MD, PhD, J J Scheepers, MD, PhD, G P van der Schelling, MD, PhD, G A Patijn, MD, PhD, O R Busch, MD, PhD, M G Besselink, MD, PhD, Academic Medical Center, Amsterdam, Erasmus Medical Center, Rotterdam, Leiden University Medical Center, Leiden, Jeroen Bosch Hospital, ’s Hertogenbosch, Maastricht University Medical Center, Maastricht, Onze Lieve Vrouwe Gasthuis, Amsterdam, Maasstad Hospital, Rotterdam, Catharina Hospital, Eindhoven, University Medical Center Groningen, Groningen, VU University Medical Center, Amsterdam, Medisch Spectrum Twente, Enschede, Radboud University Medical Center, University Medical Center Utrecht, Utrecht, Isala Clinics, Zwolle, Tjongerschans Hospital, Heerenveen, St Antonius Hospital, Nieuwegein, Reinier de Graaf Gasthuis, Delft, Amphia Hospital, Breda

Introduction/background: Auditing is an important tool to identify practice variation and ‘best practices’. The Dutch Pancreatic Cancer Audit is mandatory in all 18 Dutch centers for pancreatic surgery. Our aim was to present the design and outcomes of a prospective nationwide audit on pancreatic surgery, including outcomes of quality monitoring.

Methods: Performance indicators and case-mix factors were identified by a PubMed search for randomized controlled trials (RCT’s) and large series in pancreatic surgery. In addition, data dictionaries of two national audits, three major pancreatic centers, and the Dutch national cancer registry were evaluated. Morbidity, mortality, and length of stay were analyzed of all pancreatic resections registered during the first two audit years. Case ascertainment was cross-checked with the Dutch healthcare inspectorate and key-variables validated in all centers.

Results: Sixteen RCT’s and three large series were found. Sixteen indicators and 20 case-mix factors were included in the audit. During 2014-2015, 1,785 pancreatic resections were registered including 1,345 pancreatoduodenectomies. Diagnosis was pancreatic adenocarcinoma in 39%, and periampullary adenocarcinoma in 25% of patients. Overall in-hospital mortality was 3.6% (and following pancreatoduodenectomy 4.1%). Clavien-Dindo grade ≥III morbidity was 29.9% and median (IQR) length of stay 12 (9-18) days. In total 99.4% of >75,000 variables validated were consistent with the medical charts.

Discussion/conclusion: The Dutch Pancreatic Cancer Audit, with high quality data, reports good outcomes of pancreatic surgery on a national level. The audit facilitates nationwide and international comparison of outcomes and identification of ‘best practices’.
Background: The utility of technical strategies to prevent clinically relevant postoperative pancreatic fistula (CR-POPF) following pancreateoduodenectomy (PD) may vary by the circumstances of the anastomosis. The Fistula Risk Score (FRS) identifies a distinct high-risk cohort (FRS 7-10) that demonstrates substantially worse clinical outcomes. The value of various fistula mitigation strategies in these particular high-stakes cases has not been previously explored.

Methods: This multinational study included 5,323 PDs performed by 62 surgeons at 17 institutions. Mitigation strategies, including both technique related (i.e., pancreatogastrostomy reconstruction; dunking; tissue patches) and the use of adjuvant strategies (i.e., intraperitoneal drains; anastomotic stents; prophylactic octreotide; tissue sealants), were evaluated using multivariable regression analysis and propensity score matching.

Results: A total of 522 (9.8%) PDs met high-risk FRS criteria, with an observed CR-POPF rate of 29.1%. Pancreatogastrostomy, prophylactic octreotide and absence of externalized stents were each associated with an increased rate of CR-POPF (all p<0.001). In a multivariable model accounting for patient, surgeon and institutional characteristics, the use of external stents (internal: OR 2.94, 95% CI 1.29-6.72; none: OR 2.07, 95% CI 1.01-4.29) and the omission of prophylactic octreotide (OR 0.53, 95% CI 0.33-0.85) were independently associated with decreased CR-POPF occurrence. In the propensity score-matched cohort, an "optimal" mitigation strategy (i.e., pancreatojejunostomy, externalized stent, and no prophylactic octreotide) was associated with a reduced rate of CR-POPF (13.2% vs. 29.3%, p=0.002).

Conclusions: The scenarios identified by the high-risk FRS zone represent challenging anastomoses associated with markedly elevated rates of fistula. Pancreatojejunostomy, in conjunction with an externalized stent, and omission of prophylactic octreotide provides optimal outcomes.
Introduction: Chronic inflammation, such as in chronic pancreatitis, is a risk factor for pancreatic cancer. Macrophages modulate the migration of PDAC cells in co-cultures. This study aimed to assess the possibilities of modifying the migration of PDAC through macrophages.

Methods: The migration rate of fluorescein stained pancreatic cancer cells (MiaPaCa-2) in Matrigel was assessed when cultured alone and with M-CSF (50ng/ml) differentiated macrophages isolated from healthy human subjects. We supplemented the cell cultures with either anti-inflammatory IL10 (25ng/ml) or JAK/STAT inhibitor P6 (500nM). We used flow cytometry to measure the intracellular activation of STAT1, 3, 5, and AKT and NFkB in macrophages.

Results: The migration rate of MiaPaCa-2 increased from 10.1μm/h to 13.3μm/h (p<0.001) in co-cultures with macrophages. JAK/STAT-inhibitor P6 reversed the macrophage-induced increase in the MiaPaCa-2 migration rate. Conversely, the migration of MiaPaCa-2 increased with IL10 in macrophage co-cultures further to 17.8μm/h (p<0.001). P6 and IL10 did not change the migration rate in MiaPaCa-2 cell cultures without macrophages. Co-culture increased STAT1, STAT3, STAT5, AKT, and NFkB activation in macrophages. JAK/STAT inhibitor P6 reduced STAT1, STAT3, STAT5, AKT, and NFkB in macrophages when co-cultured with pancreatic cancer cells. IL10 reduced NFkB activation in co-cultures.

Conclusion: Macrophages increase PDAC cell migration in co-cultures. The migration rate of PDAC cells further increases with IL-10 through macrophages. JAK/STAT inhibitor P6 reverses the macrophage-induced increase of PDAC migration.
P014 TIME-DEPENDENT IMPACT OF IRREVERSIBLE ELECTROPORATION ON PANCREAS, LIVER, BLOOD VESSELS AND NERVES: A SYSTEMATIC REVIEW OF EXPERIMENTAL STUDIES. E van Veldhuisen, BSc1, J A Vogel, MD1, P Agnass, MSc1, J Crezee, MSc, PhD1, F Dijk, MD, PhD1, J Verheij, MD, PhD1, T M van Gulik, MD, prof1, M M Meijerink, MD, PhD2, L G Vroomen, MD2, K P van Lienden, MD, PhD1, M G Besselink, MD, MSc, PhD1; 1Academic Medical Centre Amsterdam, 2VU University Medical Centre Amsterdam

Introduction: Irreversible electroporation (IRE) is a novel ablation technique for treatment of unresectable cancer. Both in experimental and clinical studies, a waiting time between ablation and tissue analysis to allow for cell death through apoptosis, is often reported. However, the dynamics of IRE effect over time remain unknown. Therefore, this study aims to summarize these effects in relation to time between treatment and histological evaluation.

Methods: A systematic search was performed in Pubmed, Embase and the Cochrane Library for original articles using IRE on pancreas, liver or surrounding structures in animal or human studies. Data on pathology and time between IRE and histological evaluation were extracted.

Results: Thirty-six articles were included, regarding IRE in liver (n=24), pancreas (n=4), blood vessels (n=4) and nerves (n=4) in over 440 animals. No eligible human studies were found. In liver and pancreas, the first signs of apoptosis and haemorrhage were observed 1-2 hours after treatment, and remained visible until 24 hours in liver and 7 days in pancreas after which the damaged tissue was replaced by fibrosis. In blood vessels, the tunica media, intima and lumen remained unchanged for 24 hours. After 7 days, inflammation, fibrosis and loss of smooth muscle cells were demonstrated, which persisted 35 days. In nerves, the median time until demonstrable histological changes was 7 days.

Conclusion: Tissue damage after IRE is a dynamic process with remarkable differences between tissues in animals. Whereas pancreas and liver showed the first damages after 1-2 hours, this may take 24 hours in blood vessels and even 7 days in nerves.
Background: Multimodality therapy is considered standard of care for pancreatic cancer patients with loco-regional disease. This currently results in median survivals of 17-26 months on average in the fortunate patients eligible for surgery, illustrating the need for novel therapeutic strategies. The epithelial to mesenchymal transition (EMT) is a critical biological process by which epithelial cells lose adhesive properties, and obtain migratory and invasive features to be converted in mesenchymal cells. This transformation typically takes places during early embryonic morphogenesis, and wound healing. Nonetheless, EMT has also been noted during carcinogenesis, in particular in association with tumor cell invasion leading to metastatic dissemination. The aim of the present study was to evaluate the clinical significance of EMT-related biomarkers in pancreatic cancer.

Methods: Immunohistochemistry was used to evaluate the expression of integrin αvβ6, epithelial cell adhesion molecule (EpCAM), epithelial growth factor receptor (EGFR), hepatocyte growth factor receptor (cMET), human epidermal growth factor receptor (HER2), vascular endothelial growth factor receptor 2 (VEGFR2), and vimentin expression in surgical specimens from 137 pancreatic adenocarcinoma. For the purpose of this study immunohistochemical staining was considered positive if > 10% of the tumor cells expressed a medium or dark staining pattern. Survival analysis for overall (OS) and disease-free (DFS) survival was performed using the Kaplan-Meier method.

Results: Integrin αvβ6, EpCAM, EGFR, cMET, HER2, VEGFR2, and vimentin expression was observed in 88%, 59%, 69%, 88%, 80%, 72% and 60% of pancreatic cancer patients, respectively. Increased EGFR expression was associated with integrin αvβ6 (p=0.006), vimentin (p<0.001), and EpCAM (p=0.004) expression. EpCAM was correlated (p=0.047) with VEGFR2 expression. Patients with integrin αvβ6 (median OS, 15 vs. 35 months; log-rank p=0.004), cMET (median OS, 15 vs. 41 months; log-rank p=0.001), and loss of EpCAM (median OS, 12 vs 20 months; log-rank p=0.001) expression had a significant shorter OS. Integrin αvβ6 (median DFS, 12 vs. 20 months; log-rank p=0.038), cMET (median DFS, 12 vs 36 months; log-rank p=0.002), and loss of EpCAM (median DFS, 9 vs. 16 months; log-rank p=0.002) expression were also predictors for decreased DFS. EGFR, HER2, and VEGFR2 expression were not associated with OS or DFS.

Conclusions: Our results indicate that expression of integrin αvβ6, cMET and loss of EpCAM expression are significant prognostic biomarkers in pancreatic cancer. Further research must show if these biomarkers may have a role as therapeutic target.

Figure. Kaplan-Meijer survival curves for integrin αvβ6, cMET and EpCAM expression in pancreatic adenocarcinoma patients.
ARE WE WRONGFULLY TREATING OR UNDER-TREATING PERIAMPUTARY TUMORS WITH NEOADJUVANT THERAPY? A Lambour, MD, M Hill, R Louie, R Barth, K Smith; Dartmouth Hitchcock Medical Center

Background: With the growing acceptance of neoadjuvant therapy for localized pancreatic ductal adenocarcinoma (PDAC), patients with a non-pancreatic periampullary adenocarcinoma may be treated with neoadjuvant therapy when up-front pancreaticoduodenectomy (PD) would be preferred. Likewise, misdiagnosis can also impact opportunities for neoadjuvant treatment. We sought to determine the incidence of a change in diagnosis that impacted treatment sequencing for periampullary malignancies.

Methods: This is a single institution retrospective cohort analysis of all periampullary tumors from 2009-2016. Periampullary tumors were defined as a mass < 2 cm from the ampulla or located adjacent to the mid-distal common bile duct. Patients without a preoperative tissue diagnosis and all aborted cases were excluded. All patients underwent multidisciplinary review of the cytopathologic diagnosis, CT imaging, and endoscopic findings. Patients with a suspected diagnosis of PDAC were considered for neoadjuvant therapy protocols, while patients with non-PDAC periampullary tumors underwent up-front surgical intervention. The primary outcome was a "treatment significant" change from PDAC to non-pancreatic periampullary adenocarcinoma or non-pancreatic to PDAC based on the final surgical pathology.

Results: A total of 125 periampullary tumors met inclusion criteria. Of these, 11 patients (8.8%) had a change in diagnosis based on the final surgical pathology. Of these 11, 4 patients (3.2%) had a "treatment significant" change. In all 4 cases surgical pathology found PDAC in a presumed non-pancreatic periampullary malignancy. There were no changes from pancreatic to non-pancreatic cancer. The most common "treatment significant" change was suspected ampullary adenocarcinoma to PDAC. Breakdown of the "non-treatment significant" changes demonstrated 1 cholangiocarcinoma to duodenal, 1 ampullary to duodenal, 1 duodenal to ampullary, 1 cholangiocarcinoma to ampullary, and 3 ampullary to cholangiocarcinomas.

Conclusion: With the increasing role of neoadjuvant therapy in the treatment of localized PDAC, an accurate preoperative diagnosis of periampullary tumors is critical. In our review, only 3% of patients had a change in diagnosis that would influence the decision to recommend neoadjuvant therapy. This highlights the importance of a multidisciplinary approach to the diagnostic accuracy of periampullary tumors.
OVER-UTILIZATION OF ROUTINE SCREENING IN PANCREAS CANCER: AN OPPORTUNITY TO MINIMIZE COST AND UNNECESSARY TESTING

A V Fisher, MD, J R Schumacher, MS, PhD, S Fernandes-Taylor, PhD, J A Havlena, MS, Y Shan, MS, D C Jackson, PhD, E R Winslow, MD, S M Weber, MD, D E Abbott, MD; University of Wisconsin

Introduction: Pancreas cancer is the 3rd leading cause of cancer death in the US with only 8% five-year survival. Given this poor prognosis, performance of routine preventative health screening tests should be carefully scrutinized. We sought to define the frequency and cost associated with routine screening after the diagnosis of pancreas cancer.

Methods: The MarketScan® database (years 2012-14) was used to identify patients with new pancreas cancer diagnoses. Patients were followed for a minimum of one year, with a one year retrospective evaluation of comorbidities. Subsequent to diagnosis, we defined the frequency of several routine screening tests including colonoscopy, mammography, PSA, and cholesterol measurements using CPT and ICD-9 codes. Procedures were excluded if performed for diagnostic or therapeutic purposes. Total cost (payment) and patient out-of-pocket costs were determined.

Results: Of 10,433 patients with a new pancreas cancer diagnoses, 1,788 patients (17.1%) underwent at least one of four screening tests. 591 (5.7%) patients underwent colonoscopy, 168 (1.6%) mammography, 904 (8.7%) had a PSA lab test, and 395 (3.8%) had cholesterol screening. 1,311 patients (12.6%) underwent potentially curative resection, yet these patients accounted for only 16% of the screening test volume. The remaining 84% of screening tests occurred in unresected patients. Median costs for screening tests were $921/colonoscopy, $96/mammogram, $19/PSA, and $8/cholesterol test. Average out-of-pocket costs were under $5 for cholesterol, PSA, and mammography, but were $57 for colonoscopy. The total cost of screening in this cohort was $803,298, or $449 per screened patient.

Conclusion: In this cohort of patients with pancreas cancer, screening tests were common and expensive. When considering limited life expectancy after the diagnosis of pancreas cancer, it is difficult to recommend the use of routine screening tests for other disease processes, especially given their debated cost-effectiveness in healthy individuals. For malignancies with poor long-term survival, the health care system should be refined to eliminate this wasteful screening.
Introduction: Pretherapy serum neutrophil to lymphocyte ratio (NLR) and platelet to lymphocyte ratio (PLR) have both been identified as prognostic in pancreatic ductal adenocarcinoma (PDAC). Our aim is to identify significant prognosticators in PDAC patients at our institution to better delineate the impact of NLR and PLR on prognosis.

Methods: Data was collected retrospectively on patients who underwent resection for PDAC diagnosed between 2004-2014 using a patient registry database developed under approval of UHCMC IRB. Cox regression model was then used to investigate factors with independent prognostic value. Survival analysis was performed using the Kaplan-Meier method. Demographic, clinical, and pathologic parameters were analyzed, as well as published cutoffs for NLR (2.1, 3.1) and PLR (200).

Results: 178 patients were analyzed with a median overall survival (OS) of 17.75 months (mos). Factors that were identified as being independently predictive of overall survival (OS) included receipt of adjuvant chemotherapy (CT) or chemoradiation (CRT) (OS CT 20.9 mos, OS CRT 20.4 mos, vs. 9.2 mos no AC, p<.05), absence of angiolymphatic invasion (OS 23.8 mos vs. 13.2 mos, p<.05) and no reoperation within 30 days after pancreatectomy (OS 18.8 mos without reoperation vs. 4.8 mos with reoperation, p<.05). NLR ≥ 2.1 (OS 16.4 mos vs. 22.6 mos, p=0.15), NLR ≥ 3.1 (OS 18.2 mos vs. 16.9 mos, p=0.64), or PLR ≥ 200 (OS 17.0 vs. 18.0, p=0.87) were not independently prognostic. Survival curves for NLR and PLR overlap (Figure 1).

Conclusions: Although NLR and PLR have shown to influence survival in PDAC in previous studies, data from our institution demonstrate that neither are independent predictors of survival.

Figure 1: Survival analysis was performed using the Kaplan-Meier method. Patients who underwent adjuvant chemotherapy or chemoradiation (A), had pathologic angiolymphatic invasion (B), or underwent reoperation had a difference in survival (C). Patients who had a pretherapy NLR>2.1 (D), NLR>3.1 (E), and PLR>200 (F) had no difference in survival.
Background: Ki-67 is an established prognostic marker for recurrence after resection of pancreatic neuroendocrine tumors (PanNETs), which groups tumors into 3-categories of low, intermediate, and high grade (<3%, 3-20%, and >20%). Given that most resected PanNETs are <3%, our aim was to further stratify this group to more accurately predict recurrence of disease.

Methods: Ki-67 index was re-reviewed and scored by pathologists blinded to all other clinicopathologic variables using tissue microarray blocks made in triplicate for patients who underwent curative-intent resection of non-metastatic PanNETs at a single institution from 2000-2013. Primary outcome was recurrence-free survival (RFS).

Results: Of 113 PanNETs resected, 83 had tissue available for analysis. Ki-67 was <3% in 72(87%), 3-20% in 11(13%), and >20% in 0 tumors. All tumors were well-differentiated. Considering only <3%, tumors were further stratified by Ki-67 into A:<1%(n=43), B:1-1.99%(n=23), and C:2-2.99%(n=6). Compared to group A, groups B and C more frequently had advanced T-stage tumors (T3: 44 and 67% vs 12%;p=0.003) and lymphovascular invasion (50 and 83% vs 23%;p=0.007). Group B and C had a similar 1- and 3-yr RFS, both less than group A (Figure 1A). After combining groups B and C, a Ki-67 of 1-2.99% was associated with decreased RFS compared to group A(<1%) (Figure 1B). This persisted on multivariable analysis (HR:10.3;95%CI:1.3-83.2;p=0.03), controlling for tumor size>2cm, margin-positivity, LN-involvement, and advanced T-stage.

Conclusion: PanNETs with a Ki-67 of 1-2.99% have distinct biologic behavior and earlier recurrence of disease compared to those <1%. This new stratification scheme, if externally validated, should be incorporated in future grading systems.
Background: Management of solitary mucinous cystic lesions of the pancreas (MCLs) relies on correct differentiation between branch-duct intraductal papillary mucinous neoplasm (BD-IPMN) and mucinous cystic neoplasm (MCN). Current international consensus guidelines recommend resection for MCN, whereas unifocal BD-IPMN may be followed in the absence of worrisome features/high-risk stigmata. We hypothesized that preoperative differentiation of solitary MCLs is suboptimal, and that all solitary MCLs should be treated similarly.

Methods: A retrospective review of an institutional database (2003-2016) identified 711 patients who underwent resection for pancreatic cyst. Only lesions that met cytological and/or biochemical criteria for diagnosis of MCLs were included. MCN were defined by presence of ovarian stroma on pathology. Patients with formal preoperative diagnosis of BD-IPMN (multifocality, GNAS mutation) were excluded.

Results: 180 solitary MCLs were identified on preoperative imaging (mean age 54 years, 24% men). On surgical pathology, 108 were MCN and 72 BD-IPMN. There was no difference in invasive rate (7/108=6.5% MCN vs. 4/72=5.6% BD-IPMN, p≈1). Pancreatic ductal connectivity was reported on imaging/endoscopy in 10/108 (9%) MCN and 22/72 (31%) BD-IPMN, representing a 67% accuracy in differentiating MCN from BD-IPMN. On multivariate analysis, typical risk factors failed to predict invasiveness in either MCN or BD-IPMN. When all undifferentiated solitary MCLs were analyzed together, older age (p=0.03) and cyst size (p=0.04) were associated with increased invasive rate in multivariate analysis.

Conclusion: Unreliable differentiation and limited ability to predict invasiveness make solitary MCLs clinically challenging. With similar invasive rates, MCN and unifocal BD-IPMN should be merged into one new entity for management, the undifferentiated solitary mucinous cystic lesion (US-MCLs).
Introduction: Due to introduction of effective neoadjuvant therapy for patients with pancreas cancer, more complex and aggressive operations involving resection of surrounding vasculature are being performed. This result in complicated post-operative CT appearance of vasculature, which in addition to high rate of recurrence makes interpretation of postoperative imaging difficult. The aim of the study was to identify patterns of postoperative appearance of portal vein-superior mesenteric vein complex (PV-SMV).

Methods: A retrospective study was conducted on patients undergoing pancreaticoduodenectomy (PD) with PV-SMV resection and reconstruction (PVR) between January 2004 and December 2014 at the Johns Hopkins Hospital. Clinicopathological data were collected from a prospectively maintained database, and operative notes were reviewed to identify technique of PVR. Postoperative CT scans were reviewed to identify patterns of venous and perivenous features.

Results: The mean age of the 70 patients included in the study was 63.0 ± 12.2 years and 37 (52.9%) were males. The median time between surgery and postoperative scan was 10 days (IQR: 7-25). Tangential resection with PVR via primary closure or use of a patch was performed in 37 (52.9%) patients while the rest underwent segmental resection with PVR via an end-to-end anastomosis or use of a graft. Postoperative patterns of PV-SMV included concentric narrowing (N=40, 57.1%), eccentric narrowing (N=19, 27.1%) or partial venous thrombosis (N=7, 10.0%). Perivenous features observed included perivenous fluid collection and induration (N=57, 81.4%) and mass-like soft tissue thickening (N=13, 18.6%). Long-term follow up was available on 44 (62.9%) patients of which 28 (63.6%) demonstrated no recurrence of disease.

Conclusion: This is a novel study that identified and categorized postoperative features of PV-SMV after PD with PVR. These features overlap with those of disease recurrence and their better understanding can results in more accurate interpretation of postoperative imaging.
P022 PREDICTIVE MODELLING OF THE HISTOLOGY OF CYSTIC PANCREATIC NEOPLASMS Naveed A Pasha, MD, Zheyu Wang, PhD, Ammar A Javed, MD, Vishnu Prasath, BS, John L Cameron, MD, Matthew J Weiss, MD, Martin A Makary, MD, MPH, Anne M Lennon, MD, Christopher L Wolfgang, MD, PhD, Harold Lehmann, MD, PhD, Jin He, MD, PhD; Johns Hopkins

Introduction: Patients with cystic pancreatic neoplasms may display malignant potential and need surgical resection. Non-invasive assessment of these neoplasms is guided by the Fukuoka consensus guidelines but remains dependant on expert opinion. The goal of this study was to harness demographic and radiological features in a statistical algorithm to develop a simple tool to correlate the histopathology of cystic pancreatic lesions in order to aid the selection of surgical candidates.

Methods: A prospectively maintained institutional database was used to identify patients who underwent resection of pancreatic cystic neoplasms between 1990 and 2015. Clinicopathological and radiological data were obtained on patients with Intraductal Papillary Mucinous Neoplasm (IPMN), Mucinous Cystic Neoplasm (MCN) and Serous Cystadenoma (SCN). A model to predict the type of cystic neoplasms was developed using a statistical tree based algorithm. The performance of the model was assessed using a receiver operating curve surface and volume.

Results: A total of 711 patients with 980 images comprising of 650 CTs, 227 EUSs and 103 MRIs were identified. The final histopathological diagnosis was IPMN, SCN and MCN in 421 (59.3%), 219 (30.8%) and 71 (9.99%) patients respectively. The mean age was 64.1 ± 13.6 years, 59% were female and 82% were white.

The predictive model correctly classified SCNs, IPMNs and MCNs in 77.5 % (95% confidence interval: 54.5% - 78.5%) of all cases. Of the SCNs, 36.2% were misclassified as IPMNs or MCNs. 15.9% of non-SCN cases were misclassified as SCNs.

Conclusion: The predictive model enhances the utility of the Fukuoka guidelines by offering a fairly accurate and simplified means of predicting the histological subtype of cystic pancreatic neoplasms.
P023 RISK OF IPMNS, CANCER AND PROGRESSION OF PANCREATIC FINDINGS IN A POPULATION OF INDIVIDUAL AT RISK FOR PANCREAS CANCER WHO UNDERWENT SURVEILLANCE

Ann Morgell, MD\textsuperscript{1}, Saga Persson, MD\textsuperscript{2}, Urban Arnelo, Md, PhD\textsuperscript{2}, Ralf Segersvärd, MD, PhD\textsuperscript{2}, Christoph Ansorge, MD, PhD\textsuperscript{2}, Matthias Löhr, MD, Prof\textsuperscript{2}, Marco del Chiaro\textsuperscript{2}; \textsuperscript{1}Karolinska University Hospital, \textsuperscript{2}Karolinska Institutet

Introduction: The risk of pancreas cancer (PC) is increased in individuals with a positive family history and in patients with certain genetic syndromes.

Aims: To evaluate the risk of development of pre-cancerous (IPMNs) lesions and PC and assess the risk of progression of premalignant lesions in a population at risk.

Patients & methods: From September 2010 to December 2015, 58 individuals at risk for PC underwent surveillance at our institution. Forty-five (77.6\%) were individuals with a family history of PC, 5 (8.6\%) had a p16 mutation, 3 (5.2\%) BRCA2 mutation, 3 (5.2\%) BRCA1 mutation and 2 (3.4\%) Peutz-Jegher syndrome.

Results: Fifty-eight individuals were included in the study. The median follow-up was 45.7 months. A pancreatic finding was detected in 27 individuals (46.5\%). In 20 (34.5\%) the diagnosis was made during the first investigation. In the remaining 7 individuals, the median time from the beginning of the screening and the diagnosis was 28 months. The incidence of IPMNs was 41.4\% and of PC 5.2\%. In patients with IPMNs found during screening, the 1, 3 and 5 years risk of progression was 0\%, 6.2\% and 37.5\% respectively. Overall 4 patients (6.9\%) required surgery during the study period. All PCs detected were surgically treated.

Conclusion: Our data show that the incidence of IPMNs and PC is increased in this group compared to the general population. The risk of progression of IPMNs and PC increases with time. Screening seems to be effective in detecting lesions at a curable stage.
P024 DISCUSSION AT MULTIDISCIPLINARY PANCREATIC TUMOR BOARD ALTERS THE MANAGEMENT OF LOCALLY ADVANCED/BORDERLINE RESECTABLE PANCREATIC CANCER Christopher W McQuinn¹, Muscarella Peter², Schmidt R Carl¹, Haverick Erica¹, Dillhoff Mary¹, Mark Bloomston³, Lawrence A Shirley¹; ¹The Ohio State University, ²Montefiore Medical Center, ³21st Century Oncology

Background: The increased acceptance of the use of neoadjuvant therapy for patients with locally advanced or borderline resectable (LA/BR) pancreatic adenocarcinoma has led to more complexity in therapeutic decision-making. We sought to determine the effect of discussion at a multidisciplinary tumor board on choice of therapy in this patient type.

Methods: We reviewed all patients presented at our pancreas tumor board from 2011 to 2014. We assessed initial diagnosis, plan prior to discussion, whether the plan was changed and new plan, and whether patients who received neoadjuvant therapy went on to resection.

Results: A total of 379 patients were discussed, with 130 having an initial diagnosis of pancreatic adenocarcinoma. Of these, 51 patients (29.2%) were described as resectable, 65 (50%) as LA/BR, and 14 (20%) as metastatic. Of the patients classified as LA/BR, the initial plan prior to discussion was for neoadjuvant chemotherapy in 70.8%, resection in 23.1%, or other in 6.2%. After discussion, an initial plan for resection was changed in 7 patients (46.7%), while an initial plan for neoadjuvant therapy was changed for 13 patients (34.8%). Recommended changes for patients with an initial plan for resection were most commonly for neoadjuvant therapy (4 patients) or systemic chemotherapy alone (2 patients). Recommended changes for patients with an initial plan of neoadjuvant therapy were for systemic chemotherapy alone in 9 (69.2%) and for surgical exploration in 4 (30.8%). After discussion, 35 patients were recommended for neoadjuvant therapy, with 31 initiating therapy. Of those, 28.6% went onto receive resection. Of the 25 patients who did not proceed with resection, 80% were due to disease progression and 20% were lost to follow-up.

Conclusion: Discussion at a multidisciplinary tumor board has the ability to alter treatment plans for patients with LA/BR pancreatic cancer. For those who were recommended neoadjuvant therapy, most initiated therapy, yet the minority went on to attempted resection. As such, multidisciplinary discussion should be standard-of-care for those patients not initially resectable.
P025 PREDICTIVE VALUE OF SERUM CA19-9 LEVELS AND CT-IMAGING FOR RESECTABILITY OF LOCALLY ADVANCED PANCREATIC CANCER FOLLOWING NEOADJUVANT FOLFIRINOX. E van Veldhuisen, BSc, J A Vogel, MD, O R Busch, MD, prof, K P van Lienden, MD, PhD, J W Wilmink, MD, PhD, H A Marsman, MD, PhD, M G Besselink, MD, MSc, PhD; Academic Medical Centre, Amsterdam

Introduction: Determination of resectability after neoadjuvant FOLFIRINOX is difficult because CT-imaging cannot distinguish accurately between fibrosis and viable tumor. Therefore, predictors of resectability in these patients are of interest. CA19-9 has shown to be a valuable tumor marker in clinical evaluation of patients treated for pancreatic cancer, and may therefore be of use as prognostic factor for resectability in combination with CT-imaging.

Methods: A retrospective analysis was performed for patients with locally advanced pancreatic cancer who were treated with neoadjuvant FOLFIRINOX chemotherapy. Included patients were screened for CA19-9 serum levels pre-and post-neoadjuvant therapy, as well as tumor progression on CT-imaging according to the RECIST-criteria and eligibility for resection during laparoscopic exploration.

Results: Out of 54 patients treated with FOLFIRINOX, 36 patients underwent exploratory laparotomy. Eleven patients (20% of total) underwent resection. All but one of these had decreasing CA19-9 serum levels (median -83%, interquartile range 38%). Resectable patients were RECIST-stable in 7 cases (64%) and showed RECIST-regression in 4 patients (36%).

Conclusion: Patients with decreasing CA19.9 levels following neoadjuvant chemotherapy with FOLFIRINOX have a higher likelihood of resectability. Increasing CA19.9 levels could therefore be a relative contra-indication for surgical exploration in patients with RECIST-stable pancreatic cancer.
Introduction: Treatment of Locally Advanced Pancreatic Cancer (LAPC) remains a clinical challenge. As intra-arterial chemotherapy has become a first-line treatment option for patients with hepatic tumors, there is increasing interest to establish the clinical feasibility of such an approach in patients with LAPC. Herein, we report the early results of a multi-center post-market registry to look at the clinical efficacy of intra-arterial gemcitabine on survival of patients with LAPC.

Methods: Five sites enrolled 18 patients as part of a 100-patient registry using a novel percutaneous double balloon methodology (RenovoCath) to deliver intra-arterial gemcitabine. These 18 patients presented previously with various cancer stages and underwent various treatment regimens prior to registration in this study. Twelve of these 18 patients met the requirements of a previously completed safety study treatment protocol, which entailed two cycles of 4 intra-arterial treatments each of gemcitabine at 1000mg/m² and are reported herein. Patients who demonstrated clinical and CT-imaging evidence of tumor stability went on to a second treatment cycle. Patients with evidence of tumor progression exited the registry. Patients who showed evidence of conversion to resectability went on to surgery. Patients with stable disease following the two ‘induction’ cycles continued on with monthly or bi-monthly intra-arterial treatments until disease progression.

Results: Of the 12 patients meeting the protocol requirements as described above, one patient is currently undergoing cycle one treatment. The 11 patients who completed cycle 1 all underwent repeat CT to assess for tumor response/progression. Two patients had disease progression, discontinued treatment, and exited the registry; two underwent resection and chose to discontinue treatment despite evidence of stable disease; two showed evidence of disease stability and are currently undergoing cycle two treatments. Of the remaining four patients (who have completed cycle 2 treatments), one expired, only one showed disease progression, discontinued treatment, and exited the registry, and two continue to show evidence of disease stability, receiving monthly or bi-monthly maintenance treatments.

Overall, the time to disease progression (death, clinical or CT evidence of progression) for the entire cohort has been 20 months from time of diagnosis. The median survival for the cohort from time of diagnosis has been 22 months.

Conclusion: Localized intra-arterial delivery of gemcitabine using the RenovoCath demonstrates encouraging early results in stabilizing locally advanced pancreatic cancer as both a first and second line therapy.
Background: Surgical outcomes for resected pancreatic cancer (PC) are known to be superior at high volume centers (HVC). However, the impact of adjuvant therapy (Rx) at HVC is less studied. We examined the impact of site of adjuvant Rx administration on our resected patients.

Methods: All patients with PC diagnosed 2003-2014 and resected at HVC were identified. Patients were excluded for neoadjuvant Rx, synchronous cancer, death/lost to follow-up within 3 months or contraindications (e.g. morbidity) to adjuvant Rx. Patients were also excluded if they refused adjuvant treatment or if a community oncologist (CC) was not identified in the medical record or in the western Washington population-based cancer registry. Patient and tumor characteristics were compared in univariate analysis and survival was calculated from date of diagnosis to death or last follow-up. Five year overall survival (OS) was estimated by the Kaplan-Meier method and compared using Cox proportional hazards modeling to evaluate the impact of HVC adjuvant Rx on OS while adjusting for potential confounding factors.

Results: 245 patients were eligible for the study: 139 (57%) treated at HVC, 106 (43%) treated at CC. HVC and CC patients were similar with respect to stage and tumor size, nodal status, resection margins and average distance travelled to HVC. They only differed by age (HVC: 63.1, CC: 68.2 p< 0.01). Median and 5-yr OS was 36 mos and 33%. Median OS for HVC vs CC was 44 mos vs 28 mos (p < 0.01) and 5-yr OS was 38.6% vs 24.8% (p < 0.01). Adjustment for age did not alter our findings.

Conclusions: 1) With respect to adjuvant Rx for resected PC, HVC and CC patients differed with respect to age only. 2) Both median and 5-yr OS were statistically superior at HVC vs CC. 3) Our study supports the use of HVCs for all Rx components for PC treated with curative intent. 4) Ongoing investigation of patterns of care and their impact on OS in PC is warranted.
P028 TARGETABLE DISPARITIES IN THE SURGICAL TREATMENT OF EARLY-_STAGE PANCREATIC CANCER IN KENTUCKY Heather A Frohman, MD¹, Quan Chen, DrPH², Bin Huang, DrPH, MS³, Anh-Thu Le, MD⁴, Sean P Dineen, MD⁴, Jeremiah T Martin, MBBCh, FRCSI⁴, Ching-Wei D Tzeng, MD⁵; ¹University of Kentucky Medical Center, ²Markey Cancer Center, University of Kentucky, ³Kentucky Cancer Registry, University of Kentucky, ⁴Southern Ohio Medical Center, ⁵University of Texas MD Anderson Cancer Center

Introduction: There has been a national failure to operate on more than 50% of patients with resectable pancreatic adenocarcinoma (PDAC). The primary aims of this study were to evaluate surgery rates and identify targetable disparities in resectable PDAC patients in the state of Kentucky.

Patients and Methods: Patients with clinical stage I-II PDAC in the Kentucky Cancer Registry (2004-2013) were included. Multivariate modeling was used to identify factors associated with surgery received and overall survival (OS). An academic hospital (AH) was defined as one of the four main campus hospitals staffed by faculty from either of the two allopathic medical schools in Kentucky.

Results: Of 1,680 in-state patients diagnosed with stage I-II PDAC over the study period, only 849 (50.5%) underwent curative-intent resection. Resection rates did not change over the decade studied (range 44.5-55.7%, p=0.58). Only 45.6% of patients had treatment at an AH. There were no time trends in referral rates to AH. AH were more likely to treat patients with the following traits: Black, Appalachian county, active smoker, uninsured or Medicaid, counties with lower education levels and greater poverty (all p<0.039). Total resections were almost evenly split between AH and non-AH with 53.4% occurring at an AH. However, the resection rate was significantly higher at AH vs. non-AH (59.1% vs. 43.3%, p<0.001).

Variables independently associated with resection were AH (OR 1.64, p<0.001), age (20-49, 50-64, 65-74, vs. 75+ years, OR 5.54, 3.15, 2.54, p=0.001 for each), stage II vs. I (OR 2.11, p<0.001), and residing in less impoverished counties (low vs. very high poverty, OR 1.66, p=0.01). Gender, insurance type, county education level, and Appalachian county were not significantly associated with resection rate. Pre-treatment clinical factors independently associated with improved OS included resection (hazard ratio, HR 0.35, p<0.001), younger age (age 65-74 vs. age 75+, HR 0.77, p=0.001), and early stage (stage I vs. II, HR 0.71, p<0.001).

Conclusions: The most significant disparity influencing resection rates in early stage PDAC in Kentucky is facility type, with AH being 64% more likely to resect patients, even when accounting for differences in patient demographics. Surgical resection remains the most important determinant of OS in stage I-II PDAC. In Kentucky, coordinated statewide efforts to improve regionalization of care to academic hospitals may improve both resection rates and OS for patients with early-stage PDAC.
**Aims:** We used our own criteria for early drain removal after pancreatectomy from around 2013. In this study, we retrospectively verified our criteria to evaluate its efficacy on postoperative management.

**Method:** The consecutive 332 patients who underwent pancreatic surgery at our hospital during recent 3 years were analyzed (Pancreas head resection: 227, Distal pancreatectomy: 105). Our criteria for early drain removal is both amylase level of drainage fluid (dAMY) under 5000 U/I on postoperative day (POD) 1 and dAMY under 3000 U/I on POD 3. If criteria was satisfied, drain was promptly removed on POD 3. ISGPF grade B/C were considered as clinically relevant pancreatic fistula (cPF).

**Results:** cPF was developed in 9.3 percent. The median duration of drainage was 3 days and the median duration of postoperative hospital stays was 11 days. Re-drainage rate after drain removal was 5.1 percent. In case of “within criteria”, negative predictive value (NPV) was 96.9 percent (The rate of patients who did not develop cPF among patients who satisfied our criteria). Re-drainage was required in 2.3 percent of patients after early drain removal. These results indicated efficacy and safeness of our criteria in case of “within criteria”. However, in case of “out of criteria”, false positive rate was 67.6 percent (The rate of patients who did not develop cPF even though they were “out of criteria”). Re-drainage rate was 15.5 percent. To improve these negative results in “out of criteria”, WBC and CRP which were known as inflammatory indicators were analyzed. In cPF developed cases, these indicators were significantly high values on POD 3 (WBC: 11800 vs 9300/μl, CRP: 19.7 vs 10.2 mg/dl). Additionally, CRP on POD 3 demonstrated high diagnostic ability by ROC analysis (AUC: 0.85, Cut-off value: 14.4 mg/dl). Among “out of criteria” cases, if CRP was under 14.4 mg/dl on POD 3, cPF rate was 3.9 percent and re-drainage rate was zero.

**Conclusion:** Our own criteria was useful enough in case of “within criteria”. The additional indicator (CRP < 14.4 mg/dl on POD 3) might decrease false positive and re-drainage in case of “out of criteria”.

---

**P029 THE RETROSPECTIVE VERIFICATION STUDY OF OUR CRITERIA FOR EARLY DRAIN REMOVAL AFTER PANCREATECTOMY** Hisashi Kosaka, MD, PhD, Sohei Satoi, MD, PhD, FACS, Hiroaki Yanagimoto, MD, PhD, Tomohisa Yamamoto, MD, PhD, So Yamaki, MD, Masaya Kotsuka, MD, Satoshi Hirooka, MD, PhD, Taku Michiura, MD, PhD, Kentaro Inoue, MD, PhD, Yoichi Matsui, MD, PhD, Masanori Kon, MD, PhD; Kansai Medical University
Patients with adenocarcinoma of the pancreas have tissue plasminogen activator resistance related to viscoelastic platelet function

Introduction: Platelets have been demonstrated to be integral to immune evasion and cancer metastasis, and are known regulators of fibrinolysis. As pancreatic adenocarcinoma (ACA) is associated with thrombotic events we hypothesize that patients undergoing pancreatic resection will have increased fibrinolysis resistance compared to healthy volunteers and those with non-ACA pathology.

Methods: Patients undergoing pancreatic resection were prospectively enrolled from Dec 2015-November 2016. Blood was collected prior to surgical incision and assayed with conventional thrombelastography (n-TEG) and a modified assay (t-TEG) with exogenous tissue plasminogen activator (IPA) to quantify fibrinolysis resistance to platelet mediated clot strength (MA) and percent of clot lysis at 30 minutes (LY30). Results were compared to 160 healthy volunteers (HVS). Receiver operator characteristic (ROC) curves were developed to assess performance of the assays ability to correctly identify ACA.

Results: Sixty-four patients were enrolled in the study. Final pathologic diagnoses was ACA in 67% of patients including pancreatic ductal n=30, bile duct n=6, ampullary n=5, duodenal n=2. Non-ACA lesions included IPMN n=9, pancreatic neuroendocrine n= 7, and inflammatory mass n= 5. Compared to HVS, patients undergoing pancreatic resection had a higher median MA with n-TEG (62 mm vs 55mm p<0.001) and t-TEG (54 mm vs 39 mm p<0.001) and decreased fibrinolysis activity (LY30 n-TEG 0.4% vs 1.6% p<0.001, t-TEG 18% vs 52.9% p<0.001). Overall, t-TEG MA correlated to T stage (0.314 p=0.015) and final pathologic stage (0.365 p=0.004). Patients with ACA that went directly to surgery had n-TEG MA (p=0.01) and t-TEG MA(p=0.004) significantly higher than non-ACA patients (Figure). Patients that received neoadjuvant therapy had a decreased t-TEG MA (p=0.023 Figure) and increased t-TEG LY30 (29% vs 13% p=0.035) compared to patients who went directly to surgery with ACA. The t-TEG MA has an area under the curve of 0.672 for predicting ACA, which improved to 0.732 for patients whom had not received neoadjuvant therapy.

Conclusion: Patients with ACA have a significantly elevated t-TEG MA indicating fibrinolysis resistance to platelet mediated clot strength that improves with neoadjuvant therapy. These data support a potential diagnostic role of TEG, and echoes the oncogenic role of platelets in pancreatic cancer.
INTRODUCTION: This study was performed in preparation of the design of an algorithm on early diagnosis and management of complications after pancreatic resection. The aim of this study was to systematically review the accuracy of physical examination, biochemical parameters and imaging modalities for diagnosing clinically relevant postoperative pancreatic fistula.

METHODS: A systematic search was performed in literature to October 2016. Included were clinical studies reporting on postoperative findings in physical examination and biochemical or abdominal imaging evaluation in relation to clinically relevant postoperative pancreatic fistula (CR-POPF, i.e. grade B/C or requiring invasive intervention) following pancreatic resection.

RESULTS: Included were 28 studies on a total of 7,235 patients. Most important parameters in diagnosing CR-POPF were elevated drain amylase (7,188 patients; cut-off 90-10,000 IU/L before postoperative day [POD] 5; sensitivity 28-97%, specificity 22-99%); elevated C-Reactive Protein ([CRP] 3,406 patients; cut-off 92-272 mg/L before POD 4; sensitivity 50-99%, specificity 36-89%) and elevated leukocyte count (2,158 patients; cut-off 7-10×10⁹/L on POD 3-4; sensitivity 73-91%, specificity 62-82%). Fluid near the pancreatic anastomosis on abdominal computed tomography was suggestive for CR-POPF (91 patients; sensitivity 20-87%; specificity 75-99%).

CONCLUSION: Elevation in drain amylase level, CRP and leukocyte count appear to be associated with clinically relevant pancreatic fistula, although accuracy varies in the literature. Fluid collections as seen on subsequent abdominal imaging are indicative for clinically relevant pancreatic fistula. These diagnostic modalities should be combined in an algorithm that needs further evaluation in prospective studies to ultimately improve outcome of these patients.
Background: Many authors have reported superior outcomes for patients travelling long distances to have complex oncologic operations performed at high-volume centers compared to those treated at closer, low-volume centers. However, it is unclear if the distance travelled impacts survival by potentially limiting access to postoperative care and adjuvant treatment options.

Methods: A retrospective review of a prospectively maintained database was performed to evaluate overall survival (OS) and recurrence-free survival (RFS) following pancreaticoduodenectomy (PD) for pancreatic adenocarcinoma at a single high-volume tertiary-care center between years 1995-2015. Results were stratified by distances of < 30, 30-90, 91-180, and >180 miles from the hospital where surgery was performed.

Results: Six hundred and forty-six patients were included for study. Patients traveled a median of 83 (IQR 21 - 160) miles for care. Distance travelled groupings are shown in Figure 1. The age, gender, race, pathological stage, R0 margin status, venous resection rate, postop length of stay, and adjuvant treatment rate did not differ significantly between cohorts. Patients within 30 miles of the hospital had lower BMIs (23 vs. 26, 28, and 27; p= 0.002) and less likely to have elevated CA19-9 levels (62% vs. 75%, 72%, and 74%; p= 0.04) compared to those travelling from further distances. OS and RFS for patients travelling <30, 30-90, 91-180, and >180 miles for treatment were 20, 18, 18, and 19 months (p=.742) and 14, 12, 15, and 13 (p= 0.75) months respectively.

Conclusion: Oncologic outcomes following resection are not significantly impacted by distance travelled for resection in this single institution study.
Background: Many authors have reported inferior outcomes for African-American (AA) patients with pancreatic adenocarcinoma (PDAC) when compared to Caucasians (Cauc). This may be due to reduced access to care, distrust of the medical system, and differences referral patterns. However, differences in oncologic outcomes between these groups in patients with resectable tumors who undergo pancreaticoduodenectomy (PD) are not well characterized.

Methods: A retrospective review of a prospectively maintained database was performed comparing basic clinicopathologic variables, overall survival (OS), and recurrence-free survival (RFS) following PD between AA and Cauc patients at a single high-volume tertiary-care center between years 1995-2015.

Results: Six hundred and forty-six patients were included for study, 54 (8.7%) of which were AA. The gender, neoadjuvant treatment rate, pathological stage, R0 margin status, venous resection rate, and postop length of stay did not differ between cohorts. AA patients were younger (median 61 vs. 67 years-old; p=.004) lived closer to the hospital (median 5 vs. 98 miles; p=<.0001), were less likely to be married (38% vs. 72%; p=<.0001), had higher rates of cigarette use (49% vs. 23%; p=<.0001), and alcoholism (13% vs. 5%; p=.013) compared to Cauc. OS and RFS for AA and Cauc patients were 19 vs. 27 months (p= 0.19) and 14 vs. 19 months (p= 0.18), respectively (Figure 1). Race was not a predictor of survival on multivariate analysis (HR =0.81 [0.59 – 1.11]).

Conclusion: We found no significant difference in OS or RFS between AA and Cauc patients with resected tumors at our high-volume center, confirming reported differences in survival are unlikely to be related to peri-operative variables.
Introduction: Two-thirds of patients with pancreatic cancer have diabetes or impaired glucose tolerance prior to pancreatectomy. A new diagnosis of insulin dependent diabetes is life changing and requires adaptation to a regimen of medications and monitoring. We sought to identify risk factors associated with insulin dependent diabetes after pancreatectomy in order to assist in counseling and educating patients pre-operatively. Identification of patients at risk for peri-operative diabetes may improve the quality of care delivered during and after hospitalization.

Methods: Patients who underwent pancreatectomy (pancreaticoduodenectomy, distal pancreatectomy, duodenum preserving pancreatic head resection) between October 2011- September 2016 were identified from the electronic medical record and only patients who had a Hemoglobin A1c (HbA1c) drawn preoperatively were included. Logistic regression was used to identify factors associated with new onset insulin dependence at the time of discharge and ROC curves were utilized to create optimal cutoff values.

Results: 129 patients who had both a preoperative HbA1c level and who underwent pancreatectomy were identified. 54% patients had a prior history of diabetes with 27% being insulin dependent with mean HbA1c of 6.9 and mean pre-operative glucose of 140. The majority of patients (71%) underwent pancreaticoduodenectomy and had a cancer diagnosis (65%). Insulin use on discharge was noted in a large subset of patients (44%) and 17.1% had new onset insulin dependence. Among the 22 patients with new onset insulin dependence, 12 (9.3%) patients were previously diabetics who were taking oral medications only; while 10 (7.8%) patients had no prior history of diabetes. Of note, patients discharged with insulin were more likely to have a history of hypertension, diabetes, an elevated HbA1c (8.4 vs. 5.8, P<0.001), and a higher preoperative fasting glucose level (173 vs. 117, P<0.001). On multivariable analysis, HbA1c and pre-operative fasting glucose remained associated with discharge with insulin and new insulin dependence (both P<0.05). On ROC curve analysis, the optimal cutoff value to predict new insulin dependence and discharge with insulin were a HbA1c of 6.25 and 121 respectively.

Conclusion: Preoperative HbA1c and pre-operative fasting glucose are useful metrics to identify those patients at highest risk of new onset insulin dependence after pancreatectomy. Specifically, HbA1c of 6.25 and pre-operative glucose levels of 121 can be used to pre-operatively counsel patients regarding their risk. Identification of patients at highest risk of new-onset diabetes may allow for the implementation of diabetes education classes and insulin education prior to surgery. We feel this preparation will help patients adhere to their new medication regimen and hopefully improve quality of life after resection.
**P035 ROLE OF PREOPERATIVE THERAPY IN PATIENTS WITH ADENOCARCINOMA OF THE AMPULLA OF VATER**

Jordan M. Cloyd, Huamin Wang, Jun Zhao, Jason Denbo, Michael Overman, Guari Varadhachary, David Fogelman, Laura Prakash, Michael Kim, Thomas Aloia, Jean-Nicolas Vauthey, Jason Fleming, Jeffrey Lee, Matthew Katz; University of Texas MD Anderson Cancer Center

**Introduction:** Although increasingly administered to patients with pancreatic ductal adenocarcinoma, the role of preoperative therapy for patients with adenocarcinoma of the ampulla of Vater is undefined.

**Methods:** All patients with ampullary adenocarcinoma who were evaluated at a single institution between 1999-2014 were retrospectively reviewed (Figure). Differences in clinicopathologic characteristics, perioperative complications, locoregional recurrence and overall survival were compared between patients who underwent surgery de novo and patients who received preoperative chemotherapy or chemoradiation prior to pancreatectoduodenectomy.

**Results:** 142 patients underwent pancreatectoduodenectomy of whom 43 (30.3%) received preoperative therapy and 99 (69.7%) did not. Preoperative therapy consisted of chemoradiation (65%), chemotherapy (7%) or both (28%). Tumors resected de novo were larger (2.2 vs 1.5cm, p<0.01) and had a different subtype distribution (intestinal type: 40.4% vs 18.6%; pancreatobiliary type: 52.5% vs 53.5%; unknown: 7.1% vs 27.9%; p<0.01) on final pathology than those resected following preoperative therapy. In addition, patients who underwent surgery first had a lower comorbidity index (moderate/severe: 21.2% vs 41.9%; p<0.05) and were more likely to receive postoperative chemotherapy (34.3% vs 14.0%; p<0.01) and chemoradiation (32.3% vs 0%; p<0.0001). Nine (20.9%) specimens had <5% viable tumor cells following preoperative therapy, including 6 (14.0%) with a complete pathologic response.

There were no differences in rates of postoperative complications (53.5 vs 46.5%), 90-day mortality (1.0% vs 0%), 90-day readmission (19.2% vs 30.2%), locoregional recurrence (9.1% vs 7.0%), median survival (107 vs 146 months) or 5-year overall survival rates (60.6% vs 70.4%) among patients who underwent surgery first compared to those who received preoperative therapy (all p>0.05). On multivariate cox regression analysis, only age >70, EBL >1000mL, number of lymph nodes resected, lymph node ratio >0.2, and R1 margin status were significantly associated with overall survival; the receipt of preoperative therapy was not (OR 1.14, 95% CI 0.56-2.31).

**Conclusion:** The delivery of preoperative therapy to patients with ampullary adenocarcinoma prior to pancreatectoduodenectomy is safe, feasible and associated with excellent long term overall survival and locoregional recurrence rates. However, it was not associated with improved outcomes compared to a surgery first approach.
EVALUATION OF LONGITUDINAL CHANGES IN ANTHROPOMETRIC PARAMETERS ASSOCIATED WITH PREOPERATIVE THERAPY AND PANCREATODUODENECTOMY IN PATIENTS WITH PANCREATIC DUCTAL ADENOCARCINOMA

Introduction: The anthropometric and nutritional changes associated with preoperative therapy and pancreateoduodenectomy (PD) for pancreatic ductal adenocarcinoma (PDAC) have not previously been evaluated. We sought to quantify and to determine the clinical significance of changes that occur over the course of therapy and the first postoperative year.

Methods: 127 consecutive patients with PDAC who received preoperative chemotherapy and/or chemoradiation followed by pancreateoduodenectomy (PD) at a single institution between 2009-2012 were longitudinally evaluated. Evolving changes in patients’ nutritional profiles and body composition were measured by comparing laboratory parameters and the cross-sectional areas of their skeletal muscle (SKM), visceral adipose tissue (VAT), and subcutaneous adipose tissue (SAT) on computed tomography images obtained upon presentation, prior to PD, and approximately 3 and 12 months after surgery. Body mass index (BMI) was calculated using baseline height and weights at each corresponding interval.

Results: Prior to therapy, patients’ mean baseline BMI was 26.5±4.7 Kg/m2 and 63.0% met established criteria for sarcopenia. Preoperative therapy (12[9.4%] chemotherapy alone, 44[34.6%] chemoradiation alone, 71[55.9%] both) was administered for a mean of 5.4±2.3 months. Only minor changes in VAT and SAT occurred during preoperative therapy, and there was no significant change in SKM or BMI. In contrast, significant and progressive decreases in SKM, VAT, SAT, and BMI were observed following surgery and throughout the first postoperative year (Table). Median overall survival of all patients was 32.8 months. Anthropometric changes during preoperative therapy were not independently associated with survival, but SKM gain between the postoperative period and one year follow-up was associated with improved overall survival (OR 0.50, 95% CI 0.29-0.87).

Conclusion: In contrast to the minor changes that occur during preoperative therapy for PDAC, significant losses in key anthropometric parameters tend to occur over the first year following PD. Ongoing SKM loss in the postoperative period may represent an early marker for worse outcomes. Therefore, heightened attention to physiologic metrics both prior to and following completion of therapy is warranted.

<table>
<thead>
<tr>
<th>Pre-Treatment (n=126)</th>
<th>Pre-Operative (n=124)</th>
<th>Post-Operative (n=121)</th>
<th>One Year (n=90)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Months elapsed: 5.1±2.5</td>
<td>Months elapsed: 3.3±1.6</td>
<td>Months elapsed: 11.9±2.1</td>
<td></td>
</tr>
<tr>
<td>SKM, cm²/m²</td>
<td>Absolute</td>
<td>% Change*</td>
<td>Absolute</td>
</tr>
<tr>
<td>46.6(8.9)</td>
<td>46.2(8.3)</td>
<td>-0.5(7.8)</td>
<td>44.0(7.7)</td>
</tr>
<tr>
<td>VAT, cm²/m²</td>
<td>47.9(32.2)</td>
<td>40.7(29.1)</td>
<td>-1.8(62.6)</td>
</tr>
<tr>
<td>SAT, cm²/m²</td>
<td>67.5(37.1)</td>
<td>62.0(36.8)</td>
<td>-4.8(27.7)</td>
</tr>
<tr>
<td>BMI, Kg/m²</td>
<td>26.5(4.7)</td>
<td>26.2(4.5)</td>
<td>-0.9(6.9)</td>
</tr>
</tbody>
</table>

*Compared to baseline **Boldp<0.001
P037 OUTCOME FOLLOWING CONVERSION SURGERY FOR INITIALLY UNRESECTABLE PANCREATIC CANCER Keita Wada, MD, Keiji Sano, MD, Fumihiko Miura, Makoto Shibuya, Yutaka Ikeda, Masahiko Kainuma, Kunihiko Kainuma; Teikyo University School of Medicine

**Background:** Recent advances in chemotherapy and chemoradiation for unresectable pancreatic cancer (URPC) may alter treatment intention from palliative to curative by conversion surgery following a favorable response to non-surgical anti-cancer treatment. However, long-term outcome following conversion surgery is lacking.

**Methods:** Between 2010/6-14/6, 140 patients with PC, including 89 (64%) URPCs, were treated in our department. Outcomes were compared according to the resectability status (R/BR/UR) and treatment applied. Conversion surgery was performed if surgically-fit patients with URPC had a long-term (at least > 6months) favorable response, i.e. tumor shrinkage and significant reduction of tumor markers.

**Results:** Of 89 with URPC, 40 were locally-advanced (UR-LA) and 49 metastatic (UR-M). Conversion surgery was performed in 10 (11%), 8 UR-LAs (20%) and 2 UR-Ms (4%), at a median of 8.6 months after the induction treatment. As for surgical procedure, major arterial resection (CA-CHA or SMA) was performed in 8, portal vein resection in 5, and partial liver resection in 2. Operative time, blood loss, morbidity, mortality and length of stay were not different when comparing with 51 patients with R/BR cases who underwent surgical resection during the same period. Pathological results showed T1 in 60%, N0 in 80% and R0 in 90%. During a median follow-up of 47 months (9-77 months) for 10 patients with conversion surgery, 6 patients are still alive including three 5-year survivors, resulting 3- and 5-year overall survival of 70% and 53%, respectively. Survival for patients with conversion surgery was significantly better than patients who have had a stable disease for 6 months but not underwent surgery (P<0.01), and was similar as compared with the resectable/borderline resectable group during the same period (P=0.63).

**Conclusions:** Conversion surgery following a favorable response to induction treatment for initially unresectable pancreatic cancer may be a good option to prolong survival.
Objective: A seminal paper in 2007 characterized the underuse of surgery in the treatment of early stage pancreatic adenocarcinoma and highlighted that 38.2% with stage 1 disease failed to undergo surgery without any identifiable contraindication. Furthermore, the study correlated factors such as age, race, annual income, and education level with a lower likelihood of being offered surgery as a treatment option. Our objective was to re-evaluate the same database to determine whether there has been any reduction in disparity over the past decade.

Methods: Using the National Cancer Data Base (2005-2014), 29126 patients diagnosed with pre-treatment clinical stage I (T1N0M0 and T2N0M0) disease. Multivariate analysis was performed with a binary logistic regression model to identify factors predicting failure to undergo surgery in this patient cohort.

Results: Of the patients with potentially resectable tumors (stage 1), 56.9% (16547/29126) did not undergo surgery, compared to a 71.4% of 9559 patients 10 years ago (P < 0.001); 7.41% were denied surgery due to comorbidities; 3.86% refused surgery; and 41.04% were “not offered surgery.” Whilst the number of patients undergoing pancreatectomy has increased, age, race, insurance type, anatomic location, hospital volume, and facility type remain significantly associated with a lesser likelihood of undergoing surgery (P < 0.001).

Conclusions: Although the numbers of patients undergoing pancreatectomy for stage 1 disease has increased, a stable proportion of patients with treatable disease are not undergoing surgery despite the lack of any clear contraindication. Moreover, in spite of political and policy efforts to address healthcare shortcomings, this disparity remains, a decade later, significantly related to a patient’s age, race, and socioeconomic state.
Introduction: On the molecular level, pancreatic ductal adenocarcinoma (PDAC) has been shown to be a heterogenous disease. The aim of this study was to analyze the total PDAC proteome as to identify proteins and pathways associated with PDAC and early versus late local recurrence (LR) after margin-positive resection and additive radiochemotherapy (RCT).

Materials and Methods: Patients with margin positive resection of PDAC consecutively receiving RCT were identified retrospectively. Formalin fixed paraffin-embedded tissue from surgical PDAC specimens was used for proteome analysis by macrodissection and tandem mass spectrometry.

Results: Overall survival was significantly reduced in patients with early LR as compared to late LR (7 vs. 30 months, p=0.0001). A total of 1878 proteins were quantified in both cohorts. Overall gene set enrichment analysis revealed a protein and signaling signature characteristic of PDAC. LIMMA method identified proteins significantly up- or down-regulated. Several up-regulated proteins in the early LR group were known to be involved in tumorigenesis. Further analysis suggested the early LR group to exhibit an exocrine-like phenotype.

