2022 ANNUAL

Pancreas Club Meeting

May 20-21, 2022
Hyatt Regency Mission Bay
San Diego, CA

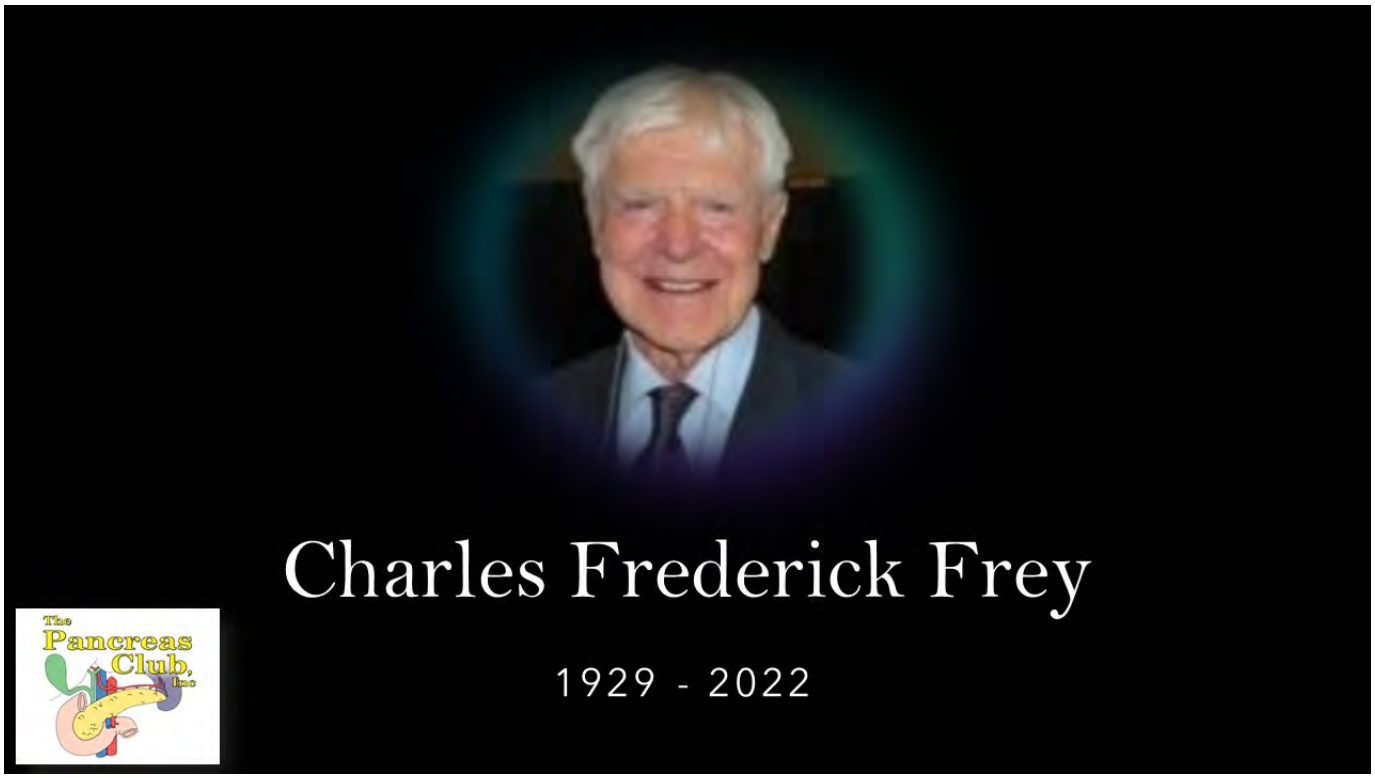
Pancreas Club

FINAL PROGRAM

CONTACT

Pancreas Club | 913.402.7102 | Pancreas@lp-etc.com | www.pancreasclub.com

REMEMBERING CHARLIE FREY



Dear Members,

We write to inform you of the recent death of one of the foundational leaders of the Pancreas Club. Charles (known as Charlie) Frey. One could easily argue that the Pancreas Club might never have prevailed through these many years without his leadership!

When he took over shared leadership with William Schiller the club was considerably smaller and largely attended by American surgeons. Under his leadership the attendance grew and the international representation vastly increased to the point that we can boast our world-wide recognition. Charlie also encouraged participation from surgeons early in their careers and asked them to be part of each annual program committee, a practice which we continue to this day.

Please join us in celebrating this great man. The Pancreas Club 2022 Annual Meeting and Final Program are dedicated to his lasting legacy within our community.

Sincerely,

Bill Nealon, Chris Wolfgang and Nick Zyromski
Pancreas Club Directors

PANCREAS CLUB THANKS OUR INDUSTRY PARTNERS

The Pancreas Club wishes to recognize and thank the following companies for their commercial promotion of this educational activity:

AbbVie | Bronze Sponsor

Alcresta Therapeutics

ChiRhoClin, Inc.

Immunovia, Inc.

Nestlé Health Science

CME INFORMATION

CONTINUING MEDICAL EDUCATION CREDIT INFORMATION

Accreditation

This activity has been planned and implemented in accordance with the accreditation requirements and policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint providership of American College of Surgeons and The Pancreas Club. The American College of Surgeons is accredited by the ACCME to provide continuing medical education for physicians.

AMA PRA Category 1 Credits™

The American College of Surgeons designates this Other activity (hybrid format-live and enduring) for a maximum of **16** *AMA PRA Category 1 Credits™.* Physicians should claim only the credit commensurate with the extent of their participation in the activity.

AMERICAN COLLEGE OF SURGEONS
Inspiring Quality:
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ACCME
ACCREDITED WITH COMMENDATION

AMERICAN COLLEGE OF SURGEONS
DIVISION OF EDUCATION

Learning Objectives

This activity is designated for physicians, advanced practice providers and nurses. Upon completion of this course, the following learning objectives will be addressed:

- Define the definitions and grading systems for managing pancreatic fistula
- Explain the role of gene expression profiling in the progression of IPMN to cancer.
- Recognize the importance of non-progression in patients managed with borderline respectable principles and locally advanced PDAC

DISCLOSURE INFORMATION

In accordance with the ACCME Accreditation Criteria, the American College of Surgeons must ensure that anyone in a position to control the content of the educational activity (planners and speakers/authors/discussants/moderators) has disclosed all financial relationships with any commercial interest (termed by the ACCME as "ineligible companies", defined below) held in the last 24 months (see below for definitions). Please note that first authors were required to collect and submit disclosure information on behalf all other authors/contributors, if applicable. All reported conflicts are managed by a designated official to ensure a bias-free presentation. Please see the insert to this program for the complete disclosure list.

Ineligible Company: The ACCME defines an "ineligible company" as any entity producing, marketing, re-selling, or distributing health care goods or services used on or consumed by patients. Providers of clinical services directly to patients are NOT included in this definition.

Financial Relationships: Relationships in which the individual benefits by receiving a salary, royalty, intellectual property rights, consulting fee, honoraria, ownership interest (e.g., stocks, stock options or other ownership interest, excluding diversified mutual funds), or other financial benefit. Financial benefits are usually associated with roles such as employment, management position, independent contractor (including contracted research), consulting, speaking and teaching, membership on advisory committees or review panels, board membership, and other activities from which remuneration is received, or expected. ACCME considers relationships of the person involved in the CME activity to include financial relationships of a spouse or partner.

Conflict of Interest: Circumstances create a conflict of interest when an individual has an opportunity to affect CME content about products or services of an ineligible company with which he/she has a financial relationship.
The ACCME also requires that ACS manage any reported conflict and eliminate the potential for bias during the educational activity. Any conflicts noted below have been managed to our satisfaction. The disclosure information is intended to identify any commercial relationships and allow learners to form their own judgments. However, if you perceive a bias during the educational activity, please report it on the evaluation. Please view the disclosure summary located at the end of the Final Program.

Thank you to the 2022 Scientific Program Committee:

William Nealon - Director

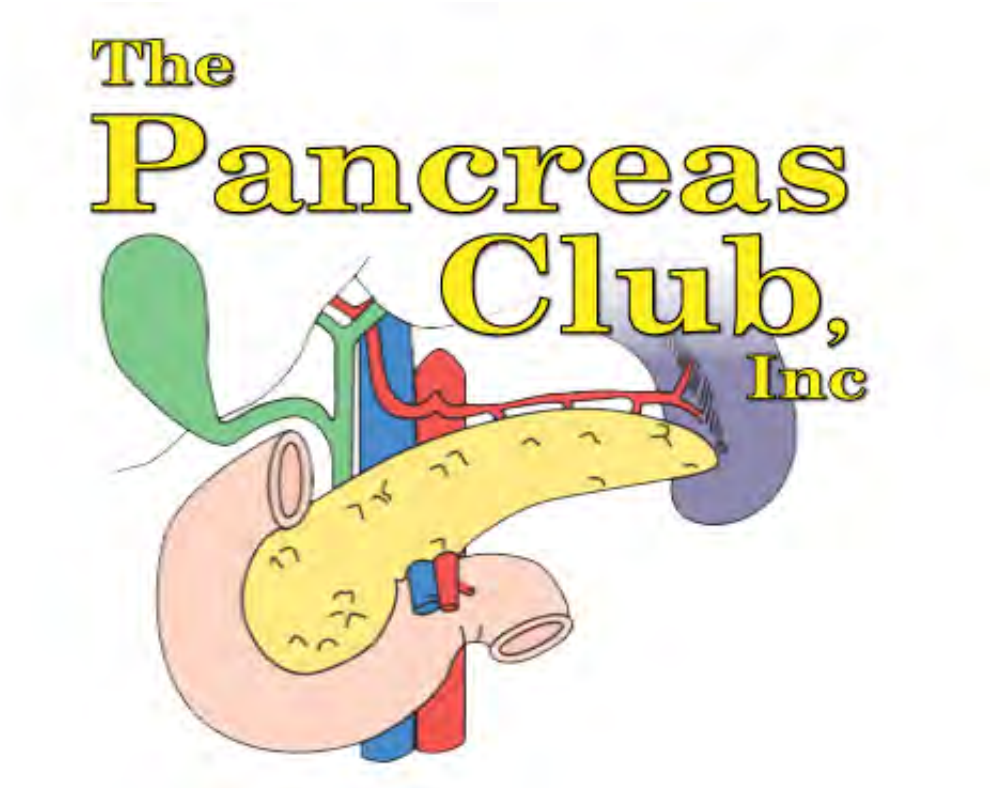
Christopher Wolfgang - Director

Nicholas Zyromski - Director

Nigel Jamieson

Wooil Kwon

Melissa Hogg



AWARDS

The Pancreas Club will recognize five outstanding presentations.
They will be awarded during the Awards Ceremony.

Dp_Iam Kmqa_ Research Award
Best presentation from young junior faculty, who is within 5 years of their end of residency. This award is generously funded by the Arpa Foundation.

PanCAN Research Awards
Best oral presentations of pancreatic cancer research by a resident or fellow. This award is generously funded by the Pancreatic Cancer Action Network.

Promising Women in Pancreas Cancer Research Award
Most promising research paper by a female investigator.
This award is generously funded by the Nikki Mitchell Foundation.

Nikki Mitchell Foundation Award
Most promising research project by a young investigator (Junior faculty within 5 years of practice, post training). This award is generously funded by the Nikki Mitchell Foundation.

PAST MEETINGS

2021 Virtual Meeting
2020 Virtual Meeting
2019 Hyatt Regency Mission Bay, San Diego, CA
2018 Willard InterContinental, Washington DC
2017 The Drake, Chicago, IL
2016 Hyatt Regency Mission Bay, San Diego, CA
2015 Washington Court Hotel, Washington, DC, Christopher Wolfgang
2014 Westin Lombard, Chicago, IL, Gerard Aranha
2013 WDW Swan & Dolphin Hotel, Orlando, FL, Pablo Arnoletti
2012 Hyatt Mission Bay, San Diego, CA, Mark Talamini
2011 Chicago, IL, Gerard Aranha, Mark Talamonti, David Bentrem
2010 New Orleans, LA
2009 Chicago, IL, Gerard Aranha, Mark Talamonti, David Bentrem
2008 San Diego, CA, Mark Talamini, Mike Bouvet
2007 Children's Medical Center, Washington, DC, Dana Anderson
2006 Los Angeles, CA, Howard A. Reber
2005 Chicago, IL, Gerard V. Aranha, Richard Bell
2004 New Orleans, LA, Alton Ochsner
2003 Orlando, FL, Michael Murr
2002 San Francisco, CA, Kimberly Kirkwood
2001 Hilton Atlanta, Atlanta, GA, Aaron Fink
2000 University of California, SD, San Diego, CA, A.R. Moosa
1999 Peabody, Orlando, FL, Michael M. Murr, James G. Norman
1998 LSU, Tulane, New Orleans, LA, J. Patrick O'Leary, Elmo Cerise
1997 University Health Sciences, Bethesda, MD, John W. Harmon
1996 Laurel Heights, UCSF, San Francisco, CA, Sean Mulvihill
1995 University of California, SD, San Diego, CA, A.R. Moosa
1994 Tulane University, New Orleans, LA, Elmo Cerise, J. Patrick O'Leary
1993 Massachusetts General Hospital, Boston, MA, Andrew Warshaw
1992 University of California, SF, San Francisco, CA, Carlos Pellegrini
1991 LSU, Tulane, New Orleans, LA, Elmo Cerise, J. Patrick O'Leary
1990 University of Texas, San Antonio, TX, Bradley Aust
1989 Washington Hilton, Gregory Bulkley, Frances Milligan, John Cameron
1988 Tulane University, New Orleans, LA, Elmo Cerise
1987 University of Illinois, Chicago, IL, Phillip Donahue
1986 Ft. Miley VA, San Francisco, CA, Carlos Pellegrini
1985 Mt. Sinai Hospital, New York, NY, David Dreiling
1984 LSU Medical Center, New Orleans, LA, Francis Nance
1983 Washington Hilton, Washington, DC, Francis Milligan
1982 University of Chicago, Chicago, IL, A.R. Moosa
1981 Alumni Hall, NYU, New York, NY, John Ranson
1980 Salt Lake City, UT, Frank Moody
1979 LSU Medical Center, New Orleans, LA, Isadore Cohn
1978 Jockey Club, Las Vegas, NV, Charles Frey
1977 Toronto, Canada, Roger Keith
1976 Doral on the Ocean, Miami, FL, Robert Zeppa
1975 University of Texas, San Antonio, TX, Bradley Aust
1974 No Meeting
1973 Mt. Sinai Hospital, New York, NY, David Dreiling
1972 University of California, SF, San Francisco, CA, Englebert Dunphy
1971 Sheraton Hotel, Philadelphia, PA, John Howard
1970 University of Chicago, Chicago, IL, Edward Paloyan
1969 Mt. Sinai Hospital, New York, NY, David Dreiling
1968 University of California, SF, San Francisco, CA, Leon Goldman
1967 Philadelphia, PA, John Howard
1966 Northwestern, Evanston, IL, Marion Anderson

Friday, May 20

7:00am - 5:30pm	Registration (Bayview Foyer)
7:00am - 8:00am	Continental Breakfast, Exhibits & Poster Viewing (Regatta Pavilion)
7:45am - 8:00am	Welcome & Dedication to Charles Frey
8:00am - 9:45am	Scientific Session 1 - Cancer Neoadjuvant/Node/Margins
9:45am - 10:00am	Morning Break, Exhibits & Poster Viewing (Regatta Pavilion)
10:00am - 11:00am	Scientific Session 2 - Fistula/High Volume
11:00am - 12:00pm	Poster Rounds with Professors (Regatta Pavilion)
12:00pm - 1:00pm	Lunch (Regatta Pavilion)
1:00pm - 3:30pm	Scientific Session 3 - Pancreatitis/Predicting R status/PNET/SPEN
3:30pm - 3:45pm	Afternoon Break, Exhibits & Poster Viewing (Regatta Pavilion)
3:45pm - 5:15pm	Scientific Session 4 - Basic Science Studies
5:15pm - 5:30pm	Finding Objective Research Priorities in Pancreatic Surgery
5:30pm - 5:45pm	Business Meeting
6:30pm - 9:30pm	Pancreas Club Annual Reception(Sunset Terrace) & Dinner(Regatta Pavilion)

Saturday, May 21

7:00am - 5:10pm	Registration (Bayview Foyer)
7:00am - 3:15pm	Continental Breakfast, Exhibits & Poster Viewing (Regatta Pavilion)
7:45am - 9:45am	Scientific Session 5 - Patient-Centered/Palliative/Disparities/Chyle
9:45am - 10:00am	Morning Break, Exhibits & Poster Viewing (Regatta Pavilion)
10:00am - 11:00am	Invited Session/How I Do It?
11:00am - 12:00pm	Poster Rounds with Professors (Regatta Pavilion)
12:00pm - 1:00pm	Luncheon (Regatta Pavilion)
1:00pm - 3:00pm	Scientific Session 6 - Robot/Immunotherapy
3:00pm - 3:15pm	Afternoon Break, Exhibits & Poster Viewing (Regatta Pavilion)
3:15pm - 5:10pm	Scientific Session 7 - IPMN/Post-Recurrence Survival/SSI/Opioid Reduction/ Palliative Care Referral/Elderly/VTE Prophylaxis/EBL
5:10pm - 6:00pm	Awards Reception (Banyon Court & Lawn)

SCIENTIFIC PROGRAM

Friday, May 20, 2022

Registration 7:00am – 5:30pm | Bayview Foyer
Exhibit Hall 7:00am – 3:45pm | Regatta Pavilion

7:00am – 8:00am
Continental Breakfast, Exhibits & Poster Viewing
Regatta Pavilion

7:45am – 8:00am
Welcome & Dedication to Charlie Frey
Bayview Ballroom

8:00am – 9:45am
Scientific Session 1 - Cancer Neoadjuvant/Node/Margins
Bayview Ballroom
Moderators:
Rajesh Gupta MD, MS, M Ch | Postgraduate Institute of Medical Education and Research
William Nealon MD | Northwell Health

8:00am - 8:15am
1. RADIOGRAPHIC, BIOCHEMICAL OR PATHOLOGIC RESPONSE TO NEOADJUVANT CHEMOTHERAPY IN RESECTED PANCREATIC CANCER: WHICH IS BEST?
Presenter: Christopher Javadi MD, PhD | Academic Medical Center
United States

8:15am - 8:30am
2. OUTCOMES AND PREDICTORS OF PATHOLOGICAL COMPLETE RESPONSE AFTER PREOPERATIVE THERAPY IN RESECTED PANCREATIC ADENOCARCINOMA
Presenter: Thomas Stoop MD, PhD | University of Colorado
United States

8:30am - 8:45am
3. BILIARY COMPLICATIONS DURING NEOADJUVANT THERAPY FOR PANCREATIC CANCER
Presenter: Sam Thalji MD | Medical College of Wisconsin
United States

8:45am - 9:00am
4. DEFINING EFFECTIVE NEOADJUVANT CHEMOTHERAPY (NAC) IN PDAC, IMPLICATIONS FROM SURVIVAL AND PATTERN OF FAILURE IN PATIENTS WHO RECEIVED NAC
Presenter: Hao Liu MD, PhD | University of Pittsburgh Medical Center
United States

9:00am - 9:15am
5. SHOULD NEOADJUVANT CHEMOTHERAPY BE CONSIDERED AS A STANDARD IN ELDERLY PATIENTS WITH RESECTABLE PANCREATIC ADENOCARCINOMA: A REVIEW OF NATIONAL CANCER DATABASE
Presenter: Neha Lad MD | Northwell Health Cancer Institute
United States

9:15am - 9:20am
6. NUTRITIONAL IMPACT OF ACTIVE HEXOSE CORRELATED COMPOUND FOR PATIENTS WITH RESECTABLE/BORDERLINE RESECTABLE PANCREATIC CANCER TREATED WITH NEOADJUVANT THERAPY
Presenter: Daisuke Hashimoto MD, PhD | Kansai Medical University
Japan

9:20am - 9:35am
7. EARLY RECURRENCE AFTER RESECTION OF LOCALLY ADVANCED PANCREATIC CANCER FOLLOWING INDUCTION THERAPY: A MULTICENTER STUDY
Presenter: Leonard W.F. Seelen MD | UMC Utrecht
Netherlands

9:35am - 9:40am

8. IMPACT OF ISOLATED POSITIVE VASCULAR GROOVE MARGIN ON RECURRENCE AND SURVIVAL FOLLOWING RESECTION FOR PANCREATIC DUCTAL ADENOCARCINOMA: A SINGLE CENTER EXPERIENCE

Presenter: Hussein H. Khachfe MD | University of Pittsburgh Medical Center

United States

9:40am - 9:45am

9. IMPORTANCE OF NODAL METASTASES LOCATION IN PANCREATODUODENECTOMY FOR PANCREATIC DUCTAL ADENOCARCINOMA: RESULTS FROM A PROSPECTIVE LYMPHADENECTOMY PROTOCOL

Presenter: Laura Maggino MD | University of Verona

Italy

9:45am – 10:00am

Morning Break, Exhibits & Poster Viewing

Regatta Pavilion

10:00am – 11:00am

Scientific Session 2 - Fistula/High Volume

Bayview Ballroom

Moderators:

Susan Tsai MD, MHS | Medical College of Wisconsin

Horacio Asbun MD | Miami Cancer Institute

10:00am - 10:15am

10. A NOVEL SCORING SYSTEM FOR THE PREDICTION OF CLINICALLY RELEVANT POSTOPERATIVE PANCREATIC FISTULA IN PATIENTS UNDERGOING DISTAL PANCREATECTOMY

Presenter: William Wong DO | Academic Medical Center

United States

10:15am - 10:20am

11. A PERIOPERATIVE BUNDLE FOR REDUCTION OF INCISIONAL SURGICAL SITE INFECTIONS FOLLOWING PANCREATICODUODENECTOMY: A PRE-POST INTERVENTION STUDY

Presenter: Thomas L. Sutton MD | Oregon Health & Science University

United States

10:20am - 10:35am

12. GENDER AND YEARS IN PRACTICE CONTRIBUTE TO DISCREPANCY BETWEEN SURGEONS' PERSONAL PREFERENCES AND RECOMMENDATIONS FOR PALLIATIVE CARE REFERRAL. RESULTS FROM AN INTERNATIONAL SURVEY

Presenter: Lyudmyla Dmeyan MD, MS | Northwell Health Cancer Institute

United States

10:35am - 10:50am

13. PANREATICOGASTROSTOMY AS A FISTULA MITIGATING STRATEGY FOR A HIGH-RISK PANCREATIC ANASTOMOSIS FOLLOWING PANCREATICODUODENECTOMY

Presenter: Dana Dominguez MD | Kaiser Permanente Oakland Medical Center

United States

10:50am - 10:55am

14. PREOPERATIVE CHEMORADIOTHERAPY IS ASSOCIATED WITH REDUCED RISK OF POSTOPERATIVE PANCREATIC FISTULA AFTER PANCREATODUODENECTOMY: A NATIONWIDE ANALYSIS

Presenter: J A Suurmeijer MD | Academic Medical Center

Netherlands

10:55am - 11:00am

15. TREATMENT OF PANCREATIC CANCER AT HIGH-VOLUME CENTERS IS ASSOCIATED WITH IMPROVED OUTCOMES AND IS UNDERUTILIZED BY SOCIOECONOMICALLY AND GEOGRAPHICALLY DISADVANTAGED PATIENTS

Presenter: Thomas L. Sutton MD | Oregon Health & Science University
United States

11:00am – 12:00pm
Poster Rounds with Professors
Regatta Pavilion
Moderators: Jeffrey Hardacre MD | University Hospitals Cancer Center

Posters of Distinction # 1-10
See Poster Listing for details

12:00pm – 1:00pm
Lunch
Regatta Pavilion

1:00pm – 3:30pm
Scientific Session 3 - Pancreatitis/Predicting R status/PNET/SPEN
Bayview Ballroom
Moderators:
Marco Del Chiaro MD | University of Colorado
Charles Vollmer MD | University of Pennsylvania

1:00pm - 1:15pm
16. PRIMARY VS. SALVAGE OPERATIVE PANCREATIC DEBRIDEMENT: DISCRETE INTERVENTIONS FOR UNIQUE POPULATIONS
Presenter: Sean McGuire MD | Indiana University School of Medicine
United States

1:15pm - 1:30pm
17. PERSPECTIVE OF POINT-OF-CARE SPECIALISTS ON THE INITIAL MANAGEMENT OF ACUTE PANCREATITIS: AN INTERNATIONAL MULTIDISCIPLINARY SURVEY FOCUSED ON DAILY PRACTICE
Presenter: Nuria Lluis MD | Miami Cancer Institute
United States

1:30pm - 1:45pm
18. OPERATIVE PANCREAS DEBRIDEMENT IN 2022: WHO AND WHEN
Presenter: Sean McGuire MD | Indiana University School of Medicine
United States

1:45pm - 2:00pm
19. INCIDENCE AND PREDICTORS OF EARLY AND LATE READMISSION AFTER ACUTE PANCREATITIS Presenter: Benjamin Richter MD | NYU Langone Health
United States

2:00pm - 2:15pm
20. ROUTINE INTENSIVE CARE UNIT OBSERVATION AFTER PANCREATECTOMY: TREATING THE PATIENT OR THE SURGEON?
Presenter: Thomas L. Sutton MD | Oregon Health & Science University
United States

2:15pm - 2:30pm
21. CHRONIC PANCREATITIS PATIENTS: ENDOSCOPIC PROCEDURES AND QUALITY OF LIFE
Presenter: Mikael Parhiala MD | Tampere University Hospital
Finland

2:30pm - 2:35pm
22. CHANGES IN ACTIVITY OF HEAT SHOCK PROTEIN-70 FAMILY GENES IS ASSOCIATED WITH EARLY ACUTE PANCREATITIS SEVERITY
Presenter: Aiste Kielaite-Gulla MD, PhD, MBA | Vilnius University Hospital Santaros Clinics (VULSK)
Lithuania

2:35pm - 2:40pm
23. WEIGHT TRACKING AS A NOVEL PROGNOSTIC MARKER AFTER PANCREATECTOMY
Presenter: Jonathan J. Hue MD | University Hospitals Cleveland Medical Center
United States

2:40pm - 2:45pm
24. MACHINE LEARNING ALGORITHM IDENTIFIES PATIENTS AT RISK FOR PANCREATIC CANCER IN A 3-YEAR TIMEFRAME
Presenter: Tamas Gonda MD | NYU Langone Health
United States

2:45pm - 3:00pm
25. POTENTIAL ROLE FOR OBSERVATION IN SMALL SOLID PSEUDOPAPILLARY ENDOCRINE NEOPLASIA (SPEN)
Presenter: Oliver Standring MD | Northwell Health Cancer Institute
United States

3:00pm - 3:15pm
26. NON-INVASIVE GRADING OF NONFUNCTIONAL PANCREATIC NEUROENDOCRINE TUMORS WITH A CT-DERIVED RADIOMICS-SIGNATURE
Presenter: Ammar A. Javed MD | NYU Langone Health
United States

3:15pm - 3:30pm
27. PREDICTION OF R STATUS IN RESECTIONS FOR PANCREATIC CANCER USING SIMPLIFIED RADIOLOGICAL CRITERIA
Presenter: Louisa Bolm MD | Massachusetts General Hospital
United States

3:30pm – 3:45pm
Afternoon Break, Exhibits & Poster Viewing
Regatta Pavilion

3:45pm – 5:15pm
Scientific Session 4 - Basic Science Studies
Bayview Ballroom
Moderators:
Christopher Wolfgang MD, PhD | NYU Grossman School of Medicine/NYU Langone Health System
John Chabot MD | Columbia University Irving Medical Center

3:45pm - 4:00pm
28. PANCREATIC CANCER PATIENT-DERIVED ORGANOIDS ACCURATELY PREDICT RESPONSE TO NEOADJUVANT CHEMOTHERAPY
Presenter: Lyudmyla Dmeyan MD, MS | Northwell Health Cancer Institute
United States

4:00pm - 4:15pm
29. VAGUS NERVE CHOLINERGIC NEURONS ORIGINATING IN THE DORSAL MOTOR NUCLEUS MITIGATE THE SEVERITY OF MURINE ACUTE PANCREATITIS
Presenter: Dane Thompson MD | Feinstein Institutes for Medical Research
United States

4:15pm - 4:30pm
30. PATENCY FOR AUTOLOGOUS VEIN IS SUPERIOR TO CADAVERIC VEIN IN PORTAL-MESENTERIC VENOUS RECONSTRUCTION
Presenter: Thomas L. Sutton MD | Oregon Health & Science University
United States

4:30pm - 4:45pm
31. ORGANOTYPIC SLICE CULTURES: EX VIVO THERAPY PREDICTION IN PANCREATIC CANCER

Presenter: Benjamin Heckelmann | University Medical Center Schleswig-Holstein
Germany

4:45pm - 5:00pm

32. HARNESSING THE POWER OF FLUORESCENT NANOBODIES FOR BRIGHT AND SPECIFIC LABELING OF HUMAN PANCREATIC CANCER IN MOUSE MODELS

Presenter: Michael D. Turner MD| University of California, San Diego
United States

5:00pm - 5:15pm

33. TARGETING CELLULAR METABOLISM IN CHOLANGIOCARCINOMA USING REPURPOSED NOVEL MITOCHONDRIAL INHIBITORS

Presenter: Saed Khalilieh MD | Thomas Jefferson University Hospital
United States

5:15pm – 5:30pm
Finding Objective Research Priorities in Pancreatic Surgery
Bayview Ballroom
Introduction: Christopher Wolfgang MD, PhD | NYU Grossman School of Medicine/NYU Langone Health System
Thilo Hackert MD | University Hospital in Heidelberg

5:30pm – 5:45pm
Pancreas Club Business Meeting
Bayview Ballroom

6:30pm – 9:30pm
Pancreas Club Annual Reception & Dinner
Sunset Terrace & Regatta Pavilion

Saturday, May 21, 2022

Registration 7:00am – 5:00pm | Bayview Foyer
Exhibit Hall 7:00am – 3:15pm | Regatta Pavilion

7:00am – 7:45am
Continental Breakfast, Exhibits & Poster Viewing
Regatta Pavilion

7:45am – 9:45am
Scientific Session 5 - Patient-Centered/Palliative/Disparities/Chyle
Bayview Ballroom
Moderators:
Barish Edil MD | University of Oklahoma Health Sciences Center
Ammar Javed MD | NYU Langone Health

7:45am - 8:00am

34. DISTRESS SCREENING AND CANCER: AN ASSESSMENT IN PANCREATICOBILIARY CANCER PATIENTS AND THEIR SIGNIFICANT OTHERS

Presenter: Theresa P. Yeo PhD, MPH, ACNP-BC | Thomas Jefferson University Hospital
United States

8:00am - 8:15am

35. FAILED RECOVERY OCCURS WITHOUT SURGICAL COMPLICATIONS FOR A SIGNIFICANT NUMBER OF PATIENTS AFTER PANCREAS SURGERY

Presenter: Guido Fiorentini MD | Mayo Clinic
United States

8:15am - 8:30am

36. TOTAL PANCREATECTOMY AND ISLET CELL AUTOTRANSPLANTATION: A 10-YEAR UPDATE ON OUTCOMES AND ASSESSMENT OF LONG-TERM DURABILITY
Presenter: Eileen Donovan MD | University of Cincinnati
United States

8:30am - 8:45am
37. SHORT- AND LONG-TERM OUTCOMES OF PANCREATIC CANCER RESECTION IN ELDERLY PATIENTS: A NATIONWIDE ANALYSIS
Presenter: Anne Claire Henry MD | Regional Academic Cancer Center Utrecht
Netherlands

8:45am - 8:50am
38. THE INCIDENCE OF DEPRESSION AND ANXIETY PRECEDING A DIAGNOSIS OF PANCREATIC CANCER
Presenter: Nathaniel Davis BS | University Hospitals Cleveland Medical Center
United States

8:50am - 9:05am
39. VALIDATION OF THE ISGPS RISK CLASSIFICATION SYSTEM FOR POSTOPERATIVE PANCREATIC FISTULA AFTER PANCREATODUODENECTOMY IN A NATIONWIDE COHORT
Presenter: Anouk Emmen MD | Academic Medical Center
Netherlands

9:05am - 9:20am
40. INCIDENCE AND RISK FACTORS OF CHYLE LEAK AFTER PANCREATECTOMY: A SINGLE HIGH-VOLUME INSTITUTION EXPERIENCE.
Presenter: Jun Ishida MD, PhD | University of Colorado
United States

9:20am - 9:25am
42. PANCREATIC STELLATE CELLS REGULATE ACINAR CELL ORGANIZATION IN A THREE-DIMENSIONAL CO-CULTURE MODEL
Presenter: Merja Bläuer PhD | Tampere University Hospital
Finland

9:25am - 9:30am
43. TREATMENT WITHIN A MULTIDISCIPLINARY CLINIC INCREASES TREATMENT AND ELIMINATE SOCIOECONOMIC SURVIVAL DISPARITIES FOR PANCREATIC CANCER: A REGIONAL HOSPITAL SYSTEM ANALYSIS
Presenter: Caroline Rieser MD | University of Pittsburgh Medical Center
United States

9:30am - 9:45am
44. SURVIVAL BENEFIT OF STEREOTACTIC BODY RADIATION THERAPY VERSUS CONVENTIONAL RADIATION THERAPY IN PATIENTS WITH PANCREATIC CANCER
Presenter: Hardik Patel DO | Northwell Health - Staten Island University Hospital
United States

9:45am – 10:00am
Morning Break, Exhibits & Poster Viewing
Regatta Pavilion

10:00am – 11:00am
How I Do It | Anticoagulation After Vascular Resection in Pancreatectomy
Bayview Ballroom
Moderator: Nicholas Zyromski MD | Indiana University School of Medicine

Panelists:
Ugo Boggi MD | University of Pisa
Marco Del Chiaro MD | University of Colorado Anschutz Medical Campus

Kathleen Chrisitans MD | Medical College of Wisconsin
Cristina Ferrone MD | Massachusetts General Hospital
Matthew Katz MD | MD Anderson Cancer Center

11:00am – 12:00pm
Poster Rounds with Professors
Regatta Pavilion
Moderator: Jin He MD, PhD | Johns Hopkins University School of Medicine
Tara Kent MD | Beth Israel Deaconess Medical Center

Posters of Distinction # 11-20
See Poster Listing for details

12:00pm – 1:00pm
Lunch
Regatta Pavilion

1:00pm – 3:00pm
Scientific Session 6 - Robot/Immunotherapy
Bayview Ballroom
Moderators:
Ulrich Adam MD | Vivantes Humboldt Hospital Berlin
Nigel Jamieson MD, PhD | Glasgow Royal Infirmary

1:00pm - 1:15pm
46. PROGNOSTIC VALUE OF CARCINOEMBRYONIC ANTIGEN (CEA) FOR PATIENTS WITH LOCALIZED PANCREATIC CANCER
Presenter: Erin P. Ward MD | Medical College of Wisconsin
United States

1:15pm - 1:30pm
47. BIOTISSUE TRAINING CURRICULUM CORRELATES WITH INTRAOPERATIVE PERFORMANCE FOR ROBOTIC PANCREATICODUODENECTOMY
Presenter: Jasmine D. Kraftician BS | University of Pittsburgh Medical Center
United States

1:30pm – 1:35pm
48. SERUM B7-H3 LEVELS AS A NOVEL PROGNOSTIC BIOMARKER TO PREDICT RESECTABILITY IN PDAC PATIENTS TREATED WITH NEOADJUVANT FOLFIRINOX
Presenter: Martina Nebbia MD | Massachusetts General Hospital
United States

1:35pm – 1:40pm
49. DOES MINIMALLY INVASIVE SURGERY HAVE DIFFERENT IMPACT ON RECURRENCE AND OVERALL SURVIVAL IN PATIENTS WITH PANCREATIC HEAD VERSUS BODY/TAIL CANCER?
Presenter: Sung Hoon Choi MD | Academic Medical Center
United States

1:40pm – 1:45pm
50. DEFINING THE OPERATIVE TIME THRESHOLD FOR SAFETY IN PATIENTS UNDERGOING ROBOTIC PANCREATICODUODENECTOMY
Presenter: Eileen Donovan MD | University of Cincinnati
United States

1:45pm – 1:50pm
51. VIDEO ANALYSIS OF GASTRO-JEJUNOSTOMY TO PREDICT DELAYED GASTRIC EMPTYING AFTER ROBOTIC PANCREATODUODENECTOMY; PRELIMINARY ANALYSIS OF TWO CENTERS
Presenter: Diederik Paijens BSc candidate | Academic Medical Center
Netherlands

1:50pm - 2:05pm
52. HYPERGLYCEMIA SENSITIZES PANCREATIC CANCER TO MACROPHAGE-SPECIFIC IMMUNOTHERAPIES: AN UPDATE
Presenter: Jonathan J. Hue MD | University Hospitals Cleveland Medical Center
United States

2:05pm - 2:20pm
53. THE EFFECT OF NEOADJUVANT THERAPY ON IMMUNE PROFILING OF PANCREATIC DUCTAL ADENOCARCINOMA: A PROSPECTIVE STUDY OF THE PREOPANC-1 RANDOMIZED CONTROLLED TRIAL.
Presenter: Dana A. Mustafa Erasmus MC | Academic Medical Center
Netherlands

2:20pm - 2:35pm
54. DOES ONE CYCLE OF FFX TREATMENT CHANGE THE BLOOD IMMUNE PROFILE IN PDAC PATIENTS?
Presenter: Casper W. van Eijck BSc | Erasmus University Medical Center
Netherlands

2:35pm – 2:40pm
55. VENOUS THROMBOSIS FOLLOWING VASCULAR RESECTION DURING PANCREATICODUODENECTOMY: INCIDENCE AND RISK FACTORS
Presenter: Hussein H. Khachfe MD | University of Pittsburgh Medical Center
United States

2:40pm – 2:45pm
56. COMPARISON OF SHORT-TERM RESULTS BETWEEN SUPERIOR MESENTERIC ARTERY RESECTION AND SUPERIOR MESENTERIC/PORTAL VEIN RESECTION DURING PANCREATECTOMY: A PROPENSITY SCORE MATCHING ANALYSIS
Presenter: Michael Ginesini MD | University of Pisa
Italy

3:00pm – 3:15pm
Afternoon Break, Exhibits & Poster Viewing
Regatta Pavilion

3:15pm – 5:10pm
Scientific Session 7 - IPMN/Post-Recurrence Survival/SSI/Opioid Reduction/Palliative Care Referral/Elderly/VTE Prophylaxis/EBL
Bayview Ballroom
Moderators:
Clancy Clark MD | Atrium Health Wake Forest Baptist
Steven Hughes MD | University of Florida

3:15pm - 3:30pm
57. PROSPECTIVE, MULTI-INSTITUTIONAL, REAL-TIME NEXT-GENERATION SEQUENCING OF PANCREATIC CYST FLUID REVEALS DIVERSE GENOMIC ALTERATIONS THAT IMPROVE THE ASSESSMENT OF PANCREATIC CYSTS
Presenter: Alessandro Paniccia MD | University of Pittsburgh Medical Center
United States

3:30pm – 3:35pm
58. DISTAL PANCREATECTOMY FISTULA RISK SCORE (D-FRS): DEVELOPMENT AND INTERNATIONAL VALIDATION
Presenter: Eduard A. van Bodegraven MD | Academic Medical Center

Netherlands

3:35pm - 3:50pm
59. PREDICTING POST-RECURRENCE SURVIVAL FOR PATIENTS WITH PANCREATIC CANCER RECURRENCE AFTER PRIMARY RESECTION: A BI-INSTITUTIONAL VALIDATED RISK CLASSIFICATION
Presenter: Lois A. Daamen MD, PhD | UMC Utrecht
Netherlands

3:50pm - 4:05pm
60. SUCCESSFUL IMPLEMENTATION OF AN OPIOID REDUCTION TOOLKIT IN PANCREATECTOMY PATIENTS SIGNIFICANTLY DECREASES NUMBER OF OPIOIDS PRESCRIBED AND CONSUMED
Presenter: Ryan Lamm MD | Thomas Jefferson University Hospital
United States

4:05pm – 4:20pm
61. POSTOPERATIVE PANCREATIC FISTULA TENDS TO BE OF A HIGHER GRADE IN MINIMALLY INVASIVE VS. OPEN PANCREATICODUODENECTOMY: TRUTH OR MYTH?
Presenter: Samer Naffouje MD | Moffitt Cancer Center
United States

4:20pm – 4:35pm
62. EVALUATING THE IMPACT OF PRE-OPERATIVE GERIATRIC-SPECIFIC VARIABLES AND MODIFIED FRAILTY INDEX ON POST-OPERATIVE OUTCOMES AFTER ELECTIVE PANCREATIC SURGERY
Presenter: Christopher Cramer MD | University of Virginia
United States

4:35pm - 4:40pm
63. A COMPARISON OF THE USE OF EXTENDED VENOUS THROMBOEMBOLISM PROPHYLAXIS ON THE RATES OF VENOUS THROMBOEMBOLISM AND POST-PANCREATECTOMY HEMORRHAGE FOLLOWING PANCREATECTOMY FOR MALIGNANCY
Presenter: Henry J. Stitzel BS | Case Western Reserve University School of Medicine
United States

4:40pm – 4:55pm
64. THE ORGANOTYPIC-LIVER SLIDE CULTURE SYSTEM FOR THE INVESTIGATION OF THE ROLE OF EXOSOMES IN PANCREATIC CANCER
Presenter: Annalisa Comandatore MD | University of Pisa
Italy

4:55pm – 5:10pm
65. INTRAOPERATIVE BLOOD LOSS ESTIMATION IN HEPATO-PANCREATO-BILIARY SURGERY: AS RELEVANT AS NON-STANDARDIZED. RESULTS FROM A SYSTEMATIC REVIEW AND A WORLDWIDE SNAPSHOT SURVEY
Presenter: Giampaolo Perri MD | University of Verona
Italy

5:10pm – 6:00pm
Awards Reception
Banyon Court & Lawn

POSTERS OF DISTINCTION

POD 1. VIDEO ANALYSIS OF HEPATICOJEJUNOSTOMY FOR PREDICTING BILIARY COMPLICATIONS AFTER ROBOTIC PANCREATODUODENECTOMY
Presenter: Sabrina L. Zwetsloot BSc | Academic Medical Center
Netherlands

POD 2. OVEREXPRESSION OF INTEGRIN ALPHA 2 (ITGA2) CORRELATES WITH POOR SURVIVAL IN PATIENTS WITH PANCREATIC DUCTAL ADENOCARCINOMA
Presenter: Rüdiger Braun MD | Academic Medical Center
Germany

POD 3. AVERAGE CAUSAL EFFECT OF TOTAL FACILITY HEPATO-PANCREATO-BILIARY MALIGNANCY CASE VOLUME ON SURVIVAL OUTCOMES OF PATIENTS WITH NON-RESECTED PANCREATIC ADENOCARCINOMA
Presenter: Mohamedraed Elshami MD, MMSc | University Hospitals Cleveland Medical Center
United States

POD 4. POSTOPERATIVE INFECTIOUS COMPLICATIONS WORSEN ONCOLOGIC OUTCOMES FOLLOWING PANCREATICODUODENECTOMY FOR PANCREATIC ADENOCARCINOMA
Presenter: Hussein H. Khachfe MD | University of Pittsburgh Medical Center
United States

POD 5. IDO1 IS A PROMISING THERAPEUTIC TARGET TO TREAT PANCREATIC CANCER-ASSOCIATED DEPRESSION
Presenter: Jonathan J. Hue MD | University Hospitals Cleveland Medical Center
United States

POD 6. FACTORS PREDICTING LONG-TERM DISEASE-FREE SURVIVAL AFTER SURGERY FOR PANCREATIC DUCTAL ADENOCARCINOMA: A NATIONWIDE ANALYSIS
Presenter: Lois Daamen MD, PhD | Regional Academic Cancer Center Utrecht
Netherlands

POD 7. IMMUNOMODULATORY EFFECTS OF RINTATOLIMOD (AMPLIGEN®) AFTER FOLFIRINOX THERAPY IN PATIENTS WITH LOCALLY ADVANCED AND METASTASIZED PANCREATIC CANCER: A SINGLE-CENTER NAMED PATIENT PROGRAM
Presenter: Dana A. Mustafa PhD | Erasmus University Medical Center
Netherlands

POD 8. THE IMPACT OF COMPLICATIONS AFTER RESECTION OF PANCREATIC DUCTAL ADENOCARCINOMA ON DISEASE RECURRENCE AND SURVIVAL
Presenter: Anne Claire Henry MD | Regional Academic Cancer Center Utrecht
Netherlands

POD 9. IMPLEMENTATION OF A SYSTEM-WIDE MULTIDISCIPLINARY CLINIC IMPROVES STANDARDIZATION OF PANCREATIC CANCER CARE
Presenter: Shamsher A. Pasha MBBS | Northwell Health Cancer Institute
United States

POD 10. DOES GOAL-DIRECTED FLUID MANAGEMENT DURING PANCREATODUODENECTOMY PREVENT DELAYED GASTRIC EMPTYING?
Presenter: Alexandra M. Roch MD, MS | Indiana University School of Medicine
United States

POD 11. SUPERIOR MESENTERIC/PORTAL VEIN RESECTION DURING ROBOT-ASSISTED PANCREATICODUODENECTOMY VERSUS OPEN PANCREATICODUODENECTOMY: A PROPENSITY SCORE MATCHED ANALYSIS
Presenter: Niccolo Napoli MD | University of Pisa
Italy

POD 12. CONTEMPORARY REPORT OF CLINICAL OUTCOMES AFTER TOTAL PANCREATECTOMY: NINE YEAR EXPERIENCE AT A HIGH VOLUME PANCREAS CENTER
Presenter: Luke L. Kowal | Thomas Jefferson University Hospital
United States

POD 13. OCCURRENCE OF DELAYED GASTRIC EMPTYING AFTER ROBOTIC PYLORUS PRESERVING PANCREATODUODENECTOMY: A COMPARISON WITH THE TRADITIONAL OPEN APPROACH
Presenter: Annalisa Comandatore MD | University of Pisa
Italy

POD 14. HYPERGLYCEMIA IS ASSOCIATED WITH IMPROVED SURVIVAL AMONG PATIENTS WITH METASTATIC PANCREATIC CANCER TREATED WITH CHEMOTHERAPY
Presenter: Jonathan J. Hue MD | University Hospitals Cleveland Medical Center
United States

POD 15. ROBOTIC VERSUS LAPAROSCOPIC DISTAL PANCREATECTOMY IN PATIENTS WITH RESECTABLE PANCREATIC CANCER: AN INTERNATIONAL RETROSPECTIVE COHORT STUDY
Presenter: Jeffrey W. Chen MD | Academic Medical Center
Netherlands

POD 16. PANDORA-2 PROTOCOL; INTERVENTION STUDY TO IMPROVE QUALITY OF LIFE IN PATIENTS WITH SMALL (≤2 CM) NON-FUNCTIONAL PANCREATIC NEUROENDOCRINE TUMORS
Presenter: Jeffrey W. Chen MD | Academic Medical Center
Netherlands

POD 17. MANAGEMENT AND OUTCOMES OF MIXED ADENONEUROENDOCRINE CARCINOMA OF THE AMPULLA OF VATER: A SYSTEMATIC REVIEW AND POOLED ANALYSIS OF 56 PATIENTS
Presenter: Ioannis A. Ziogas MD | University of Colorado
United States

POD 18. THE IMPORTANCE OF B CELLS IN THE TUMOR MICROENVIRONMENT OF PATIENTS WITH PANCREATIC CANCER
Presenter: Dana A. Mustafa Erasmus MC | Academic Medical Center
Netherlands

POD 19. MANAGEMENT OF ADENOCARCINOMA OF THE PANCREATIC TAIL IN THE ELDERLY
Presenter: Christina Boutros DO | Case Western Reserve University School of Medicine
United States

POD 20. RADICAL ANTEGRADE PANCREATOSPLENECTOMY (RAMPS): DOES ADRENALECTOMY ALTER OUTCOMES?
Presenter: Catherine H. Davis MD, MPH | Rutgers Cancer Institute of New Jersey
United States

POSTER LISTINGS

P 22. A NOVEL TOOL TO PREDICT NODAL METASTASIS IN SMALL PANCREATIC NEUROENDOCRINE TUMORS – A MULTICENTER STUDY
Presenter: Ammar A. Javed MD | Johns Hopkins University School of Medicine
United States

P 23. NECROTIZING PANCREATITIS-ASSOCIATED ANXIETY, DEPRESSION, AND STRESS: INCIDENCE, RISK FACTORS, AND TARGETS FOR INTERVENTION
Presenter: Sean McGuire MD | Indiana University School of Medicine
United States

P 24. THE ROLE OF MARGIN CLEARANCE ON PROGNOSIS AMONG STAGE IIB AND III PANCREATIC DUCTAL ADENOCARCINOMA PATIENTS ACCORDING TO STANDARDIZED HISTOPATHOLOGICAL EVALUATION.
Presenter: Reea Ahola MD, PhD | Tampere University Hospital
Finland

P 26. SHOULD SERUM CA125 BE USED IN CLINICAL PRACTICE AS PREDICTIVE MARKERS OF SURVIVAL IN PANCREATIC DUCTAL ADENOCARCINOMA?
Presenter: Niccolo Napoli MD | University of Pisa
Italy

P 29. AN AGE-BMI COMPOUND VARIABLE PREDICTS MORBIDITY AND MORTALITY FOLLOWING WHIPPLE: A NSQIP ANALYSIS
Presenter: Hussein H. Khachfe MD | University of Pittsburgh Medical Center
United States

P 30. PANCREATIC CANCER INCIDENCE AND MORTALITY: 27-YEAR TRENDS FROM THE PENNSYLVANIA CANCER REGISTRY
Presenter: Jonathan Pham BS | Penn State College of Medicine
United States

P 32. SHORT TERM OUTCOME AFTER 1,004 MINIMALLY INVASIVE AND OPEN CENTRAL PANCREATECTOMIES: SYSTEMATIC REVIEW AND META-ANALYSIS
Presenter: Eduard A. van Bodegraven MD | Academic Medical Center
Netherlands

P 33. PANCREATECTOMY FOR INTRADUCTAL PAPILLARY MUCINOUS NEOPLASM: HAS ANYTHING CHANGED IN NORTH AMERICA?
Presenter: Catherine H. Davis MD, MPH | Rutgers Cancer Institute of New Jersey
United States

P 34. ENDOSCOPIC ULTRASOUND VERSUS COMPUTED TOMOGRAPHY EVALUATION OF VEIN INVOLVEMENT FOR PANCREATIC DUCTAL ADENOCARCINOMA
Presenter: June S. Peng MD | Penn State College of Medicine
United States

P 36. COST-EFFECTIVENESS OF STAGING LAPAROSCOPY AND PERITONEAL CYTOLOGY IN PANCREATIC ADENOCARCINOMA
Presenter: Neal Panse | Rutgers New Jersey Medical School - Newark
United States

P 37. PREVALENCE AND PROGRESSION OF INTRADUCTAL PAPILLARY MUCINOUS NEOPLASMS OF THE PANCREAS IN SOLID ORGAN TRANSPLANT RECIPIENTS: A SYSTEMATIC REVIEW
Presenter: Toshitaka Sugawara MD, PhD | University of Colorado
United States

P 38. BILE VOLATILE ORGANIC COMPOUNDS IN THE DIAGNOSTICS OF BILIARY OBSTRUCTION AND PANCREATIC CANCER
Presenter: Ville Teränen MD | Tampere University Hospital
Finland

P 39. A NEW POTENTIAL PROGNOSTIC BIOMARKER AND TARGET IN HEPATO-PANCREATO-BILIARY CANCERS: THE GLUCOSE TRANSPORTER-1
Presenter: Annalisa Comandatore MD | University of Pisa
Italy

P 41. PROGNOSTIC FACTORS FOR ISOLATED LOCAL RECURRENCE AFTER RESECTION OF PANCREATIC DUCTAL ADENOCARCINOMA: A NATIONWIDE ANALYSIS
Presenter: Lois Daamen MD, PhD | Regional Academic Cancer Center Utrecht
Netherlands

P 43. "COLD TRIANGLE ROBOTIC PANCREATODUODENECTOMY": TECHNIQUE, POSTOPERATIVE COMPLICATIONS AND PATHOLOGICAL RESULTS.
Presenter: Emanuele Federico Kauffmann MD | University of Pisa
Italy

P 45. EFFECT OF INSURANCE STATUS ON PERIOPERATIVE OUTCOMES AND TIME TO INITIATE ADJUVANT THERAPY AFTER ROBOTIC PANCREATICODUODENECTOMY: A PROPENSITY-SCORE MATCHED ANALYSIS
Presenter: Harel Jacoby MD | Digestive Health Institute Tampa
United States

P 46. COMPARISON OF ONCOLOGIC OUTCOMES BETWEEN OPEN AND LAPAROSCOPIC DISTAL PANCREATECTOMY FOR PANCREATIC DUCTAL ADENOCARCINOMA USING DATA FROM THE KOTUS-BP NATIONAL DATABASE
Presenter: Hongbeom Kim | Seoul National University College of Medicine
Korea

P 48. ASSESSING THE IMPACT OF PREOPERATIVE CORTICOSTEROID THERAPY IN PATIENTS UNDERGOING PANCREATICODUODENECTOMY USING THE NATIONAL SURGICAL QUALITY IMPROVEMENT PROGRAM (NSQIP)
Presenter: Saba Alvi MD | Tufts University School of Medicine
United States

P 49. OPTIMAL PAIN MANAGEMENT AFTER OPEN WHIPPLE: COMPARISON OF EPIDURAL VERSUS INTRATHECAL (IT) MORPHINE PLUS TRANSVERSUS ABDOMINIS PLANE (TAP) BLOCK VERSUS TAP BLOCK ALONE
Presenter: June S. Peng MD | Penn State College of Medicine
United States

P 50. PLASMA SOLUBLE UROKINASE-TYPE PLASMINOGEN ACTIVATOR RECEPTOR (P-SUPAR) REFLECTS THE INFLAMMATORY RESPONSE AFTER PANCREATIC SURGERY.
Presenter: Anu Aronen MD | Sigrid Jusélius Foundation
Finland

P 51. VASCULAR PANCREATIC SURGERY WITH VENOUS AND ARTERIAL CONDUITS: REFLECTIONS ON TECHNIQUE, POSTOPERATIVE AND ONCOLOGIC OUTCOMES
Presenter: Benedict Kinny-Köster MD | NYU Langone Health
United States

P 52. THE INFLUENCE OF SARCOPENIA AND SYSTEMIC INFLAMMATION ON SURVIVAL IN RESECTED PANCREATIC CANCER
Presenter: Nigel Jamieson MD, PhD | University of Glasgow
United Kingdom

P 53. SANTORINI'S DUCT IPMN: SHOULD IT BE ADDED AS A NEW HIGH-RISK CRITERION?
Presenter: Marcel C. Machado MD | University of São Paulo
Brazil

P 56. ROLE OF INFLAMMATORY AND NUTRITIONAL MARKERS IN PREDICTING COMPLICATIONS FOLLOWING PANCREATICODUODENECTOMY
Presenter: Rajeshwar Jotheeswaran MD | Postgraduate Institute of Medical Education And Research
India

P 57. COMPARING POST- OPERATIVE OUTCOMES FOR PANCREATIC DUCTAL ADENOCARCINOMA: NEOADJUVANT THERAPY VERSUS UPFRONT SURGERY
Presenter: Tariq Almerey MD | Mayo Clinic, Jacksonville
United States

P 58. ANALYZING HOW PERIOPERATIVE VARIABLES PREDICT SURVIVAL IN ROBOTIC DISTAL PANCREATECTOMY AND SPLENECTOMY FOR PATIENTS WITH ADENOCARCINOMA OR NEUROENDOCRINE PATHOLOGY
Presenter: Harel Jacoby MD | Digestive Health Institute Tampa
United States

P 59. SURGICAL RESECTION OF SPORADIC PANCREATIC NEUROENDOCRINE TUMORS: A TWO-DECADE EXPERIENCE AT A LARGE VOLUME CANCER CENTER
Presenter: Bradford J. Kim MD, MHS | University of Texas MD Anderson Cancer Center
United States

P 60. THE FIRST 40 CONSECUTIVE FULLY ROBOTIC PANCREATODUODENECTOMY PERFORMED BY A SINGLE SURGEON WITHOUT CONVERSION TO OPEN SURGERY: A CASE- SERIES
Presenter: Annalisa Comandatore MD | University of Pisa
Italy

P 61. COMPLETE PANCREATIC DUPLICATION: CASE REPORT AND REVIEW OF THE LITERATURE
Presenter: Nuria Lluis MD | Miami Cancer Institute
United States

P 62. BUTYRYLCHOLINESTERASE CONTROLS THE CANINE PANCREAS DIGESTIVE ENZYMES SYNTHESIS RATE BY CONTROLLING THE NUMBER OF ACH RECEPTORS OCCUPIED. THIS EXPLAINS HOW TOXIC ACINAR CELL DAMAGE CAUSES PANCREATITIS
Presenter: Thomas D. Dressel BME, MS, MD | University of Minnesota
United States

P 63. CAN WE COMPARE THE RESULTS OF THE TREATMENT OF RESECTABLE AND BORDERLINE PANCREATIC CANCER.
Presenter: Igor Zhvitiashvili DM, DPh | Smolensk State Medical University
Russian Federation

P 64. CYTOREDUCTION WITH HIPEC FOR ADENOCARCINOMA FOLLOWING COMPLETION PANCREATECTOMY FOR RECURRENT IPMN
Presenter: Neha Lad MD | Northwell Health Cancer Institute
United States

P 65. SURVIVAL ASSOCIATED WITH STAGING CT AND DIAGNOSTIC LAPAROSCOPY AND CYTOLOGY IN PANCREATIC ADENOCARCINOMA: A CASE SERIES
Presenter: Neal Panse | Rutgers New Jersey Medical School - Newark
United States

P 66. RECURRENT METASTATIC SOLID PSEUDOPAPILLARY NEOPLASM OF THE PANCREAS FOLLOWING ABDOMINAL TRAUMA TREATED BY CYTOREDUCTIVE SURGERY
Presenter: Brandon Wummer BSc | Thomas Jefferson University Hospital
United States

ORAL ABSTRACTS

1. RADIOGRAPHIC, BIOCHEMICAL OR PATHOLOGIC RESPONSE TO NEOADJUVANT CHEMOTHERAPY IN RESECTED PANCREATIC CANCER: WHICH IS BEST?