Conclusion: Protein signatures characteristic of PDAC as well as profiles associated with early vs. late post-RCT local recurrence were identified. Proteomic profiling may serve to select patients with pancreatic cancer for radiation therapy. Experimental work is going on to evaluate the causal role of the identified signatures and targets.
SIGNIFICANCE OF SURGICAL RESECTION FOR METASTATIC TUMORS IN PANCREATIC CANCER

Masamichi Mizuma, MD
Fuyuhiko Motoi, MD
Masahiro Iseki, MD
Tatsuyuki Takadate, MD
Kyohei Ariake, MD
Shimpel Maeda, MD
Kunihiro Masuda, MD
Masaharu Ishida, MD
Koji Fukase, MD
Naoaki Sakata, MD
Hideo Ohtsuka, MD
Hiroki Hayashi, MD
Kei Nakagawa, MD
Takanori Morikawa, MD
Takeshi Naitoh, MD
Yoshinori Okada, MD
Michiaki Unno, MD

1Department of Surgery, Tohoku University
2Department of Thoracic Surgery, Tohoku University

Objectives: Significance of surgical resection for metastatic tumors in pancreatic cancer is unclear. The aim of this study was to investigate outcome of surgical resection for metastatic tumors in pancreatic cancer.

Methods: From 2001 to 2013, 349 consecutive cases of pancreatic cancer, who underwent surgical resection of the primary tumor at our institute, were retrospectively examined. 72 cases of no recurrence and 5 cases of unknown recurrence date were excluded. Prognosis of patients with surgical resection for metastases (SURGERY group) was evaluated, compared to those with no resection for them (NO SURGERY group).

Results: Pancreatic cancer: 277 cases (79.4%) showed metastases after resection of the primary tumor. Surgical resection of metastatic tumors was performed in 10 cases (3.6%). In removed metastatic site, lung, liver and abdominal lymph node was seen in 7, 2 and 1 case, respectively. The number of the resected metastatic tumors was 1, 2-3 and ≥4 in 5, 3 and 2 cases, respectively. There was no significant difference in age, gender, location of the primary tumor, Stage, residual tumor status, histopathological grade and adjuvant therapy between the groups. Median time to recurrence from the primary tumor resection was significantly longer in SURGERY than that in NO SURGERY (median; 22.9 mo vs 8.0 mo, p=0.0081). Overall survival (OS) from metastases detection showed significantly better in SURGERY than in NO SURGERY (3-year survival rate; 40.0% vs 9.4%, MST; 27.8 mo vs 8.7 mo, p=0.0006). In cases with recurrence after more than 1 year from primary tumor resection, OS was significantly better in SURGERY than in NO SURGERY (3-year survival rate; 51.4% vs 12.9%, MST; undefined vs 15.8 mo, p=0.0081).

Conclusion: Surgical resection for oligometastases in pancreatic cancer might have a significance as a part of multidisciplinary treatment.
P041 RE-RESECTION OF A POSITIVE PANCREATIC MARGIN IS ASSOCIATED WITH PROLONGED SURVIVAL AMONG PATIENTS WITH PANCREATIC CANCER TREATED WITH PREOPERATIVE THERAPY AND PANCREATODUODENECTOMY

Michael E Egger, MD, MPH, Laura R Prakash, MD, Jordan M Cloyd, MD, Huamin Wang, MD, Michael Kim, MD, Ching-Wei D Tzeng, MD, Thomas A Aloia, MD, Jean N Vauthey, MD, Jason B Fleming, MD, Jeffrey E Lee, MD, Matthew H Katz, MD; University of Texas MD Anderson Cancer Center

Introduction: The role of re-resection of a positive pancreatic transection margin on the basis of intraoperative assessment in patients undergoing de novo pancreatoduodenectomy for cancer has recently been debated. Preoperative therapy may improve margin-negative resection rates and select patients with "favorable tumor biology" for surgery. We therefore hypothesized that re-resection of a positive pancreatic transection margin to a negative one prolongs survival following preoperative therapy.

Methods: The records of consecutive patients who underwent pancreatoduodenectomy following the administration of chemotherapy and/or chemoradiation between 2000-2014 at a single center were reviewed. The intraoperative assessment of each patient's pancreatic margin was compared to its final status, which was categorized as negative, converted by re-resection to negative, or positive. The superior mesenteric artery (SMA) margin was defined as negative if ≥ 1mm. Kaplan-Meier survival analysis and multivariable Cox proportional hazard modeling was performed for overall survival (OS) and recurrence-free survival (RFS).

Results: A positive pancreatic transection margin was identified intraoperatively in 52 (11%) of 471 patients. The final pancreatic margin was reported as negative in 415 (88%), converted by re-resection to negative in 39 (8%), and positive in 17 (4%) patients. 28 (72%) patients in whom the pancreatic margin was converted from positive to negative had a negative SMA margin and 18 (46%) had negative lymph nodes. Patients in whom the pancreatic margin was converted to negative had a longer OS than those in whom the final margin was positive, even after controlling for other factors (multivariable HR 0.48, 95%CI 0.24-0.97). However, conversion was not associated with a prolongation of RFS (multivariable HR 0.67, 95% CI 0.30-1.27). The five year OS rate was 24% in the converted margin group and 31% in the negative margin group; there were no five year survivors in the positive margin group.

Conclusion: In patients with pancreatic cancer treated with preoperative therapy and pancreatoduodenectomy, the status of the pancreatic transection margin should be determined intraoperatively, and re-resection of a positive margin should be performed when technically feasible.
**P042 FOLFIRINOX WITH RADIOTHERAPY FOR LOCALLY ADVANCED PANCREATIC CANCER: A PROSPECTIVE COHORT STUDY**

**Mustafa Suker, Joost J Nuyttens, Ferry E Eskens, Bas Groot Koerkamp, Casper H van Eijck; Erasmus Medical Center**

**Introduction:** Investigate the efficacy and tolerability of the combined treatment of FOLFIRINOX with subsequent radiotherapy for patients with locally advanced pancreatic cancer (LAPC).

**Methods:** A prospective cohort of all patients diagnosed with biopsy-proven LAPC who were considered to have FOLFIRINOX with subsequent radiotherapy between January 2012 and December 2014. These patients underwent an diagnostic laparoscopy to exclude metastasis. The therapy consisted of 8 cycles of FOLFIRINOX followed by 30 fractions of 2 Gray radiotherapy and eventually if possible a resection. Primary outcomes were overall survival (OS) and progression free survival (PFS). Secondary outcomes were radical resections and treatment-related toxicity.

**Results:** The diagnosis of biopsy-proven LAPC was found in 53 patients. Thirty patients were not eligible for the proposed treatment due to poor condition (n=10), which patient (n=7), lost to follow-up (n=5), no diagnostic laparoscopy prior to treatment (n=4), metastasis during laparoscopy (n=3) and age (n=1). Twenty-three patients started with FOLFIRINOX therapy of whom 17 (74%) completed all cycles of FOLFIRINOX. One patient had complete response after FOLFIRINOX, one patient had progression under FOLFIRINOX and three patients had to stop treatment due to toxicity. Seventeen (74%) patients were treated with radiotherapy following their FOLFIRINOX treatment. All of them completed 30 fractions of 2 Gy radiotherapy. The median OS is 16.9 months (95% CI 10.6 – 23.1 months) and a median PFS of 12.6 month (range 12.2 – 13.0 months). Four (17%) patients were eligible for a resection of whom three (75%) had a radical resection and one patient had metastasis during laparotomy. Ten patients had a grade 3 or 4 toxicity during FOLFIRINOX, including liver failure (n = 2), neutropenic fever (n = 2), diarrhea (n = 2), nausea (n = 1), mucositis (n = 1), fatigue (n = 1) and ascites (n = 1). No patient had a grade 3 or 4 toxicity during radiotherapy.

**Conclusions:** FOLFIRINOX followed by radiotherapy for LAPC gives a big benefit for OS and PFS despite the low resection rate. Furthermore, the FOLFIRINOX treatment followed by radiotherapy can be considered as safe.
**Introduction:** Locally advanced pancreatic cancer (LAPC) is found in 35% of patients with pancreatic cancer. We looked for occult metastases during staging laparoscopy in patients with LAPC.

**Methods:** Between January 2012 and November 2016 patients with pancreatic cancer underwent a 3 phase pancreas protocol CT. All patients with LAPC underwent a staging laparoscopy to exclude intrahepatic and peritoneal metastases. Univariate and multivariable logistic regression analysis was conducted to predict metastasis found at laparoscopy. Preoperative risk factors for occult metastatic disease included gender, age, tumor size, and serum tumor markers (CEA and CA 19-9).

**Results:** A total of 78 (median age 64 years, 39% male) patients were included. During staging laparoscopy metastases were found in 13 patients (16.7%, 95% CI: 9.2% - 26.8%). Six patients had liver, 6 patients peritoneal and 1 patient liver and peritoneal metastases. Univariate and multivariable logistic regression of the preoperative risk factors (gender, age, tumor size, CEA and CA 19-9) were not significant predictors.

**Conclusion:** The yield of staging laparoscopy for occult intrahepatic or peritoneal metastases was about 1 in 6 patients in this cohort. Finding these metastases has prognostic and therapeutic consequences for patients with LAPC. Therefore staging laparoscopy should be a standard procedure for patients with LAPC.
P044 DOES ADJUVANT RADIATION PROVIDE ANY SURVIVAL BENEFIT FOLLOWING R1 RESECTIONS FOR PANCREATIC CANCER? N R Suss, BS, M S Talamonti, MD, D S Bryan, MD, C H Wang, PhD, K M Kuchta, MS, S J Stocker, LPN, D J Bentrem, MD, K K Roggin, MD, D J Winchester, MD, R Marsh, MD, R A Prinz, MD, M S Baker, MD, NorthShore University HealthSystem, University of Chicago, Pritzker School of Medicine, Northwestern University, Feinberg School of Medicine

Background: The benefit of adding radiation to adjuvant systemic chemotherapy in patients that have undergone a margin positive resection for early stage pancreatic cancer (PDAC) has not been well established.

Methods: We queried the National Cancer Database (NCDB) for 2004 through 2013 to identify patients with pathologic stage I-II PDAC of the pancreatic head who underwent pancreaticoduodenectomy and had a microscopic positive margin on final pathology (R1 resection). Kaplan-Meier, multivariable and cox regression modeling were employed to identify factors associated with radiation use and compare overall survival for patients receiving adjuvant chemotherapy with radiation (CRT) to those receiving adjuvant chemotherapy alone (ACT). Patients receiving neoadjuvant therapy and those who did not receive adjuvant chemotherapy were excluded.

Results: 1,397 patients met inclusion criteria. 263 (18.8%) were lymph node negative (Stages IA, IB, IIA) and 1,134 (81.2%) were node positive (Stage IIB). 941 (67.4%) patients received CRT, while 456 (32.6%) received ACT. Multivariable stepwise logistic regression identified younger age (OR 2.046, 95% CI [1.351, 3.098]), treatment in New England (OR 3.022, 95% CI [1.499, 6.093]), and negative nodal status (OR 1.676, 95% CI [1.216, 2.312]) as independently associated with use of CRT. Treatment at academic facilities (OR 0.409, 95% CI [0.209, 0.798]) and increased patient comorbidities (OR 0.577, 95% CI [0.357, 0.934]) were independently associated with lower CRT utilization. Cox modeling adjusting for age, sex, race, comorbid disease state, socioeconomic status (SES), insurance status, facility type, surgery type, vascular abutment, pathological T stage, radiation treatment and nodal status, identified High SES (HR 0.742, 95% CI [0.630, 0.873]), treatment at an academic institution (HR 0.755, 95% CI [0.572, 0.996]), and use of CRT (HR 0.836 95% CI [0.737, 0.949]) as independently associated with improved overall survival. Charlson score of two (HR 1.353 95% CI [1.060,1.727]) and node positivity (HR 1.443, 95% CI [1.237, 1.682]) were independently associated with higher risk of mortality. Cox modeling stratified by stage demonstrated the benefit of radiation to be statistically significant in node positive patients only (HR 0.801, 95% CI [0.698, 0.919]). Node positive patients undergoing CRT demonstrated a median survival of 17.2 months vs. 14.8 months for node positive patients undergoing ACT (p=0.002). In patients who were lymph node negative, there was no difference in overall survival with radiation (22.4 vs. 23.2 months, p=0.701)[Figure 1].

Conclusions: Addition of radiation to adjuvant chemotherapy confers a limited survival benefit over treatment with chemotherapy alone in patients having an R1 resection for lymph node positive pancreatic head cancer. Radiation offers no benefit for patients undergoing an R1 resection for disease that is node negative. Randomized trials are needed to better identify subgroups of PDAC patients for whom benefits of radiation justify the known risks.

Figure 1. Adjusted Overall Survival By Pathologic Stage Adjusted for Age, Sex, Race, Comorbidities, Radiation, Vascular Abutment, Pathologic T, SES, Insurance, Facility Type and Surgery Type. A: Overall Survival All Stages, B: Overall Survival Node Negative Patients (Pathologic Stage IA, IB, IIA), C: Overall Survival Node Positive Patients (Stage IIB).
Background: To increase the number of patients with locally advanced pancreatic cancer (LAPC) who can be offered a chance for cure after radical pancreatectomy, efforts are being made to develop a more effective preoperative therapeutic strategy including chemo- and chemoradiotherapy for LAPC.

Objective: The aim of this study was to determine the recommended dose of a biweekly combination neoadjuvant chemotherapy including gemcitabine, nab-paclitaxel and S-1 (GAS) for patients with LAPC.

Methods: Patients with borderline resectable or unresectable LA-PDAC without distant metastasis were eligible for this study. The planned dosage of gemcitabine (mg/m², day1), nab-paclitaxel (mg/m², day1) and S-1 (mg/day, day1-7) were 800 / 100 / 60-100 at level 1, and 1000 / 125 / 60-100 at level 2. The treatment cycle was repeated every 2 weeks, and patients were assessed resectability and response to the treatment after 6 cycles.

Results: Sixteen patients with LAPC enrolled this study. According to the resectability status of NCCN 2016 version 2, 14 (88%) patients was diagnosed as borderline resectable pancreas cancer, whereas 2 (12%) was diagnosed as unresectable LAPC. Of the 2 patients with unresectable LAPC, one had a tumor contacted with common hepatic artery with extension to hepatic artery bifurcation, and the other had a tumor contacted with superior mesenteric artery more than 180 degree. At dose level 1, one of 8 patients experienced dose limiting toxicity (DLT). Next, one of the following 8 patients also experienced DLT at dose level 2. Based on these results level 2 was confirmed as the recommended dose in this regimen. Two (13%) patients experienced grade 3 of leukopenia (level 1: n = 1, level 2: n = 1) and 3 (19%) experienced grade 3/4 neutropenia (level 1: n = 1, level 2: n = 2). With regard to overall non-hematological toxicity, grade 3 cholangitis was observed in only 1 (6%) patient at the dose of level 1. Pancreatectomy with curative intent could be performed in 13 (81%) of 16 patients. R0 resection was performed in 12 (92%) of 13 patients underwent surgical resection.

Conclusion: In conclusion, the recommended dose of biweekly GAS chemotherapy regimen was determined as nab-paclitaxel: 125 mg/m², gemcitabine: 1000 mg/m² on day 1, S-1: < 1.25 m², 60 mg; 1.25 – 1.5 m², 80 mg; > 1.5 m², 100 mg twice a day on days 1 – 7. GAS chemotherapy in this study showed good preliminary efficacy with mild toxicity, which warrant further phase 2 trial to investigate the efficacy of GAS regimen for LAPC.
P046 NEOADJUVANT THERAPY FOR RESECTABLE PANCREATIC ADENOCARCINOMA: A SINGLE CENTER COHORT COMPARISON STUDY. Nigel B Jamieson, MD, PhD, Janet Graham, MD, PhD, Derek Grose, MD, Fraser Duthie, MD, Hedvig Karteszi, MD, Lavanniya K Palani Velu, MD, Laura Mulligan, MD, Stephan Dreyer, MD, Andrew V Biankin, MD, PhD, David K Chang, MD, PhD, Euan J Dickson, MD, Ross Carter, MD, Colin J McKay, MD; 1West of Scotland Pancreatic Unit, 2Beatson West of Scotland Cancer Centre, 3University of Glasgow, Department of Pathology, 4Department of Radiology, Glasgow Royal Infirmary, 5University of Glasgow, Institute of Cancer Sciences, Glasgow, Scotland, UK

Introduction: Neoadjuvant chemotherapy is increasingly used in patients with borderline resectable pancreatic ductal adenocarcinoma (PDAC) but there is limited experience in patients with resectable disease. Neoadjuvant chemotherapy allows delivery of potentially more effective combinations, in particular FOLFIRINOX, and may also confer a selection advantage avoiding the morbidity of surgical resection in patients with biologically unfavourable disease. We present our initial experience of neoadjuvant chemotherapy and chemoradiotherapy in a cohort of unselected patients with resectable pancreatic cancer.

Methods: Clinicopathological and treatment data were prospectively collected for 98 patients diagnosed with PDAC between August 2012 and December 2015 from a single institution. From 2012, patients with cytologically confirmed disease >2cm in size received neoadjuvant therapy with either FOLFIRINOX or gemcitabine/capecitabine according to performance status followed in the majority of cases by chemoradiotherapy. Patients with smaller tumors were managed by a conventional surgery-first approach. Outcomes were compared with a historical cohort of 100 patients undergoing surgical exploration from 2008-2012, where a surgery-first approach was universally employed. Patients with borderline resectable disease are excluded from this analysis.

Results: There was no overall difference in survival between those managed in 2008-12 and those managed in 2012-15 (median 20 months [14.5–25.5] vs 23.1 months [19.1–26.9], P =0.11). Of 98 patients in the 2012-15 cohort, 53 were managed with neoadjuvant therapy. Of these, 12 had progressive disease, 1 had marked clinical deterioration and 1 had complications of chemotherapy. The remaining 39 patients progressed to trial dissection of whom 5 underwent palliative bypass. In the 34 patients undergoing resection, median overall survival was significantly improved in the neoadjuvant cohort (38 months) compared with both historical and concurrent surgery-first cohorts (26 and 24 months respectively, P = 0.012). This is despite the concurrent surgery-first cohort being comprised primarily of radiologically earlier stage disease. Notably, patients treated by neoadjuvant therapy who underwent resection had significantly longer overall survival when compared to patients undergoing up-front resection who completed all cycles of adjuvant therapy (38 months vs 29 months, P = 0.047) and completion of multimodality therapy was significantly more likely in the neoadjuvant-treated group. Following neoadjuvant therapy, the most significant pathological predictor of improved survival was histological evidence of tumor response to neoadjuvant therapy. To date there has been only one death amongst the 19 patients who underwent resection for which there was evidence of either a good or complete pathological response to neoadjuvant therapy.

Conclusion: This study, in a group of patients with resectable pancreatic cancer, demonstrates improved overall survival in patients treated by a neoadjuvant approach compared with historical and concurrent surgery-first cohorts. Furthermore we observed that this improved survival is mostly observed in the subgroup of patients with histological evidence of a good or complete pathological response to chemotherapy. Future strategies to improve survival in PDAC should focus on improving response rates to chemotherapy and is likely to be best achieved in the neoadjuvant setting.
Introduction: Pancreatic ductal adenocarcinoma (PDAC) is one of the leading causes of cancer-associated death worldwide. It is often diagnosed at a late incurable stage, but even after surgery for local PDAC survival is poor. CA 19-9 is the most used tumor marker for PDAC, and it is known to correlate with survival. PDAC is associated with enhanced coagulation activity. The aim of this study was to explore whether a combination of CA 19-9, coagulation-associated markers of FVIII, D-dimer and thrombin time (TT) could predict outcome after pancreatic cancer surgery better than CA 19-9 alone.

Patients and methods: In 2010-2015 132 patients underwent surgery for PDAC at Helsinki University Hospital. Patients were divided into two groups: local (n=101) and metastasized (n=32) disease. Neoadjuvant treatments (NT) were recorded. Survival for each patient and the cause of death of deceased patients were documented. The median (IQR) follow-up time was 1.6 (1.2 – 2.4) years for local and 0.80 (0.43 – 0.95) years for metastasized PDAC. CA 19-9, FVIII, TT and D-dimer were analyzed preoperatively. The results were scored to form a 10-point panel score: CA 19-9 <26 kU/L 1 point, 26-340 kU/L 2 points and >340 kU/L 3 points, FVIII <170 IU/dL 1 point, 170-220 IU/dL 2 points, >220 IU/dL 3 points, D-dimer <0.5 mg/L 1 point and >0.5 mg/L 2 points, TT =19 s 1 point and <19 s 2 points (Mattila et al, submitted 2016). Survival analysis was made using the Kaplan-Meier estimate.

Results: The median (IQR) in local and metastasized PDAC were 95 (29-508) kU/L and 287 (48-1459) kU/L for CA 19-9, 217 (178-252) IU/dL and 245 (202 – 288) IU/dL for FVIII, 0.3 (0.2-0.5) mg/L and 0.7 (0.2 – 1.1) for D-dimer, and 18 (17 – 19) s and 18 (17-19) s for TT, respectively. The median (IQR) panel score was 7 (6-8) for local PDAC and 8 (8-9) for metastasized PDAC. Of the 101 local PDAC patients, 72 patients had scores of 7 or more and 51 were alive at follow-up. All patients with a metastasized disease were deceased. In local PDAC panel score of 7 or more predicted worse survival (p<0.001), regardless of NT. In both local and metastasized panel score 10 predicted worse survival compared to lower scores (p<0.05). CA 19-9 alone predicted worse survival in local PDAC only when over 340 kU/L (n=22), and not at all in metastasized disease.

Conclusion: Our study shows that preoperative CA 19-9 combined with coagulation-associated FVIII, fibrin turnover marker D-dimer and shortened TT can predict survival after PDAC surgery. Further studies are needed to determine whether patients with a high panel score could benefit from prolonged postoperative anticoagulant medication.
SURVEILLANCE FOR PANCREATIC CANCER IN HIGH-RISK INDIVIDUALS: FIRST-ROUND SCREENING RESULTS OF A MULTICENTRIC ITALIAN PROGRAM

Salvatore Paiella¹, Gabriele Capurso², Giovanni Butturini³, Claudio Bassi¹, Signoretti Marianna², Isabella Frigerio³, Massimo Falconi⁴, Alessandro Zerbi⁵; ¹Pancreas Institute, General and Pancreatic Surgery Department, Verona, Italy, ²Sant’Andrea Hospital, La Sapienza University, Pancreatic Disorders Clinic, Roma, Italy, ³Pederzoli Clinic, HPB Unit, Peschiera del Garda, Italy, ⁴IRCCS San Raffaele Scientific Institute, Pancreatic Surgery Unit, Milano, Italy, ⁵Humanitas Research Institute, Pancreatic Surgery Unit, Milano, Italy

BACKGROUND: Surveillance programs on high-risk individuals (HRI) proved to be able to detect premalignant lesions or early pancreatic adenocarcinoma (PDAC). We report the results of the first-round of screening of the Italian multicentric surveillance program.

METHODS: The multicentric surveillance program includes: a) individuals with familial pancreatic cancer (FPC) defined as those with ≥ 3 first-, second- or third-degree relatives with PDAC or individuals with 2 relatives with PDAC with at least 1 first-degree relative; b) BRCA 1/2 or p16 mutation carriers with at least 1 first- or second-degree relative diagnosed with PDAC; subjects suffering from hereditary pancreatitis or Peutz-Jegher syndrome. The surveillance program consists of an annual magnetic resonance cholangiopancreatography (MRCP).

RESULTS: Fifty-four subjects were enrolled from September 2015 to November 2016. The mean age was 48 years (range 26-79). Forty-eight (88.9%) FPC, 5 syndromic HRI (9.2%) and 1 (1.9%) hereditary pancreatitis were included. MRCP detected pancreatic cystic lesions in 7 HRI (13%, all FPC-HRI) and features of chronic pancreatitis (confirmed by Endoultrasisonography) in 1 (1.9%). All cystic lesions were BD-IPMNs, 2 of them being multifocal. The mean diameter was 8.5 mm (range 4-16). No further diagnostic tests were performed to characterize BD-IPMNs since they did not show worrisome features nor high-risk stigmata. No solid lesions were identified. Interestingly, 2 migration anomalies (annular pancreas) and 2 fusion anomalies (pancreas divisum) were detected.

CONCLUSIONS: At the time of the first-round screening program in Italy, the rate of diagnosed lesions is lower than expected, all of them being BD-IPMN. This might be due either to the low rate of syndromic HRI and to a low mean age compared to other series. The program is ongoing and 100 subjects are expected to receive the first round of screening by the end of 2017.
Background: Intraductal papillary mucinous neoplasms (IPMN) are most commonly diagnosed in the seventh decade of life. We sought to determine the clinicopathological profile of young patients with resected IPMN.

Methods: We evaluated 1,564 resected IPMN from the database of the Pancreatic Surgery Consortium. Patients were classified as young (<50 years of age) or older (≥50 years). Clinicopathological characteristics and survival were compared between groups.

Results: There were 78 (5%) young patients and 1,486 (95%) older patients. Median age among young patients was 44 years (range 19-49) and 70 years (range 50-93) in older patients. There was no difference in sex between age groups (49% men in each group). In univariate analysis, young patients were less likely to present with jaundice (0% vs. 11%, P<0.001), and were more likely to have intestinal (52% vs. 31%; OR 2.4, 95% CI 1.14-4.90, P=0.017) and oncocytic (16% vs. 3%, OR 5.3, 95% CI 1.85-15.33, P=0.006) epithelial subtypes. There was no significant difference in recurrence/progression rates (13% in each age group), but young patients were more likely to have a reoperation (OR 5.4, 95% CI 2.10-13.8, P<0.001) than older patients. Young patients had 48% lower risk of invasive carcinoma after adjusting for sex and IPMN type (95% CI 0.29-0.99, P=0.047). Among IPMN with an associated invasive carcinoma, young patients had a non-significant higher frequency of colloid type of invasive carcinoma (55% vs. 32%, P=0.189) and favorable prognosis (5-year overall survival 71% vs. 38%, log-rank P=0.036).

Conclusion: IPMN are uncommonly resected in patients under age 50, but when this occurs, they are more likely to exhibit certain clinicopathological features. These include a higher frequency of intestinal and oncocytic phenotypes, a lower risk of invasive cancer, and a more favorable prognosis among invasive cases, suggesting there may be underlying biological differences between IPMN arising in young and older patients.
Purpose: Accurate assessment of tumor extent in pancreatic ductal adenocarcinoma (PDAC) by computed tomography (CT) is crucial in the determination of resectability and treatment response. However, PDAC tumor characteristics often lead to indistinct size measurements. This review seeks to provide an overview of measurement and quantification methods used to define PDAC tumor extent and to assess treatment response.

Methods: A systematic search in PubMed, Embase and the Cochrane Library from May 2011 to May 2016 was performed to identify 1) medical-oncological studies, including PDAC, CT-imaging and (modified) FOLFIRINOX or nab-paclitaxel plus gemcitabine and 2) surgical studies involving PDAC with all surgical treatments and CT-imaging. Primary endpoints were methods for measuring tumor size and extent of disease, and methods for measuring disease progression over time.

Results: After screening 1086 articles, 15 medical-oncological studies (n=994 patients) and 11 surgical studies (n=1222 patients) were included. The medical-oncological studies used Response Evaluation Criteria In Solid Tumors (n=15), tumor diameter (n=15) and resectability criteria (n=6) to quantify tumor size. The surgical studies measured tumor diameter (n=6), circumferential vascular involvement (n=10) or longitudinal vascular involvement (n=1). None of the 26 articles specified definitions for assessments of tumor border nor described how to account for infiltrative growth-pattern or how to distinguish inflammation or fibrosis from viable tumor tissue.

Conclusions: Although accurate size measurement is crucial for making treatment decisions, no uniform method for quantification of the primary tumor in PDAC was found. Therefore, a standardized measuring and quantification protocol, taking into account the morphological characteristics of PDAC, should be agreed upon.
P051 PHASE 2 TRIAL OF POSTOPERATIVE ADJUVANT GEMCITABINE AND CISPLATIN CHEMOTHERAPY FOLLOWED BY CHEMORADIATION WITH GEMCITABINE IN PATIENTS WITH RESECTED PANCREATIC CANCER

Wooil Kwon, MD, PhD1, Seock-Ah Im, MD, PhD2, Kyung-Hun Lee, MD2, Do Youn Oh, MD2, Yung-Jue Bang, MD, PhD2, Eui Kyu Chie, MD, PhD3, Sun-Whee Kim, MD, PhD1, Jin-Young Jang, MD, PhD1; 1Department of Surgery, Seoul National University College of Medicine, 2Department of Internal Medicine, Seoul National University College of Medicine, 3Department of Radiation Oncology, Seoul National University College of Medicine

Background: Despite "potentially curative" resection for pancreatic carcinoma the 5-year survival in these patients is less than 20%. Progression of disease can occurs both locally and in distant sites. Effective multimodality adjuvant treatment protocol is needed for these patients receiving curative resection.

Methods: Patients with curatively resected pancreatic adenocarcinoma (stage IIB ~ IIB, AJCC 7th ed.), ECOG PS of 0-2, and no prior chemo- or radiotherapy were eligible. Treatment consisted of chemotherapy with gemcitabine 1,200mg/m^2 (D1,8) and cisplatin 60mg/m^2 (D1) every 3 weeks for 2 cycles. Subsequently, patients without progression received chemoradiotherapy (CRT) (50.4 Gy/ 28 Fx) with concurrent weekly gemcitabine (300mg/m^2/week). Gemcitabine 1,200mg/m^2 were given on day 1, 8 every 3 weeks for 4 cycles after CRT. The primary endpoint was to evaluate one year disease free survival (DFS) rate. The secondary endpoints were median DFS, overall survival (OS), and safety.

Results: From Oct. 2005 to Sep. 2009, we enrolled 74 patients with curatively resected pancreas cancer (median age 61, M:F = 48:26 ). At the median follow up duration of 31.5 months (range 6 ~ 115 months), 6 patients withdrew consent, 11 patients were confirmed with disease progression during treatment and 57 patients completed CRT followed by systemic chemotherapy. One-year DFS was 57.9%. Fifty-seven patients (77.0%) were diagnosed with recurrence. Most of recurrences were systemic disease (52 patients, 70.3% of all patients). Median DFS was 15.0 months and median OS was 33.0 months in all patients. The stage (73.3% in IIA, 55.6% in IIB, p<0.001) and the nodal status (71.0% in N0, 55.6% in N1, p=0.01) at the time of diagnosis were significantly related with DFS. Toxicities were generally tolerable, 53 events of grade 3 or 4 hematologic toxicity were reported and four patients experienced febrile neutropenia.

<table>
<thead>
<tr>
<th>Survival outcome after the protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1yr DFS</strong></td>
</tr>
<tr>
<td>All patients</td>
</tr>
<tr>
<td>Stage IIA</td>
</tr>
<tr>
<td>Stage IIB</td>
</tr>
</tbody>
</table>

Conclusions: Induction chemotherapy with gemcitabine/cisplatin followed by chemoradiation and maintenance gemcitabine shows promising efficacy and good tolerability in resected pancreatic cancer. The combined multimodal treatment warrants further evaluation.
Background: As the proportion of senior citizens increases in Japan, we encounter the problems how to treat elderly patients with pancreatic ductal adenocarcinoma (PDAC), especially 80 years or older. Careful considerations for the clinicopathological features of the elderly patients should be taken when we determine the treatment strategies.

Methods: We retrospectively reviewed a total of 67 patients who consecutively diagnosed as PDAC at Kinan Hospital, which is located at rural area, between January 2006 and December 2015. All patients were divided into the following two groups based on their age: under 80 years old (Group Y: n=42) and 80 years or older (Group E: n=25: 37.3%). We compared various factors, including performance status (PS), comorbidities, laboratory data and tumor-related factors, and median survival time (MST) according to kinds of treatments and grade of PS. Risk factors contributing to overall survival are also evaluated in each group.

Results: The prevalences of PS 2 or more and dementia were significantly higher in Group E than in Group Y (44.0% vs. 9.5%, p=0.001, 24.0% vs. 0%, p=0.001). When prognosis in Group Y was compared according to types of treatment, the patients who underwent curative surgery (n=5) and those who underwent chemotherapy (n=23) had significantly better prognoses than those with supportive care alone (n=15), respectively (MST: 14.0 months vs. 9.0 vs. 2.0, p<0.001, p<0.001). In Group E, the patients who underwent chemotherapy (n=7) tended to have better prognoses than those with supportive care alone (n=17) (MST: 8.0 months vs. 3.0, p=0.064). Regarding chemotherapy, relative dose intensity, adverse events and total duration of chemotherapy did not differ between the two groups. When we focused on PS, the patients with PS 2 or more (n=15) had significantly poor prognosis comparing to those with PS 1 or 0 (n=52) (MST: 3.0 months vs. 8.0, p=0.001). In Group E, the patients with PS 2 or more (n=14) showed significantly poorer prognosis than those with PS 0 or 1 (n=11) (MST: 3.0 months vs. 8.0, p=0.001). In multivariate analysis, significant risk factors contributing to overall survival were ASA physical status classification of more than III (p=0.04) and distant metastases (p<0.001) in Group Y, and CA 19-9 >1000 IU/L (p=0.002), lymph node metastases (p=0.03), and PS 2 or more (p<0.001) in Group E.

Conclusion: In PDAC patients of 80 years or older, chemotherapy is tolerable as long as their clinical condition is preserved. In addition to the anatomical tumor extension of PDAC, tumor biological status and patient physiological condition were closely related to their prognosis, regardless of age.
Background: Pancreatic intraepithelial neoplasia-3 (PanIN-3), namely non-invasive pancreatic ductal adenocarcinoma (PDAC), is characterized by severe cytological and architectural atypia, and considered to progress to invasive PDAC. The 5-year survival rate of PanIN-3 is reported to be 85%, which is better than that of invasive PDAC. Thus, detection of PanIN-3 is important to improve the prognosis of PDAC.

Objective: The aim of this study was to clarify clinicopathological features and diagnostic strategy for detecting PanIN-3.

Methods: The medical records of 267 patients who underwent pancreatectomy for PDAC between 2010 and 2015 were retrospectively reviewed. The clinicopathological features and diagnostic ability of imaging modalities to detect suspicious findings for PDAC such as dilation or localized stenosis of main pancreatic duct, and hypoechoic lesion were evaluated. In addition, the role of pancreatic juice cytology (PJC) under endoscopic retrograde pancreatography (ERP) and endoscopic ultrasonography-guided fine needle aspiration (EUS-FNA) were also evaluated.

Results: Ten patients (4%) were diagnosed as having PanIN-3. There were 5 males and 5 females diagnosed with the median age of 70 years (range 58-81). The 5-year disease specific survival rate of PanIN-3 in our study was 100%. Eight of 10 (80%) patients were diagnosed with PDAC preoperatively, while in the remaining 2, PanIN-3 was occasionally found in resected specimen after pancreatectomy for intraductal papillary mucinous neoplasm (IPMN). Seven of 10 (70%) patients had such symptoms as abdominal pain in 5 and back pain in 2. Risk factors for PDAC were observed in 9 of 10 (90%) patients (IPMN in 6, chronic pancreatitis in 4, diabetes mellitus in 2). The sensitivity of US, CT, MRCP, EUS and ERP for the detection of PanIN-3 was 0% (0/4), 50% (5/10), 67% (6/9), 78% (7/9), and 78% (7/9), respectively. The sensitivity of PJC under ERP and EUS-FNA were 67% (6/9) and 33% (1/3), respectively.

Conclusion: Surveillance of high risk patients for PDAC such as IPMN and pancreatitis seems to be the important step for detecting the PanIN-3, and EUS and ERP are useful modalities.
Objective: The 10-point Fistula Risk Score (FRS) has been shown to predict the development of pancreatic fistula (PF) after pancreateoduodenectomy (PD). However, its ability to predict PF severity is incompletely defined. This study aimed to provide external validation of the FRS and assess its role in predicting PF severity after PD.

Methods: Patients who underwent PD at a single academic tertiary care center were included. Clinicopathological, demographic and perioperative data were collected. The FRS was calculated for each patient and PF severity was graded according to the International Study Group on Pancreatic Fistula standards as A, B, or C. Grades B and C were considered clinically relevant (CR-PF).

Results: Data from 280 patients (mean age 64.4 years) were analyzed. PF occurred after 96 PDs (34.3%), and 68 were CR-PF (24.6%). The FRS correlated closely with the development of PF (for each 1 point increase, PF Odds Ratio 1.47, 95% Confidence Interval CI 1.28-1.70, p<0.001). PF developed in 11.3% of patients with scores 0-1 (9.3% CR-PF), 40.6% of patients scoring 2-3 (23.4% CR-PF), and 53.6% of patients with scores of 4 or more (43.9% CR-PF) (p<0.001). However, the score did not correlate with the severity of the fistula, with similar distributions of severity grades for each individual FRS score (p=0.46).

Conclusion: These findings externally validate the FRS as a useful tool in predicting PF after PD. The inability of FRS to predict PF severity suggests that other factors may determine the ultimate clinical sequelae of a PF.
Introduction: A growing body of literature has demonstrated the favorable perioperative and equivalent short-term oncologic outcomes of minimally invasive distal pancreatectomy (MIDP). However, how surgical approach influences cost—from insurer and patient perspectives—is unknown.

Methods: Using the MarketScan® databases we identified cases of open (ODP), laparoscopic (LDP), and robotic (RDP) distal pancreatectomy performed for malignant disease using ICD-9 and CPT procedure codes (2013-2014). Cost, defined from a societal perspective to include insurer and patient out-of-pocket (OOP) payment, was determined, inclusive of index hospitalization and any 90-day readmissions.

Results: A total of 892 patients were identified (658 ODP, 126 LDP, 108 RDP). There were no differences in baseline comorbidities between the three groups (Table 1). ODP patients were more likely to have a longer index hospitalization (ODP 6d, LDP 4d, RDP 5d; \( p < 0.001 \)). All groups had similar readmission rates (ODP 16.2%, LDP 14.3%, RDP 13.0%; \( p = 0.62 \)) with similar LOS at readmission; total hospitalization time remained longest in the ODP group (ODP 7d, LDP 4.5d, RDP 5d; \( p < 0.001 \)). ODP had the highest median index hospital payment (ODP $36,135, LDP $30,283, RDP $31,672; \( p = 0.01 \)) and median 90-day total payment (ODP $39,260, LDP $30,616, RDP $33,416; \( p =0.02 \)) among the three groups.

Conclusion: This all-payer claims-based analysis demonstrates that MIDP is associated with significantly lower 90-day costs compared to an open approach. These data make a compelling fiscal argument that MIDP—when safe and feasible—should be the preferred approach to distal pancreas malignancies.
P056 FLANGE GASTROENTEROSTOMY IS ASSOCIATED WITH A REDUCTION IN INCIDENCE AND SEVERITY OF DELAYED GASTRIC EMPTYING (DGE) AFTER STANDARD PANCREATODUODENECTOMY - A PROSPECTIVE COHORT STUDY

Adeel S Khan, MD, MPH, Greg Williams, Cheryl Woolsey, NP, Ryan Fields, MD, Majella B Doyle, MD, William Hawkins, MD, Steven Strasberg, MD; Washington University in St Louis, MO

Introduction: DGE is a common serious problem after pancreateoduodenectomy (PD) and can significantly increase procedure related morbidity. Flange gastrojejunostomy is a previously described technique that creates an internal flange in a hand sewn gastroenterostomy (JOGS 15:1468, 2011). It appears to result in less postoperative anastomotic swelling. Results of flange gastrojejunostomy on incidence and severity of DGE after PD are described.

Methods: Data were obtained from a prospective database of PD and its complications over a three year period 2013-2015. Two types of anastomoses after standard PD with antrectomy (SPD) were performed according to surgeon preference – SPD with flange gastroenterostomy (F-SPD) or SPD with non-flange gastroenterostomy techniques (NF-SPD). International Study Group (ISG) definition of DGE was used and DGE severity was graded based on ISG grading system and the Modified Accordion Grading System. (MAGS)

Results: A total of 215 SPD were performed during the study period. 68 (32%) were F-SPD and 147 (68%) were NF-SPD. DGE rates in F-SPD and NF-SPD were 8.8% and 23.1% respectively (p=0.02). The differences in severity of DGE were even more prominent. 29.4% of DGEs in NF-SPD group were ISG grade C versus 0% in F-SPD. Also 35.2% of DGEs in NF-SPD group were MAGS3 versus 0% in F-SPD (P<0.05). The difference remained significant even after excluding patients with organ space infection and pancreatic fistulae (MAGS3 or higher) as potential confounders (6.2% DGE in F-SPD vs 19% in NF-SPD). There were no significant difference in age, race, ASA status, BMI, serum albumin levels, pre-existing diabetes mellitus, pre-operative ERCP and stenting, use of neo-adjuvant chemotherapy, operative blood loss, rates of vascular reconstruction, or malignancy on pathology. There was also no difference in rates of organ space infection (OSI) and pancreatic fistulae (PF) between the two groups (P>0.05). Patients with DGE had significantly higher length of post-operative hospital stay (15.8 d with DGE vs 8.9 d without DGE) and readmission rates (93% with DGE vs 26.9% without DGE) (P<0.05). During the same period 47 pylorus sparing PDs were done with a DGE rate of 23.4%.

Conclusion: In this prospective cohort study the flange technique was associated with a marked reduction of the incidence and severity of DGE after PD.
INFECTED INTRAOPERATIVE BILE CULTURES WITH MULTIDRUG-RESISTANT GERMS IS ONE OF PREDICTORS OF COMPLICATION AFTER PANCREATICODUODENECTOMY  Francesca Gavazzi1, Cristina Ridolfi1, Giovanni Capretti1, Paola Morelli2, Marco Montorsi3, Alessandro Zerbi4; 1Pancreatic Surgery Unit, Humanitas Research Hospital, Rozzano, Italy, 2Infectious Diseases Unit, Hospital Health Direction, Humanitas Research Hospital, Rozzano, Italy, 3Departement of General Surgery, Humanitas Research Hospital,Humanitas University, Rozzano, Italy, 4Pancreatic Surgery Unit, Humanitas Research Hospital,Humanitas University, Rozzano, Italy

Backgrounds: Pathogenic bacteria resistant to multiple antimicrobial agents have become a critical challenge in health care facilities; surgical departments aren’t excluded. Gram-positive and Gram-negative strains are both involved.

Methods: We collected data of 315 consecutive patients underwent pancreaticoduodenectomy (PD) from January 2013 to October 2016. Analyzed factors were: infected, polimicrobic bile, type of bacteria strains isolated in bile cultures, pancreatic texture, Wirsung diameter. We wanted to estimate the impact of intraoperative bile culture positive to extended spectrum beta lactamase (ESBL), extensively drug-resistant bacteria (XDR), carbapenem-resistant Klebsiella Pneumoniae (CR-KP) on postoperative complications in the subgroup of patients with intraoperative infected bile. Continuous data were compared by the T-test or the Wilcoxon test. Univariable and multivariable odds ratios (OR) with 95% confidence intervals (CI) were calculated.

Results: Patients with infected bile cultures were 185 (59%), of which 150 (81%) with polimicrobic bile, 37 (20%), 12 (6%) and 9 (5%) with ESBL, XDR, and CR-KP bacteria positive bile respectively. At univariable analysis the occurence of wound infection was statistically significant related to intraoperative infected bile (infected 20%, sterile 2%, p<0.001) and to the presence of ESBL (positive 39%, negative 15%, p=0.001), XDR (positive 42%, negative 18%, p=0.046) and CR-KP (positive 56%, negative 18%, p=0.015) bacteria in bile cultures. Both patients with ESBL and CR-KP positive bile had a significantly higher incidence of medical complications (positive 40%, negative 13%, p<0.001, positive 56%, negative 16%, p=0.003, respectively). Patients with XDR positive bile strains were statistically associated to reintervention (positive 25%, negative 5%, p=0.033) and major surgical complications (Clavien≥3; positive 67%, negative 21%, p<0.001). The multivariable model confirmed the results of univariable analysis for wound infection with the higher risk for CR-KP germ positive bile patients (OR 6.82, 95% CI: 1.67; 27.82, p<0.001) and for medical complications for ESBL (OR 6.45, 95% CI: 2.57; 16.17, p=0.001) and CR-KP (OR 8.61, 95% CI: 2.07; 35.81, p=0.003) bacteria positive bile patients. ESBL bacteria into bile cultures increased also the risk of reintervention of 4.59 times (p=0.024) and of readmission of 4.23 times (p=0.018). At multivariable analysis XDR bacteria in bile cultures maintain is deleterious effect on the risk of developing major surgical complications (OR 7.84, 95% CI: 2.1; 29.34, p=0.002) and furthermore these patients had an increased risk of undergoing reintervention (OR 8.51, p=0.008). Patients with XDR and CR-KP bile positive cultures had a longer hospital stay (median days: negative 12, positive 18.5 p=0.041 respectively). No differences in mortality were observed (death: 2%, 4/185).

Conclusions: Pathogenic bacteria resistant to multiple antimicrobial agents, present into intraoperative bile cultures of these patients underwent PD, affected their postoperative course: particulary XDR and CR-KP strains increased hospital stay length because of burden of complications.
P058 PREOPERATIVE FUNCTIONAL CAPACITY AND PULMONARY FUNCTION IN PATIENTS THAT UNDERWENT PANCREATICODUODENECTOMY: A PILOT STUDY

Giovanni Capretti¹, Francesca Gavazzi¹, Marco Provenzano², Martinez Monica Caravaca³, Katia Amato⁴, Sara Pierini⁴, Stefano Aglieri⁴, Alessandro Zerbi⁵, ¹Pancreatic Surgery Unit, Humanitas Research Hospital, Rozzano, Italy, ²Nursing Course, Humanitas University, Rozzano, Italy, ³Nursing Staff, Humanitas Research Hospital, Rozzano, Italy, ⁴Physiotherapy Department, Humanitas Research Hospital, Rozzano, Italy, ⁵Pancreatic Surgery Unit, Humanitas Research Hospital, Humanitas University, Rozzano, Italy

Introduction: Pulmonary function and functional capacity are often not evaluated during the preoperative assessment. However increasing reports, especially in thoracic surgery, underline their impact on outcomes. Moreover some evidence showed that a prehabilitation protocols can affect these status before the surgical procedure.

Methods: from July 2015 to January 2016 31 patient that underwent a pancreaticoduodenectomy in our center were preoperatively evaluated with a 6 minute walking test (6MWT) and a spirometry. Borg rating of perceived muscular and respiratory exertion was evaluated at the beginning and at the end of the 6MWT, also variations in blood saturation ad arterial pressure were measured. Pre, intra and postoperative data were prospectively collected. Postoperative complications were defined according to Clavien-Dindo classification (major complications > 2). Chi square, Pearson test and logistic regression models were used. Data are expresses as median [IQR]

Results: All patients were treated for a neoplastic disease (22 pancreatic adenocarcinoma; 6 biliary track adenocarcinoma;2 neuroendocrine tumors; 1 ampullary tumor), 17 were male, median age was 70 [63-77], BMI 21.6 [20.2-25.4], 74.2% were ASA 2, 8 were active smokers. The median distance at the 6MWT was 420 meters [345-468], 25 (80.6%) walked a distance inferior to the expected. At spirometry 48.4% of patients show a Forced Expiratory Volume at 1 second (FEV1) inferior of the expected, 45.2% a Forced Vital Capacity (FVC), 77.4% a Peak Expiratory Flow (PEF), 29% a Tiffeneau Index (TI). Major complications rate among patients with a low distance at the 6MWT was 20% vs 0%. Patients with a reduced FEV 1 show a rate of major complications of 26.7% vs 6.3% (p=0.122).The same was observed for FVC 28.6% vs 5.9% (p=0.087). TI doesn't show any correlation with postoperative overall and major complications. Systolic difference of pressure before and after 6MWT was correlated with overall postoperative complications (p=0.034; OR 1.21). Borg respiratory rating was correlated with major complications (p=0.038; OR 3.839). Length of stay, variation of Borg respiratory rating (p=0.003; 0.533) and systolic pressure (p=0.016; 0.442) before and after the 6MWT were also correlated in our population.

Conclusions: functional capacity and pulmonary function are impaired in most of patients that underwent a pancreaticoduodenectomy. This condition seems to be related with a higher rate of complications and a prolonged length of stay. This subgroup of patients could benefit of prehabilitations or specific recovery protocols. Larger studies are needed to assess the efficacy of these protocols in patients that undergo pancreatic surgery.
**Background:** While pancreatic surgery has become increasingly centralized, the impact of rural location on overall survival has not been studied for pancreas cancer. We hypothesized that in patients with Stage I pancreatic cancer, rural patients would have decreased rate of pancreatectomy and a survival disadvantage compared to urban patients.

**Methods:** A retrospective analysis of the Surveillance, Epidemiology, and End Results Program (SEER) database was performed reviewing patients with Stage I pancreatic cancer from 2004-2013. Patients were examined based on Rural-Urban Continuum Code (RUCC), with county of residence classified as urban, rural adjacent to urban, and rural non-adjacent to urban. The primary outcome measured was the rate of surgical resection. Multivariate logistic regression and Cox proportional hazard models were used to examine likelihood of undergoing pancreatectomy and independent predictors of survival, respectively.

**Results:** Of 80,130 patients with pancreatic cancer, 6,196 were Stage I pancreatic cancer; 6,192 of these had an available RUCC code, and 2947 underwent pancreatectomy. Resection was performed on 48.5% of patients residing in urban counties compared to 41.1% and 39.5% of patients residing in rural-adjacent and rural non-adjacent counties, respectively, with increased rates of surgery not being recommended in rural counties (p=0.002). Multivariate logistic regression controlling for demographics and time period of diagnosis revealed a lower likelihood of undergoing pancreatectomy among patients from rural counties with an adjusted odd ratio 0.69 (95% CI; 0.53-0.90) and 0.68 (95% CI; 0.51-0.91) for adjacent and non-adjacent cohorts. For all patients, regardless of resection status, median survival of 18 months was seen for urban patients, 14 months for rural-adjacent patients, and 10 months for non-adjacent patients with Stage I pancreas cancer (p<0.001). Controlling for demographics, time period of diagnosis, receipt of surgery, and radiation therapy, while there was no difference between survival within rural-adjacent and urban counties (HR 1.07; 95% CI, 0.93-1.22), patients residing in rural non-adjacent counties had a statistically significant decrease in survival (HR 1.28; 95% CI, 1.10-1.48; p <0.001) compared to urban counties.

**Conclusion:** As we hypothesized, patients residing in both rural adjacent and rural non-adjacent counties were significantly less likely to undergo pancreatectomy than patients in urban counties, but there was a survival disadvantage only for rural non-adjacent patients. Further exploration of rural disparities and implications of driving distance, referral barriers, and access to health care for pancreas cancer is warranted.
**Introduction:** The rate of superficial surgical site infection (SSI) following pancreatectoduodenectomy remains high. Despite significant investment in process measures aimed at reducing perioperative infectious complications, there has been no change in SSI rates. Following resection for cancer, complications such as SSI impact adjuvant therapy delivery and portend worse survival. The utilization of an incisional negative pressure dressing (iVAC) has been demonstrated to reduce SSI in other high-risk cohorts.

**Methods:** Following a comprehensive effort to identify patients at high risk for SSI, the practice patterns at a single academic center shifted and iVAC use increased. Data regarding SSI were subsequently collected in a prospectively maintained database. Individualized patient risk and frequency of SSI in the cohort receiving iVAC was compared to the cohort receiving standard incisional closure.

**Results:** In total, 436 patients underwent pancreatectoduodenectomy over a 21-month period. There were 120 patients (27.5%) who had an iVAC applied. The overall rate of SSI was 20%. On multivariate analysis, increased risk for SSI was associated with neoadjuvant therapy administration, preoperative biliary interventions and prior abdominal surgery. Obese patients and patients receiving preoperative biliary intervention were more likely to have an iVAC employed. Despite this, iVAC use was associated with a decreased rate of SSI (OR 0.45, p<0.009). In the highest-risk patients, SSI rate was decreased from 49% in patients without an iVAC to 19% with iVAC use (p=0.018).

**Conclusion:** The use of an iVAC following pancreatectoduodenectomy is associated with decreased SSI rates. This is particularly true for patients at highest risk. When integrated with prior work, these data suggest iVAC use may improve adjuvant therapy administration for cancer patients with potential long-term oncologic benefit.
P061 BLOOD TRANSFUSION IS ASSOCIATED WITH WORSE OUTCOMES FOLLOWING PANCREATIC RESECTION FOR PANCREATIC DUCTAL ADENOCARCINOMA Ammar A Javed, MD, Sean M Ronnekleiv-Kelly, MD, Richard A Burkhart, MD, Martin A Makary, MD, MPH, Jin He, MD, PhD, John L Cameron, MD, Christopher L Wolfgang, MD, PhD, Matthew J Weiss, MD; Johns Hopkins

Introduction: Pancreatectomy remains the only potentially curative therapy for patients with pancreatic ductal adenocarcinoma (PDAC). Existing literature suggests that 27-68% of patients require perioperative allogeneic blood transfusion (PBT). An historical practice of liberal PBT use is being questioned as data emerges documenting a detrimental long-term oncologic effect. The impact of transfusion in an era of restrictive PBT is incompletely described.

Methods: A single-institution, prospectively-maintained database identified 553 patients who underwent resection for PDAC from 2009-2015. Patients were stratified by PBT and clinicopathological variables were analyzed. Perioperative mortalities were excluded. Primary outcome measure was median overall survival (OS).

Results: A total of 238 patients (43.0%) received PBT. Those receiving PBT were more likely to be elderly or have a history of coagulopathy and anemia. PBT was also more common with rising ASA class, neoadjuvant therapy administration, higher estimated blood loss (EBL), positive margin status, and need for concomitant vascular resection.

The median OS for the entire cohort was 24.8 months. PBT was associated with a poorer median OS (17.2 vs. 27.4 months, p<0.001) (Figure 1). Univariate analysis identified age, AJCC T-stage, number of harvested nodes, tumor size, lymphovascular invasion, EBL and margin status as factors associated with OS. In the multivariable analysis, PBT was independently associated with poorer OS (HR=1.6, p=0.001). Receipt of two or more blood units was associated with a shorter survival (16.2 vs. 26.8 months, p<0.001).

Conclusion: Patients are more apt to require PBT with increasing comorbidities, locally-advanced/borderline-resectable tumors, and neoadjuvant therapy. PBT is associated with decreased survival, while increasing transfusion requirements are associated with poorer outcome. This is the largest single-institution study confirming the effects of PBT on long-term outcomes after pancreatectomy for PDAC.
P062 NEOADJUVANT AND ADJUVANT CHEMOTHERAPY IN PANCREATIC DUCTAL ADENOCARCINOMA: DOES DRUG SELECTION, DURATION, OR SEQUENCE AFFECT OUTCOMES? Ammar A Javed, MD, Richard A Burkhart, MD, Alina H Shah, BS, Lauren M Rosati, Jin He, MD, PhD, Martin A Makary, MD, MPH, Daniel A Laheru, MD, Ralph H Hruban, MD, Lei Zheng, MD, Joseph M Herman, John L Cameron, MD, Christopher L Wolfgang, MD, PhD, Matthew J Weiss, MD; Johns Hopkins Hospital

Introduction: Surgery, the only potentially curative therapy for pancreatic ductal adenocarcinoma (PDAC), is only possible in 20% of patients at presentation. Modern neoadjuvant chemotherapeutics can increase the cohort eligible for surgery. There are two common chemotherapeutic backbones for PDAC, 5-fluorouracil (5FU) and gemcitabine (GEM). Guidelines for therapy in the neoadjuvant and adjuvant setting are limited.

Methods: A single-institution, prospectively-collected database review of borderline resectable (BR) or initially locally-advanced PDAC (LAPC) who underwent resection after neoadjuvant therapy. Patients were stratified by type and duration of neoadjuvant therapy. Adjuvant therapy was catalogued and survival was analyzed.

Results: Over 10 years, 293 patients underwent resection after neoadjuvant therapy for an initial diagnosis of BR or LAPC. 5FU and GEM-based therapy was most common (46.4% and 39.6%, respectively). A complete resection (R0) was achieved in 72.1%, R1 in 21.8%, and R2 in 6.1%.

After surgery, half received no adjuvant chemotherapy. Of the remainder, half received the same chemotherapeutic backbone as before surgery. Median overall survival (OS) for the entire cohort was 18.1 months. The neoadjuvant chemotherapeutic backbone (5FU or GEM) did not impact OS. Patients receiving the same regimen postoperatively had an OS similar to those who switched drugs (19.9 months same-agent, 21.4 months for therapeutic switch, p=0.09). For those receiving less than four months of neoadjuvant therapy, receipt of adjuvant therapy was associated with an improved median OS (no adjuvant vs. same-regimen vs. different-regimen: 9.1 vs. 23.7 vs. 21.4 months, p=0.036). In those patients receiving four or more months of neoadjuvant therapy, no association was found between OS and adjuvant therapy.

Conclusion: There is considerable variability in neoadjuvant and adjuvant therapy use in PDAC. A therapeutic switch in the adjuvant period does not appear to improve overall survival. In patients receiving fewer than four months of neoadjuvant therapy, the administration of adjuvant treatment is associated with improved overall survival.
Objective: The objective this study is to evaluate perioperative risk factors associated with pancreatic fistulas following distal pancreatectomy.

Methods: We analyzed data at our institution in patients undergoing distal pancreatectomy (2012-2016). Predictors of pancreatic fistula were determined by univariate and multivariate logistic regression analysis. A pancreatic fistula was defined as a drain amylase >300. The need for percutaneous drain insertion was a considered clinically relevant pancreatic fistula.

Results: Among 129 patients undergoing distal pancreatectomy, median age was 60 years (range 20-85) and 60 (46.5%) were male. A pancreatic fistula was diagnosed in 42 (32.6%) patients. On multivariate analysis, a BMI ≥ 25 (OR 2.46, 95% CI 1.03-5.89), PD £3 mm (OR 2.94, 95% CI 1.14-7.59), and laparoscopic surgery (OR 2.99, 95% CI 1.32-6.80) were associated with a pancreatic fistula. Nine patients (21.4%) had a clinically relevant pancreatic fistula. The use of a stapling device for pancreatic transection was associated with a reduced risk of a clinically relevant pancreatic fistula (OR 0.05, 95% CI 0.01-0.31). BMI ≥ 25, PD £3 mm, and laparoscopic surgery were not associated with a clinically relevant pancreatic fistula (all p>0.05).

Conclusions: Patients with a BMI ≥ 25, PD £3 mm, and undergoing laparoscopic surgery were at risk for developing a pancreatic fistula, but not clinically relevant pancreatic fistulas. While selection bias may play some role, transection of the pancreas with a stapling device was associated with a lower risk of developing a clinically relevant pancreatic fistula.
Objective: To compare the accuracy of the American Gastroenterological Association (AGA) 2015 guidelines, Fukuoka Consensus 2012 guidelines, and a modified Fukuoka guideline including a cyst ≥3 cm as indication for pancreatectomy in the management of pancreatic mucinous cystic neoplasms (PMCNs).

Methods: We retrospectively identified all patients at our institution that underwent pancreatectomy for PMCNs (2012-2016). Preoperative clinical, radiographic, and cytopathology results were reviewed. The AGA, Fukuoka, and modified Fukuoka criteria were applied and the incidence of missed high grade dysplasia (HGD) and invasive cancer were evaluated.

Results: We identified 92 patients with PMCNs: 11 (11%) MD-IPMN, 28 (27%) SB-IPMN, 37 (35%) mixed-IPMN, and 16 (15%) MCNs. Among all patients, 48 (52%) were symptomatic, 22 (24%) had high risk features, 80 (88%) had worrisome features, and 13 (14%) had suspicious or positive cytology. Using AGA guidelines, 72 (78%) patients met criteria for pancreatectomy, 74 (80%) using Fukuoka criteria, and 97 (92.4%) using modified Fukuoka criteria. On surgical pathology, HGD or invasive cancer was found in 82% of MD-IPMN, 10% of SB-IPMN, 81% of mixed-IPMN, and 25% of MCNs. Overall, the rate of missed HGD or invasive cancer was 13%, 17%, and 6% using the AGA, Fukuoka, and modified Fukuoka guidelines, respectively.

Conclusions: The addition of a cyst size ≥3 cm as an indication for pancreatectomy in patients with mucinous neoplasms reduced the percentage of missed HGD or invasive cancer from 13% using the AGA guidelines and 17% using the Fukuoka guidelines to less than 6%.
Introduction: Patients undergoing pancreaticoduodenectomy (PD) frequently require post-hospital recovery at rehabilitation facilities. Early identification of patients at risk for rehab placement may help with pre-operative education, risk stratification, and discharge planning. We evaluated the predictive role of early perioperative factors on rehabilitation facility placement to identify patients who may require this service.

Methods: The ACS-NSQIP pancreas-targeted database was queried to identify patients who underwent pancreaticoduodenectomy (PD) in 2014. Patients who originated from a facility, those with unknown or expired discharge disposition, and emergency cases were excluded. All perioperative variables were assessed via multivariate logistic regression analysis to identify predictors of discharge to a rehabilitation facility.

Results: Of 3073 PD patients with complete data, 409 (13.3%) were discharged to rehab. Mean age was 64; 53.7% were male. Most PDs (80%, n= 2458) were performed for malignant disease. Vascular resection was performed in 16.4% of cases, while 7.1% underwent an additional major concurrent procedure, the most common of which were ventral hernia repair, partial colectomy, component separation, hepatic resection, and partial/total nephrectomy.

On multivariate analysis, age, ASA score, BMI, dyspnea, COPD, ascites, chronic dialysis, non-malignant indication, and major concurrent procedure were predictive of rehab disposition. Neoadjuvant therapy and vascular resection were not significant, even on subgroup analysis of malignant patients only.

Conclusion: Perioperative risk factors that predict need for post-operative rehabilitation after PD include advancing age, BMI, ASA score, presence of major comorbidities, and undergoing a major concurrent procedure. At-risk patients may benefit from additional preoperative education/risk stratification, and earlier engagement of advanced discharge planning services.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Odds Ratio</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>1.094</td>
<td>.000</td>
</tr>
<tr>
<td>Female</td>
<td>1.214</td>
<td>.126</td>
</tr>
<tr>
<td>ASA ≥ 3</td>
<td>1.508</td>
<td>.028</td>
</tr>
<tr>
<td>BMI</td>
<td>1.036</td>
<td>.001</td>
</tr>
<tr>
<td>Diabetes</td>
<td>1.222</td>
<td>.073</td>
</tr>
<tr>
<td>Dyspnea</td>
<td>1.622</td>
<td>.045</td>
</tr>
<tr>
<td>Non-Caucasian</td>
<td>0.854</td>
<td>.451</td>
</tr>
<tr>
<td>Active Smoker</td>
<td>1.293</td>
<td>.051</td>
</tr>
<tr>
<td>COPD</td>
<td>2.093</td>
<td>.002</td>
</tr>
<tr>
<td>Ascites</td>
<td>11.072</td>
<td>.002</td>
</tr>
<tr>
<td>CHF</td>
<td>2.576</td>
<td>.392</td>
</tr>
<tr>
<td>Hypertension</td>
<td>1.185</td>
<td>.148</td>
</tr>
<tr>
<td>Dialysis</td>
<td>36.666</td>
<td>.016</td>
</tr>
<tr>
<td>Chronic Steroids</td>
<td>1.352</td>
<td>.204</td>
</tr>
<tr>
<td>Perioperative Transfusion</td>
<td>1.440</td>
<td>.308</td>
</tr>
<tr>
<td>Weight loss &gt; 10%</td>
<td>1.137</td>
<td>.353</td>
</tr>
<tr>
<td>Bleeding disorder</td>
<td>1.351</td>
<td>.649</td>
</tr>
<tr>
<td>Wound classification ≥ 3</td>
<td>1.251</td>
<td>.085</td>
</tr>
<tr>
<td>Obstructive jaundice</td>
<td>0.825</td>
<td>.226</td>
</tr>
<tr>
<td>Biliary Stent</td>
<td>0.933</td>
<td>.663</td>
</tr>
<tr>
<td>Minimally-invasive approach</td>
<td>0.548</td>
<td>.063</td>
</tr>
<tr>
<td>Vascular Resection</td>
<td>0.984</td>
<td>.925</td>
</tr>
<tr>
<td>Major concurrent procedure</td>
<td>2.245</td>
<td>.000</td>
</tr>
<tr>
<td>Malignant indication</td>
<td>0.504</td>
<td>.000</td>
</tr>
<tr>
<td>Pancreatitis histology</td>
<td>0.546</td>
<td>.046</td>
</tr>
</tbody>
</table>
P066 MAGS SEVERE COMPLICATIONS SCORING: A UNIVERSAL RIGOROUS COMPLICATION EVALUATION TECHNIQUE INDEPENDENT OF COMPLICATION GATHERING METHODS AND BASED ON GRADE 3-6 COMPLICATIONS IN THE MODIFIED ACCORDION GRADING SYSTEM (MAGS) Dominic E Sanford, Cheryl A Woolsey, Gregory Williams, Ryan C Fields, Maria B Majella Doyle, William G Hawkins, William C Chapman, Steven M Strasberg; Washington University in St. Louis

Introduction: By comparison of NSQIP to non NSQIP methods we showed that variations in definition and method of retrieval of complications very significantly influence outcome statistics after pancreateoduodenectomy (JACS 219:407;2014). Interestingly, this problem applies only to Modified Accordion Grading System (MAGS) mild (MAGS1) and moderate (MAGS2) complications. For severe complications (MAGS grades 3-6) there was excellent concordance in results when either NSQIP or other techniques were used including retrospective chart review. Worldwide, few institutions have NSQIP so valid comparisons across time or institutions are severely restricted. However basing comparisons on severe complications in MAGS overcomes this problem. The methodology is applied in a case series of pancreateoduodenectomies.

Methods: 90 day complications after pancreateoduodenectomy were gathered at a weekly clinical conference over exactly 5 years starting in 2011 and graded by MAGS criteria. These are MAGS3 = complication requiring invasive procedure not under GA, MAGS4 = complication requiring invasive procedure under GA or complication with single organ system failure, MAGS5 = complication requiring invasive procedure under GA plus complication with single organ system failure OR complication with multi-organ system failure and MAGS6 = postoperative death. The previously validated weights for these categories in which no complication is 0 and postoperative death is 1.00 are MAGS3 = 0.37; MAGS4 = 0.60; MAGS5 =0.76; MAGS6 = 1.00. The highest grade MAGS3-6 90 day complication in each patient having such a complication was used to calculate the MAGS severe complication index. Patients without complications or those whose complication was below MAGS3 were scored as 0.

Results: 504 patients had PD. 85 patients or 16.9% had a MAGS3-6 complication. The highest grade severe complications in individual patients were MAGS3 52 patients (10.3%), MAGS4 13 patients (2.6%), MAGS5 11 patients (2.2%) and MAGS6 9 patients (1.8%). In 6 patients the complication occurred after day 30 including one death. In MAGS3 non-hemorrhagic consequences of pancreatic anastomotic failure (20 patients) and delayed gastric emptying (12 patients) were the most common complications. The most common MAGS4-6 complications were postoperative bleeding sometimes associated with pancreatic fistula. Taking into account all patients the severe complication score was 0.087 ie about 9% of the maximum possible score.

Conclusions: Complication rates and severity are critical indicators of outcome of surgery. They are used within surgery and by external agencies to rate quality and value. Other than NSQIP, which has limited availability there is no reliable complication scoring system because of the variability in the methods of retrieval and definition of complications. And NSQIP does not grade the severity of complications. MAGS Severe Complications Scoring does not assess mild and moderate complications. However it is rigorous and can be accurately determined even on retrospective data review and without a specialized complication gathering team. It should prove to be an important comparative metric.
Introduction: The patient's refusal to accept blood transfusions during major abdominal surgery forces the surgeon to face an ethical challenge and raises doubts about the appropriate perioperative management of these patients. We sought to present our experience regarding feasibility and safety of bloodless major pancreatic surgery.

Material and methods: We retrospectively analysed perioperative outcomes of 28 unselected Jehovah's witness who underwent surgical exploration for pancreatic and periampullary tumors between March 2010 and October 2016. Four patients were considered unresectable intraoperatively and were excluded from the study. With the collaboration of a multidisciplinary team, we tried to achieve best-target values of preoperative haemoglobin and we treated perioperative anaemia with the administration of drugs stimulating erythropoiesis such as recombinant human erythropoietin, iron and folic acid.

Results: Clinico-pathological data of 24 patients were included. Median age was 65 years (range 31 to 77), 15 (62.5%) patients were female. Seventeen (n=17, 70.8%) patients underwent pylorus preserving pancreaticoduodenectomy, 3 (12.5%) spleen-preserving left pancreatectomy, 3 (12.5%) distal splenopancreatectomy, 1 (4.2%) total pancreatectomy. Median estimated intraoperative blood loss was 400mL (range 300 to 700). Median duration of surgery was 470 minutes (range 390 to 545). Median preoperative value of haemoglobin was 14.1g/dL (range 12.4 to 15.8) and median postoperative day 1 haemoglobin was 12.4g/dL (range 9.3 to 14.9). Thirteen (54.2%) patients presented ductal pancreatic adenocarcinoma, 3 (12.5%) neuroendocrine tumor, 2 (8.3%) mucinous cystadenocarcinoma, 2 (8.3%) adenocarcinoma of the common bile duct, 1 (4.2%) mucinous cystadenocarcinoma, 1 (4.2%) serous cystadenoma, 1 (4.2%) pseudopapillary solid tumor of the pancreas, 1 (4.2%) adenocarcinoma of the ampulla of Vater. We observed complications Clavien-Dindo grade I-II in 10 (41.7%) patients: 6 (25%) postoperative pancreatic fistula (5 grade A and 1 grade B), 3 (12.5%) Delayed gastric emptying (2 grade A and 1 grade B), 1 (4.2%) abdominal collections, 1 (4.2%) biliary fistula, and 1 (4.2%) pulmonary thromboembolism. We reported only 1 complication Clavien-Dindo grade III such as abdominal fluid collection which required percutaneous drainage. In hospital mortality was 0%. Median length of stay was 16 days (range 8 to 30).

Conclusions: Multidisciplinary approach and specific perioperative management permit feasible and safe pancreatic resections in Jehovah's Witness patients.
Objective: The Prognostic Nutritional Index (PNI) has been shown to predict the development of complications after certain gastrointestinal procedures, mainly in Far Eastern populations. However, its role in pancreatic surgery has not been adequately evaluated. The aim of this study is to assess the ability of PNI to predict the risk for complications after pancreatoduodenectomy (PD) in a Western population.

Methods: Patients who underwent PD at a single academic tertiary care center were included. Clinicopathological, demographic and perioperative data were collected. The PNI was calculated for each patient according to the formula 10 x serum albumin (g/dL) + 0.005 x blood lymphocyte count (per mm3), and two groups were generated (PNI≥50, PNI<50). The relationship between postoperative complications and PNI was assessed using linear logistic regression and chi-square.

Results: 210 patients (mean age 64.3 years) were included and analyzed. The median PNI score was 48.6 (Interquartile range 44.5-53.7). Malignant pathology was associated with a lower PNI: 35.2% of patients with malignant disease had PNI≥50, compared to 67.3% of those with benign disease (p<0.001). 148 patients developed complications, and the PNI did not predict the overall development of complications in either linear (p=0.99) or dichotomized models (PNI≥ or < 50, p=0.49). With regards to specific complications, both models failed to demonstrate an association between lower PNI and the occurrence of surgical site infections, postoperative sepsis, delayed gastric emptying, pancreatic fistula or hospital readmissions.

Conclusion: These findings do not support the use of PNI to delineate the postoperative complication risk for patients undergoing PD.
Factors predicting postoperative complications following salvage surgery for failed endoscopic management in chronic pancreatitis

Gautham Krishnamurthy, Vikas Moond, Srinath Rathod, Surinder S Rana, Deepak Bhasin, Rajinder Singh, Rajesh Gupta; Post Graduate Institute of Medical Education and Research

Introduction: Chronic pancreatitis management is multimodal involving pharmacological, radiological, endoscopic and surgical interventions. Patients are operated late in the disease process due to the increasing indications and expertise of endoscopic management. The progressive inflammatory process and repeated interventions could complicate the definitive surgery for failed endotherapy.

Materials and methodology: Present study is a retrospective analysis of prospectively maintained data base of chronic pancreatitis patients managed surgically between July 2012 to July 2016. Analysis was performed based on the clinical, radiological and perioperative course of these patients. Patients were divided into two groups based on presence (group 1) or absence (group 2) of prior pancreatic ductal stenting.

Results: 52 patients with chronic pancreatitis were included. 26/52 did not have demonstrable etiology and 23 had alcohol as etiology. Pancreatic divisum and post-traumatic sequelae were the causes in two and one patient respectively. Prior endoscopic management was present in 27/52 patients. 22 had pancreatic ductal stenting alone whereas 4 had biliary stenting alone. One patient had both. There was no significant difference between the group 1 and group 2 among the preoperative clinical, radiological and biochemical parameters.

Frey’s procedure, Modified Frey’s (head and body coring) procedure and partial pancreaticoduodenectomy were performed in 35, 12 and 5 patients respectively. 6 patients had postoperative bleeding, all requiring surgical intervention. One of these patients later developed pancreatic fistula managed endoscopically. 3 others died.

Among the study cohort, history of acute pancreatitis (p=0.03) and elevated amylase (p=0.02) at the time of surgery were associated with increased postoperative complications. No significant difference was present between group 1 and group 2 in this regard (p=0.58). Among group 1 patients, prior history of jaundice (p<0.01) and CT features of collaterals were commoner in the patients with postoperative complications. Duration of pain, etiology, exocrine or endocrine insufficiency, biliary stenting and various pancreatic pathologies on preoperative imaging did not have impact on perioperative outcomes. After excluding pancreaticoduodenectomy, there was no difference between group 1 and group 2 with respect to duration of surgery and blood loss.

Conclusion: Endoscopic stenting does not have adverse outcome on surgery. However, among those stented, factors like prior history of jaundice, acute pancreatitis and radiological features of collaterals are associated with increased risk of bleeding. (Long term impact on functional outcomes and quality of life are being assessed).
Background: The probability of occult metastatic disease (OMD) in patients with pancreatic adenocarcinoma (PDAC) in the era of enhanced computed tomography (CT) remains unknown. We assess that question through a retrospective descriptive study in a high-volume center for pancreatic surgery.

Methods: A retrospective cohort study was performed to identify all patients with PDAC and aborted surgery due to OMD from January 2007 to September 2016. Patient demographics and clinical and imaging data were evaluated. The identified cases were matched, based on age and gender, to a cohort of patients without OMD on a 1:3 ratio. Preoperative clinical and treatment characteristics were compared between the two cohorts and potential risk factors associated with OMD were assessed using a multivariable logistic regression model.

Results: In the studied time-period, 117 patients with OMD (8.22%) were identified in a total of 1423 pancreatectomies performed for PDAC. A diagnostic laparoscopy was performed selectively in 33 cases (28.2%) while the remainder commenced with exploratory laparotomy. Liver metastasis was the most common finding (n=92, 78.6%) followed by peritoneal implants (n=15, 12.8%). When compared with non-OMD pancreatectomy cases, patients with OMD presented more often with abdominal pain (59.8% vs. 36.5%; p<0.001) and weight loss (42.7% vs. 29.6%; p=0.009). Preoperative CA 19-9 levels were significantly increased in the OMD group (median 232 U/mL vs 120 U/mL, p=0.007). Additionally, 47 OMD patients (40.2%) had suspicious lesions on a pancreatic protocol CT, which could not be definitively characterized as metastases due to small size or non-specific characteristics. These indeterminate lesions were perceived in 17.4% of patients without OMD (n=61, p<0.001). Multivariable logistic regression of preoperative characteristics distinguished three independent predictors for OMD: presence of indeterminate lesions on preoperative CT-scan (OR 3.42, 95%CI 1.89-6.20), presence of abdominal pain (OR 2.96, 95%CI 1.67-5.25) and preoperative CA 19-9 levels higher than 200 U/mL (OR 1.98, 95%CI 1.14-3.46).

Conclusions: Occurrence of occult metastatic disease in pancreatic adenocarcinoma accounts for 8% of the cases in the era of enhanced imaging. Accurate assessment of risk factors for OMD is difficult. However, preoperative CA 19-9 higher than 200 U/mL and identification of indeterminate lesions in preoperative CT may indicate the need for diagnostic laparoscopy.
INTRODUCTION: Different composite metrics based upon the aggregate of weighted risk factors have been used to predict morbidity after pancreateoduodenectomy (PD). Yet, an optimal scoring system has not been identified. This prospective observational study compared the performance of three existing scoring systems for the prediction of major morbidity after PD.

METHODS: Patients who underwent PD from January 2015 to August 2016 were included in the study. The three selected scoring systems were: (I) The PREPARE score, a procedure-specific score based on preoperative factors only; (II) The Charlson-Age Comorbidity Index, a generic score based on patient comorbidities and age; (III) The Fistula Risk Score (FRS), a complication-specific score mainly based on intraoperative variables. Each score was calculated at the time of admission or before the pancreatic anastomosis construction, as appropriate. Postoperative complications were graded according to the Clavien and Dindo system. Major complications were defined as grade 3 or greater. In addition, the Comprehensive Complication Index (CCI) was calculated to correlate the prediction scores with the total burden of complications. Data were analyzed using standard statistical methods.

RESULTS: The study population consisted of 319 patients, of whom 195 (61.4%) had a complicated postoperative course. The incidence of major complications was 14.1% (45/319), the mortality rate was 1.9% (6/319). On both univariate and multivariable analyses, the FRS was strongly associated with the development of any complication (P<0.001) and major complications (P=0.008). Furthermore, there was a correlation between the FRS and an increase of the CCI (P<0.001). In particular, the FRS high-risk zone had a rate of major complications in excess of 50%, and a median CCI of 30. The Charlson-Age comorbidity index did correlate with 30-day mortality (P=0.014). The PREPARE was not significantly correlated with the development of major complications, CCI increase, or mortality.

CONCLUSION: The FRS, originally designed to predict the incidence of clinically-relevant pancreatic fistula, seems to be similarly useful for predicting major complications after PD. This might be because the variables included in the FRS (especially pancreas texture and duct size) are the principal drivers of complications, and weigh more than patient age, comorbidities or other preoperative variables.
Introduction: Postoperative pancreatic fistula (POPF) and further complications remain the Achilles heel of pancreatic surgery. Almost all models for risk prediction refer to parameters which are known only postoperatively. The aim of the current study was the prediction of clinical relevant POPF after pancreatoduodenectomy by preoperatively available parameters.

Methods: 89 patients with PD operated from December 2012 to June 2015 were included. Pancreas morphology was characterized by radiological parameters. The statistical analysis was carried out using a Classification and Regression Tree (CART) algorithm of the R software. Nine radiological-morphological parameters and seven clinical routine parameters were included in the prediction model.

Results: The incidence of POPF grade B/C according to ISGPS classification was 15%. A simple CART model on the basis of two parameters (BMI and radiological parenchyma thickness) predicted 91% of the cases correctly (positive/negative predictive value 66% and 96%). There was a significant correlation between prediction and pancreatic texture as well as Clavien-Dindo classification.

Conclusion: Clinical and radiological parameters combined in a CART model can correctly predict a clinical relevant POPF after pancreatoduodenectomy already before the operation. This can be used for clinical decision and stratification in randomized trials.
**P073 PREOPERATIVE NOMOGRAM PREDICTING NON-HOME DISCHARGE FOLLOWING PANCREATICODUODENECTOMY IN A NATIONAL COHORT OF PATIENTS**

Ibrahim Nassour, MD, Alana Christie, MS, Ali A Modad, MD, MS, Michael A Choti, MD, MBA, John C Mansour, MD, Rebecca M Minter, MD, MBA, Matthew R Porembka, MD, Matthew M Augustine, MD, PhD, Sam C Wang, MD, PhD; University of Texas Southwestern

**Background:** In spite of the improved surgical outcomes of pancreatic surgery and development of pathways to enhance recovery and discharge to home, a significant proportion of patients are discharged to inpatient facilities after pancreaticoduodenectomy (PD). The aim of this study is to determine the rate of non-home discharge (NHD) following PD in a national cohort of patients and to develop a predictive nomogram for NHD that can assist to set realistic expectations, perform adequate patient counseling and postoperative discharge planning.

**Methods:** The National Surgical Quality Improvement Program was used to identify patients who underwent pancreaticoduodenectomy between 2011-2013. Patients that underwent NHD were identified and compared to the group of patients discharged to home. A multivariate logistic regression was used to determine patient and preoperative factors predictors of NHD and to construct a nomogram. C-index was calculated to validate the predictive ability of the model.

**Results:** 6901 pancreaticoduodenectomy patients were identified of which 927 (13.4%) were NHD. Sixty-four percent were discharged to skilled care facility, 32% to a rehab facility and 3% to acute care facility. On multivariate analysis, predictors of NHD were female gender (OR=1.49; 95% CI:1.27-1.74), older age (OR=1.65; 95% CI:1.30-2.09), higher BMI (OR=1.06; 95% CI:1.02-1.11), albumin level (OR=0.73; 95% CI:0.58-0.91), ASA class III/IV (OR=1.61; 95% CI:1.29-2.00), >10% weight loss (OR=1.24; 95% CI:1.01-1.51), bile duct/ampullary neoplasm (OR=1.32; 95% CI:1.08-1.62) and neuroendocrine tumor (OR=2.03; 95% CI:1.06-3.91) compared to pancreatic cancer. A nomogram was constructed based on these preoperative variables. We also analyzed the association of intraoperative and postoperative variables with NHD. Patients who are on the ventilator for more than 48 hours, develop septic shock, undergo unplanned intubation or have postoperative pneumonia have high rate of NHD (65.4%, 65.1%, 59.0% and 49.6%, respectively). After adjusting for pre-operative variables, independent intra and postoperative predictors of NHD are: return to the operating room (OR=1.91; 95% CI:1.43-2.55), length of stay>14d (OR=3.24; 95% CI:2.75-3.82) and major inpatient complications (OR=1.62; 95% CI:1.38-1.92). When adding postoperative variables to the model, the C-index improved from 0.77 to 0.82.

**Conclusions:** Older age, female, higher BMI, lower serum albumin, high ASA, bile duct/ampullary/neuroendocrine neoplasms and weight loss are the main predictors of NHD after pancreaticoduodenectomy. Being able to predict discharge destination has been shown to improve discharge efficiency, better hospital resource utilization and better patients’ satisfaction. This nomogram provide the tool needed for surgeons to predict risk of NHD and therefore counsel patients and integrate this information in discharge planning. A more universal model for all operations would be a natural next step and that will make such a tool more applicable across different disciplines.
P074 DOES CT SCAN FOR ISOLATED LEUKOCYTOPSIS LEAD TO CHANGES IN CLINICAL MANAGEMENT? Jason Maggi, MD, Mazen Zenati, MD, Ahmad Hamad, BA, Amer Zureikat, MD, Herbert Zeh, MD, Melissa Hogg, MD; University of Pittsburgh Medical Center

Background: Pancreaticoduodenectomies (PD) have high post-operative morbidity and readmission rates, with infection accounting for many of these. Current trends in health care and reimbursements push for shorter length of stay and lower rates of readmission. The aim of this study is to determine if a CT scan performed in the absence of clinical infection provided clinical or diagnostic benefit for diagnosis of occult intra-abdominal infections in patients with a leukocytosis when ready for discharge after a PD.

Methods: A retrospective review of a prospectively maintained database was performed of all consecutive patients undergoing PD at a high-volume tertiary medical center over a six-year period (1/1/2010-3/30/2016). Clinical infection was defined as temperature ≥ 38.5°C and/or positive culture (blood, urine, or body fluid). Trend and absolute values of WBC during hospitalization were analyzed, and leukocytosis was defined as >13 x 10^9/L based on laboratory ranges. Univariate analyses of clinical factors during hospital admission were performed, and a multivariate logistic regression model was constructed to determine associations between clinical factors present during the index admission on rates of 90-day readmission.

Results: A total of 777 patients underwent PD, with mean age=66.5±11.4 years and male=53%. Of these, 555 patients (71.4%) demonstrated no clinical evidence of infection during hospital admission. Within this cohort without clinical infection, 308 (55.5%) had a persistent leukocytosis compared to 163 (73%); p<0.0001) with clinical infection. Forty-eight percent of patients (226/471) with a leukocytosis underwent a CT scan. Of the patients without clinical infection that had a leukocytosis, 92 (30%) underwent a CT scan compared to 134 (82%); p<0.001) with clinical infection. However, in the absence of clinical infection only 8/92 (9%) required an invasive intervention after CT compared to 43/134 (32%; p<0.001) with evidence of a clinical infection. In patients without clinical evidence of infection, leukocytosis did not predict the need for invasive interventions after CT in patients (OR=1.62, 95% CI (0.48 - 5.44), P=0.435), but it did in those with signs of clinical infection (OR= 2.66, 95% CI (1.12 – 6.31), P=0.026). Readmission within 90-days for the entire cohort was 33.7%; 31.9% without clinical infection and 38.3% with clinical infection (p=0.094). Leukocytosis in absence of clinical infection predicted 90-day readmission (OR=0.66, 95% CI 1.1-2.1, p=0.013) on univariate, but not multivariate, analysis (OR=1.41, 95% CI 0.96-2.07; p=0.078). CT scanning in the absence of clinical infection demonstrated a trend toward decreased risk of 90-day readmission (odds ratio=0.67, 95% CI 0.43-1.05, P=0.064).

Conclusions: CT scanning for isolated leukocytosis in the absence of clinical signs of infection resulted in low rates of clinical intervention; however, a trend towards reduced readmission was observed. Leukocytosis present upon discharge without clinical infection is a predictor of readmission. Further analysis to create a clinical algorithm to improve the positive predictive value of this expensive test is further warranted.
**Practice Patterns of Operatively Placed Drains Following Pancreatoduodenectomy: Too Much Variation**

Joel D Beane, MD, Michael G House, MD, Eugene P Ceppa, MD, Scott Dolejs, MD, Ben L Zarzaur, MD, Henry A Pitt, MD; 1Indiana University School of Medicine, Dept of Surgery, 2Temple University Health System, Philadelphia, PA

**Background:** Early drain removal, when guided by POD#1 drain fluid amylase (DFA-1), is associated with reduced rates of clinically relevant postoperative pancreatic fistula (CR-POPF) and abdominal complications following pancreatoduodenectomy (PD). However, whether surgeons have altered their management strategy based on these findings is unknown. Our aim is to report current practice patterns and management of intraoperatively placed drains following PD in a large, national cohort.

**Methods:** The American College of Surgeons-National Surgical Quality Improvement Program (ACS-NSQIP) Participant Use File for 2014 was queried to identify patients having undergone PD (n=3,069). Patients with intraoperatively placed drains were stratified according to the day of drain removal. Use of DFA as part of the management strategy and outcomes were recorded.

**Results:** Of 2698 patients, only 580 (21.5%) of patients had a DFA-1 recorded and 626 (23.2%) patients never had a DFA analyzed in the postoperative period. The use of DFA-1 varied based on timing of drain removal. Outcomes following Early (day 1-3; n = 207, 7.7%), Routine (days 4-7; n = 1,131, 41.9%), Delayed (days 8-14; n = 498, 18.5%), Late (days 15-28; n = 292, 10.8%), and Very Late ≥29 days (n = 293, 10.9%) day of drain removal are shown in the table.

**Conclusion:** Significant variation exists in the use of drain fluid amylase in the management and timing of surgical drain removal following pancreatoduodenectomy. Using an evidence based approach to the management of drains has the potential to improve postoperative outcomes and should be implemented in the care of these patients.

<table>
<thead>
<tr>
<th>Drain Timing</th>
<th>DFA-1 Collected (%)</th>
<th>DFA-1 Value (U)</th>
<th>Any DFA Collected (%)</th>
<th>Highest DFA-2-30 (median)</th>
<th>CR-POPF (%)</th>
<th>Any SSI (%)</th>
<th>Overall Morbidity (%)</th>
<th>30-Day Mortality (n, %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Drain (n=387)</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>11.5*</td>
<td>25.1*</td>
<td>29.0*</td>
<td>11, 2.9</td>
</tr>
<tr>
<td>Early (n=207)</td>
<td>63.7</td>
<td>857</td>
<td>92.3</td>
<td>248</td>
<td>3.9</td>
<td>11.6</td>
<td>11.6</td>
<td>5, 2.4</td>
</tr>
<tr>
<td>Routine (n=1131)</td>
<td>19.3*</td>
<td>3066*</td>
<td>76.5*</td>
<td>726</td>
<td>6.8</td>
<td>15.6</td>
<td>17.7†</td>
<td>13, 1.2</td>
</tr>
<tr>
<td>Delayed (n=498)</td>
<td>15.2*</td>
<td>3547*</td>
<td>76.0*</td>
<td>2,115†</td>
<td>10.3*</td>
<td>25.3*</td>
<td>34.6*</td>
<td>12, 2.4</td>
</tr>
<tr>
<td>Late (n=292)</td>
<td>19.0*</td>
<td>6180*</td>
<td>78.6*</td>
<td>6,208*</td>
<td>21.7*</td>
<td>33.8*</td>
<td>51.7*</td>
<td>8, 2.8</td>
</tr>
<tr>
<td>Very Late (n=277)</td>
<td>20.7*</td>
<td>4385*</td>
<td>82.4†</td>
<td>13,678*</td>
<td>49.7*</td>
<td>50.3*</td>
<td>69.3*</td>
<td>1, 0.3</td>
</tr>
</tbody>
</table>

* P ≤ 0.01 vs Early; † P ≤ 0.05; DFA, drain fluid amylase; SSI, surgical site infection
MINIMALLY INVASIVE PANCREATODUODENECTOMY: LAPAROSCOPIC OR ROBOTIC? Joel D Beane, MD, Michael G House, MD, Attila Nakeeb, MD, Eugene P Ceppa, MD, Scott Dolejs, MD, Herbert J Zeh, MD, Henry A Pitt, MD; Indiana University School of Medicine, Dept of Surgery, University Pittsburgh Medical Center, Dept of Surgical Oncology, Temple University Health System, Philadelphia, PA

Background: Laparoscopic and robotic surgery are novel approaches to pancreateoduodenectomy (PD). Reported series of minimally invasive PD are small or not adequately controlled. The aim of this analysis is to report outcomes following laparoscopic and robotic pancreateoduodenectomy compared with the open procedure in a large, multi-center cohort.

Methods: The American College of Surgeons-National Surgical Quality Improvement Program (ACS-NSQIP) Participant Use File 2014 was queried to identify patients having undergone minimally invasive (MI) pancreateoduodenectomy (163/3092, 5.2%). MI-PD included laparoscopic and robotic approaches as well as converted cases. Patients with a hybrid approach, vascular resections, and other major concomitant organ resection were excluded. Propensity scoring was used to match cohorts of patients having undergone and open, laparoscopic, and robotic PD.

Results: The median age was 65, and 56% were men. Fifteen percent of patients were pretreated with neoadjuvant therapy, 51% had pancreatic adenocarcinoma. Patient cohorts were similar with respect to patient demographics, comorbidities, neoadjuvant therapy, and pancreatic gland texture and duct size. Operative time was longer in patients having undergone MI-PD. Post-operative outcomes are shown in the table.

Conclusion: Laparoscopic and robotic approaches to pancreateoduodenectomy are safe and can be performed with comparable morbidity and mortality but take longer to perform. A robotic approach may reduce the need for conversion to open surgery compared to traditional laparoscopy.

<table>
<thead>
<tr>
<th></th>
<th>Conversion to Open (%)</th>
<th>Operative Time (min)</th>
<th>Overall Morbidity (%)</th>
<th>CR-POPF (%)</th>
<th>DGE (%)</th>
<th>Percutaneous Drain (%)</th>
<th>30-Day Mortality (n, %)</th>
<th>Length of Stay (Days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open (n=350)</td>
<td>-</td>
<td>353.0*</td>
<td>27.9</td>
<td>14.7</td>
<td>16.0</td>
<td>11.5</td>
<td>9, 1.7</td>
<td>10.7</td>
</tr>
<tr>
<td>Laparoscopic (n=81)</td>
<td>32.7†</td>
<td>436.8</td>
<td>27.1</td>
<td>19.6</td>
<td>26.0†</td>
<td>13.9</td>
<td>2, 2.5</td>
<td>11.0</td>
</tr>
<tr>
<td>Robotic (n=77)</td>
<td>12.5</td>
<td>421.6</td>
<td>26.0</td>
<td>18.1</td>
<td>11.8</td>
<td>10.5</td>
<td>1, 1.3</td>
<td>10.9</td>
</tr>
</tbody>
</table>

*P < 0.01 vs Lap/Robotic; † P < 0.05 vs Robotic; CR-POPF: clinically relevant-postoperative pancreatic fistula; DGE: Delayed gastric emptying.
Introduction: The prognosis of PNETs is heterogeneous. Whether immune events play a role in this heterogeneity is unknown. The revival of interest in the role of immunosurveillance in cancer prompted us to correlate the expression of immunologically relevant molecules such as HLA class I antigen and B7-H3, and the tumor specific immune response with the clinical course of the disease.

Methods: PNETs were immunohistochemically analyzed for HLA class I antigen and B7-H3 expression, and for peri- (p) and intra- (i) tumoral CD4+ and CD8+ T cell infiltration. Results were correlated with histopathological characteristics of the tumors and with disease-free (DFS) and overall survival (OS).

Results: Of the 104 patients for whom PNET tissue was available, 53% were male, 87% Caucasian, with a median age of 55y and median Charlson Comorbidity Index of 3. Forty-five percent of tumors were WHO grade 1 and the remaining grade 2, 91% were non-functional, median size was 2.8cm, and 17% had positive lymphnodes.

HLA-A and HLA-B/C heavy chain, and β2m expression was defective in 72, 65 and 56% of tumors, respectively. B7-H3 had cytoplasmic and membranous expression is 72 and 29% of tumors, respectively. HLA class I antigen expression was not associated with B7-H3 expression but was positively associated with CD8+ T cell infiltration and WHO grade.

Mean DFS and OS for the whole cohort were 143 and 180 months, respectively. No deaths were observed in patients with positive HLA-A and HLA-B/C expression (p=0.05). DFS was decreased in patients with high B7-H3 expression (p=0.018). OS and DFS were decreased in patients with higher pCD4+ (p=0.04, 0.002, respectively) and lower iCD8+ cells (p=0.05, 0.013, respectively). On multivariate analyses the combination of HLA-B/C expression and high pCD8+ T cell number was an independent predictor of DFS (HR=0.19; p=0.04) and pCD4+ T cell infiltration of OS (HR=1.04; p=0.02).

Conclusion: Immunological events appear to play a role in the clinical course of PNET since HLA class I expression and CD4+ T cell infiltration are associated with prognosis. Defects in HLA-B/C expression may provide PNET cells with an immune escape mechanism which may contribute to a decrease in survival.
P078 DOES IMMUNOSUPPRESSION FOLLOWING ORGAN TRANSPLANTATION INCREASE THE RISK OF MALIGNANT TRANSFORMATION OF SIDE BRANCH INTRADUCTAL PAPILLARY MUCINOUS NEOPLASMS? Maheswaran Pitchaimuthu, MD, Valery Vilchez, MD, Bijan Eghtesad, MD, R Matthew Walsh, MD, FACS, Gareth Morris-Stiff, MD; Cleveland Clinic Foundation

Introduction: Intraductal papillary mucinous neoplasms, including those of side-branch origin (SB-IPMN) have a documented risk for development of a carcinoma. Likewise, post-transplant immunosuppression is well known to increase the incidence of the majority of cancer phenotypes. The aim of this study was to assess whether immunosuppression lead to a high rate of malignant transformation in transplant recipients with documented SB-IPMNs.

Methods: Patients undergoing transplantation in the multivisceral program were identified from a prospectively collected institutional database, and their records were analyzed for documentation of the presence of a SB-IPMN. Preoperative characteres of the SB-IPMNs, as well as subsequent imaging, treatment, immunosuppression, and survival data were evaluated.

Results: 23 patients were found to have a SB-IPMN based on cross-sectional imaging prior to transplantation. Transplanted organs included: liver (n 15); kidney (n 7); and heart (n 1). Median pre-transplant cyst size was 1.5cms (Interquartile range (IQR) 1.4-2.0). At presentation 2 patients each had mild duct dilatation and cyst size more than 3 cms but did not undergo immediate surgery. Seven patientes were found to have multiple cysts. All but 1 patient, who received cyclosporine, were prescribed tacrolimus and mycophenolate based immunosuppressive therapies. Median follow up was 77 months (IQR 43-124). The cyst sizes had increased to a median of 2.1 cms (IQR 1.35-2.95). In 1 case the diagnosis was amended to a mixed-type IPMN during follow-up but due to co-morbidities, the patient did not fit surgery. Three patients underwent resection for an increase in size, 1 was found to have and incidental adenocarcinoma, and the remaining 2 demonstrated low-grade dysplasia on histopathology. A further patient had a borderline resectable pancreatic carcinoma and declined surgical resection. Three patient were evaluated with EUS and cytology, and currently remain in the surveillance program.

Conclusions: SB-IPMNs in the post-transplant setting show a similar progression to a non-immunosuppressed population and the malignant transformation rate of 8.9% justifies close surveillance.
**Introduction:** Pancreatic resection is, nowadays, the only curative treatment for pancreatic and biliary malignancies. Most of these malignancies occur mainly in elderly patients. In the past, pancreatic resection in the elderly population was associated with increased morbidity and mortality rates of around 30%. Indeed, elderly patients present increased susceptibility to infection after surgical procedures. **Aim:** To show that knowledge of the aging physiological and immunological aspects and the improvement of surgical techniques can change this scenario.

**Methods:** We studied 214 patients who had undergone pancreaticoduodenectomy (PD) in our center. The patients were divided into two groups based on age: group I (patients aged <70 years) and group II (those aged ≥70 years). Group II patients were submitted to a very short period of preoperative fast and a short period of postoperative enteral deprivation by using an enteral tube to reduce intestinal barrier dysfunction.

Our approach to reconstruction is based in the use of an isolated jejunal loop for the pancreatic enteric anastomosis with by diverting the pancreatic juice from biliary secretion may contribute to reducing the severity of pancreatic fistulas and the secondary complications. **Results:** The overall incidence of complications in the group of patients aged ≥70 years was 42.85%, while the group of patients aged less than 70 years showed 28.5% of complications (Chi-square test. p-value =0.0577 )

The overall incidence of complications in 214 patients submitted to PD was 31.77%. All patients survived to the surgical procedure.

**Discussion Conclusion:** Age is not an independent factor for complications and mortality following major pancreatic resection. With knowledge of physiological and immunological characteristic of aging, careful selection and using the best available surgical technique elderly patients will have a similar outcome following even major pancreatic surgery when compared to younger.
Background: A postoperative pancreatic fistula (POPF) is a common complication and associated with extended hospitalization, increased medical costs and a reduction in quality of life. Aim of the present study was to analyze the feasibility of ambulatory drain management and to develop a management algorithm.

Methods: We included all pancreatic resections between 01/2005 and 12/2014. Patients with POPF grade B/C and persistent drainage were identified. Postoperative events and clinical outcome of these patients were retrospectively analyzed from a prospectively collected database. The POPF was classified according to the criteria of the International Study Group for Pancreatic Fistula (ISGPF).

Results: A total of 887 pancreatic resections were performed in the above mentioned period. Some 132 patients (14.8%) developed a POPF (B/C), and 45 (34.1%) were discharged from hospital with percutaneous drainage of a POPF (Grade B: n=35; Grade C: n=10). In Grade B fistulas the mean hospital stay was significantly shorter compared with Grade C fistulas (mean 27.7 days vs. 40 days p=0.0285). In general, patients were discharged with one single drain left (95.6%). About 40% of the patients with ambulatory drainage developed a complication, but only 28.9% (n=13) required readmission. Of those, 52.9% necessitated no specific treatment, 26.3% were treated with a new drain placement. No patient showed major complications (Clavien-Dindo >IIIb). However, between B- and C fistulas no differences in frequency of complications could be observed (p=0.872). In grade B group the length of drain leaving was significantly shorter than in grade C group (52.2 days vs. 85.9 days; p=0.0007). The mean amount of ambulatory presentations till drain removal was 3.5 times.

Conclusion: Ambulatory drainage management is feasible once POPF is diagnosed. No severe complications during ambulatory course were observed. A management algorithm for ambulatory drains is recommendable. Furthermore, possibly medical costs could be reduced and quality of life could be increased by ambulatory drain management.
DUODENO-PANCREATECTOMY WITHOUT VASCULAR RESECTION FOR ISHIKAWA TYPE B ADENOCARCINOMA: UNDERTREATMENT OR NOT?

Luca Morelli, MD, FACS1; Simone Guadagni, MD1; Gregorio Di Franco, MD1; Matteo Palmeri, MD1; Luca Bastiani, PhD2; Niccolò Furbeta, MD1; Gianni Stefanini, MD1; Camilla Cremonini, MD1; Matteo Bianchini, MD1; Dario Gambaccini, MD3; Niccola Funel, PhD4; Luca Pollina, MD4; Daniela Campani, MD4; Santino Marchi, MD3; Giulio Di Candio, MD1; Franco Mosca, MD, FACS5; 1General Surgery, Department of Surgery, University of Pisa, 2Institute of Clinical Physiology, National Council of Research, 3Gastrointestinal Unit, Department of Gastroenterology, University of Pisa, 4Division of Surgical Pathology, University of Pisa, Italy, 5EndoCAS (Center for Computer Assisted Surgery), University of Pisa

BACKGROUND: Pancreatic cancer is an aggressive neoplasia characterized by poor prognosis. To achieve complete tumor clearance, en bloc portal/superior mesenteric vein resection has become routine in high volume hospitals, for locally advanced pancreatic head adenocarcinoma (PHA). However, it’s impact on survival still remain controversial. The aim of our study was to investigate the impact on local/distant recurrence rate and on patients survival of a preoperative Ultrasound (IU) guided conservative approach, on a selected group of patients, with preoperative radiological evidence of pancreatic head adenocarcinoma (Ishikawa type B group) with portal-mesenteric axis (PMA), in which we separate the neoplasia from the vein, without performing primary en bloc vascular resection (VR).

METHODS: Retrospective data of a consecutive series of patients who underwent duodeno-pancreatectomy (DP) for PHA at our tertiary care center, between 2008 and 2016, were reviewed. All patients underwent pre-operative Computer Tomography and were grouped according to Ishikawa classification in five types based on the relationship of the tumor to the PMA. We identified a selected group of Ishikawa type B (contact tumor/PMA with smooth shift without narrowing) in which, after checking the feasibility with IU, we preserved the vein without macroscopic residual (no vascular resection, nvrDP), and we compared it with a Ishikawa type A (no direct contact tumor/PMA) standard DP (sDP) group, in order to evaluate differences in local/distant recurrence and oncologic outcomes. Survival was compared using the Kaplan–Meier method and log-rank test P<0.05 was considered statistically significant.

RESULTS: A total of 136 DP were performed for PHA during the study period, of which 116 without VR and 20 with VR. The nvrDP group consisted in 34 (25%) cases whereas 82 (60%) patients were the sDP group. Isolated local recurrence rate in nvrDP cases, at the time of diagnosis disease recurrence, was not superior if compared with sDP group (12.5% vs 18.9%, p=0.56), as well as we didn’t find any statistically differences in systemic progression (38.5% in nvrDP group vs 44.3% in the sDP, p=0.38) or local plus synchronous systemic disease rate (4.9% in sDP group vs 11.5% in nvrDP group, p=0.26) at Chi-quadro test. Into the nvrDP group when disease recurrence was diagnosed, isolated local recurrence occurred only in the 13% vs 87% of cases in which a distant metastatic spread was found. There were no differences in terms of overall survival rate (1-year: 61% sDP vs 53% nvrDP; 3-year: 22% vs 18%; 5-years: 14% vs 17%; p=0.9) between the two groups.

CONCLUSIONS: PD without VR is a surgical approach that could be considered safe and oncologically acceptable in the vast majority of pre-operative Ishikawa type B PHA, without any significant influence of oncologic outcomes respect to sDP. Poor prognosis of PHA is more related to the aggressive biology and systemic spread of the tumor, rather than the local control. “Principled” vascular resection could not be justified in all the Ishikawa B PHA, in absence of significant improvement of disease control and patient's survival.
Background: A soft pancreatic consistency is a well-known risk factor for postoperative pancreatic fistula (POPF) after pancreaticoduodenectomy (PD). However, pancreatic consistency is usually evaluated intraoperatively and subjectively by surgeons, and soft pancreatic consistency is not an absolute indicator of the development of POPF. Preoperative, objective, and quantitative evaluation of the pancreatic texture could lead to a more widely acceptable means of assessing the risk of POPF. This study sought to characterize soft and hard pancreatic textures radiologically and histologically, and to evaluate specific risk factors in a soft pancreas associated with POPF formation after PD.

Methods: Consecutive 145 patients who underwent PD with a standardized procedure at a single institution between January 2010 and May 2013 were studied. Pancreatic consistency was intraoperatively judged as soft or hard. Pancreatic configuration, such as main pancreatic duct (MPD) diameter and parenchymal thickness, was assessed using preoperative CT. Histologic components of the pancreatic stump, such as fibrosis, lobules, and fat, were evaluated using a quantitative morphometric analysis. Clinicopathologic parameters were then analyzed for the risk of clinically-relevant POPF (grade B or C in the classification of the International Study Group on Pancreatic Fistula).

Results: Median age for all the patients was 68. There were 102 male patients (70.3%). PD was performed for 73 patients (50.3%) with pancreatic ductal adenocarcinoma. There were 79 patients with a soft pancreas and 66 patients with a hard pancreas. Clinically-relevant POPF occurred in 27 patients (18.6%). Compared with patients with a hard pancreas, those with a soft pancreas had a smaller MPD diameter (2.2±1.9 mm vs. 5.8±3.3 mm, P < 0.001) and a larger parenchymal thickness (9.2±4.2 mm vs. 6.2±2.8 mm, P < 0.001) on CT, showed a smaller fibrosis ratio (3.0±4.2 % vs. 13.1±10.9 %, P < 0.001) and a larger lobular ratio (77.5±14.1% vs. 56.5±17.4%, P < 0.001) histologically, and developed clinically-relevant POPF more frequently (30.4% vs. 2.5%, P < 0.001). In patients with a soft pancreas, a strong correlation was observed between the lobular ratio and the fat ratio (r = -0.914). In patients with a soft pancreas, multivariate analysis showed the following parameters independently associated with clinically-relevant POPF after PD: an MPD diameter < 2 mm (RR, 14.251; P < 0.010), a parenchymal thickness ≥ 10 mm (RR, 7.824; P = 0.007), a lobular ratio < 75% (RR, 10.946; P = 0.003), and a fat ratio ≥ 20% (RR, 4.561; P = 0.026).

Conclusions: Distinct differences in preoperative CT findings, morphometric data for histologic specimens, and the occurrence of clinically-relevant POPF after PD were observed between patients with a soft pancreas and a hard pancreas. In patients with a soft pancreas, a thick parenchyma, a small main pancreatic duct, and fatty infiltration were independently associated with clinically-relevant POPF after PD. Preoperative CT was shown to have a predictive value for clinically-relevant POPF. Fatty infiltration with decreased lobules in pancreas was considered a degenerative process containing risk for clinically-relevant POPF.
Prolonged Survival with Pancreatectomy for Metastatic Renal Cell Carcinoma in the Modern Era

Nelson A. Royall, MD, K E Westesson, MD, G A Falk, MD, C H Simpfendorfer, S Chalikonda, M C Gong, S C Campbell, R M Walsh, MD, C A Chipperfield, MD; 1Department of HPB Surgery, Digestive Disease Institute, Cleveland Clinic Foundation, Cleveland, Ohio, USA, 2Cleveland Clinic Foundation

Introduction/Background: Cytoreduction for metastatic renal cell carcinoma (RCC) is a currently supported therapy in the management algorithm based upon multiple consensus guidelines. The safety of well-selected patients undergoing pancreatectomy for metastatic RCC has been shown to be equivalent to other indications for pancreatectomy in historical reports. The purpose of this study is to determine factors associated with overall survival following pancreatic metastatectomy for RCC.

Methods: We retrospectively reviewed all patients who underwent a pancreatectomy for renal cell carcinoma at the Cleveland Clinic Foundation between 1989 and 2016. Patient charts were reviewed by the investigators and respective variables and treatment outcomes were evaluated. Survival analyses were performed to determine factors associated with overall survival. Statistical analyses were completed using IPM SPSS software version 24.

Results: We identified 34 patients who had underwent pancreatectomy for metastatic renal cell carcinoma with available operative and clinical data. Male patients represented 73.5% of the group and the mean age at the time of pancreatectomy was 64 years (range: 34 to 81). The primary site of RCC was the right kidney in 51.7%. The number of pancreatectomies performed was stable over the study period without a significant difference by era. Median length of stay was 9 days (range: 5 to 41). Final pathology demonstrated metastatic renal cell carcinoma in the pancreatic specimen in 86.4% of patients, the remaining 13.6% were chronic pancreatitis and IPMN. The histologic sub-type of RCC was clear cell in 86.7%, with the chromophobe and sarcomatoid sub-types representing 6.7 each. At completion of the study period there were 15 patients alive with a median overall survival of 11.1 years (IQR = 15.4 - 9.5 years) following pancreatectomy. Of those who died during follow-up the median overall survival was 6.8 years (IQR = 9.9 – 1.7 years). We found no factors which correlated with overall survival. The performance of a pancreatoduodenectomy trended towards an increased overall survival compared to distal pancreatectomy and splenectomy although this did not reach significance ($\chi^2 = 5.367, df = 2, p = 0.068$). The gender, primary tumor laterality, age at operation, and date of surgery were not significantly associated with overall survival ($p > 0.10$). We were unable to evaluate the impact of histologic sub-type due to the low frequency of non-clear cell types.

Discussion/Conclusion: Pancreatectomy for RCC metastases is associated with prolonged survival following pancreatectomy in multiple series. We have demonstrated that a prolonged survival was present without any independent predictors of overall survival in this series. There was a potential trend towards improved survival based on the type of pancreatectomy, although this did not reach statistical significance. Larger studies are needed in the future to better identify factors which predict improved survival following pancreatic metastatectomy for RCC.
Background: The risks of postoperative complications following pancreaticoduodenectomy is thought to be higher in octogenarians compared to younger patients. However, the costs of pancreaticoduodenectomy in this population are thought to be similar to younger patients despite a higher rate of complications. This study focuses on evaluating the postoperative outcomes and costs following pancreaticoduodenectomy in octogenarians compared to younger patients.

Methods: This is a retrospective database review of patients undergoing pancreaticoduodenectomy at a single institution from 2009-2014. Patient demographics, operative details and postoperative complications were obtained from patients’ charts. Hospitalization and emergency room costs up to 90 days following surgery were obtained from hospital administrative databases and were included in the analyses. Risk factors associated with postoperative complications were evaluated by univariable and multivariable analyses.

Results: There were 276 patients included and divided into two age groups: 253 younger patients (<80 years, median age=65) and 23 octogenarians (>=80 years, median age=82). Pancreatic cancer was the most common indication for surgery (58% vs. 65%). The mean ASA class was higher in the octogenarian group (3.2 vs. 3.4, P=0.026). The length of hospital stay was longer in this group also (9 vs. 11 days, P=0.042). The overall postoperative complication (47% vs. 74%, P=0.015) and the major complication rate (18% vs. 39%, P=0.016) were higher in the octogenarian group, mainly due to a higher rate of pneumonia (5% vs. 22%, P=0.011). The rehospitalization rate and the postoperative mortality were not statistically different between the two groups. In the multivariable analysis, factors associated with major complications were age >80 (OR=3.2, 95% confidence interval=2.27-4.13) and a diagnosis other than pancreatic cancer (OR=2.65, 95% confidence interval=2.02-3.27). There was a trend for a higher overall mean cost in the octogenarian group, $32,616 (SD=32,616) vs. $34,649 (SD=42,340) mainly driven by a higher cost of primary surgery, $28,053 (SD=23,241) vs. $33,271 (SD=42,559).

Conclusions: Pancreaticoduodenectomy in octogenarians is associated with a higher rate of overall and major postoperative complications, which lead to a longer length of hospital stay and higher costs for the healthcare system.
NON-Steroidal Anti-Inflammatory Drug (NSAID) Use Independently Increases Risk of Post-Operative Pancreatic Fistula Following Pancreaticoduodenectomy

Stacy J Kowalsky, MD, Mazen S Zenati, MD, MPH, PhD, Jennifer Steve, BS, Kenneth K Lee, MD, Melissa E Hogg, MD, MS, Herbert J Zeh III, MD, Amer H Zureikat, MD; University of Pittsburgh

Background: Ketorolac, a commonly used non-selective NSAID in the post-operative period, has been associated with increased risk of anastomotic leak after colon resection. The effect of post-operative NSAID use, specifically ketorolac, on post-operative pancreatic fistula (POPF) after pancreaticoduodenectomy (PD) is unknown.

Methods: Retrospective review of PDs at a high volume pancreas center from 2012-2015. POPF was graded using ISGPF criteria. Demographics, operative variables and 30-day post-operative NSAID use, dosage and timing (early=POD 0-5, late >5) were collected. Univariate and multivariate logistic regression was used to identify predictors of POPF.

Results: 423 PDs were analyzed (mean age 66, 47% female), and 60% received NSAIDs postoperatively. Ketorolac (median POD 0-5 cumulative dose 90 mg, IQR 60-165) was used in 35.7% (n=151). POPF occurred in 90 patients (21.3%). Early (POD 0-5) ketorolac use was associated with increased POPF, especially grade A (OR 2.16, p=0.036). Each 25 mg incremental increase in ketorolac use was associated with a 10% increased risk of POPF (OR 1.10, p=0.021), while a cumulative dose of >150 mg was associated with a 44% increased risk of POPF (OR 1.44, 95% CI1.03-2.01, p=0.035). A multivariate regression model identified EBL, soft gland, pancreatic duct diameter, BMI, and cumulative ketorolac dose >150 mg to be independent predictors of POPF (p<0.0001 pseudo R2=0.149).

Conclusion: Increasing doses of ketorolac in the early post-operative period are associated with increased risk of POPF, while a cumulative dose of >150 mg is an independent predictor of POPF following PD.
OBJECTIVE: Estimated blood loss (EBL) is an important factor predicting clinical outcomes, but is frequently under- and overestimated, which can be dangerous for individual patients, and confounding for scoring systems that rely on EBL.

METHODS: We performed direct measurement of hemoglobin (hgb) levels of suction-canister volumes after collecting all blood from sponges and the field with dilute heparin-saline. Hgb levels were then used to calculate the measured blood loss (MBL), which was compared to the EBL, as estimated both by surgeons (sEBL) and anesthesiologists (aEBL). Power calculation predicted 83% power to detect a difference of 100 mL with a sample size of 35. An interim analysis was performed midway through the study. A paired t-test was used to compare MBL with EBL.

RESULTS: Of 23 eligible cases at interim analysis, pancreaticoduodenectomy (n = 8) was the most common. Median ASA score was 3 (range 2-4) and 96% of patients had comorbidities (median 3/patient). Median length of stay was 8 days (range 2-34), operative time was 5:14 (range 2:05-9:01), and complications occurred in 48%, and were Clavien grade >2 in 22%. The aEBL overestimated MBL by 192mL (143%) on average, and was significantly greater than MBL (P = 0.004), while the sEBL was significantly less than MBL (P = 0.009).

CONCLUSION: Surgeons underestimate and anesthesiologists overestimate blood loss during pancreatectomies and other major abdominal operations. This difference shown here is clinically substantial and statistically significant, and impacts not only immediate patient care but also the interpretation of scoring systems that rely on EBL as a variable that may in fact be frequently inaccurate.
Background: Gastrinomas are rare neuroendocrine tumors that ectopically secrete gastrin and classically originate within the duodenum or pancreas. The presence of primary lymph node gastrinoma, although reported multiple times, is controversial. Here we report on a single-institution’s experience with gastrinoma, with focus on primary lymph node tumors.

Methods: Patients who underwent surgical resection of gastrinoma between 1992 and 2016 at a single academic medical center were identified. All pathology reports were re-reviewed, and a diagnosis of primary lymph node gastrinoma was defined as tumor confined to one or more resected peripancreatic lymph nodes, negative localization for any extra-nodal disease and normal fasting gastrin and negative imaging post-resection.

Results: 39 consecutive patients underwent surgical resection of gastrinoma. Mean age was 53y and 49% were male. 5 patients (13%) had Multiple Endocrine Neoplasia type 1 (MEN-1). The most common symptoms were abdominal pain (69%) and diarrhea (59%). Median symptom duration prior to surgery was 24 months. 93% of patients had successful pre-operative localization. 19 patients (49%) underwent enucleation of their tumor and 17 (44%) a segmental resection. Overall 5 and 10-year survival was 78% and 56% respectively.

Primary lymph node gastrinoma was identified in 11 cases (28.2%). The presentation and work-up of primary lymph node and non-primary lymph node patients were similar with the exception that no patients with MEN-1 were identified with primary lymph node disease. There was no significant difference in surgical extent, tumor size or overall survival. At median follow-up of 46 months, patients with primary lymph node gastrinoma were less likely to have persistent or recurrent disease (9.1% vs 42.9%, p=0.04).

Conclusion: This series supports the existence of primary lymph node gastrinomas, and indicates that as many as 1 in 4 patients with gastrinoma have this form of the disease. Primary lymph node gastrinoma does not differ from regular gastrinomas in clinical presentation, although patients were less likely to develop persistent or recurrent disease and did not have MEN-1. This entity should be considered when an isolated pathologic lymph node is identified, although thorough investigation with duodenal exploration and intra-operative ultrasound is still recommended to exclude other occult disease.
Introduction: Pancreatic neuroendocrine tumors (pNETs) account for 1-2% of all pancreatic malignancies and are usually slow growing with an indolent course. Enucleation of low grade pNETs has the advantage of avoiding short and long term morbidity related to formal resections but carries a risk of significant post-operative pancreatic fistula (POPF), especially if the tumor is close to the main pancreatic duct (MPD). We have recently started using intra-operative ERCP to facilitate enucleation of pNETs ≤ 3mm from MPD in order to enhance the safety associated with the surgery.

Methods: Intraoperative ERCP is considered for patients with pNETs ≤ 3 mm from MPD who are being considered for enucleation. Intraoperative pancreateography is done after enucleation to assess for extravasation of contrast from MPD or major side branches at site of enucleation, which is considered an indicator for development of significant POPF. If no extravasation is noted, a pancreatic stent is deployed and the procedure terminated after placement of intraabdominal drain. If significant extravasation is noted, then the procedure is converted to a formal resection (pancreaticoduodenectomy, central pancreatectomy or distal pancreatectomy).

Results: Steps of technique are described with accompanying images from patient cases. A treatment algorithm is provided detailing step by step approach in patients being considered for ERCP assisted enucleation.

Conclusion: The described technique of ERCP assisted enucleation can allow safe resection of pNETs ≤3mm from MPD. It can potentially increase procedural safety though earlier assessment of MPD integrity, decreasing risk of development of significant POPF, and avoiding morbidity of major pancreatic resections.
Introduction: Laparoscopic distal pancreatectomy (LDP) is a feasible alternative to Open DP with regard to patient safety and oncologic outcomes. In the absence of vascular involvement, LDP has become the preferred approach to managing neoplasms in the body and tail of the pancreas. As an alternative minimally invasive (MI) platform, Robotic DP is regarded to provide technical benefits. Introduction of RDP into a high volume program with over a decade’s experience with LDP was analyzed to understand the place of RDP when a minimally invasive approach was deemed appropriate.

Methods: All distal pancreatectomies since RDP was introduced at our institution were compared (5/2012-4/2016), with the exclusion of modified Appleby, pancreatitis and vascular-reconstruction operations. Clinical and pathologic data were analyzed to compare perioperative outcomes and oncologic utility in patients who underwent DP via open, laparoscopic, and robotic approaches.

Results: Over the study period, 58 (32%) ODP, 39 (21%) LDP and 87 (47%) RDP were performed. There were no significant differences between the three groups based on age, gender, race, or BMI, though ODP patients were more likely to be classified as ASA 3/4 (p=0.01). The LDP and RDP conversion rates were 13% and 20%, respectively (p=0.36). ODP was more often performed for malignancies (85%), than LDP (41%) and RDP (60%) (p<0.01). There was not a significant median difference in operative duration between the three approaches: ODP 220 (IQR 166,244), LDP 192 (IQR 145,256) and RDP 207 (IQR 154,257) minutes. Blood loss was significantly less with the minimally invasive approaches: ODP 500 (IQR 300,800), LDP 200 (IQR 50,450) and RDP 300 (IQR 200,650) mL (p<0.001). Length of stay was also shorter for the MIS approaches: ODP 5 (IQR 4,8) LDP 5 (IQR 4,6) and RDP 4 (IQR 4,6) days (p<0.001). Clavien Grade 3-5 and 30 day readmission rates were 12.8% and 10.2% for the cohort, and not significantly different by modality (p<0.76). The overall R1 rate (inclusive of anterior or posterior surfaces < 1mm) was 19.69%, with ODP more likely to be positive at 32.2% (p=0.01). Node capture was median of 12 (IQR 5,20), and not significantly different between modalities (p=0.929).

Conclusion: Although there is a statistical trend in decreased length of stay and estimated blood loss for the MI approaches over ODP, this is offset by the malignant complexity of the cases performed by ODP. What is clear is that both LDP and RDP are safe procedures relative to ODP, with equivalent nodal capture. Despite the RDP learning curve competing with long institutional experience with LDP, LDP and RDP were equivalent on almost all measures, and can be used interchangeably based on the preference and experience of the surgeon.
P090 A NATIONWIDE COMPARISON OF ROBOT-ASSISTED VERSUS LAPAROSCOPIC DISTAL PANCREATECTOMY  C. L Nota1, T de Rooij2, M G Dijkgraaf2, O R Busch2, B. Groot Koerkamp3, I H Borel Rinkes1, J Hagendoorn1, I Q Molenaar1, M G Besselink2; 1UMC Utrecht, 2AMC Amsterdam, 3Department of Surgery, Erasmus Medical Center

For the Dutch Pancreatic Cancer Group

Introduction Robot-assisted distal pancreatectomy (RADP) is on the rise, as it is suggested that the robotic platform offers several advantages over laparoscopic distal pancreatectomy (LDP). However, the real benefits and, in absence of nationwide data, the generalizability of this procedure are unknown. Hence, the aim of this study was to compare outcomes of RADP with LDP on a nationwide level.