C Javadi, JD Chang, E Forgo, MU Ahmad, GA Fisher, DT Chang, Dj Delitto, MM Dua, B Lee, BC Visser, JA Norton, GA Poultsides

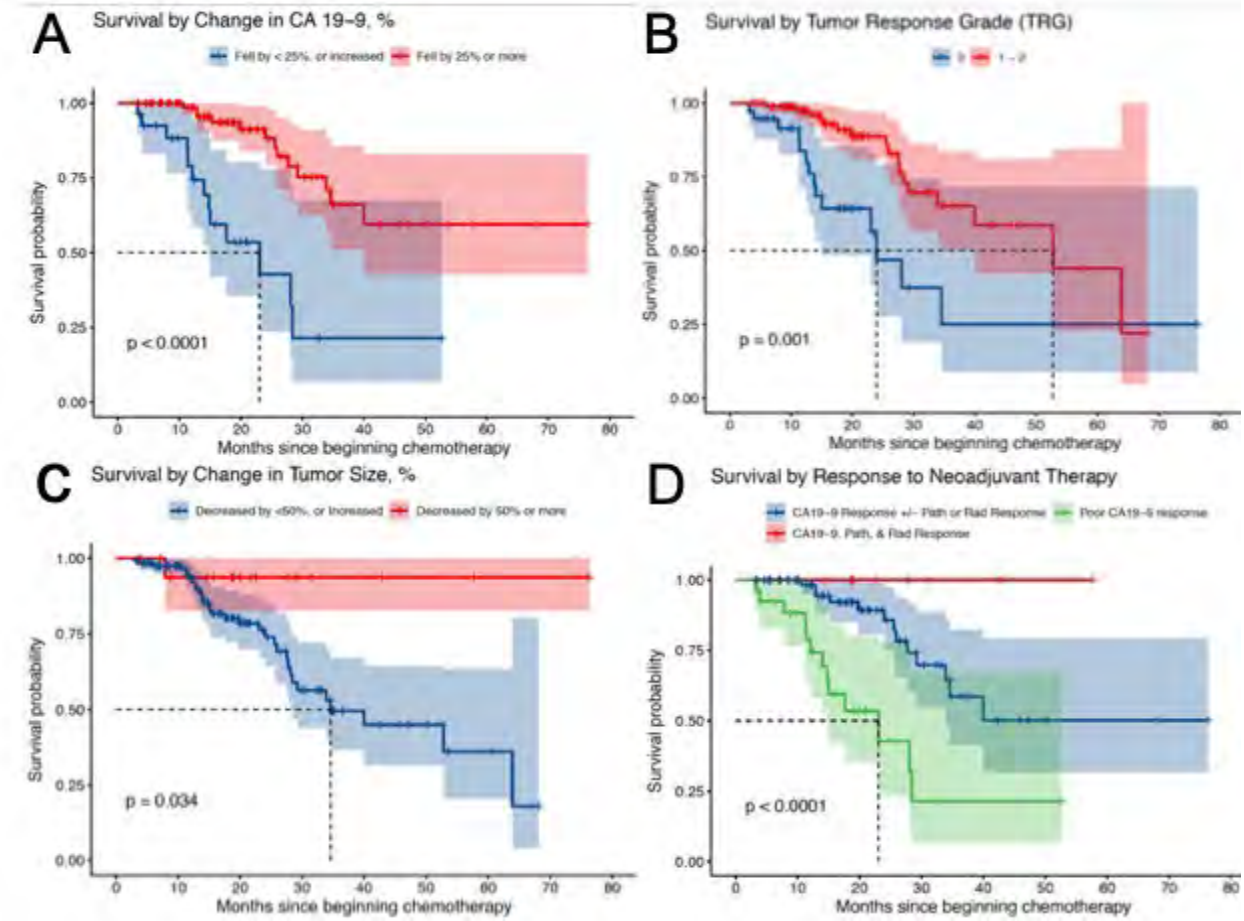
Presenter: Christopher Javadi MD, PhD | Academic Medical Center, United States

Background: Response to neoadjuvant therapy for pancreatic ductal adenocarcinoma (PDAC) can be assessed by radiographic (change in tumor size), biochemical (change in CA 19-9), and pathologic parameters (tumor regression grade, TRG). However, the relative prognostic significance of each type of response in comparison to the other two remains unclear. This study compared the individual and collective ability of these three types of response in predicting survival after neoadjuvant therapy and resection of PDAC.

Methods: Patients who underwent neoadjuvant chemotherapy and PDAC resection at a single institution were retrospectively analyzed. Several thresholds for radiographic, CA19-9 and pathologic response were assessed and compared to each other. Overall survival (OS) was calculated with the Kaplan–Meier method and compared with log rank and Cox proportional hazard methods.

Results: From 2011 to 2021,146 patients with PDAC received neoadjuvant chemotherapy (Folfirinox, n=101; Gem-Abraxane, n=30; other, n=15) followed by surgical resection. Thirty patients (21%) also received neoadjuvant radiation. Porto-mesenteric venous reconstruction was required in 75 (51%) patients. Median OS from initiation of chemotherapy was 53 months. Longer OS was observed in patients with CA19-9 decrease > 25% (NR vs 23 mos, p 50% (NR vs. 35 mos, p=0.034, Figure 1C). Interestingly, a RECIST radiographic response (decrease in tumor size > 30%) was not predictive of OS. In multivariate analysis, CA 19-9 decrease > 25% was independently associated with OS (HR=0.36, p=0.026), whereas pathologic (p=0.074) and radiographic response (p=0.16) were not. OS was optimal in the presence of all 3 types of response (Figure 1D) and intermediate in the presence of CA19-9 response with or without an additional type of response.

Conclusion: Pancreatic cancer patients with simultaneous radiographic, biochemical, and pathologic response to neoadjuvant chemotherapy have very favorable prognosis. In the absence of concordance between the three types of response, biochemical response (CA19-9 decrease by > 5%) best predicts long-term survival.


A
Survival by Change in CA 19–9, %
Fell by < 25%, or increased
Fell by 25% or more
Survival probability
p < 0.0001
Months since beginning chemotherapy
B
Survival by Tumor Response Grade (TRG)
Survival probability
p = 0.001
Months since beginning chemotherapy
C
Survival by Change in Tumor Size, %
Decreased by <50%, or Increased
Decreased by 50% or more
Survival probability
p = 0.034
Months since beginning chemotherapy
D
Survival by Response to Neoadjuvant Therapy
Survival probability
p < 0.0001
Months since beginning chemotherapy

2. OUTCOMES AND PREDICTORS OF PATHOLOGICAL COMPLETE RESPONSE AFTER PREOPERATIVE THERAPY IN RESECTED PANCREATIC ADENOCARCINOMA

A Oba, T Stoop, YHA Wu, S van Roessel, L Beaty, K Colborn, B Janssen, M Al-Musawi, A Jain, A Saiura, A Sauvanet, A Coppola, B Groot Koerkamp, B Miller, C Mack, D Hashimoto, D Caputo, D Kleive, E Sereni, G Belfiori, H Ichida, J van Dam, J Dembinski, K Akahoshi, K Roberts, K Tanaka, K Labori, M Falconi, M House, M Sugimoto, M Tanabe, N Gotohda, P Krohn, R Burkhart, R Thakkar, R Pande, S Dokmak, S Hirano, S Burgdorf, S Crippa, S Satoi, S White, T Hackert, T Nguyen, T Yamamoto, T Nakamura, W Burns, Y Inoue, Y Takahashi, Y Ushida, J Wilmink, W Messersmith, J Verheij, J Kaplan, R Schulick, M Besselink, M Del Chiaro

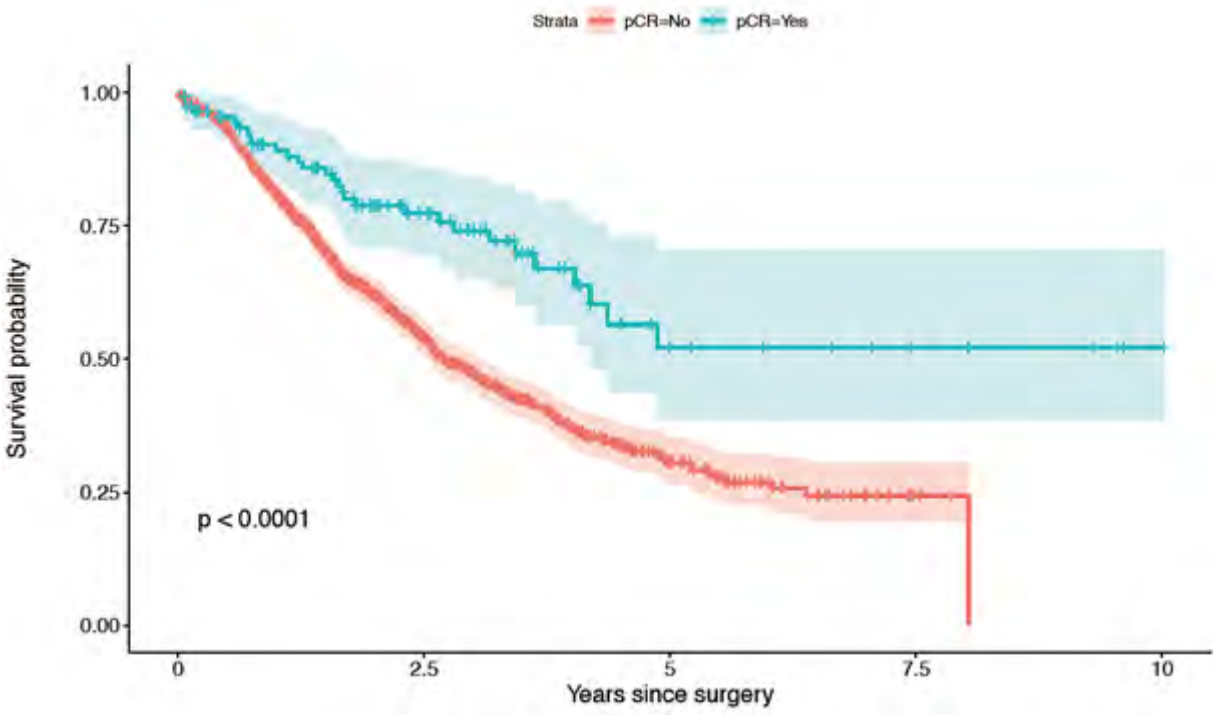
Presenter: Thomas Stoop MD, PhD | University of Colorado, United States

Background: Pathological complete response (pCR) is increasingly reported in patients with resected pancreatic cancer after chemo(radio)therapy. However, large, international multicenter studies on pCR following different preoperative regimens of chemo(radio)therapy in resected pancreatic cancer are lacking. This international multicenter study was designed to investigate the incidence, predictors, and outcomes of pCR.

Methods: This retrospective analysis included consecutive patients after resection of pancreatic cancer following at least two courses of preoperative chemo(radio)therapy from 20 centers, including those from Japan, the United States, and 7 European countries (2010-2018). Patients with pCR required preoperative pathology-confirmed pancreatic ductal adenocarcinoma. Two centers only provided pCR patients (n=66), and a sensitivity analysis was done to evaluate the impact by excluding their data. Factors associated with survival from time of surgery and predictors associated with pCR were investigated by Cox proportional hazards and logistic regression models, respectively.

Results: Among 1278 patients, 110 had pCR after resection of pancreatic cancer. The rate of pCR was 3.6% (44/1212 patients), after excluding the 66 pCR patients from the two sites with only pCR. Median survival in 110 patients with pCR was 27.5 months (interquartile range [IQR] 12.4-42.3) versus 20.6 (IQR 12.3-33.6) for patients without pCR (Wilcoxon rank sum p=0.02). pCR was associated with better overall survival (hazard ratio=0.48, 95% confidence interval [CI] 0.31-0.74). The use of preoperative FOLFIRINOX versus other multi-agent therapies was associated with a higher rate of pCR (odds ratio [OR]=3.03, 95%CI 1.69-5.56). Patients with radiotherapy (other than regular external beam radiotherapy; OR=9.91, 95%CI 4.90-20.61) and patients with preoperative chemotherapy duration ≥12 months (OR=4.26, 95%CI 1.75-10.93) had higher rates of pCR. Patients with stable/progressive disease after chemo(radio)therapy (OR=0.10, 95%CI 0.05-0.18) and patients with preoperative carbohydrate antigen 19.9 ≥37 U/ml (OR=0.22, 95%CI 0.10-0.42) had lower rates of pCR. The sensitivity analysis showed that predictors for pCR did not change after excluding the two above-mentioned centers.

Conclusion: This international study found pCR in 1 in every 28 patients with resected pancreatic cancer following chemo(radio)therapy. Although pCR does not reflect cure of pancreatic cancer, it is associated with more favorable survival. Predictors of pCR may have implications for pancreatic cancer treatment strategies and should be confirmed in prospective studies.


Strata
pCR=No
pCR=Yes
1.00
0.75
0.50
0.25
0.00
Survival probability
p < 0.0001
0
2.5
5
7.5
10
Years since surgery

3. BILIARY COMPLICATIONS DURING NEOADJUVANT THERAPY FOR PANCREATIC CANCER

SZ Thalji, D Fernando, KS Dua, AH Khan, S Madhavan, P Chisholm, M Aldakkak, KK Christians, CN Clarke, B George, M Kamgar, BA Erickson, WA Hall, DB Evans, S Tsai

Presenter: Sam Thalji MD | Medical College of Wisconsin, United States

Background: Neoadjuvant therapy (NeoTx) for pancreatic cancer (PC) requires durable biliary decompression. The impact of biliary complications (BC) during NeoTx are unknown.

Methods: BCs were identified in patients (pts) with operable PC of the pancreatic head/neck who had a biliary stent and received NeoTx prior to intended surgery. Association with early disease recurrence (< 1 year from surgery) and median overall survival (mOS) were assessed.

Results: Among 528 pts, 91 (17%) pts developed a BC during NeoTx at a median of 64 days (IQR 112) after initial stent placement. The cumulative incidence of BCs at 2 months (mo), 2-4 mo, >4 mo from diagnosis were 8%, 6%, and 20%. There were 113 BCs in the 91 pts: 41 (37%) stent occlusions without cholangitis, 34 (30%) stent occlusions with cholangitis, 26 (23%) cholecystitis, 1 (1%) hemobilia, 10 (9%) pancreatitis, and 1 (1%) hepatic abscess. Among 91 pts with BCs, 71 (78%) were hospitalized for a median of 4 days (IQR 4) and 25 (27%) had a delay in NeoTx (median of 7 days, IQR 8.5). Of the 528 pts, completion of NeoTx and surgery occurred in 59 (65%) of the 91 with BCs and 308 (71%) of the 437 without BCs (p=0.29). Among the 367 pts who completed NeoTx and surgery, 17 (29%) of the 59 pts with BCs had positive margins compared to 40 (13%) of the 308 pts without BCs (p=0.002). Early locoregional recurrence occurred in 47 (13%) of the 367 pts; 13 (22%) of the pts with BCs compared to 34 (11%) of 308 (p=0.02) pts without BCs. No differences were observed in rates of distant recurrence. The mOS for all 528 pts was 26 mo; 20 mo among 91 pts with a BC and 29 mo among 437 without a BC (p=0.006). For the 367 pts who completed NeoTx and surgery, mOS was 39 mo; 26 mo among 59 pts with a BC and 44 mo among 308 pts without a BC (p=0.02, Figure 1). BCs were associated with an increased risk of death (HR: 1.56; CI 1.10-2.23) in an adjusted hazards model.

Conclusion: The cumulative incidence of BCs during NeoTx was 17% and increased with duration of NeoTx but had no impact on the completion of all intended NeoTx and surgery. BCs were associated with worse outcome, possibly due to tumor-associated anatomy which predisposes to both recurrent disease and BCs.

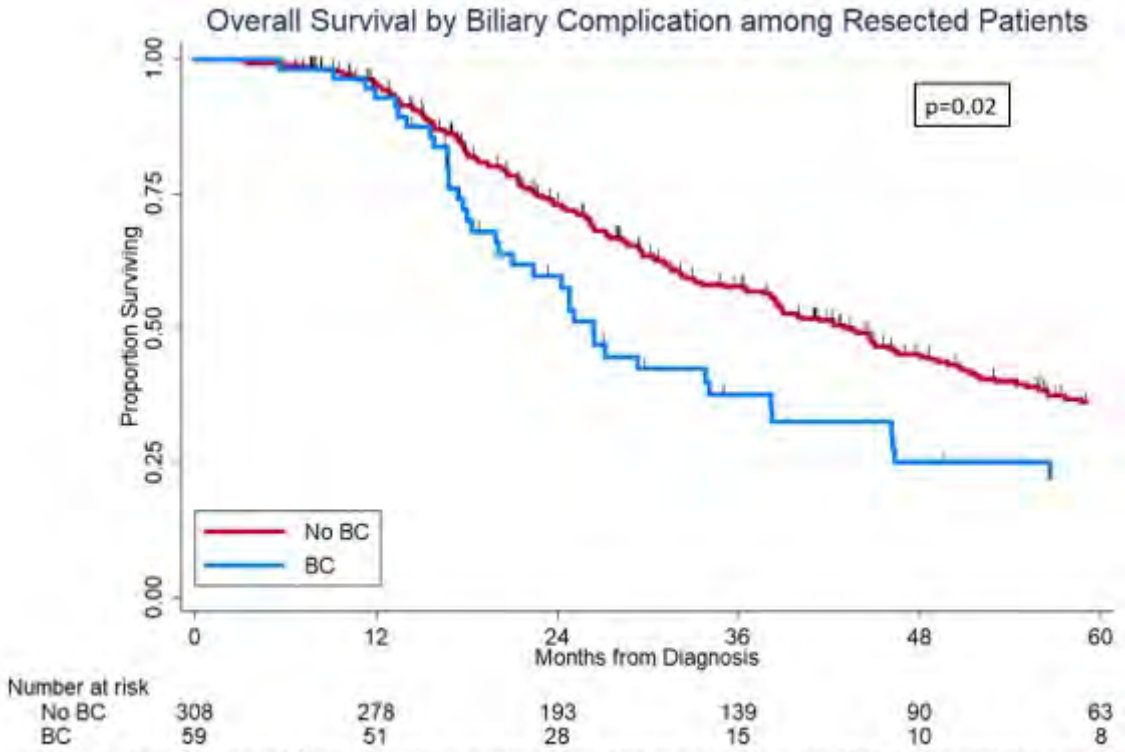


Figure 1: Overall survival from diagnosis by presence of biliary complication (BC) during neoadjuvant therapy for patients who underwent surgical resection (n=367). Among 59 patients with a prior BC, mOS was 26 months compared to 44 months among the 308 patients without a BC (p=0.02).

4. DEFINING EFFECTIVE NEOADJUVANT CHEMOTHERAPY (NAC) IN PDAC, IMPLICATIONS FROM SURVIVAL AND PATTERN OF FAILURE IN PATIENTS WHO RECEIVED NAC

H Liu, M D'Alesio, S AlMasri, A Hammad, A Desilva, S Lebowitz, C Rieser, E Ashwat, E Hampton, H Khachfe, M Laffey, A Singhi, N Bahary, K Lee, A Zureikat, A Paniccia

Presenter: Hao Liu MD, PhD | University of Pittsburgh Medical Center, United States

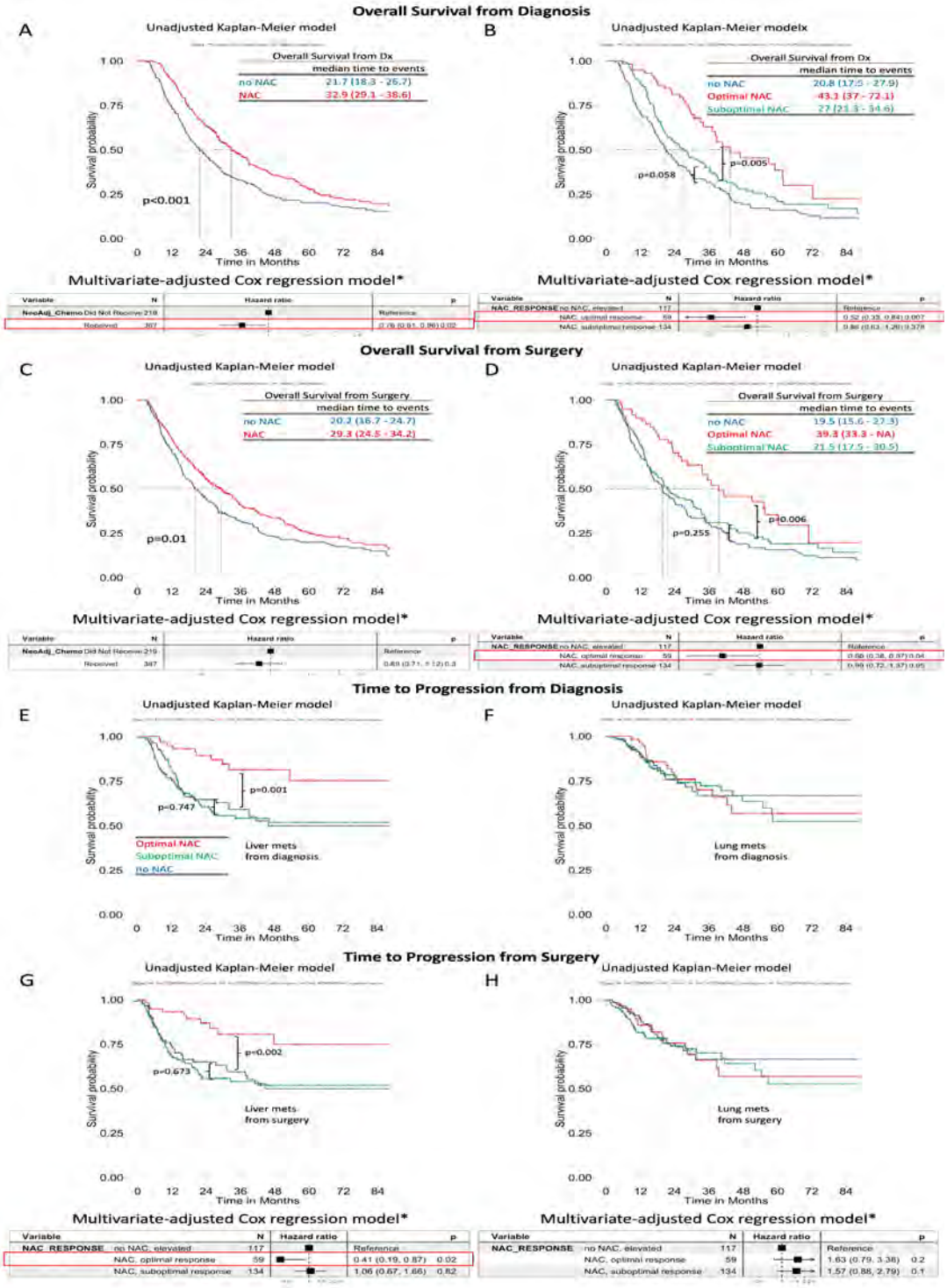
Background: Neoadjuvant chemotherapy (NAC) is gaining popularity over the surgery-first (SF) approach in treating resectable and borderline resectable pancreatic ductal adenocarcinoma (PDAC). Although CA19-9 change during NAC predicts oncological outcomes among NAC patients, what constitutes effective neoadjuvant chemotherapy in resectable or borderline resectable PDAC patients is unknown.

Methods: We retrospectively analyzed resectable and borderline resectable PDAC patients who underwent pancreaticoduodenectomy (2010-2019) at a single institution. Optimal CA19-9 response was defined as normalization AND >50% reduction. Radiological evidence of metastasis development in the liver, lung, peritoneal cavity, and local recurrence was defined as disease progression. We utilized Kaplan-Meier, multivariable-adjusted Cox models, and competing risk subdistribution methods for statistical analysis. The propensity score of receiving neoadjuvant chemotherapy was calculated by age, gender, age-adjusted CCI, pre-treatment CA19-9, and administration of neoadjuvant radiation therapy. Overall survival (OS) was calculated from both diagnosis and surgery to account for the immortal time bias of receiving NAC.

Results: 586 patients were included in this study. The multivariate-adjusted analysis demonstrated OS benefit in the NAC group only when OS was calculated from diagnosis (HR=0.77, p=0.021), but not from surgery (HR=0.89, p=0.312). However, in 59 patients who achieved optimal CA19-9 response, OS is significantly longer than the 134 patients with suboptimal CA19-9 response (39.3m vs. 21.5m, p=0.005) or the 117 SF patients (39.3m vs. 19.5m, p< 0.001). Notably, a suboptimal CA19-9 response conferred no OS advantage compared to SF patients in both unadjusted and multivariate-adjusted models, even when calculating OS from diagnosis (HR=0.86, p=0.378).

Liver metastasis was significantly reduced in patients with optimal CA19-9 response to NAC (HR 0.41, p=0.02). However, lung metastasis was not affected, even with optimal CA19-9 response (HR 1.63, p=0.2). There is also no significant reduction in peritoneal metastatic progression or local recurrence reduction, even with optimal CA19-9 response.

Conclusion: We identified a CA19-9 response to NAC of "normalization AND >50% reduction" as the marker for effective NAC. Suboptimal CA19-9 NAC responses did not correlate with a survival benefit compared to the SF approach, even when accounting for the NAC immortal-time bias. However, optimal CA19-9 is associated with longer survival with a significant reduction in metastatic progression in the liver, but not other sites. This result should be verified in a multi-institutional study.



Abstract Figure 1

Unadjusted Kaplan-Meier Survival Analysis (KM) and Multivariable-adjusted Cox Proportional Hazards Model (CPH) on patients with and without neoadjuvant chemotherapy (NAC) (A and C) and on patients who had optimal and suboptimal CA19-9 response to NAC (B and D), counting from the time of diagnosis (A and B) and surgery (C and D). Unadjusted Kaplan-Meier (KM) analysis on time to liver (E) and lung (F) metastatic progression from the time of diagnosis, as well as unadjusted KM and multivariate-adjusted Cox Proportional Hazards Ratio Model on time to liver (G) and lung (H) metastatic progression from the time of surgery.

*Covariates adjusted in multivariable CPH models include age, gender, Charlson Comorbidity Index (CCI), radiation therapy, vascular resection, tumor size, pre-treatment CA19-9, margin, lymph node ratio (LNR), lymphovascular invasion (LVI), perineural invasion (PNI), Grade, post-op complication, and adjuvant chemotherapy.

5. SHOULD NEOADJUVANT CHEMOTHERAPY BE CONSIDERED AS A STANDARD IN ELDERLY PATIENTS WITH RESECTABLE PANCREATIC ADENOCARCINOMA: A REVIEW OF NATIONAL CANCER DATABASE

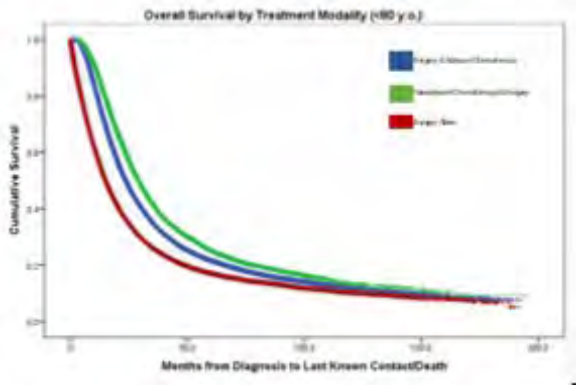
NL Lad, O Standring, L Demyan, GB Deutsch, MJ Weiss, D DePeralta
Presenter: Neha Lad MD | Northwell Health Cancer Institute, United States

Background: For resectable pancreatic ductal adenocarcinoma (PDAC) in elderly patients (>80y), timing of chemotherapy and surgery remains poorly defined. Clinical decision making is more challenging in elderly due to presence of comorbidities in addition to disease biology, which impacts treatment choice.

Methods: National Cancer Database (NCDB) was reviewed from 2007-2018 to identify elderly (>80y) vs non-elderly(< 80y) with PDAC. Statistical analyses were used to compare outcomes in elderly with upfront surgery (US) vs neoadjuvant+surgery (N+S). Subset analysis compared survival in upfront surgery alone (USa), surgery+adjuvant chemotherapy(S+A), and N+S groups.