Methods Patients who had undergone distal pancreatectomy in 17 Dutch centres between January 2005 and August 2016 were analyzed retrospectively. All RADPs were compared with all LDPs. Primary outcome was major complications (Clavien-Dindo grade ≥ III).

Results In total, 210 patients were included in this study, of whom 33 underwent RADP (15.7%) and 177 LDP (84.3%). Baseline characteristic were comparable, except for mean tumor size, which was 23 (±15) mm for RADP vs. 33 (±20) mm for LDP (p=0.02). The mean operative time was 229 (±72) min. vs. 224 (±98) min for LDP (p=0.78). Four patients (12%) in the robotic group underwent resection for pancreatic duct adenocarcinoma vs. 31 patients (18%) in the laparoscopic group (p=0.67). Splenectomy rates were 33% vs. 42% (p= 0.32), respectively. Conversion was needed in 15% in case of RADP vs. 19% in case of LDP (p= 0.58). Six patients (18%) had a major complication after RADP vs. 30 patients (17%) after LDP (p = 0.86). 30-day mortality was 0% vs. 1% (p>0.99). Median length of hospital stay was not significantly different between groups (7 (IQR 6-9) vs. 7 (IQR 6-11) days).

Conclusion In this nationwide study RADP seems as effective as LDP. Future studies should investigate the cost-effectiveness and the clinical significance of technical advantages of RADP over LDP, preferably in a randomized setting.
Stapling is a popular method for stump closure in distal pancreatectomy (DP). However, research on which cartridges are suitable for different pancreatic thickness is lacking. To identify the optimal stapler cartridge choice in DP according to pancreatic thickness.

From November 2011 to April 2015, data were prospectively collected from 217 consecutive patients who underwent DP with 3-layer endoscopic staple closure in Seoul National University Hospital, Korea. Postoperative pancreatic fistula (POPF) was graded according to International Study Group on Pancreatic Fistula definitions. Staplers were grouped based on closed length (CL) (Group I: CL ≤ 1.5?mm, II: 1.5 mm < CL < 2?mm, III: CL ≥ 2?mm). Compression ratio (CR) was defined as pancreas thickness/CL. Distribution of pancreatic thickness was used to find the cut-off point of thickness which predicts POPF according to stapler groups.

POPF developed in 130 (59.9%) patients (Grade A; n=86 [66.1%], B; n=44 [33.8%]). The numbers in each stapler group were 46, 101, and 70, respectively. Mean thickness was higher in POPF cases (15.2?mm vs 13.5?mm, P=0.002). High body mass index (P=0.003), thick pancreas (P=0.011), and high CR (P=0.024) were independent risk factors for POPF in multivariate analysis. Pancreatic thickness was grouped into <12?mm, 12 to 17?mm, and >17?mm. With pancreatic thickness <12?mm, the POPF rate was lowest with Group II (I: 50%, II: 27.6%, III: 69.2%, P=0.035).

The optimal stapler cartridges with pancreatic thickness <12?mm were those in Group II (Gold, CL: 1.8?mm). There was no suitable cartridge for thicker pancreases. Further studies are necessary to reduce POPF in thick pancreases.
Background: In pancreatoduodenectomy, mesopancreas excision with division of the inferior pancreatoduodenal artery (IPDA) is technically difficult because of the complex anatomy resulting from intestinal rotation occurring during embryological development. We have developed an intestinal derotation procedure for facilitating mesopancreas excision. The perioperative factors of pancreatoduodenectomy were retrospectively compared between our derotation and the conventional procedure.

Methods: The entire small intestine and right colon are mobilized from the retroperitoneum, and intestinal rotation is reduced. This procedure simplifies the anatomical situation, in which (1) the mesopancreas stretches from the right side of the superior mesenteric artery (SMA) in a horizontal plane, (2) the IPDA arises from the right wall of the SMA, and (3) the SMA is situated at the right-posterior side of the superior mesenteric vein. In 232 cases undergoing pancreatoduodenectomy, the perioperative factors were retrospectively compared between the derotation (n = 117) and conventional (n = 115) procedure groups.

Results: The derotation procedure significantly decreased operative time (434 vs. 516 min) and blood loss (521 vs. 908 ml), and tended to increase the rate of R0 resection (90% vs. 78%), as compared with the conventional procedure. The derotation group had a significantly higher incidence of early, i.e. before division of the drainage vein, IPDA division. Postoperative complication rates did not differ, between the two groups.

Conclusions: The derotation procedure is a simple but useful technique which facilitates mesopancreas excision and early IPDA division during pancreatoduodenectomy. This procedure is another type of artery-first approach.
Background: Duct-to-mucosa pancreatojejunostomy after pancreatoduodenectomy can be technically difficult, particularly in cases with a non-dilated pancreatic duct. We devised a novel procedure employing a pancreatic duct holder and mucosa squeeze-out technique facilitating duct-to-mucosa anastomosis. We compared the perioperative outcomes of pancreatoduodenectomy with duct-to-mucosa pancreatojejunostomy between the novel and conventional procedures.

Methods: Our pancreatic holder has a cone-shaped tip with a slit. The holder can expand the pancreatic duct and provides a good surgical field for anastomosis. A small incision for anastomosis is made on the jejunum while the jejunum is grasped around the incision. Then, the jejunal mucosa becomes squeezed out and everted. This mucosa squeeze-out technique facilitates suturing the full thickness of the jejunum. Propensity score matching yielded 113 cases each undergoing the novel and the conventional procedure, among 308 cases receiving pancreatoduodenectomy with duct-to-mucosa pancreatojejunostomy.

Results: The overall morbidity rate was significantly lower in the novel procedure group. The pancreatic fistula (ISGPF grade B/C) rate was significantly lower in the novel (5%) than in the conventional (13%) procedure group. For cases with a non-dilated pancreatic duct (≤3 mm), the rate was significantly lower in the novel (10%) than in the conventional procedure group (24%). Multivariate analysis identified a non-dilated pancreatic duct, soft pancreas, and the conventional procedure as factors independently predicting the complication of pancreatic fistula formation.

Conclusions: Our novel procedure facilitates duct-to-mucosa pancreatojejunostomy and decreases the pancreatic fistula rate. This procedure is simple, rational and useful for achieving anastomosis, particularly in cases with a non-dilated pancreatic duct.
Background: One of the most critical steps of the pancreaticoduodenectomy (PD) is the treatment of pancreatic stump, because anastomotic leak is the cause of major morbidity and mortality due to the intra-peritoneal release of enterokinase and the activation of pancreatic enzymes, with subsequent septic and hemorrhagic complications. There is still no universally accepted technique for pancreaticojejunostomy (PJ) and there are two widely used methods to accomplish an end-to-side PJ: duct-to-mucosa PJ or invagination PJ.

Methods: From October 2008 to October 2016 we performed 401 pancreatic resection of which 187 were PD. From November 2010 we used in 84 patients a new personal invagination PJ technique (piPJ). This technique consists of a particular double layer of stitches: the outer layer is a monofilament non absorbable interrupted sutures (using 5-0 polypropylene suture) to reach the invagination of the pancreatic stump and with the knot falling on the bowel; a small enterotomy is made in the jejunum, of the same size and exactly opposite with respect to the location of the pancreatic duct, and a stent is inserted inside the duct. The internal layer is a row of continuous running non absorbable suture (using 5-0 polypropylene suture), placed between the pancreatic capsule and the seromuscular layer of the jejunum. We hereby describe the technical details, the methods, the devices and the cornerstones of this piPJ. The Fistula Risk Score, the presence of post-operative pancreatic fistulas, POPF (ISGPF Classification) and the perioperative outcomes, were evaluated on this group of patients.

Result: POPF occurred in 14/84 (16.67%). Grade A of POPF was found in 9/84 patients (10.71%), Grade B of POPF in 4/84 patients (4.76%). The presence of Grade C pancreatic fistulas was documented in one 1/84 patients (1.19%). Patients were stratified into four groups according to the risk of pancreatic fistula (Fistula Risk Score, FRS): negligible, low, intermediate and high risk. We documented that the fistula rate in patients with high risk (FRS 7-10) was less than the expected found from literature (21.43% vs 50.0%, classification proposed by Miller), while with low and intermediate FRS was comparable to that expected (5.88% vs 11.4% and 20.83% vs 30.2% respectively). The re-operation rate was 3.58% (3/84): two of these for bleeding and one for POPF grade C. The overall mortality rate was 2.38% (2/84) and the specific mortality rate for POPF was 1.19% (1/84). Mean operative time was 437.44 ± 82.90 min. Mean postoperative hospital stay was 18.82 ± 11.89 days.

Conclusions: The piPJ technique was found to be safe and resulted in satisfactory postoperative outcomes. The percentage of pancreatic fistula less than expected in particular for the "difficult" pancreas with high FRS, including soft gland texture and small pancreatic duct diameter. Comparative prospective studies with other techniques are necessary to draw conclusions.
P095 EFFECT OF NEGATIVE PRESSURE WOUND THERAPY ON WOUND COMPLICATIONS FOLLOWING PANCREATECTOMY

Michael Kuncewitch, MD2, Aaron Blackham, MD1, Clancy Clark, MD2, Rebecca Dodson, MD2, Gregory Russel, MS3, Edward Levine, MD2, Perry Shen, MD2; 2Surgical Oncology, Wake Forest School of Medicine, 1Surgical Oncology, Lehigh Valley Physician Group, 3Biostatistics, Wake Forest School of Medicine

Introduction: Surgical site infection (SSI) and incisional hemia are common complications following major pancreatectomy. Both add considerable morbidity to patients and costs to healthcare systems. The prophylactic application of negative pressure wound therapy (NPWT) at the time of primary skin closure has been used in attempts to decrease these events. We investigated the effects of NPWT on short- and long-term wound outcomes in patients undergoing pancreatectomy.

Methods: A randomized controlled trial comparing the effect of NPWT to standard surgical dressing (SSD) on wound outcomes was performed in 265 patients undergoing open gastro-intestinal resections from 2012 to 2016. We performed a subset analysis of 73 patients in the study who underwent pancreatectomy and were randomized to SSD or NPWT. Postoperative wound complications in the first 30 days and incisional hernia rates were assessed.

Results: There were 33 (45%) female patients in the study and for all patients the average BMI was 27.6. The pancreaticoduodenectomy rate in our series was 68%, while 27% of patients underwent distal or subtotal pancreatectomy, and 4% underwent total pancreatectomy. The rates of incisional hemia were 32% and 14%, between the SSD and NPWT groups, respectively (p=0.067). In the SSD (n=37) and NPWT (n=36) cohorts, the superficial SSI, deep SSI, seroma, and dehiscence rates were 16% and 14% (p>0.99), 5% and 8% (p=0.67), 16% and 11% (p=0.74), and 5% and 3% (p=>0.99), respectively. After adjusting for pancreatic fistula and delayed gastric emptying, no statistically significant differences in the primary outcomes were observed. These findings were also true irrespective of the type of pancreatic resection performed.

Conclusion: Both short- and long-term wound complications were not improved with NPWT after pancreatectomy. We did observe a trend towards decreased incisional hemia rates in patients treated with NPWT, however, owing to the multifactorial nature of wound complications, it is yet to be determined which cohorts of pancreatectomy patients will best benefit from NPWT.
Background: In patients with advanced pancreatic cancer, pancreatectomy with combined resection of portal vein and/or superior mesenteric vein (PV/SMV) sometimes leads to prolonged prognosis. We estimated the surgical outcomes of patients who underwent pancreatectomy with PV/SMV resection and reconstruction and also evaluated the usefulness of interposed venous graft during this procedure.

Methods: We retrospectively reviewed a total of consecutive 158 pancreatic cancer patients who underwent pancreatectomy with resection of PV/SMV including 13 using an interposed venous graft at our institution between February 2005 and November 2016. We evaluated the surgical complications associated with PV/SMV reconstruction and harvesting venous grafts and reconstructed PV/SMV patency within one month after pancreatectomy.

Results: Of the 158 patients, the type of pancreatectomy was total pancreatectomy in 1, pancreaticoduodenectomy (PD) in 133, and distal pancreatectomy (DP) in 24. In the 13 patients who underwent PV/SMV reconstruction using venous graft, the graft was harvested from the right external iliac vein (EIV) in 12 patients and left internal jugular vein (IJV) in 1. When we compared the incidence of acute thrombus formation and/or stenosis at PV/SMV reconstruction occurring one month postoperatively between 13 patients with interposed venous graft and 145 without venous graft, there were no events in those with venous graft, while in those without graft it occurred in 7 (4.8%): 4 in PD and 3 in DP. The estimated cause of thrombus or stenosis was the length of SMV/PV resection more than 35 mm (n=2) and postoperative pancreatic fistula (POPF) (n=2) in PD and POPF (n=3) in DP. In two PD patients with postoperative acute thrombosis, one required revision of PV/SMV reconstruction using an interposed graft on one day after operation and the other underwent insertion of the metallic sent into the PV/SMV anastomosis transhepatically. All patients who suffered from POPF resulting in stenosis of reconstructed PV/SMV underwent drainage for POPF and conservative therapy for portal venous stenosis. In the 13 patients with venous graft, 10 (83.3 %) with EIV grafts had experienced leg edema until one week after operation but after then the symptom improved in all patients. One patient with IJV graft had never experienced complications associated with sacrificing veins.

Conclusion: According to the length of resection of PV/SMV segment, an interposed venous graft for venous reconstruction should be aggressively used to prevent acute thrombus formation and/or stenosis.
Background: Postoperative pancreatic Fistula (POPF) is the most relevant complication after pancreateoduodenectomy (PD) and is – among other factors – influenced by the type of reconstruction. We have modified a two-layer pancreateojunostomy (Warren–Cattell) by using a 8 cm resorbable monofilament (polydioxanone) as internal pancreatic duct drainage (PDD-PJ).

Patients and methods: In 370 PD from 2006 to 2016, pancreatic anastomosis was performed by PDD-PJ (n=247) or in 123 cases by pancreateojunostomy (PJ) and pancreatogastrostomy (PG). PDD-PJ was established as the standard procedure but PJ or PG was performed instead according to individual decision. The clinical results of PDD-PJ vs. PJ/PG were analyzed retrospectively. Postoperative complications were classified according to the Accordion classification (grade 1-6) and the ISGPF classification (grade A-C).

Results: PD (pylorus preserving n=329 and typical Whipple n=41) were performed for malignancies (n=265), chronic pancreatitis (n=62) and others (n=43). Median duration of surgery was 375 minutes. Median patient age was 68 years and 60% were male. The rate of POPF was 21% (n=52) in PDD-PJ and 28% (n=34) in PJ/PG group; p=0.16. Clinical relevant POPF of grade B/C occurred in 12% (n=31) in PDD-PJ and in 20% (n=24) in PJ/PG; p=0.08. Postoperative complications occurred in 61% (n=151) in PDD-PJ and in 54% (n=65) in PJ/PG; p=0.18. Postoperative Mortality was 4% (n=10) in PDD-PJ and 4.9% (n=6) in PJ/PG; p=0.7.

Conclusion: PDD-PJ is a safe technical modification of the established two layer pancreateojunostomy. The rate of POPF is not significantly reduced but a trend to a reduction of clinical relevant B/C POPF is observed. PDD-PJ may have beneficial effects on the rate and severity of POPF after PD. Further examinations are necessary for more precise evaluation.
LONG-TERM RESULTS OF THE NEW APPROACH IN THE SURGICAL TREATMENT OF CHRONIC PANCREATITIS
Volodymir N Klymenko, MD, Andrii V Klymenko, MD, Andrii A Steshenko, PhD; Zaporizhzhia State Medical University

Introduction: Resection of the pancreas in patients with chronic pancreatitis (Beger operation and modifications, Frey procedures) pathogenetically is not reasonable procedure dramatically reduces the functional reserve.

Methods: In 116 chronic pancreatitis patients with pancreatic ductal hypertension (women - 32 men - 84) performed a total longitudinal pancreatowirsungoduodenopanillotomy with the formation of an isolated pancreaticojejunoduodenoanastomosis - in 59 (50,9%), on a short Roux-en-Y loop - in 57 (49,1%). In all patients performed ultrasound, CT-scan, MRCP, endoscopy, X-ray of the esophagus, stomach and duodenum, histological examination of intraoperative pancreatic material, pancreatic fecal elastase-1, coprogram, C-peptide, endogenous insulin, glycated hemoglobin, IgG4, oncomarker CA 19-9.

In 71 (61,2%) patients at baseline had a moderate degree of exocrine insufficiency (pancreatic fecal elastase-1 - 153±14 mkp/g), in 45 (38,8%) - severe (pancreatic fecal elastase-1 - 62±9 mkp/g). Long-term results were studied every 6 months for 5 years.

Results: Where were no deaths after the operation. Every 6 months, patients were detailed examined including instrumental and clinical and biochemical studies. Over 5 years for all patients were saved functional reserve of the pancreas, as well as before the operation, there was no pain. In patients with moderate exocrine insufficiency in 5 years were founded the same indicators of pancreatic fecal elastase-1 (159±16 mkp/g), quality of life of these patients was equal to the category of healthy individuals (T=9,89; p=0,1295; Kruskal-Wallis test). In patients with severe exocrine insufficiency were not changes of indicators of pancreatic fecal elastase-1, 72±12 mkp/g, but this group of patients has been forced to take enzyme replacement therapy (T=4,08; p=0,6663; Kruskal-Wallis test).

Conclusions: In chronic pancreatitis patients with ductal hypertension requires the operation before the development of severe exocrine insufficiency. Operation of choice should be offered proven parenchima-preservation procedure that can replace resection interventions (operation of Beger, Frey) like pathogenetically is not reasonable in benign process how a chronic pancreatitis is.
**Introduction:** Heme oxygenase-1 (HO-1) is an anti-oxidative, anti-inflammatory, and cytoprotective enzyme that is induced in response to cellular stress. The HO-1 promoter contains (GT)n dinucleotide repeats and is highly polymorphic. In this study we hypothesized that different expression of HO-1 determined by the number of GT repeats is associated with different expression of interleukins thus may predict severe onset and course of acute pancreatitis (AP).

**Methods:** AP patients (n= 63) and matched healthy controls (n= 33) were studied. Genomic DNA and mRNA were extracted from peripheral blood samples of patients and control groups. The HO-1 promoter region with the GT repeats was PCR amplified with fluorescent tagged primers, while mRNA expression by QRT-PCR. A short allele was defined as ≤ 27 GT repeats, whereas a long allele ≥ 27 repeats. Clinical data on study cohort was incorporated for the statistical analysis.

**Results:** The subjects were categorized into 3 groups based on the genotype results: one short and one long allele (S/L), two short alleles (S/S) and two long alleles (L/L). The presence of: S/L -42.3%, L/L- 47.2%, S/S- 10.5% was recorded in AP group. The levels of IL-1b, IL-6, IL-8, IL-10 were measured and ninety percent of patients who were carriers of L/L genotype had increased levels of IL-8 and IL-10 (p<0.003) levels compared to controls. These subjects were also at higher risk for developing severe acute pancreatitis.

**Conclusion:** The polymorphism of the GT repeats in the HO-1 promoter region, L/L genotype, may be a risk factor for altering interleukins and associated with severe course and outcome of acute pancreatitis.
P100 THE INTENSITY OF BRIEF INTERVENTIONS AFTER ACUTE ALCOHOLIC PANCREATITIS SHOULD BE INCREASED, ESPECIALLY IN YOUNG PATIENTS WITH HEAVY ALCOHOL CONSUMPTION Jussi Nikkola, MD1, Johanna Laukkanen, MD, PhD2, Heini Huhtala, MsC3, Juhani Sand, MD, PhD1; 1Dept. of Gastroenterology and Alimentary Tract Surgery, Tampere University Hospital, Finland, 2University of Tampere, School of Medicine, Finland, 3University of Tampere, School of Health Sciences, Finland

Objective: After the first acute alcoholic pancreatitis (AAP), active repeated brief interventions (BIs) have been shown to protect from recurrent attacks of AAP (RAP). However, in daily hospital practice the means and intensity of BI vary. Our aim was to study BIs performed in the clinic during AAP and whether this prevents from future RAP episodes.

Patients and methods: All patients discharged between 10/2010-10/2012 with acute pancreatitis as the primary diagnosis were obtained from the hospital database. The final cohort included only patients with the first attack of AAP during the study period. The details of documented BIs (by a doctor, nurse or social worker) during hospitalization of AAP and RAP and development of RAP and chronic pancreatitis (CP) during median follow-up of 4.2 (0.2-6.1) were analyzed. Patients were also contacted with a mailed questionnaire.

Results: Seventy-four patients with first AAP during the study period were included. 32% developed RAP during follow-up. 72% received a documented BI during hospitalization, with no difference between the patients who later did or did not develop RAP (71% vs. 72%; ns). Younger age (OR=0.96, 95% CI=0.92-1.00) and higher AUDIT points (p=0.044) were associated with RAP. AUDIT test had a 70% sensitivity and 71% specificity at a cut-off value of 20 points for predicting RAP.

Conclusions: Only 70% of the patients received a documented BI during the initial hospitalization for AAP. The in-hospital intervention as such did not prevent the development of RAP. Especially the young patients with AUDIT points more than 20 are in high risk for developing RAP and should be included in a more intense follow-up care program to maximize prevention.
Introduction: The pancreatic and intrapancreatic biliary ducts converge within the pancreas allowing their contents to enter the duodenum through the ampulla. Little is known about how these ducts respond to inflammatory injury of the pancreas. Within the gastrointestinal system tuft cells play an important role in epithelial repair and regeneration. In this study, we investigate the response of the intrapancreatic biliary duct and the pancreatic duct to pancreatitis and the contribution of tuft cells to this process.

Methods: An acute model of pancreatitis was induced in 6-7 week-old B6129 and IL-4Rα-/− mice by eight hourly injections of cerulein (50 mg/kg) every other day for 7 days. Pancreata were harvested 1, 2, 3, 4, 8, and 15 days after injury. Immunohistochemical and immunofluorescent analyses were performed employing antibodies specific to tuft cells (Dclk1), ductal cells (cytokeratin 19) and a marker of proliferation (Ki67). Tuft cell numbers were normalized to the length of ductal epithelium and proliferative index quantified as the proportion of cytokeratin positive cells that stained for Ki67.

Results: The ductal epithelium of the intrapancreatic biliary and pancreatic ducts exhibited a low proliferation index (<10%) in non-injured mice. However, in response to pancreatitis, only the ductal cells of the intrapancreatic biliary duct system responded with increased proliferation (>40% 4-8 days after injury). In the normal pancreato-biliary duct system, tuft cells were found to exist largely in the ampulla (64 cells/10mm duct), with low levels in the common channel, intrapancreatic biliary duct, and pancreatic duct (14, 11, and 3 cells/10mm duct respectively). While tufts cells did not increase in the pancreatic duct in response to injury, a progressive increase in their abundance within the ampulla, common channel and intrapancreatic biliary duct was observed after injury, suggesting a migration of tuft cells from the ampulla to the biliary duct. Maximum levels of tuft cells were observed 4 days after injury (168, 91, and 99 cells/10mm duct respectively). Elevated tuft cell levels remained in the intrapancreatic bile duct for at least 15 days, whereas levels in the ampulla returned to non-injured levels by day 8. Tuft cell hyperplasia in response to parasitic insult of the intestine has been shown to require IL-4Rα. Increases in tuft cell abundance and intrapancreatic biliary duct proliferation were not observed in mice deficient in IL-4Rα, consistent with a role for IL-4Rα in the tuft cell mediated response to pancreatic injury.

Conclusion: Increased tuft cell abundance and concurrent epithelial proliferation within the intrapancreatic biliary duct after pancreatic injury suggests tuft cell involvement in ductal regeneration within the pancreas. The low levels of proliferation and absence of tuft cell response in the pancreatic duct highlights the differences in how these ductal compartments respond to inflammatory injury.
P102 LAPAROSCOPIC FREY PROCEDURE - SHORT-TIME OUTCOMES  Aleksey Anrianov, Roman Izrailov, Viktor Tsvirkun, Pavel Tyutyunnik; Moscow Clinical Scientific Center

Aim: To demonstrate experience of laparoscopic Frey procedure.

Materials and Methods: From November 2013 to September 2016 laparoscopic Frey procedure were performed in 25 patients (19 male and 6 female) with chronic pancreatitis type C (classification of M.Buchler).

The age of the patients was 50.5±7.8 years. The average size of the pancreatic head was 33.8±13.6 mm, the average diameter of the main pancreatic duct was 9.8±2.5 mm. The procedures were performed through the 5 trocar accesses.

Operative technique: After the pancreas mobilization and visualization vena mesanterica superior the head of the pancreas was stitched with the stay sutures on the border of resection. The main pancreatic duct was opened with the unipolar coagulator or an active branch of the Harmonic scalpel. Ventral part of the head of pancreas was resected. A side-to-side pancreaticojejunoanastomosis was formed with single-layer continuous sutures using nonabsorbable materials. The pancreaticojejunoanastomosis was covered additionally with a strand of greater omentum in nine cases.

Results: The average operating time was 460.4±94.1 minutes. Blood loss was less than 200 ml. Conversion was required in two cases: in the first case due to the peritoneal comissures after laparotomy and in the second case by virtue of the impossibility of main pancreatic duct. There were no deaths. Complications developed in the post-operative period in 4 patients (maximum grade IIIA) (classification of Clavien-Dindo). The average postoperative stay period was 9.1±4.3 days. The follow-up ranged from 3 months to 40 months. Pain relief was complete in 24 patients. One patient has recurrent pain, but pain is less than before operation and he doesn’t need analgesia. All patients had significant weight gain (2–15 kg)

Conclusions: The short-time outcomes shows that laparoscopic Frey procedure for the chronic pancreatitis are safe and feasible.
**Objective:** Necrotizing pancreatitis (NP) is a severe systemic inflammatory process. In our high volume pancreatic surgery practice, we have observed a high incidence of venous thromboembolism (VTE) in NP patients. However, remarkable few data exist to document the true incidence of VTE—including deep venous thrombosis (DVT) and pulmonary embolism (PE)—in NP. Therefore, we sought to determine the incidence and risk factors for VTE in NP patients.

**Methods:** Retrospective review of all NP patients treated at a single academic center between 2005 and 2015. VTE diagnosis was secured by ultrasound (US), computed tomography (CT), magnetic resonance imaging (MRI) and ventilation/perfusion (V/Q) scan. Descriptive statistics and univariate analysis were applied; p-value<0.05 was considered statistically significant.

**Results:** 537 NP patients (mean age 53 years; 66% males) had gallstones (45%) and alcohol (17%) as the leading disease etiology. VTE was diagnosed in 311 patients (58%). DVT was found in splanchnic veins only in 72%, extremity veins only in 12% and both extremity and splanchnic veins in 16%. Pulmonary embolism was detected in 32 patients (6%). VTE was diagnosed at a median of 37 days following initial diagnosis of NP. Eighty percent of patients required at least one surgical procedure over the course of their NP. VTE was diagnosed preoperatively in 63% of surgical patients. Only male gender was identified as a risk factor for VTE (p=0.0005) by univariate analysis.

**Conclusion:** Venous thromboembolism is extremely common in necrotizing pancreatitis. Regular ultrasound screening may be considered to facilitate early diagnosis in this high-risk population.
Objectives: Over the past decade, the treatment of necrotizing pancreatitis (NP) has incorporated greater use of percutaneous drainage and endoscopic debridement. No study has yet compared outcomes of patients treated with all available techniques. We sought to define the evolution of NP treatment at our high volume pancreas center.

Methods: Treatment strategy of NP patients at a single academic medical center between 2005-2014 was reviewed. Definitive management of pancreatic necrosis was categorized as: 1) medical treatment only; 2) surgical only; 3) interventional radiology (IR) only; 4) endoscopic only; and 5) combination (Surgery+/-IR+/-Endoscopy).

Results: 512 NP patients included biliary (45%), alcohol (17%), and idiopathic (20%) etiology. The graph documents evolving treatment strategy. Select patients were managed exclusively by medical, IR, or endoscopic treatment; use of these therapies remained relatively consistent over time. A combination of therapies was used in about 30% of patients. Over time, the percentage of NP patients managed without operation increased from 28% to 41%. 247 (47%) of patients had operation as the only NP treatment; an additional 143 (27%) required surgery as part of a multidisciplinary management.

Conclusions: Select NP patients may be managed exclusively by medical, IR, or endoscopic treatment. Combination treatment is necessary in many NP patients, and surgical treatment continues to play an important role in the definitive therapy of necrotizing pancreatitis patients.
P105 PERCUTANEOUS GASTROSTOMY IN NECROTIZING PANCREATITIS: FRIEND OR FOE? Alexandra M Roch, MD, MS, Rosalie A Carr, MD, James L Watkins, MD, Glen Lehman, Michael G House, MD, Attila Nakeeb, MD, C. Max Schmidt, MD, PhD, MBA, Eugene P Ceppa, MD, Nicholas J Zyromski, MD; Indiana University School of Medicine

**Background:** Enteral nutrition plays a central role in managing necrotizing pancreatitis patients. Although the nasojejunal (NJ) route is widely used, percutaneous gastrostomy with jejunal extension (PEG-J) is an alternative technique that is being applied more commonly. The complication profile of these enteral feeding routes has not been compared directly. Based on our clinical observations, we hypothesized that NJ and PEG-J had similar morbidity when used in the setting of necrotizing pancreatitis.

**Methods:** All patients undergoing surgical debridement for necrotizing pancreatitis between 2005 and 2015 were identified. Those receiving preoperative enteral nutrition were segregated into NJ or PEG-J groups. Patients who had NJ followed by PEG-J had efficacy and safety metrics recorded for the time with each specific feeding method. Efficacy of enteral feeding was measured by the ability to reach nutritional goal, withdrawal from total parenteral nutrition (TPN), and percentage increase in serum albumin concentration. Complications were classified according to the Clavien-Dindo scale.

**Results:** Two hundred and forty-two patients had complete data for analysis (155 men/87 women, median age 53.5 years). The dominant etiologies for necrotizing pancreatitis were biliary in 47%, and alcohol in 16%. NJ was used exclusively in 187 patients (77%); 25 patients (10%) were fed exclusively by PEG-J; the remaining 30 patients (13%) had NJ first, followed by PEG-J. PEG-J were placed radiologically in 32 (59%) and endoscopically in 23 (42%) patients. Comparing NJ to PEG-J, comparable proportions reached enteral feeding goal (67% vs. 68%, p=1), and increased serum albumin concentration (39% vs. 36%, p=0.87). Importantly, no difference was seen in rate of necrosis infection (NJ 53% vs. PEG-J 49%, p=0.64). NJ patients had a significantly higher overall complication rate compared to PEG-J (61% vs. 27%, p=0.0015). However, NJ patients had more grade I/II complications (difficulty to place/ repositioning/ replacement/ clogging/ sinusitis), compared to PEG-J patients, who had more grade III/IV complications (perforation/leakage/peritonitis) (Grade I/II: NJ - 100% vs. PEG-J - 60%; Grade III/IV NJ - 0% vs. PEG-J - 48%, p<0.0001). Two of the fifty-five PEG-J patients (4%) required urgent operation to manage a severe complication.

**Conclusion:** In necrotizing pancreatitis, NJ and PEG-J both delivered enteral nutrition effectively. Patients with NJ feeding had significantly more complications than those with PEG-J; however, NJ complications were less severe. Since 11% of PEG-J patients experienced a major/serious complication as a result of the tube placement compared to no patients with NJ tube, the advantages of PEG-J route for enteral nutrition must be weighed carefully against the potential severe complication profile.
Introduction: To date no single classification system has effectively predicted severity and treatment for Acute Pancreatitis (AP). This study aims to compare the effectiveness of both past and current classification systems: Original Atlanta (OAC), Revised Atlanta (RAC), Determinant based classification (DBC), PANC 3, Harmless Acute Pancreatitis Score (HAPS), Symptoms Nutrition Necrosis Antibiotics and Pain (SNNAP), and Beside Index of Severity for Acute Pancreatitis (BISAP) in predicting outcomes in AP.

Methods: Scores for BISAP, Panc 3, HAPS, SNNAP, OAC, RAC, and DBC were calculated for 222 adult patients hospitalized for AP from January 2015 to February 2016. Receiver Operating Characteristic curve analysis and Akaike Information Criteria were used to compare the systems effectiveness at predicting need for surgery, ICU admission rate, readmission within 30 days, and length of hospital stay.

Results: No system showed significant capacity to predict need for surgery or hospital readmission. However, results indicated that both the RAC and the DBC strongly predict length of hospital and ICU admission rate without any significant differences between them. Both systems performed better than the OAC. Additionally both BISAP and PANC 3 showed weak predictive capacity at identifying length of stay and ICU admission. Neither HAPS, nor SNAPP proved significant for any of the outcomes.

Conclusion: We suggest that BISAP and PANC3, which can be obtained within the initial 24 hours of a patient's stay, may be useful to offer early prediction of length of stay and likelihood of ICU admission, and RAC and DBC can offer further information later in the course of the disease.
P107 IS NUTRITIONAL STATUS AN IMPORTANT INDICATOR OF SEVERITY AND OUTCOMES IN ACUTE PANCREATITIS?
Benjamin Villacres Mori¹, Joaquin Cagliani, MD², Spencer Lee³, Rachel Gray¹, Peter Nauka¹, Tabia Santos¹, Rehana Rasul², Alex Castaneda, MD³, Gene Coppa, MD⁴, Jeffrey Nicastro, MD⁴, Horacio Rodriguez Rilo, MD¹, Barak Friedman, MD¹; ¹Hofstra Northwell School of Medicine, ²Feinstein Institute for Medical Research, ³Pancrease Disease Center, ⁴Department of Surgery, Long Island-Jewish Medical Center

Introduction: Nutritional support is associated with better patient outcomes in Acute Pancreatitis. However current tools to assess nutritial status including NSR-2002, SNAQ, BMI, and weight have inherent limitations in certain populations and their interpretation can be subjective. Studies have shown that L3 skeletal muscle index (L3-SMI) provides a more accurate, faster, and objective way to assess nutritional status. This study explored the relationship between diminished nutritional status using L3-SMI and the severity and outcomes of acute pancreatitis.

Methods: The L3 skeletal muscle index was obtained for 166 patients with AP by normalizing the calculated L3 skeletal muscle area with the patient height. These values divided patients into undernourished and adequately nourished groups based on sex-specific cutoffs. The indices along with the clinical data were used to determine the correlation between nutritional status and outcomes including length of hospital stay, admission to the ICU, incidence of organ failure, and BISAP classification.

Results: Results showed that undernourished patients are more likely to be associated with worse outcomes and more severe AP. The association between undernourished status and organ failure was statistically significant (p=0.0096). Similarly, the association between the undernourished status and BISAP classification was also statistically significant (p=0.0001).

Conclusion: The relationship between nutritional status and outcomes as well as severity of acute pancreatitis is statistically significant. Further studies are needed to explore the biological basis behind this association. However, establishment of this association can be beneficial to clinicians. Assessment of nutritional status using readily available CT scans can be harnessed to predict patient prognosis and the severity of AP. This can provide more information to help direct the appropriate management of AP.
Introduction: Bilateral thoracoscopic splanchnicectomy (BTS) is an option for pain from chronic pancreatitis. Mixed short term results are reported but long term results are not well known. However, by the time of referral for surgery patients have often failed medical therapy. BTS may be a reasonable alternative to total pancreatectomy. We evaluated long term outcomes of a recent single institution experience using of BTS for patients with chronic pancreatitis-associated pain.

Methods: A retrospective review was conducted of all patients who underwent BTS for chronic pancreatitis-associated pain between 2013 and 2016 at a single institution. Retrospective assessment of levels of pre- & postoperative pain (scale of 0-10) was performed. Patient outcomes are compared using the Wilcoxon signed-rank test to compare decrease in pain level and change in pain medication use in daily oral morphine equivalents (OME) from before to after surgery. Long term outcomes including progression to pancreatic surgery are assessed.

Results: Ten patients were evaluated with a median follow up of 12.7 months. Median age was 44 years and 6 (60%) were female. Of them, 6 (60%) reported successful BTS, 4 (40%) thought it was not. Patients reporting success trended towards having larger decreases in pain levels after surgery vs patients reporting no success [median pain level change (IQR), 4.0(3.0:7.0) vs 1.0(0.5:2.0);p=0.06]. There was no significant difference in change in pain medication between pre- & postoperative doses (OME) between patients reporting success vs no success [median difference (IQR)=0.0(-96:82.5) vs -200.5(-491:90);p=0.9]. 2 (22%) patients underwent further surgery (pancreatectomy & Puestow procedure) for non-resolving pain; mean interval after BTS=306 days.

Conclusion: We studied long term outcomes of BTS in patients to determine if this is a viable alternative to more morbid surgical management, such as total pancreatectomy. BTS remains a feasible option for treating chronic pancreatitis-pain. Most patients report subjective improvement, independent of quantitative outcomes. A minority of patients proceed to pancreatic resection for pain management. Future research should compare standardized medical therapy + BTS to medical therapy alone to more rigorously assess the benefit of surgical intervention in this challenging patient population.
BACKGROUND/AIMS: Earlier we and others have shown that the progression of chronic pancreatitis (CP) may be slowed down by cessation of smoking and prevention of acute attacks. Our aim was to investigate the epidemiologic and behavioural data on CP patients in Finland.

METHODS: All patients with a CP diagnosis (with an ICD code K86*) were obtained from the Tampere University Hospital (TUH) electrical medical records from 2014-2015. After going through the medical records, only the true CP patients were included in the study database. Information about ethiology, time after diagnosis, pancreatic function, treatment, complications and lifestyle was gathered.

RESULTS: The final database included 234 CP-patients (median age 57 (25-94) years, 65% men). Time after diagnosis was 4.5 years (1-41 years). The ethiology was alcohol in 67% of the cases, efferent ducts in 10%, hypertriglyceridemia in 4% and miscellaneous in 20%. In 54% of the cases smoking contributed to the development of CP (average 21 cigarette package years). 78% continued smoking even after their diagnosis. 65% of the patients had developed exocrine insufficiency, 55% endocrine insufficiency and 37% both. Calcification of pancreas was found in 65% and enlarged pancreatic duct in 50% of the patients. CP related complications were pseudocysts in 57%, pancreatic duct stenosis in 10%, pseudoaneurysms in 5%, and pancreatic fistulas and porta thrombosis in 5%. Pseudocysts were more common alcohol related CP than in non-alcohol related CP (60% vs 38%, p<0.05). Endoscopic procedures were performed in 31% of the patients (bile duct stenting 19%, pancreatic duct stenting 61% and endoscopic drainage 19%). 9% of the patients underwent surgical interventions 15% (36 patients) died during the follow-up, approximately 6 years from their diagnosis.

CONCLUSIONS: CP patients create a great burden to the health care system. Half of the patients treated in TUH had pancreatic insufficiency and different kind of complications. According to the current knowledge, the most important step to halt the progression of CP is to prevent acute phases and quit smoking. As this does not actualize in CP patients, it would be crucial to increase this awareness among CP patients and medical staff.
Total pancreatectomy with islet autotransplantation (TPIAT) can improve quality of life in patients with chronic pancreatitis. Patient selection, including timing of intervention, remains challenging. Genetic etiologies of pancreatitis are increasingly recognized, and this subgroup of patients deserves consideration, including potentially different treatment algorithms.

**Methods:** A prospectively collected database is reviewed. Particular attention is given to patients with genetic pancreatitis (GP) and genetic patients with prior pancreatic surgery as compared to those without. Islet function is inferred by daily insulin requirements. Quality of life (QoL) is assessed by the ShortForm-12 questionnaire.

**RESULTS:** 174 patients underwent TPIAT. 38 patients had genetic pancreatitis (GP: 15 PRSS1; 15 CFTR; 2 SPINK1; 3 SPINK1/CFTR) and 136 patients had other etiologies (NGP). GP had a longer disease duration than NGP (10.6 vs 7.1 years, p=0.001). GP had fewer islets harvested (2470 vs 3703IE/kg, p=0.02), but had similar rates of insulin independence at 2-years follow-up (40% vs 35%, p=NS). GP patients had better preoperative physical and mental QoL (35 vs 27, 47 vs 38, p=0.001) and significantly better postoperative scores at 2-years than NGP (PPQoL 43 vs 34, MPQoL 46 vs 41, p<0.01). Nine GP patients had pancreatic surgery prior to TPIAT (GP-PS) and had significantly longer disease duration (17 vs 9 years, p=0.002) than those without prior surgery (GP-NPS). GP-PS patients had a trend toward a lower islet yield (1603 vs 2727IE/kg, p=0.06) and insulin independence (11 vs 30%, p=0.1) than GP-NPS. Their preop QoL scores were similar but postop PPQoL scores were significantly lower at last follow-up (33 vs 44, p=0.02).

**CONCLUSIONS:** GP patients have superior QoL and similar islet function after TPIAT to patients with pancreatitis of other etiologies. GP patients with pancreatic surgery prior to TPIAT do less well, with a trend toward lower islet yield and function, and significantly lower improvements in QoL. Genetic pancreatitis patients may do better with earlier referral for TPIAT.
P111 IGF-II AND NSC-631570 COMPOUNDS AFFECT PMP22 GENE EXPRESSION IN PANCREATIC DUCTAL ADENOCARCINOMA. COULD BE THE NEW TARGET FOR BOTH CHEMO-RESISTANCE AND NEURONAL INVASION?

Niccola Funel, PhD1, Luca E Pollina, MD2, Ugo Boggi, MD3, Wassil Nowicky4, Viktoria Romanchuk5, Daniela Campani5; 1Department of Translational Research and New Technologies in Medicine and Surgery, 2Division of Surgical Pathology, Hospital of Pisa, Italy, 3Division of General and Transplants Surgery, University of Pisa, Italy, 4Anticancer Institute, Wien, Austria, 5Division of Surgical Pathology, University of Pisa, Italy

Context: Peripheral myelin protein 22 gene (PMP22) encodes a membrane protein of myelin in the peripheral nervous system, and PMP22 duplication causes the Charcot-Marie-Tooth 1A (CMT1A) phenotype. PMP22 is also capable of delaying the transition from G0/G1 to S phase (Growth Arrest Specific Gene 3, GAS3). However, growth factors involved in PMP22 regulation, such as Insulin-like growth factor-II (IGF-II), are up-regulated after radiation in fibroblast cells, and might influence chemoradiosensitivity. Since the compound NSC-631570 had a protective effect on human fibroblasts but not human tumour cells against ionizing radiation, and showed beneficial effects in phase II studies in metastatic and locally advanced PDAC patients.

Objective: The aim of this study was to evaluate the interaction between PMP22, IGF-II and NSC-631570 in PDAC Primary Cell Cultures (PCCs).

Methods: DNA duplication of PMP22 gene was evaluated by PCR and digestion of specific hybrid fragment CMT1A-related by endonucleases EcoRI and NsiI in 13 PDAC tissues, 3 PCCs and PBMCs from 3 healthy subjects (used as negative controls in genetic tests for the CMT1A syndrome). PMP22 protein expression was evaluated in tissues and cells by ImmunoHistoChemistry (IHC), and ImmunoCytocChemistry (ICC) using a quantitative scoring (eg, 0 absent, 1 low, 2 intermediate and 3 high expression). The PCCs were also exposed to IGF-II 100nM, 200nM and 400nM; 72h and NSC-631570 (IC50 of PCCs; 72h), and their combination. A radio-therapy treatment "in vitro" was performed in our PCCs, using 4 different dose (1, 2, 3, and 4 Gy) and the same clinical dose-rate. Finally, expression of PMP22 was correlated with cell proliferation index.

Results: The PMP22 genetic duplication was observed in 56% (9/15) of PDAC patients and in 66% (2/3) of PCCs. No CMT1A amplification was discovered in healthy cases. PDAC duplicated samples showed significantly higher score of PMP22 protein expression (p=0.0262) with respect to not amplified cases. PDAC cells involved in peri-neuronal infiltration showed high expression of PMP22 protein. Indeed, PMP22 protein was correlated with decreased cell growth, whereas 400 nM IGF-II reduced PMP22 expression and increased cell proliferation. Conversely, the addition of 1mM NSC-631570 increased PMP22 expression, and overcame IGF-II induced proliferation (p=0.0183). Furthermore the lower radion doses on PCCs stimulated recovery of cellular growth.

Conclusion: This is the first study reporting PMP22 duplication in PDAC specimens and cells and this duplication was correlated with PMP22 protein expression. PMP22 protein was inversely related to cell proliferation and its inhibition by IGF-II might explain chemoradioresistance caused by PDAC associated fibroblasts. NSC-631570 increased PMP22 expression and might synergize with anticancer treatments against PDAC, includi radio-chemotherapy. Finally, the PMP22 might represent the connection between PDAC and it's neuronal invasion.
AN ANALYSIS OF PERIOPERATIVE CHEMOTHERAPY IN RESECTED PANCREATIC CANCER: IDENTIFYING THE NUMBER AND SEQUENCE OF CHEMOTHERAPY CYCLES NEEDED TO OPTIMIZE SURVIVAL  Irene Epelboym, Mazen S Zenati, Jennifer Steve, Kenneth Lee, Nathan Bahary, Melissa E Hogg, Herbert J Zeh, Amer H Zureikat; University of Pittsburgh Medical Center

**Background:** Receipt of 6 cycles of systemic adjuvant therapy (AT) is standard of care in resected pancreatic cancer (PDA). Neoadjuvant chemotherapy (NAC) is being increasingly used; however, the optimal number of chemotherapy cycles needed alone or in combination with AT remains unknown. We sought to determine the optimal number and sequencing of chemotherapy cycles in resected PDA.

**Methods:** Retrospective review of all resected PDAs from 2008-2015 at a single institution. Total number of chemotherapy cycles received and their sequence (no chemo, AT only, NAC only, and NAC+AT) was evaluated. Overall survival (OS) was compared across groups using log-rank tests. Cox-proportional hazard modeling was used to determine adjusted hazard ratios.

**Results:** 522 patients were analyzed: NAC alone = 71 (13.6%), NAC + AT = 166 (31.8%), AT alone = 222 (42.5%), no chemo = 63 (12.1%). For the entire cohort, median number of total received cycles was 6 (range 0-15), while follow-up and OS was 45.8 and 27.9 mos. Median OS based on total cumulative cycles was 13 mos for 0 cycles (n=63, 12.1%), 18.5 mos for 1-5 cycles (n=150, 29%), and 36.9 mos for ≥6 cycles (n=309, 59%)(p<0.05). Median survival with >6 AT cycles was comparable to >6 cycles of mixed NAC+AT (37 vs 35.1 mos, p=0.856). On MVA (P <0.0001), compared to 0 cycles, receipt of a minimum of 6 cycles either as AT only (HR 0.34, CI 0.24-0.48) or as combined NAC+AT (HR 0.33, CI 0.23-0.47) was independently associated with improved OS, whereas higher tumor stage (HR 1.52, CI 1.22-1.88), positive nodal disease (HR 1.67, CI 1.30-2.15), positive resection margin (HR 1.85, CI 1.40-2.45), and lower Charlson Comorbidity Index (HR 1.15, CI 1.04-1.26) were associated with decreased survival. Receipt of < 6 cycles (in any combination) was not associated with survival (HR, 0.74, CI 0.53-1.03) on MVA.

**Conclusion:** This analysis suggests receipt of 6 or more cycles of NAC+AT or AT alone is associated with equivalent and optimal survival in resected PDA. Neoadjuvant and adjuvant chemotherapy effects are additive, suggesting those receiving NAC may need a shorter course in the adjuvant setting.
Introduction: Grade of pathologic treatment response highly correlates with postoperative survival in patients receiving neoadjuvant therapy for PDAC. Computed tomography (CT) indices do not accurately assess therapeutic responses. PET-MRI is more sensitive than traditional PET imaging by utilizing silicone photomultiplier (SiPMT) detector systems combined with high resolution anatomic and functional information derived from simultaneous co-localized, respiratory-gated, contrast-enhanced MRI/MRCP. We hypothesized that PET-MRI would be of utility in assessing treatment response and determining therapeutic recommendations in patients undergoing therapy for PDAC.

Methods: We retrospectively reviewed all patients with PDAC undergoing systemic chemotherapy therapy imaged with PET-MRI between April-November 2016. All patients underwent concomitant high-resolution triple phase CT imaging. Charts were abstracted for patient demographics, treatment, and clinicopathologic factors. The indication for PET-MRI and impact on clinical decision making were captured.

Results: A total of 44 patients (n=26 male) with PDA underwent PET-MRI during the study period. Median age at diagnosis was 66 years. 40 of the 44 patients (91%) were diagnosed with non-metastatic PDAC, 39 (98%) of whom received or are currently receiving multimodality neoadjuvant therapy. 38 patients (86%) were CA19-9 secretors. No patients demonstrated radiographic response by RECIST criteria. 3 patients have undergone surgical resection to date and demonstrated Grade 0/1 pathologic treatment response and no FDG activity on preoperative PET-MRI. All 13 patients (100%) that underwent baseline PET-MRI prior to systemic chemotherapy had PET-avid tumors, and metastatic disease not evident on CT was discovered in 2 of these patients (15%). Findings on PET-MRI guided changes in treatment strategy in 18 patients (41%). Of the 14 patients who were CA19-9 non-secretors or had normal CA19-9 at diagnosis, results of PET-MRI affected treatment strategy in 5 patients (36%) at last follow-up.

Conclusions: Based on early results, there appears to be a high correlation between PET-MRI functional/metabolic status and histopathologic treatment response. Furthermore, PET-MRI appears to have utility in guiding systemic chemotherapy decisions beyond what typical biomarkers and RECIST criteria can provide. A current prospective trial is underway in all patients undergoing neoadjuvant therapy for PDAC. Future analysis will assess utility of PET-MRI as a novel predictor of treatment response in patients who lack elevated biochemical markers.
Background: In recent years, radiofrequency ablation (RFA), is being explored as new treatment option for locally advanced pancreatic cancer (LAPC). This article provides a systematic evaluation of the CT-findings after RFA in LAPC, by describing the changing appearances of the tumor, the ablation zone and their relation to surrounding vessels during follow-up (FU).

Methods: Institutional review board approval was obtained and informed consent from all 18 patients with LAPC who underwent RFA. All CT-studies performed prior to RFA and during FU were reassessed by two radiologists in consensus, using standardized scoring lists.

Results: In total, 69 CT-scans were reassessed. One week after RFA, the ablation zone was visible in 100%, as a (partially) sharply-defined (83%), heterogeneous area (94%). In 2 patients (11%), the ablation zone included the entire tumor. At 3 months FU, the ablation zone was completely invaded by tumor in 67% of patients and still present, but decreased in 33%. The SMV (44%) and portal vein (28%) were partially included in the ablation zone, complicated by local thrombosis (n=1) and/or occlusion (n=2) of the SMV in 21%. The occlusions persisted without clinical consequences and the thrombosis disappeared. In 39%, arteries were involved in the ablation zone, which led to lumen reduction in one case (14%).

Conclusions: Directly after RFA the ablation zone is well-defined on CT-imaging, but is usually replaced by tumor ingrowth at 3 months FU. The ablation zone regularly includes vascular structures, with asymptomatic venous occlusion or thrombosis in a minority of cases and without adverse effects in case of arterial involvement.
P115 NON-TRAUMATIC EMERGENT PANCREATECTOMY FOR NEOPLASTIC DISEASE: ANALYSIS OF 534 ACS-NSQIP PATIENTS

C A Puig, MD, C A Thiels, DO, J R Bergquist, MD, D S Ubi, MPH, R L Smoot, MD, D M Nagomey, MD, M B Farnell, MD, M L Kendrick, MD, E B Habermann, PhD, M J Truty, MD; Mayo Clinic

Introduction: While emergent pancreatic resection for trauma has been previously well described, there have been no large contemporary series and investigations into the frequency, indications, and outcomes of emergent pancreatectomy secondary to complications of neoplastic disease. Prior historical reports have been small single-institution series suggesting poor outcomes. Database studies typically exclude these emergent cases from their analyses thus large series outcomes are unknown.

Methods: ACS-NSQIP was reviewed for all non-traumatic pancreatic resections (DP – distal pancreatectomy, PD - pancreaticoduodenectomy, or TP- total pancreatectomy) in patients with pancreatico-biliary or duodenal neoplastic disease from 2005-2013. Emergent operation was defined as NSQIP criteria for emergent case and/or one of the following: ASA Class 5, preoperative ventilator dependency, preoperative sepsis, or requirement of >4 units RBCs in 72 hours prior to resection. Chi-square tests, Fisher’s exact tests were performed to compare postoperative outcomes.

Results: Of 21,452 patients who underwent pancreatectomy for neoplastic indications, we identified 534 (2.5%) patients that underwent emergent pancreatectomy. Preoperative systemic sepsis (66.3%) and bleeding (17.9%) were most common indications for emergent operation. Overall 30-day mortality (9.4% vs. 2.7%), major morbidity (46.1% vs. 25.6%), perioperative PRBC transfusion (47.6% vs. 23.4%), return to OR (14% vs. 5.6%), any SSI (26.6% vs. 19.6%), UTI (8.8% vs. 4.6%), unplanned intubation (9% vs. 4.1%), pneumonia (9.6% vs. 4.2%), length of stay (14 days vs. 11 days), and discharge to skilled facility (22% vs. 11.7%) were expectedly higher in the emergent cohort. For emergent cases, PD was performed more often (76.5% vs. 68.8%), DP was less common (21.5% vs. 29.0%), and TP was similar (1.9% vs. 2.1%) compared to elective cohorts. Similar worse outcomes persisted when stratified by type of pancreatic resection (DP, PD, TP), with the highest mortality found for emergent TP (20.0%).

Conclusion: Emergent pancreatic resection for neoplastic disease results in substantial mortality and morbidity. The results of this large series of modern national data may assist surgeons in making emergent operative decisions in select cases and provide more informed risk counseling on expected outcomes after such rare unanticipated procedures.
P116 A STANDARDIZED AND RISK STRATIFIED, BUNDLED CARE MODEL FOR PANCREATEODOUODENECTOMY IMPROVES OUTCOMES AND REDUCES COST OF CARE. Christopher R Shubert, MD, MHA, Elizabeth B Habermann, PhD, Amy E Glasgow, MHA, Florencia G Que, MD, Rory L Smoot, MD, Mark J Truty, MD, David M Nagorney, MD, Michael B Farnell, MD, Michael L Kendrick, MD; Mayo Clinic

Background: Overall morbidity following Pancreatoduodenectomy (PD) remains 30-50% despite current advances. Non-modifiable patient specific risk factors for POPF are well established. In September 2014, we implemented a standardized and risk stratified, bundled care model for all PD. Our aim was to study the clinical and cost outcomes of this care model for PD to that of our historical standardized practice.

Methods: Clinical and cost outcomes were compared among our prospective PD cohort treated via a risk stratified bundled care model from 9/2014-9/2015 to a previously published historical cohort of PDs from 1/2007-2/2014. According to intraoperative risk stratification, postoperative bundled care components differed by type and duration of perioperative antibiotics, postoperative octreotide, number of operative drains and utilization of jejunostomy tube (Figure 1).

Results: 128 prospective PD were compared to 808 historical.

Overall POPF rate did not change, 23.6% historically versus 27.1% prospectively, p=0.38. However, POPF severity decreased, Grade B decreased from 14.2% to 10.9%, and Grade C decreased from 5.6% to 3.8%, p<0.01.

Average length of stay (LOS) decreased from 12 to 10 days, p<0.001. Readmission rate did not change. Rate of any postsurgical interventional radiology procedure decreased from 26.4% to 18.0%, p=0.048. Monitored care utilization decreased from 35.6% to 23.4%, p<0.01. Among those utilizing monitored care, the median LOS decreased from 3 to 1 day, p<0.001.

Adjusted inpatient cost of care decreased by $6,387(-11.1%) per patient, p=0.016. High risk patients’ adjusted cost of care decreased by $17,307 (-21.1%) per patient, p<0.01. Total 30 day costs decreased by $8,565(-13.7%) per patient (p=0.01); representing a total 30 day cost reduction of $1,096,320 over the first year experience.

Conclusion: Stratifying PD patients according to risk for complication and treating them via standardize bundled care model leads to significantly improved outcomes and decreased costs of care.

<table>
<thead>
<tr>
<th>Intraoperative Bl/ Se</th>
<th>Fg</th>
<th>Med</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infection/ Inflammation</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>5 Day Postoperative Treatment</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Jejunostomy Use</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Additional Drainage</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Fluorine Fluoropty member</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Additional Catheter</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Additional Blending</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Monitored Care Utilization</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
</tbody>
</table>
INTRODUCTION: Regionalization of pancreaticoduodenectomy (PD) has been driven by data demonstrating better outcomes at centers with higher surgical volume. However, the relationship between hospital market share and the costs/charges associated with PD remain unexplored.

METHODS: Patients undergoing PD in urban hospitals in the Nationwide Inpatient Sample (NIS) between 2003 and 2011 were selected. Hospital-level competition by metropolitan statistical area (MSA) was determined using the Herfindahl-Hirschman Index (HHI) in the Hospital Market Structure file. Markets were categorized as "highly competitive," "moderately competitive," and "non-competitive." Log-linear models of costs and charges using survey sample weights were constructed to determine the association with HHI and volume, adjusting for both patient and hospital-level factors.

RESULTS: There were 28,543 admissions for PD in the time period examined. Overall, 48.9% of patients were covered by Medicare; 83.5% of PD procedures were performed in hospitals in highly competitive markets, while 83.7% occurred in teaching hospitals. Unadjusted costs and charges were examined across volume and competition strata (Figure). Higher PD charges and total costs were associated with a greater patient Charlson comorbidity index (CCI) (CCI>2 vs. CCI=0: +9.6%, 95%CI: 5.0%–14.2%), extended length of stay (+79%, 95%CI: 74.5%–83.5%, p<0.001), and post-operative complications (2 or more vs. none: +33.4%, 95%CI: 25.6%–41.3%) (all p<0.001). An overall increase in adjusted charges, but not costs, was noted over time (per-year +3.3%, 95%CI: 0.2%–6.4%, p=0.035). Lower charges, but not costs, were associated with higher volume (-11.8%, 95%CI: -22.7% -0.8%, p=0.035). Highly competitive markets were notable for higher charges compared with moderately competitive markets (+14.8%, 95%CI 0.3%–29.4%, p=0.046). In contrast, costs were higher at hospitals both in highly competitive and non-competitive markets (+14.0%, 95%CI: 2.3%–25.7%, p=0.019; +13.7%, 95%CI: 1.5%–26.0%, p=0.028, respectively) compared with moderately competitive markets.

CONCLUSIONS: After adjusting for demographic and clinical covariates, PD associated charges and costs were not only associated with hospital PD volume, but also competitive market forces. Future studies should seek to better define the factors that impact inter-hospital competition and the variable price scaling of hospitals around PD.
Objective: Minimally invasive pancreatectomy (MIP) is being utilized with increasing frequency. Using a large, national database, we sought to examine short-term outcomes of those undergoing unplanned conversion to an open procedure during MIP and determine factors predictive of failed MIP.

Methods: The 2014-2015 ACS-NSQIP datasets were examined. Based on CPT code, proximal and distal pancreatectomies were selected and grouped by modality. Successful MIP was compared to unplanned conversion to an open procedure. Outcomes and 30-day mortality were compared. Patient specific variables were examined. Univariate analysis was performed with students t-test and the chi-square for continuous and categorical variables, respectively. Multivariate analysis of factors approaching significance on a univariate level was performed with stepwise logistic regression.

Results: 266 (20.6%) of 1291 distal MIP were unsuccessful and experienced unplanned conversion to an open procedure. Unplanned conversion was associated with significantly greater morbidity, including higher rates of delayed gastric emptying (6.8 vs 1.4%), superficial SSI (3.8 vs 1.4%), organ space SSI (12.4 vs 6.4%), unplanned re-intubation (3.8 vs 1.0%), cardiac arrest (1.9 vs 0.2%), MI (1.5 vs 0.3%), septic shock (1.9 vs 0.5%), and perioperative bleeding (22.2 vs 3.3%) (all p<0.05). Unplanned conversion was associated with greater LOS (7.6 d vs 5.3 d, p <0.0001) and unplanned readmission (20.7 vs 14.6%, p 0.0186). Significantly greater 30-day mortality was seen with unplanned conversion (2.6 vs 0.2%, p = 0.0004). Patient specific variables remaining significantly associated with unplanned conversion after multivariate analysis (p<0.05) include male sex (OR 1.5, 95% CI 1.2 – 2.0), BMI ≥ 40 (OR 2.4, 95% CI 1.3 – 4.4), resection for pancreatic adenocarcinoma (OR 2.0, 95% CI 1.4 – 2.7), need for vascular resection (OR 1.9, 95% CI 1.1 – 3.2), smoking (OR 1.9, 95% CI 1.4 – 2.7), and >10% weight loss in the last 6 months (OR 2.0, 95% CI 1.1 – 3.9).

Of 400 proximal MIP, 102 (25.5%) experienced unplanned conversion. Again, a trend toward more complications was seen. Significantly higher rates of pancreatic fistula (28.4 vs 17.8%), pneumonia (6.9 vs 1.3%), respiratory failure (6.9 vs 1.3%), sepsis (13.7 vs 5.0%), and perioperative bleeding (43.1 vs 9.4%) were seen compared to those who underwent successful MIP (all p<0.05). Unplanned conversion was associated with higher rates of percutaneous drainage (30.4% vs 11.7, p<0.0001) and prolonged LOS (13.8 d vs 9.5 d, p<0.0001). Higher 30-day mortality was seen but failed to reach statistical significance (4.9 vs 2.3%, p=0.1925). Patient specific factors associated with unplanned conversion after multivariate analysis included age ≥ 80 (OR 3.9, 95% CI 1.1 – 14.0), need for vascular resection (OR 7.0, 95% CI 3.9 – 12.6), disseminated cancer (OR 24.4, 95% CI 4.7 – 126.8), and chronic steroid use (OR 4.8, 95% CI 1.3 – 15.7) (all p < 0.05).

Conclusion: In this national database, unplanned conversion to an open procedure during MIP is associated with greater morbidity and mortality. This investigation identified several factors for both proximal and distal pancreatectomy that should be carefully considered when selecting patients for MIP.
Comparison of invagination and duct-to-mucosa pancreaticojejunostomy following Whipple’s resection: Randomized clinical trial in patients at high risk of postoperative pancreatic fistula

Marco Del Chiaro, PhD, Srinivas Sanjeevi, MD, Bergthor Björnsson, PhD, Thomas Gasslander, PhD, Ralf Segersvård, PhD, Juhani Sand, PhD, Lars R Lundell, PhD; Dept of Surgery, CLINTEC, Karolinska Institutet, Stockholm, Sweden, Dept of Surgery, Linköping University, Linköping, Sweden, Dept of Surgery, University of Tampere, Tampere, Finland

Introduction: Postoperative pancreatitis and pancreatic fistula following pancreaticoduodenectomy (POPF) are potentially lethal complications, which most frequently occur after extensive surgical manipulation of natural and unaffected pancreatic parenchyma. The aims of the current study were 1) to evaluate a remnant invaginating technique of pancreaticojejunal reconstruction (INV) following Whipple’s resection in a cohort of selected patients at high risk of postoperative pancreatic fistula, and 2) to compare the INV technique to the traditional duct-to-mucosa anastomosis (D-M) regarding the risk of POPF and other associated morbidity.

Method: The current prospective randomized clinical trial was conducted in patients undergoing pancreaticoduodenectomy between 2012 and 2015. The risk of POPF was estimated intraoperatively according to a standardized assessment of pancreatic gland characteristics. Only patients at high risk of POPF due to unaffected pancreatic parenchyma (soft pancreatic texture and small pancreatic duct) were included and randomized to either INV or D-M. POPF, post-pancreatectomy hemorrhage (PPH) and other associated morbidity were classified according established definitions.

Results: A 123 patients were included (62 INV, 61 D-M) in the analysis. Pancreatic duct and gland circumference were median 2 and 80 mm. The groups had comparable operating times (336 min) and blood loss (400 mL). INV reconstruction was faster (28 min vs 36 min; p=0.001) but created technical problems in more cases than D-M (14 pts vs 7 pts). Severe postoperative complications were observed in 57 patients of the total cohort (48%; 25 INV, 32 D-M; p=0.273). Overall mortality was 7.5% (2 INV, 7 D-M; p=0.163), and pancreatic leakage-related mortality was 5% (1 INV, 5 D-M, p=0.207). INV had a lower incidence of severe overall morbidity (Dindo-Clavien IV+V) compared to D-M (3 pts vs 13 pts, p=0.006). Clinical-relevant leakage (POPF B and C) was observed in both groups (30 INV, 31 D-M); however, when compared with D-M, INV had fewer cases of severe POPF C (2 pts vs 12 pts; p=0.002) and PPH (0 pts vs 7 pts; p=0.003), and required fewer reoperations (8 pts vs 18 pts; p=0.020).

Conclusion: Remnant invaginating pancreaticojejunostomy represents a suitable alternative to the duct-to-mucosa technique for a safe pancreaticojejunal reconstruction after Whipple’s resection. In patients at high risk of postoperative pancreatic fistula due to soft pancreatic texture and small pancreatic duct, the presented remnant invaginating technique seems to be associated with a lower risk of severe pancreatic fistula and associated morbidity/mortality (ClinicalTrials Identifier NCT01696903).
P120 REAL-TIME VISUALIZATION OF PANCREATIC LEAK USING CHYMOTRYPSIN-ACTIVATED FLUOROPHORE FOR OPTIMIZING MANAGEMENT OF POSTOPERATIVE PANCREATIC FISTULA Takeaki Ishizawa, MD, PhD, FACS,1 Masayuki Tanaka, MD, PhD,1 Yoshihiro Mise, MD, PhD,1 Hiromichi Ito, MD,1 Yosuke Inoue, MD, PhD,1 Yu Takahashi, MD, PhD,1 Kaho Mori, MD,1 Suguru Yamashita, MD, PhD,2 Norihiro Kokudo, MD, PhD,2 Mako Kamiya, PhD,2 Yasuteru Urano, PhD,2 Akio Saiura, MD, PhD;1 1Cancer Institute Hospital, Japanese Foundation for Cancer Research, 2The University of Tokyo

Background: Despite recent advance in surgical techniques, pancreatic fistula (PF) still occurs and remains the most serious complication after digestive surgery associated with mortality. We have developed a novel fluorophore activated by pancreatic chymotrypsin to identify pancreatic juice leaking from the pancreatic stump based on its protease activities.

Methods: A chymotrypsin probe (glutaryl-phenylalanine hydroxymethyl rhodamine green [gPhe-HMRG] with added trypsin) was newly designed and synthesized. 1) The chymotrypsin probe was sprayed onto the filter papers that had been attached to the patients’ pancreatic stump during pancreatic resection. The ability of this technique to visualize the leakage of pancreatic juice and to predict postoperative PF formation was assessed. 2) In a swine distal pancreatectomy model, the chymotrypsin probe was sprayed directly on the remnant pancreatic stump divided with surgical staplers. 3) Preclinical safety trials of gPhe-HMRG were conducted according to the ICH Consensus Guideline.

Results: 1) Fluorescence imaging using the chymotrypsin probe visualized pancreatic juice leakage on filter papers within 3 minutes in 25 out of the 32 patients. The fluorescence intensity correlated positively with amylase levels of pancreatic juice (r = 0.664, P < 0.001). Symptomatic postoperative pancreatic fistula never developed in the 7 patients with no fluorescence signals on the pancreatic stump. 2) Pancreatic juice leaking from staple halls was identified not only with laparoscopic fluorescence imaging system but also by naked-eye examination through light-blocking glasses. 3) Preclinical safety trials including repeated dose toxicity studies revealed no significant toxicity of gPhe-HMRG.

Conclusions: If the chymotrypsin probe can be sprayed directly to the patient’s pancreatic stump in the future, fluorescence imaging of pancreatic juice may enable pinpoint closure of pancreatic leak and accurate prediction of symptomatic postoperative PF based on pancreatic protease activities, improving safety of pancreatic surgery.
BACKGROUND: Current standard-of-care technologies are unable to distinguish IPMN at high-risk of malignancy from low-risk lesions. The objective of this study was to create a single-platform assay to identify IPMN that are at high-risk for malignant progression.

METHODS: Building on the Verona consensus conference BD-IPMN biomarker study; specific protein, cytokine, mucin, and miRNA cyst fluid targets were identified for creation of a q-PCR based assay. A multi-institutional international IPMN cyst fluid collaborative was developed to contribute patient samples to validate this platform. Cyst fluid gene expression levels were processed to obtain RQ values that were normalized, z-transformed, and utilized in classification and regression analysis by a support vector machine (SVM) training algorithm.

RESULTS: From 59 cyst fluid samples, principal component analysis confirmed no institutional bias/clustering. Sixty percent of eligible samples were randomized to a training set, followed by SVM model optimization with 10-fold cross-validation, and then applied to a test set. The model was repeated 100 times and performance determined by ROC analysis. Machine learning methods classified samples into low-risk (low/moderate dysplasia) or high-risk (high-grade dysplasia/invasive cancer). The assay accurately discriminated high from low-risk cysts with a c-statistic (AUC) of 0.83 (figure).

CONCLUSIONS: We have identified a single-platform PCR-based assay using multiple targets to predict IPMN with high-malignant potential. The creation of this test may allow identification of patients with low-risk IPMN to avoid pancreatic surgery, while identifying patients with high-risk lesions so that they may undergo surgery before the development of invasive disease.
Introduction: Surgical resection is the only curative treatment for pancreatic cancer. However, 80% of patients develop local/distant recurrence within 2 years of curative resection. An immunocompetent model to study tumor recurrence after resection that closely recapitulates the microenvironment in human disease is currently unavailable.

Methods: Tumors from a genetically modified mouse model of pancreatic cancer, KrasLSLG12D/+; p53R172H/+; PdxCre/+ (KPC), were harvested and divided into fragments with a diameter of 3 mm each. These tumor fragments were then implanted into the pancreatic tail of immunocompetent wild type (WT) mice using 7-0 prolene sutures and subsequently followed for tumor take. Mice bearing palpable tumors were then serially resected at 2, 3 and 4 weeks post-tumor implantation. For resection, a midline laparotomy was done to expose tumors which were then carefully resected with grossly negative margins. Mice with local tumors invading peritoneal structures other than pancreas and spleen precluding resection or mice with distant metastases were excluded from the study.

Results: Tumors implanted from KPC into WT immunocompetent mice consistently formed tumors that recapitulated the dense desmoplastic stroma closely simulating human disease. Resection at 2 weeks post tumor-implantation produced tumors that were mostly limited to the distal pancreas with or without local splenic involvement. In contrast, when tumor bearing mice were resected beyond 2 weeks, they had larger tumors involving multiple peritoneal structures precluding resection or were associated with significant post-operative mortality. On tumor resection at 2 weeks post implantation, 5/5 mice with tumor diameter ≥10 mm developed intra-peritoneal recurrence within 5 weeks of resection with 2/5 mice developing malignant ascites. In mice with tumors <10 mm in diameter at resection, tumor recurrence was significantly lower (1/10) at 5 weeks.

Conclusion: Our study describes a reliable model of pancreatic tumor resection and recurrence that is modelled in an immunocompetent setting and closely resembles the dense desmoplasia associated with human disease. Further characterization will provide a valuable tool to study patterns and mechanisms responsible for recurrence. The insight into these understudied pathways will help design novel strategies to treat recurrence in pancreatic cancer.
THE DUTCH PANCREAS BIOBANK: A NATIONWIDE BIOBANK OF PANCREATIC DUCTAL ADENOCARCINOMA, PERIAMPUTLLARY CANCERS AND CHRONIC PANCREATITIS

M Strijker, A Gerritsen, J van Hilst, Mf Bijlsma, Ba Bonsing, Mj Bruno, Rm van Dam, F Dijk, Chj van Eijck, Rs Fichtinger, Mf Gerhards, B Groot Koerkamp, Ihjt de Hingh, Y Issa, Kp de Jong, G Kazemier, Jn Klaase, Cj van Laarhoven, T LeLarge, Ve de Meijer, Hc van Santvoort, M Suker, Jh Verhagen, Hw Verspaget, Iq Molenaar, Or Busch, Mg Besselink, Ma Boermeester; 1Academic Medical Center, Amsterdam, 2Leiden University Medical Center, Leiden, 3Erasmus Medical Center, Rotterdam, 4Maastricht University Medical Center, Maastricht, 5Onze Lieve Vrouwe Gasthuis, Amsterdam, 6Catharina Hospital, Eindhoven, 7University Medical Center, Groningen, 8VUMedical Center, Amsterdam, 9Medisch Spectrum Twente, Enschede, 10Radboud University Medical Center, Nijmegen, 11St Antonius Hospital, Nieuwegein, 12Parelsnoer Instituut, 13UMC Utrecht

Introduction: Large biobanks with uniformly collected and stored biospecimens are essential for research on genetic and molecular characteristics of pancreatic diseases. The Netherlands has traditionally been strong in multicenter clinical research on pancreatic diseases, including the nationwide multidisciplinary Dutch Pancreatic Cancer Group (DPCG) and Dutch Pancreatitis Study Group (DPSG), but translational research was less developed. In order to enable future translational research on pancreatic diseases in the Netherlands, the Dutch Pancreas Biobank was established by the DPCG and DPSG.

Aim and methods: The Dutch Pancreas Biobank will include all 8 Dutch university medical centers and several teaching hospitals. The biobank is incorporated in the Parelsnoer Institute, which is a nation-wide biobanking initiative of the Netherlands Federation of University Medical Centers, providing infrastructure and up-to-date standard procedures for the establishment, expansion and optimisation of clinical biobanks for scientific research. All adult patients undergoing pancreatic surgery (all indications) are eligible for inclusion. Pre-operative blood samples (plasma, serum and isolated DNA), intraoperative collected tissue samples (tumour tissue, cyst wall, inflammatory tissue and normal tissue), pancreatic (cyst)fluid and follow-up blood samples (plasma and serum) are collected. All biomaterials are processed and stored at -80°C according to standard operating procedures. Besides biomaterials, clinical parameters are prospectively collected in collaboration with national registries on pancreatic cancer and chronic pancreatitis. A multidisciplinary scientific committee has been installed to assess all requests for the use of biobank material for scientific purposes.

Results: Collection of biomaterials has started in 4 university medical centers and 1 teaching hospital. Institutional review board approval has been obtained in 3 other university medical centers and is being obtained in the other centers. Between January 2015 and December 2016, 338 patients signed informed consent for participation in the Dutch Pancreas Biobank. In this period over 1500 tissue and blood samples were collected: 900 pre-operative blood samples, 585 per-operative tissue samples, and 228 follow-up blood samples. The scientific committee recently approved the first request for use of the biomaterials and preparations for this study have started.

Conclusion: A nationwide biobanking collaboration on pancreatic diseases has been established in the Netherlands. The collection of biomaterials has started and will be expanded to all participating centers in the near future. The Dutch Pancreas Biobank will facilitate multidisciplinary research on diagnostic markers and personalized treatment of pancreatic diseases.
INCREASED EXPRESSION OF SOX9 IN PREMALIGNANT AND MALIGNANT PANCREATIC NEOPLASMS

Jennifer L Gnerlich, MD, Xianzhong Ding, MD, Cara J Joyce, PhD, Kevin Turner, Gerard Abood, MD, Gerard V Aranha, MD, Sam G Pappas, MD; Loyola University Medical Center

Background: Transcription factors involved in epithelial-mesenchymal transition (EMT) are correlated with higher grade and poorer prognosis in various cancers. SOX9, a progenitor cell marker important for normal pancreatic ductal development, is also implicated in malignant tissue transformation. Our aim was to examine differences in expression of SOX9 in intraductal papillary mucinous neoplasms (IPMNs) and ductal adenocarcinoma (PDAC) compared with benign pancreatic ducts (BP).

Methods: SOX9 expression was evaluated by immunohistochemistry performed on 45 specimens including 37 BP, 24 low grade (LG) IPMN, 12 high grade (HG) IPMN, and 20 PDAC. Eight patients with PDAC were found to have an associated IPMN. A linear mixed model was used to compare the percentage of cells expressing SOX9 by specimen type. Repeated measures MANOVA was used to evaluate differences in SOX9 expression by staining intensity (weak, moderate, and strong) in pancreatic epithelial cells.

Results: The study group consisted of 45 patients (25 males and 20 females; median age, 71 years [range, 39-87 years]). The majority of patients had pathology in the head of their pancreas, with 34 patients undergoing Whipples, 9 had distal pancreatectomies, and 2 received total pancreatectomies. Cellular staining profiles of acinar and islet cells did not demonstrate nuclear SOX9 expression, while centroacinar cells showed 100% SOX9 expression and epithelial (ductal) cells stained diffusely positive. Nuclear SOX9 expression was detected in the epithelial cells of 98% HG IPMN, 93% LG IPMN, 81% PDAC, and 60% BP. Compared with BP, SOX9 was expressed from a significantly greater percentage of cells in LG IMPN, HG IMPN, and PDAC (P<0.001 for each). BP and PDAC showed greater variability in SOX9 expression in epithelial cells (BP: 4% strong, 25% moderate, 23% weak staining; PDAC: 22% strong, 44% moderate, 13% weak staining) compared with IPMNs which showed strong, homogenous SOX9 expression in almost all cells (HG IPMN: 99% strong staining; LG IPMN: 94% strong staining). Compared with BP, both LG and HG IPMN showed significantly greater SOX9 expression (P<0.001 for each in strong staining intensity), but there was no significant difference in SOX9 expression between LG and HG IPMN (P>0.05). PDAC had significantly higher expression of SOX9 compared to BP, driven primarily by differences in moderate staining intensity (P=0.02), but significantly lower SOX9 expression compared with LG or HG IPMN (P<0.001 for strong staining intensity).

Conclusions: IPMNs demonstrated the highest expression levels of SOX9, irrespective of grade. SOX9 expression patterns in BP and PDAC demonstrated much more heterogeneity when compared with the strong, uniform SOX9 expression in LG and HG IPMN. Further investigation is needed to evaluate the role of SOX9 as a marker in premalignant lesions and pancreatic cancer development.
Pancreatic cancer (PDAC) lethality is linked to its rapid growth and metastatic propensity, which is thought to be driven by microenvironmental signals provided by stromal cancer associated fibroblasts (CAFs). To characterize the interplay between these cell types, we generated multiple patient-derived PDAC and CAF lines and found differential functional response to CAF signaling: quasimesenchymal PDACs have enhanced proliferative and invasiveness, which is not seen in epithelial subtypes. Using single cell proteomic and transcriptomic analyses, we demonstrated heterogeneity in the acquisition of proliferative and invasive phenotypes with a double positive subpopulation, driven by MAPK and STAT3 pathway co-activation, which increases with stromal content and is associated with worsened survival. This multi-layered heterotypic response to stromal CAFs between different PDAC subtypes combined with single cell heterogeneity linked to relative CAF abundance has uncovered novel insights into tumor-stroma interactions that has prognostic and therapeutic implications for patients with pancreatic cancer.
P126 IMPROVED SURVIVAL IN PATIENTS WITH RADIOLOGICALLY OCCULT METASTATIC PANCREATIC DUCTAL ADENOCARCINOMA DETECTED BY DIAGNOSTIC LAPAROSCOPY

Ace J St John, MS, Maureen V Hill, MD, Kerrington D Smith, MD; Dartmouth Hitchcock Medical Center

Introduction: Patients with metastatic pancreatic ductal adenocarcinoma (PDAC) have an average life expectancy of 6 months. Early diagnostic laparoscopy performed on all patients without radiographic metastatic disease and suspected localized PDAC can identify computed tomography (CT) occult metastatic disease. Our aim was to determine the average survival of patients with radiologically occult metastatic PDAC determined by diagnostic laparoscopy.

Methods: We identified all patients with suspected PDAC who presented to our institution from 2005-2013 with metastatic disease detected on either staging CT or at time of diagnostic laparoscopy. Patients without follow-up data were excluded. Resectability of the primary tumor was defined according to the 2009 AHBPA/AAST/SSO consensus. Primary outcome was months of survival. Statistical analysis was performed using a Student’s t-test.

Results: 104 patients with metastatic disease were noted; 89 identified by staging CT and 25 by diagnostic laparoscopy. Of the patients with radiologically occult disease, 5 (20%) had resectable, 10 (40%) had borderline resectable (BR), and 7 (28%) had locally advanced (LA) primary tumors. Three patients had unknown resectability. The average survival for patients with metastases evident on CT imaging was 6.2 (±8.6 SD) months compared to 11.8 (± 7.4) months in patients with CT-occult metastatic disease (p=0.002). In the patients with CT-occult metastases, the average survival for resectable, BR and LA primary tumors with was 6.0, 14.0 and 9.6 months, respectively.

Conclusions: Patients with radiologically occult metastatic PDAC have an average survival that is almost doubled that of those with CT detected metastases. The average survival also varied by primary tumor resectability. This can have implications on discussion of treatment and goals of care in this patient population.
P127 A PHASE II STUDY OF PANCREATIC ENZYME REPLACEMENT ON COMPLETION RATES OF ADJUVANT CHEMOTHERAPY AMONG SUBJECTS WITH RESECTED PANCREATIC DUCTAL ADENOCARCINOMA Ana Sofia Ore, MD1, Ammara A Watkins, MD1, Hui Zheng, PhD2, Andrea Bullock, MD1, A. James Moser, MD1; 1The Pancreas and Liver Institute at Beth Israel Deaconess Medical Center, Boston, MA, USA., 2Biostatistics Center Massachusetts General Hospital, Boston, MA, USA.

Introduction/Background: Despite Phase III data showing that completion of adjuvant chemotherapy prolongs survival after surgical resection for pancreatic cancer. SEER data indicates therapy rates less than 50%. Potential factors limiting chemotherapy include delayed recovery from surgery, and unrecognized pancreatic exocrine insufficiency, which affects up to 68% of patients undergoing surgical resection, and reach even higher rates by one year after surgery. We hypothesized that pancreatic exocrine insufficiency impacts post-operative nutritional status and reduces completion rates of adjuvant chemotherapy. We designed a Phase II study to test the effect of pancreatic enzyme replacement on completion rates of standard of care adjuvant chemotherapy among subjects with resected pancreatic ductal adenocarcinoma (PDAC).

Methods: Single institution, non-randomized, open label, phase II clinical trial. Our primary endpoint is completion of standard of care adjuvant therapy, defined as receiving all intended planned doses of chemotherapy. Eligible subjects must have potentially resectable biopsy proven PDAC. Patients will be excluded if they have received prior chemotherapy or radiation for pancreatic cancer, present with a second malignancy with active disease or have allergy or hypersensitivity to pancreaticlipase. Subjects may be replaced if final pathology other than pancreatic ductal adenocarcinoma, disease not resected at the time of surgery or are unable to tolerate a regular diet. Pancrelipase (Zenpep, 75 000 IU) will be administered with every meal starting before surgery for a total of 12 months. Subjects may be replaced at week 6 or 12 if they have <50% adherence to enzyme replacement therapy per patient diary. 67 patients will be enrolled with a target completion rate of 70%, corresponding to a 40% improvement over single institution historical control. A Simon's minimax two-stage design will be used with 23 patients enrolled during the first stage. If 12 or more patients are successes the trial will continue with an additional 16 patients being enrolled during the second stage. If 24 or more patients reach the primary endpoint the trial will declare that the intervention has met the pre-specified criteria for success. Secondary endpoints include: adherence to pancreatic enzyme replacement therapy by patient diaries and scheduled pill counts, evaluation of overall survival and progression free survival, improvement of postoperative nutrition status measured by pre-and post-treatment albumin, evaluation of incidence of surgical complications using the Clavien-Dindo surgical complication grading scale for 90 days and improvement of quality of life measured via the EQ-5D-5L.

Discussion/Conclusion: Pancreatic enzyme replacement may improve completion rates of potentially lifesaving adjuvant chemotherapy and diminish post-operative complications.
Major pathologic response after neoadjuvant therapy has been associated with improved outcomes in patients with pancreatic cancer. The purpose of this study is to analyze the survival of patients with combined pancreatic and celiac resection after neoadjuvant therapy according to pathologic response.

Methods: We reviewed a prospective database of patients with pancreatic adenocarcinoma and celiac axis involvement treated with chemoradiation and chemotherapy followed by resection from 1995-2014. Histopathology was performed in all specimens to identify major response to neoadjuvant therapy as defined by fibrosis ≥ 95%. Survival curves were generated using Kaplan-Meier method and compared with the log-rank test. Survival was calculated from the day of diagnosis.

Results: The study included 14 consecutive patients from 1995 to 2014 operated by the authors. One patient expired two months after resection and was excluded from the analysis. All received neoadjuvant radiation with concurrent Gemcitabine, 5FU or Xeloda. Four patients received neoadjuvant gemcitabine-based chemotherapy followed by chemoradiation. There were 7 women. Four patients had Whipple procedures, 3 had total pancreatectomy and 7 had subtotal pancreatectomies. Nine patients needed liver revascularization. Three patients had fibrosis ≥ 95%. Median survival from diagnosis for the entire cohort was 25 months. There was no difference found in disease free or overall survival between groups. Median survival for those with major response was 20 months vs 26 months for the rest of the group (p:0.83). Interestingly, there was no difference in survival in patients with positive vs negative lymph nodes (p: 0.75).

Conclusions: Major pathologic response to preoperative therapy does not correlate with survival in patients with pancreatic adenocarcinoma with involvement and resection of the celiac axis. The results may well have been influenced by the small size of our cohort. Furthermore the majority of patients did not receive preoperative chemotherapy or more modern chemotherapy. Further experience with more patients treated with prolonged modern chemotherapy may well change our findings so that they correlate to experience with patients with neoadjuvant therapy without celiac resection.
P129 IMPACTS OF HISTOLOGICAL EFFECT AND INTRATUMOR STROMAL EXPRESSION OF TENASCIN-C IN THE SPECIMEN RESECTED AFTER CHEMORADIOThERAPY FOR INITIALLY LOCALLY UNRESECTABLE PANCREATIC ADENOCARCINOMA

Aoi Hayasaki; Mie university

**Objectives:** Although prognostic benefit of preoperative chemoradiotherapy (CRT) for pancreatic adenocarcinoma (PDAC) has been indicated by several reports, it remains controversial whether histologic grading of the extent of residual tumor in the posttreatment pancreatectomy specimen is associated with patient prognosis or not. Tenascin-C (TN-C) is an extracellular matrix which is up-regulated in the stromal tissue of PDAC and associated with cell-matrix interaction facilitating epithelial tumor cell invasion. The aim of the current study is to assess the impacts of histologic effect and intratumor expression of TN-C in the resected specimen as prognostic markers for initially locally unresectable (UR-LA) PDAC patients after CRT.

**Methods:** Among 272 patients with cytologically/histologically proven PDAC who underwent CRT from February 2005 to December 2015, the subjects were 110 with UR-LA PDAC (CRT regimen: gemcitabine-based in 51 and S-1+gemcitabine-based in 59). Curative-intent resection could be performed in the 46 (41.8%) of these 110 patients. On pathological examination for the 46 resected specimens, the histological effect of CRT was divided into the two groups according to Evans criteria: high (tumor destruction>50%) and low (<=50%) responders. The intratumor stromal expression of TN-C was evaluated by immunostaining of the stroma around the tumor cells using resected specimens in the 45 cases, excluding one case with complete histological response.

**Results:** The 26 patients with R0 resection and 20 with R1-2 resection had significantly longer median disease-specific survival (DSS) time than 64 without surgery. (R0 and R1-2 vs. unresected: 25.3 and 21.0 vs. 11.6 months, P=0.001 and 0.012). The 12 high responders achieved significantly higher R0 rate than the 34 low responders (R0 rate: 83.3 vs. 47.1%, P=0.031). The positive expression rate of TN-C was significantly lower in the high responders than in the low responders (high vs. low: 18.2 vs. 61.8%, P=0.013). DSS did not differ significantly between high responders and low responders (MST: 29.8 vs. 21.0 months, P=0.056), while the patients with negative TN-C had significantly longer survival than those with positive TN-C (MST: 29.3 vs. 17.1 months, P=0.001) (Figure). In multivariate analysis, the negative expression of TN-C is an independent favorable prognostic factor in the UR-LA PDAC patients with resection after CRT (HR:0.20, 95% CI: 0.07-0.59, P=0.003).

**Conclusions:** Histological effect of CRT contributes to increasing rate of R0 resection and improving survival for the patients with UR-LA PDAC. The intratumor stromal TN-C expression in the remnant tumor will become much stronger prognostic indicator in the UR-LA PDAC patients with resection after CRT.
**Introduction:** Diagnostic laparoscopy (DL) at the time of resection for pancreatic cancer can detect occult metastatic disease and alter surgical management. We examined the yield of DL in the current era of high quality computed tomography (CT) and routine review of patient data and imaging by a multidisciplinary tumor board.

**Methods:** Patients undergoing exploration from January 2014 to December 2015 for radiographically resectable, proven or suspected pancreatic ductal adenocarcinoma (PDAC) were included. Data regarding demographics, operative details, and pathology were collected. Patients who underwent neoadjuvant therapy as part of clinical trials were excluded. DL proceeded with placement of one port and visual examination using a 5 mm, 30 degree laparoscope without mobilization. A second 5 mm port was placed as needed to perform a biopsy if a lesion was visualized. Patients with asymptomatic metastatic disease did not undergo prophylactic surgical palliation.

**Results:** A total of 86 patients were included with 68 head/uncinate lesions and 18 body/tail lesions. Fifty patients (58%) had prior abdominal surgery. Seventy-six patients (88%) underwent DL while 10 patients (12%) did not due to need for palliation (3), prior surgery (4), or surgeon preference (3). Two DLs were technically unsuccessful. Of the 74 successful DLs, 23 patients (31%) underwent at least one biopsy. Eight (11%) showed positive findings (3 of 58 head/uncinate, 5 of 18 body/tail). Eleven resections (15%) were completed robotically or laparoscopically. Sixteen patients underwent laparotomy (57 after DL, 10 without DL) and five were found to have distant metastatic disease: two had DLs without biopsy, one had an unsuccessful DL due to adhesions, and two did not have DL. Two additional patients had a positive celiac axis node and six patients had locally unresectable disease without metastasis. Overall, 65 patients underwent successful resection, with 52 of 68 proximal (76%) and 13 of 18 distal lesions (72%). Pathologic outcomes are shown in Table 1.

**Conclusions:** DL is safe and successful even in patients with prior surgeries and should be performed prior to resection for suspected PDAC. DL currently has a detection rate of 11% overall for occult metastasis and 28% in body and tail lesions.

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>Head/Uncinate</th>
<th>Body/Tail</th>
</tr>
</thead>
<tbody>
<tr>
<td>DL</td>
<td>86</td>
<td>68</td>
<td>18</td>
</tr>
<tr>
<td>Positive</td>
<td>8 (11)</td>
<td>3 (5)</td>
<td>5 (28)</td>
</tr>
<tr>
<td>Negative</td>
<td>66 (87)</td>
<td>53 (92)</td>
<td>13 (72)</td>
</tr>
<tr>
<td>Failed</td>
<td>2 (3)</td>
<td>2 (3)</td>
<td>0</td>
</tr>
<tr>
<td>E1ap</td>
<td>67</td>
<td>60</td>
<td>7</td>
</tr>
<tr>
<td>Metastatic</td>
<td>7 (10)</td>
<td>7 (12)</td>
<td>0</td>
</tr>
<tr>
<td>Locally Advanced</td>
<td>6 (9)</td>
<td>6 (10)</td>
<td>0</td>
</tr>
<tr>
<td>Resected</td>
<td>65 (76)</td>
<td>52 (76)</td>
<td>13 (72)</td>
</tr>
<tr>
<td>Open</td>
<td>54</td>
<td>47</td>
<td>7</td>
</tr>
<tr>
<td>Minimally Invasive</td>
<td>11</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Pathology</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PDAC</td>
<td>59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ampullary</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cholangiocarcinoma</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duodenal</td>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PDAC</th>
<th>Size (cm)</th>
<th>R0</th>
<th>R1</th>
<th>R2</th>
<th>R3</th>
<th>R4</th>
<th>N0</th>
<th>N1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3.0</td>
<td>37 (63)</td>
<td>22 (37)</td>
<td>11 (19)</td>
<td>11 (19)</td>
<td>48 (81)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Expressed as number (percentage) or median.
P131 THE VALUE OF DIAGNOSTIC LAPAROSCOPY AT THE TIME OF PANCREATODUODENECTOMY FOR PERIAMPUTLARY MALIGNANCIES June S Peng, Sricharan Chalikonda, Wey Jane, R. Matthew Walsh, Gareth Morris-Stiff; Cleveland Clinic Foundation

Objective: To examine the yield of diagnostic laparoscopy (DL) at the time of resection for periampullary malignancies.

Methods: Patients who underwent exploration from January 2014 to December 2015 for periampullary malignancies without neoadjuvant therapy were included. Prophylactic double bypass in patients with asymptomatic metastatic disease was not routinely performed. Patient data and imaging were reviewed by a multidisciplinary tumor board. Data regarding operative findings and pathology were collected.

Results: A total of 107 patients underwent exploration during the study period. DL was performed in 84 patients (79%) and omitted in 23 due to need for palliation (8), preoperative diagnosis other than PDAC (5), prior surgery (5), recent DL (1), or surgeon preference (4). There were three injuries related to DL. Details of the biopsies are demonstrated in the table. In 82 technically successful DLs, 20 patients (24%) underwent at least one biopsy, 3 (4%) revealed metastatic disease, all in patients with suspected PDAC. Sixty-seven patients underwent laparotomy after negative DL, and an additional 7 biopsies were performed (10%) – five after mobilization. Overall, DL was successful in obtaining a biopsy in 20 of 22 patients (91%) with lesions expected to be visualized without mobilization. DL alone confirmed pathologic diagnosis of metastasis in 3 of 8 patients.

Conclusion: In our experience, the yield of DL is 5% in radiographically resectable PDAC and zero in suspected non-pancreatic malignancies. The yield may be lower than in historical series due to increasing quality of imaging, anatomic definitions of resectability, and standardized radiographic review.

<table>
<thead>
<tr>
<th>Preoperative Diagnosis</th>
<th>Total</th>
<th>PDAC</th>
<th>CBD</th>
<th>Duodenal</th>
<th>Ampullary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>107</td>
<td>68</td>
<td>14</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>DL Attempted</td>
<td>84 (78)</td>
<td>58 (86)</td>
<td>12 (86)</td>
<td>6 (50)</td>
<td>8 (62)</td>
</tr>
<tr>
<td>DL Successful</td>
<td>82 (98)</td>
<td>50 (97)</td>
<td>12</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Biopsy Positive</td>
<td>3 (4)</td>
<td>3 (5)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>MRS PD</td>
<td>14</td>
<td>5</td>
<td>3</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Exp After DL</td>
<td>67</td>
<td>46</td>
<td>9</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Biopsy</td>
<td>7</td>
<td>5</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Without Mobilization</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>With Mobilization</td>
<td>5</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Biopsy Positive</td>
<td>3</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Exp After DL</td>
<td>23</td>
<td>10</td>
<td>2</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Biopsy</td>
<td>6</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Without Mobilization</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>With Mobilization</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Biopsy Positive</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Metastatic</td>
<td>13</td>
<td>10</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Locally Advanced</td>
<td>6</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Resected</td>
<td>88</td>
<td>52</td>
<td>15</td>
<td>11</td>
<td>11</td>
</tr>
</tbody>
</table>

Pathology
- PDAC: 46%
- CBD: 2%
- Duodenal: 1%
- Ampullary: 3%

Reported as number (percent).
The value of preoperative biliary drainage in patients with obstructive jaundice due to pancreatic head tumors is still under debate. So far, no benefit of preoperative biliary stents has been demonstrated.

**Patients and methods:** From 09/2003 until 12/2015 a total of 449 pancreatic resections including 288 pancreaticoduodenectomies were performed in our department. From a prospectively collected database we analyzed 155 patients with preoperative obstructive jaundice. Postoperative complications were defined according to international standards. We compared patients with (group 1) and without (group 2) preoperative biliary drainage procedures regarding morbidity and mortality.

**Results:** Both groups did not differ in demographic or biological variables. In both groups, final histology revealed malignancy in more than 80%. In 111 patients preoperative biliary drainage was performed for a median of 21 days (range 4-355 days). 44 patients with a median bilirubin of 142 µmol/l (range 36-346 µmol/l) did not receive any biliary drainage procedure.

With regard to intraoperative variables duration of operation was significantly longer in group 1 (p=0.03). The incidence of postoperative complications was higher in group 2 vs. group 1 (75% vs 49%, p<0.005). Especially the incidence of postoperative bleeding was increased in group 2 (23% vs 5%, p<0.01). The rate of postoperative pancreatic fistulas, wound infections, septic complications, length of ICU treatment or length of hospital stay did not differ between the two groups. Mortality was comparable in both groups.

**Conclusion:** Preoperative biliary drainage could reduce surgical complications in our series of patients. There was no adverse effect of biliary drainage on postoperative morbidity and mortality.
Background: New guidelines recommend differentiating between carcinoid and pancreatic neuroendocrine tumors (PNETs) during clinical trials. However, little is known about the behavior and incidence of primary pancreatic carcinoid tumors.

Methods: Retrospective cohort study utilizing the National Cancer Data Base (NCDB) to identify adults with primary PNETs diagnosed between 2004 and 2013. The Kaplan-Meier method was used to evaluate overall survival and multivariate Cox proportional hazards model was used to assess the hazard of death in resected patients.

Results: Of 10,752 patients, 12.7% were diagnosed with carcinoid tumors, 84.7% with non-functional and 2.6% with functional PNETs. While the number of functional PNETs has remained relatively constant over time, rates of non-functional and carcinoid tumors have risen dramatically. Only 36 (5.7%) carcinoid tumors were diagnosed in 2004, which increased to 497 (27.7%) in 2013. Overall survival was significantly longer for carcinoid compared to functional and non-functional tumors (log-rank p<0.0001); with 5 year survival rates of 63.1%, 58.3%, and 52.6%, respectively. For resected patients, overall survival further improved for carcinoid tumors relative to functional (log-rank p=0.0011) and non-functional (log-rank p=0.0001) tumors, but the survival difference between functional and non-function tumors disappeared (log-rank p=0.4579); 5 year survival rates were 89.2%, 76.6%, and 78.7%, respectively. On multivariate Cox regression of the resected cohort, mortality was significantly higher for patients with functional (HR 1.81) and non-functional (HR 1.40) PNETs compared to carcinoid tumors (see Figure).

Conclusions: Primary pancreatic carcinoid tumors are increasingly diagnosed. Differentiating PNET subtypes plays an important role in prognostication. Resection remains a critical component of care.
P134 DIFFERENCES BETWEEN THE SERUM PROTEIN PROFILE OF PANCREATIC CANCER AND CHRONIC PANCREATITIS

Hanna Seppänen, MD, PhD1, Mayank Saraswat, PhD2, Sakari Joenväärä, BS2, Risto Renkonen, Prof2, Caj Haglund, Prof3; 1Department of Surgery, Helsinki University Hospital, Helsinki, Finland, 2Transplantation Laboratory, Haartman Institute, University of Helsinki, 3Department of Surgery, University of Helsinki and Helsinki University Hospital

Background: Age-standardized incidence rates for pancreatic cancer (PC) in men have increased by 25% from 1957 to 2011 in Finland. The average age of diagnosis for PC is 69 years in Nordic males, whereas the average age of diagnosis of chronic pancreatitis (CP) is 40-50 years, but the cases overlap in age. By radiology the evaluation of a pancreatic mass, i.e. the differential diagnosis between CP and PC is often difficult. Preoperative needle biopsies are difficult to obtain and are demanding to interpret. New blood based biomarkers are needed. The accuracy of the only established biomarker for PC, CA 19-9 is rather poor in differentiating between benign and malignant mass of the pancreas.

Patients and Methods: In this study, we have performed mass spectrometry HDMSE analysis of serum samples from patients with chronic pancreatitis and pancreatic cancer. We have quantified 652 proteins and performed detailed statistical analysis such as principal component analysis, orthogonal partial least square discriminant analysis and receiver operating curve analysis.

Results: The proteomic signature of CP vs PC samples was able to separate the two groups by multiple statistical techniques. Some of the enriched pathways in the proteomic dataset were LXR/RXR activation, complement and coagulation systems and inflammatory response. We propose that multiple high confidence biomarker candidates including Inter-alpha-trypsin inhibitor heavy chain H2 (Area under the curve, AUC: 0.947), protein AMBP (AUC: 0.951) and prothrombin (AUC: 0.917) should be further evaluated in larger patient series as potential new biomarkers for differential diagnosis between CP and PC.
**P135 DIFFERENCES IN N-GLYCAN PROFILES IN INTRADUCTAL PAPILLARY MUCINOUS NEOPLASMS (IPMN) WITH DYSPLASIA AND IPMN ASSOCIATED CARCINOMA**

Heini Nieminen, MD, Tero Satomaa, BS, Annamari Heiskanen, BS, Tuomas Kaprio, MD, PhD, Jukka Hiltunen, PhD, Jaana Hagström, MD, PhD, Ari Ristimäki, Prof, Caj Haglund, Prof, Hanna Seppänen, MD, PhD;

1Department of Surgery, Helsinki University Hospital, Finland, 2Glykos Finland Ltd., Helsinki, Finland, 3Department of Pathology and Oral Pathology, University of Helsinki and Helsinki University Hospital, Helsinki, Finland, 4Department of Pathology, University of Helsinki and Helsinki University Hospital, Helsinki, Finland, 5Department of Surgery, Helsinki University Hospital, University of Helsinki, Finland

**Introduction:** Intraductal papillary mucinous neoplasm (IPMN) is a cystic neoplasm of the pancreas. There are three main types of IPMN tumors: main duct (MD) type, branch duct (BD) type and a mixed type which affects both the main and the branch ducts. Some of the IPMN-tumors develop over time increasing dysplasia and at the end IPMN associated carcinoma. If IPMN tumors are operated before carcinoma has developed the prognosis for the patients is much better. A new prognostic marker showing which tumors are likely to develop cancer would be important, because these patients could then undergo surgery earlier and on the other hand the tumors that are not likely to develop cancer would not have to be followed up on.

Glycans are sugar molecules that can be found on the cell surface of every cell as protein- and lipid-linked glycoconjugates. The glycan profile changes when a normal cell turns in to a cancer cell. In this study we determined the protein-linked N-glycan profiles in IPMN with dysplasia, IPMN associated carcinoma and healthy pancreas tissue and compared the groups.

**Experimental Procedures:** We found 10 patients that were operated on in Helsinki University Hospital during the years 2002-2014 that had representative tumor samples of both dysplasia and carcinoma. Five samples of healthy normal pancreas were from patients that had surgery for neuroendocrine tumor.

**Results:** The N-glycan profiles were clearly different in the three groups: dysplasia, cancer and controls. Neutral N-glycan structural groups that associate with tumor tissue were terminal N-acetylgalactosamine, non-sialylated complex-type, small high-mannose, hybrid-type/monoantennary, and fucosylated paucimannose N-glycans. In acidic N-glycans we saw a clear decrease in sulfation and instead of sulfation we saw sialylation.

With control tissue samples associate large high-mannose, bisecting GlcNAc and complex fucosylated N-glycans in the neutral N-glycan fraction and in the acidic N-glycans sulfation of hybrid-type, and complex-type N-glycans.

**Discussion:** The N-glycan profiles differed clearly between normal pancreatic tissue, dysplastic and carcinoma samples. Similar differences have earlier been seen in lung, kidney, breast, and ovarian cancer. The glycans that are typical for cancer cells are potential targets for immunotherapy or could possibly be used as diagnostic or prognostic markers. Clinically it would be of great importance to find new prognostic markers in order to identify patients for operation before cancer has developed.
Background: Recent advanced surgical techniques and intensive neoadjuvant therapy sometimes allows the patients with advanced pancreatic ductal carcinoma (PDC) to survive more than 5 years even if tumor severely invades the adjacent major vessels. On the other hand, even small resectable PDC often develops distant metastasis during the interval of preoperative therapies or at the early period after the curative surgery, resulting in the grim prognoses of these patients. The aim of this study is to clarify the significant prognostic factors for PDC patients treated with preoperative gemcitabine-based chemoradiotherapy (CRT) and to propose the nomogram for predicting patient survival before the initiation of CRT, revealing what kind of patients achieve the special benefit of CRT.

Patients and methods: From Feb. 2005 and Dec. 2015, 259 patients with PDC treated with preoperative Gemcitabine-based chemoradiotherapy (CRT) (Gem or Gem+S1 +45-50.4Gy) were divided into 2 groups; training cohort (n=187, 2013) and validation cohort (n=72, 2013-2015). To identify the significant pre-CRT prognostic factors for PDC patients treated with preoperative CRT, 187 patients (45 with resectable PDC, 79 with borderline resectable PDC, 91 with locally unresectable PDC) were analyzed by uni- and multivariate analyses. Based on these results, predictive nomogram was proposed, making it possible to predict the 1, 3 and 5 years survivals of PDC patients before the initiation of CRT.

Results: The 3- and 5-year survival rates in training cohort were 28% and 24%, respectively. In multivariate analysis, pre-CRT performance status (p=0.007), high neutrophil lymphocyte ratio (NLR) (p=0.026), high BMI (p=0.001) and CEA levels (p<0.001), presence of SMA contact (p<0.001) were selected as independent prognostic factors. According to the predictive nomogram created by these factors, the 3- and 5-year survival rates were 46% and 42% in the patients whose scores were less than 29.9 points, 26% and 23% in those with 30 to 39.9 points, and only 10% and 5% in those with more than 40 points, respectively, showing clear separation of survival curves according to the each score range. Moreover, when we used this nomogram for validation cohort, the 1-year survival rate was 96% in the patients with less than 29.9 points, 76% in those with 30 to 39.9 points and 65% in those with more than 40 points, respectively.

Conclusion: Before the initiation of preoperative CRT for PDC patients, we should assess anatomical factors of tumor, tumor biological markers and patient physiological factors including SMA contact, CEA level, PS, BMI and NLR to predict the benefit of CRT followed by surgery. According to our nomogram, the patients with low score are likely to achieve long-term survival even in advanced PDC.
Pancreatic cancer is one of the most lethal cancers, with an increasing incidence and limited treatment options. Over the past few decades there has been little improvement in survival. Prevention might, therefore, be key in lowering the burden of this disease. Two well-known modifiable risk factors, that have been associated with the risk of pancreatic cancer, are smoking and an increased body mass index (BMI). For other lifestyle factors, such as diet, there is limited or inconsistent evidence for the association with pancreatic cancer. The World Cancer Research Fund (WCRF) and American Institute for Cancer Research (AICR), have developed dietary and lifestyle guidelines for the prevention of cancer. Adherence to these guidelines is significantly associated with a lower risk of breast and colorectal cancer. We aimed to study whether adherence to these recommendations, is also associated with the risk of pancreatic cancer.

We used data from the Rotterdam Study, which is an ongoing, population-based, prospective cohort study in the suburban area of Rotterdam, the Netherlands, and is one of the oldest and largest cohorts in Europe. Between 1989 till 2006, people aged 45 years and over were enrolled (with an overall response rate of 71.7 %). Data on dietary intake were collected at baseline, through a frequent food questionnaire. We excluded subjects of whom we had incomplete or unreliable food data. We constructed a score, based on the WCRF/AICR recommendations: weight management, foods and drinks that promote weight gain, plant and animal foods, alcoholic drinks, and use of dietary supplements. We used Cox Proportional Hazard Models to estimate the association between the score and pancreatic cancer risk. Next we evaluated the risk of pancreatic cancer for each individual component of the WCRF/AICR score. Furthermore, we performed a sensitivity analysis, excluding cases that occurred within 2 years from the start of follow-up, to assess whether results were influenced by yet undetected disease.

At baseline 14,922 participants were at risk of developing pancreatic cancer. For 9778 participants dietary data was available. During a median follow-up time of 20.1 years, 77 patients developed pancreatic cancer. Adherence to the WCRF/AICR recommendations was significantly associated with a reduced risk of pancreatic cancer (HRcrude: 0.73, 95% CI: 0.56-0.96). This association remained after adjustment for age, sex, smoking status and diabetes status (HRadjusted: 0.74, 95% CI: 0.57-0.97) and persisted after excluding all participants with less than two years of follow-up. Further analysis of the individual components showed that the effect was mainly driven by refraining from taking dietary supplements (HR: 0.53, 95% CI: 0.34-0.84).

In conclusion, our findings support, that adherence to dietary and lifestyle recommendations of the World Cancer Research Fund and American Institute for Cancer Research, decreases the risk of pancreatic cancer. Promoting these recommendations to the general population could help reduce the burden of pancreatic cancer.
In many European countries pancreatic cancer mortality is, paradoxically, higher than the incidence. This suggests an underestimation of the reported incidence or an overestimation of pancreatic cancer mortality, which could be important for several reasons. Firstly, because these numbers are supposed to inform clinicians and their patients. Secondly because incidence and mortality rates largely influence the way we prioritize our focus in studying different diseases and lastly, because these numbers are used to advise health care and insurance company policy makers. The objectives of this study were to establish the incidence of pancreatic cancer and its mortality in a large and longstanding population-based prospective cohort study, and to extrapolate this number to a national level to get insight into this discrepancy in figures from national registries.

We used data from the Rotterdam Study to calculate the incidence rate of pancreatic cancer. The Rotterdam Study is an ongoing, population-based, prospective cohort study in the suburban area of Rotterdam, the Netherlands, and is one of the oldest and largest cohorts in Europe. Between 1989 till 2006, people aged 45 years and over were enrolled (with an overall response rate of 71.7%). Details on incident pancreatic cancer cases were available until 2013. All potential cases and level of certainty thereof were independently adjudicated by two physicians. In case of disagreement, consensus was sought through consultation of an experienced pancreatic surgeon. Date of death was obtained through municipality records, while cause of death was obtained through medical records. Age specific incidence rates were calculated and compared to data available in the Netherlands Cancer Registry, which registers all cancer incidence nationwide. Additionally we provided all cases to the Netherlands Cancer Registry for matching.

At baseline 14,922 participants were at risk of developing pancreatic cancer. Completeness of follow-up until the 1st of January 2013 was 98.5%, with a median follow-up time of 16.4 person years per person. In total 113 participants developed pancreatic cancer: 38.9% male and 61.1% female. Almost all cases diagnosed above the age of 65 (92.0%), with a mean age at diagnosis of 77.3 years (SD 8.8). In only 44.2% of the cases, diagnosis was confirmed through pathology. Rates increased with age, with an incidence rate of 109.9 (95% CI; 85.7-138.8) per 100,000 person years for people older than 75. This is higher than the currently reported 55.9 – 89.2 per 100,000 person years. Of the 113 cases identified in the Rotterdam Study, only 67.3% was reported as pancreatic cancer in the Netherlands Cancer Registry. Cases that were not registered in the registry, were significantly less likely to have had their diagnosis confirmed by pathology, were significantly older and had a significantly poorer survival.

The incidence of pancreatic cancer, as registered by the Netherlands Cancer Registry, is an underestimation. Patients, not registered by the cancer registry, have a significantly poorer survival. Consequently, we are likely to overestimate the already poor survival of pancreatic cancer.
LYMPHADENECTOMY IN RESECTED NODE-NEGATIVE PANCREATIC CANCER: ARE SOME PATIENTS BEING UNDERTAGED? Jad Abou-Khalil, MD, MSc, Margaret Mandelson, PhD, Adnan Alseidi, MD, Scott Helton, MD, Thomas Biehl, MD, Vincent Picozzi, MD, Bruce Lin, MD, Flavio Rocha, MD; Virginia Mason Medical Center

Introduction: Validated benchmarks for adequate lymphadenectomy (LAD) are well established for gastric and colon cancers to avoid stage-migration. Although a harvest of 15 nodes has been proposed for pancreas cancer, this number has not been confirmed in a large, multi-institutional setting.

Goal: We examined the relationship between LAD and survival in node-negative patients having undergone pancreatetomy for pancreatic adenocarcinoma to identify whether some patients with low lymph node counts are understaged.

Methods: We identified all node-negative patients undergoing pancreaticoduodenectomy (PD) and distal pancreatectomy (DP) for pancreatic adenocarcinoma within the National Cancer Database (NCDB) between 2004 and 2014. We excluded patients with clinical or pathologic M1 disease, as well as patients that died within 90 days from surgery and those with no data on lymph node harvest. Univariate and multivariate quantile regression were used to identify the effect of lymph node harvests and other patient and tumor-specific variables on survival.

Results: We identified 7329 and 2071 patients undergoing PD and DP respectively staged as pN0 and meeting inclusion criteria. Patient characteristics are summarized in Table 1. Median survival was 21.5 months (95%CI 21.1-21.9) and 21.2 months (95%CI 20.1-22.1) in the PD and DP groups respectively. Median survival of various lymph node harvest groups is demonstrated in Figure 1. In the PD group, LAD>=15 was not associated with a higher median survival (21.6 (95%CI 20.9-22.4) and 21.3 (95%CI 20.7-21.9) months in the<15LN and >=15LN respectively, p=0.223.). In the DP group, median survival was 20.2 (95%CI 19.2-21.6) and 22.6 (95%CI 20.9-24.4) in the LAD<15 and LAD>=15 groups (0.068). On univariate quantile regression, age, higher tumor grade, lymphovascular invasion, higher T stage, positive margin and not receiving chemotherapy or radiation were associated with decreased survival and retained that association on multivariate regression (Tables 1 and 2) whereas LAD was not associated with a change in survival in the PD group.

Conclusion: We did not identify a group of patients that were understaged as a function of low lymph nodes harvests. A benchmark of 15 lymph nodes for pancreas cancer cannot be recommended as a quality measure.
<table>
<thead>
<tr>
<th></th>
<th>BC(73%) (95% CI)</th>
<th>Univariate Quantile regression coefficient towards survival (pam212, P50&amp;C82-p)</th>
<th>BC(73%) (95% CI)</th>
<th>Univariate Quantile regression coefficient towards survival (pam212, P50&amp;C82-p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (mean, in years)</td>
<td>68.8 (86.0-88.5)</td>
<td>-0.13 (-0.15, -0.11, p = 0.60)</td>
<td>67.8 (85.7-89.8)</td>
<td>-0.13 (-0.15, -0.11, p = 0.60)</td>
</tr>
<tr>
<td>Female Sex</td>
<td>50.0% (40.3-61.8%)</td>
<td>0.16; 95% CI 1.84, p = 0.075</td>
<td>57.9% (47.1-68.6%)</td>
<td>0.16; 95% CI 1.84, p = 0.075</td>
</tr>
<tr>
<td>Grade</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Well differentiated</td>
<td>83.6% (93.1-93.5)</td>
<td>2.75 (0.36-4.00, p = 0.046)</td>
<td>11.2% (10.3-12.1)</td>
<td>4.75 (0.39-8.1, p = 0.031)</td>
</tr>
<tr>
<td>Moderately differentiated</td>
<td>33.4% (30.1-51.8)</td>
<td>-0.00 (0.55-1.33, p = 0.001)</td>
<td>51.6% (49.3-53.9)</td>
<td>0.30 (0.28-0.34, p = 0.782)</td>
</tr>
<tr>
<td>Poorly differentiated</td>
<td>33.4% (30.1-51.8)</td>
<td>-7.95 (0.82-15.1, p = 0.001)</td>
<td>37.9% (30.1-57.7)</td>
<td>-0.39 (0.22-3.74, p = 0.094)</td>
</tr>
<tr>
<td>Lymphovascular invasion</td>
<td>45.2% (40.7-49.8)</td>
<td>0.7 (0.39-1.5, p = 0.001)</td>
<td>37.9% (30.1-57.7)</td>
<td>-0.39 (0.22-3.74, p = 0.094)</td>
</tr>
<tr>
<td>Stage</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1</td>
<td>1.4 (1.1-1.6)</td>
<td>11.1 (8.1-13.1, p = 0.001)</td>
<td>1.4 (1.1-1.6)</td>
<td>11.1 (8.1-13.1, p = 0.001)</td>
</tr>
<tr>
<td>T2</td>
<td>4.1 (2.8-5.2)</td>
<td>6.0 (4.5-7.6, p = 0.001)</td>
<td>4.1 (2.8-5.2)</td>
<td>6.0 (4.5-7.6, p = 0.001)</td>
</tr>
<tr>
<td>T3</td>
<td>14.0% (11.1-14.9)</td>
<td>4.0 (3.0-5.0, p = 0.001)</td>
<td>14.0% (11.1-14.9)</td>
<td>4.0 (3.0-5.0, p = 0.001)</td>
</tr>
<tr>
<td>T4</td>
<td>3.5% (3.3-3.8)</td>
<td>2.3 (1.4-3.1, p = 0.001)</td>
<td>3.5% (3.3-3.8)</td>
<td>2.3 (1.4-3.1, p = 0.001)</td>
</tr>
<tr>
<td>R0</td>
<td>85.9% (82.0-89.6)</td>
<td>0.0 (0.0-1.0, p = 0.001)</td>
<td>85.9% (82.0-89.6)</td>
<td>0.0 (0.0-1.0, p = 0.001)</td>
</tr>
<tr>
<td>R1</td>
<td>13.5% (11.4-14.6)</td>
<td>0.0 (0.0-1.0, p = 0.001)</td>
<td>13.5% (11.4-14.6)</td>
<td>0.0 (0.0-1.0, p = 0.001)</td>
</tr>
<tr>
<td>R2</td>
<td>0.5% (0.0-0.8)</td>
<td>2.3 (1.4-3.1, p = 0.001)</td>
<td>0.5% (0.0-0.8)</td>
<td>2.3 (1.4-3.1, p = 0.001)</td>
</tr>
<tr>
<td>Chemotherapy</td>
<td>74.9% (73.0-76.8)</td>
<td>5.0 (4.0-6.0, p = 0.001)</td>
<td>74.9% (73.0-76.8)</td>
<td>5.0 (4.0-6.0, p = 0.001)</td>
</tr>
<tr>
<td>Radiotherapy</td>
<td>40.3% (38.2-42.3)</td>
<td>3.0 (2.0-4.0, p = 0.001)</td>
<td>40.3% (38.2-42.3)</td>
<td>3.0 (2.0-4.0, p = 0.001)</td>
</tr>
<tr>
<td>Lymph Node Harvest (median)</td>
<td>14 (14-14)</td>
<td>0.0 (0.0-0.0, p = 0.001)</td>
<td>14 (14-14)</td>
<td>0.0 (0.0-0.0, p = 0.001)</td>
</tr>
<tr>
<td>&lt;=5 Lymph Nodes Harvested</td>
<td>48.4% (40.2-56.5)</td>
<td>-0.31 (-0.15, 0.76, p = 0.053)</td>
<td>48.4% (40.2-56.5)</td>
<td>-0.31 (-0.15, 0.76, p = 0.053)</td>
</tr>
</tbody>
</table>
P140 PERCEIVED VS. ACTUAL BENEFIT: A NATIONAL ANALYSIS OF THE SURGERY-FIRST APPROACH FOR RESECTABLE PANCREATIC CANCER. John R Bergquist, MD, Christopher R Shubert, MD, Tommy Ivanics, MD, Matthew C Hernandez, MD, Santhi S Vege, MD, David M Nagorney, MD, Michael L Kendrick, MD, Michael B Farnell, MD, Elizabeth B Habermann, PhD, Rory L Smoot, MD, Mark J Truty, MD; Mayo Clinic

Background: Surgical resection is necessary for long-term survival in pancreatic adenocarcinoma (PDAC) and is perceived as the optimal initial treatment strategy in patients with “resectable” tumors. However, three critical factors are necessary for maximal survival benefit: (A) negative margin resection, (B) absence of metastatic disease, and (C) adjuvant chemotherapy. We sought to determine the combinatorial frequency of these critical factors and their effect on survival outcomes after a surgery-first approach in localized PDAC using national retrospective outcomes data.

Methods: The National Cancer Data Base (NCDB) 2009-2012 was reviewed for patients with early stage (I/II) anatomically resectable PDAC undergoing curative intent resection and assessed for: (A) negative margins, (B) normal pre-op CA19-9 levels (surrogate for absence of occult metastases), and (C) receipt of adjuvant chemotherapy. Patients receiving surgery-first were scored based on presence (score=1) or absence (score = 0) of combinations of these factors (total score=0-3) and overall survival (OS) was analyzed by various factor combinations. We then compared these outcomes with patients receiving neoadjuvant therapy on an intention to treat (ITT) basis, including those that did not subsequently undergo surgery.

Results: 7,249 total patients were assessed (n = 5,512 surgery-first, n = 1,737 ITT neoadjuvant). Unadjusted survival decreased with each failing factor and varied by specific factor combinations, this persisted even after adjustment. Only 28.8% of patients undergoing surgery-first approach were able to achieve an ideal score (3) that was associated with greatest survival benefit (OS=29.1 months). A similar proportion (27.2%) achieved the lowest scores (0 or 1) and resulted in the lowest survival (OS=13.1 months). For comparison, the entire ITT neoadjuvant therapy cohort, including those who did not ultimately undergo resection, realized overall survival outcomes (24.2 months, log rank p<0.001), that were superior to 71.2% of the surgery-first patients (score ≤ 2).

Conclusion: Survival decreases with each failing factor and is cumulatively contingent by specific factorial combinations that cannot be guaranteed prior to resection. Despite the perception of optimal benefit from a surgery-first approach in seemingly “resectable” PDAC, only approximately 1 in 4 patients are ultimately able to realistically achieve maximal survival benefit. Patients are equally likely to have the worst survival outcomes with a surgery-first strategy. Similarly staged patients undergoing neoadjuvant therapy (including those not resected) can achieve survival outcomes that are superior to the majority of those undergoing a surgery-first approach. Further investigation is needed to critically re-assess the appropriateness and our perception of benefit versus actual outcomes with a surgery-first sequence strategy in resectable PDAC.
Background: Pancreatic ductal adenocarcinoma (PDAC) is a deadly disease with an overall 5-year survival of less than 5%. Favorable patient prognosis relies on early detection and radical surgery, making identification of new biomarkers crucial. The proteasome has a fundamental role in physiological and pathophysiological conditions including different types of cancer, as it is the main cellular protein degradation system. The proteasome-associated deubiquitinating enzyme UCHL5/Uch37 is a modulator of proteasome activity with prognostic marker potential in cancer. UCHL5 tissue expression in PDAC was investigated in this study by immunohistochemistry. We examined the association of UCHL5 tumor expression with clinicopathological variables and the prognostic value of UCHL5 expression for the patient outcome.