Results: Total 75,806 with PDAC were identified, 568 were elderly N+S group. 6659 elderly patients underwent upfront surgery, of which 36.7% received adjuvant chemotherapy; as compared to non-elderly, where 63.4% received adjuvant chemotherapy. Elderly N+S vs US were comparable with age (82.2 vs82.9y), comorbidities (p=NS); however, N+S vs US, had slightly more males (51.2 vs 45.5%), presence of head tumor (74.1 vs 67%), larger tumor size (5.07 vs 2.78cm), higher presence of clinical stage2 (38.6 vs 25.5%), improved 30-day (3.1 vs 6.7%) and 90-day (8.5 vs 13.9%) mortality were statistically significant (all p< 0.05), respectively. On subset analysis, median OS in elderly undergoing USa compared to S+A, and N+S was significantly lower (11.7 vs 20.1 vs 22.6 months, p< 0.001).

Conclusion: Elderly with PDAC undergoing upfront surgery have significantly high mortality, fewer patients get adjuvant chemotherapy, and failure to receive chemotherapy either adjuvant or neoadjuvant setting leads to poor survival. Neoadjuvant chemotherapy should be strongly considered in all elderly patients for improved outcomes.



6. NUTRITIONAL IMPACT OF ACTIVE HEXOSE CORRELATED COMPOUND FOR PATIENTS WITH RESECTABLE/BORDERLINE RESECTABLE PANCREATIC CANCER TREATED WITH NEOADJUVANT THERAPY

S Satoi, T Yamamoto, S Yamaki, M Ishida, Y Matsui, S Hirooka, M Sekimoto

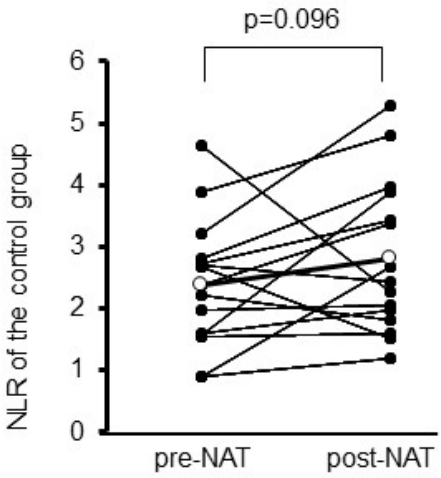
Presenter: Daisuke Hashimoto MD, PhD | Kansai Medical University, Japan

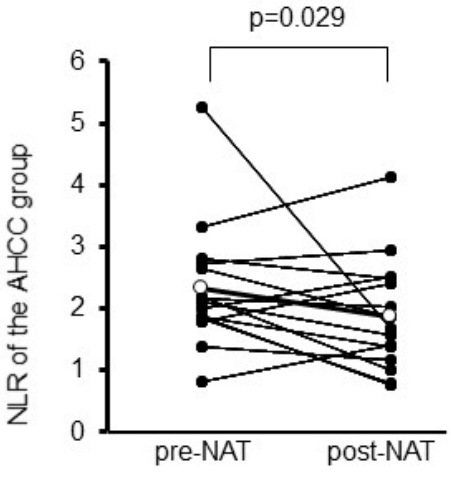
Background: One of the possible reasons for the worse prognosis of patients with pancreatic ductal adenocarcinoma (PDAC) is malnutrition. Malnutrition due to the cancer burden can exist at the initial diagnosis, and the entry and completion rate of neoadjuvant therapy (NAT) for PDAC can be decreased by malnutrition. NAT itself can lead malnutrition, hampering recovery after surgery. Thus, it is important to improve the nutritional status of patients with pancreatic ductal adenocarcinoma PDAC during NAT. Active hexose correlated compound (AHCC) is a standardized extract from cultured Lentinula edodes mycelia and is considered to be a potent biological response modifier in cancer treatment. The aim of this study was to evaluate the nutritional effect of AHCC during neoadjuvant therapy in patients with PDAC.

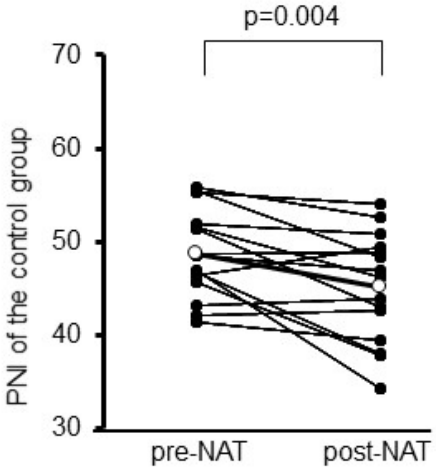
Methods: From June 2019 to May 2020, 30 consecutive patients with resectable/borderline resectable PDAC underwent planned neoadjuvant therapy with gemcitabine plus S-1 followed by surgery. The clinical course of patients who received AHCC combined with neoadjuvant therapy was evaluated retrospectively and compared with patients who did not receive AHCC. Patients of the AHCC group began taking AHCC at 3.0 g/day (1.0 g × 3 times/day) on the first day of NAT. AHCC intake was planned to be continued until the day before surgery. NAT was performed with GEM plus S-1 in this study.

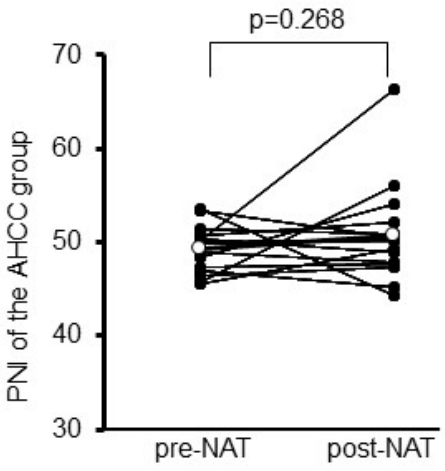
Results: Fifteen patients received AHCC with neoadjuvant therapy and 15 patients did not. Median (range) RDI was significantly higher (p=0.023) in the AHCC group (100 (77.1–100)%) than in the control group (81.4 (71.3–100)%). There were no significant differences in response rate (p=0.974), and carbohydrate antigen 19-9 (CA19-9) before NAT (p=0.266). However, median change (range) of CA19-9 after NAT was significantly lower (p=0.045) in the AHCC group (−83.6 (−99.7–115.0)%) than the control group (−58.8 (−99.9–871.4)%). Median (range) neutrophil-to-lymphocyte ratio (NLR) before NAT was similar (p=0.438) in both groups (2.67 (0.89–4.63) in the control group vs 2.10 (0.82–5.26) in the AHCC group). There was no significant change after NAT in the control group (2.44 (1.21–5.27), p= 0.096). However, NLR was significantly decreased after NAT in the AHCC group (1.68 (0.76–4.14), p=0.029). Median (range) prognostic nutrition index (PNI) before NAT was similar (p=0.344) in both groups (48.5 (41.3–55.8) in the control group vs 49.8 (45.5–53.6) in the AHCC group). PNI was significantly decreased after NAT in the control group (46.2 (34.3–54.1), p=0.004). However, there was no significant change after NAT in the AHCC group (50.2 (44.4–66.4), p=0.268). In this cohort, all patients who received NAT underwent pancreatectomy, and the resection rate was 100% in both groups. There were no significant differences in surgical time, surgical bleeding, and incidence of postoperative complications. There was no in-hospital mortality in both groups.

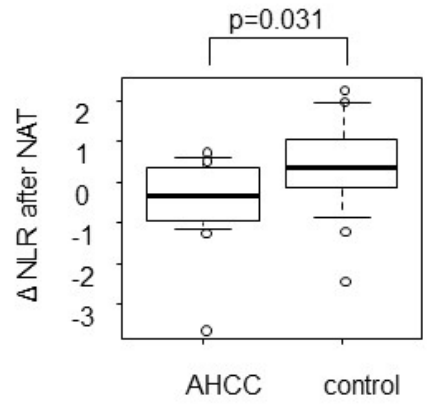
Conclusion: In conclusion, AHCC improved the nutritional status of patients with R/BR PDAC during NAT with GEM plus S-1. To validate this effect and to evaluate the long-term impact of AHCC, a double-blind randomized multicenter prospective phase II study of AHCC for patients with R/BR PDAC is ongoing.

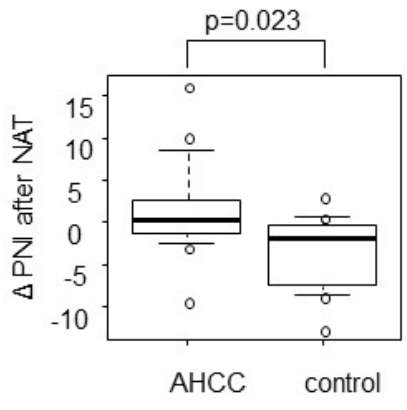

p=0.096
NLR of the control group
6
5
4
3
2
1
0
pre-NAT
post-NAT


p=0.029
NLR of the AHCC group
6
5
4
3
2
1
0
pre-NAT
post-NAT


p=0.004
PNI of the control group
70
60
50
40
30
pre-NAT
post-NAT


p=0.268
PNI of the AHCC group
70
60
50
40
30
pre-NAT
post-NAT


p=0.031
Δ NLR after NAT
2
1
0
-1
-2
-3
AHCC
control


p=0.023
Δ PNI after NAT
15
10
5
0
-5
-10
AHCC
control

7. EARLY RECURRENCE AFTER RESECTION OF LOCALLY ADVANCED PANCREATIC CANCER FOLLOWING INDUCTION THERAPY: A MULTICENTER STUDY

LWF Seelen, AF van Oosten, LJH Brada, VP Groot, LA Daamen, MS Walma, BF van der Lek, B Groot Koerkamp, OR Busch, IHJT de Hingh, CHJ van Eijck, MG Besselink RA Burkhart, IHM Borel Rinkes, CL Wolfgang, IQ Molenaar, J He, HC van Santvoort

Presenter: Leonard W.F. Seelen MD | UMC Utrecht, Netherlands

Background: Advancements in systemic treatment and surgery have increased the resection rate in locally advanced pancreatic cancer (LAPC). Nevertheless, a substantial part of patients will develop disease recurrence within a short time after resection. A universally accepted cut-off value to define early recurrence in LAPC is, however, not available. Moreover, it remains unclear which patients are at risk for early recurrence. This information may be useful to guide clinicians and patients in shared decision-making on treatment and postoperative follow-up regimes. Therefore, the aim of this study was to establish a cut-off value for early recurrence after resection for LAPC and to identify predictive factors for early recurrence.

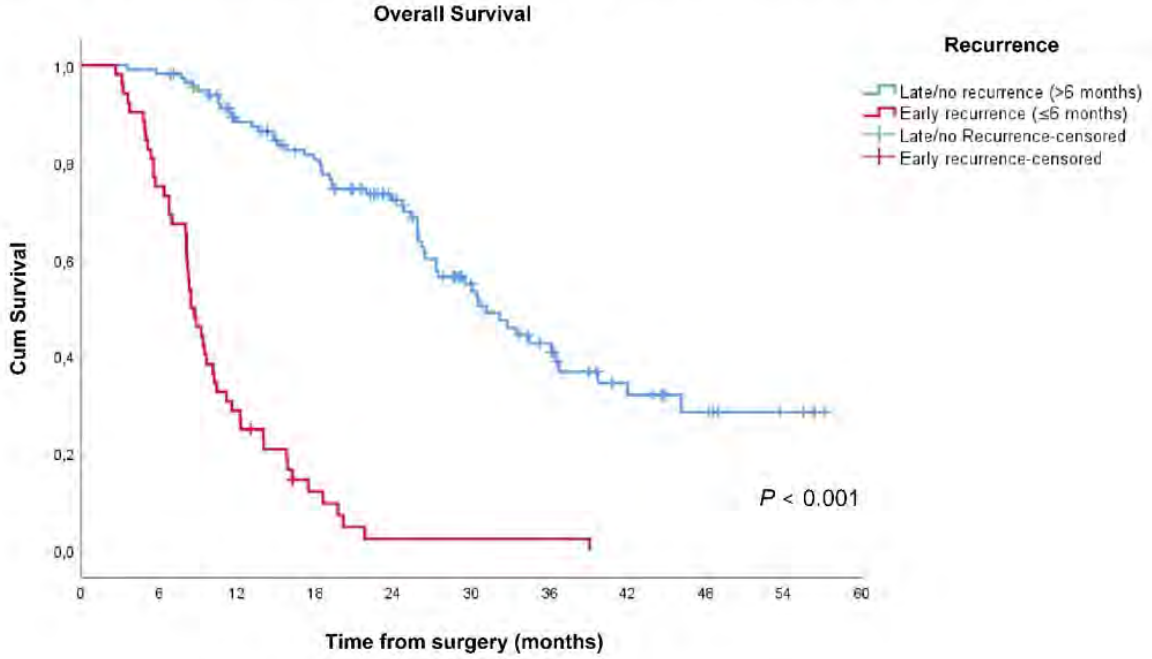
Methods: The present study is a post-hoc analysis of two prospective databases. All patients with histologically confirmed LAPC who underwent resection following induction therapy in eight tertiary pancreatic centers in the Netherlands (2015-2019) and one tertiary center in the United States of America (USA) (2016-2018) were included. LAPC was defined according to the National Comprehensive Cancer Network (NCCN) criteria. Using the log-rank test, post-recurrence survival (PRS) was compared between patients with early and late recurrence after LAPC resection, assessing different cut-off points for recurrence-free survival (RFS) to define "early recurrence". The cut-off point with the lowest P-value was chosen. Patients with early and late/no recurrence were compared with regard to overall survival (OS). Potential preoperative and postoperative predictors for early recurrence were evaluated using multivariable logistic regression analysis.

Results: A total of 170 consecutive patients were included. Median follow-up after resection was 25 months (interquartile range [IQR] 15-37). Disease recurrence occurred in 118 (69%) patients after a median RFS of 7 months. The optimal cut-off point for RFS to differentiate between early (n=52, 44%) and late recurrence (n=66, 56%) was 6 months (P< 0.001). OS was 8.4 months (95%-CI 7.3-9.6) in the early recurrence group (n=52, 31%) vs. 31.1 months (95%-CI 25.7-36.4) in the late/no recurrence group (n=118, 69%) (P< 0.001). The only independent preoperative predictor for early recurrence was post-induction therapy but preoperative CA 19-9 ≥100 U/ml (OR 5.09 [95%-CI 2.14-12.06]; P< 0.001). Postoperative predictive factors were poor tumor differentiation (OR 4.62 [95%-CI 1.51-14.08]; P=0.008) and not starting with adjuvant chemotherapy (OR 5.95 [95%-CI 2.45-14.49]; P< 0.001).

Conclusion: The optimal cut-off to define early recurrence after LAPC resection, based on subsequent prognosis, is a recurrence-free survival of six months. Early recurrence occurs in around 31% of patients and is associated with a very poor survival. Preoperative CA 19-9 ≥100 U/ml, poor tumor differentiation and no adjuvant therapy are predictors for early recurrence.

Knowledge of these predictors for early recurrence in LAPC can be used to inform patients on their prognosis and guide clinicians and patients in shared decision-making on perioperative counseling and postoperative treatments.

Figure 1. Overall Survival Kaplan-Meier Curve Comparing Early and Late/No Recurrence Cohorts



Number at risk (number censored):

Late/no recurrence	116 (0)	114 (10)	93 (5)	80 (10)	62 (11)	36 (5)	24 (6)	13 (4)	8 (4)	4 (4)
Early recurrence	52 (0)	39 (0)	15 (2)	5 (0)	1 (0)	1 (0)	1 (0)	-	-	-
Months	0	6	12	18	24	30	36	42	48	54

8. IMPACT OF ISOLATED POSITIVE VASCULAR GROOVE MARGIN ON RECURRENCE AND SURVIVAL FOLLOWING RESECTION FOR PANCREATIC DUCTAL ADENOCARCINOMA: A SINGLE CENTER EXPERIENCE

HH Khachfe, C Hlavin, A Chopra, A deSilva, A Y Hammad, S AlMasri, H Liu, J Kraftician, A Singhi, KK Lee, AH Zureikat, A Paniccia

Presenter: Hussein H. Khachfe MD | University of Pittsburgh Medical Center, United States

Background: Significant controversy exists regarding the definition of a positive vascular groove margin (VGm) and its prognostic value after pancreaticoduodenectomy for pancreatic ductal adenocarcinoma (PDAC). The updated version 4.2.0.0 of the College of American Pathologists no longer considers the VG a resection margin but rather a surface margin. Moreover, when all other surgical resection margins are negative, the impact of an isolated positive VGm remains poorly characterized. The aim of this study was to evaluate the impact of an isolated positive VGm on PDAC recurrence and survival.

Methods: We identified 195 patients who underwent a pancreaticodudenectomy for PDAC and met our inclusion criteria, between 2005-2019. Surgical margins were classified as R1 (with positive vascular groove being the only positive margin, with tumor within 1mm) or R0 (all margins negative). Recurrence free survival (RFS) and overall survival (OS) were evaluated using multivariate Cox-regression proportional hazard models. Estimates for RFS and OS were calculated using Kaplan-Meier analysis.

Results: An isolated positive vascular groove margin was identified in 90 (46.1%) patients and was associated with a significantly lower mOS (25 vs 42 months, p= 0.015) and mRFS (17 vs 27 months, p < 0.001) compared to patients with R0 resections. Patients with positive vacular groove margin were older (68.3 vs 67.5 years, p= 0.001), more likely to receive neoadjuvant chemotherapy (44.3 vs 55.7%, p = 0.013), and to have lymphovascular invasion (48.6 vs 51.4%, p = 0.012). Moreover, the use of neoadjuvant chemotherapy was not associated with improved OS in patient with positive VGm (HR= 0.84 [0.54-1.30], p=0.438). Local recurrence as first site of recurrence was more frequent in the positive VGm group (41.4 vs 58.5%) however this difference was not significant (p=0.097). Positive vascular groove margin proved to be an independent predictor of recurrence (HR: 2.83, p < 0.001) and decreased OS (HR: 1.48, p = 0.032) on multivariate analysis.

Conclusion: Positive vascular groove margins is significantly associated with OS and recurrence for patients with resected PDAC.

	Univariate Analysis		Multivariate Analysis	
	Hazard Ratio [95% CI]	Sig.	Hazard Ratio [95% CI]	Sig.
Age	1.00 [0.98-1.02]	0.830		
Sex	0.95 [0.69-1.30]	0.745		
BMI	0.97 [0.94-1.00]	0.140		
CCI Age Adjusted	1.10 [0.98-1.23]	0.106		
Tumor Site	1.01 [0.94-1.09]	0.716		
Neoadjuvant Chemotherapy	1.04 [0.75-1.45]	0.795		
# of Neoadjuvant Chemotherapy Cycles	1.02 [0.91-1.14]	0.716		
Vein Resection/Repair	1.36 [0.97-1.88]	0.061		
Gx	**REF**			
G1	1.29 [0.27-6.07]	0.748		
G2	1.15 [0.28-4.65]	0.847		
G3	1.57 [0.37-6.53]	0.537		
Lymph Node Positive	2.01 [1.40-2.88]	<0.001	1.40 [0.94-2.07]	0.096
Lymphovascular Invasion	1.97 [1.32-2.94]	0.001	1.45 [0.92-2.25]	0.105
Perineural Invasion	2.14 [1.20-3.80]	0.010	1.46 [0.80-2.65]	0.211
Positive Vascular Groove Margin	**1.51 [1.078-2.12]**	**0.017**	**1.48 [1.03-2.11]**	**0.032**
Adjuvant Chemotherapy	1.27 [1.06-1.51]	0.009	0.50 [0.34-0.73]	<0.001
# of Adjuvant Chemotherapy Cycles	0.94 [0.80-1.09]	0.433		
Recurrence	2.77 [1.88-4.07]	<0.001	2.84 [1.91-4.20]	<0.001
1st Site of Recurrence	1.26 [0.85-1.86]	0.254		

9. IMPORTANCE OF NODAL METASTASES LOCATION IN PANCREATODUODENECTOMY FOR PANCREATIC DUCTAL ADENOCARCINOMA: RESULTS FROM A PROSPECTIVE LYMPHADENECTOMY PROTOCOL

L Maggino, G Malleo, F Casciani, G Lionetto, S Nobile, G Lazzarin, S Paiella, A Esposito, P Capelli, C Luchini, A Scarpa, C Bassi, R Salvia

Presenter: Laura Maggino MD | University of Verona, Italy

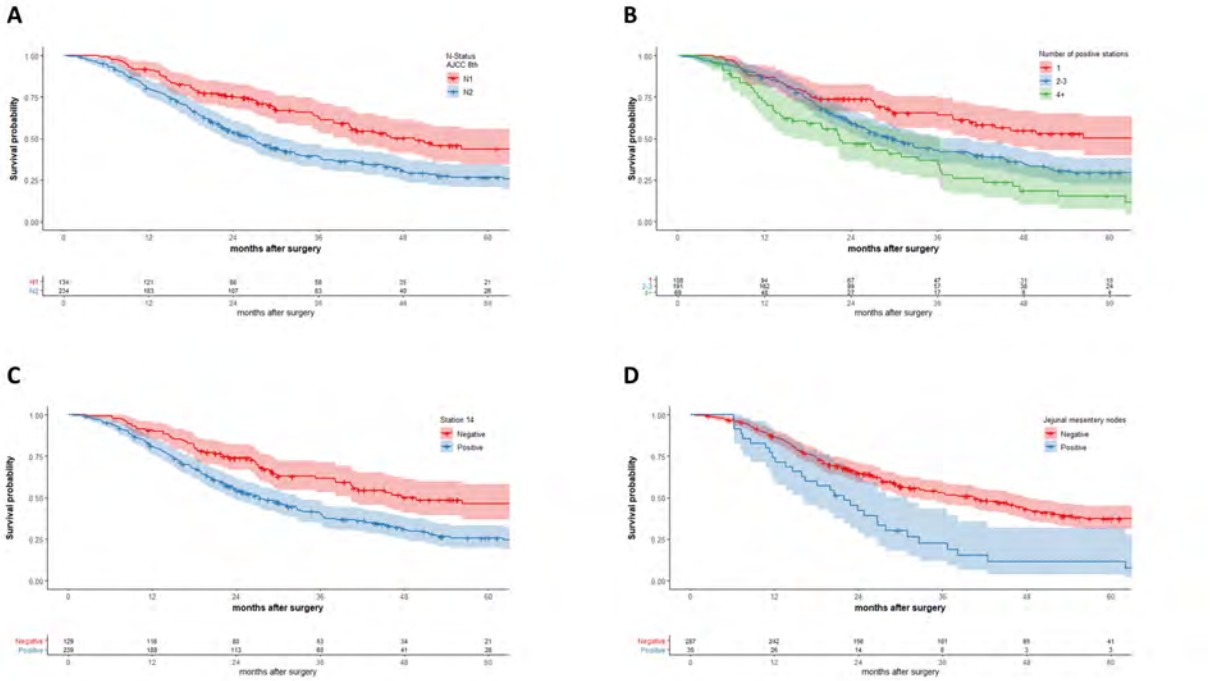
Background: The issue of lymph node (LN) metastases location in upfront pancreatoduodenectomy (PD) for pancreatic ductal adenocarcinoma (PDAC) is unclear. Implementing a prospective lymphadenectomy protocol, we investigated the nodal yields and metastases per anatomical stations and nodal echelon. Next, the relationship between the extension of nodal dissection, the number of examined/positive nodes (ELN/PLN), disease staging and prognosis was assessed.

Methods: A protocol for LN dissection in upfront PD for presumed PDAC was established from January 2013 and one academic institution. Slightly modifying the standard ISGPS concept, the lymphadenectomy included stations 5, 6, 8a-p, 12a-b-c-p, 13, 14a-b, 17, and jejunal mesentery nodes per the Japanese Pancreas Society definition. Tumors were staged according to the 8th edition of the AJCC manual. Stations embedded in the specimen (13/14/17/jejunal mesentery) were defined as first-echelon, those sampled separately (5/6/8/12) as second-echelon. Recurrence and survival were analyzed. To avoid collinearity, nodal-related parameters were analyzed in separate multivariable models.

Results: Overall, 424 PDs (2013-2018) were enrolled. The median number of ELN and PLN was 42 (IQR 34-50) and 4 (IQR 2-8). A total of 11.8% of the patients were N0 (n=50), 31.8% were N1 (n=135) and 56.4% were N2 (n=239). The commonest metastatic sites were stations 13 (77.8%) and 14 (57.5%) while jejunal mesentery LNs were positive in 9.9% of the patients. Overall, 248 patients (58.5%) had metastases only in the first echelon, 4 (0.9%) only in the second, 122 (28.8%) in both. The median number of ELN and PLN in the first echelon was 28 (IQR 23-34) and 4 (IQR 1-7). Second-echelon nodes increased nodal counts by 10 ELN (IQR 6-14) and 0 PLN (IQR 0-1), translating in only minor changes in staging.

After multivariable adjustment, nodal-related factors independently associated with survival in the subset of node-positive patients were N-status (HR 1.958, 95%CI 1.368-2.803, p< 0.001), multiple metastatic stations (HR=1.225, 95%CI 0.862-1.742, p=0.258 for 2-3 versus 1 and HR=1.816, 95%CI 1.149-2.871, p=0.011 for ≥4 versus 1 metastatic stations), metastases to station 14 (HR=1.774, 95%CI 1.100-2.861, p=0.019) and jejunal mesentery nodes (HR=3.740, 95%CI 1.983-7.054, p< 0.001). Survival curves stratified by these nodal-related parameters are shown in the Figure. Notably, the highest concordance was reached in the model including metastases location (c-index=0.709). Similar results were obtained when analyzing recurrence.

Conclusion: First-echelon dissection provides an adequate number of ELN for optimal staging during PD for PDAC. Nodal metastases occur mostly at stations 13/14, although second-echelon involvement is frequent. Station 14 and jejunal mesentery nodes involvement is prognostically relevant. They should be included in the standard nodal map and analyzed pathologically.


A
N-Status
AJCC 8th
N1
N2
Survival probability
months after surgery
B
Number of positive stations
1
2-3
4+
Survival probability
months after surgery
C
Station 14
Negative
Positive
Survival probability
months after surgery
D
Jejunal mesentery nodes
Negative
Positive
Survival probability
months after surgery

10. A NOVEL SCORING SYSTEM FOR THE PREDICTION OF CLINICALLY RELEVANT POSTOPERATIVE PANCREATIC FISTULA IN PATIENTS UNDERGOING DISTAL PANCREATECTOMY

W Wong, C Vining, R Perez Holguin, C Stahl, V Chinchilli, C Pameijer, M Dixon, J Peng
Presenter: William Wong DO | Academic Medical Center, United States

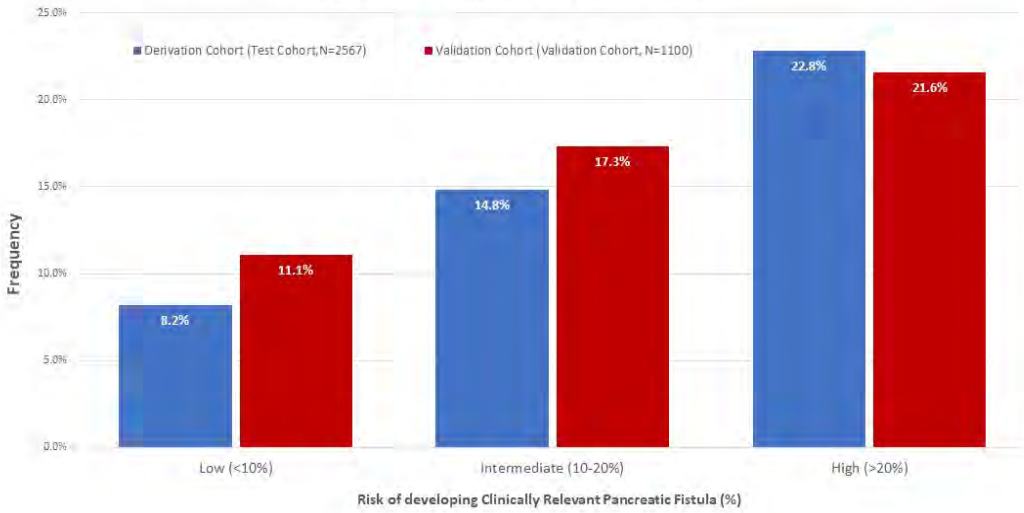
Background: Clinically relevant postoperative pancreatic fistula (CR-POPF) is a major source of morbidity and mortality after a pancreatectomy. While there is a Fistula Risk Score (FRS) to predict CR-POPF after a Whipple procedure, the FRS is not validated for distal pancreatectomy (DP). The goal of this study is to develop and validate a predictive fistula risk score for distal pancreatectomy (DP-FRS).