Methods: Cytoplasmic and nuclear immunoreexpression of UCHL5 were evaluated in 154 pancreatic ductal adenocarcinoma (PDAC) surgical specimens from patients treated at Helsinki University Hospital, Finland, in 2000-2011. UCHL5 expression in relation to clinicopathological parameters and the association between UCHL5 expression and patient survival were assessed. The associations between UCHL5 expression and clinicopathological variables were assessed by Fisher’s exact test and the linear-by-linear test. The prognostic value of UCHL5 expression was explored by Kaplan-Meier analysis and the Cox proportional hazard model.

Results: Positive nuclear UCHL5 expression associated with longer patient survival (p=0.005). Survival benefit was also identified in subgroups of patients older than 65 years (p<0.001), of patients with tumor stages IIB-III (p=0.007), and those with lymph-node positivity (p=0.006). In the subgroup of stages IIB-III disease, the 5-year cancer specific survival was nearly two times higher for patients with positive UCHL5 nuclear expression compared to negative UCHL5 nuclear expression. In multivariate analysis positive nuclear UCHL5 expression was an independent prognostic factor (HR 0.63, 95% CI 0.44-0.90, p=0.012).

Conclusions: Our results demonstrate that positive nuclear UCHL5 expression predicts better prognosis in PDAC patients, and it could function as an independent prognostic marker. Specifically, differences in survival were detected in patients older than 65 years, in stage IIB-III disease, and in patients with lymph-node positive disease. Our results should be of clinical relevance, as UCHL5 seems to be one of few markers predicting increased survival.
ADJUVANT THERAPY (AT) FOLLOWING RESECTION OF PANCREATIC DUCTAL ADENOCARCINOMA (PDAC): ARE PATIENTS FROM RURAL, REMOTE AREAS DISADVANTAGED? Kimberly A Bertens, MD, MPH1, John D Massman2, W S Helton, MD2, Samuel Garbus, MD2, Margaret Mandelson, PhD2, Vincent J Picozzi, MD, MMM2, Bruce Lin, MD2, Thomas Biehl, MD2, Adnan A Alseidi, MD, MEd2, Flavio G Rocha, MD2; 1The Ottawa Hospital, 2Virginia Mason Medical Center

Background: AT with chemotherapy (CT) + radiation (RT) has been shown to improve PDAC survival over surgery alone. Although race and socioeconomic status can affect outcomes in PDAC, the impact of rural or remote residence on the delivery and effect of AT has not been studied.

Methods: Patients undergoing pancreatectomy for PDAC were identified from the National Cancer Data Base between 2006 and 2013. Individuals were classified as living in a metro area, urban/rural adjacent to metro area (URA), and urban/rural remote area (URR). Patients with less than 6 months follow-up were excluded. Logistic regression was performed to assess residence as a predictor of receiving AT. Overall survival (OS) as a function of inhabitance was estimated by the method of Kaplan and Meier and prognostic factors were identified by Cox regression.

Results: A total of 32,521 individuals underwent pancreatectomy for PDAC. The majority of AT was delivered in academic research facilities in 56% of patients while only 29% of patients received both CT and RT. Univariate analysis demonstrated individuals in URR were less likely to receive CT (55% vs 58%, p<0.01) but not RT (30% vs 31%, p<0.261) and had a longer interval to AT (82 vs 75 days, p<0.009) than those in metro areas. However on multivariate analysis URR inhabitance was no longer predictive of any form of AT (OR=0.892, 95% CI: 0.792-1.006, p=0.062). Hispanic ethnicity, Medicaid insurance, uninsured status, and lower education were all predictive of decreased likelihood of receiving AT. Median OS was inferior for URR dwellers with pathologic T2 and T3 tumors compared to those in metro areas (19.8 vs. 24.4 months, p=0.044 and 17.5 vs. 19.4 months, p<0.001). Cox regression revealed URR location remained independently associated with poorer OS (HR 1.076, 95% CI: 1.008-1.149, p<0.029).

Conclusion: While living in a URR does not lead to reduced access to AT, it is associated with a worse OS in resected PDAC. This may be due to inadequate AT or other socioeconomic factors present in URR patients. Attention must be focused on improving oncologic care for groups susceptible to treatment disparities.
P143 NEOADJUVANT THERAPY HAS A POSITIVE IMPACT ON ALL ADVERSE PATHOLOGICAL FEATURES OF RESECTED PANCREATIC ADENOCARCINOMA

Laura Maggino, MD, Giuseppe Malleo, MD, PhD, Andrea Montresor, MD, Giovanni Marchegiani, MD, Alessandra Binco, Elena Viviani, Marta Sandini, Paola Capelli, Luca Landoni, MD, Alessandro Esposito, Luca Casetti, Claudio Bassi, MD, FRCS, FACS, Roberto Salvia, MD, PhD; Unit of General and Pancreatic Surgery, The Pancreas Institute, University of Verona, Italy, 1School of Medicine and Surgery, Milano-Bicocca University, San Gerardo Hospital, Monza, Italy, 2Department of Diagnostics and Public Health, University of Verona Hospital Trust, Italy

Background: Despite its increasing use, the specific influence of neoadjuvant therapy (NAT) on the pathological characteristics of resected pancreatic adenocarcinoma (PDAC) remains unclear. This study aims to compare histopathological features and pattern of lymph node (LN) involvement between PDAC patients undergoing upfront surgery or surgery after NAT. Secondly, differences in survival between the groups were investigated.

Methods: Clinical and pathological data of 422 patients who underwent pancreatectomy for PDAC from 2013 to 2015 were retrospectively reviewed. The Japanese Pancreas Society classification was applied to categorize LN stations and stratify patients based to the site of LN involvement (N0 = no LN metastasis, N1/2/3 = peripancreatic/regional/distant LN involvement, respectively). Patients receiving upfront surgery or surgery after NAT were compared for pathological and long-term outcomes. Patients’ survival was calculated from the time of diagnosis.

Results: 104 patients (24.6%) underwent pancreatectomy after NAT. The most common protocol was Folfirinox (64.4%) followed by gemcitabine either alone (10.6%) or in combination with Oxaliplatin (16.3%) or Nab-Paclitaxel (14.4%). 14 patients also received preoperative radiotherapy. Serum levels of Ca 19-9 at diagnosis were higher in the NAT group (152.5 versus 96.0 U/mL, p=0.281) while the preoperative levels of Ca 19-9 were significantly lower in comparison with patients receiving upfront surgery (29.0 U/mL versus 96.0 U/mL, p<0.001). Type of surgery distribution was comparable between the groups (p=0.529).

In comparison with upfront surgery, NAT was associated with smaller tumor size at gross pathology (20 vs 28 mm), lower incidences of T3 status (79.8% vs 90.3), lymphovascular (73.1% vs 96.9%), perineural (80.8% vs 98.1%) and peripancreatic fat invasion (71.2% vs 91.2%), all p<0.001. Despite a similar median number of harvested LNs (41 vs 42, p=0.711), the proportion of N1 patients (60.6% vs 79.4%, p<0.001), the number of positive LNs (1 vs 4, p<0.001), and the median LN ratio (0.031 vs 0.097, p<0.001) were decreased. Consequently, NAT patients displayed significantly lower pathological disease stages (p<0.001). There were also fewer margin-positive resections (37.5% vs 46.2%, p=0.042).

Figure 1 shows the impact of NAT on the distribution of nodal metastasis. More than half of the patients undergoing upfront pancreaticoduodenectomy were classified as N2, while patients treated with NAT were equally distributed between the N0 and N2 classes (p<0.001). Patients undergoing upfront distal pancreatectomy were more often classified as N1, while the majority of NAT patients were N0 (p=0.004). The effect persisted when stratifying patients undergoing pancreaticoduodenectomy based on tumor size (p< 0.001 for tumors ≤2cm, and p=0.03 for > 2 cm).

However, when analyzing patients who were resectable/borderline-resectable at diagnosis, NAT was not associated to a significant survival benefit in comparison with upfront surgery (median survival from diagnosis 39 vs 37 months, p=0.212).

Conclusion: Neoadjuvant therapy favorably impacts all adverse histopathological features and the pattern of LN involvement of resected PDAC. However, the influence of these modifications on long-term survival of the patients is unclear, and the optimal indication for NAT remains elusive.
P144 TLR2 AND TLR4 PREDICT FAVORABLE PROGNOSIS IN EARLY PANCREATIC CANCER M. Lanki¹, J. Hagström², H. Mustonen³, H. Seppänen³, C. Haglund¹; ¹Research Programs Unit, Translational Cancer Biology, University of Helsinki, Helsinki, Finland, ²Department of Pathology and Oral Pathology, University of Helsinki and Helsinki University Hospital, Helsinki, Finland, ³Department of Surgery, University of Helsinki and Helsinki University Hospital, Helsinki, Finland

BACKGROUND: Toll-like receptors (TLRs) play an essential role of our innate immune system and are a point of interest in contemporary cancer research. So far TLRs have shown promising prognostic value in adenocarcinomas of the mouth, colon and ovaries, but the role of TLRs in pancreatic ductal adenocarcinoma (PDAC) is yet to be explored. We set out to investigate whether TLR expression could be used for prognostic evaluation in PDAC as well.

METHODS: Our study comprised of 154 stage I-III PDAC patients surgically treated at Helsinki University Hospital between 2000 and 2011. Patients receiving neoadjuvant therapy were excluded from the study. We used tissue microarrays and immunohistochemistry to assess the expression of TLR2 and TLR4 in PDAC tissue, and we matched staining results against clinicopathological parameters using Fischer's test. For survival analysis we used the Kaplan-Meier method and log-rank test, and the Cox regression proportional hazard model for univariate and multivariate analyses.

RESULTS: High TLR2 expression was observed in 51 (34%) and high TLR4 in 50 (33%) patients. Overall neither marker showed correlation with patient mortality. However, multivariate analysis showed that high TLR2 expression predicted lower death risk when tumor size was less than 30mm (HR=0.32; p=0.009; 95% CI 0.13-0.75), and that high TLR4 expression predicted lower death risk in patients with lymph node negative disease (HR=0.21; p=0.006; 95% CI 0.07-0.65).

CONCLUSION: We found high TLR2 and TLR4 expression to be independent factors of better prognosis in PDAC patients with early disease.
P145 NATIONWIDE MULTIDISCIPLINARY ONLINE EXPERT PANEL FOR LOCALLY ADVANCED Pancreatic Cancer: Initial results.

M.s. Walma1, J. van Hilist2, J.a. Vogel2, S.j. Rombouts1, B.a. Bonsing3, T.l. Bollen4, R.c. Bruijnen1, R.m. van Dam5, R.s. Dwarkasing6, M.f. Gerhards7, B. Groot Koerkamp6, I.h. de Hingh9, K.p. de Jong9, G. Kazemier10, N.c. Krak6, H.w. van Laarhoven2, C.j. van Laarhoven11, K.p. van Lienden2, C.y. Nio2, S.s. Phoa2, H.c. van Santvoort4, J.j. de Vries10, J.w. Wilmink2, O.r. Busch2, C.h. van Eijck6, I.q. Molenaar1, M.g. Besselink2; 1University Medical Center Utrecht, 2Academic Medical Center Amsterdam, 3Leiden University Medical Center, 4St. Antonius Hospital Nieuwegein, 5Maastricht University Medical Center, 6Erasmus University Medical Center Rotterdam, 7OLVG Oost Amsterdam, 8Catharina Hospital Eindhoven, 9University Medical Center Groningen, 10VU University Medical Center Amsterdam, 11Radboud University Medical Center Nijmegen

Introduction: Due to the centralization of pancreatic cancer surgery within 17 Dutch (non-academic and academic) hospitals, both postoperative mortality and overall survival are improving. However, a risk of centralization is the decrease in knowledge on new treatment strategies and clinical trials in centers not performing pancreatic surgery. With the development of an online expert panel we aim to facilitate a swift and easily accessible expert advice for patients with locally advanced pancreatic cancer (LAPC), and thereby determine the appropriate treatment or clinical trial possibilities for the patient.

Methods: A secured system (ImageHub®) has been developed which allows for online reviewing of CT, MRI and other imaging modalities. Next, a nationwide multidisciplinary expert panel for pancreatic cancer consisting of surgeons, (interventional) radiologists, gastroenterologists, and medical oncologists was installed. This is a prospective analysis of patients with LAPC who were referred to the online expert panel between June 2015 and October 2016.

Results: A total of 102 patients from 9 centers were referred. In 47% (48/102) of these patients, the expert panel consultation led to additional treatment or a change in treatment strategy. A resection with curative intention was performed in 7 patients (7%) and 38 patients (37%) were included in a clinical trial, investigating local ablative therapies. To establish an advice, the expert panel needed a median of 5 days (range 0 – 18 days).

Conclusions: An online expert panel is feasible and changed the treatment strategy in almost half of the patients with LAPC. Future studies will need to determine the impact of an online expert panel on the accessibility of new treatment strategies and ultimately survival and quality of life.
Objectives: Even with real-time assessment by a pathologist, cytological analysis of fine needle aspiration biopsies fails to confirm locally-confined pancreatic ductal adenocarcinoma (PDAC) in approximately 22% of cases. We hypothesized that soluble protein analysis can discriminate PDAC from benign pancreatic conditions.

Methods: Tissue lysates from PDAC (n = 36), chronic pancreatitis (n = 9), and normal pancreatic tissues (N = 6) were analyzed for concentrations of 41 cytokines and chemokines. A global test for logistic regression, revealed analyte concentrations that significantly differed between cancer and non-cancer groups (p-value < 0.0001). A covariate penalized logistic model was used to identify an efficient diagnostic algorithm and to generate a pancreatic cancer risk score. The diagnostic prediction rule was evaluated with leave-one-out cross-validation.

Results: Analysis of the 41-plex identified that concentrations of 4 analytes (Eotaxin, IL-1RA, IL-7, and IP-10) independently provided discrimination of PDAC compared to chronically inflamed or normal pancreas. When applied to the training cohort, this 4-item diagnostic model produced a diagnostic accuracy of 92% with a 97% positive predictive and an 82% negative predictive values. Leave-one-out cross-validation of the decision algorithm produced diagnostic accuracy of 88% with 94% positive predictive value and 76% negative predictive value.

Conclusion: Soluble protein analysis of pancreatic tissue lysates has the potential to surpass current cytological methods of diagnosing PDAC. Refinement and clinical adoption of this assay could positively impact patient experience, health care costs, and neoadjuvant therapy clinical trial accrual.
P147 PROGNOSTIC SIGNIFICANCE OF PERITONEAL WASHINGS IN POTENTIALLY RESECTABLE PANCREATIC ADENOCARCINOMA
Neha Goel, MD1, Kathryn C Chen, MD2, Karen Ruth, MS1, Andreas Karachristos, MD1, Hoffman P John, MD1, Sanjay S Reddy, MD1; 1Fox Chase Cancer Center, 2Harbor-UCLA

Introduction: Limited data exist on the prevalence and clinical significance of positive peritoneal cytology (PPC) in potentially resectable pancreatic adenocarcinoma. The objective of this study is to evaluate whether peritoneal cytology should be performed in pancreatic cancer and if definitive surgery, pancreatoduodenectomy (PD) or total pancreatectomy (TP), should be performed in the setting of PPC.

Methods: This is a retrospective study of 187 patients treated at our institution from 2000-2010 with the diagnosis of pancreatic adenocarcinoma who underwent peritoneal washings at the time of planned resection. Patients undergoing distal pancreatectomy (n=12), those with macroscopic disease discovered at the time of surgery (n=8), and those with stage IV disease (n=7) were excluded. Associations of peritoneal cytology on final pathologic review with margin status and pStage were also evaluated.

Results: After review, 160 patients met inclusion criteria. The analytic cohort was 53% female (85/160) and 7% non-white race. Median age at surgery was 68 years (range 37-91). Of the 160 patients with intraoperative cytology, 15 (9%) were found to have PPC on final cytology. Overall survival was lower in those with PPC compared to those with NPC (median survival= 16.1 mo vs 20.1 mo, p=0.040).

Twelve (80%) of the 15 patients with PPC underwent definitive surgery with either a PD or TP. Overall survival for patients who underwent definitive surgery in the setting of PPC compared to those who underwent definitive surgery in the setting of NPC was lower by 8 months and strongly trended towards significance (median survival=10.7 mo and 18.7 mo, p=0.067).

The proportion of patients with PPC increased with increasing pStage (0% in Stage 0, to33% in stage III, trend p=0.004). Fewer R0 resections were performed in those patients with PPC (6.2% in R0 patients vs 17% in R1/R2, p=0.041).

Conclusion: Although limited data exist on the utility of peritoneal cytology in pancreatic adenocarcinoma, this study shows that patients with PPC have a statistically significant worse OS and achieve a lower RO resection rate. Peritoneal cytology should therefore be performed as it provides clinically significant information. This study also questions the overall survival benefit of performing a PD or TP in patients with PPC. No patient with PPC and resection survived more than 64 months. Additionally, median survival was lower by 8 months in patients who underwent definitive surgery in the setting of PPC. This study concludes that PPC is a strong indicator of poor OS and suggests that these patients may more likely benefit from prolonged chemotherapy with or without pancreatic resection rather than pancreatic resection alone.
P148 RESECTION OF PANCREATIC NEUROENDOCRINE TUMORS: ANALYSIS OF PROGNOSTIC FACTORS OF SURVIVAL.
Pietro Addeo, MD, MPH, Antonio D'Alessandro, MD, Gerlinde Averous, MD, Gennaro Nappo, MD, Francois Faitot, MD, Alessio Imperiale, MD, PhD, Philippe Bachellier, MD, PhD; University of Strasbourg

Background: Pancreatic neuroendocrine tumors (PNET) remain rare, with few large series evaluating prognostic factors of survival after resection. The present study aimed to evaluate short and long-term outcomes after resection of pNET in a large cohort.

Methods: This study retrospectively evaluated 115 consecutive pancreatic resections performed for PNET between January 1995 and December 2015. The 2010 World Health Organization grading system was used for classifying all specimens. Univariate and multivariate Cox analysis were performed to assess survival prognostic factors.

Results: Median age was 56 (range, 18-80, years) and there were 93 non-functioning tumors (80.8%) and 9 tumors (7.8%) in the context of an inherited syndrome. There were 30 pancreaticoduodenectomies, 47 splenopancreatectomies, 19 distal pancreatectomies, 5 total pancreatectomy and 14 various parenchymal-sparing resections. Forty-four patients (38.2%) had synchronous metastatic disease. Forty-five patients required extended resections including: synchronous liver resection (28), portal vein resection (9) or resection of adjacent invaded organs (10). Overall mortality and morbidity were 0.9% and 36%. The 1-, 3-, 5-, and 10-year overall survival rates were 96%, 87%, 76% and 57%, respectively. In presence of synchronous liver metases, the 1-, 3-, 5-, and 10-year overall survival rates were 92%, 78%, 61% and 34%, respectively. In multivariate analysis, tumor grade (P=<0.0001) and synchronous metastatic disease (P=0.006) were identified as independent poor prognostic factors.

Discussion/Conclusions: Tumor grade and presence of synchronous metastatic disease were identified as prognostic factors of overall survival in resected pNET. Even in presence of synchronous liver metastases, long term survival can be achieved.
P151 OPERATIVE TREATMENT STRATEGY FOR PANCREATIC CANCER IS REGION DEPENDED: A FINNISH REGISTER STUDY COVERING THE ENTIRE NATION. Reea Ahola¹, Heini Hölsä², Samuli Kiskola², Pirkka Ojala², Aino Pirttilä², Juhani Sand¹, Johanna Laukkarinen¹; ¹Tampere University Hospital, ²Tampere University

Introduction: Surgical resection is the only possibility for cure in pancreatic cancer (PC). Accessibility to health care facilities may affect the diagnostics and treatment outcome.

Aims: Our aim was to analyse whether PC treatment strategies show regional variation in Finland, a country with unstricted, public health care.

Patients and Methods: Patients diagnosed with PC in 2003 or 2008 were selected from the nationwide Finnish Cancer register. The data regarding tumor, treatment and demographics were recorded from the patient archives. Other malignancies than PC were excluded. Time spans to the beginning of treatments were calculated. Patients were grouped based on the health care region at the diagnosis and the regions based on the experience in pancreas surgery into three groups (HLE=high level of experience; n=2, MLE= medium level of experience; n=6 and LLE= low level of experience; n=13).

Results: Out of the 1935 patients identified from the national cancer register, 1546 PC patients were included in the final database after reviewing the patient records, Median age was 72 years (range 34-97), and 45% were men. Proportion of male, age groups (<60, 60-75 and >75) years), stage IV disease (52-54%) and PC diagnosed post mortem (2.7%) were similar between the regions. Despite of this, the proportion of radical resection varied widely between the regions (5.1-26%, p=0.001), being 18% in the regions of HLE and 8-11% elsewhere (p<0.01). Among patients with stage I-III disease the proportion of radical resections was significantly higher in HLE regions compared to MLE and LLE regions (49 vs 29-22%; p<0.05). Logistic regression analysis considering age, ASA, stage and the level of experience in pancreatic surgery showed that the proportion of radical resections was larger in the patients living in the area of HLE center.

Conclusions: Accessibility to PC curative treatment is region depended in Finland, even though the unstricted public health care system should offer similar accessibility to all citizens. The patient has a significantly greater change to receive a radical resection when living in a health care region including a hospital with high level of experience in pancreatic surgery.
P152 CYSTIC PANCREATIC NEUROENDOCRINE TUMORS: A MORE FAVORABLE LESION? Panagiotis Bletsis, BS, Rosalie A Carr, MD, Alexandra M Roch, MD, Mazhar Soufi, MD, Christian M Schmidt, William P Lancaster, MD, Michael G House, MD, Nicholas J Zyromski, MD, Attila Nakeeb, MD, C. Max Schmidt, MD, MBA, PhD, Eugene P Ceppa, MD; Indiana University Department of Surgery

Introduction: Pancreatic neuroendocrine tumors (PNET) are predominantly solid lesions with malignant potential. Cystic PNETs are a small subset in which data are scarce. We aim to compare clinical/pathologic features and prognostic implications of cystic versus solid PNET.

Methods: Patients with PNET undergoing pancreatectomy between 1988-2016 at a high-volume center were retrospectively reviewed. Demographic, clinical, and histopathologic data were collected and analyzed. PNET lesions were defined cystic if at least partially cystic on preoperative imaging or pathology.

Results: 347 patients with PNET were identified; 27% (n=94) were cystic. Patients with cystic PNET were older (59 vs. 55 years, p=0.05) and more likely to be men (64% vs. 51%, p=0.04). Cystic PNET were more commonly non-functional (95% vs. 82%, p=0.004), asymptomatic (44% vs. 28%, p=0.009), and located in the pancreatic body/tail (81% vs. 60%, p<0.001) than solid PNET. On multivariate analysis, tumor location alone remained significant. When available (n=149), Ki-67 proliferation index, a negative prognostic indicator, was significantly lower in patients with cystic PNET (Ki-67≤2%: 83% vs. 63%; p=0.02). Nevertheless, cystic and solid PNET had similar sizes, histologic grade, pathologic stage, presence of nodal (21% vs. 31%, p=0.08) and distant (9% vs. 18%, p=0.06) metastasis at the time of resection.

Conclusion: This study found a higher than previously published incidence of cystic PNET (27%). Cystic PNET were less symptomatic and located in the distal pancreas. The disparity in Ki-67 index may suggest an improved prognosis. Distinguishing cystic PNET from solid preoperatively may assist in surgical decision-making; further attention is warranted for long-term follow-up.
Introduction: Cancer Antigen 19-9 (CA 19-9) levels correlates with tumor burden in patients with pancreatic cancer. Pre-operative CA 19-9 levels is shown to predict pathological staging in resectable and response to therapy in unresectable pancreatic cancer. A decrease in the post-operative CA 19-9 levels have correlated with improved survival. The goal of this study was to identify a “cut-off point” for post-operative CA 19-9 levels that would predict long-term mortality in resectable adenocarcinoma of the pancreas.

Methods: This is a single institution retrospective review of all patients with resectable adenocarcinoma of pancreas, who had undergone classic Whipple procedure between January 2008 and December 2015. After obtaining institutional IRB approval, demographic and clinical information was abstracted from electronic medical records, including age, gender, race, primary diagnosis, primary procedure, pathologic stage, tumor grade, pre-operative and post-operative CA 19-9 levels, chemotherapy, radiation therapy and survival. Three groups were formed, based on the CA 19-9 levels, Group 1 included patients who had normal CA 19-9 levels (<39 U/ml) and their post-operative levels remained normal, Group 2 included patients who had high pre-operative CA 19-9 levels (>39U/ml) and their post-operative CA 19-9 continued to rise and Group 3 included patients with high pre-operative CA19-9 levels (>39U/ml) but there was decrease in the post-operative levels compared to pre-operative CA 19-9 levels. Student t test was used to compare continuous variables and Chi squared test was used to compare categorical variables. Receiver operating characteristic (ROC) curve was plotted to determine the sensitivity and specificity of post-operative CA 19-9 levels in predicting long-term mortality. IBM® SPSS 20.0 statistical software was used for data analysis.

Results: Sixty five patients formed the study group, with a mean age of 67.45 ± 10.2 years. The three groups were comparable in terms of age, gender and race distribution, tumor grade, stage, chemotherapy, radiation therapy and combined chemoradiation therapy on univariate analysis (Table 1). Overall survival was 21.4 ± 16.1 months with 17.0 ± 5.6 months for group 1, 28.3 ± 15.1 months for group 2 and 20.0 ± 19.2 for group 3, there was no statically significant difference between the groups (p = 0.8). The overall mortality was 52.3% (N=34), with 33.3% (N=3) for group 1, 66.7% (N=20) for group 2 and 42.3% (N=11) for group 3, there was no statically significant difference between the groups (p= 0.09). The 5-year survival was highest in group 3 (24%) compared to Group 2 (9%). Using a cut-off value of 172.1U/ml, post-operative CA 19-9 levels predicted mortality with a sensitivity of 70.6% and specificity of 64.5%, with an area under the ROC curve (aROC) of 0.68 (95% CI; 0.56 - 0.79, p < 0.006).

Conclusion: In this study we observed that patients with decrease in post-operative CA 19-9 levels compared to pre-operative values had a better survivals. A cut-off value of 172.1U/ml for post-operative CA 19-9 levels has the highest sensitivity and specificity in predicting long-term mortality in patients with resectable adenocarcinoma of pancreas. Further studies are needed to validate these findings.
Introduction: Pancreatic cancer is the 4th most common cause of cancer deaths, with a peak incidence in 8th decade. Surgical resection offers the highest survival benefit but advancing age is associated with decreased surgical rates, mainly related to medical co-morbidities, and <7% of patients over 80 years undergo surgery. This is the largest population based study analyzing long term survival outcomes in octogenarians and nonagenarians following the Whipple procedure (WP) for pancreatic adenocarcinoma.

Methods: 1,026 patients > 80 yo who underwent a Whipple procedure were identified from the Surveillance, Epidemiology and End Results Database (SEER 1998-2011). Elderly patients (>80 years) were compared against patients <79 years to determine or demographic, clinical and long term survival outcomes. Standard statistical methodology was utilized.

Results: 11,12 patients undergoing a WP were identified among which were > 1,021 patient 80 years old (9.2%). The mean age was 82.6±2.5 years. Compared to younger patients, elderly patients have a lower male: female ratio at 1: 1.2, (p <0.001), and a higher number of Caucasians (p <0.001). No differences in tumor grade, size or SEER stage at presentation between groups was noted. Elderly patients were far less likely to receive adjuvant radiation (17%, p < 0.001). Overall mortality was much higher in those > 80 years (77.8%, p = 0.004) but there was no difference in cancer specific mortality (63.8%, p = 0.52). The mean survival was lower at 31.0±1.6 months (p < 0.001), as were the 1-year and 5-year survival rates analyzed by all stages, <0.001. Multivariate Cox regression analysis among the elderly patients identified males, no-radiation therapy, high grade tumor and SEER stage II and III were as associated with increased mortality.

Conclusions: Patients over 80 years old account for ~ 10% those undergoing Whipple procedure. There are no significant difference in the tumor characteristic and cancer specific mortality between this elderly groups and younger patients. Decreased long term survival in these elderly patients is likely indicative of preexisting comorbidities and less aggressive treatment approaches. Aggressive pancreatic surgery is safe and feasible in the select very elderly patient.
PREOPERATIVE FOLFIRINOX IN PATIENTS WITH BORDERLINE RESECTABLE PANCREATIC CANCER: A SYSTEMATIC REVIEW AND PATIENT-LEVEL META-ANALYSIS

Stefan Buettner¹, Niek Peters², Mustafa Suker¹, Berend Beumer¹, Andrea Wang-Gillam³, Peter Hosein⁴, Sing Moorcraft⁵, Casper van Eijck¹, Matthew Katz⁶, Bas Groot Koerkamp¹; Erasmus MC, UMC Utrecht, Washington University in St. Louis, University of Miami, The Royal Marsden NHS Foundation Trust, MD Anderson Cancer Center

Introduction: FOLFIRINOX has become an important chemotherapeutic regimen in the treatment of pancreatic cancer (PC) after the landmark paper by Conroy et al in 2011 in metastatic patients. Its effectiveness in the neoadjuvant setting in patients with (borderline) resectable pancreatic cancer remains debated. We performed a systematic review and patient-level meta-analysis on neoadjuvant FOLFIRINOX in patients with (borderline) resectable PC.

Methods: A systematic review was performed according to the PRISMA guidelines. Primary endpoints were overall and disease free survival. Authors of included papers were contacted to provide individual patient-level data.

Results: A total of 19 studies with 815 participants were included. Planned FOLFIRINOX cycles ranged between 2 and 8, with an average of 4. A median number of 5 (IQR: 4-5) cycles was administered. Resectability after preoperative FOLFIRINOX was 82% in the borderline resectable group. R0 resection was achieved in 84% of borderline resectable patients. Median follow-up ranged from 8.5 months to 41.4 months. Median disease free survival (DFS) ranged from 6.0 months to 21.3 months. Median overall survival (OS) ranged from 10.2 months to 35.4 months. In our preliminary patient-level data analysis, median DFS was 14.1 months, and median OS was 18.5 months.

Conclusion: We found a median OS of 18 months in patients with borderline resectable pancreatic cancer after neoadjuvant FOLFIRINOX. The majority of patients underwent resection after FOLFIRINOX with a high R0 resection rate.
INTRODUCTION: The treatment of pancreatic cystic neoplasms (PCNs) relies on several International guidelines that identify features able to predict the risk of malignancy. One of these factors is represented by the presence of symptoms. The incidence of symptomatic PCNs is mainly based on retrospective surgical series that might overestimate the actual incidence, and consequently lead to inappropriate indication for surgery.

METHODS: Patients with PCNs observed from September 2015 to July 2016 were prospectively enrolled. All patients underwent MRI with cholangiopancreatography and a specific interview on GI symptoms. An identical survey was carried out on a control population in which any pancreatic disease was excluded by MRI. The two populations were then matched for age and sex with propensity score matching.

RESULTS: PCN group have a greater prevalence of abdominal pain (31.9 vs. 22.6%, p= 0.01). They were able to better characterize abdominal pain regarding its relationship with meals and sleeping. According to the pancreatic specialist, symptoms in the PCN group were related to the cyst in only 11% of symptomatic cases. After stratifying for PCN location, no differences were found any more when compared with controls both for PCNs of the head (31.8 vs. 22.6%, p= 0.06) and the body-tail of the gland (33 vs. 22.6%, p= 0.06). After stratifying for presumed diagnosis, the prevalence of abdominal pain was greater than in controls for IPMN (33.1 vs. 22.6%, p= 0.01), but not for presumed MCN-SCN (29.3 vs. 22.6%, p= 0.2). This last evidence was confirmed also considering lesions of less than 30 mm (for IPMN 33.3 vs. 22.6%, p= 0.02, while for MCN-SCN 26.8 vs. 22.6%, p= 0.2). There was no difference in the prevalence of abdominal pain between PCNs with and without high-risk stigmata according to Fukuoka 2012 guidelines (22.2% vs. 27.3%, p = 1).

CONCLUSION: Overall, patients with PCNs have an increased prevalence of abdominal symptoms compared with a matched cohort of patients without any pancreatic disease. The connection with the pancreatic ductal system seems to be the main determinant of this finding, independently from cyst size or location. Abdominal pain is not correlated with the presence of high-risk stigmata, therefore it seems not to be a clinical predictor of malignancy.
A preoperative score to predict early death after pancreatic cancer resection

Introduction/Background: Identifying patients with resectable pancreatic ductal adenocarcinoma (PDAC) who are more likely to succumb within one year from resection will improve the efficiency of surgery. In fact these patients may undergo neoadjuvant treatment instead of upfront surgery. This study aimed to develop and to externally validate a preoperative prognostic model for death within one year after pancreatectomy in patients with resectable PDAC.

Methods: A derivation cohort study of 296 patients who underwent surgical resection for PDAC at Ospedale San Raffaele, Milan, from 2008 through 2012 was prospectively enrolled in an observational study. The study outcome was death within one year after surgery. Independent predictors of early death were selected using logistic regression modeling. Preoperative significant predictors at multivariate analysis were assembled in a risk score (Milan score). The score predictivity was validated in an external cohort (182 patients) who underwent pancreatic resection for PDAC between 2009 and 2014.

Results: Seventy eight out of 296 patients (26%) died within the first year. Preoperative independent predictors of one year mortality were: nutritional status (Geriatric Nutritional Risk Index) (odds ratio (OR) 2.23, 1.14-4.38; p=0.02), ASA score (OR 2.56, 1.1-5.98; P=0.03), abdominal or back pain as presenting symptom (OR 2.51, 1.05-5.9; p=0.038) and hepatopathy as comorbidity (OR 4.5, 1.05-19.3; p=0.043). A preoperative score with a range from 0 to 7 points was developed and it was significant at multivariate analysis (OR 1.99; 95% CI, 1.25-3.17 [p<0.0001]). In the validation set, the model was able to predict early mortality (OR 7.1; 95% CI, 3.9-12.7 [p<0.0001]). The score showed a predictive ability of 53.5% (Nagelkerke R2), with an area under the receiver operating characteristic curve of 88.7% and an acceptable calibration (goodness-of-fit test, p = 0.403).

Conclusions: The new simple risk scoring system proved to be reliable in forecasting one year mortality and may be useful to preoperatively select the adequate treatment in patients with resectable PDAC.
P158 SYSTEMATIC REVIEW AND META-ANALYSIS OF PROGNOSTIC ROLE OF SPLENIC VESSELS INFILTRATION IN RESECTABLE PANCREATIC CANCER Stefano Crippa¹, Roberto Cirocchi², Stefano Partelli¹, Enrico Longo¹, Marco Palucci¹, Michele Reni¹, Massimo Falconi¹; ¹San Raffaele Scientific Institute, ²University of Perugia

Introduction/Background: Identification of factors associated with early recurrence and poor survival after resection in resectable pancreatic ductal adenocarcinoma is important to select patients for upfront surgery or neoadjuvant treatment. The present meta-analysis aimed to compare the results of pancreatic resection with and without splenic vessels infiltration in patients with resectable pancreatic adenocarcinoma.

Methods: A systematic search was performed of PubMed, Embase and the Cochrane Library in accordance with PRISMA guidelines. Inclusion criteria: histological diagnosis of pancreatic ductal adenocarcinoma; tumors located in the body-tail of the gland; presence of resectable pancreatic cancer (no evidence of distant disease, no evidence of tumor abutment/encasement of the superior mesenteric artery, celiac axis, common hepatic artery, portal vein and superior mesenteric vein); radiological and/or pathological details of presence/absence of splenic artery (SA) and vein (SV) infiltration. 5-year overall survival (OS) was the primary outcome.

Results: Five articles with 359 patients were analysed. Of these, 106 patients (34%) had an invasion of SA and 183 patients (51%) of SV. Patients with radiological or pathological splenic artery invasion had a worse survival compared with those without infiltration (5-year OS: 8.5 versus 33.6%; RR 1.42, 95% CI 1.28 to 1.58; participants = 359; P < 0.00001). A similar results was found when considering only studies with pathological infiltration of the splenic artery (5-year OS: 2.7 versus 23.3%; RR 1.23, 95% CI 1.13 to 1.35; participants = 276; P < 0.00001). In the four studies showing data on pathological splenic vessels infiltration, survival was significantly poorer when splenic vein infiltration was present (5-year OS: 7 versus 31%; RR 1.35, 95% CI 1.19 to 1.53; participants = 276; P < 0.00001).

Conclusions: This meta-analysis showed worse survival for patients with splenic vessels infiltration undergoing distal pancreatectomy for resectable pancreatic cancer. Splenic vessels infiltration may be the stigmata of a more aggressive disease and may be the target of neoadjuvant treatment.
P159 PREOPERATIVE NOMOGRAM TO PREDICT SURVIVAL FOR PATIENTS WITH RESECTABLE AND BORDERLINE RESECTABLE PANCREATIC CANCER (PC) Sun Young Jeong¹, Mohammed Aldakkak¹, Kwang Woo Ahn¹, Chiang-Ching Huang², Kathleen K Christians¹, Beth A Erickson¹, Paul S Ritch¹, Ben George¹, Douglas B Evans¹, Susan Tsai¹; ¹Medical College of Wisconsin, ²University of Wisconsin-Milwaukee

Introduction/Background: Nomograms have been developed for patients with localized pancreatic cancer (PC) who undergo upfront surgery, but have not been developed for patients who have received alternative treatment sequencing to include neoadjuvant therapy. Given the morbidity and mortality of pancreatic surgery for PC, appropriate surgical patient selection is necessary to maximize quality of life and survival and minimize unnecessary toxicities in high-risk patients. We sought to develop and internally validate a prognostic nomogram that predicts survival among patients who received neoadjuvant therapy prior to surgery.

Methods: Clinical data and survival outcomes of patients with PC who completed neoadjuvant therapy and surgery at a single institution were collected. Survival at 1-, 2-, and 3-years from the date of restaging after neoadjuvant therapy and prior to surgery were used for the purpose of nomogram construction. Concordance index (c-index) and calibration plots were used to assess predictive accuracy. Clinical stage was defined at the time of diagnosis as resectable or borderline resectable disease.

Results: The nomogram was developed from a cohort of 168 patients with resectable and borderline resectable PC. A parsimonious nomogram including clinical stage, preoperative CA19-9, and age predicted 1-, 2-, and 3-year survival with c-indices of 0.64, 0.64, and 0.65, respectively. The c-indices for 1-, 2-, and 3-years using the AJCC staging system were 0.58, 0.55, and 0.55, respectively. Clinical stage (HR:2.32; 95%CI:1.49-3.62) and preoperative CA19-9 levels (HR:1.66; 95%CI:1.08-2.58) were the strongest prognostic factors.

Discussion/Conclusion: Prognostic nomograms utilizing clinical stage, preoperative CA19-9, and age provide more accurate survival prediction than the AJCC stage. This nomogram can be used to identify patients at high risk for early disease recurrence, prior to surgery. It can also be used to engage patients in shared decision making with regard to surgery. External validation will be performed to assess the nomogram’s generalizability. The nomogram will be developed into a free-access online platform.
P160 IMPACT OF NODAL STATUS ON ADJUVANT THERAPY FOR PATIENTS WITH LOCALIZED PANCREATIC CANCER TREATED WITH NEOADJUVANT THERAPY

Chad A Barnes, MD, Mohammed Aldakkak, Kathleen K Christians, MD, Abdul H Khan, MD, Kiyoko Oshima, MD, Paul S Ritch, MD, Ben George, MD, William A Hall, MD, Beth Erickson, MD, Douglas B Evans, MD, Susan Tsai, MD, MHS; Medical College of Wisconsin

Introduction/Background: Among patients with localized pancreatic cancer (PC) who undergo upfront surgery, adjuvant therapy improves overall survival (OS) as compared to observation. The impact of adjuvant therapy after neoadjuvant therapy and surgery has not been well described.

Methods: Details regarding adjuvant treatment were collected from patients with resectable and borderline resectable PC who completed all intended neoadjuvant therapy and surgery. Patients were categorized by pathologic nodal status (LN+/LN-) and receipt of any adjuvant therapy.

Results: Data was available from 217 consecutive patients, 110 (51%) with resectable and 107 (49%) with borderline resectable PC. Of the 217 patients, 83 (38%) were LN+ and 134 (62%) were LN-. Of the 83 LN+ patients, 57 (69%) received adjuvant therapy and 26 (31%) did not. Of the 134 LN- patients, 73 (54%) received adjuvant therapy and 61 (46%) did not. The median OS for the 217 patients was 40 months; 45 months for patients who received any adjuvant therapy and 34 months for those who did not (p=0.15). Of the 83 LN+ patients, the median OS was 39 months with adjuvant therapy and 23 months without (p=0.05). Of the 134 LN- patients, the median OS was 45 months with adjuvant therapy and 43 months without (p=0.40). In an adjusted hazards model, the receipt of adjuvant therapy had a greater protective effect among LN+ patients (HR:0.40; 95%CI:0.18-0.88; p=0.02) compared to LN- patients (HR:0.72; 95%CI:0.41-1.24; p=0.23).

Discussion/Conclusion: Among patients with localized PC who have received neoadjuvant therapy and surgery, the effect of adjuvant therapy varies based on nodal status, and patients with LN+ disease experience the greatest survival benefit. The benefit of adjuvant therapy for patients with LN- disease after neoadjuvant therapy should be investigated in larger cohorts, as the benefit of such treatment may be quite low.

![Overall Survival by Nodal Status and Receipt of Adjuvant Therapy](image-url)
Our institution has been performing chemoradiotherapy (CRT) followed by surgery for locally advanced borderline resectable pancreatic ductal adenocarcinoma (PDAC). We previously used single-agent gemcitabine (Gem) as chemotherapy and recently switched to combination therapy of S-1 (orally active combination of tegafur, gimeracil and oteracil) and Gem (GS) aiming at improvement of treatment outcome. The purpose of this study was to evaluate clinicopathological response between Gem-CRT and GS-CRT for PDAC. 129 consecutive patients with cytologically/histologically proven PDAC from February 2005 to December 2015 had been enrolled for our protocol. Gem-CRT (2005.2-2011.9) and GS-CRT (2011.10-2015.12). CRT regimen: radiation therapy (45 to 50.4 Gy in 25 to 28 fractions) with chemotherapy which included Gem (800mg/m², day 1, 8, 22, 29) or S-1 (60mg/m², day 1-21 and day 29-49) + Gem (600mg/m², day 8, 22, 36, 50). We compared perioperative various factors in both groups including CA 19-9 reduction rate after CRT, resection rate, margin-negative (R0) resection rate, histopathological effect (lymph node metastases, tumor reduction rate using Evans classification) and survival rates according to resectability.
P163 CROSS-SECTIONAL IMAGING, MARGIN STATUS AND SURVIVAL IN PANCREATIC CANCER - PROPOSAL OF REFINED CRITERIA FOR BORDERLINE RESECTABLE PANCREATIC CANCER Ulrich F Wellner, MD1, Katharina May, MD2, Katharina Reddemann, MD3, Laura Frohneberg, MD1, Hryhoryi Lapshyn, MD1, Christoph Thorns, MD3, Dirk Bausch, MD1, Tobias Keck1; 1Clinic for Surgery, UKSH Campus Lübeck, 2Clinic for Radiology, UKSH Campus Lübeck, 3Institute of Pathology, UKSH Campus Lübeck

Introduction: Borderline resectable pancreatic cancer (BRPC) is defined as pancreatic cancer with a local extension which, despite technical resectability, is likely to result in margin positive resection. The aim of the current study was to investigate the correlations between the current ISGPS BRPC criteria, alternative refined BRPC criteria, margin status according conventional (zero distance) and CRM rule (1mm), and survival in pancreatic carcinoma.


Results: N = 78 patients operated from 2013 to 2015 were included. No patient received neoadjuvant therapy. Median survival was 25 months. BRPC status according to the ISGPS definition was not significantly predictive of conventional margin status or survival after resection. However, refined BRPC criteria and CRM margin status, lymph node and distant metastases were significant predictors of survival in univariate and multivariate analysis. The refined BRPC criteria correlated significantly with CRM margin status and categorized only about 40% of tumors as resectable. Median survival in this resectable subgroup was not reached during the observation period, whereas patients with BRPC suffered from significantly reduced survival (9 to 21 months, depending on BRPC criterion, p < 0.01).

Conclusion: We propose refined radiologic BRPC criteria to predict margin status and survival after resection of pancreatic cancer. Our data support the indication for neoadjuvant treatment in BRPC.
Background: Due to disparities in access to care, patients with Medicaid or no health insurance are at risk of not receiving appropriate adjuvant treatment following resection of pancreatic cancer. We have previously shown inferior short-term outcomes following surgery at safety-net hospitals. We now hypothesize that safety-net hospitals caring for these vulnerable populations utilize less adjuvant chemoradiation therapy, resulting in inferior long-term outcomes.

Methods: The American College of Surgeons National Cancer Data Base was queried for patients diagnosed with pancreatic adenocarcinoma (n=32,296) from 1998-2010. Hospitals were grouped according to safety-net burden, defined as the proportion of patients with Medicaid or no insurance. The highest quartile, representing safety-net hospitals, was compared to lower-burden hospitals with regard to patient demographics, disease characteristics, surgical management, delivery of multimodal systemic therapy, and survival.

Results: Patients at safety-net hospitals were less often white, had less income, and were less educated. Safety-net hospital patients were just as likely to undergo surgical resection (OR 1.03, p=0.73), achieving similar rates of negative surgical margins when compared to patients at medium and low burden hospitals (70% vs. 73% vs. 66%). No clinically significant differences were noted in the proportion of surgical patients receiving either chemotherapy (48% vs. 52% vs. 52%) or radiation therapy (26% vs. 30% vs. 29%) or the time between diagnosis and start of systemic therapy (58 days vs. 61 days vs. 53 days). Across safety-net burden groups, no difference was noted in stage-specific median survival (all p > 0.05) or receipt of adjuvant as opposed to neoadjuvant systemic therapy (82% vs. 85% vs. 85%). Multivariate analysis adjusting for cancer stage revealed no difference in survival for safety-net hospital patients who had surgery and survived >30 days (HR 1.02, p=0.63).

Conclusion: Despite previous reports suggesting worse short-term surgical outcomes at safety-net hospitals, these centers have equivalent long-term survival following pancreatic cancer surgery potentially due to equivalent delivery of multimodal therapy as at non-safety net hospitals. Safety-net hospitals are a crucial resource that provides quality long-term cancer treatment for vulnerable populations.
Objective: Controversy remains regarding the management of patients with IPMN. Traditionally, main-duct and mixed forms of IPMN have been considered similar entities and managed with a similar algorithm. We aim to assess whether current guidelines appropriately characterize the clinical and pathologic characteristics of main-duct, mixed-type, and branch-duct IPMN.

Methods: The medical records of seven-institutions were reviewed for patients that underwent surgical management of IPMN between 2000-2015.

Results: 244 patients (50% male) were included in the analysis. 39.8% of patients had main-duct, 20.9% had mixed-type, and 39.3% had branch-duct IPMN. No significant differences in age, gender, race, co-morbidities, or presentation were found between all groups. Main-duct and mixed-type had a statistically higher pre-operative CA 19-9 level than branch-duct IPMN (248.7 vs. 216.7 vs. 45.6; p = 0.019). The average number of high risk features (0.22 vs. 0.24 vs. 0.09; p = 0.05) and worrisome features (0.923 vs. 1.24 vs. 0.70; p = 0.018) were similar between main-duct and mixed type, which were both significantly higher than branch-duct IPMN. Additionally, main-duct and mixed-type had a significantly higher rate of high grade dysplasia (26.3% vs. 29.4% vs. 12.5%; p = 0.020) or invasive carcinoma (38.1% vs. 23.5% vs. 15.6%; p = 0.002). There was no statistical difference in 5-year overall survival (p = 0.983) between all three groups.

Conclusion: Current consensus guidelines for classification of IPMN are appropriate. Given that main-duct and mixed-type IPMN appear to be similar entities, the threshold to operate on mixed-type should remain consistent with standard surgical management of main-duct IPMN.
AN UNRECOGNIZED CYSTIC LESION OF THE PANCREAS: LESSONS LEARNED FROM 29 LYMPHOEPITHELIAL CYSTS

Vincent P Groot, MD, Sameer S Thakker, Behnoud B Noveiry, MD, Georgios Gemenetzis, MD, Michael Noé, MD, Ammar A Javed, MD, Martin A Makary, MD, MPH, John L Cameron, MD, Matthew J Weiss, MD, Christopher L Wolfgang, MD, PhD, Anne M Lennon, MD, PhD, Jin He, MD, PhD; Johns Hopkins School of Medicine

**Objectives:** Lymphoepithelial cyst (LEC) of the pancreas is a rare and benign cystic tumor. The current literature on LECs is limited. The aim of this study was to identify the clinical and diagnostic features.

**Methods:** A retrospective analysis was performed of the institutional pathology archives and the pancreatic cyst database from 1995 to 2016 to identify surgically- and non-surgically resected LEC. Clinicopathological and radiographic findings were reviewed.

**Results:** Twenty-nine patients with pancreatic LEC were identified, 22 of whom underwent surgical resection (76%). The majority of patients were male (n=24, 83%) and Caucasian (n=27, 93%). Median age at diagnosis was 55 years (range, 21-74) and 17 patients were either current or past smokers (59%). LEC were most common in the body/tail (n=22, 76%) with a quarter (n=7, 24%) located in the head of the pancreas. None of the patients presented with jaundice or had evidence of main pancreatic duct dilatation on imaging.

Half (n=11) the LEC in the surgical cohort were incidentally detected. Non-specific abdominal pain (n=12) and/or weight loss (n=4) were present in two thirds of patients. All the patients underwent a CT-scan and additional EUS (n=15) and/or MRCP (n=6) was often performed. Non-specific imaging findings led to pre-operative differential diagnoses including IPMN, mucinous cystic neoplasm and other cystic neoplasms of the pancreas. EUS with fine needle aspiration (FNA) in 9 patients led to a suspicion of LEC in two patients.

All of the 7 LEC which did not undergo surgical resection were incidentally detected and had CT-imaging and EUS-FNA. Five patients also underwent MRCP. In 5 patients (71%) the diagnosis of a LEC was based on the presence of squamous cells, proteinaceous and keratinaceous debris in the EUS-FNA sample. In the remaining 2 patients (29%) the diagnosis was made based on CT-imaging. Three patients had cyst fluid CEA measured, of whom two had levels higher than 192 ng/mL. One of these three, and one other patient had next generation sequencing performed of the cyst fluid with a panel of eight pancreatic cyst-related genes, with no mutations identified. No change of the LEC occurred in the 7 patients undergoing surveillance after a median follow-up of 43.3 months (range 8.6-70.6)

Our ability to correctly identify LEC improved over time. All 18 patients presenting with a pancreatic LEC to our institution before January 2011 had an incorrect diagnosis leading to a pancreatectomy. After 2011, 7 of 11 patients (64%) were correctly diagnosed.

**Conclusion:** This is the largest series to date examining LEC. Differentiating LEC from (pre)malignant pancreatic cystic neoplasms remains difficult. Further familiarity with clinical, radiological and cytopathological features may help guide the correct diagnosis and may spare patients unnecessary major surgery for these benign cystic lesions.

**Figure.** Hematoxylin-eosin staining of LEC showing pancreatic parenchyma (B), the cyst wall lined by stratified squamous epithelium (arrow) and characteristic dense lymphoid tissue beneath the lining (A).
Introduction: Retroperitoneal margin clearance for cancer of the pancreatic head is not amenable to surgical control. Traditionally, microscopically negative specimen margins are associated with the best prognosis in pancreatic cancer. The purpose of this study was to determine the association between retroperitoneal margin clearance and patterns of recurrence after pancreatectoduodenectomy for pancreatic cancer.

Methods: A prospectively maintained database of patients undergoing pancreatectoduodenectomy at a high volume pancreatic surgery center was reviewed. Patients were included if final pathology demonstrated pancreatic adenocarcinoma. Patients were classified according to the radial width of retroperitoneal margin clearance (R1, <1mm, 1-10mm, >10mm) determined by experienced pancreatic pathologists.

Results: A total of 215 consecutive patients from June 2010 to December 2013 were included in the analysis. The median follow-up for the entire cohort was 20 mos. Among patients with R1 retroperitoneal margin, the median disease-free survival (DFS) was 18 mos. Retroperitoneal margin clearance of <1mm, 1-10mm, and >10mm was not associated with improved DFS (median DFS 15, 22, 18 mos respectively, p=0.5), see graph. No patients with R1 or <1mm margin status were free of recurrence at 3 yrs whereas 5-yr DFS for the 1-10mm and >10mm groups was 20% and 37%, respectively. The predominant site of recurrence in all groups was distant (liver, lung, peritoneum) compared to locoregional; R1 75%, <1mm 67%, 1-10mm 71%, >10mm 77%, p=1.

Conclusion: The degree of retroperitoneal margin clearance is not associated with disease-free survival or patterns of disease recurrence after pancreatectoduodenectomy for pancreatic cancer. Positive or narrow retroperitoneal margins represent surrogate markers for unfavorable cancer biology associated with early disease progression.
Introduction/Background: Pancreatic adenocarcinoma will in 2030 become the second leading cause of cancer related death in the Western World. Improvements in imaging modalities lead to a progressively increased diagnosis of possible pre-neoplastic lesions, such as pancreatic cystic neoplasms, potentially amenable for preventive surgical removal. Despite the prevalence of PCNs is up to 20% in general population, their surgical approach is still hampered by high rates of preoperative diagnostic errors. This is mainly due either to the low diagnostic accuracy of preoperative imaging and to the absence of predefined criteria for identifying high risk lesions. In fact, a univocal definition of MPD involvement, which probably plays a major role in the definition of high risk categories, implies different cut-off in different guidelines, leading to possible under and over treatments for patients and subsequent economic consequences on the healthcare system. The aim is to correlate preoperative dilation of the MPD with the presence advanced finding on the final histological report.

Methods: We performed a retrospective analysis of prospectively collected cohort of IPMN-patients. All cases were histologically confirmed. Data about pre-operative imaging and final histology were collected. Indication for surgery was assessed in a multidisciplinary conference by the presence of either symptoms or worrisome features, defined as MPD-dilatation above 6 mm, the presence of nodules or thickening of cyst wall. Subclass analysis according to the degree of MPD-dilation and according to the presence of high grade dysplasia alone or in combination with cancer was also performed. Categorical variables were analyzed by chi-square. Sex and age adjusted logistic regression analysis was performed for statistically significant variables.

Results: From 2008 to 2015 129 patients were operated for IPMN, 15 (11.6%) were MD-IPMN, 79 (61.2%) were MT-IPMN and 35 (27.1%) were BD-IPMN. MPD was 1-4.9 mm in 54 (41.9%), 5-9.9 mm in 53 (41.1%), 10-14.9 mm in 8 (6.2%), 15-19.9 mm in 7 (5.4%), >20 mm in 7 (5.4%) patients. The group of patients with MPD>4.9 mm and the one with MPD>9.9 mm displayed a statistically significant increased prevalence of histological advanced lesions such as either high grade dysplasia or cancer (respectively 72.23% vs 50.00%, p=0.02 and 27.65% vs 10.97%, p=0.02). Logistic regression analysis of both groups were consistent with an increased risk to find advanced lesions, respectively OR 2.77 (CI 1.26-6.09) and OR 3.13 (CI 1.21-8.08), although the former group displayed an higher AUC compared to the latter (respectively AUC=0.64 vs AUC 0.58). MPD>4.9 mm, but not MPD>9.9 mm, was also associated with a borderline statistically significant increased prevalence of lone high grade dysplasia (respectively 75.00% vs 53.46, p=0.06 and 25.00% vs 14.85%, p=0.3). In the logistic regression analysis, MPD>4.9 mm was consistent with an increased risk to find high grade dysplasia at the final histology (OR 2.72, CI 1.05-7.05; AUC 0.62).

Discussion/Conclusion: The presence of MPD-dilation confers an increased risk of having cancer or HGD at final histology in resected IPMN-patients. 4.9 mm cut-off seems to provide a better accuracy in identifying IPMN with HGD which represents the ideal target for preventive, effective surgical treatments.
Objective: Conventional wisdom holds that complex, often long cases such as pancreatoduodenectomy (PD) benefit from early operating room (OR) scheduling and should not start late due to the potential negative effects of surgical team fatigue on outcomes. The purpose of this study was to determine whether late scheduling was associated with increased complication rates after PD.

Methods: Patients who underwent PD at a single academic tertiary care center were included. Clinicopathological, demographic and perioperative data were collected. Cases were considered “early” if the operative start (incision) time was before 11 am and “late” if it was after this time. The relationship between postoperative complications and start time, as well as other established predictors of perioperative morbidity, was assessed using chi-square and multivariable logistic regression.

Results: 210 patients (mean age 64.3 years) were included and analyzed. 163 cases were “early” (77.3%) and 47 were “late” (22.7%). The preoperative characteristics of the two groups were comparable, with no difference in the Charlson comorbidity index (mean score 5.07 for “early” patients and 5.72 for “late”, p=0.46) or pathology (75.3% of “early” and 78.7% of “late” had malignant disease, p=0.47). 148 patients developed complications, and “late” OR time was associated with decreased rate of complications (Odds Ratio 0.47, 95% Confidence Interval 0.24 - 0.92) on univariable analysis, and this effect remained present once other predictors of perioperative outcomes were included in multivariable models (OR 0.41, 95% CI 0.19 - 0.90).

Conclusion: These findings indicate that there is no adverse effect of late operating room scheduling on the perioperative outcomes of PD.
Objective: Studies of the prognostic value of lymph node ratio (LNR) in pancreatic head cancer (PDAC) and distal cholangiocarcinoma (DCA) have been limited by variability in the number of nodes assessed across populations examined.

Methods: We queried the National Cancer Database to identify patients undergoing resection for PDAC and DCA between 2004 and 2013. Sensitivity testing in lymph node negative patients identified 15 nodes as a threshold above which assessment of higher numbers of nodes resulted in no survival benefit. Patients having R2 resections, metastatic disease, neoadjuvant treatment and <15 nodes assessed were excluded from subsequent analyses.

Results: 7141 PDAC and 896 DCA patients underwent resection and assessment of >15 nodes. 44.2% of PDAC had LNR<0.1 whereas 63.5% of DCA patients had LNR<0.1. Overall survival (OS) varied inversely with LNR (Figure 1). Cox regression identified pathologic stage III (HR 2.469 [2.107, 4.004]), R1 resection (HR 1.427 [1.321, 1.542]), high grade (HR 1.930 [1.405, 2.651]) and LNR>0.3 (HR 1.653 [1.512, 1.808]) as independent predictors of OS conferring greatest risk of death in PDAC. Stage III (HR 1.872 [1.280, 2.737]), R1 resection (HR 1.535 [1.182, 1.994]) and LNR>0.3 (HR 3.101 [2.328, 4.130]) were predictors of OS conferring greatest risk in DCA.

Conclusions: In adequately staged pancreaticobiliary malignancy, LNR is an important measure of prognosis independent of stage, histologic grade and margin status and should guide adjuvant treatment.
IDENTIFYING APPROPRIATE INDICATIONS FOR THE USE OF TOTAL PARENTERAL NUTRITION IN PATIENTS UNDERGOING PANCREATICoduodenectomy

Cullen E Worsh, Talar Tatarian, MD, Awinder Singh, MD, Michael J Pucci, MD, Jordan M Winter, MD, Charles J Yeo, MD, Harish Lavu, MD; Jefferson Pancreas, Biliary, and Related Cancer Center, Department of Surgery, Thomas Jefferson University, Philadelphia, Pennsylvania

Introduction: Total parenteral nutrition (TPN) has historically been used conservatively in the management of patients undergoing pancreaticoduodenectomy (PD). In this study, we set out to identify the indications for and outcomes associated with TPN use in a high volume pancreatic surgery center.

Methods: With IRB approval, we retrospectively queried our institution’s pancreatic surgery database and identified patients who received TPN after undergoing PD from 2006 through 2015.

Results: Of 1246 patients who underwent PD, 232 (19%) received TPN perioperatively. Sixty-seven percent were male and 50% had a soft pancreas. The most common postoperative complications requiring the initiation of TPN were delayed gastric emptying (DGE, n=131, 56%), pancreatic fistula (n=51, 22%), and generalized malnutrition (n=25, 11%). The median day of TPN initiation was POD 4 (range: minus 31 to 22), with a median usage of nine days (range: 1 to 115) at a cost of $650 to $950 per day. Forty-four (19%) patients were on TPN for a short period of time (three days or less), primarily those diagnosed with isolated DGE without associated complications (p=0.02). On upper GI examination, patients receiving short-term TPN predominately had evidence of anastomotic edema (p=0.03). Seventy-seven percent of TPN patients underwent postoperative CT imaging, of which half were found to have drainable intra-abdominal fluid collections, predominately those on long-term TPN therapy (p=0.001). Hyperglycemia (glucose >200 mg/dL, 34%) was the most common complication resulting from TPN use, while central line infections (3%) were rare. Readmissions (36% on TPN; 15% historical institutional rate) were most commonly due to poor oral intake (27%). The 30-day mortality rate in the overall TPN cohort was 3.4% compared to our institutional no-TPN rate of 0.8%.