Methods: The 2014-2019 American College of Surgeons National Surgical Quality Improvement Project pancreatectomy Participant User Data File was queried for patients who underwent elective DP. A randomly generated 70% of the final cohort was used as the derivation cohort to identify independent predictors of CR-POPF based on multivariable logistic regression and backward selection. A value was assigned to each statistically significant variable (1 if odds ratio (OR) ≥1 and 2 if OR ≥2); a DP-FRS was developed and stratified into three risk categories. The remaining 30% of patients were used as the validation cohort to determine the receiver operator characteristic curve and area under the curve (AUC).

Results: The final cohort consisted of 3,667 patients who underwent DP. CR-POPF was identified in 13.2% (N=338/2567) and 15.0% (N=165/1100) of the derivation cohort and validation cohort, respectively. Predictors of CR-POPF utilized for the DP-FRS model included: body mass index ≥25kg/m2 (OR=1.5), male gender (OR=1.3), non-White race (OR=1.5), history of chronic obstructive pulmonary disease (OR=2.1), histologic subtype other than adenocarcinoma or chronic pancreatitis (OR=1.5), operation time >4 hours (OR=1.7), and blood transfusion (OR=1.6) (all $p< 0.05$). A value was assigned depending on the presence of the associated risk factor. An eight-point model was developed and patients were stratified into low (score ≤2; < 10% CR-POPF), intermediate (score 3; 10-20% CR-POPF), and high (score ≥4; >20% CR-POPF) risk. Under these categories, the associated CR-POPF rates were 8.2%, 14.8%, and 22.8% in the derivation cohort, respectively, and 11.1%, 17.3%, and 21.6% in the validation cohort, respectively. The AUCs for the derivation and validation cohorts were 0.63 and 0.60, respectively.

Conclusion: This is the largest study to date to establish and validate a DP-FRS in patients undergoing DP. This novel scoring system may aid surgeons in evaluating patients at risk for developing CR-POPF, in decision-making for drain placement, and in postoperative care management after DP. Additional studies are required to further improve the predictive ability of the DP-FRS for CR-POPF.

Figure 1. Percentage of Clinically Relevant Pancreatic Fistula after Distal Pancreatectomy by Risk Categories in the Derivation and Validation Cohorts.



11. A PERIOPERATIVE BUNDLE FOR REDUCTION OF INCISIONAL SURGICAL SITE INFECTIONS FOLLOWING PANCREATICODUODENECTOMY: A PRE-POST INTERVENTION STUDY

TL Sutton, K Potter, J O'Grady, J Chuong, SC Mayo, E Gilbert, BC Sheppard
Presenter: Thomas L. Sutton MD | Oregon Health & Science University, United States

Background: Patients undergoing pancreaticoduodenectomy are at high risk of incisional surgical site infections (iSSIs) due to violation of the biliary and upper gastrointestinal tracts. Multiple perioperative interventions have been proposed to reduce SSIs in patients undergoing pancreaticoduodenectomy, however high quality data following implementation of these interventions are lacking.

Methods: In July 2017 a multidisciplinary perioperative bundle was implemented at our center aimed at enhancing recovery and reducing iSSIs. Interventions included pre-habilitation, pre-operative nutritional supplementation, routine use of wound protectors and closure trays, ensuring appropriate intra-operative antibiotic redosing, and utilization of multimodal pain control.

Using prospective National Surgical Quality Improvement Project (NSQIP) data, patients undergoing pancreaticoduodenectomy from July 2013 to April 2020 were identified. Multivariable logistic and linear regression were utilized to generate odds ratios (OR) for experiencing the primary outcomes of interest, NSQIP-defined iSSIs and length of stay (LOS).

Results: Four-hundred-fifty-seven patients underwent pancreaticoduodenectomy during the study period, with 228 (49.9%) receiving the perioperative bundle. Groups were not significantly different in most clinicopathologic characteristics (Table). Following adoption of the bundle, the proportion of patients developing NSQIP-defined iSSIs declined from 23.1% (n=53) to 8.8% (n=20; P< 0.001).

On multivariable analysis controlling for age, comorbidities, blood loss, stent presence, and neoadjuvant therapy, bundle implementation was independently associated with reduced odds of iSSI (OR 0.31; 95% CI 0.18-0.54; P< 0.001). LOS was also significantly reduced following implementation (median 10 versus 11 days), with bundle implementation remaining independently associated with reduced LOS on multivariable regression (size of effect: -2.05 days; 95% CI -3.56, -0.55; P=0.008).

Conclusion: In a pre-post intervention analysis utilizing standardized NSQIP definitions, implementation of a comprehensive perioperative bundle reduced iSSIs and LOS in patients undergoing pancreaticoduodenectomy. We recommend protocolization of similar perioperative interventions to reduce iSSIs at centers where pancreaticoduodenectomy is performed.

Table: Clinicopathologic Characteristics of Patients Undergoing Pancreaticoduodenectomy

Characteristic	Pre- Bundle Implementation (n=229); No. (%)	Post- Bundle Implementation (n=228); No. (%)	*P*
Age, Years; median [IQR]	67 [60-73]	68 [59-73]	>0.99
Gender			0.93
Female	109 (47.6)	110 (48.2)	
Male	120 (52.4)	118 (51.8)	
Reason for Resection			0.08
Other Malignant	42 (18.3)	58 (25.4)	
Benign	27 (11.8)	37 (16.2)	
PDAC	143 (62.4)	120 (52.6)	
PNET	17 (7.4)	13 (5.7)	
NSQIP-defined Comorbidities			0.95
0	51 (22.3)	52 (22.8)	
1-2	127 (55.5)	123 (53.9)	
≥3	51 (22.3)	53 (23.2)	
Pre-operative Chemotherapy	32 (14.0)	72 (31.6)	<0.001
Biliary Stent	143 (62.4)	136 (59.6)	0.57
Minimally Invasive Approach	9 (3.9)	21 (9.2)	0.02
Vascular Reconstruction	53 (23.1)	53 (23.2)	>0.99
Surgical Duration, Hours; median [IQR]	8.2 [6.9-9.9]	8.2 [6.9-9.7]	0.97
Intraoperative Blood Loss, mL; median [IQR]	700 [400-1100]	600 [300-1025]	0.14
Wound Protector Use	98 (42.8)	207 (90.8)	<0.001
Intraoperative Antibiotics			<0.001
1st generation cephalosporin	25 (10.9)	44 (19.3)	
2nd/3rd generation cephalosporir	164 (71.6)	99 (43.4)	
Broad spectrum	33 (14.4)	85 (37.3)	
Other	7 (3.1)	0 (0)	
Soft Gland Texture	73 (31.9)	67 (29.4)	0.61
Pancreatic Duct Size			0.007
<3 mm	72 (31.4)	49 (21.5)	
3-6 mm	102 (44.5)	133 (58.3)	
>6 mm	38 (16.6)	24 (10.5)	
Not Specified	17 (7.4)	22 (9.6)	

Abbreviations: IQR=Interquartile Range; PDAC=Pancreatic Ductal Adenocarcinoma; PNET=Pancreatic Neuroendocrine Tumor; NSQIP=National Surgical Quality Improvement Project

12. GENDER AND YEARS IN PRACTICE CONTRIBUTE TO DISCREPANCY BETWEEN SURGEONS' PERSONAL PREFERENCES AND RECOMMENDATIONS FOR PALLIATIVE CARE REFERRAL. RESULTS FROM AN INTERNATIONAL SURVEY

L Demyan, G Wu, A Blumenthaler, C Nofi, N Kohn, GB Deutsch, JM Herman, W Nealon, MJ Weiss, DK DePeralta
Presenter: Lyudmyla Dmeyan MD, MS | Northwell Health Cancer Institute, United States

Background: Early palliative care (PC) consultation has been promoted for patients with gastrointestinal cancers. However, the timing of PC consultation for patients with resectable pancreatic cancer is often dictated by their surgeon. We hypothesized that pancreatic surgeons may want early PC for themselves, if they had a potentially resectable pancreatic cancer, but would not recommend early PC referral to their patients.

Methods: An anonymous international survey was distributed to Pancreas Club members in 2021. Chi-square test or Fisher's exact test were used for analyzing categorical variables and the Wilcox test was utilized for analyzing Likert scaled questions. Statistical significance was set at $p< 0.05$.

Results: 138 surveys were completed. 83% of surgeons were male, 85% completed a fellowship, 80% practiced in academia, 46% performed >30 annual curative-intent operations for PDAC and 90% have been in practice ≤30 years. 88% of surgeons were from the US. 94% of surgeons reported that they would pursue a standard of care treatment if they had a potentially curative pancreatic cancer. However, female surgeons (75%) were less likely to report that they would pursue a standard of care treatment if they had a potentially curative pancreatic cancer compared to male surgeons (98%) (p 30 years were more likely to report that they would not want PC referral prior to resection if diagnosed with resectable pancreatic cancer (p=0.043).

Conclusion: The overweighing majority of surgeons report that they would pursue a standard of care for resectable pancreatic cancer with the treatment in line that they recommend to their patients. However, surgeons are more inclined to pursue early palliative care for themselves during disease-modifying treatment compared to their patients. Gender, fellowship training, and years in practice influence surgeons' personal preference and their recommendations for their patients regarding PC referral. Further studies are needed to elucidate factors that influence physicians' recommendations for their patients and the impact of their own personal biases and preferences on their practice.

Potential benefits to pre-operative palliative care consultation	**n (%)**	**Surgeons Supporting Respective Statements p-value (OR)**
More support for patients	102 (74%)	
Access to additional support resources (nutrition, psychosocial support)	99 (72%)	US Surgeons (p=0.0028; OR 4.53[CI1.58-12.97])
More support for families	97 (70%)	US Surgeons (p=0.025; OR 3.12 [CI 1.11-8.80])
Symptom management	91 (66%)	Female (p=0.047; OR 3.02 [CI 1.97-9.45]) Fellowship training (p=0.0162; OR 4.16 [CI 1.30-13.32])
Improved prognostic awareness	66 (48%)	US Surgeons (p=0.0078; OR 5.06 [CI 1.38-18.5])
Less aggressive treatment once the patient reaches the end of life	57 (41%)	
No – I don't see any potential benefits	8 (6%)	

Table 1. Surgeons' perceptions regarding benefits of preoperative palliative care.

13. PANREATICOGASTROSTOMY AS A FISTULA MITIGATING STRATEGY FOR A HIGH-RISK PANCREATIC ANASTOMOSIS FOLLOWING PANCREATICODUODENECTOMY

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Background: Clinically relevant postoperative pancreatic fistula (CR-POPF) heavily dominates the spectrum of morbidity following pancreaticoduodenectomy (PD). It leads to extended hospital stay and increased rates of readmission, reoperation, and mortality. Multiple studies have shown that CR-POPF is much more likely to occur in patients with so-called "high-risk" pancreatic remnant which is characterized by soft gland texture and small pancreatic duct size. We hypothesized that selective use of pancreaticogastrostomy (PG) in that group of patients should lead to a decrease in the rate of CR-POPF compared with a standard two-layer pancreaticojejunostomy (PJ).

Methods: An IRB-approved retrospective review of all PD's performed at a single institution between 2009 and 2019 was conducted focusing on the type of procedure, clinical and biochemical parameters, intraoperative surgeon's assessment of gland texture (soft versus hard) and pancreatic duct size (< 3 mm was classified as "small"). Primary endpoints included morbidity, mortality, and CR-POPF rates. The pancreatic remnant was labeled "high-risk" if at least one risk factor was present (soft gland or small duct). The use of PG during the study period was restricted to patients in the high-risk group, while PJ was performed in the settings of both high-risk and low-risk pancreatic remnant per surgeon's discretion.

Results: A total of 309 patients underwent PD for benign (19.7%) and malignant (80.3%) disease. Pancreatic ductal adenocarcinoma (PDAC) was the most common malignancy (58.9%). PJ was performed in 199 cases including 147 low-risk and 52 high-risk gland remnants; PG was done in 110 cases (all high risk). There was no difference in the length of the procedure, blood loss, transfusion requirements, rates of reoperation and readmission, overall morbidity (Clavien-Dindo Grade III and higher), and mortality. The rate of gastrointestinal (GI) bleeding was higher in the PG group:10% vs. none in PJ group (P=0.001); only 2 patients required intervention. Overall CR-POPF rate was 11.9% for the whole study population with no significant difference between PJ and PG groups. Risk-stratified analysis revealed that the use of PJ in low-risk group was associated with CR-POPF rate of 5.4%, however, there was a 6-fold increase in CR-POPF rate when PJ was used in patients with high-risk gland: 36.5.1%, (p=0.0001). The use of PG was associated with much lower rate of CR-POPF (9.1%) in the similar group of patients ($p < 0.0001$). Univariate analysis of 16 variables showed that soft gland texture, affiliation with "high risk" group, obesity, and unfavorable histology (any etiology other than PDAC or chronic pancreatitis) were associated with increased risk of CR-POPF amongst PJ patients; duct size and blood loss did not reach statistical significance. On multivariate analysis, soft gland texture remained the strongest independent predictor of CR-POPF (OR=11.25, 95% CI 3.035-41.7).

Conclusion: Our results demonstrate that PG after pancreaticoduodenectomy is associated with considerable reduction in the rate of CR-POPF in patients with high-risk pancreatic remnant. This technique can be regarded as a fistula-mitigating strategy in these challenging group of patients. Increased rate of GI bleeding calls for further refinement of the technique and postoperative management.

14. PREOPERATIVE CHEMORADIOTHERAPY IS ASSOCIATED WITH REDUCED RISK OF POSTOPERATIVE PANCREATIC FISTULA AFTER PANCREATODUODENECTOMY: A NATIONWIDE ANALYSIS

LV Wismans, JA Suurmeijer, JC van Dongen, BA Bonsing, HC van Santvoort, JW Wilmink, G van Tienhoven, IH de Hingh, DJ Lips, E van der Harst, VE de Meijer, GA Patijn, K Bosscha, MW Stommel, S Festen, M den Dulk, JJ Nuyttens, MP Intven, J de Vos-Geelen, IQ Molenaar, OR Busch, B Groot Koerkamp, MG Besselink, CH van Eijck for the Dutch Pancreatic Cancer Group

Presenter: JA Suurmeijer MD | Academic Medical Center, Netherlands

Background: Postoperative pancreatic fistula (POPF) remains the main cause of morbidity and mortality after pancreatoduodenectomy for pancreatic ductal adenocarcinoma (PDAC). This study aimed to investigate the effect of preoperative chemotherapy (PCT) and preoperative chemoradiotherapy (PCRT) on postoperative pancreatic fistula (POPF) and other pancreatic-specific surgery related complications.

Methods: All patients after pancreatoduodenectomy for PDAC were included from the mandatory nationwide prospective Dutch Pancreatic Cancer Audit (DPCA; 2014-2020). Baseline and treatment characteristics were compared between immediate surgery, preoperative chemotherapy (PCT) and preoperative chemoradiotherapy (PCRT). The relationship between preoperative chemo(radio)therapy and clinically relevant POPF (ISGPS grade B/C) was investigated using multivariable logistic regression analyses.

Results: Overall, 2019 patients after pancreatoduodenectomy for PDAC were included, of whom 1678 underwent immediate surgery (83.1%), 192 (9.5%) received PCT, and 149 (7.4%) received PCRT. POPF occurred in 8.3% of patients after immediate surgery, 4.2% after PCT, and 2.0% after PCRT (p=0.004). In multivariable analysis, the use of PCRT was associated with reduced risk of POPF (OR 0.21, 95%CI 0.03-0.69, p=0.033) compared to immediate surgery, whereas PCT was not (OR 0.59, 95%CI 0.25-1.25, p=0.199). During surgery, firm pancreas texture was most often observed after PCRT (53% immediate surgery, 62% PCT, 77% PCRT, p< 0.001).

Conclusion: In this nationwide analysis in patients with PDAC after pancreatoduodenectomy PCRT was associated with a reduced risk of POPF.

15. TREATMENT OF PANCREATIC CANCER AT HIGH-VOLUME CENTERS IS ASSOCIATED WITH IMPROVED OUTCOMES AND IS UNDERUTILIZED BY SOCIOECONOMICALLY AND GEOGRAPHICALLY DISADVANTAGED PATIENTS

TL Sutton, A Johnson, F Rocha, P Worth, BC Sheppard
Presenter: Thomas L. Sutton MD | Oregon Health & Science University, United States

Background: Patients with pancreatic adenocarcinoma (PDAC) treated at high-volume centers (HV) experience improved overall survival (OS) than at low-volume centers (LV) in population-level datasets. However, it is often difficult to account for selective referral of patients with better prognosis to HV centers in such datasets. Additionally, predictive factors for HV center treatment are poorly characterized.

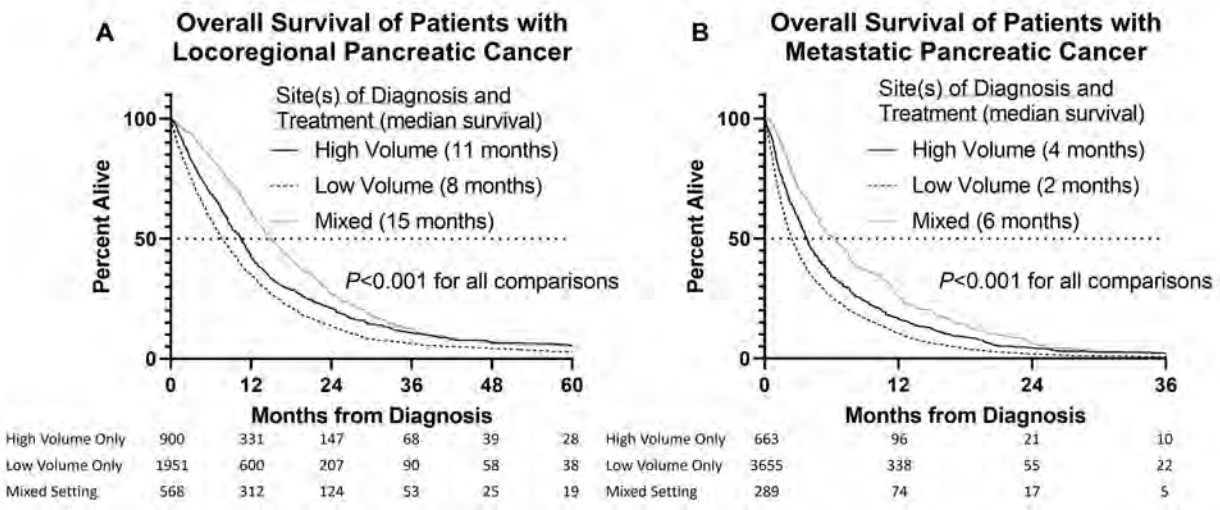
Methods: We queried a statewide cancer registry for patients with PDAC diagnosed from 1997-2018. All facilities reporting data for each patient record were classified as HV (≥50 pancreatectomies for PDAC/year) or LV (< 50/year). Patients were grouped by characteristics of reporting facilities: HV-only, LV-only, and mixed (containing all LV to HV referrals). Kaplan-Meier analysis was used to evaluate OS from diagnosis, and logistic regression was utilized to evaluate odds of HV treatment.

Results: We identified 8026 patients with complete clinical staging (n=3419 locoregional, n=4607 metastatic). Diagnosis and treatment were entirely at LV centers in 75% (n=5606), at HV in 16% (n=1563), and at mixed settings in 9% (n=857). Patients diagnosed and treated in mixed settings were younger (mean 66 years) than those in LV (mean 72 years) and HV settings (mean 68 years, both P< 0.001). Mixed settings had improved median OS for locoregional and metastatic disease (15 and 6 months, respectively) compared to patients in only HV (11 and 4 months, respectively) or LV (8 and 2 months, respectively, P< 0.001 for all comparisons, Figure).

Patients with locoregional disease were more likely to undergo resection in HV (OR 2.80, P< 0.001) and mixed settings (OR 5.01, P< 0.001) compared to LV settings after adjusting for relevant clinicopathologic characteristics. Compared to LV settings, odds of receiving chemotherapy were not different in HV settings for either locoregional (OR 1.07, P=0.43) or distant disease (OR 1.15, P=0.11), but were higher in mixed settings (OR 3.30 and 2.66, respectively, P< 0.001).

On multivariable logistic regression, factors independently associated with lower odds of HV treatment included older age (OR 0.95/year, P< 0.001), farther distance to nearest HV center (OR 0.84/20km, P< 0.001), lower estimated income (OR 1.12, P< 0.001), and distantly metastatic disease (OR 0.37, P< 0.001).

Conclusion: The improved outcome of mixed setting compared to HV-only treatment may reflect improved prognostic or comorbid features of this cohort—prompting referral to HV centers—or previously unknown benefits of mixed setting treatment. Independent of this phenomenon, HV-only treatment is associated with improved OS versus LV-only treatment in all PDAC stages. Additionally, significant disparities in receipt of HV treatment exist, as patients with lower income, longer distance to nearest HV center, and older age are less likely to receive HV treatment. Efforts to promote referral of socioeconomically disadvantaged and geographically remote patients to HV centers may significantly improve outcomes in PDAC in rural states.


A
Overall Survival of Patients with Locoregional Pancreatic Cancer
Site(s) of Diagnosis and Treatment (median survival)
High Volume (11 months)
Low Volume (8 months)
Mixed (15 months)
P<0.001 for all comparisons
Percent Alive
100
50
0
0
12
24
36
48
60
Months from Diagnosis
High Volume Only 900 331 147 68 39 28
Low Volume Only 1951 600 207 90 58 38
Mixed Setting 568 312 124 53 25 19
B
Overall Survival of Patients with Metastatic Pancreatic Cancer
Site(s) of Diagnosis and Treatment (median survival)
High Volume (4 months)
Low Volume (2 months)
Mixed (6 months)
P<0.001 for all comparisons
Percent Alive
100
50
0
0
12
24
36
Months from Diagnosis
High Volume Only 663 96 21 10
Low Volume Only 3655 338 55 22
Mixed Setting 289 74 17 5

16. PRIMARY VS. SALVAGE OPERATIVE PANCREATIC DEBRIDEMENT: DISCRETE INTERVENTIONS FOR UNIQUE POPULATIONS

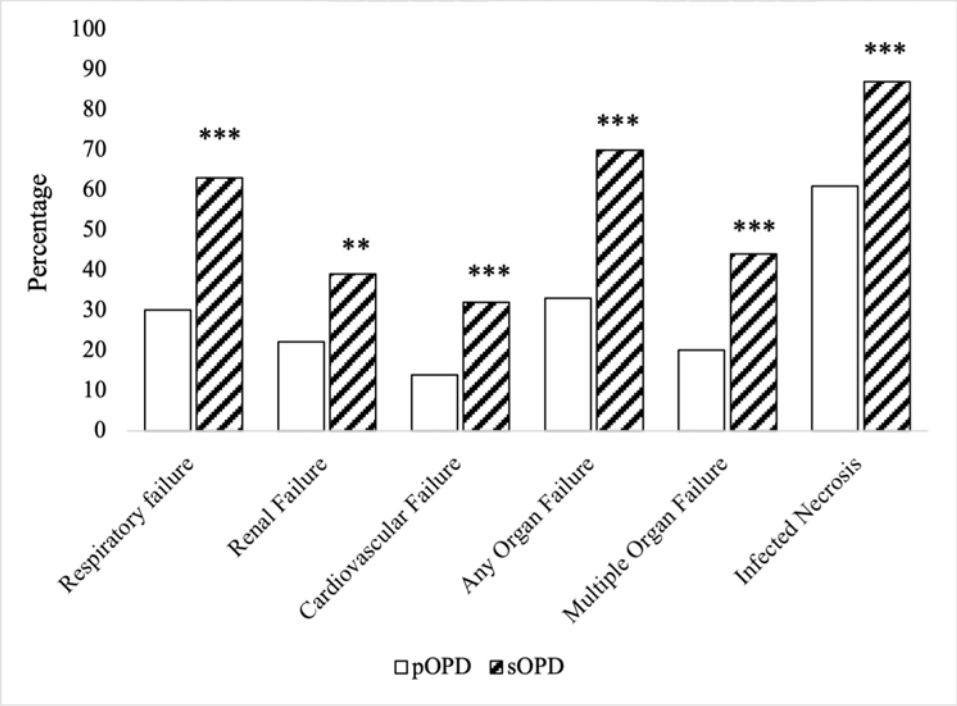
S McGuire, A Roper, T Maatman, E Ceppa, M House, A Nakeeb, T Nguyen, C Schmidt, N Zyromski
Presenter: Sean McGuire MD | Indiana University School of Medicine, United States

Background: A minimally invasive step-up approach is the initial treatment strategy for necrotizing pancreatitis (NP); however, operative pancreatic debridement (OPD) remains an important therapy. OPD is applied as a primary approach in biliary pancreatitis with concomitant cholecystectomy or when there is concern for ischemic/perforated viscus. Conversely, OPD is applied after failure to progress with percutaneous or endoscopic interventions. We hypothesized that primary OPD and salvage OPD represent discrete interventions for unique patient populations and may have different outcomes.

Methods: Single institution retrospective review of 468 NP patients treated between 2011-2019. Operative pancreatic debridement included video-assisted retroperitoneal debridement (VARD), open and minimally invasive transgastric debridement (TGD), and open debridement with external drainage. Primary OPD was defined as OPD performed prior to any other necrosis intervention; salvage OPD was defined as OPD performed following either percutaneous or endoscopic necrosis intervention. NP patients treated with primary OPD were compared with patients treated with salvage OPD.

Results: 273/468 (58%) of patients underwent OPD. 194 (71%) were primary OPD and 79 (29%) were salvage OPD. No difference was seen in etiology of NP or comorbidity profile between groups. Organ failure was present in 33% (64/194) of the primary OPD group and 77% (55/79) of the salvage OPD group, $p < 0.001$ (Figure). Infected necrosis was present in 60% (117/194) of the primary OPD group and 87% (69/79) of the salvage OPD group, $p< 0.001$. The percentage of pancreatic parenchymal necrosis was similar between groups. In the salvage group, the initial intervention included placement of a percutaneous drain in 87% (69/79) of patients and endoscopic debridement in 13% (10/79) of patients. The indication for primary OPD was most commonly biliary pancreatitis with need for concomitant cholecystectomy (53%, 103/194). In the primary OPD group, the initial intervention for pancreatic necrosis was performed later than in the salvage OPD group (76 ± 6 days versus 45 ± 6 days after NP diagnosis, $p = 0.006$). The primary group underwent fewer total procedures during NP disease course (3.5 ± 0.3 vs 6.7 ± 0.4, $p< 0.001$). Overall disease duration (190 ± 12 days (primary) versus 228 ± 21 days (salvage), $p=0.1$) and mortality (7% (primary) versus 13% (salvage), $p=0.2$) were similar between groups. Disease duration after first necrosis intervention was shorter in the primary OPD group than the salvage OPD group (121 ± 12 days versus 192 ± 21 days, $p=0.003$).

Conclusion: Primary and salvage operative pancreatic debridement are important therapies for patients with necrotizing pancreatitis. Salvage OPD is employed later in disease course in patients with high rates of organ failure and infected necrosis. Despite this challenging clinical context, salvage OPD achieves necrosis resolution with similar mortality rates to primary OPD.


100
90
80
70
60
50
40
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10
0
Percentage
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Respiratory failure
Renal Failure
Cardiovascular Failure
Any Organ Failure
Multiple Organ Failure
Infected Necrosis
pOPD
sOPD

17. PERSPECTIVE OF POINT-OF-CARE SPECIALISTS ON THE INITIAL MANAGEMENT OF ACUTE PANCREATITIS: AN INTERNATIONAL MULTIDISCIPLINARY SURVEY FOCUSED ON DAILY PRACTICE

N Lluis, HJ Asbun, MG Besselink, G Capurso, PK Garg, A Gelrud, W Khannoussi, HS Lee, A Leppäniemi, M Löhr, SJ Mahapatra, C Mancilla, HC van Santvoort, SS Vege, P Zapater, F Lluís, E de-Madaria, JM Ramia
Presenter: Nuria Lluis MD | Miami Cancer Institute, United States

Background: In the past decade, various international scientific associations have endorsed clinical practice guidelines for the management of patients with acute pancreatitis. However, the implementation of expert recommendations in daily health care can be suboptimal. Point-of-care decisions have been reported to differ from clinical guideline recommendations. Identifying factors associated with these discrepancies could guide improvement strategies.

Methods: The questionnaire consisted of two parts. The first aimed at characterizing the professional profile of the participants, the second was designed to characterize the management strategies currently used by professionals in the management of patients with acute pancreatitis during the first 72 hours after admission. It focused on fluid resuscitation, prophylactic antibiotics, early oral, enteral, or parenteral feeding, and the timing of cholecystectomy. Potentially interested scientific societies were contacted. In parallel, the summary and the link were distributed via social media. This was a completely anonymous survey. Study data were collected and managed using REDCap tools. Multivariable logistic regression was used to identify the characteristics of participants associated with compliance with the recommendations provided by the clinical guidelines.

Results: A total of 1,054 participants from 94 countries completed the questionnaire; median age (IQR) was 39 (32-47) years; 30.7% were women. Thirty-seven % of the participants opted for non-moderate flow of i.v. fluid, 31% for fluid type other than Ringer's lactate; 73.4% were in favor of nil per os to patients who could eat, 75.5% for other than enteral feeding to patients with oral intolerance; 15.5% used prophylactic antibiotic in patients with severe acute pancreatitis, 34.1% in necrotizing acute pancreatitis, and 27.4% in patients with systemic inflammatory response syndrome; 27.8% delayed cholecystectomy after biliary acute pancreatitis (Fig 1-A). The degree of compliance was good / excellent (meaning 5 to 8 matching responses) in 62.2% of participants, and poor / moderate (0 to 4 matching responses) in the remaining 37.8% (Fig 1-B). In multivariable analysis, participants from Asia / Oceania (P=.01), surgeons (P=.046), other specialists (P<.001), and those participants unaware of the number of patients with AP admitted annually (P=.02) were more likely to poorly / moderately comply with the recommendations of the clinical practice guidelines. Participants with publications in PubMed on acute pancreatitis showed better compliance (0R, 1.62; 95% CI, 1.15 – 2.32; P=.007) with recommendations of the clinical guidelines (Fig 1-B).

Conclusion: Despite a significant effort in the development of evidence-based guidelines through complex scientific processes, the results of this study appear to emphasize that attention also needs to be placed on the implementation and adoption of these well-developed guidelines. Feeding and nutrition appear to require the greatest need for wider adoption. Awareness campaigns, medical society educational programs, and structural changes should be invested to increase the compliance of these guidelines in the initial management of patients with acute pancreatitis.

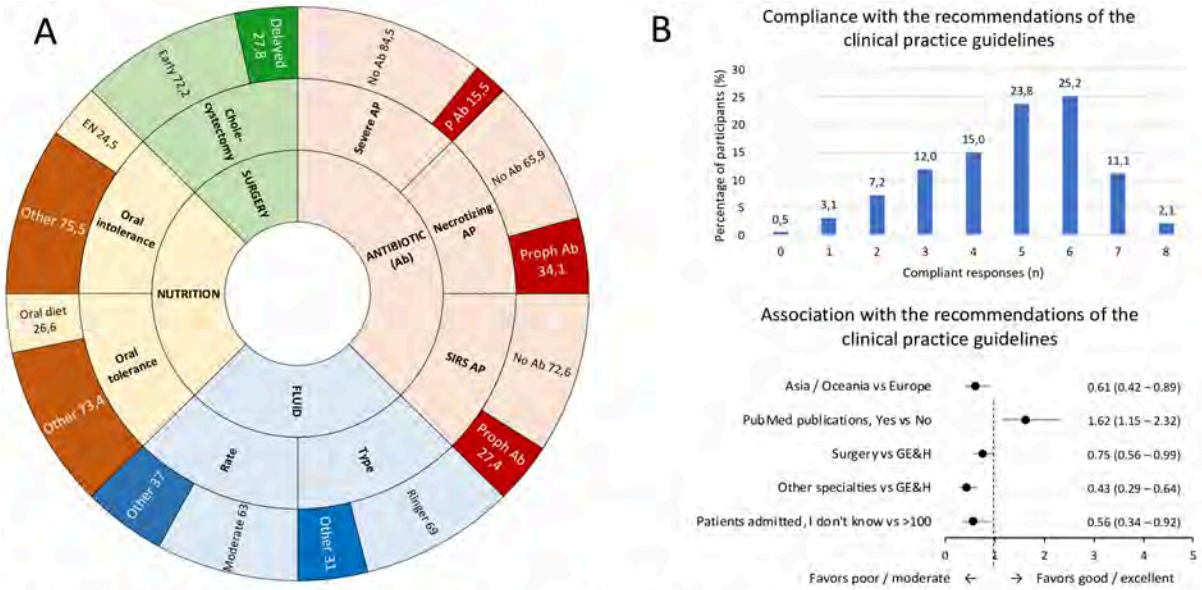

Figure 1. A) Sunburst chart: Case management. B) Bar graph and forest plot: Compliance and association with the recommendations of the clinical practice guidelines

18. OPERATIVE PANCREAS DEBRIDEMENT IN 2022: WHO AND WHEN

S McGuire, T Maatman, E Ceppa, M House, A Nakeeb, T Nguyen, C Schmidt, N Zyromski
Presenter: Sean McGuire MD | Indiana University School of Medicine, United States

Background: Treatment of necrotizing pancreatitis (NP) has shifted in favor of a minimally invasive step-up approach rather than primary operative pancreatic debridement (OPD). We evaluated the contemporary role of OPD in NP treatment.

Methods: Single institution retrospective review of 468 NP patients treated between 2011-2019. Operative pancreatic debridement included video-assisted retroperitoneal debridement (VARD), open and minimally invasive transgastric debridement, and open debridement with external drainage. NP patients whose treatment included OPD were compared with patients treated definitively without OPD.

Results: Since 2011, 256/468 (55%) of patients were treated with OPD. Gender and comorbidity profile were similar between groups. Necrotizing pancreatitis etiology was more likely biliary (52% vs 32%) and less likely secondary to alcohol (19% vs 35%) in patients treated with OPD ($p< 0.001$). Computed tomography severity index (CTSI) of pancreatic necrosis was similar between groups; however, infected necrosis was more common in patients who underwent OPD (68% versus 33%, $p < 0.001$). Patients treated with OPD were more likely to have disconnected pancreatic duct syndrome (DPDS) (53% vs 29%, $p < 0.001$). Among patients who underwent OPD during their treatment, 73% underwent OPD as their initial intervention at 73 ± 6 days after disease onset while 27% underwent OPD as salvage therapy at 95 ± 16 days after disease onset, $p=0.1$.

Conclusion: Operative pancreatic debridement remains an important treatment modality in patients with pancreatic necrosis. OPD is employed as either primary or salvage therapy most frequently in patients with NP of biliary etiology, infected necrosis, and patients with disconnected pancreatic duct.

19. INCIDENCE AND PREDICTORS OF EARLY AND LATE READMISSION AFTER ACUTE PANCREATITIS

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Presenter: Benjamin Richter MD | Northwestern Medicine, United States

Background: Acute pancreatitis (AP) incidence is increasing globally. Despite advances in management of and diagnostic testing for AP, recurrence and readmission remain common. Identifying modifiable risk factors for readmission and useful interventions during hospitalization or in the early post-discharge period may have a significant impact on long term outcomes. Our goal was to identify predictors of readmission in patients admitted with AP at a tertiary medical center.

Methods: This is a retrospective cohort study of patients at a large urban academic medical center. Consecutive patients over the age of 18 with a discharge ICD-10-CM diagnosis of AP between 2/5/2013 and 1/28/2021 were included. Data was extracted from the Electronic Health Record via the Enterprise Data Warehouse. Separate multivariate regressions were performed to evaluate predictors of pancreatitis-related readmissions for all patients, for only non-biliary pancreatitis patients, and for early (0 to 30 days) vs. late (31 to 180 days) readmissions.

Results: Our study included 1079 patients. 129 (10.6%) patients were readmitted for all causes and 114 (8.5%) for pancreatitis-related complications (recurrence, infected pancreatic necrosis or fluid collections, and procedural complications). 43.5% of readmissions occurred 30 days post-discharge; 56.5% occurred from 31 to 180 days post-discharge. All the following regressions were performed using pancreatitis-related readmissions as the dependent variable: Biliary pancreatitis (OR 2.11, $p < 0.05$), male sex (OR 1.69, $p < 0.05$), and history of prior AP (OR 3.58, $p < 0.01$) were predictors of 180-day readmission. Gallbladder resection during hospital stay was associated with a significantly decreased risk of readmission (OR 0.156, $p < 0.01$). When gallbladder resection was removed from the regression, biliary pancreatitis was no longer associated with readmission (OR 1.19, P 0.58). When non-biliary pancreatitis was evaluated independently, history of alcohol abuse (OR 1.94, $p < 0.05$) and prior AP (OR 4.01, $p < 0.01$) were predictors of readmission. Predictors of early readmission included gallbladder resection (OR 0.69, $P < .05$), prior AP (OR 2.79, $p < .05$) and early outpatient follow up (OR 2.34, $P < .05$). Predictors of late readmission were male sex (OR 2.5, $p < .05$) and prior acute pancreatitis (OR 3.85, $P < .01$).

Conclusion: About one-tenth of patients discharged with AP will be readmitted, with the majority of the readmissions (56%) occurring after 30 days. We identified male sex and biliary pancreatitis as independent risk factors for late readmission, though gallbladder resection during hospitalization attenuates the risk of the latter. Recurrent AP was the only risk factor for both early and late readmission and was the strongest predictor of both. Unexpectedly, close outpatient follow up did not prevent readmission.

20. ROUTINE INTENSIVE CARE UNIT OBSERVATION AFTER PANCREATECTOMY: TREATING THE PATIENT OR THE SURGEON?

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Presenter: Thomas L. Sutton MD | Oregon Health & Science University, United States

Background: Routine intensive care unit admission (ICUA) is commonplace following pancreatectomy, particularly pancreaticoduodenectomy, and aims to allow early postoperative complications to occur in a high acuity setting. The value of this practice in avoiding failure-to-rescue or impacting perioperative mortality is poorly studied, however.

Methods: We queried our institutional National Surgical Quality Improvement Project (NSQIP) database for patients undergoing pancreatectomy from 2013-2020. Initial postoperative dispositions, ICU courses, subsequent ICU transfers, and hospital cost data in United States Dollars (USD) were reviewed. Patients were analyzed in three groups by postoperative disposition and level of care as defined by the Society of Critical Care Medicine: those with ICUA requiring ICU-level care (e.g., invasive ventilation, vasopressors, inotropes, intravenous antiarrhythmics), those with ICUA requiring ward-level care, and those admitted to the ward. Data were analyzed with multivariable logistic regression.

Results: Six-hundred-thirty-seven patients were identified; 404 (63%) underwent pancreaticoduodenectomy (Table 1). At postoperative admission, two-thirds (n=318, 63%) of patients were only receiving ward-level interventions. Of 318 patients with ICUA requiring ward-level care, 235 (74%) had no identified disturbances or complications, 66 (21%) had minor disturbances requiring ward-level care, and 17 (5%) required ICU-level interventions during initial ICUA, most commonly antiarrhythmic infusion (n=12). 30-day and 90-day mortality in patients requiring ICU-level interventions was 5% (n=10) and 8% (n=16) versus 0.3% (n=1) and 1.2% (n=4) in those without, respectively. Hospital length of stay was significantly longer with initial ICU-level interventions (median 11 versus 9 days, P< 0.001), as were total ICU costs (mean 8683 versus 14611 USD, P< 0.001).

On multivariable analysis, factors associated with higher odds of requiring ICU-level care at case closure were older age (OR 1.04/year, P< 0.001), additional NSQIP-defined comorbidities (OR 1.34/comorbidity, P=0.003), pancreaticoduodenectomy (OR 1.93, P=0.04), higher intraoperative blood loss (OR 3.88/liter, P< 0.001), longer surgical duration (OR 1.44/hour, P< 0.001), and higher intraoperative crystalloid volume (OR 1.11/liter, P=0.008. There were no identified factors associated with new ICU-level interventions in patients admitted to ICU for observation.

Conclusion: At high-volume pancreas centers, patients undergoing pancreatectomy who require only ward-level care at ICUA are at very low risk of requiring ICU-level care during observation, or of 30- and 90-day mortality. In patients with ward-level care needs postoperatively, ward admission with a low threshold for care escalation presents a significant opportunity for costs-savings and un-burdening ICUs.

Table 1: Clinicopathologic Characteristics of Patients Undergoing Pancreatectomy by Postoperative Disposition and Level of Care

Characteristic	ICU with ICU Interventions; N=190; No. (%)	ICU without ICU Interventions; N=318; No. (%)	Admitted to Ward; N=129; No. (%)	*P*
Age, Years; median [IQR]	67 [58-74]	66 [57-72]	58 [44-69]	<0.001
NSQIP-Defined Comorbidities				0.004
0	39 (20.5)	89 (28.0)	48 (37.2)	
1-2	112 (58.9)	187 (58.8)	68 (52.7)	
3+	39 (20.5)	42 (13.2)	13 (10.1)	
Operation				<0.001
DP/RAMPS	43 (22.6)	67 (21.1)	123 (95.3)	
Whipple/Total Pancreatectomy	147 (77.4)	251 (78.9)	6 (4.7)	
Vascular Reconstruction	76 (40.0)	30 (9.4)	0 (0)	<0.001
Surgical Duration, Hours; median [IQR]	9.4 [7.6-11.4]	7.3 [5.8-8.5]	3.9 [3.2-4.7]	<0.001
Intraoperative Blood Loss, mL; median [IQR]	1200 [700-2000]	500 [300-750]	150 [55-400]	<0.001
Intraoperative Crystalloid, L; median [IQR]	9.1 [6.0-12.5]	5.5 [4.2-7.4]	3.0 [2.3-3.9]	<0.001
Initial ICU LOS, days; median [IQR]	2 [2-3]	1 [1-2]	N/A	<0.001*
Hospital LOS, days; median [IQR]	11 [8-17]	10 [8-15]	6 [5-7]	<0.001
90-day Mortality, %	16 (8.4)	3 (0.9)	1 (0.8)	<0.001
Total ICU Costs, Thousand USD; median [IQR]	10.8 [6.4-14.8]	6.1 [4.0-8.8]	4.8 [4.7-5.6]	<0.001*
Total Ward Costs, Thousand USD; median [IQR]	9.9 [6.6-18.1]	9.4 [6.6-15.0]	7.5 [6.2-8.9]	<0.001
ICU Cost Share of Postoperative Costs, %; median [IQR]	48.3 [35.9-61.8]	38.0 [27.1-50.0]	0 [0-0]	<0.001*

*Comparison between groups with initial ICU admission

Abbreviations: IQR=Interquartile Range; ICU=Intensive Care Unit; NSQIP=National Surgical Quality Improvement Project; DP=Distal Pancreatectomy; RAMPS=Radical Antegrade Modular Pancreatosplenectomy; LOS=Length of Stay; USD=United States Dollars

21. CHRONIC PANCREATITIS PATIENTS: ENDOSCOPIC PROCEDURES AND QUALITY OF LIFE

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Presenter: Mikael Parhiala MD | Tampere University Hospital, Finland

Background: Chronic Pancreatitis (CP) may cause chronic or intermitting abdominal pain, as well as endocrine and exocrine pancreatic insufficiency. Morphological changes in the pancreatic tissue, leading to and complications such as biliary strictures and pseudocysts may need endoscopic interventions.

Our aim was to investigate the frequency of endoscopic procedures in the CP patients, and to study pain and quality of life in these patients after the procedures.

Methods: SBPC database is the largest prospectively multicentre CP database, containing over 2000 CP patients meeting M-ANNHEIM diagnostic criteria (1). In this study, 1176 CP patients from 4 countries and 8 centres were included. We analysed patients who underwent endoscopic procedures (endoscopic group; E-CP) and gathered all related information, such as types of endoscopic procedures, pancreatic function, pain, time after diagnosis and EORTC C-30 Quality of life (QOL) questionnaire. Patients who did not have any invasive interventions were used as a control group (C-CP;n=916)

Results: 260 patients (22%) of the CP patients underwent endoscopic procedures. Procedures were performed median one year (range 0-39 years) after the CP diagnosis. 68% of the patients were males. Age median was 59 years (range 20-90 years). Most common etiological factors were alcohol in 65% and smoking in 71%. Biliary duct stenting was performed in 37% of the patients. Pancreatic stenting was performed in 56% of the patients and out of these 72% had multiple pancreatic stents.

Exocrine pancreatic insufficiency was slightly more common in the endoscopic group compared to the control group, 62% vs 53% (p=0.020). Endocrine insufficiency was found similar between the groups (45% vs 40%, p=0.144).

Fewer patients were painless in the endoscopy group compared to the control group (42% vs 51%, p=0.020). The number of patients with constant pain was similar (16.5 v 14.7% p=0.516).

39% of the patients with one pancreatic stent and 45% the patients with multiple pancreatic stents were painless (p=0.523). 23% of the patients underwent pancreatic surgery later. EORTC QOL was similar in functioning and in symptom scores in the endoscopic and control population.

Conclusion: One out of five of the CP patients underwent endoscopic procedures in the SBCP database. 56% underwent pancreatic and 37% biliary stenting. Exocrine pancreatic insufficiency was slightly more common in the endoscopic group compared to the control group. Constant pain and Quality of life were similar between the groups.

1. SS Olesen, J L Poulsen, A M Drewes, J B Frøkjær, J Laukkarinen, M Parhiala et al. The Scandinavian baltic pancreatic club (SBPC) database: design, rationale and characterisation of the study cohort. Scand J Gastroenterol. 2017 Aug;52(8):909-915. doi: 10.1080/00365521.2017.1322138. Epub 2017 May 4.

22. CHANGES IN ACTIVITY OF HEAT SHOCK PROTEIN-70 FAMILY GENES IS ASSOCIATED WITH EARLY ACUTE PANCREATITIS SEVERITY

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Presenter: Aiste Kielaite-Gulla MD, PhD, MBA | Vilnius University Hospital Santaros Clinics (VULSK), Lithuania

Background: Acute pancreatitis is a severe inflammatory disease, which is able to affect multiple organ systems and impair patients' health, often requiring hospital admission. There has been advancements made in understanding the pathophysiology of the disease, however a method, which could accurately predict the severity and clinical outcome is still lacking. We hypothesized that Heat Shock Protein 70 (HSP70) single nucleotide polymorphisms (SNPs) may play a role in early detection of acute pancreatitis severity.

Methods: A total of 109 patients, of which 57 were diagnosed with AP and 52 did not have the disease, were tested prospectively. The patients were admitted to Vilnius University Hospital Santaros Klinikos from 2018 to 2021. Peripheral blood samples from pancreatitis patients were collected upon admission. The severity of AP was determined according to the revised Atlanta classification. Genomic DNA was extracted from the blood samples of patients and controls groups. Two SNPs of the HSP70-gene family were selected. The polymorphism frequencies were determined by performing quantitative polymerase chain reaction (qPCR) and using TaqMan allelic discrimination assays. Additionally, RNA was extracted parallel to genomic DNA from AP patients (N&#3f57) and healthy controls (N&#3f52). Gene expression of two HSP70 family members HSPA1A and HSPA1L was measured using TaqMan gene expression assays via reverse transcription quantitative polymerase chain reaction (RT-qPCR).

Results: Major allele frequency for HSPA1A frequency was 0.672 (A>C) for patients and 0.7 (A>C) for controls, while for HSP70-HOM and HSPA1A, the major allele frequencies were 0.638 (A>G) and 0.672 (G>C) for patients and 0.85 (A>G) and 0.65 (G>C) for controls, respectively. Patients with alcohol-induced AP and those with other causes of disease and mild or severe course had the allele frequencies of 0.638. Furthermore, after gene expression of HSPA1L and SNP relationship analysis we identified that AP patients with heterozygous genotype had higher expression levels as compared to non-AP patients (p=0.014).

Conclusion: Our data suggest that polymorphism of the HSP70 promoter region may be a risk factor for developing severe acute pancreatitis.

Further study to determine the serum and/or urine levels of HSP70 protein expression is needed to confirm the protective mechanism of HSP70.

23. WEIGHT TRACKING AS A NOVEL PROGNOSTIC MARKER AFTER PANCREATECTOMY

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Presenter: Jonathan J. Hue MD | University Hospitals Cleveland Medical Center, United States

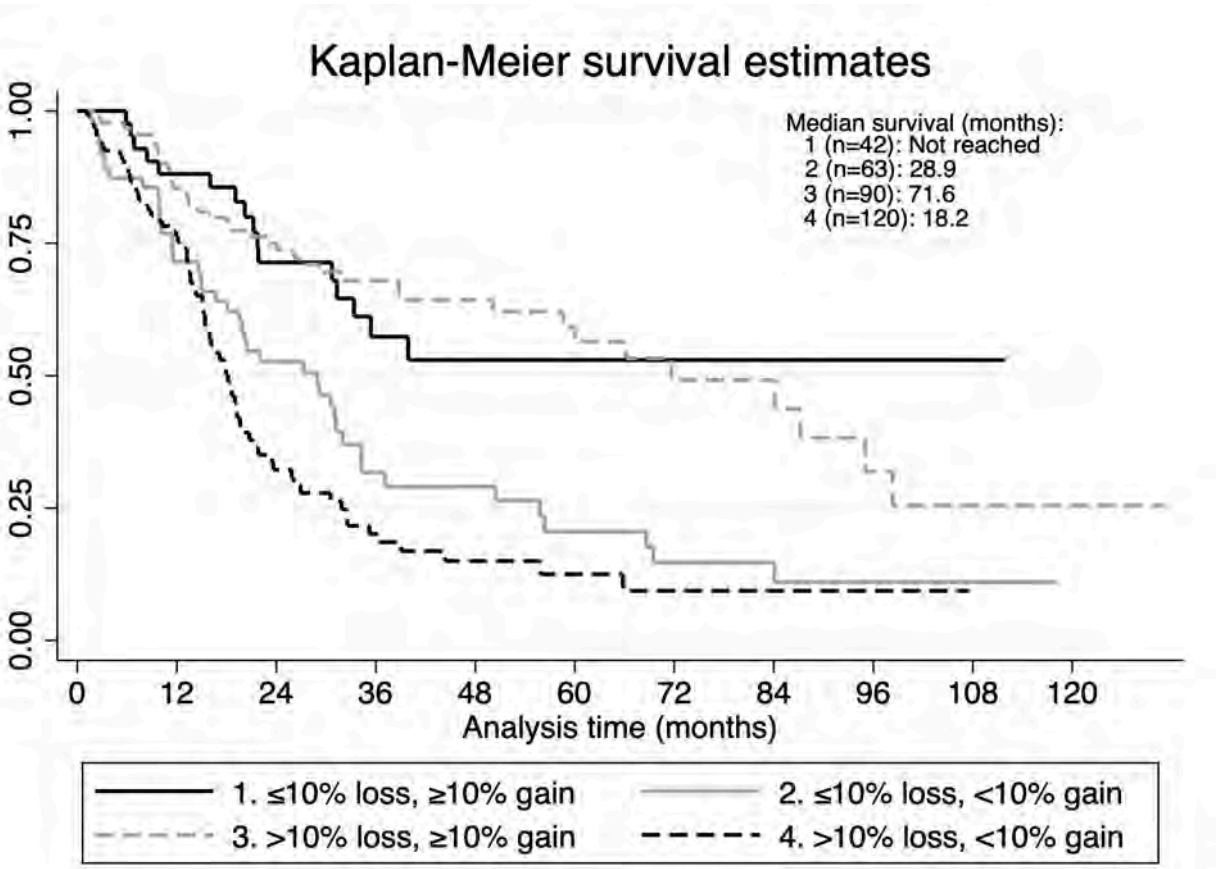
Background: Objective measures of post-pancreatectomy weight change for pancreatic ductal adenocarcinoma (PDAC) have not been extensively studied for long-term outcomes. We aimed to use weight measurements in our institutional medical record to analyze trends in post-pancreatectomy weight and determine the association with disease status and survival.

Methods: Pancreatectomies for PDAC (n=315) and benign indications (n=111) were identified. Preoperative baseline, minimum postoperative (Min #1), and subsequent postoperative maximum (Max) weights were abstracted. Multivariable logistic regression was used to assess if the time from surgery to Min #1 was predictive of PDAC recurrence, when controlling for age, sex, operation, margin positivity, lymph node positivity, and receipt of chemotherapy. Multivariable Cox proportional hazards regressions were conducted to analyze the association between weight change and survival.

Results: Preoperatively, patients with PDAC were 12 lbs lighter as compared to the benign group (166 vs. 178 lbs, p=0.01). Postoperatively, both groups lost greater than 20 lbs (22.7 lbs PDAC vs. 20.1 lbs benign, p=0.33) from their Baseline. Over 28% of PDAC patients lost >20%, which was a greater proportion as compared to the benign group (15.3%, p=0.02). PDAC patients gained 10 lbs after Min #1, compared to 15 lbs in the benign cohort (p< 0.001). Few patients returned to their Baseline weight (29.8% PDAC vs. 40.5% benign, p=0.04).

Patients with early PDAC recurrence (20% loss: HR 1.11, 95% CI 0.75-1.65). However, the ability to regain weight (Min #1 to Max) was associated with a significant survival advantage (5-10% vs. 10% vs. 10%).

Conclusion: Pancreatectomy is often followed by substantial postoperative weight loss without an associated survival impact based on these data. However, PDAC patients who are unable to eventually regain weight fare significantly worse. Weight loss persisting for ≥12 months is a strong predictor of PDAC recurrence, as is additional weight loss after weight recovery. Greater emphasis on accurate body weight tracking in the postoperative period may provide easily captured and useful information regarding disease status after pancreatectomy for PDAC.


Kaplan-Meier survival estimates
Median survival (months):
1 (n=42): Not reached
2 (n=63): 28.9
3 (n=90): 71.6
4 (n=120): 18.2
0.00
0.25
0.50
0.75
1.00
0
12
24
36
48
60
72
84
96
108
120
Analysis time (months)
1. ≤10% loss, ≥10% gain
2. ≤10% loss, <10% gain
3. >10% loss, ≥10% gain
4. >10% loss, <10% gain

24. MACHINE LEARNING ALGORITHM IDENTIFIES PATIENTS AT RISK FOR PANCREATIC CANCER IN A 3-YEAR TIMEFRAME

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Presenter: Tamas Gonda MD | NYU Langone Health, United States

Background: Early detection of pancreatic cancer (PC) remains challenging largely due to the low population incidence and few known risk factors. However, screening in at-risk populations and detection of early cancer has the potential to significantly alter survival. We used an Electronic Health Records (EHR) based large-scale machine learning algorithm to identify disease codes that are associated with the development of PC at least 3 years before diagnosis and developed a predictive model to identify patients at risk for PC 27-33 months later.

Methods: EHR data was analyzed between 2000 and 2021 and individuals with at least 3 years of continuous presence in the database were included. A 1:4 case-control matching based on age, sex, length of medical history to all diagnosed with PC was performed. In one model, all patients meeting database presence were included, whereas in a second model only those without known prior pancreatic disease were evaluated. We introduced PheWas study to select the significant variables. Among demographic, 19,304 disease variables, and 10 lab values 27-33 months prior to PC diagnosis, we used the p-value of associations to select significant variables (cut-off p-value < 0.01), and trained a logistic regression model. Final predictive performance was tested on a held-out validation cohort.

Results: 537,410 patients were analyzed. 1923 patients with PC were matched to 7728 cancer-free patients. We identified 77 variables (73 diagnosis codes and 4 lab values) with significant association of development of PC, including pancreatic cysts, diabetes, family or personal history of breast cancer, and chronic pancreatitis (ranked results and statistical analysis are shown for top 10 variables in Table 1). These variables were selected for the regression model, which we trained in over 598,725 patients. In our second model, in patients without prior pancreatic diseases, 594,802 patients were included. The area under the receiver operating characteristic curve (AUROC) were 0.810 [0.792, 0.828] and 0.778 [0.759, 0.789] in the two models respectively.

Conclusion: In a robust EHR-based analysis, we identified a list of diagnostic variables associated with pancreatic cancer development in a 3-year time frame and developed a model to identify patients at risk. Although the inclusion of additional variables such as laboratory results and radiomics will likely improve the accuracy of the model, the current algorithm will allow us to develop an EHR-based identification of patients at risk for PC.

Codes	Description	P-value	Unadjusted Odds Ratio [95% Confidence Interval]	P-value (Model 1)	Adjusted odds Ratio (Model 1) [95% Confidence Interval]	P-value (Model 2)	Adjusted odds Ratio (Model 2) [95% Confidence Interval]
K86.89	Other specified diseases of pancreas	1.50E-06 **	5.49 [2.52, 11.96]	0.00E+00 ***	6.429 [4.734, 8.124]	NA	NA
D49.0	Neoplasm of unspecified behavior of digestive system	1.05E-08 **	8.05 [3.44, 18.84]	6.99E-08 ***	4.106 [2.243, 5.970]	6.35E-07***	4.581 [2.146, 7.016]
K85.90	Acute pancreatitis without necrosis or infection, unspecified	4.98E-03	4.01 [1.41, 11.45]	8.44E-14 ***	4.019 [1.568, 6.470]	NA	NA
C64.9	Malignant neoplasm of unspecified kidney, except renal pelvis	7.89E-03	2.87 [1.27, 6.46]	2.00E-15 ***	3.947 [2.634, 5.259]	1.42E-06 ***	4.377 [1.846, 6.908]
M19.049	Primary osteoarthritis, unspecified hand	9.46E-03	3.21 [1.26, 8.14]	1.39E-10 ***	2.868 [1.984, 3.752]	4.00E-05 **	2.681 [1.436, 3.926]
Z80.9	Family history of malignant neoplasm, unspecified	2.51E-04	3.35 [1.69, 6.66]	2.22E-16 ***	2.768 [2.136, 3.399]	1.11E-06 **	2.841 [1.587, 4.094]
Z15.09	Genetic susceptibility to other malignant neoplasm	1.17E-05 **	5.23 [2.29, 11.94]	0.00E+00 ***	2.159 [0.597, 3.720]	1.30E-13 ***	2.270 [1.103, 3.436]
K86.2	Cyst of pancreas	6.21E-29 **	14.45 [7.79, 26.80]	2.44E-15 ***	1.924 [1.127, 2.720]	NA	NA
Glucose	Glucose > 126.0	3.01E-06 **	2.06 [1.52 , 2.81]	1.45 E-04 *	1.910 [1.223, 2.596]	6.74E-04 *	1.153 [1.059, 1.247]
C50.919	Malignant neoplasm of unspecified site of unspecified female breast	2.89E-03	1.72 [1.20, 2.46]	0.00E+00 ***	1.880 [1.660, 2.100]	0.00E+00 ***	2.129 [1.844, 2.414]

25. POTENTIAL ROLE FOR OBSERVATION IN SMALL SOLID PSEUDOPAPILLARY ENDOCRINE NEOPLASIA (SPEN)

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Presenter: Oliver Standring MD | Northwell Health Cancer Institute, United States

Background: Solid Pseudopapillary Epithelial Neoplasms (SPEN) are rare tumors of the pancreas which predominantly affect young women. Surgical resection is the mainstay of treatment and offers definitive management, but is associated with significant morbidity and potential mortality. With increased utilization of high-resolution abdominal imaging, small SPEN may be increasingly identified incidentally. We aim to test the hypothesis that there may be a subset of small SPEN that could be safely observed.