Conclusion: In modern PD surgery, TPN is a critical and safe adjunct to aid in the rescue of patients from postoperative complications. However, an opportunity exists to limit TPN overuse by avoiding initiation in patients who have DGE secondary to anastomotic edema and focusing TPN use to patients who have additional PD-associated complications such as pancreatic fistula or intra-abdominal fluid collections.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>TPN ≤3 days</th>
<th>TPN &gt;3 days</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years) n=144 (%)</td>
<td>70 (52)</td>
<td>69 (48)</td>
<td>0.80</td>
</tr>
<tr>
<td>TPN Indication</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DGE</td>
<td>32 (73)</td>
<td>99 (53)</td>
<td>0.02</td>
</tr>
<tr>
<td>Pancreatic Fistula</td>
<td>2 (5)</td>
<td>49 (26)</td>
<td>0.001</td>
</tr>
<tr>
<td>Anastomotic Edema</td>
<td>5 (40)</td>
<td>18 (17)</td>
<td>0.03</td>
</tr>
<tr>
<td>Drainable Abd Fluid Collection</td>
<td>5 (23)</td>
<td>94 (60)</td>
<td>0.001</td>
</tr>
<tr>
<td>Median Days on TPN (Range)</td>
<td>2 (1-3)</td>
<td>12 (4-115)</td>
<td>N/A</td>
</tr>
</tbody>
</table>

TPN, total parenteral nutrition; DGE, delayed gastric emptying; Abd, abdominal.
Introduction: Post-Pancreatic hemorrhage (PPH) is the Achilles heel of pancreateoduodenectomy and reported to occur in 5-6% of patients. Early reports of minimally invasive pancreateoduodenectomy have shown increased incidence of PPH. Our objective is to determine whether PPH incidence is elevated in a mature series of robotic pancreateoduodenectomy (RPD) or if video review can identify technical factors which may contribute to PPH.

Methods: A retrospective review of RPDs between 10/2008-3/2016 was performed. PPH was classified by ISGPS criteria. Technical factors from video analysis were reviewed for variables including: anomalous arterial anatomy, trauma to vessels, method of GDA ligation, length of GDA stump, use of clip on arteries, and creation of falciform flap. Clinical and technical variables were analyzed using multivariate analysis (MVA).

Results: 400 patients underwent RPD with a PPH=16(4%); 167(42%) RPD had videos to review. MVA of clinical variables showed females, EBL>500ml, long OR time, and neoadjuvant therapy were predictors of PPH (p=0.042; R2=0.148). Falciform flaps were routinely performed after RPD#181 and were performed with less frequency in the PPH group (37.5% vs 75%; p=0.033). On MVA of clinical and technical variables, suture ligation of GDA and long OR times were predictive of PPH (p=0.06; R2=0.19). A negative relationship (Figure) was found between frequency of PPH and time (r=-0.533; p<0.05). Routine use of falciform flaps dropped the PPH rate (Early-200 RPD=6% vs Late-200 RPD=2%; p<0.05).

Conclusions: PPH for RPD in a mature series is on par with historical open control; however, improves with experience and use of a falciform flap.
**P173 ROBOTIC APPROACH IS AN INDEPENDENT PREDICTOR OF SHORTER LENGTH OF STAY AND LOWER COST AT AN EXPERIENCED HIGH VOLUME PANCREAS CENTER**

Deepra Magge, MD, Mazen Zenati, Ahmad Hamad, MD, Caroline Rieser, MD, Jennifer Steve, BA, Amer Zureikat, MD, Herbert Zeh, MD, Melissa Hogg, MD; University of Pittsburgh Medical Center

**Introduction:** Recent NSQIP data shows 50% of distal pancreatectomies (DP) are performed minimally invasively (MIS). Clear advantages have been demonstrated for MIS DP, yet comparative cost data is limited. We sought to compare outcomes and cost in patients undergoing open (ODP), laparoscopic (LDP), and robotic (RDP) at a single institution.

**Methods:** A retrospective review was performed on patients undergoing ODP, LDP, and RDP between 1/2010- 5/2016. Analyses was intention-to-treat, and cost data was available after 2013.

**Results:** DP was performed in 374 patients: ODP=85(23%), LDP=93(25%), and RDP=196(52%). LDP patients had lower CCI (p=0.016), ASA (p=0.0001), and pancreas cancer (0.002) than ODP and RPD. Operating time was lowest in the RPD (211±68) cohort (OPD=316±140 vs LPD=318±124; p<0.0001). ODP had higher EBL (p<0.0001) and transfusions (p<0.0001) than LPD and RPD. LPD (9%) had greater conversions than RPD (2%; p=0.006). Postoperative outcomes were similar (Table). LOS was higher in the ODP (p=0.0001) than LPD and RPD. Overall cost for the ODP ($23,228) was higher than the RPD ($15,440) and LPD ($16,733) group (p=0.002). On multivariate analysis, RPD reduced LOS (ODP: Odds=6.5 [p=0.0001] and LPD: Odds=2.1 [p=0.036]) and total cost (ODP: Odds=5.7 [p=0.002] and LPD: Odds=2.8 [p=0.042]) independently of all demographics and illness covariates.

**Conclusions:** MIS PD conveys cost advantage over ODP with a decreased LOS. LPD patients are more highly selected than OPD and RPD. Overall, RPD reduces LOS and total cost compared to OPD and LPD.

<table>
<thead>
<tr>
<th>Event</th>
<th>Total</th>
<th>Open</th>
<th>Laparoscopic</th>
<th>Robotic</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=374</td>
<td>n=85 (23%)</td>
<td>n=93 (25%)</td>
<td>n=196 (52%)</td>
<td></td>
</tr>
<tr>
<td>Pancreatic leak</td>
<td>138 (37)</td>
<td>24 (29)</td>
<td>35 (38)</td>
<td>79 (40)</td>
<td>0.174</td>
</tr>
<tr>
<td>ISGPF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>73 (20)</td>
<td>11 (13)</td>
<td>16 (17)</td>
<td>46 (24)</td>
<td>0.217</td>
</tr>
<tr>
<td>B</td>
<td>55 (15)</td>
<td>10 (12)</td>
<td>18 (20)</td>
<td>27 (14)</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>10 (3)</td>
<td>3 (4)</td>
<td>1 (1)</td>
<td>6 (3)</td>
<td></td>
</tr>
<tr>
<td>Admitted to ICU initially</td>
<td>108 (29)</td>
<td>48 (57)*</td>
<td>24 (26)</td>
<td>36 (18)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Fluid collection</td>
<td>53 (14)</td>
<td>12 (14)</td>
<td>15 (16)</td>
<td>26 (13)</td>
<td>0.809</td>
</tr>
<tr>
<td>Post Op bleeding</td>
<td>10 (3)</td>
<td>4 (5)</td>
<td>2 (2)</td>
<td>4 (2)</td>
<td>0.390</td>
</tr>
<tr>
<td>Wound infection</td>
<td>18 (5)</td>
<td>6 (7)</td>
<td>6 (7)</td>
<td>6 (3)</td>
<td>0.219</td>
</tr>
<tr>
<td>Reoperation</td>
<td>15 (4)</td>
<td>5 (6)</td>
<td>5 (5)</td>
<td>2 (3)</td>
<td>0.282</td>
</tr>
<tr>
<td>90 day Re-admission</td>
<td>102 (27)</td>
<td>23 (27)</td>
<td>25 (27)</td>
<td>54 (28)</td>
<td>1.000</td>
</tr>
<tr>
<td>90-day Mortality</td>
<td>11 (3)</td>
<td>4 (4.7)</td>
<td>4 (4.3)</td>
<td>3 (1.5)</td>
<td>0.209</td>
</tr>
</tbody>
</table>
**Introduction:** Recent studies have identified obesity as one of the few modifiable factors associated with an increased risk of pancreatic cancer. Obesity remains a prevalent problem, as nearly two-thirds of adults in the United States are overweight or obese. We attempt to identify how the clinical course for patients undergoing pancreaticoduodenectomy (PD) with pancreaticogastrostomy (PG) is unique for this growing segment of the population.

**Methods:** Data were collected retrospectively on patients who underwent PD with PG at a single institution from June 1990 through May 2014. Data gathered included the patient’s preoperative height and weight, which were used to calculate body mass index (BMI). Patients were assigned to normal weight (BMI 18.5-24.9), overweight (BMI 25.0-30.0), or obese (BMI greater than 30.0) according to the World Health Organization guidelines.

**Results:** In the 24-year study period, 316 PDs with PG were performed for periampullary adenocarcinoma and BMI data were available on 152 patients. Fifty-nine patients (38.8%) were normal weight, 60 patients (39.5%) were overweight, and 29 patients (19.1%) were obese. Obese patients were younger (age 62.6 years, versus 68.2 years for overweight and 67.2 years for normal weight, p = 0.036) at presentation. Both overweight and obese patients had higher intraoperative estimated blood loss (981.2 and 989.7 milliliters, respectively) with longer operative times (5.9 and 6.1 hours, respectively) than normal weight patients (734.7 milliliters and 5.3 hours, p < 0.01 for both). Obese patients also experienced significantly more wound infections postoperatively (11.5%, compared to 3.4% of overweight and 0% of normal weight, p = 0.041) and higher postoperative mortality (11.5%, compared to 1.7% of overweight and 0% of normal weight, p = 0.016). Using Cox proportional hazards model, BMI group did not influence postoperative survival.

**Conclusions:** In our cohort, PD with PG in overweight and obese patients is associated with longer operative time higher intraoperative blood loss. The obese population may be at risk for more postoperative wound infections and have a higher 30-day postoperative mortality, but BMI grouping did not affect long term survival.
**P175 DIAGNOSIS AND DEFINITIONS INFLUENCE NSQIP PANCREATECTOMY OUTCOMES**

Elizabeth M Gleeson, William F Morano, MD, Henry A Pitt, MD, Wilbur B Bowne, MD; Drexel University College of Medicine

**Objectives:** Pancreatic surgery is performed on patients with a variety of pathologies, and morbidity rates after surgery may depend on the diagnosis. Likewise, definitions for morbidity may vary between institutions. The National Surgical Quality Improvement Program (NSQIP) has traditionally provided very explicit definitions of morbidity, and recently, the program has collected pancreas-targeted outcomes such as delayed gastric emptying (DGE) and pancreatic fistula (PF). These differences in definitions and patient mix are important when comparing morbidity rates among hospitals that perform pancreatic surgery. The aim of this study was to determine the influence of diagnoses and definitions of morbidity on the outcomes of pancreatectomy.

**Methods:** The 2014 Procedure Targeted Pancreatectomy NSQIP Participant Use File was employed. Procedures included pancreaticoduodenectomy, distal pancreatectomy and total pancreatectomy (CPT codes 48140, 48145, 48146, 48150, 48152, 48153, 48154, and 48155). Patients (n=4,806) were categorized into six diagnostic categories based on final pathology: pancreatic ductal adenocarcinomas (n=2,205) neuroendocrine tumors (n=559), periampullary adenocarcinomas (n=416), cystic neoplasms (serous, mucinous and solid pseudopapillary) (n=837), intraductal papillary mucinous neoplasms (n=446) and chronic pancreatitis (n=343). Overall morbidity was defined in three ways: a) standard NSQIP (which included all the traditionally collected outcomes of morbidity), b) standard NSQIP plus the specific morbidity of bleeding requiring transfusion (B/T) and c) standard NSQIP plus PF and DGE. Subgroups were compared by Chi-squared and McNemar analyses.

**Results:** Mortality (30-day) and overall morbidity (three definitions) are presented in the Table. Mortality is significantly higher than all other diagnoses in patients with pancreatic ductal adenocarcinoma (2.3%). Overall morbidity was highest in patients with periampullary adenocarcinoma regardless of whether morbidity was defined as the standard NSQIP (40.6%), NSQIP+B/T (49.3%) or NSQIP+PF/DGE (54.1%). Overall morbidity also is increased when either bleeding/transfusion or pancreatectomy-specific outcomes are included in the definition. For example, in neuroendocrine tumors, morbidity was highest when defined as NSQIP+PF/DGE (42.1%) followed by the NSQIP+B/T definition (33.6%), both higher than the standard NSQIP (27.4%).

**Conclusions:** Morbidity and mortality differ significantly depending on diagnosis, with the highest rate of mortality in pancreatic ductal adenocarcinoma and highest morbidity in periampullary adenocarcinoma. Overall morbidity varied significantly among the three definitions. These results demonstrate the need for a standardized definition of morbidity and reporting of outcomes by diagnosis. Bleeding requiring transfusions should be considered a risk-factor, not an outcome, whereas pancreas-specific complications should be routinely reported in morbidity for pancreatic surgery.
Background: The survival rates after pancreatectomy for elderly patients with adenocarcinoma of the pancreas remain poor. Elderly patients have increased perioperative mortality rates, higher morbidity rates, and higher rates of continued inpatient nursing care after pancreatectomy. Our objective was to evaluate the outcomes of surgical resection versus chemotherapy (with or without radiation) for elderly patients with potentially resectable adenocarcinoma of the pancreas.

Methods: Using 2000-2010 Surveillance Epidemiology End Results (SEER)-Medicare data we examined the relationship between patient characteristics and receipt of surgery using multivariate logistic regression. We restricted our cohort to patients with American Joint Committee on Cancer stage I and II and Charlson comorbidity scores of ≤2. The association between treatment (surgery or chemotherapy without surgery) and hazard of death was evaluated using Kaplan-Meier Cox proportional hazards modeling.

Results: We identified 2,629 patients with pancreatic adenocarcinoma who underwent either surgery (pancreatectomy) or chemotherapy without surgery. Younger patient age and smaller tumor size was significantly associated with receipt of surgery. For the overall cohort, the median survival rate was significantly improved for patients treated with surgery as compared with chemotherapy (15 months versus 10 months). However, the absolute survival benefit attenuated as the cohort became older.

Conclusions: The survival benefit associated with surgical resection as compared to chemotherapy was very small for certain subgroups of patients (age > 80 years and lymph node metastases). Since the morbidity rate is high after pancreatectomy for elderly patients, perhaps chemotherapy, instead of surgery, is a better treatment strategy for many of these patients.
P177 BACTERIOLOGICAL PROFILES OF SURGICAL SITE INFECTIONS FOLLOWING PANCREATODUODENECTOMY - DO WE NEED TO CHANGE THE PROPHYLACTIC ANTIBIOTIC REGIMEN? Carolyn Power1, Daniel Joyce1, Nancy Anzlovar2, Teresa Diago Uno1, R Matthew Walsh1, Gareth Morris-Stiff1; 1Department of HPB Surgery, 2Quality Data Registries

Introduction: The aim of the current study was to analyse the use of prophylactic antibiotics prior to pancreatoduodenectomy (PD) and assess the results of a change in prescribing policy on SSI rates.

Methods: A prospectively maintained departmental database was used to identify all patients undergoing PD between January 2010 and December 2015. Patient data relating to SSIs was obtained from the NSQIP data set and the details of culture results and organism sensitivity extracted from the electronic medical record. For the purpose of the study it was hypothesized that an appropriate choice of prophylactic antibiotic would reduce the prevalence of SSIs.

Results: During the 6-year period of the study 500 PDs were performed. Microbiologically-proven SSIs were observed within the first 30 post-operative days in 107 (21.4%) patients. There was no standard antibiotic policy, though the majority received Cefazolin as their sole prophylaxis, the main exception being those with a penicillin allergy. In only 35 cases were organisms identified as the cause of SSI sensitive to the prophylactic antibiotic prescribed prior to surgery. From May 2015 onwards 56 PDs were performed of which 34 received Cefotaxime and Metronidazole. Only 2/34 (5.9%) patients developed an SSI whilst 5/22 (22.7%) not receiving the new regimen had a culture-positive SSI.

Conclusion: A detailed analysis of the microflora responsible for SSIs in our patient cohort identified that the existing prophylaxis was inadequate. Following internal audit, change of prescribing policy, and closure of the audit cycle the SSI rate improved significantly.
**Background:** Resectable pancreatic ductal adenocarcinoma continues to carry a poor prognosis. Of the controllable clinical variables known to affect outcome, margin status is paramount. Though the importance of a R0 resection is generally accepted, not all margins are easily managed. The superior mesenteric artery [SMA] in particular is the most challenging to clear. The aim of this study was to systematically review the literature with specific focus on the role of a SMA periadventitial dissection during PD and its effect on margin status in pancreatic adenocarcinoma.

**Methods:** the MEDLINE, EMBASE and Cochrane databases were searched for abstracts that addressed the effect of margin status on survival and recurrence following pancreaticoduodenectomy [PD]. Quantitative analysis was performed.

**Results:** The overall incidence of a R1 resection ranged from 16% to 79%. The margin that was most often positive following PD was the SMA margin, which was positive in 15-45% of resected specimens. Most studies suggested that a positive margin was associated with decreased survival. No consistent definition of R0 resection was observed.

**Conclusions:** Margin positivity in resectable pancreatic adenocarcinoma is associated with poor survival. Inability to clear the SMA margin is the most common cause of incomplete resection. More complete and consistently reported data are needed to evaluate the potential effect of periadventitial SMA dissection on margin status, local recurrence, or survival.
**Background:** An abundance of radiologic studies often accompanies patients at a surgical consultation. The perceived benefit of utilizing imaging as an educational tool for patients to facilitate a greater understanding of their complex medical diagnoses and enable them to actively participate in medical decision-making has not yet been studied.

**Methods:** In this IRB approved study, we surveyed patients presenting for pancreaticobiliary surgical consultations at a tertiary care institution. Surveys were administered pre- and post-appointment, where a surgeon scrolled through CT and/or MRI scans with the patient and family. All scans were reviewed by our pancreaticobiliary team prior to the patient encounter. Using a 1 (strongly agree) to 5 (strongly disagree) Likert scale, patients reported their perceived importance of viewing the imaging studies and understanding of their medical condition.

**Results:** Of fifty-one patients surveyed, 78% reported they had not previously seen their imaging and only 55% of patients thought that it was important for them to do so. On average, the surgeons spent 2.7 ± 1.9 minutes reviewing imaging studies with the patient and family. Selected survey question responses are depicted in Figure 1. On the post-visit survey, 90% and 86% of patients, respectively, responded positively to better understanding their disease and their planned operation having seen the imaging studies. Mean scores for the statements “I understand my disease” and “I understand my planned operation” significantly improved from 2.5 ± 1.2 to 1.7 ± 1.1 (p = 0.001), and 3.2 ± 1.2 to 1.8 ± 0.9 (p = 0.00004) after the consultation. Ninety percent of patients felt the imaging review was worthwhile, including 100% of patients that were ultimately not deemed appropriate surgical candidates.

**Conclusions:** After surgical consultations during which a surgeon reviewed imaging studies with patients, almost all patients felt that the experience was valuable and enhanced their understanding even though many did not have this opinion prior to the visit. Surgeons should routinely incorporate a short imaging review into patient encounters as it can be utilized as a powerful educational tool. Furthermore, in the current climate of focus on patient satisfaction, we propose that this practice be further analyzed as a possible quality metric.
P181 LOWER MORTALITY RATES AFTER PANCREATICO-DUODENECTOMY (PD) WHEN THE OPERATION IS PERFORMED IN A HIGH-VOLUME CENTER. A NATIONWIDE STUDY IN FINLAND 2012-2014. Reea Ahola, Juhani Sand, Johanna Laukkanen; Tampere University Hospital

Introduction: Centralization of PD surgery is slowly proceeding in Finland, a country with a sparse population of 5.5 million people and public health care system. The aim of this study was to analyse the effect of hospital volume on PD associated mortality and complications in Finland in 2012-2014.

Methods: The Finnish Operation and Treatment Register (HILMO) was searched for all PDs performed in Finland 2012-2014. Demographics, TNM and R status, complications and operational hospital were recorded from the patient archives. Complications were graded according to Clavien-Dindo (CD) and international study group classifications for fistulae (POPF), hemorrhage (POPH) and delayed gastric emptying (DGE). Operation volume per hospital was defined by the median number of PDs performed per year and categorized in high (HVC; ≥20), medium (MVC; 6-19) and low (LVC; ≤5) volume centers, respectively.

Results: A total of 399 patients (median age 67 (range 30-85) years; 52% male) were operated for PD during the study period and were included in the study database. PDs were performed in 2 HVCs (58% of all PD), 4 MVCs (31%) and 7 LVCs (11%). ASA 1, 2 and 3-4 classes covered 30, 37, 33% of the cases, respectively, without any difference between HVCs, MVCs and LVCs. Final diagnosis was malignant in 78% of the cases, and out of them there were 63% R0, 36% R1 and 2% R2 resections, with no differences between HVC, MVC and LVC. More vascular resections were performed in HVCs than in MVCs and LVCs (14% vs 4.9 and 4.4%, p=0.011). In-hospital mortality was significantly lower in HVCs compared MVCs and LVCs (1.3% vs 8.1% and 15.6%, p= 0.000). Within patients with a vascular resection the in-hospital mortality was 3.1% in HVCs, 33.3% in MVCs and 100% in LVCs. Percentages of clinically significant complications (gr B-C) were for POPF 7.4 - 8.1 - 8.9% (in HVC - MVC - LVC), for POPH 3.0 - 4.1% - 8.9% and for DGE 4.3 - 4.9 - 8.9%.

Conclusions: Mortality after PD is significantly lower in HVC compared to MVC and LVC in Finland still in 2012-2014. This favours proceeding further with centralization of PD surgery in Finland.
Background: Appropriate pancreatic stump closure technique to reduce pancreatic fistula after distal pancreatectomy (DP) remains still controversial. Stapler closure for DP has been becoming universal, however, we previously reported that stapler closure for transection of a thicker pancreas significantly increased pancreatic fistula after DP. Additionally, it is difficult to manipulate stapler closure in DP with en bloc celiac axis resection (DP-CAR), because the pancreatic transection is performed on the right side of the portal vein, which results in a large cross-section surface. Therefore, a procedure to decrease pancreatic fistula is urgently needed.

Aim: The aim of this study was to clarify strategy of pancreatic stump closure technique to reduce pancreatic fistula after DP.

Method 1: First of all, a multicenter randomized controlled trial (RCT) whether PJ of pancreatic stump decreases the incidence of pancreatic fistula after DP compared to stapler closure. One hundred thirty-six patients scheduled for DP were enrolled in this study at 6 high-volume surgical centers in Japan. Enrolled patients were randomized to either stapler closure or PJ. The primary endpoint was the incidence of pancreatic fistula based on the International Study Group on Pancreatic Fistula criteria. This RCT was registered with ClinicalTrials.gov (NCT01384617).

Result 1: Sixty-one patients randomized to stapler and 62 patients randomized to PJ were analyzed by intention-to-treat. Pancreatic fistula occurred in 23 patients (37.7%) in the stapler closure group and 24 (38.7%) in the PJ group (p=0.332) in intention-to-treat analysis. The incidence of clinically relevant pancreatic fistula (grade B or C) was 16.4% for stapler closure and 9.7% for PJ (p=0.201). Mortality was zero in both groups. In thickness of pancreas more than 12 mm, the incidence of clinically relevant pancreatic fistula occurred in 22.2% of the patients in the stapler closure group and in 6.2% of the PJ group (p=0.080).

Method 2: Secondary, Twenty-six consecutive patients who underwent DP-CAR were reviewed retrospectively. The first 13 consecutive patients underwent DP-CAR without anastomosis, and the subsequent 13 consecutive patients underwent PJ.

Result 2: In DP-CAR, the incidence of clinically relevant pancreatic fistula was 5 (38.5%) of 13 cases of DP-CAR without anastomosis. On the other hand, the incidence of clinically relevant pancreatic fistula was 2 (15.4%) of 13 cases with isolated Roux-en-Y anastomosis of the pancreatic stump. No significant difference was observed between two groups regarding the incidence of clinically relevant pancreatic fistula. However, extremely high amylase levels (>4000 IU/L) of drainage fluid on postoperative day 1, 3 and 4 were detected more frequently in cases with no anastomosis (n = 7) compared to those with PJ (n = 1) (P = 0.056).

Conclusion: PJ of the pancreatic stump during DP does not reduce pancreatic fistula compared to stapler closure. However, PJ for pancreatic stump might offer a potential reduction of pancreatic fistula in cases with a thick pancreas. Additionally, PJ in DP-CAR prevents an extremely high amylase level (>4000 IU/L) in the drainage fluid. RCT in stratification of a thick pancreas or DP-CAR is required to confirm the impact of PJ of pancreatic stump to reduce pancreatic fistula.
Introduction: Perioperative morbidity rates after pancreatoduodenectomy (PD) remain high, reaching 20-50% even in high-volume centers. Post-pancreatectomy hemorrhage (PPH) is one of the most serious complications. Delayed PPH usually originates from a pseudoaneurysm resulting from a postoperative pancreatic fistula (POPF). Placement of an endovascular stent has recently been used to treat arterial pseudoaneurysms. In this study, intra-arterial stent-graft placement for pseudoaneurysm after PD was examined.

Methods: Five cases in which intra-arterial stent-grafts were inserted for pseudoaneurysm secondary to POPF after PD were evaluated.

Results: The intra-arterial stent-graft was placed at the common hepatic artery in 3 cases, the splenic artery in 1 case, the right hepatic artery in 1 case, and the superior mesenteric artery in 1 case (including 2 repeat case). A Jostent Graft master (Abbott Vascular, Redwood City, CA, USA) was used for all cases. Two cases required additional stents, and two cases needed metallic coil embolization. No vascular adverse events, including stent-graft obstruction, were encountered during this procedure. All cases survived and were discharged after the procedure.

Conclusion: While only selected cases have been treated with this strategy, the present results suggest that intra-arterial stent-graft placement is safe and effective for cases with a bleeding pseudoaneurysm after PD.
P184 DEVELOPMENT AND EXTERNAL VALIDATION OF AN INTRAOPERATIVE FISTULA RISK MODEL IN PANCREATODUODENECTOMY Timothy Mungroop,1 Bengt van Rijssen,1 David van Klaveren,2 Jasmijn Smits,3 Victor van Woerden,4 Ralph Linnemann,5 Brett Ecker,6 Susan van Dieren,1 Bert Bonsing,7 Olivier Busch,1 Ronald van Dam,4 Joris Erdmann,7 Casper van Eijck,2 Michael Gerhards,8 Harry van Gooi,9 Erwin van der Harst,10 Ignace de Hingh,11 Koert De Jong,12 Geert Kazemier,14 Mischa Luyer,11 Awad Shamali,14 Salvatore Barbaro,14 Thomas Armstrong,14 Arjun Takhar,14 Zaed Hamady,14 Joost Klaase,14 Daan Lips,5 Quintus Molenaar,3 Vincent Nieuwenhuis,5 Coen Rupert,15 Hjalmar van Santvoort,16 Joris Scheepers,17 George van der Schelling,18 Charles Vollmer,6 Ewout Steyerberg,2 Mohammed Abu Hilal,14 Bas Groot Koerkamp,2 Marc Besselink;1 1Academic Medical Center, 2Erasmus Medical Center, 3UMCU, 4MUMC, 5Isala, 6Hospital of University of Pennsylvania, 7LUMC, 8OLVG Oost, 9Radboud UMC, 10Maasdorp, 11Catharina ziekenhuis, 12UMCG, 13VUMC, 14University Hospital Southampton NHS Foundation Trust, 15Ziekenhuis de Tjongerschans, 16st. Antonius ziekenhuis, 17Reinier de Graaf, 18Amphia ziekenhuis

Introduction: Postoperative pancreatic fistula (POPF) remains one of the most threatening complications after pancreateoduodenectomy (PD). The Fistula Risk Score (FRS, Callery - 2013) predicts POPF based on gland texture, pancreatic duct diameter, intraoperative blood loss, and pathology. However, intraoperative blood loss was not a significant factor at recent external validation (Shubert - 2015) and is not registered in several audits (e.g., the Netherlands and USA-NSQIP). Moreover, definitive pathology may differ from the preoperative assessment. We therefore aimed to develop a fistula risk model without blood loss and pathology.

Methods: We included patients who underwent pancreateoduodenectomy from three databases. For model development: the nationwide Dutch Pancreatic Cancer Audit (18 centers) between January 2014 and March 2016, and the University Hospital Southampton NHS between 2007-2016. Clinically relevant POPF (CR-POPF) was defined as ISGPF grade B/C fistula. Missing data were imputed with multiple imputation (five times). A prediction model was developed by multivariable logistic regression modelling using the combined dataset. Known and possibly related risk factors were included in a backward selection approach to develop a prediction model. Internal validation was performed using bootstrap sampling and external validation was performed with an independent database (17 international centers, between 2001-2016).

Results: For model development, 1137 consecutive patients were included with 161 (13%) patients developing CR-POPF. Three predictors were strongly associated with CR-POPF: soft pancreatic texture (odds ratio: 2.78), small pancreatic duct diameter (continuous to a maximum of 5mm, odds ratio 0.71), and high Body Mass Index (BMI) (continuous, odds ratio 1.07). Discrimination of the model was good with a c-statistic of 0.73 [95% CI:0.70-0.76] and 0.72 [95% CI: 0.69-0.76] after internal validation. External validation (n=2031) found a c-statistic of 0.71 [95% CI: 0.69-0.74]. An online calculator is available at pancreascalculator.com. Three risk categories were identified with low (0-5%), medium (6%-19%) and high risk (≥20%) of developing CR-POPF.

Conclusions: This externally validated intraoperative fistula risk model allows for intraoperative prediction of CR-POPF based on pancreatic texture, ductal diameter, and BMI. The model can aid surgical management (e.g., drain placement, use of somatostatin analogues) and can be used for risk-adjusted comparison of CR-POPF across centers.
Introduction/Background: There is debate concerning the impact of the analgesic modality and enhanced recovery in pancreatoduodenectomy. The most frequently used analgesic modality, epidural analgesia is associated with hypotension and need for fluid resuscitation on the ward which may slow down recovery. In addition, the required preoperative placement is disliked by many patients and time-consuming with considerable failure rates. Continuous pre-peritoneal wound infiltration with local anesthetics seems to be as effective in providing analgesia, but without many of these disadvantages. With this study, we aimed to assess clinical outcomes after stepped implementation of first (1) continuous wound infiltration first and thereafter (2) an enhanced recovery program. We hypothesized this stepwise implementation would lead to less morbidity and a shorter hospital stay in both phases after implementation.

Methods: A total of 257 consecutive patients undergoing PD in the University Hospital Southampton NHS between January 2009 and February 2015 were analyzed. Data was collected from a prospectively maintained database. Group 1 received epidural analgesia (n=70), Group 2 received continuous wound infiltration with local anesthetics (n=90) and group 3 received continuous wound infiltration, and was treated with an enhanced recovery program (n=97). Outcomes included morbidity and mortality, fluid requirement, length of hospital stay, duration of high dependency unit (HDU) and intensive treatment unit (ITU) admission.

Results: After implementation of continuous wound infiltration a significant shorter length of hospital stay was observed (15 days [12-22] vs 11 [8-15], mean difference -6 (95% CI: -3 to -10), p=0.001). Postoperative IV-fluid requirement [day 1-5] was lower (15 liter [14-16] vs 13 [12-14], mean difference -2.2 (95% CI: -2.8 to -1.6), p=0.001). Intraoperative fluid requirement did not differ between groups. The number of procedure related complications including anastomotic leakage did not differ, as well the number of patients with any complication. In the third phase, after implementation of the enhanced recovery program, an additional reduction in length of hospital stay was observed (11 [8-15] vs 9 [7-13], mean difference -3 days (95% CI: -5 to -1), p=0.001). No significant difference in patients with any complication was observed, but there was a significant reduction in pneumonia (18% vs 6%, mean difference -12% (95% CI: -21% to -2%) p=0.021). There was no difference in the occurrence of thrombotic events. Both steps led to significant reduction in duration of HDU and ITU admission.

Discussion/Conclusions: Stepped implementation of continuous wound infiltration and enhanced recovery was associated with several clinically relevant improvements in recovery after PD. Although other developments over time may also have contributed to these improvements, the effect sizes are in our opinion robust indicators of the additional value. Both the implementation of continuous wound infiltration as well as an enhanced recovery program are supported by the findings of this study.
Introduction: Arterial resections during pancreatectomy are not yet considered the standard of care for patients suffering from LAPDAC.

Aim: The aims of this study are to analyze the feasibility of pancreatectomies associated to vascular resection and compare the long term results of these procedures with a group of patients with same stage of disease, who underwent palliative treatment.

Methods: All consecutive patients underwent arterial resection associated with pancreatectomy or explorative laparotomy for LAPDAC at Karolinska University Hospital, from 2008 to 2015, were enrolled in the study.

Results: Overall 24 patients underwent pancreatectomy associated with artery (n=11; 45.8%) or artery/venous (n=13; 54.2%) resection. In 23 patients (95.8%) the histology showed PDAC and in 1 (4.2) neuroendocrine tumor. Eight (34.7%) of the patient with PDAC received neo-adjuvant and 14 (60.8%) adjuvant treatment. One patients (4.1%) died post-operatively and 13 (54.1%) developed post-operative complications. The 1, 3 and 5 yrs survival of patients who underwent surgery for LAPDAC was significantly better than a group of 26 patients underwent palliative treatment for the same stage of disease (66.4%, 20.7% and 20.7% vs 44.4%, 5.2% and 0; p=0.01).

Conclusions: Artery and artery/venous resection for LAPDAC, in selected patients, seems to be safe and feasible, with an advantage in survival compared to patients with the same stage of diseases who underwent palliative treatment.
OBJECTIVE: Approximately 17% of patients with pancreatic adenocarcinoma (PDAC) “resectable” by imaging criteria have metastatic disease on exploration. Our aim was to assess the potential impact of staging laparoscopy versus upfront laparotomy in patients with metastatic PDAC.

METHODS: Clinicopathologic data was retrospectively collected for all patients with PDAC undergoing an operation with curative intent between 2001-2015 at a single institution.

RESULTS: Of the 1,001 patients undergoing surgical evaluation, 160 had unsuspected metastatic PDAC. Staging laparoscopy was performed in 60% (96/160) of patients, while 40% (64/160) underwent an exploratory laparotomy with or without prophylactic bypass. There were no differences in patient demographics and preoperative CA 19-9 levels between the staging laparoscopy and exploratory laparotomy groups. However, staging laparoscopy was more often performed for pancreatic body/tail lesions (80.0% vs 50.5% for pancreatic head lesions, p<0.001). Patients who only underwent laparoscopy started palliative chemotherapy more quickly (19.5 days vs 43.2 days in the laparotomy group, p<0.001). No difference was appreciated in patients requiring post-operative procedures (38.5% vs 26.6% laparotomy group, p=0.116). The median overall survival for the staging laparoscopy group (12.2 months) was significantly longer than the laparotomy group (8.3 months, p=0.002). In a cox regression analysis adjusting for clinicopathologic variables, staging laparoscopy was associated with significantly improved overall survival when compared to the laparotomy group (HR 0.596, 95% C.I. 0.400-0.887, p=0.009).

CONCLUSION: For patients diagnosed with metastatic PDAC at the time of surgical exploration, staging laparoscopy was associated with a shorter time to chemotherapy and improved survival duration when compared to those explored without laparoscopy.
P188 SUPERIOR MESENTERIC/PORTAL VEIN RESECTION AND RECONSTRUCTION DURING PANCREATIC RESECTION: UNADJUSTED AND PROPENSITY SCORE MATCHED ANALYSIS OF OPEN VERSUS ROBOTIC PROCEDURES
Niccolo Napoli, MD1, Francesca Menonna, MD1, Emanuele F Kauffmann, MD1, Sara Iacopi, MD1, Francesco Arces, MD1, Erica Pieroni, MD1, Carlo Lombardo, MD1, Francesca Costa, MD1, Niccola Funel, PhD2, Pollina Luca, MD2, Daniela Campani, MD2, Fabio Vistoli, MD1, Ugo Boggi, MD, FEBS1; 1Division of General and Transplant Surgery, University of Pisa, 2Division of Pathology, University of Pisa

Introduction/Background: Resection and reconstruction of the superior mesenteric/portal vein during pancreatectomy (VR-P) has become an accepted procedure in patients with pancreatic tumors, otherwise amenable to radical resection. Recent evidence shows that VR-P is feasible during robotic operations (Langenbecks Arch Surg, 2016), but no comparison is available with the open procedure.

We herein provide unadjusted and propensity score matched analysis of open VR-P vs robotic VR-P.

Methods: Only patients undergoing upfront surgery were analyzed, since the need for a neoadjuvant treatment was considered an exclusion criteria for robotic VR-P.

Incidence of severe post-operative complications (Clavien-Dindo≥3b) and 90-day mortality were considered the main outcome measures. Propensity score (PS) was calculated to balance possible confounders (age, sex, BMI and ASA score) between the two groups and was used to perform a nearest-neighbor 1-to-1 match.

Survival analysis was also carried out in the subgroup of patients with pancreatic cancer.

Data were prospectively entered into a database and retrospectively analyzed.

Results: Between May 2011 and May 2016, 100 patients underwent VR-P at our institution including 85 open and 15 robotic procedures (table 1).

A summary of operative and post-operative results is provided in table 2 and 3. Severe post-operative complications occurred in 4 (26.7%) and 12 (14.1%) patients (p=0.25) after robotic and open VR-P, respectively. The unadjusted point estimate of the effect size was 2.21 (0.60-8.09). Equivalent figures for 90-day mortality were 2 (13.3%) and 7 (8.2%) (p=0.48). The unadjusted odds ratio was 1.71 (0.32-9.18).

Median survival (IQR) in patients with pancreatic cancer was 31 months (31-NA) after robotic VR-P and 31 months (15-47.3) after open VR-P. According to PS, 10 open VR-P were matched to 10 robotic VR-P (table 4). In either groups the incidence of severe complications and the 90-day mortality were 30% and 10%, respectively (table 5 and 6). After matching, a reduction of the effect size for both severe post-operative complications, from 2.21 (0.60-8.09) to 1 (0.15-6.77), and for 90-day mortality, from 1.71 (0.32-9.18) to 1 (0.05-18.57), was observed.

Discussion/Conclusion: In selected patients, robotic VR-P are feasible and achieve results comparable with open VR-P in terms of both post-operative morbidity/mortality and long-term survival. These results need to be confirmed in large series. Multi-institutional studies and/or registry data would be especially useful to elucidate the value of robotic VR-P since enrollment of a large number of patients at a single center is expected to require several years.

<table>
<thead>
<tr>
<th>Table 1. Baseline characteristics of the study population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open VR-P</td>
</tr>
<tr>
<td>Number of patients (%)</td>
</tr>
<tr>
<td>Mean age, (±SD)</td>
</tr>
<tr>
<td>Gender, male (%)</td>
</tr>
<tr>
<td>Median Body Mass Index, (IQR)</td>
</tr>
<tr>
<td>Median ASA score, (IQR)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2. Operative results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedure, n (%)</td>
</tr>
<tr>
<td>--------------------------------</td>
</tr>
<tr>
<td>Paracardial resection</td>
</tr>
<tr>
<td>Total pancreatoduodenectomy</td>
</tr>
<tr>
<td>Distal pancreatoduodenectomy</td>
</tr>
<tr>
<td>Resected veins, (%)</td>
</tr>
<tr>
<td>--------------------------------</td>
</tr>
<tr>
<td>Superior mesenteric vein</td>
</tr>
<tr>
<td>Portal-portal junction</td>
</tr>
<tr>
<td>Portal vein</td>
</tr>
<tr>
<td>IGS category of vein resection, (%)</td>
</tr>
<tr>
<td>--------------------------------</td>
</tr>
<tr>
<td>Type 1</td>
</tr>
<tr>
<td>Type 2</td>
</tr>
<tr>
<td>Type 3</td>
</tr>
<tr>
<td>Type 4</td>
</tr>
<tr>
<td>Median operative time, (IQR)</td>
</tr>
</tbody>
</table>
Table 3. Post-operative results

<table>
<thead>
<tr>
<th></th>
<th>Open VR-P</th>
<th>Robotic VR-P</th>
<th>Overall</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median length of hospital stay, (Q4)</td>
<td>17 (11–24)</td>
<td>21 (15–31)</td>
<td>17.5 (13.3–24.4)</td>
<td>0.15</td>
</tr>
<tr>
<td>Post-operative complications, (%)</td>
<td>16 (18.8%)</td>
<td>6 (9%)</td>
<td>19 (16.8%)</td>
<td>0.12</td>
</tr>
<tr>
<td>Claudien—Bride I</td>
<td>25 (26.5%)</td>
<td>5 (8%)</td>
<td>13 (12.4%)</td>
<td>0.07</td>
</tr>
<tr>
<td>Claudien—Bride II</td>
<td>2 (2.2%)</td>
<td>0 (0%)</td>
<td>2 (1.8%)</td>
<td>0.35</td>
</tr>
<tr>
<td>Claudien—Bride III</td>
<td>1 (1.0%)</td>
<td>0 (0%)</td>
<td>1 (0.9%)</td>
<td>0.88</td>
</tr>
<tr>
<td>Claudien—Bride A</td>
<td>7 (7.7%)</td>
<td>2 (3%)</td>
<td>5 (4.5%)</td>
<td>0.11</td>
</tr>
<tr>
<td>Claudien—Bride B</td>
<td>2 (2.2%)</td>
<td>0 (0%)</td>
<td>2 (1.8%)</td>
<td>0.35</td>
</tr>
<tr>
<td>Claudien—Bride C</td>
<td>7 (7.7%)</td>
<td>2 (3%)</td>
<td>5 (4.5%)</td>
<td>0.11</td>
</tr>
<tr>
<td>Claudien—Bride D</td>
<td>1 (1.0%)</td>
<td>0 (0%)</td>
<td>1 (0.9%)</td>
<td>0.88</td>
</tr>
<tr>
<td>Claudien—Bride E</td>
<td>6 (6.6%)</td>
<td>2 (3%)</td>
<td>4 (3.5%)</td>
<td>0.38</td>
</tr>
<tr>
<td>Claudien—Bride F</td>
<td>12 (12.6%)</td>
<td>4 (6%)</td>
<td>16 (14.6%)</td>
<td>0.15</td>
</tr>
<tr>
<td>Post-pancreatic fistula, (%)</td>
<td>24 (25.5%)</td>
<td>6 (9%)</td>
<td>30 (27.2%)</td>
<td>0.04</td>
</tr>
<tr>
<td>Delayed gastric emptying, (%)</td>
<td>32 (34.4%)</td>
<td>10 (15%)</td>
<td>42 (37.4%)</td>
<td>0.04</td>
</tr>
<tr>
<td>Post-pancreatic hemorrhage, (%)</td>
<td>24 (25.5%)</td>
<td>6 (9%)</td>
<td>30 (27.2%)</td>
<td>0.04</td>
</tr>
<tr>
<td>Abdominal fluid collections, (%)</td>
<td>24 (25.5%)</td>
<td>6 (9%)</td>
<td>30 (27.2%)</td>
<td>0.04</td>
</tr>
<tr>
<td>Post-90-day re-intervention, (%)</td>
<td>8 (8.6%)</td>
<td>4 (6%)</td>
<td>12 (10.7%)</td>
<td>0.08</td>
</tr>
<tr>
<td>90-day readmission, (%)</td>
<td>3 (3.3%)</td>
<td>1 (1.0%)</td>
<td>4 (3.5%)</td>
<td>0.48</td>
</tr>
</tbody>
</table>

Pathology, (%)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pancreatic cancer</td>
<td>63 (74.1%)</td>
</tr>
<tr>
<td>Malignant PMN</td>
<td>20 (23.1%)</td>
</tr>
<tr>
<td>Pancreatic neuroendocrine</td>
<td>3 (3.5%)</td>
</tr>
<tr>
<td>Adenocarcinoma</td>
<td>2 (2.4%)</td>
</tr>
<tr>
<td>Metastasis</td>
<td>1 (1.2%)</td>
</tr>
<tr>
<td>Other pancreatic cancers</td>
<td>2 (2.4%)</td>
</tr>
<tr>
<td>Positive resection margins (RII), (%)</td>
<td></td>
</tr>
</tbody>
</table>

Lymph nodes

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of examined lymph nodes, (median)</td>
<td>57 (62.5)</td>
</tr>
<tr>
<td>Median positive lymph nodes, (Q4)</td>
<td>31 (31.6)</td>
</tr>
<tr>
<td>Median number of lymph nodes, (Q4)</td>
<td>3 (3.6)</td>
</tr>
<tr>
<td>Median lymph node ratio, (Q4)</td>
<td>0.65 (0.63–0.64)</td>
</tr>
<tr>
<td>Peritoneal invasion, (%)</td>
<td>25 (29.5%)</td>
</tr>
<tr>
<td>Positive vascular infiltration, (%)</td>
<td>25 (29.5%)</td>
</tr>
<tr>
<td>Total resection margins</td>
<td>24 (27.2%)</td>
</tr>
<tr>
<td>Total resection margins, (Q4)</td>
<td>24 (27.2%)</td>
</tr>
<tr>
<td>Total resection margins, (Q4)</td>
<td>24 (27.2%)</td>
</tr>
</tbody>
</table>

Table 4. Baseline characteristics of matched subgroups selected by propensity score analysis

<table>
<thead>
<tr>
<th></th>
<th>Open VR-P</th>
<th>Robotic VR-P</th>
<th>Overall</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of patients (%)</td>
<td>10 (50%)</td>
<td>10 (50%)</td>
<td>20</td>
<td>-</td>
</tr>
<tr>
<td>Mean age, (SD)</td>
<td>66.3±2.3</td>
<td>66.7±3.7</td>
<td>66.5±2.2</td>
<td>0.91</td>
</tr>
<tr>
<td>Gender, males (%)</td>
<td>7 (37%)</td>
<td>5 (50%)</td>
<td>6 (60%)</td>
<td>0.65</td>
</tr>
<tr>
<td>Median Body Mass index, (Q4)</td>
<td>21.1 (18.3–23.8)</td>
<td>21.7 (19.5–26.7)</td>
<td>21.2 (19.7–26.4)</td>
<td>0.97</td>
</tr>
<tr>
<td>Median ASA score, (Q4)</td>
<td>2 (2–2)</td>
<td>2 (2–2)</td>
<td>2 (2–2)</td>
<td>0.41</td>
</tr>
</tbody>
</table>

Table 5. Operative results of matched subgroups selected by propensity score analysis

<table>
<thead>
<tr>
<th></th>
<th>Open VR-P</th>
<th>Robotic VR-P</th>
<th>Overall</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedure, n (%)</td>
<td>6 (60%)</td>
<td>6 (60%)</td>
<td>12 (60%)</td>
<td>1.00</td>
</tr>
<tr>
<td>Pancreato-duodenectomy</td>
<td>4 (40%)</td>
<td>4 (40%)</td>
<td>8 (40%)</td>
<td>1.00</td>
</tr>
<tr>
<td>Distal pancreatectomy</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>-</td>
</tr>
<tr>
<td>Resected veins, (%)</td>
<td>3 (30%)</td>
<td>2 (20%)</td>
<td>5 (25%)</td>
<td>1.00</td>
</tr>
<tr>
<td>Superior mesenteric vein</td>
<td>6 (60%)</td>
<td>7 (70%)</td>
<td>13 (65%)</td>
<td>1.00</td>
</tr>
<tr>
<td>Portal mesenteric junction</td>
<td>1 (10%)</td>
<td>1 (10%)</td>
<td>2 (10%)</td>
<td>1.00</td>
</tr>
<tr>
<td>Category of vein resection, (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type 1</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>-</td>
</tr>
<tr>
<td>Type 2</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>-</td>
</tr>
<tr>
<td>Type 3</td>
<td>7 (70%)</td>
<td>5 (50%)</td>
<td>12 (60%)</td>
<td>0.65</td>
</tr>
<tr>
<td>Type 4</td>
<td>3 (30%)</td>
<td>5 (50%)</td>
<td>8 (40%)</td>
<td>0.65</td>
</tr>
<tr>
<td>Median Operative time, (Q4)</td>
<td>463 (436.8–545)</td>
<td>387 (437.3–888.5)</td>
<td>520 (453.3–617.5)</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>Open VR-P</td>
<td>Robotic VR-P</td>
<td>Overall</td>
<td>p</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-----------</td>
<td>--------------</td>
<td>---------</td>
<td>-------</td>
</tr>
<tr>
<td><strong>Post-operative complications, (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clauden-Birdge I</td>
<td>3 (30%)</td>
<td>0 (0%)</td>
<td>3 (15%)</td>
<td>0.21</td>
</tr>
<tr>
<td>Clauden-Birdge II</td>
<td>1 (10%)</td>
<td>6 (60%)</td>
<td>7 (13%)</td>
<td>0.60</td>
</tr>
<tr>
<td>Clauden-Birdge III</td>
<td>1 (10%)</td>
<td>0 (0%)</td>
<td>1 (5%)</td>
<td>1.00</td>
</tr>
<tr>
<td>Clauden-Birdge IV</td>
<td>1 (10%)</td>
<td>2 (20%)</td>
<td>3 (15%)</td>
<td>1.00</td>
</tr>
<tr>
<td>Clauden-Birdge V</td>
<td>1 (10%)</td>
<td>0 (0%)</td>
<td>1 (5%)</td>
<td>1.00</td>
</tr>
<tr>
<td>Clauden-Birdge VI</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td></td>
</tr>
<tr>
<td>Clauden-Birdge VII</td>
<td>1 (10%)</td>
<td>1 (10%)</td>
<td>2 (10%)</td>
<td>1.00</td>
</tr>
<tr>
<td><strong>Post-operative pancreatic fistula, (%)</strong></td>
<td>1 (10%)</td>
<td>1 (10%)</td>
<td>2 (10%)</td>
<td>1.00</td>
</tr>
<tr>
<td><strong>Delayed gastric emptying, (%)</strong></td>
<td>4 (40%)</td>
<td>7 (70%)</td>
<td>11 (55%)</td>
<td>0.37</td>
</tr>
<tr>
<td><strong>Post-pneumonectomy hemorrhage, (%)</strong></td>
<td>3 (30%)</td>
<td>5 (50%)</td>
<td>8 (40%)</td>
<td>0.65</td>
</tr>
<tr>
<td><strong>Abdominal fluid collections, (%)</strong></td>
<td>5 (50%)</td>
<td>6 (60%)</td>
<td>11 (100%)</td>
<td>1.00</td>
</tr>
<tr>
<td><strong>90-day reintervention, (%)</strong></td>
<td>3 (30%)</td>
<td>3 (30%)</td>
<td>6 (30%)</td>
<td>1.00</td>
</tr>
<tr>
<td><strong>90-day readmission, (%)</strong></td>
<td>0 (0%)</td>
<td>1 (10%)</td>
<td>1 (5%)</td>
<td>1.00</td>
</tr>
<tr>
<td><strong>Pathology, (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pancreatic cancer</td>
<td>6 (60%)</td>
<td>5 (50%)</td>
<td>11 (55%)</td>
<td>1.00</td>
</tr>
<tr>
<td>Malignant PMN</td>
<td>1 (10%)</td>
<td>3 (30%)</td>
<td>4 (20%)</td>
<td>0.56</td>
</tr>
<tr>
<td>Adenocarcinoma, carcinoma</td>
<td>0 (0%)</td>
<td>2 (20%)</td>
<td>2 (10%)</td>
<td>0.47</td>
</tr>
<tr>
<td>Metastasis</td>
<td>1 (10%)</td>
<td>0 (0%)</td>
<td>1 (5%)</td>
<td>1.00</td>
</tr>
<tr>
<td>Other pancreatic tumors</td>
<td>2 (20%)</td>
<td>0 (0%)</td>
<td>2 (10%)</td>
<td>0.47</td>
</tr>
<tr>
<td>Positive resection margins</td>
<td>3 (30%)</td>
<td>3 (30%)</td>
<td>6 (30%)</td>
<td>1.00</td>
</tr>
<tr>
<td><strong>Lymph nodes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean number of examined lymph nodes, (±SD)</td>
<td>5±1±2</td>
<td>60±2±40</td>
<td>55±9±9</td>
<td>0.13</td>
</tr>
<tr>
<td>Median number of positive lymph nodes, (IQR)</td>
<td>2.5 (0.4-3)</td>
<td>3.5 (0.6-11.3)</td>
<td>3.3 (0.6-8)</td>
<td>0.35</td>
</tr>
<tr>
<td>Median lymph node ratio, (IQR)</td>
<td>0.05 (0.01)</td>
<td>0.06 (0.01)</td>
<td>0.06 (0.01)</td>
<td>0.35</td>
</tr>
<tr>
<td>Perineural invasion, (%)</td>
<td>8 (80%)</td>
<td>9 (90%)</td>
<td>17 (85%)</td>
<td>1.00</td>
</tr>
<tr>
<td>Positive vascular infiltration, (%)</td>
<td>6 (60%)</td>
<td>6 (60%)</td>
<td>12 (60%)</td>
<td>1.00</td>
</tr>
<tr>
<td>To tumors adventitia</td>
<td>0 (0%)</td>
<td>2 (20%)</td>
<td>2 (10%)</td>
<td>0.47</td>
</tr>
<tr>
<td>To tumors media</td>
<td>2 (20%)</td>
<td>1 (10%)</td>
<td>3 (15%)</td>
<td>1.00</td>
</tr>
<tr>
<td>To tumors veins</td>
<td>4 (40%)</td>
<td>1 (10%)</td>
<td>7 (15%)</td>
<td>1.00</td>
</tr>
</tbody>
</table>

* Limited to pancreasbodyectomy malignant PNN+ malignant extrabiliary pancreato-rumor-wesem.
Background: Incomplete evaluation of venous invasion has led to conflicting results regarding the prognosis of patients undergoing pancreatectomy with synchronous venous resection (VR). This study evaluates the prognostic value associated with the presence and the depth of venous invasion in T3 pancreatic adenocarcinoma (PAD).

Methods: This study retrospectively evaluated 181 consecutive pancreaticoduodenectomies (PDs) performed for T3N0M0 and T3N1M0 PADs (stage IIA and IIB) from January 2006 to December 2014. Univariate and multivariate Cox analysis were performed to assess survival prognostic factors.

Results: PD with a segmental VR was performed on 91 patients, while 90 had a standard PD. Pathological venous invasion was detected in 68 (74.43%) of the 91 VR patients. Depth of venous invasion was up to the adventitia (n=25), media (n=28) and intima (n=15). The overall survival rates at 1, 3, 5 and 10 years were 74.5%, 32.5%, 20.7%, and 6.2%, respectively. There were no differences in survival between patients undergoing standard PD and PD with VR (26.85 vs. 21.93 months; p= 0.28) nor between patients with and without venous invasion (19.75 vs. 26.52 months; p= 0.08). In multivariate analysis, depth of venous invasion up to the intima (HR: 2.25; 95% CI: 1.16–4.34; p =0.0001) and adjuvant chemotherapy (HR: 0.16; 95% CI:0.09–0.43; p =<0.0001) were identified as independent prognostic factors of overall survival.

Conclusions: Depth of venous invasion up to the intima indicates poor survival in pancreatic T3 adenocarcinoma. Preoperative identification of this factor could be helpful for better selection of patients for surgery.
P190 PROGRESSIVE DECLINE IN PERIOPERATIVE BLOOD TRANSFUSIONS FOR VASCULAR RESECTION DURING PANCREATICODUODENECTOMY FOR Pancreatic Adenocarcinoma: Identification of Clinical Targets for Optimization

Rebecca A Snyder, MD, MPH, Laura R Prakash, MD, Graciela M Nogueras-Gonzalez, MPH, Nisha Narula, MD, Bradford J Kim, MD, Michael P Kim, MD, Thomas A Aloia, MD, Jean-Nicolas Vauthey, MD, Jeffrey E Lee, MD, Jason B Fleming, MD, Matthew H Katz, MD, Ching-Wei D Tzeng, MD; University of Texas MD Anderson Cancer Center

Background: Perioperative blood transfusion during resection of pancreatic adenocarcinoma (PDAC) has been linked to both worse short-term and oncologic outcomes. Vascular resection during pancreaticoduodenectomy (PD) is presumed to be associated with higher transfusion rates. The primary aims of this study were to evaluate trends in transfusion rates and predictors of transfusion during PD with vascular resection in a modern cohort.

Methods: Consecutive patients with PDAC who underwent PD with concomitant vascular resection from 2008-2015 at a single institution were identified from a prospectively maintained database. Trends in rates were compared over equal time periods. Predictors of perioperative transfusion (defined as intraoperative or within 72 hours) were analyzed to identify factors that could be further optimized.

Results: Of 142 total patients, 131 (92%) were treated with neoadjuvant therapy (NT) prior to PD. The type of vein resection varied, with 38 (27%) undergoing primary repair, 25 (18%) patch venoplasty, 40 (29%) end-to-end primary anastomosis, and 36 (26%) interposition graft. Interposition grafts included internal jugular vein (26) or bovine pericardium (10). Combined arterial and venous resection was performed in 22 (15%) patients. Nearly half of all patients (70, 49%) received a perioperative transfusion, although transfusion rates decreased significantly in the recent cohort [22/35 (63%) in 2008-09, vs. 7/24 (29%) in 2014-15, p=0.029]. Median estimated blood loss (EBL) was 500ml in non-transfused patients vs. 1000ml in transfused patients (p<0.001). Postoperative bleeding-related major complications were uncommon (12/142, 9%). While interposition graft was associated with transfusion on univariate analysis, it was not associated with transfusion in the multivariate model (p=0.114). Significant independent predictors of transfusion included age (odds ratio, OR-1.08 per year, p=0.004), preoperative hemoglobin <12.3g/dL (OR-3.84, p=0.006), EBL (OR-1.33 per 100ml, p<0.001), and extent of resection utilizing splenic vein ligation (OR-3.79, p=0.047).

Conclusions: Despite increased complexity, transfusion rates associated with PD with vascular resection have decreased dramatically in recent years. For patients with PDAC, addressing preoperative anemia during neoadjuvant therapy and optimizing operative technique, specifically limiting EBL, may further reduce blood utilization when vascular resection is necessary during PD.
P191 ARE POST-OPERATIVE DRAINS ASSOCIATED WITH RISK OF PANCREATIC FISTULA? ANALYSIS OF OVER 5,000 PANCREATECTOMY PATIENTS Rym Elkhoury1, C Kabir2, M Banulescu1, P Wasserman1, V K Maker1, A V Maker1; 1University of Illinois at Chicago, UIC-Metropolitan Group Hospitals Residency Program in Surgery, 2Creticos Cancer Center at Advocate Illinois Masonic Medical Center

BACKGROUND: Conflicting evidence exists from randomized controlled trials supporting both increased complications/fistulae and improved outcomes with drain placement after pancreatectomy. The objective was to determine drain practice patterns in the U.S.A., and to identify if drain placement was a risk for fistula formation.

METHODS: Demographic, perioperative, and outcomes data were captured from the NSQIP 2014 database, including components of the fistula risk score. Fistulas were classified based on International Study Group definition. P<0.05 was used for statistical significance in univariate analysis and entry criteria to adjusted logistic regression models.

RESULTS: Of 5013 pancreatectomy patients, 4343 (87%) underwent drain placement. When controlled for other factors, drain placement was associated with ducts <3mm, soft glands, and blood transfusion within 72h of surgery. Age, obesity, neoadjuvant radiation, INR, and malignant histology lost significance in the adjusted model. Drained patients experienced higher readmission rates (17 vs. 14%,p<0.05); and experienced increased (20 vs. 8%,p<0.01) and type A/B/C fistulae. Fistula was associated with obesity, no neoadjuvant chemotherapy, drain placement, <3mm duct, soft gland, and longer operative times. Drain placement remained independently associated with fistula after both distal pancreatectomy (OR=2.84[1.70-4.75],p<0.01) and pancreaticoduodenectomy (OR=2.29[1.28-4.11], p<0.01).

CONCLUSIONS: Drains are placed in the vast majority (87%) of pancreatectomy patients from >100 institutions; particularly those with soft glands, small ducts, and associated blood transfusions. When these factors are controlled for, drain placement is independently associated with clinically relevant fistulae in both distal and proximal pancreatectomy, raising questions regarding the utility of drain placement.
Introduction: Pancreatic cancer is the fourth most common cause of cancer deaths, with a peak incidence in 70 to 79 years. Surgical resection offers highest survival benefits, but advancing age reduces the chances of surgery, mainly related to medical co-morbidities. <7% of patients over 80 years undergo surgery. This is the first population based study analyzing morbidity and mortality outcomes following the Whipple procedure (WP) in patients > 80 years of age.

Methods: National Inpatient Database (NIS 1998-2010) was used to identify patient with the WP (ICD-9 code 52.6 and 52.7). Discharge weights were applied to get National estimates. Elderly patients (>80 years) were compared against patients <79 years for demographic and clinical differences, using standard statistical methodology.