Methods: A retrospective review of the Pancreas National Cancer Database from 2004-2018 was performed using histology code 8452 to identify invasive SPEN. Type of surgical resection was noted. Accuracy of clinical staging was performed exclusively in patients with full clinical and pathologic staging profiles.

Results: A total of 994 SPENs were identified, with a 7-fold increase from 19 (2004) to 144 (2018), making up 0.1-0.4% of pancreatic tumors within the NCDB. Mean age was 36.8 ± 0.5 years, 84.9% (n=844) were female, and most had a Charlson-Deyo Comorbidity Coefficient (CDCC) of 0-1 (96.6%, n = 960). Patients were most likely staged as clinically cT2 (69.5%, n = 457) followed by cT3 (17.6%, n = 116), cT1 (11.2%, n = 74), and cT4 (1.7%, n = 11). Overall lymph node and distant metastasis rates on clinical assessment were 3.0% and 4.0% respectively. Surgical resection was performed in 96.6% of patients (n=960), most commonly partial pancreatectomy (i.e. distal, 44.3%, n=440) followed by pancreatoduodenectomy with or without gastrectomy (31.3%, n=311), and total pancreatectomy (8.1%, n=81).

Staging accuracy was evaluated by comparing clinical staging to pathologic assessment post-resection. In patients clinically staged as node (N0) and distant metastasis (M0) negative, occult lymph node involvement was found in 0% (0/28) of stage cT1 and 0.5% (1/185) of cT2 patients (Table 1). The risk of incorrect nodal staging significantly increased to 8.9% (5/61) for cT3 patients compared to cT2 patients ($p< 0.001$). This risk further increased to 50% (1/2) in cT4 patients. No patients harbored occult metastatic disease at the time of resection. Survival was similarly excellent for localized cT1, cT2, and cT3 disease, but was notably worse for those with lymph node or distant metastasis. There was one case of a healthy 22-year-old woman who died within 90 days of an extended pancreatectomy for T3N0M0 disease.

Conclusion: Due to the rarity of SPEN, the literature lacks granularity regarding stage specific treatment, particularly for patients with clinical T1 tumors. In this study, the specificity of excluding nodal involvement clinically is 99.5% in tumors ≤ 4cm (cT1-2) and 100% in tumors ≤ 2cm (cT1). There may be a role for close observation in patients with cT1N0 lesions in order to mitigate morbidity from major pancreatic resection. Further prospective investigation is warranted, and given the rarity of small SPEN, will require multicenter collaboration.

Risk of Occult Lymph Node Involvement and Distant Metastasis in SPEN

AJCC $cT_xN_0M_0$

cT_1	**pT**	1	71.4% (20)	**N**	0	100% (28)	**M**	0	100% (28)
(n=28)		2	14.3% (4)		**1**	**0% (0)**		1	0% (0)
		3	14.3% (4)						
		4	0% (0)						
cT_2	**pT**	1	1.6% (3)	**N**	0	99.5% (184)	**M**	0	100% (185)
(n=185)		2	78.9% (146)		**1**	**0.5% (1)**		1	0% (0)
		3	18.4% (34)						
		4	1.1% (2)						
cT_3	**pT**	1	0% (0)	**N**	0	91.8% (56)	**M**	0	100% (61)
(n=61)		2	11.5% (7)		**1**	**8.9% (5)**		1	0% (0)
		3	86.9% (53)						
		4	1.6% (1)						
cT_4	**pT**	1	0% (0)	**N**	0	50% (1)	**M**	0	100% (2)
(n=2)		2	0% (0)		**1**	**50% (1)**		1	0% (0)
		3	0% (0)						
		4	100% (2)						

Nodal and distant metastasis negative patients with full clinical *and* pathologic assessment were included in this analysis. Data presented as % (n)

26. NON-INVASIVE GRADING OF NONFUNCTIONAL PANCREATIC NEUROENDOCRINE TUMORS WITH A CT-DERIVED RADIOMICS-SIGNATURE

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Presenter: Ammar A. Javed MD | NYU Langone Health, United States

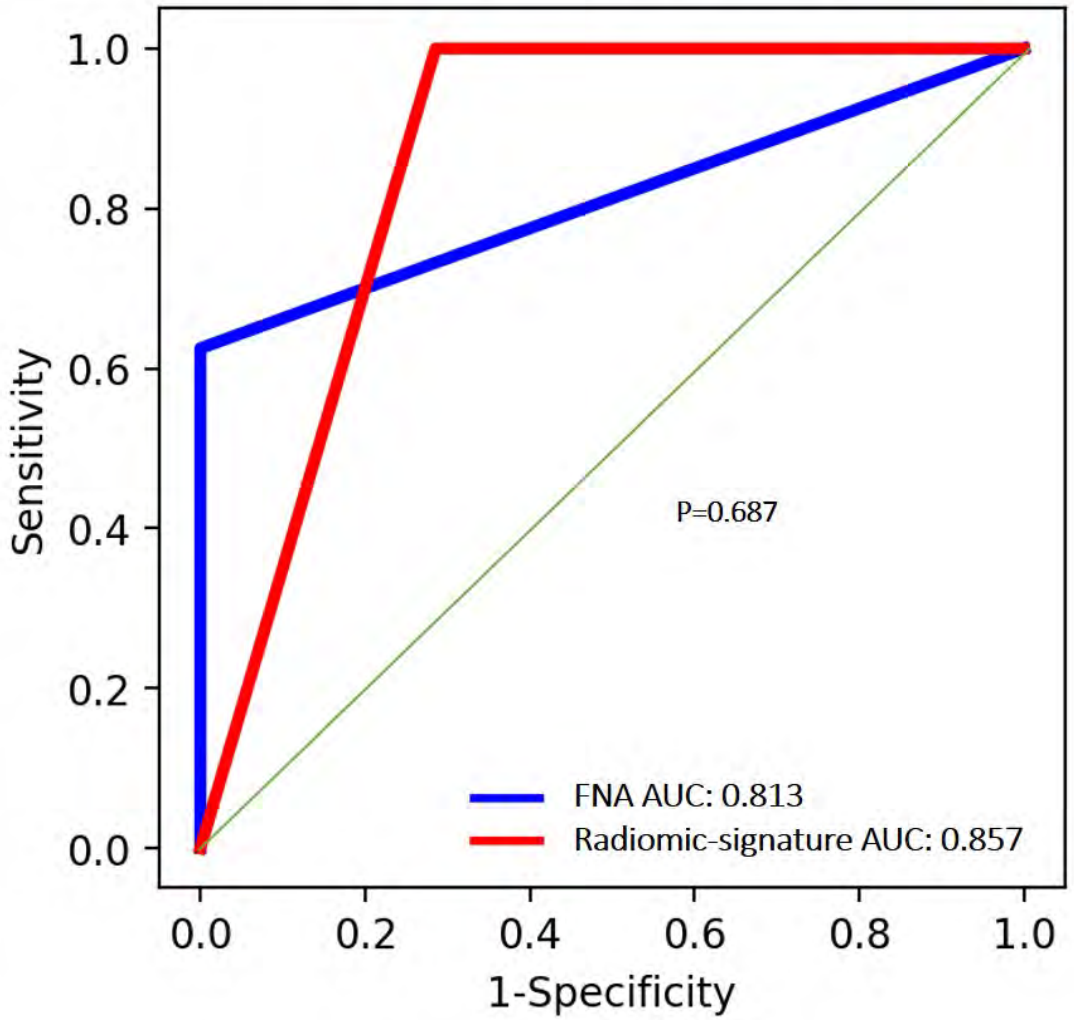
Background: Nonfunctional pancreatic neuroendocrine tumors (NF-PanNETS) exhibit a wide range of biologic behaviors. Tumor grade is indicative of disease biology and the WHO grading system has been established to guide patient management. However its preoperative assessment through endoscopic ultrasound-fine needle aspiration (EUS-FNA) remains challenging. The aim of this study was to develop a radiomics-signature for preoperative prediction of tumor grade in patients with NF-PanNETs.

Methods: A retrospective study was performed on patients undergoing resection for NF-PanNETs at Johns Hopkins between 2010 and 2019. A total of 2436 radiomic features were extracted from the arterial and venous phases of pancreas-protocol CT scans. Radiomic features that were associated with the pathologic grade observed in the surgical specimens were then subjected to Joint Mutual Information Maximization for hierarchical feature selection and the development of the radiomic-signature. Youden-index was used to identify optimal cutoff for determining tumor grade. A random forest prediction model was trained and validated internally. The performance of this tool in predicting tumor grade was then compared to that of EUS-FNA.

Results: A total of 111 patients were included and a fusion radiomic-signature based on 10 selected features was developed. Upon internal validation a strong discrimination was observed with an area under the curve (AUC) of 0.858 (95%CI: 0.856-0.860). The corresponding sensitivity and specificity were 94.4% and 76.0% respectively. Of the study population, 50 patients underwent EUS-FNA. Intriguingly, in the 28 patients where biopsies could not be graded due to insufficient sample the radiomic signature was able to accurately grade tumors in 27 patients (accuracy: 96.4%). For those in whom biopsies were graded (N&#3f22), the radiomic-signature demonstrated a similar performance as compared to EUS-FNA (AUC: 0.857 vs. 0.813, p=0.687), however a higher sensitivity i.e. ability to accurately identify G2/3 lesion was observed (62.5% vs. 100%) (Figure 1).

Conclusion: Non-invasive assessment of tumor grade in patients with PanNETs using the proposed radiomic-signature demonstrated high accuracy. Prospective validation and optimization could overcome the commonly experienced diagnostic uncertainty in the assessment of tumor grade in patients with PanNETs and could facilitate clinical decision-making.

Figure 1. Comparison between the performance of EUS-FNA and Radiomics-signature in predicting tumor grade in patients with NF-PanNETs



27. PREDICTION OF R STATUS IN RESECTIONS FOR PANCREATIC CANCER USING SIMPLIFIED RADIOLOGICAL CRITERIA

L Bolm, N Pisuchpen, M Qadan, A Kambadakone, S Sondermann, K Mueller, N Petruch, K May, P Zelga, M Nebbia, T Michelakos, T Baba, J Roldan, JM Harrison, KC Honselmann, T Keck, KD Lillemoe, CR Ferrone, UF Wellner, C Fernández-del Castillo

Presenter: Louisa Bolm MD | Massachusetts General Hospital, United States

Background: Negative surgical margins (R0) are a key predictor of local recurrence and overall survival in pancreatic ductal adenocarcinoma (PDAC). Anticipating R status prior to surgery is warranted.

Methods: Patients undergoing pancreatic resection with curative intent for PDAC were identified from two high-volume centers. Using the CT scans from the time of diagnosis, the 2019 NCCN borderline resectability criteria were compared to novel criteria: Presence of any alteration of the superior mesenteric-portal vein (SMPV) and perivascular stranding of the superior mesenteric artery (SMA). Accuracy of predicting R status was evaluated for both criteria. Patient baseline characteristics, surgical, histopathological parameters and long-term overall survival (OS) after resection were evaluated.

Results: A total of 593 patients undergoing pancreatic resections for PDAC between 2010 and 2018 were identified. Three-hundred and twenty-five (54.8%) patients underwent upfront surgery while 268 (45.2%) received neoadjuvant therapy. In upfront resected patients, positive SMA stranding was associated with 56% margin positive resection rates while positive SMA stranding and SMPV alterations together showed a margin positive resection rate of 75%. In contrast to these criteria, the 2019 NCCN borderline criteria failed to predict margin status. In patients undergoing neoadjuvant therapy, only perivascular SMA stranding remained a predictor of margin positive resection, leading to a rate of 33% R+ resections. Perivascular SMA stranding was related to higher clinical T stage (p=0.003) and clinical N stage (p=0.043) as well as perineural invasion (p=0.022). SMA stranding was associated with worse survival in both patients undergoing upfront surgery (36 vs. 22 months, p=0.002) and neoadjuvant therapy (47 vs. 34 months, p=0.050).

Conclusion: The novel criteria were accurate predictors of R status in PDAC patients undergoing upfront resection. After neoadjuvant treatment, likelihood of positive resection margins is approximately halved, and only perivascular SMA stranding remained a predictive factor.

28. PANCREATIC CANCER PATIENT-DERIVED ORGANOIDS ACCURATELY PREDICT RESPONSE TO NEOADJUVANT CHEMOTHERAPY

L Demyan, DA King, A Habowski, A Deschênes, D Plenker, H Patel, L St. Surin, O Standring, S Pasha, R Parakrama, A Rishi, JM Crawford, J Boyd, C Metz, PK Gregersen, C Valente, S Abadali, S Matadial-Ragoo, DK DePeralta, GB Deutsch, J Herman, WH Nealon, M Talamini, D Tuveson, MJ Weiss

Presenter: Lyudmyla Dmeyan MD, MS | Northwell Health Cancer Institute, United States

Background: Patient-derived organoids (PDOs) have been explored as a biomarker of therapy response and personalized therapeutics for patients with pancreatic cancer. We hypothesized that PDOs may predict response to neoadjuvant (NAT) chemotherapy in patients with pancreatic adenocarcinoma (PDAC).

Methods: During 2017-2021, PDO cultures were established from surgical specimens and fine needle aspiration or biopsies (FNA/FNB) obtained from consented patients with pancreatic cancer. Patient recruitment for the generation of PDOs was accomplished under IRB-approved protocols. Organoids of interest were analyzed through a translational pipeline incorporating DNA sequencing, RNA sequencing, and high-throughput drug sensitivity testing utilizing 123 compounds. A retrospective chart review was performed to obtain clinicopathological information, pathological chemotherapy response, somatic and germline DNA analysis, surgical, and oncological outcomes.

Results: 136 samples from 117 patients with pancreatic cancer were collected. Among these, 80 samples were from surgical resections and 56 samples were from FNBs/FNAs. 51 % of patients were male. 37 (32%) of PDOs were derived from minority populations, consisting of 16% Black, 9% Asian, 7% Hispanic/Latino. 94 PDAC samples were subjected to molecular profiling and drug screening. 56% (n=53) of patients were clinical AJCC stage I and II, and 43% (n=41) AJCC stage III and IV. Organoids were established in an average 3-8 weeks. Among surgical specimens, PDO generation was successful in 71% (15 out of 21) of patients who had received NAT prior to sample collection and in 76% (39 out of 51) in patients who were chemotherapy and radiation naïve at the time of collection. 54% of PDO were successfully established from FNBs/FNAs pre-treatment. PDO transcriptomic subtypes were classified by the Moffitt system (Figure 1A) and correlated with clinical patients' outcome. Pathological response to NAT correlated with PDO chemotherapy response; a representative example of poor NAT response (grade 3) based on pathology correlated with PDO pan-resistance to standard of care chemotherapy agents (Figure 1B).

Conclusion: Herein we report the largest single-institution pancreatic cancer PDO library, including its recruitment of ethnic minorities. PDOs were successfully established from surgical specimens and FNBs, irrespective of tumor stage. The ability to establish PDOs from chemotherapy-naïve and post-NAT tissue enables longitudinal PDO generation to maintain dynamic chemotherapy sensitivity profiling. The proposed pipeline for PDO generation and drug testing is feasible to predict chemotherapy sensitivity and potentially enable patient-specific therapy, inclusive of patients with diverse backgrounds.

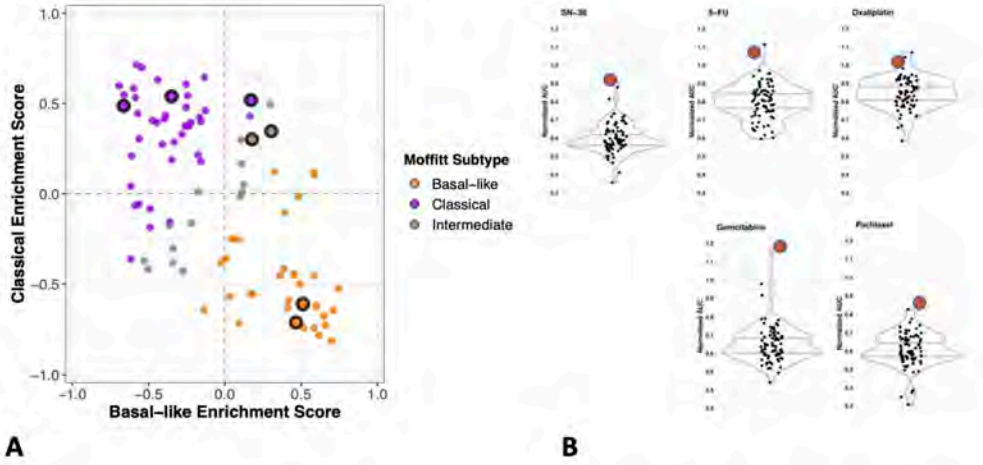


Figure 1. A) Classical and Basal-like subtypes of PDOs based on Moffitt classification. B) PDO drug screening utilizing the standard of care chemotherapy agents. The orange dot represents the case of interest; black dots represent the other sampled PDOs.

29. VAGUS NERVE CHOLINERGIC NEURONS ORIGINATING IN THE DORSAL MOTOR NUCLEUS MITIGATE THE SEVERITY OF MURINE ACUTE PANCREATITIS

DA Thompson, T Tsaava, K Tracey, S Chavan
Presenter: Dane Thompson MD | Feinstein Institutes for Medical Research, United States

Background: The efferent component of the inflammatory reflex, the cholinergic anti-inflammatory pathway, originates in the dorsal motor nucleus (DMN) and travels through the vagus nerve to the organs of the body, including the pancreas. Stimulation of this pathway can dampen maladaptive immune responses and cytokine production by nicotinic acetylcholine receptor-positive macrophages. Acute pancreatitis is a common disease, affecting hundreds of thousands of people, with few therapeutic options. We reasoned that stimulation of this pathway will mitigate the severity of pancreatitis in a preclinical model.

Methods: Pancreatitis was induced with two intraperitoneal injection of caerulein (50 mcg/kg), one hour apart. To target the DMN cholinergic neurons, an optogenetic probe was surgically placed in the brainstem of ChAT-ChR2 mice, which express channel rhodopsin (ChR2), on choline acetyltransferase-positive (ChAT) cholinergic neurons. These neurons were activated by 473 nm wavelength light (5 minutes, 20 Hz, 25% duty cycle, 8-12 mW total power). For vagotomy experiments, mice underwent bilateral subdiaphragmatic vagotomy and pyloric dilation, or sham surgery, 1 week prior to pancreatitis. The nicotinic acetylcholine receptor antagonist mecamylamine (1 mg/kg) was administered prior to optogenetic stimulation. Mice were euthanized 4 hours after final caerulein injection.

Results: Stimulation of cholinergic neurons in the DMN significantly attenuates levels of serum amylase (light vs. sham stimulation: 2940 ± 512.8 vs. 4043 ± 877 mU/mL, p = 0.0164; n = 9-11 mice/group), pancreatic IL-6 (1046 ± 288.1 vs. 1907 ± 879.3 pg/mg, p = 0.033), and pancreatic Monocyte chemoattractant protein-1 (MCP-1) (471.2 ± 241.7 vs. 953.1 ± 461.8 pg/mg, p = 0.0123), indicating a lower level of pancreatic inflammation. In addition, DMN stimulation also decreases the histological severity of pancreatitis, including reduced inflammatory cell infiltration and edema (histological score: light vs sham stimulation 5.352 ± 1.435 vs. 6.863 ± 1.67, p = 0.462; n = 9-11 mice/group). Ablation of vagus nerve-mediated signals by subdiaphragmatic vagotomy abolished the protective effects of DMN cholinergic stimulation (light vs sham: 2517 ± 746.7 vs. 2761 ± 787.3 mU/mL, p = 0.30; n = 3). Mice pre-treated with mecamylamine had significantly higher amylase compared to mice that did not receive the antagonist (Sham stimulation vs. DMN vs. DMN + Mecamylamine: 5047 ± 315.4 vs. 3769 ± 241.5 vs. 5620 ± 385.9, p = 0037; n = 10 mice/group).

Conclusion: Our studies demonstrate that activation of DMN cholinergic neurons reduces the severity of acute pancreatitis in a vagus-nerve mediated and nicotinic acetylcholine receptor-dependent manner. Together these studies provide new insights into the identity and central origin of the efferent vagus nerve fibers regulating acute pancreatitis.

30. PATENCY FOR AUTOLOGOUS VEIN IS SUPERIOR TO CADAVERIC VEIN IN PORTAL-MESENTERIC VENOUS RECONSTRUCTION

TL Sutton, V Sandoval, D Warner, G Moneta, E Gilbert, SC Mayo, AD Politano, E Maynard, BC Sheppard, CK Enestvedt

Presenter: Thomas L. Sutton MD | Oregon Health & Science University, United States

Background: Portal vein reconstruction is often needed during resection of hepato-pancreato-biliary malignancies. Primary repair or interposition grafting with either autologous vein or cryopreserved cadaveric vein may be required; however, relative patency and oncologic outcomes between techniques are largely unknown.

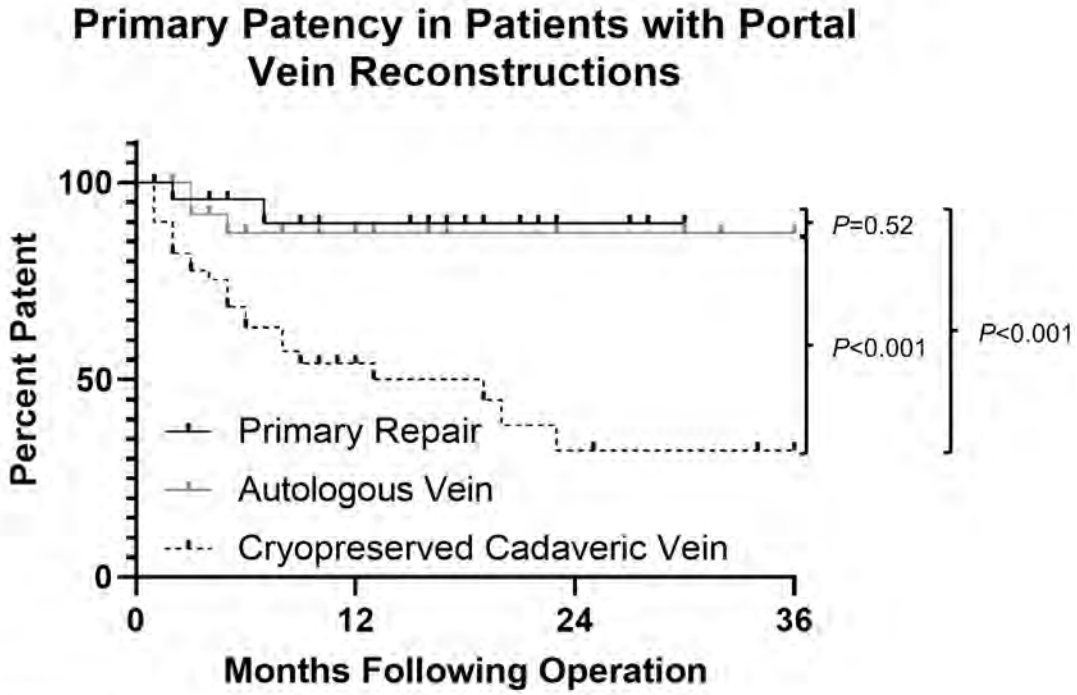
Methods: A single center review was performed for all patients undergoing portal vein reconstruction between 2007-2019. Primary patency was defined as time to first occlusion or intervention for patency-threatening stenosis, while survival-adjusted patency was defined as time to either first occlusion or death. Primary patency, overall survival, and survival-adjusted patency at 3 years were evaluated with Kaplan-Meier and Cox proportional hazards modeling. Operative time, costs, and clinical presentation of patency loss were assessed.

Results: One-hundred-twenty patients were identified with a median follow-up of 12 months (range 3-112 months). Most underwent pancreaticoduodenectomy (n=102, 85%) or distal pancreatectomy (n=16, 13%). The method of reconstruction was primary repair in 28 (23%), autologous vein graft in 35 (29%), and cryopreserved vein graft in 57 (48%). Operative time and costs were lower for primary repair but did not significantly differ between reconstructions with autologous and cryopreserved cadaveric vein.

For primary repair, autologous vein, and cryopreserved cadaveric vein reconstructions there were two (7%), four (11%), and 29 (51%) thromboses, respectively. Most (n=20, 57%) thromboses were symptomatic with either new-onset ascites (n=13), abdominal pain (n=2), or gastrointestinal hemorrhage requiring intervention or admission (n=5).

On Kaplan-Meier analysis, 3-year primary patency was greater for both primary repair (90%) and autologous vein (83%) reconstruction compared to cryopreserved cadaveric vein reconstruction (33%, log-rank P0.4 for all comparisons). On multivariable analysis, reconstruction with cryopreserved cadaveric vein had independently worse 3-year primary patency (HR 7.89, 95% CI 1.87-33.2, P=0.005) and survival-adjusted patency (HR 2.09, 95% CI 1.13-3.86, P=0.02) compared to primary repair, while autologous vein reconstructions were equivalent to primary repair (P>0.4 for both primary patency and survival adjusted patency).

Conclusion: For portal vein reconstructions, primary repair and reconstruction with autologous vein demonstrate superior patency to reconstructions utilizing cryopreserved cadaveric vein. Reconstruction with autologous vein is recommended when primary repair is not technically achievable, as cryopreserved cadaveric vein is associated with high rates of symptomatic patency loss without benefits to operative time or costs. Frequent surveillance of patency in patients with cryopreserved vein grafts is recommended.



Primary Repair	28	12	3	0
Autologous Vein	34	13	6	4
Cadaveric Vein	56	15	5	3

31. ORGANOTYPIC SLICE CULTURES: EX VIVO THERAPY PREDICTION IN PANCREATIC CANCER

B Heckelmann, O Lapshyna, S Eckelmann, L Bolm, K Honselmann, O Schilling, M Stillger, T Keck, P Bronsert, M Brandenburger, U Wellner, R Braun

Presenter: Benjamin Heckelmann | University Medical Center Schleswig-Holstein, Germany

Background: Despite the increase in the incidence of pancreatic ductal adenocarcinoma (PDAC) since the 1970s, therapeutic options that sufficiently reduce mortality are still very limited. We have been studying ex vivo Organotypic Slice Cultures (OTSCs) as a solution to the lack of realistic preclinical models of PDAC for therapy prediction. OTSCs differ from other culture models such as xenografts, primary cell cultures, and organoids. They are both time and cost efficient and realistically preserve the specific tumor microenvironment in situ. OTSCs retain the specific tissue architecture of solid tumors and therefore allow to provide insights into structural changes that occur under treatment ex vivo. By refining the OTSC model for PDAC, we aimed to collect information on individual intra- and intertumoral changes for response to therapy.