Results: 95,011 patients with the WP were identified and elderly patients contributed to 7.7% (N=7,332). The mean age was 82.8±2.5 years. Compared to younger patients, patients > 80 years were noted to have following significant differences. The Male: Female ratio of 1: 1.1. Highest number of Caucasians and lower number of other races underwent surgery. Majority (90.3%) had a Charlson's score of ≥6. Higher number (36.2%) was discharged to a nursing home, with an overall in-hospital mortality of 11.5%. The mean length of stay was 18.1±13.7 days. Medical complications (respiratory, cardiac, stroke and sepsis) were higher. Surgical complications like wound dehiscence (0.8%), DVT (0.7%), and post-op ileus (11.8%) was higher and incidence of pancreatic fistula was lower (1.3%). There was no difference in the post-operative bleeding, wound infection, intra-abdominal abscess, and gastroparesis when compared to patients <79 years. On multivariate analysis in patients age >80, males, African Americans, Hispanics, Charlson’s score > 6, respiratory complications, sepsis, post-operative hemorrhage and DVT were associated with higher mortality.

Conclusions: Elderly patients (>80years) accounts for very few (7.7%) Whipple procedures performed in the US. Majority of them have multiple medical comorbidities. The incidence of post-operative medical complications is higher. There is no increased incidence of post-operative complications pertaining to Whipple procedure. The high mortality rate in the elderly patients is mainly related to modifiable post-operative complications and medical co-morbidities. Appropriate risk stratification will improve outcomes following Whipple procedure in this patient population.
Introduction: There is a wide variability in the use of suture material for pancreatic anastomosis after pancreaticoduodenectomy (PD). A recent retrospective analysis showed that the use of polyester (PE) sutures might decrease the incidence of clinically relevant postoperative pancreatic fistula (CR-POPF). This study evaluates the role of suture material on CR-POPF after pancreaticojejunostomy (PJ) in a risk-adjusted setting.

Methods: A retrospective study comparing PE with polydioxanone (PDO) was performed in 520 PDs. Using propensity score matching, patients were matched for risk for CR-POPF as assessed using the fistula risk score (FRS).

Results: Both the matched PE and PDO groups consisted of 232 patients. The incidence of CR-POPF was lower in the PE group (11.6 vs. 22%, p < 0.01), with a lower rate of grade B (10.3 vs. 15.5%, p < 0.01) and C (1.3 vs. 6.5%, p < 0.01) POPF. After stratifying by fistula risk zone, PE suture remained associated with a reduced incidence of CR-POPF (9.4 vs. 15.6% in the low-, p=0.04; 15.6 vs. 28.1% in the intermediate-, p = 0.02; and 16.7 vs. 83.3% in the high-risk zone, p<0.01, respectively). Multivariate analysis demonstrated that pancreatic texture, preoperative diagnosis, FRS and the use of PE sutures were independent predictors of CR-POPF.

Conclusions: In the setting of a case-control matched for risk analysis, the use of PE suture for PJ is associated with a significant reduction of CR-POPF.
P194 PATTERN OF VENOUS COLLATERAL DEVELOPMENT AFTER SPLENIC VEIN OCCLUSION IN AN EXTENDED WHIPPLE PROCEDURE (WHIPPLE AT THE SPLENIC ARTERY) AND LONG TERM RESULTS Ismael Domiguez Rosado, MD1, Sanjeev Bhalla2, Luis Sanchez, MD3, William G Hawkins, MD1, Ryan C Fields, MD1, Steven M Strasberg1; 1Section of HPB Surgery, Washington University in St Louis, 2Mallincrodt Institute of Radiology, Washington University in St Louis, 3Section of Vascular Surgery, Washington University in St Louis

**Background:** Extended Whipple procedures may require division of the splenic vein (SV). Controversy exists regarding risk of sequelae of sinistral portal hypertension when the SV is ligated without re-implantation. The aim of this study was to identify postoperative venous collateral patterns and sequelae of SV ligation, as well as long term results in an extended Whipple procedure.

**Study Design:** Patients who had an extended Whipple procedure (Whipple at the Splenic Artery or WATSA) were entered in an institutional database. Evaluation of the venous collaterals was performed at least 5 months postoperatively by contrast-enhanced Multidetector Computed Tomography. Spleen size and platelet counts were measured before and between 5-69 months after operation.

**Results:** 15 patients were entered from 2009-2004. SV was not re-constructed and the IMV-SV junction was always resected. Two collateral routes developed. An inferior route was present 14/15 patients. Collaterals originating in the SV passed anteriorly in the spleno-colic omentum. From there the veins connected to marginal veins of the right colon and from there to the SMV via the ileocolic or right colic veins. The pathway through the marginal veins of the transverse colon was usually, but not always more prominent than that through the omentum. Interconnections between omental and marginal veins of the colon were common. A superior route, present in 10/15 patients connected the residual SV to the portal vein via gastric, perigastric and coronary veins. The inferior route was the only or the dominant route in 10 patients, of equal size to the superior route in 4 patients, and absent in one patient with SMV thrombosis. Gastrointestinal bleeding did not occur. Mean platelet count and spleen size were not affected significantly. Procedures were long, but few severe complications developed. In 12 patients with adenocarcinoma the median survival has not been reached and the 5 year overall survival is 58% in this highly selected group of patients.

**Conclusions:** Patients who have SV ligation in an extended Whipple are protected against sequelae of sinistral portal hypertension mainly by inferior collateral routes. The omentum and marginal veins of the colon are key links in this pathway. Therefore the lesser sac should be opened below the gastroepiploic arcade rather than by detaching the omentum from the colon or by resecting the greater omentum.
The aim of this study was to assess the feasibility of prophylactic pancreatojejunostomy (PJ) following enucleation or limited pancreatic resection regarding the risk of postoperative pancreatic fistula (POPF). We retrospectively reviewed the medical records of 32 patients who underwent enucleation or limited pancreatic resection and compared the clinical parameters between patients with (n=10) and without (n=22) prophylactic PJ. Prophylactic PJ was performed in patients with a possible high risk of POPF who had a ≤3-mm distance between the tumor (or parenchyma defect) and main pancreatic duct as determined by intraoperative ultrasonography; however, the final decision for implementation of pancreatojejunostomy was made based on the preference of the attending surgeon. No operation-related mortality occurred. Operation time was significantly longer (p<0.01) and blood loss significantly greater (p<0.01) in patients with PJ. Overall complications were more frequent (p=0.02) and postoperative hospital stay was significantly longer (p=0.02) in patients with PJ. However, other assessed factors including the prevalence of POPF did not differ between groups. In conclusion, prophylactic PJ is feasible, and its efficacy in preventing POPF after enucleation or limited pancreatic resection in high-risk patients will require further study.
P197 NATIONAL VARIABILITY IN BLOOD TRANSFUSIONS AFTER PANCREATICODUODENECTOMY Vikrom K Dhar, Koffi Wima, MS, Jeffrey M Sutton, MD, Andrew Jung, MD, Young Kim, MD, Richard S Hoehn, MD, Syed A Ahmad, MD, Shimul A Shah; University of Cincinnati

Objective: To characterize the variability in perioperative blood use for patients undergoing pancreaticoduodenectomy (PD) and determine impact on readmission, mortality, and cost at the national level.

Methods: The University HealthSystems Consortium (UHC) database was queried for all PDs performed between 2011-2013 (n=9,739). Patients were grouped according to transfusion requirements into none (0 units, n=6147; 63%), low (1 unit, n=716; 7%), medium (2-5 units, n=1947; 20%), and high (>6 units, n=929; 10%) during hospital stay. Logistic regression models were used to determine predictors of increased transfusions, readmission, and cost.

Results: 37% of patients who undergo PD at academic medical centers receive blood perioperatively. Patients undergoing PD with high transfusion requirements were of similar age, race, and gender, however had a significantly higher severity of illness (SOI) (60.4% extreme vs. 20.3% vs. 12.6% vs. 5.7%; p < 0.01). Having a high transfusion requirement correlated with higher readmission rates (OR 1.19, p=0.04), higher cost (RR 1.92, p < 0.01), increased length of stay (19 vs. 12 vs. 10 vs. 8 days; p < 0.01), and in-hospital mortality (15% vs. 2% vs. 0.4% vs. 0.4%; p < 0.01). A negative correlation was identified between surgeon volume and transfusion requirements, with higher volume surgeons demonstrating lower transfusion requirements (OR 0.61, p < 0.01).

Conclusion: This is the first report to show that significant variability exists nationally in transfusion practices for patients undergoing PD, which directly influences patient outcomes and resource utilization. Efforts to reduce such variability could lead to improved outcomes and healthcare cost savings.

<table>
<thead>
<tr>
<th>Transfusion Group (Ref = None)</th>
<th>Readmission OR</th>
<th>p-value</th>
<th>Readmission RR</th>
<th>p-value</th>
<th>Cost OR</th>
<th>p-value</th>
<th>Cost RR</th>
<th>p-value</th>
<th>High Transfusion Use OR</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>0.95</td>
<td>0.62</td>
<td>1.11</td>
<td>&lt;0.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>1.19</td>
<td>0.04</td>
<td>1.92</td>
<td>&lt;0.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>1.23</td>
<td>0.02</td>
<td>2.07</td>
<td>&lt;0.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DRG (Ref = No CC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CC</td>
<td>1.26</td>
<td>0.03</td>
<td>1.14</td>
<td>0.01</td>
<td>4.59</td>
<td>&lt;0.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Major CC</td>
<td>1.66</td>
<td>&lt;0.01</td>
<td>1.27</td>
<td>&lt;0.01</td>
<td>5.59</td>
<td>&lt;0.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOI (Ref = Minor)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>1.19</td>
<td>&lt;0.01</td>
<td>2.65</td>
<td>0.32</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Major</td>
<td>1.36</td>
<td>&lt;0.01</td>
<td>5.31</td>
<td>0.07</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extreme</td>
<td>2.49</td>
<td>&lt;0.01</td>
<td>51.8</td>
<td>&lt;0.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Center Volume (Ref = Low)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>0.85</td>
<td>&lt;0.01</td>
<td>0.69</td>
<td>&lt;0.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>0.94</td>
<td>0.01</td>
<td>0.61</td>
<td>&lt;0.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surgeon Volume (Ref = Low)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>0.95</td>
<td>&lt;0.01</td>
<td>0.61</td>
<td>&lt;0.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>0.94</td>
<td>0.01</td>
<td>0.61</td>
<td>&lt;0.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CC = comorbidities/complications, SOI = severity of illness
Background: Despite recent advances in surgical techniques, the incidence of postoperative pancreatic fistula (POPF) after distal pancreatectomy (DP) remains high. The aim of this study was to clarify the efficacy of our modified DuVal (mDuVal) pancreatojejunostomy during DP in patients with high risk of POPF.

Methods: Medical records of 284 consecutive patients who underwent DP between 2006 and 2014 at Kyushu University Hospital, were retrospectively reviewed. mDuVal procedure consists of end to side pancreatojejunostomy and jejunoojejunostomy with Roux-en-Y fashion. Indication for mDuVal procedure was determined according to the following findings; Hard or thick pancreas which could not be closed using linear stapler, high risk patients for POPF who have malnutrition or underwent hemodialysis, and the patients who had pancreatic divisum or stenosis of the main pancreatic duct at the proximal side of the pancreatic stump. Detailed operative factors and postoperative outcome were compared between mDuVal and standard DP groups.

Results: mDuVal procedure and standard DP were performed in 17 and 267 patients, respectively. There were no significant differences in operative time and blood loss between 2 groups. The start of diet after operation was significantly earlier in mDuVal group than standard DP group (Median 6 days vs. 7 days, P=0.01), while there were no significant differences between 2 groups in the prevalence of POPF (12% vs. 13%), overall complication (18% vs. 18%), and postoperative hospital stay (Median 15 days vs. 18 days).

Conclusion: mDuVal procedure might be useful during DP for the patients with high risk of POPF.
Comparative Effectiveness of Resection versus Surveillance for Pancreatic Branch Duct Intraductal Papillary Mucinous Neoplasms with Worrisome Features

Yinin Hu, MD, Lily Johnston, MD, Vanessa M Shami, MD, George J Stukenborg, PhD, Todd W Bauer, MD, Reid B Adams, MD, Victor M Zaydfudim, MD; University of Virginia

Objectives: Pancreatic intraductal papillary mucinous neoplasms (IPMN) carry a risk for malignant transformation that varies based on morphology. The 2012 consensus guidelines defined a subcategory of branch duct (BD) IPMNs with "worrisome features" which may be followed with close surveillance in lieu of resection. The objective of this study was to compare the utility of resection versus surveillance for BD-IPMN's with worrisome features. We hypothesized that, due to a low rate of malignant transformation, surveillance of these controversial lesions would offer superior long-term utility.

Methods: A Markov decision-analysis model was constructed to represent a 65 year-old patient with a BD-IPMN with worrisome features. Two management strategies were modeled: early resection and long-term surveillance. Within the surveillance strategy, resection is pursued upon progression to high-risk BD-IPMN or cancer. Utility estimates, transition rates between disease states, and surgical morbidity rates were estimated from literature review. Utilities were measured in quality-adjusted life years (QALY) and discounted at an annual rate of 3%. Probabilistic and one-way sensitivity analyses were performed to illustrate confidence level and to identify the key variables that drive the model outcomes.

Results: For appropriate surgical candidates, early resection for BD-IPMN with worrisome features yields 11.54 QALY over the first 20 years, compared to 11.37 QALY for surveillance. Probabilistic sensitivity analysis indicates that resection has a 94% likelihood of being more effective than surveillance (Figure 1). However, because the absolute difference in utility is not large, early resection is only justified if all of the following criteria are met: life expectancy ≥ 18 years, surgical mortality < 4.3%, and baseline preoperative utility ≥ 0.78. Additional drivers of the model outcomes include the rate of progression from worrisome to high-risk features and the likelihood of finding cancer upon resection for high-risk BD-IPMN.

Conclusion: Contrary to our hypothesis, early resection compares favorably to surveillance in the management of branch duct IPMN. Because the difference in utility is small, careful consideration of patient factors, surgeon outcomes, and cost structures is imperative.

Figure 1: Distributions of expected utility for resection versus surveillance
Introduction: To investigate the impact of postoperative complications on survival after curative resection for pancreatic cancer.

Methods: We reviewed retrospectively the medical records of 122 patients who underwent curative R0 resection for pancreatic cancer. Major complications included pancreatic fistula and hemorrhage of grade B or C according to the International Study Group of Pancreatic Fistula or Surgery criteria, and other complications of grade ≥III according to the Clavien-Dindo classification.

Results: Thirty-eight patients (31%) suffered major postoperative complications and 40 patients (33%) suffered minor complications only. Univariate survival analysis showed that patients with major complications had a significantly worse prognosis than those without major complications, with regard to recurrence-free survival (RFS) (P <0.01) and overall survival (OS) (P <0.01), whereas minor complications did not affect survival. Major complications significantly inhibited or delayed adjuvant chemotherapy. Multivariate survival analysis showed that the absence of postoperative major complications was an independent favorable factor for RFS (hazard ratio: 0.48; 95% confidence interval: 0.28–0.85) and OS (hazard ratio: 0.47; 95% confidence interval: 0.27–0.81).

Conclusions: Postoperative major complications after pancreatectomy for pancreatic cancer affect the prognosis.
**P201 CAN HEMOSTASIS PRODUCTS PREVENT POSTOPERATIVE PANCREATIC FISTULAS AFTER DISTAL PANCREATECTOMY? RESULTS OF A RANDOMIZED, CONTROLLED ANIMAL TRIAL**

**Christian M Kühlbrey, Steivan Kasper, Ulrich T Hopt, Stefan Fichtner-Feigl, Uwe A Wittel; Department of General- and Visceral Surgery of the University of Freiburg**

**Introduction:** Despite intense surgical research, postoperative pancreatic fistula (POPF) after distal pancreatectomy remains a pestering challenge for pancreatic surgeons. As many hemostasis products have been applied for sealing the pancreatic stump without showing significant clinical benefit, our aim was to analyze if these existing products are worthwhile for further clinical studies.

**Methods:** In vitro hemostasis products were exposed to enterokinase activated pancreatic juice for up to 7 days and physical stability was determined at different times. In vivo laparoscopic assisted distal pancreatectomy was conducted in nine pigs. Closure of the stump was either obtained by Sealant A (S_A, based on glutaraldehyde), Sealant B (S_B, based on two polyethylenglycols) or no closure at all (control). On postoperative day 5 animals were sacrificed. The stability of pancreatic stump closure was evaluated by burst pressure experiments. Histology and immunohistochemistry were performed to support the clinical findings.

**Results:** All hemostasis products based on collagen or fibrin completely lost their integrity in activated pancreatic juice in less than 6 hours. In vitro two sealants showed acceptable stability in activated pancreatic juice on day 7 (S_A: 578 mmHg ±90; S_B: 126 mmHg ±15). After laparoscopic distal pancreatectomy in pigs, no difference in drain amylase levels or drain output volume was observed in sealant treated animals compared to control animals without stump closure. Macroscopically after 5 days S_A did not adhere to the pancreatic remnant in all pigs with a visible and open pancreatic duct. In contrast, complete closure of the pancreatic stump was observed in all animals treated with S_B and control animals. Pressure applied to the pancreatic duct confirmed the lack of adherence of S_A and animals treated with S_A showed significant lower burst pressures than S_B and control animals (S_A 81 ±24 mmHg, S_B 242 ±12 mmHg, control 218 ±7 mmHg p<0.05). Histological findings in the area of the pancreatic stump showed impaired wound healing and reduced collagen expression in animals treated with S_A. Animals treated with S_A further showed increased serum amylase levels on day 1 suggesting local pancreatic inflammation at pancreatic surface (control vs. S_A 108% ± 3 vs. 178% ± 37) as well as increased inflammatory reaction (control vs. S_A 207%±4 vs. 409%±6; p<0.05).

**Conclusion:** Hemostasis products on basis of fibrin or collagen are not suitable to prevent POPF after pancreas resection. Polyethylenglycol based sealants may have the capability to support healing of the pancreatic stump after distal pancreatectomy.
Introduction: The objective of this study is to assess the accuracy of the ACS NSQIP calculator for estimating risk of complications after distal pancreatectomy for benign and malignant disease.

Methods: Data regarding postoperative complications after pancreatectomy were collected from a prospectively maintained pancreas surgery consortium database at three academic medical centers. The ability of the NSQIP calculator to estimate risk of postoperative complications was assessed using the c-statistic (0.7 or above for reasonable models).

Results: 254 adult patients who underwent distal pancreatectomy with or without splenectomy were included. Numbers and rates of complications were as follows: pneumonia 14, 5.6% (median predicted risk, c-statistic: 2.6%, 0.652); cardiac complications 14, 5.6% (0.70%, 0.543); surgical site infections 11, 4.4% (11.2%, 0.613); urinary tract infection 13, 5.2% (3.8%, 0.630); venous thromboembolism 11, 4.4% (0.450.3%); renal failure 14, 5.6% (0.6%, 0.590); readmission 58, 23.1% (0.602, 15.1%); return to the OR 12, 4.8% (2.7%, 0.558); death 1, 0.04% (0.5%, 0.555). Median length of stay was 5.0 (Range: 0-40) and predicted median length of stay was 7.0 (Range: 5–11).

Conclusions: The ACS NSQIP Risk Calculator estimates the risk of pneumonia (c-statistic 0.652) reasonably well for patients undergoing distal pancreatectomy but generally underestimates risk of other postoperative complications. Retrospective collection of complication data (used to model the calculator) may not accurately reflect the true volume of complications after distal pancreatectomy.
INTRODUCTION: Many types of pancreateoenteric anastomoses have been proposed to reduce the incidence of pancreatic fistula. The aim of this review was to compare the fistula rate between pancreatogastrostomy and pancreateojunostomy and to provide an overview of different anastomosis techniques on a newly designed website, www.pancreatic-anastomosis.com.

METHODS: A systematic literature search was performed up to November 2016. Included were randomized controlled trials (RCT’s) comparing anastomosis techniques for the incidence of clinically relevant pancreatic fistula (i.e. International Study Group of Pancreatic Fistula grade B/C). For a complete overview of anastomosis techniques, all studies describing technical aspects of the pancreatic anastomosis after open pancreateoduodenectomy are furthermore included.

RESULTS: A total of 263 studies, including 10 RCT’s, were included describing 66 different anastomosis techniques. In 6 RCT’s, the fistula rate was 12% after pancreatogastrostomy (n=555) versus 20% after pancreateojunostomy (n=531), risk ratio 0.59, 95% confidence interval 0.35-1.01, p = 0.05. The 4 RCT’s comparing different subtypes of pancreateojunostomy (n = 744) showed a pooled fistula rate of 8%. Similar results were found for invagination versus duct-to-mucosa pancreateojunostomy, respectively 12% vs. 10%, risk ratio 1.12, 95% confidence interval 0.21-6.01.

CONCLUSION: When comparing data of randomized studies on pancreatogastrostomy versus pancreateojunostomy and studies on subtypes of pancreateojunostomy, no clearly superior anastomosis could be identified. The choice for an anastomosis should therefore be based on the surgeons’ expertise and preference. All pancreatic anastomoses ever published are presented on www.pancreatic-anastomosis.com. This website can be used as an interactive platform, for uniformity in reporting anastomosis techniques and for educational purposes.
P204 REDUCTION IN THE RATE AND SEVERITY OF POSTOPERATIVE PANCREATIC FISTULA CAN BE ACHIEVED BY SELECTIVE USE OF PANCREATICOGASTROSTOMY  

George Kazantsev, MD, Austin Spitzer, MD, Peter Peng, Rene Ramirez, Ck Chang; Kaiser Oakland Medical Center

Introduction: Postoperative pancreatic fistula (POPF) continues to dominate the spectrum of complications of pancreaticoduodenectomy (PD). We previously presented retrospective data indicating pancreaticogastrostomy (PG) may lead to a significant decrease in POPF rate compared to pancreaticojejunostomy (PJ) in patients with so called “high-risk pancreatic remnant.” Further review demonstrates that selective application of PG does lead to reduction in rate and severity of POPF.

Methods: Retrospective chart review of all PD performed between 2009 and 2016 was conducted with respect to type of procedure, diagnosis, clinical and biochemical parameters, intraoperative gland assessment (soft vs. hard), duct size (< 3mm was considered small) and postoperative outcomes. The pancreatic remnant was classified as “high-risk” if at least one risk factor (soft gland, small duct) was present. POPF was evaluated according to ISGPF classification.

Results: 141 patients underwent PD at a single institution for malignant (74.5%) and benign disease (25.5%). Pylorus preservation was achieved in 73.8% and vascular resection/reconstruction was required in 14.9% of cases. PG was done in 49 (34.8%) and PJ in 71 (70.6%) patients. The choice of procedure was up to the individual surgeon. All PGs were done for high-risk remnant while PJ was performed in both groups. Two early deaths occurred (1.4%), neither related to POPF. Clinically relevant POPF (Grade B and C) developed in 15 patients (10.8%); no significant difference between PG and PJ was observed (8.3% vs. 11.1%). However, subgroup analysis revealed that the majority of leaks after PJ occurred in patients with high risk remnants: 32% vs. 4.5%, p=0.005. In contrast, PG performed in a similar group of patients, was associated with significantly lower POPF rate: 8.3% vs. 32%, p=0.016). All cases of POPF in PG group were Grade B only; 3 Grade C and 5 Grade B leaks occurred in the “high risk” PJ subgroup. Gland texture, risk group affiliation, BMI, but not duct size or blood loss, were strong predictors of POPF on univariate analysis. Gland texture appeared to be the strongest predictor on multivariate analysis. Based on observed leak rates, use of PG in all “high-risk” cases could potentially lead to a 75% reduction in the rate of POPF.

Conclusion: We conclude that PJ remains the procedure of choice in patients with low-risk gland remnant (hard pancreas, large duct) as the rate of POPF is very low. In patients with a “high-risk” (soft pancreas and/or small duct) remnant PG offers substantial reduction in the rate and severity of POPF compared to PJ, and should be the preferred method of reconstruction. Prospective collection of data will be needed to confirm this hypothesis.
Background: We have used a novel reconstruction technique for portal or superior mesenteric vein resection during pancreatic surgery. The postoperative outcomes from pancreatic surgery with different vascular reconstruction (VR) were analyzed.

Patients and Methods: There were 1065 patients who had pancreatic surgery at the Helsinki University Hospital 2000-15. When tumor infiltration to the superior mesenteric (SMV) or portal vein (PV) was detected excision and reconstruction by either tangential, end-to-end anastomosis (< 2cm) or a spiral graft from great saphenous vein (GSV, >2cm) was performed. The GSV was excised and splitted open, side branches were ligated. It was sown around a 5-10 ml syringe. The spiral graft was anastomosed with SMV and PV. Splenic vein was anastomosed end-to-side to the graft.

Results: There were 155 (15 %) pancreatic tumor patients who had VR. Of them 133 (86%) had only venous reconstruction. 118 (89 %) had pancreaticoduodenectomy, 10 (7.5 %) total pancreatectomy and 5 (4 %) distal resection. There were 50 (38 %) patients with spiral GSV graft reconstruction, 57 (43 %) with end-to-end anastomosis, 24 (18 %) with tangential suture or patch and 21 patients had other kind of reconstruction (including arterial, or combined). There was one in-hospital death (d 38) for surgical complications in end-to-end anastomosis group. This patient was the only one with a grade C fistula, 2 (1.5%) had grade B, and 3 (7%) had grade A fistula postoperatively. There were no significant differences in re-operations with different kind of VR techniques.

Conclusions: This is a first series showing that patients with borderline resectable pancreatic tumor demanding a portal or superior mesenteric vein resection can be safely and feasibly be reconstructed with a spiral graft from great saphenous vein.
**Introduction:** The most common and the most severe complication to a distal pancreatic resection is the forming of a postoperative pancreatic fistula (POPF). A frequency of 30-60% has been reported. In previous studies, the combination of stapling technique and resorbable staple line reinforcement has shown both positive and negative influence on POPF frequency. The present study is a prospective, randomized, controlled multicentre trial (RCT) comparing reinforcement with resorbable mesh (The Biodesign™ Cook® Medical, Bloomington, Ind., USA) or not at the site of stapling division of the pancreas in distal pancreatic resection.

**Aim:** Primary outcome was a pancreatic fistula or leakage, in accordance with the definition of a pancreatic fistula made by ISGPF's (International Study Group of Pancreatic Fistula) and the number of days to healing/drain evacuation.

**Method:** Patients planned for open or laparoscopic distal pancreatic resection, at four Swedish tertiary referral centres, were included and peroperatively randomized, after confirming that resection could take place, to either reinforcement or not at the division site.

**Results:** 105 patients (51 female/54 male) aged 62.9 (28-89), ASA 2 (median) were randomized to either reinforcement (54) or no reinforcement (51) on the stapler instrument dividing the pancreas. Preliminary analysis show that in the group with reinforcement 22.2% of the patients developed a fistula (12/54) and in the group without reinforcement 39.2% (20/51) developed a fistula (p=0.043). Once a fistula had occurred there was no difference in healing time/ days to drain removal between the groups.

**Conclusion:** Reinforcing the stapler line with a resorbable mesh when performing a distal pancreatic resection results in a reduced risk of developing a POPF.
Objective: Lymph node counts after pancreatic resections are linked to staging accuracy, may impact regional disease control and are postulated as quality metric for oncologic adequacy of surgical therapy of pancreatic malignancy.

Methods: Prospectively collected data from a single surgeon's pancreatectomy experience within four different institutions were analyzed for predictors of lymph node counts. Significant relationships were examined with ANOVA, chi square and logistic regression analyses.

Results: Of 312 patients (54% female, median age: 65, range 18-88), 239 had a proven cancer diagnosis (77%). Operations included pancreatectoduodenectomy (69%), distal pancreatectomy (26%), total pancreatectomy (1%) and others (4%). Patients were treated in a nonacademic tertiary cancer center (Institution A, 11%), university HPB practice (B, 46%), academic cancer center (C, 28%) and community cancer center (D, 15%), with constant regional dissection standards. Total pathologic LN counts (median 16, range 1-88) differed between pancreatic/periampullary cancers (median: 19) and other diagnoses (median: 9, p<0.0001), and among procedures (PD: 17, DP: 14, total: 11, others: 2, p=0.048). Mean LN counts differed between institutions for both malignancies (A: 18, B: 13, C: 26, D: 26, p<0.0001) and benign diseases (p=0.003). Minimum total LN counts of 10 or 15 were reported in 79% and 62% of cancer patients, respectively; frequencies ranged among institutions from 62-98% for 10+ and 35-91% for 15+ LNs examined (p<0.0001 for both cut points).

Conclusion: Pancreatectomy-associated LN counts varied considerably between institutions. Pathologic processing should be standardized if LN numbers are to be adopted as a surgical quality metric for pancreatic cancer resections.
P208 LAPAROSCOPIC VS. OPEN PANCREATICODUODENECTOMY. A MATCHED-PAIR ANALYSIS AND LONG-TERM FOLLOW UP OF 120 CASES Steffen Deichmann, MD, Ulrich Wellner, MD, Kim Honselmann, MD, Hryhoriy Lapshyn, MD, Tobias Keck, MD, Dirk Bausch, MD; University Medical Center Schleswig-Holstein, Campus Luebeck, Germany

Introduction: Minimally invasive techniques have revolutionized surgical procedures and have been applied to nearly every abdominal operation. While laparoscopic pancreaticoduodenectomy (LPD) is feasible, the procedure is technically extremely demanding. To date, most of the available retrospective data focuses on perioperative outcome measures. However, its oncological equivalence to open pancreaticoduodenectomy (OPD) is still unclear. Surrogate parameters, such as the number of lymph nodes harvested and R-status suggest equality of both procedures, but long-term survival data is scarce. The aim of this study was thus to determine retrospectively the long-term survival after LPD and compare it to conventional surgery using a propensity matched-pair analysis of 120 cases.

Methods: In this retrospective intention to treat analysis all patients that underwent pancreaticoduodenectomy from 2000 – 2015 were included. Overall 549 patients were identified with 489 in the OPD group and 60 patients in the LPD group. Patients were matched 1:1 for age, sex, BMI, ASA, histologic diagnosis, pancreatic texture and portal venous resection (PVR). A total number of 120 patients were identified. Follow up in the OPD group and the LPD group was done from 2000 until 2015 and 2010-2015, respectively. LPD was performed in a hybrid technique with laparoscopic resection and open reconstruction via mini laparotomy.

Results: Patient baseline characteristics like age, sex, BMI, ASA, pancreatic texture, histologic diagnosis, pT and pN – stage showed no significant difference. The perioperative outcomes confirmed the general advantages of minimal invasive advantages procedures: ICU-stay and OHS were significantly shorter and transfusion rate was significantly lower in the LPD group. Regarding the procedure related complications, LPD was associated with lower rates of severe POPF (B/C) and DGE (B/C). The number of harvested lymph nodes and R0-resection rates were equal. Overall long-term survival seems to be beneficial in the LPD group.

Discussion: Pancreatic surgery also confers the advantages commonly associated with minimally-invasive procedures. The procedure related complication rate was at least equivalent to conventional surgery. Long-term survival after LPD and OPD for PDAC and periampullary cancer is at least equivalent. The study is limited by its relatively small number of patients and its retrospective nature.
Background: In recent years, literature has shown promising results for irreversible electroporation (IRE) as a new treatment option for locally advanced pancreatic cancer. Nowadays, IRE is performed by insertion of needles around the tumor, which entails the risk of inducing pancreatic fistula. The use of two plate electrodes (‘paddles’) may overcome this complication. The present study seeks to investigate the long-term clinical, radiological and pathological outcomes of IRE using paddles in a porcine model.

Methods: A total of 6 healthy pigs underwent a median laparotomy in order to mobilize the pancreas and perform an IRE-ablation. Each pig was treated with 2 separate ablations, 1 of the duodenal and 1 of splenic lobe of the pancreas, after which the abdomen was closed. The pigs were followed up for 2 weeks, during which clinical parameters, laboratory values and in 2 cases computed tomography (CT) imaging were assessed. After 2 weeks, a total pancreatectomy was performed. Subsequently, the pigs were terminated and the pancreatic tissue was preserved for histology examination.

Results: All animals survived IRE ablation and the subsequent 14 days. None of the animals developed signs of infection and no significant abdominal distention occurred postoperatively. The serum amylase and lipase levels peaked significantly at day 1 postoperatively in all pigs, after which they returned to normal range, indicating the absence of pancreatic fistula. On CT-imaging the ablation zone was visible as an ill-defined, hypodense lesion. No abscess formation, cyst development or ascites was seen. At histology, a lesion was present in all the ablated areas of the pigs. This area showed influx of inflammatory cells, fibrosis and acinar to ductal metaplasia.

Conclusion: IRE ablation of healthy pancreatic tissue using two parallel plate electrodes is feasible and safe and can create a homogenous fibrotic lesion, in a porcine model. IRE-paddles should be tested on pancreatic cancer tissue to ensure the efficacy of the ablation of cancer tissue using plate electrodes as well.
Irrversible Electroporation of the Pancreas Using Parallel Plate Electrodes in a Porcine Model: A Feasibility Study

Steffi Rombouts, Maarten Nijkamp, Willemijn van Dijck, Lodewijk Brosens, Maurits Konings, Inne Borel Rinkes, Jeroen Hagendoorn, Fred Wittkampf, Quintus Molenaar; UMC Cancer Center

Background: Irreversible electroporation (IRE) with needle electrodes is being explored as treatment option in locally advanced pancreatic cancer. Several studies have shown promising results with IRE needles, positioned around the tumor to achieve tumor ablation. Disadvantages are the technical difficulties for needle placement, the time needed to achieve tumor ablation, the risk of needle track seeding and most important the possible occurrence of postoperative pancreatic fistula via the needle tracks. The aim of this experimental study was to evaluate the feasibility of a new IRE-technique using two parallel plate electrodes, in a porcine model.

Methods: Twelve healthy pigs underwent laparotomy. The pancreas was mobilized to enable positioning of the paddles. A standard monophasic external cardiac defibrillator was used to perform an ablation in 3 separate parts of the pancreas; either a single application of 50 or 100J or a serial application of 4x50J. After 6 hours, pancreatectomy was performed for histology and pigs were terminated.

Results: Histology showed necrosis of pancreatic parenchyma with neutrophil influx in 5/12, 11/12 and 12/12 of the ablated areas at 50, 100, and 4x50J respectively. The electric current density threshold to achieve necrosis was 4.3, 5.1 and 3.4 A/cm² respectively. The ablation threshold was significantly lower for the serial compared to the single applications (p=0.003). The content of the ablated areas differed between the applications: areas treated with a single application of 50 J often contained vital areas without obvious necrosis, whereas half of the sections treated with 100 J showed small islands of normal looking cells surrounded by necrosis, while all sections receiving 4x50 J showed a homogeneous necrotic lesion.

Conclusion: Pancreatic tissue can be successfully ablated using two parallel paddles around the tissue. A serial applications of 4x50J was most effective in creating a homogeneous necrotic lesion.
THE "COLONIAL WIG" PANCREATICOJEJUNOSTOMY: ZERO LEAKS WITH A NOVEL TECHNIQUE FOR RECONSTRUCTION AFTER PANCREATECODUODENECTOMY

Xihua (Steve) Yang, Pouya Aghajafari, Naeem Goussous, Shirali T Patel, Steven C Cunningham, MD, FACS; Saint Agnes Hospital

BACKGROUND: Despite extensive global experience with pancreaticoduodenectomy (PD) and the pancreatic anastomosis (PA) in particular, postoperative pancreatic fistula (POPF) after PD is still common, occurring in >40% of soft-pancreas cases in randomized controlled studies, and is associated with significant morbidity. For this reason, and given no general agreement on the best approach, many diverse PA techniques have been described.

METHODS: Reasoning that leaks occur not only from the main pancreatic duct, but also from small ductules on the cut surface of the pancreas, and that anastomatic corners are especially susceptible areas for leaking, we combined a compressive U-stitch invaginating technique with a novel technique to obliterate or bury the corners with the "curls" of the colonial wig (Figure). We recently completed 22 consecutive pancreaticojejunostomies (PJ) using the "Colonial Wig" technique, and compared the POPF rate to that of our historical controls. Patients having complications precluding assessment of POPF (eg, 2 early postoperative mortalities), or not having a pancreatic anastomosis, were excluded. A chi square test was used to compare categorical data and a T-test for sample means.

RESULTS: Of 50 consecutive pancreatic head resections at a community teaching hospital, 48 were PDs, and 2 were total pancreatectomies. The median number of significant comorbidities was 5, and 96% of patients had at least one significant comorbidity. The median number of lymph nodes harvested was 19, and the R0 rate for cancer cases was 89%. Transfusions were required in 32% of cases (mean of 0.72 units per case). The morbidity rate was 49% (27% Clavien grade >2). The median length of stay was 11 days.

In the first 26 PDs, the PJ was performed with a duct-to-mucosa technique and the clinically relevant (ISGPF grade B or C) POPF (CR-POPF) rate was 15%. In the next 20 PJs, the "Colonial Wig" anastomosis was employed (Figure), with a CR-POPF rate 0% (P = 0.066). The two groups were similar in the proportion of soft and firm glands, and in the average predicted POPF rate based on the Fistula Risk Score: 14% for the first group, and 13% for the "Colonial Wig" group (P = 0.35). The observed CR-POPF rate of 0% was significantly lower than the predicted rate of 13% (P = 0.049).

CONCLUSIONS: High-volume pancreatic surgery is possible at a teaching community hospital, and results are comparable with those in the literature. Our novel "Colonial Wig" anastomosis may be a safe and effective way to lower POPF rates.
THE mRNA EXPRESSION OF SERCA AND NCX IN ACUTE PANCREATITIS MODEL UNDER MELATONIN AND TRISULFATE DISSACHARIDE ACTION

Introduction: The injury of the pancreatic cells in acute pancreatitis (AP) has as precipitating factor the intracellular calcium overload, whose homeostasis depends crucially on calcium excess withdrawal by means of Plasma Membrane Calcium ATPase (PMCA), but with joint participation of Sarcoplasmic Reticulum Calcium ATPase (Serca) for calcium uptake to the sarcoplasmic reticulum, and the Sodium Calcium Exchanger (NCX) by the withdrawal of calcium to the extracellular medium. Melatonin, through its antioxidant action and cell structure and function protection and the ultra-low molecular weight heparin fragment Trisulfate Disaccharide (TD) with action on intracellular calcium withdrawal by the acceleration of sodium calcium exchanger leading to cellular protection, could influence the cellular injury determined by pancreatitis, through the protection of the structures involved in calcium homeostasis and/or decreased intracellular calcium by the acceleration of the sodium calcium exchanger.

Objective: To evaluate the mRNA expression of Serca and NCX in a taurocholate model of experimental AP in Wistar rats pre-treated with melatonin and/or TD. Materials and methods: Adult male Wistar rats (n = 25) were divided into 5 groups: I-Control (no pancreatitis), II- taurocholate 3% AP, III-AP with melatonin pre-treatment, IV-TD and V-melatonin associated with the TD. In the animals treated pharmacologically, melatonin 50 mg/kg and TD 0.2 mg/kg were injected intraperitoneally 30 min and 10 minutes before AP, respectively. Pancreatic tissue samples were collected after 2 hours for the detection of mRNA levels of Serca2 and NCX1 for analysis of polymerase chain reaction. Results: There was an increase of the expression in Serca2 in the melatonin group (III), but no increase in expression of NCX. The TD did not affect levels of Serca 2 and NCX. The set treatment with melatonin and TD reduced the expression of Serca 2.

Conclusion: The effect of melatonin is restricted to Serca 2 expression increase. TD has no action on gene expression, however, when associated with melatonin its action in accelerating the withdrawal of calcium exchanger can explain the slightest expression of Serca 2 by a joint action of drugs with different and possibly complementary mechanisms.
Background: Intracellular calcium overload is a common factor in tissue and cell destruction. The use of ultra-low molecular weight heparin fragment Trisulfate Disaccharide (TD) without effect on clotting mechanisms and with action on intracellular calcium withdrawal by the acceleration of sodium calcium exchanger leading to cellular protection was demonstrated “in vitro” and “in vivo” in liver cells in cellular and animal models but not in other tissues. Acute pancreatitis (AP) has on calcium overload an important factor for injury and cell death.

Objective: to evaluate the action of TD on calcium dynamics and cell mortality in a pancreatic cell culture using the standard concentrations of taurocholate usually used in the “in vivo” experimental rat model. Material and Method: Human pancreatic cells from epithelial pancreatic carcinoma (MIA PaCa-2) were grown in Dulbecco medium modified and supplemented by 24 hours and exposed to fluorescent marker of Fura-2/AM Calcium (4 µM). Cells were washed and the images acquired and analyzed by open field microscopy and photographed digitally. Changes of cytosolic calcium levels were measured at 37° C for 15 minutes. The experiment was performed in two phases in the same group of cells, sequentially: Phase A: cells treated with DT 50 µM and subjected to the action of Thapsigargin (4 µM) for intracellular calcium content rise through the inhibition of Ca+2 reuptake by endoplasmic reticulum; Phase B: Submission to ionophore action (0.25 µM) for formation of hydrophilic pores allowing the elevation of intracellular Ca+2 from the extracellular medium. The control group was conducted under the same conditions, but without TD use. Determination of cell viability was done by MTT reduction. Cells were incubated in supplemented DMEM medium in different concentrations of taurocholate during 4h or 12h in the presence and absence of the TD. MTT (0.25 mg/mL) was then added, followed by incubation for 4 more hours. The crystals of formazan were solubilized by adding 100 µL of SDS 10% (m/v) (in 0.01 mol/L HCl) and, after 12 hours, the absorbance was measured at 570 nm (reference 620 nm), and the percentage of viable cells was evaluated in relation to the control without adding the experimental agents (100%).

Results: TD decreases intracellular calcium of pancreatic cells when exposed to calcium overload, however, when these cells are exposed to the action of taurocholate in different concentrations the cell mortality is the same in the absence or presence of TD. Conclusion: Although TD decreases intracellular calcium in pancreatic cells under calcium overload situations, it was not able to prevent the pancreatic cellular injury determined by taurocholate, possibly due to the high degree of cell damage caused by this model of acute pancreatitis.
CHARACTERIZING FAMILIAL CHYLOMICRONEMIA SYNDROME: BASELINE DATA OF THE APPROACH STUDY

Dirk J Blom¹, Andres Digenio², Vicki Alexander², Ewa Prokopczuk², Andrew Hsieh², Linda Hemphill³, Ovidio Muñiz-grijalvo⁴, Joseph Witztum⁵, Seth Baum⁶, Daniel Gaudet⁷; ¹University of Cape Town, ²Akcea Therapeutics, ³Partners, Boston MA, ⁴Hospital Virgen del Rocio, Sevilla Spain, ⁵University of California SD, ⁶Boca Raton Regional Hospital, ⁷Universite de Montreal

BACKGROUND: Familial Chylomicronemia Syndrome (FCS) is a rare, recessive genetic disorder caused by mutations in Lipoprotein Lipase (LPL) or genes required for LPL functionality. FCS is characterized by hyperchylomicronemia, recurrent abdominal pain, hepatosplenomegaly and recurrent episodes of acute pancreatitis that may result in pancreatic insufficiency. There are no FDA approved treatments for FCS and patients are managed with a low-fat diet. Due to the rarity of FCS there are few case series describing phenotypic variability in this disorder.

OBJECTIVE: To describe demographic and clinical characteristics of adult FCS patients enrolled in a clinical trial.

METHODS: We analyzed baseline data from 67 patients with FCS, participating in a Phase III study of volanesorsen (apoC-III antisense oligonucleotide).

RESULTS: Sixty-seven patients with a mean age of 46±13 years were enrolled. In 54 patients (80%) the diagnosis was confirmed genetically with LPL mutations accounting for 41 (81%) cases. The median age (P25, P75) at diagnosis was 27 (15, 36) years. Fifty-four percent were female and 81% were Caucasian with a mean body mass index of 24.9±5.7 kg/m². Median fasting TG (P25, P75) were 2012 (1247, 3117) mg/dL despite 43% of patients receiving fibrates, 27% fish oils and 21% statins. Eruptive xanthomas and lipemia retinalis were identified in 15 (22%) and 14 (21%) of patients, respectively. Forty-nine patients (73%) had a documented history of acute pancreatitis and among those, 27 patients experienced 83 pancreatitis events within the past 5 years. Twenty-five percent of patients (17 out of 67) reported abdominal pain events during the 6-8 week screening period. Magnetic resonance imaging demonstrated that liver and splenic volumes were increased and that splenic volume had a mild inverse correlation with platelet counts (r=-0.1200, p=0.0052). Postprandial TG clearance was severely impaired (Figure).

CONCLUSIONS: Our data confirm that TGs remain significantly elevated in most FCS patients despite dietary restrictions and TG-lowering therapies and that FCS is frequently complicated by acute pancreatitis. A relatively late age of diagnosis suggests a likely under diagnosis and appreciation of this rare genetic disorder.
Familial Chylomicronemia Syndrome (FCS) is a rare, inherited lipid disorder characterized by severely high levels of triglycerides (TGs) and chylomicrons in the plasma. The impact of FCS includes acute physical manifestations (eruptive xanthoma, lipemia retinalis, hepatosplenomegaly) and potentially life-threatening recurrent acute pancreatitis (RAP), which frequently leads to chronic pancreatitis. Patients with FCS often live in fear of RAP and debilitating abdominal pain. There is currently no FDA approved pharmacotherapy. The current mainstay in the management of FCS is an ultra-low-fat diet (<20g of fat per day) and strict control of lifestyle factors (e.g., avoidance of alcohol and some medications), which is difficult for patients to maintain. There is a dearth of information regarding the burden of FCS on quality of life for patients and their caregivers. A panel of patients diagnosed FCS and their caregivers was assembled and surveyed to assess the clinical and psychosocial burden of FCS. The results of the panel discussion suggest that FCS and its associated symptoms impose a considerable clinical and psychosocial burden on patients that reduces quality of life and limits employment opportunities. Acute pancreatitis is the most serious complication of FCS. AP results in debilitating pain, anxiety, loss of employment, and frequent hospitalizations that disrupt the lives of patients. Of the 10 patients on the panel, the mean number of episodes of AP was 34 with a range of 6-60 across their life span (Mean age 48). Additionally, a median of 17 hospitalizations results from the AP episodes with a range of 6-60. Acute and chronic pancreatitis is a serious consequence to patients with FCS although little is known about this ultra-rare genetic disorder.
**P217 PLASMA SUPAR LEVELS DO NOT RISE DURING THE LONG-TERM PROSPECTIVE FOLLOW-UP IN PATIENTS WHO DEVELOP CHRONIC PANCREATITIS.** Anu Aronen, MD, Janne Aittoniemi, MD, PhD, Reetta Huttunen, MD, PhD, Anssi Nikkola, MD, Jussi Nikkola, MD, Olli Limnell, MB, Isto Nordback, MD, PhD, Juhani Sand, MD, PhD, Johanna Laukkarinen, MD, PhD; 1Department of Gastroenterology and Alimentary Tract Surgery, Tampere University Hospital, Finland, 2Fimlab Laboratories, Tampere, Finland, 3Department of Internal Medicine, Tampere University Hospital, Finland, 4University of Tampere, School of Medicine, Tampere, Finland

**Objectives:** SuPAR (soluble urokinase plasminogen activator receptor) is a biological marker reflecting the systemic inflammatory state. Earlier we have shown that P-SuPAR can be used in patients with acute alcohol-induced pancreatitis (AAP) at admission to detect the mild cases, and after recovery to detect the cases with a high risk for long-term mortality. The only previous study (Sorio et al., *BMC Cancer*, 2011) about suPAR and chronic pancreatitis (CP) suggested urinary suPAR/creatinine ratio levels to be elevated in CP, which would be fairly similar compared to the findings in pancreatic cancer (PC) and several other cancers. Thus it is not known, whether P-SuPAR could be used to distinguish CP from PC. Our aim was to study the levels of P-SuPAR in CP in a long-term prospective follow-up setting.

**Methods:** 83 patients (median age 47.5, range 25-71 years, 90% male) diagnosed with first AAP were prospective followed up for 7.0 (0.3-9.8; median and range) years. P-suPAR values were measured at first admission, on recovery, and at 5, 7, and 9 years. Recurrent acute pancreatitis (RAP) episodes, other covariates and the development of CP were registered.

**Results:** Out of the 83 AAP patients, 39% had at least one RAP episode and 14% developed CP during the long-term follow-up. Severity of first AAP or age were not associated to the development of CP in this population. Smoking correlated with development of CP, as expected. Among the patients who developed CP, the high P-suPAR levels at the first AAP admission (median 4.9 (IQR 3.7-6.1) ng/mL) decreased significantly on recovery (3.2 (2.6-4.0) ng/mL; p=0.003) and remained low during the long-term follow-up; similarly compared to the non-RAP, non-CP patients. Thus, P-suPAR levels at any time point did neither predict the development, nor were associated to CP.

**Conclusions:** After the first AAP with high P-SuPAR levels, the patients have low P-SuPAR levels on recovery and during the long-term follow-up even though they develop CP. Thus P-SuPAR levels may possibly be used to distinguish CP patients from PC patients with high P-SuPAR levels.
**Introduction:** Acute pancreatitis (AP) is a common gastrointestinal disorder associated with a high morbidity and mortality rate. Current guidelines advocate the need for aggressive fluid resuscitations within the initial 24 hours to prevent patient deterioration. This study aims to explore whether fluid volume by 12 hours post presentation is associated with poorer outcomes.

**Methods:** This retrospective cohort study was conducted at Long Island Jewish Medical Center (LIJ) and North Shore University Hospital (NSUH) between April and September 2015. 223 non-transferred, adult patients without organ failure were identified using the ICD-9 discharge code for AP (577.0). All patients met the criteria for AP on having two out of three criteria: (1) lipase or amylase > 3 times the upper limit of normal, (2) radiological findings of AP, (3) presence of epigastric pain. Three equal groups were formed based on fluid volume administered: Group A (n = 75; mild fluid treatment), Group B (n = 74; moderate fluid treatment), Group C (n = 74; aggressive fluid treatment). A univariate followed by a multivariate analysis was conducted to determine significance of various outcome variables.

**Results:** Univariate analysis revealed significant differences between groups for ICU admission (p = 0.035) and incidence of pancreatic necrosis (p = 0.014). Both outcomes were more prevalent in Group B and C than Group A. Upon controlling for various demographic and clinical factors, the differences between groups for ICU admission disappeared. However, in the multivariate analysis, the incidence of pleural effusion was noted to be different among groups (p = 0.03).

**Conclusions:** These results further support the hypothesis that necrosis is an early phenomenon, and aggressive fluid resuscitation may not suppress it. Pleural effusion was noted to have a statistically significant higher frequency, after controlling for various factors, in Groups B and C. Current guidelines on fluid therapy in AP may not be appropriate for every patient.
Background: Single operator Spyglass cholangioscopy (SOC) with intra-ductal live image is an addition to standard endoscopic retrograde cholangio-pancreatography (ERCP) in the diagnostics of indeterminate biliary strictures. We compared the rate of adverse events during the learning curve and after establishment of a routine in SOC practice.

Methods: We included all SOC ERCPs performed from the beginning or SOC practice in a in a single tertiary referral ERCP center during 2012-2015. The data was collected prospectively for indications, procedure details and adverse events, and supplemented from patient records for eventual clinical outcome.

Results: Altogether 1920 ERCPs were performed during the study period. Of those 113 patients (5.9%; mean age 58 y, 57% male) underwent SOC ERCP. Median follow-up was 19 months (range 1-48). The indication for SOC was primary sclerosing cholangitis in 43%, indeterminate stricture in 30% and stone disease in 24%. 92% of SOCs were performed in outpatient setting. In the very first 25 SOCs, the rate of adverse events was 20%: all 5 patients had a severe post-ERCP pancreatitis (PEP). One of these ended in patient’s death. In the next 88 SOCs rate of adverse events was 8% (PEP 3%, cholangitis 3%, bleeding 1%, mortality 0%, none severe). In indeterminate strictures, the sensitivity and specificity of SOC biopsies were 75% and 87% for detecting cancer, respectively.

Conclusion: The risk of PEP after SOC is high in the beginning of practice. When procedure becomes routine, the risk decreases to the tolerable level seen in ordinary ERCP. SOC may be considered as a safe even in outpatient setting. It may give diagnostic help in indeterminate biliary strictures.
P220 SURGICAL MANAGEMENT OF SEVERE ACUTE NECROTIZING PANCREATITIS: IMPROVED OUTCOMES AND MORTALITY

Jessica L Cioffi, MD, Adrian Vlada, MD, Micheal Gerber, MD, Bradley Schmit, MD, Cristina Crippen, Jose Trevino, MD, Steven J Hughes, MD, Kevin Behrns, MD; University of Florida

Introduction: The clinical course of acute pancreatitis has significant variability with mortality rates of 3% for mild disease, 17% in the presence of necrosis, and 47% in patients with organ failure. The aim of this study was to evaluate our institutional surgical experience of severe acute necrotizing pancreatitis (ANP) treated by a delayed operative approach.

Methods: A retrospective review of a prospectively collected database from July 2005-June 2012 identified patients with severe ANP at a single academic institution. Severe ANP was defined according to the revised Atlanta classification. Management included resuscitation, enteral nutrition, and operative necrosectomy was performed 4-6 weeks following disease onset.

Results: Eighty patients were identified. The majority were male (72%) with a median age of 60 years and 81% were transferred from a lower acuity institution. Thirty-four patients (42.5%) had persistent multi-system organ failure; ICU care was required for 80% of patients for a median of 14 days (range 1-112), and 80% underwent necrosectomy. Post-operative length of stay was 14 days (range 7-168). Twenty-eight patients (35%) experienced post-operative morbidity with 4% Clavien-Dindo grade 4/5 complications. Mortality during admission was 6.3% with a 5% 30-day and 7.5% 90-day mortality rate. The presence of infected necrosis (52.5%) did not affect outcomes.

Conclusion: Severe ANP can be safely and effectively managed with delayed operative intervention with mortality rates substantially lower than previously reported. To optimize outcomes and mortality, the management of patients with severe ANP should be regionalized at tertiary care facilities with experience in the management of pancreatitis.
Introduction: Pancreatic debridement (PD) is the standard of care for pancreatic necrosis following acute pancreatitis, especially in the presence of infection. In the last decade, there has been a reduction in mortality following PD secondary to advances in minimally invasive approaches and critical care. The morbidity following PD has not been widely published. The goal of this study was to perform a detailed analysis of morbidity following PD using population-based database.

Methods: The National Inpatient Database (NIS 1998-2010) was used to identify patients with Acute Pancreatitis (ICD-9-CM code 577.0). Demographic and Clinical data were abstracted. Patients who had PD (ICD-9-PR codes 52.22 and 52.59) were compared against those who did not undergo debridement for demographic and clinical differences. Further, three age groups were created (18-40 years, 41-65 years, and ≥66 years) to compare the differences in complication rates. The different groups were compared using standard statistical methodology and p <0.05 was set as statistical significance. For complications in PD patients, Discharge Weights were applied to get National estimates and the obtained values were converted to events per 100,000. Multivariate analysis was conducted to analyze complications affecting mortality in patients with PD.

Results: Acute pancreatitis was identified in 643,441 patients, but 0.3% (N=2,129) required PD. Patients who underwent PD were older, Caucasian, males, had a Charlson score ≥3, higher length of stay, higher rates of discharge to nursing homes, and higher mortality compared to those who did not receive PD. Both medical and surgical complications were higher in patients with PD. In patients with PD, respiratory complications were more common (6/100,000), followed by post-operative myocardial infarction (7.5/100,000), renal failure (5/100,000), and stroke (0.5/100,000). Intraabdominal abscess was the most common surgical complication (25.9/100,000), followed by sepsis (18.3/100,000), GI complications (17.4/100,000), intra abdominal bleeding (10.9/100,000), deep vein thrombosis (8.6/100,000), enteric fistula (7/100,000), wound dehiscence (3.8/100,000), urinary complications (3/100,000), and pulmonary embolism (1.4/100,000). On subgroup analysis, there was no significant difference in the complication rates among the three age groups compared, except for MI, renal failure, and urinary complications, which were significantly higher in patients >65 years of age when compared to patients <65 years of age receiving PD. On multivariate analysis, urinary complications (odds ratio; OR 4.6), cardiac complications (OR 3.4), post-op hemorrhage (3.2), and respiratory complications (OR 1.4) all significantly affected mortality.

Conclusions: Patients receiving pancreatic debridement account for only 0.3% of all patients with acute pancreatitis. Both medical and surgical complications were more common in patients receiving PD. On multivariate analysis, urinary, cardiac, and respiratory complications significantly affected mortality in PD patients. The results of this study will potentiate risk reduction strategies in those patients in need of PD.
Background: Infected pancreatic necrosis is a highly morbid disease that was traditionally approached with an open necrosectomy. This approach was associated with rates of morbidity and mortality up to 95% and 39%, respectively. The multicenter randomized controlled PANTER trial published in 2010 in the New England Journal of Medicine proposed a “Step-Up” approach which demonstrated fewer major complications than conventional treatment, with comparable rates of mortality, and spared a major operation in one-third of patients. We sought to evaluate the practical adherence to the Step-Up approach at a single tertiary care institution, its temporal adoption into clinical practice, and impact on outcomes.

Methods: This is a retrospective review of all patients treated at a tertiary care center with infected pancreatic necrosis between 2006 and 2014. Diagnosis was based on positive culture on pancreatic fine needle aspiration, or presence of an air filled necroma on computed tomography. “Modified Step-Up” (MSU) was defined as percutaneous or endoscopic drainage followed by additional percutaneous or endoscopic drainage, followed by any surgical intervention, including video-assisted retroperitoneal debridement and open necrosectomy. Patients were stratified into the “early” pre-PANTER (2006-2010) or “late” post-PANTER (2010-2014) period. Rates of adherence to the MSU approach were compared as well as clinical outcomes.

Results: There were 130 patients with infected necrotizing pancreatitis in the overall cohort; 75 (58%) and 55 (42%) were treated in the early and late period. At baseline, patients admitted in the late period were more likely to have higher ASA scores (3-5 vs 1-2, 92% vs 39%, p<0.001). In the late period, adherence to MSU was 46% (n=25) vs. 27% (n=27) in the early period (p<0.05). Late period patients had a greater likelihood of percutaneous drainage (65% vs. 43%, p=0.012) and greater number of total median interventions (3 vs. 2, p<0.001), however had comparable rates of surgery (73% vs. 79%, p=0.432), including 34 (85%) open necrosectomies in the late period vs. 55 (93%) in the early period. There were no differences in length of hospital stay, rates of in-hospital mortality, long-term complications, or survival at 2-years following discharge. Patients in the late period were less likely to have a pancreatitis-related readmission (47% vs. 71%, p=0.007) or multiple readmissions (31% vs. 51%, p=0.024).

Conclusions: Overall, adherence to the MSU approach was 46% between 2010 and 2014. Patients treated during this period had lower rates of pancreatitis-related readmission and total readmissions, with similar rates of long-term complications and mortality compared to patients between 2006-2010. This study demonstrates that adoption of clinical guidelines can result in improved clinical outcomes. Barriers to implementation of the Step-Up approach should be identified to improve adherence rates.
P223 RELATIONSHIP BETWEEN SECRETED PROTEIN ACIDIC AND RICH IN CYSTEINE EXPRESSION AND CLINICAL OUTCOMES IN PATIENTS WITH RESECTED Pancreatic Ductal Adenocarcinoma TREATED WITH ADJUVANT GEMCITABINE-BASED CHEMOTHERAPY Ryuta Shintakuya, Naru Kondo, Yoshiaki Murakami, Kenichiro Uemura, Naoya Nakagawa, Keisuke Okano, Hiroki Ohge, Taijiro Sueda, Kenjiro Okada, Department of Surgery, Institute of Biomedical and Health Sciences, Hiroshima University

Background: Although postoperative adjuvant chemotherapy for pancreatic ductal adenocarcinoma (PDAC) improves survival in some patients, its efficacy varies among individuals. It is useful to identify the biomarkers which can predict the prognosis of patients with PDAC treated with adjuvant chemotherapy.

Objective: The aim of this study was to investigate whether SPARC expression can predict the survival of patients with PDAC who received adjuvant gemcitabine-based chemotherapy (AGC).

Methods: Stromal SPARC and cytoplasmic SPARC were examined immunohistochemically in 241 patients who underwent surgical resection for PDAC between 2000 and 2014. The association of SPARC expression with clinicopathological factors and overall survival (OS) was analyzed.

Results: Of the 241 patients, stromal SPARC expression and cytoplasmic SPARC expression were high in 140 (58%) and in 65 (27%) patients, respectively. Pathological differentiation (P=0.046) and lymph node metastasis (P<0.001) were significantly associated with stromal SPARC expression, whereas no clinicopathological factor was significantly associated with cytoplasmic SPARC expression. In univariate analysis, high stromal SPARC was significantly associated with poor OS (P<0.001). In multivariate analysis, R1 factor (P=0.007), moderately or poorly differentiated adenocarcinoma (P=0.019), lymph node metastasis (P<0.001) and high stromal SPARC expression (P<0.001) was independently associated with poor OS. In addition, the prognostic significance of SPARC expression was also evaluated in the subgroups of patients who did and did not receive AGC. Within a subset of 211 patients treated with AGC, high stromal SPARC expression was significantly associated with poor OS (P<0.001). Moreover, multivariate OS analysis revealed that only high stromal SPARC expression was independently associated with poor OS (P<0.001). In contrast, both stromal and cytoplasmic SPARC expression did not affect OS in 30 patients who did not receive AGC.

Conclusions: High stromal SPARC expression was an independent predictor of poor OS, particularly in patients treated with AGC. Stromal SPARC expression could be a relevant biomarker for prediction of prognosis and AGC efficacy in patients with PDAC after resection.