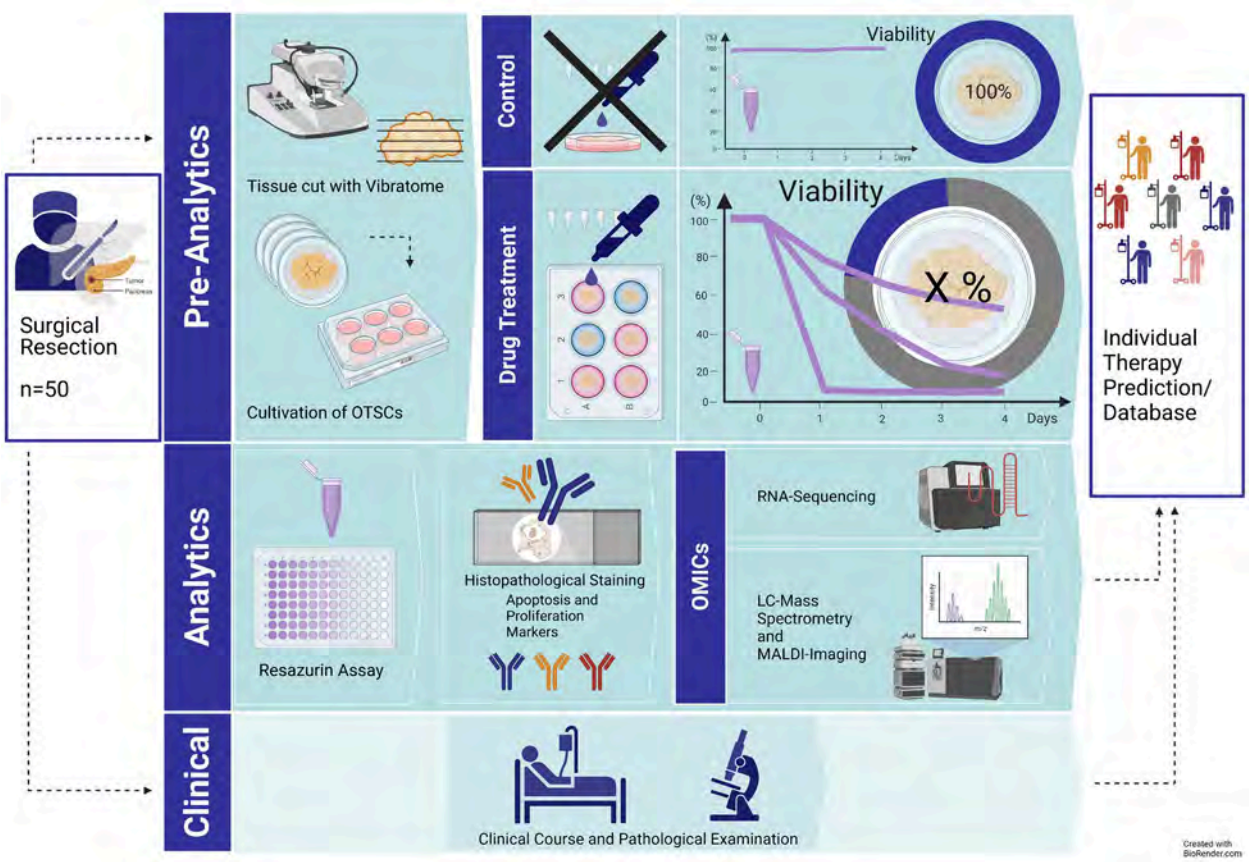
Methods: PDAC-tissue slices of 300µm thickness were generated using a vibratome. Sections were paired according to their location in the original tumor biopsy and cultured for up to 9 days at the air-liquid interface on PTFE membranes in modified DMEM/F12 medium in 6-well plates for ideal O2 supply. OTSCs were treated with gemcitabine (-paclitaxel), mFOLFORINOX, and puromycin as positive control for treatment response. Viability was determined by resazurin reduction, histopathological (HE), immunohistochemical staining (vimentin and cytokeratin 7 for tumor stromal differentiation, cleaved caspase 3 for apoptosis), and TUNEL apoptosis assay. MALDI imaging was used for spatially resolved proteomic analysis.

Results: Untreated OTSCs can be cultivated up to 9 days, with viability rates increasing, remaining constant, or decreasing only slightly. Histopathological evaluation revealed a decrease in tissue diameter, but the histological structure maintained intact. The staining of cleaved caspase 3 showed no difference from day 0 in most cases and agreed well with the results of the viability assay. However, the staining of cleaved caspase 3 increased remarkably after 15 days in culture. After treatment with gemcitabine and mFOLFORINOX, a decrease in viability was observed compared with untreated controls, although the individual response varied greatly depending on the sample and specific tissue conformation. In contrast, positive control samples treated with puromycin showed a consistent and strong decrease in viability.

Compared to other ex vivo culture models, OTSCs facilitate spatially resolved molecular analyses. In initial experiments, we generated spatially resolved proteomic profiles of PDAC-OTSCs using MALDI imaging. Simultaneous HE staining enabled analysis of mass spectrometric profiles and morphology. In this way, we were able to identify tissue-specific mass signatures.

Conclusion: OTSCs provide a unique, short-term and adequate opportunity for personalized and individualized therapy prediction. Viability testing and staining methods can be used to evaluate multiple therapeutic options within 10-12 days of surgical resection of the tumor. The interplay of classical viability assessment, OMICs approaches, and clinical data collection will benefit basic research in understanding intra- and inter-tumoral differences and has the potential to improve clinical outcomes by adding to the field of personalized medicine in the area of precision medicine.

We intend to integrate novel therapeutic strategies and further expand the data already collected through transcriptomics and proteomics approaches, in particular using MALDI imaging.


Surgical Resection
n=50
Pre-Analytics
Tissue cut with Vibratome
Cultivation of OTSCs
Control
Drug Treatment
Viability
100%
Viability
X %
(%)
Days
Individual Therapy Prediction/ Database
Analytics
Resazurin Assay
Histopathological Staining
Apoptosis and Proliferation Markers
OMICs
RNA-Sequencing
LC-Mass Spectrometry and MALDI-Imaging
Clinical
Clinical Course and Pathological Examination
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32. HARNESSING THE POWER OF FLUORESCENT NANOBODIES FOR BRIGHT AND SPECIFIC LABELING OF HUMAN PANCREATIC CANCER IN MOUSE MODELS

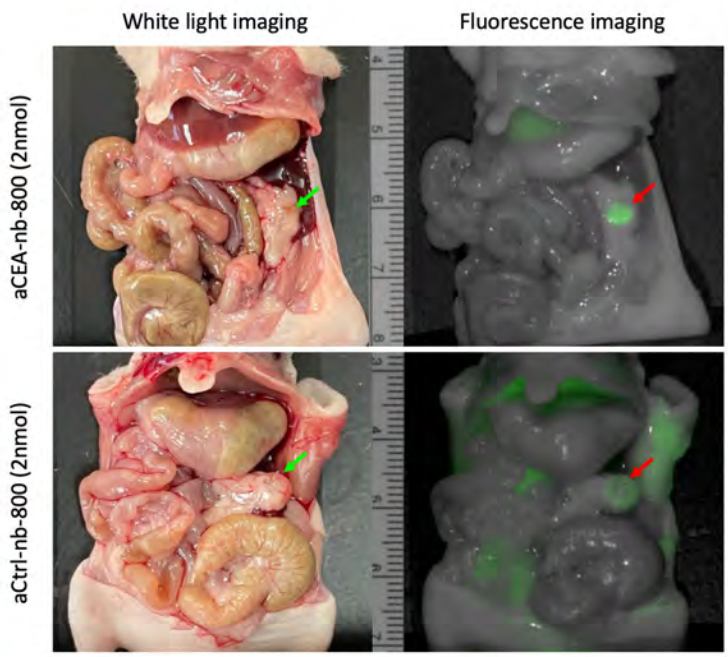
MA Turner, H Nishino, S Amirfakhri, S Hernot, RM Hoffman
Presenter: Thinzar M. Lwin MD, MS | University of California, San Diego, United States

Background: Pancreatic cancer is an aggressive malignancy and surgery can offer a cure when the disease is localized. Traditional approaches to determining resectability and determining extent of resections are subjective. Neoadjuvant treatment effect can further confound intraoperative visualization of the tumor. Local recurrence at the surgical bed occurs in 50-65% of patients after curative-intent pancreatic surgeries despite adjuvant therapies, indicating the challenge in obtaining truly negative oncologic margins. Real-time intra-operative tumor-specific labeling using nanobodies tagged with a fluorescent near-infrared dye can enhance visualization of viable tumor, determine and secure resection margins, and confirm completeness of resection within the surgical bed.

Methods: Anti-CEA nanobodies were conjugated with the NIR dye IRDye800CW to establish an aCEA-nb-800 probe. Control scrambled nanobodies were conjugated with IRDye800CW to establish aCtrl-nb-800. Human pancreatic cancer from surgical specimen obtained with an IRB approval protocol were implanted into either subcutaneous pockets or the pancreatic tail of nude mice to establish mouse models of localized pancreatic cancer. BxPC3-GFP human pancreatic cancer cells (5x106 cells suspended in 500 uL of PBS) were injected intraperitoneally into the abdomen of nude mice to establish peritoneal carcinomatosis models. After tumors and cancer cells were allowed to engraft for 3-4 weeks, 2 nmol of aCEA-nb-800 or aCtrl-nb-800 was injected intravenously. Mice were subsequently serially imaged over time under NIR fluorescence.

Results: Pancreatic tumors were rapidly labeled with anti-CEA fluorescent nanobodies. Tumors as small as ~2-3mm demonstrated a fluorescence signal within 3 hours of intravenous probe administration. Mean fluorescence intensity (MFI) at the tumor using aCEA-nb-800 was 1.65 a.u. with a background MFI of 0.61 and a tumor-to-background ratio (TBR) of 2.7 (top panel). The control probe aCtrl-nb-800 showed a faint signal at the tumor but this was not above background. MFI at the tumor using aCtrl-nb-800 was 0.60 a.u. with a background MFI of 0.35 and a TBR of 1.7 (Bottom panel). A representative pancreatic orthotopic patient-derived orthotopic xenograft tumor was bivalved and a tissue section was further imaged under NIR fluorescence ex-vivo using the LICOR-Odyssey. Images of the tumors injected with aCEA-nb-800 and aCtrl-nb-800 were also obtained under white light, fluorescence, and a pseudo-color intensity map. The fluorescence signal was clearly localized at the tumor and did not show a signal in the surrounding pancreatic parenchyma. Under magnification, the tumor showed a TBR of 11.97 in the tumor using aCEA-nb-800 and a TBR of 2.97 using the aCtrl-nb-800.

Conclusion: Fluorescent anti-CEA nanobodies were able to clearly and specifically label orthotopic pancreatic xenografts. There was stability of the tumor-specific signal that persisted over time while background signals in the liver and other soft tissue decreased. Even small lesions that were millimeters were detectable using this probe. Compared to traditional antibodies, nanobody labeling kinetics permit same day administration and imaging. Fluorescent nanobody probes are promising molecules for to enhance accurate localization of pancreatic cancer.


White light imaging
Fluorescence imaging
aCEA-nb-800 (2nmol)
aCtrl-nb-800 (2nmol)

33. TARGETING CELLULAR METABOLISM IN CHOLANGIOCARCINOMA USING REPURPOSED NOVEL MITOCHONDRIAL INHIBITORS

S Khalilieh, A Jain, WB Bowne, CJ Yeo, H Lavu, A Nevler
Presenter: Saed Khalilieh MD | Thomas Jefferson University Hospital, United States

Background: Cholangiocarcinoma is a rare, aggressive cancer of the biliary tree which accounts for 10-20% of periampullary cancers. Its annual incidence has slowly increased to approximately 2-cases per 100,000 people. The prognosis is grim and the 5-year overall survival rate is 9-10%. Therapy for cholangiocarcinoma is challenging, as this cancer is extremely resistant to standard chemotherapy regimens which act through the induction of DNA damage. The cholangiocarcinoma microenvironment is relatively hypovascular and as such, is characterized by relative hypoxia and nutrient depletion. We therefore hypothesized that metabolic inhibitors, targeting mitochondrial function might be a useful adjunct for cholangiocarcinoma treatment. We have shown that the previously FDA-approved anti-parasitic compound, Dithiazanine Iodide (CDI), is a strong, targeted mitochondrial inhibitor. We assessed the potential of this compound as an anti-cancer drug in in-vitro cell cultures of patient-derived cholangiocarcinoma cell lines.

Methods: Two human cholangiocarcinoma cell lines, EGI-1 and CCC-5 were cultured in normal conditions (37°C, 5% CO2). Five-day cell viability assays were performed using Picogreen® dsDNA measurement. Cellular ATP measurements were performed by initial incubation of the cells in glucose-free media for 24 hours and then dosing of the drug compounds and collection of samples after an 8-huors incubation period. Cell viability and ATP quantification were preformed using the GloMax® Explorer Multimode Microplate Reader (Promega, Madison, WI). Mitochondrial RNA expression was quantified by qRT-PCR after 24 hours of drug treatment utilizing RPS as references (Rneasy Mini Kit, Qiagen was used for RNA extraction). Expression of mitochondrial electron transport chain (ETC) proteins was assessed by western blot of OxPhos staining (#ab110411, 1:1000, Abcam, Boston, MA) after 48 hours of exposure to CDI and the control compounds (DMSO and Oxaliplatin). Data were plotted and IC50s were calculated utilizing non-linear dose-response curve fitting in GraphPad Prism 8.0.1. (GraphPad Software, San Diego, CA).

Results: EGI-1 and CCC-5 cells displayed a marked sensitivity to CDI compared to 5-Flourouracil and Irinotecan. Mitochondrial RNA expression of CCC-5 cells was significantly decreased with CDI treatment compared to controls (DMSO and Oxaliplatin) as shown in Figure 1A ($P < 0.05$). A 48-hour dosing study assessing mitochondrial ETC protein expression in CDI treated cholangiocarcinoma cells further revealed a marked decrease in expression of complexes I-IV (Figure 1A), suggesting the cause of the mitochondrial inhibition to be through a decrease in mitochondrial gene expression or increased ETC degradation. ATP Quantification of CCC-5 cells grown in a-glycemic conditions showed normal ATP levels with control (DMSO) and chemotherapeutic drugs (5-Fluorouracil, Gemcitabine and Oxaliplatin) and decreased ATP levels with CDI and with known mitochondrial inhibitors (Rotenone, FCCP and Pyrvinium Pamoate), as shown in Figure 1B.

Conclusion: Cholangiocarcinoma is an aggressive cancer, highly resistant to standard chemotherapeutic agents. Metabolic targeting through mitochondrial inhibition can potentially overcome the resistance. The previously FDA-approved anti-parasitic drug, CDI, shows anti-cancer properties in-vitro and is associated with decreased ETC protein expression, decreased mitochondrial RNA expression and cellular ATP depletion in cholangiocarcinoma cells. A phase-1 study is currently underway to assess the ability of similar mitochondrial inhibitors to target pancreatic and periampullary adenocarcinomas.

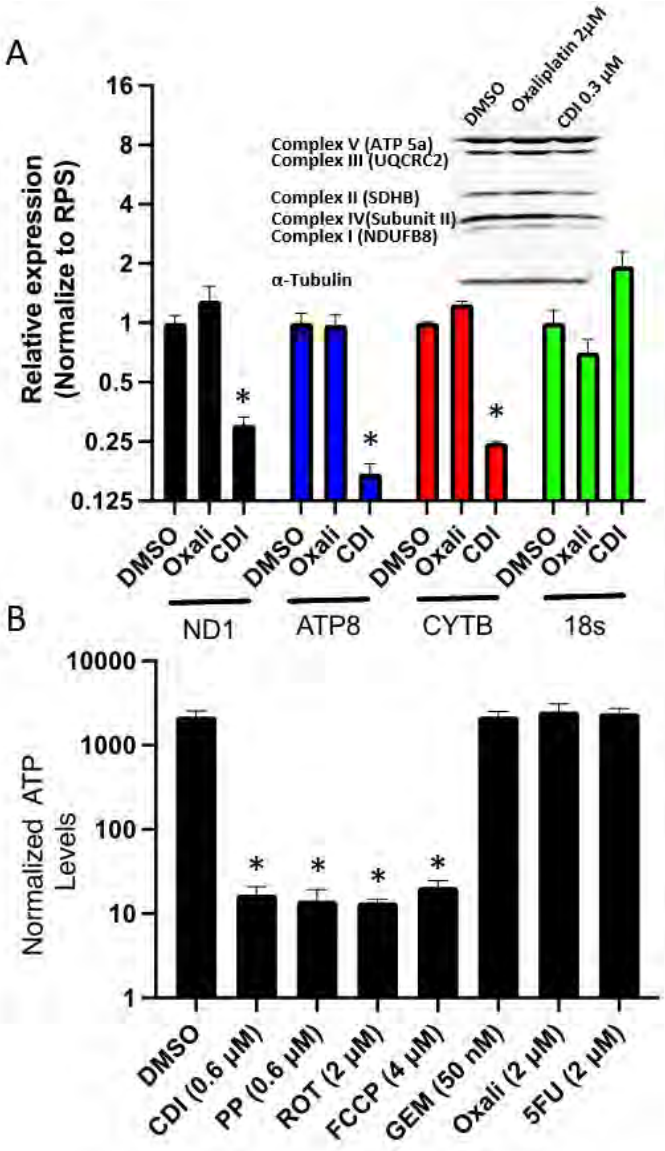


Figure 1. qRT-PCR showing mitochondrial RNA expression in CCC-5 cells treated with CDI utilizing RPS as reference (**A)** and sub-panel of Western-Blot of ETC Chain proteins in EGI-1 cells showing decreased levels of complexes I-IV in cells treated with CDI (0.3 μM) compared to DMSO control and Oxaliplatin.**(B)** ATP quantification study of CCC-5 cells grown in glucose-deficient media, 8-hours incubation with drugs, values normalized to control (DMSO). PP – Pyrvinium Pamoate; ROT–Rotenone; GEM – Gemcitabine; Oxali – Oxaliplatin; 5-FU – 5-Flourouracil. * P<0.05.

34. DISTRESS SCREENING AND CANCER: AN ASSESSMENT IN PANCREATICOBILIARY CANCER PATIENTS AND THEIR SIGNIFICANT OTHERS

TP Yeo, S Cannaday, R Thompson, R Fogg, H Lavu, CJ Yeo
Presenter: Theresa P. Yeo PhD, MPH, ACNP-BC | Thomas Jefferson University Hospital, United States

Background: The diagnosis of cancer provokes sadness, fear and turmoil in affected individuals and in family members and significant others. The American Cancer Society and other investigators estimate that 24% to 52% of cancer patients suffer from uncontrolled and undiagnosed distressing symptoms, and that their cancer care suffers as a result. Distress screening has been mandated for NCI-designated facilities since 2015 and is an important component of oncological care. Clinical implementation remains limited for individuals with pancreaticobiliary cancers in outpatient settings. The purpose of this observational study was to identify differences in mean distress scores based on the National Comprehensive Cancer Network's Distress Thermometer/Problem List® in pancreatic cancer patients as compared to those with periampullary cancer and benign pancreatic conditions. Distress scores in spouses and significant others (SOs) of the pancreatic cancer patients were also assessed. The goal were to quantify the level of distress and to identify specific problem areas in this patient population.

Methods: The Distress Thermometer/Problem List® was offered to patients and SOs at a pancreaticobiliary surgical oncology clinic between March 2018 - July 2019. Patients and SOs were asked to independently complete the paper and pencil survey about their own level of distress over the past seven days including on the day of the visit. The DT/Problem List was reviewed by a health care provider in real time. Summary statistics for cancer type and SOs were calculated for sex, age and race. Distress scores (0 to 10) were dichotomized at a cut-off point of ≤5 vs >5 (moderate-severe distress). The U.S. Zip Code database was used to identify income range, percent poverty, racial composition and educational level in the patient's self-identified zip code. Regression models were fitted using these data to identify independent predictors of distress.

Results: Of 603 screenings completed, 547 individuals had evaluable data: 404 pancreatic cancers; 52 periampullary cancers; 91 benign conditions; and 184 SOs. The mean score for the patient cohort was 3.9 and 4.5 for SOs. 30% of the patients had a score >5. There was a strong association between the number of preexisting medical conditions and distress scores, such that having ≥ 3 medical problems correlated with a score > 5 (p=0.02). Distress scores were highest for those with treatment decision concerns, insurance coverage worries, and preexisting emotional problems. Amongst all patients, pancreatic cancer reported the highest levels of distress. Higher distress scores correlated with fatigue, pain, indigestion, depression, and transportation to treatment. Spouses of pancreatic cancer patients reported greater distress than did the patients. Higher income level independently predicted higher distress; higher percent of poverty in zip code of residence predicted lower distress. Zip code correlated with distress based on income and percentage of poverty, but not on race.

Conclusion: Significant distress is found in pancreatic cancer patients and family members and has implications for screening, underscoring the need for focused interventions and supportive care referrals. This is the first DT/Problem List survey specifically in pancreaticobiliary cancer patients reported in the literature.

Table: Distress Thermometer Scores, Problem List Items, & Zip Code Findings, By Group

Characteristics:	Pancreatic Cancer Group (N=403)	Periampullary Cancer Group (N=52)	Benign PB Disease Group (N=92)	Significant Other Group (N=184)
Mean DT Score (SD)	3.9 (3.2)	3.3 (3.2)	3.5 (3.0)	4.5 (3.0)
Number of items reported on Problem List when DT score ≥5	13 items*	1 item*	13 items*	12 items*
DT score for patients who live in zip code with highest income level	4.3	3.4	2.8	N/A
DT score for patients who live in zip code with highest percent poverty	3.7	2.7	2.9	N/A

DT = distress thermometer score, DT scores range from 0 (lowest) - 10 (highest), SD = standard deviation,*(p-values = 0 .001 to 0.03).

35. FAILED RECOVERY OCCURS WITHOUT SURGICAL COMPLICATIONS FOR A SIGNIFICANT NUMBER OF PATIENTS AFTER PANCREAS SURGERY

G Fiorentini, KT Hanson, EB Habermann, SG Warner, RL Smoot, SP Cleary, MJ Truty, J Bingener Casey, ML Kendrick, CA Thiel

Presenter: Guido Fiorentini MD | Mayo Clinic, United States

Background: The absence of surgical complications has traditionally been used to define successful recovery after pancreas surgery. However, patient-reported outcomes (PRO) measures may better able to identify patients at risk of failed recovery than surgical complications alone.

Methods: Patients scheduled for pancreaticoduodenectomy were prospectively enrolled. PROs were collected using the LASA questionnaire which covers on several factors impacting on quality of life preoperatively and on post-operative days 2, 7, 14, 30 and monthly until 6 months. Thirty-day surgical complications were prospectively assessed; clinically significant pancreatic fistulas and delayed gastric emptying (DGE) within 30 days postoperatively were recorded. Patients were asked if they felt fully recovered at 30 days and 6 months. The comprehensive complication index (CCI) was utilized to group patients by 30-day complications, where patients with CCI ≥ 26.2 were grouped as major complication (major complication or multiple minor complications) and patients with CCI < 26.2 were grouped as uncomplicated. Chi-square and Kruskal-Wallis tests were used to assess associations with recovery by 6 months.

Results: Of 116 patients that met inclusion criteria, 32 (28%) were grouped as having a major complication. However, fewer than 1 in 10 patients (7%) reported feeling fully recovered at 30 days postoperatively and only half (55%) reported feeling fully recovered at 6 months. Of patients within the major complication group, over half (62%) did not recover by 6 months, while 38% of those in the uncomplicated group reported not being recovered at 6 months (p=0.03). Patients who experienced DGE were less likely to report full recovery at 6 months (36%) compared to those with no DGE (60%, p=0.048). Further, full recovery at 6 months did not significantly differ by pancreatic fistula (p=0.51), age, gender, ASA classification, receipt of neoadjuvant therapy, or cancer status (all p>0.05). Lastly, higher preoperative pain severity was higher in patients with failed recovery at 6 months (preoperative pain mean 2.3 [SD 2.4] among 6-month failed recovery vs 1.6 [2.2] among 6-month successful recovery, p=0.04), while preoperative PRO measures of quality of life, social activity, and fatigue were not associated with failed recovery at 6 months. Patients who underwent MIS surgery reported a clinically, but not statistically significant, higher rate of full recovery at 6 months (48.5% of MIS vs 67.6% of open, p=0.07). Individual patient level recovery trajectory as defined by PROs over the full 6-month postoperative course suggested a failed recovery was not observed only in patients with complications by all 4 LASA domains investigated (Fig. 1). Among patients in the uncomplicated group, poor 30-day postoperative pain severity, quality of life, and social activity were associated with failed recovery at 6 months.

Conclusion: A significant number of patients without a 30-day complication failed to recover from pancreas surgery at 6 months. In patients with a complication, DGE appeared to be a more significant driver of failed recovery than pancreatic fistula. However, in patients without a complication, short-term post-operative deficits in pain severity, quality of life, and social activity may be able to identify patients at risk of failed long-term recovery.

36. TOTAL PANCREATECTOMY AND ISLET CELL AUTOTRANSPLANTATION: A 10-YEAR UPDATE ON OUTCOMES AND ASSESSMENT OF LONG-TERM DURABILITY

KM Turner, E Donovan, AM Delman, J Brunner, S Wahab, K Choe, M Smith, SH Patel, SA Ahmad, GC Wilson

Presenter: Eileen Donovan MD | University of Cincinnati, United States

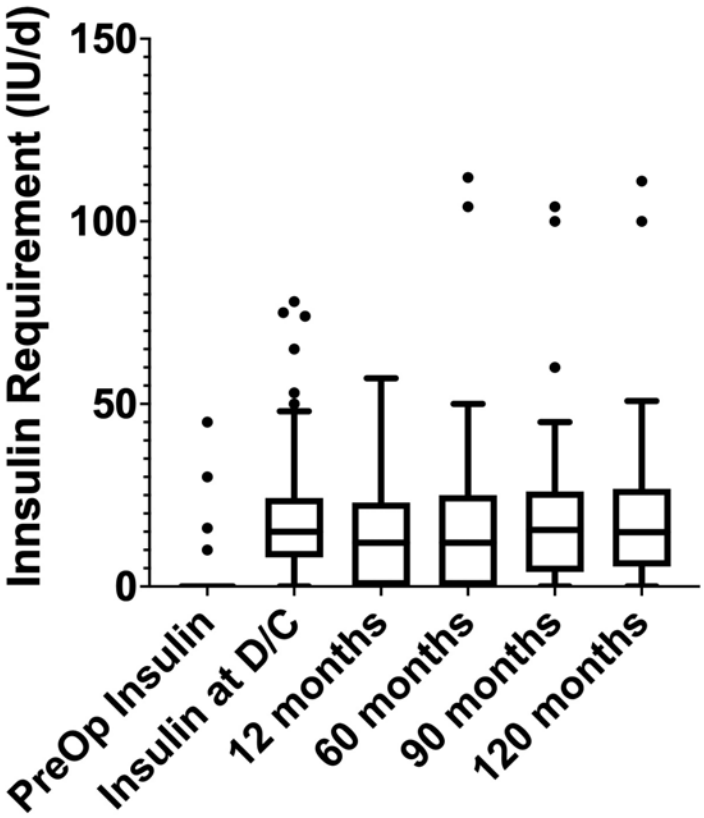
Background: Total pancreatectomy and islet cell autotransplantation (TPIAT) offers an effective, durable solution for

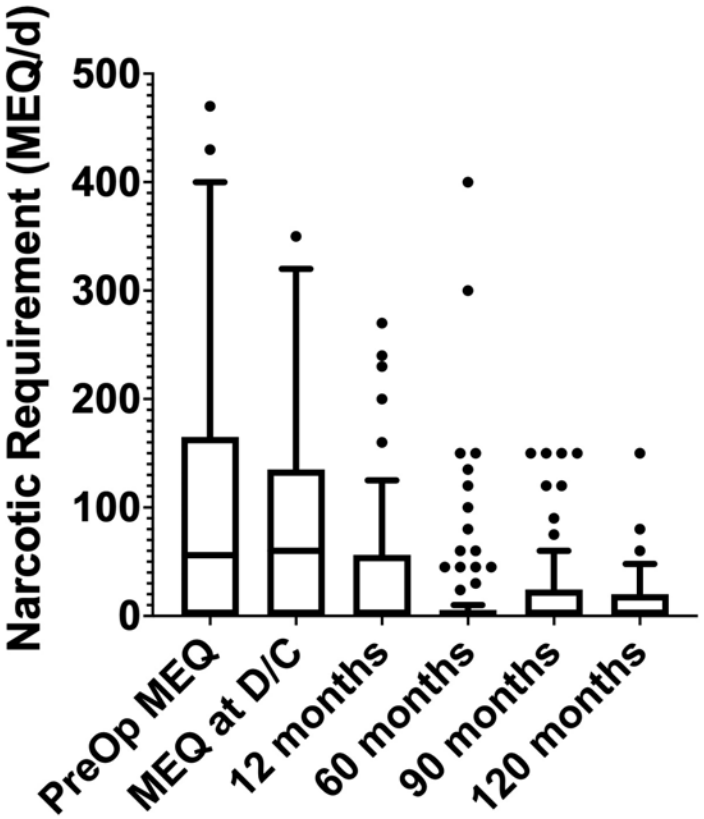
the management of chronic pancreatitis, as previously reported by our group. The aim of this study was to assess the durability of TPIAT at 10-years post-operatively.

Methods: Patients undergoing TPIAT for chronic pancreatitis eligible for 10-year follow-up were included. Primary outcomes, including insulin requirement, glycemic control, and narcotic requirement, were reported at 5-, 7.5-, and 10-years post-operatively.

Results: Of the 223 patients who underwent TPIAT at our institution, 142 patients were eligible for inclusion. All patients underwent successful TPIAT with a median of 4,928 islet equivalents per body weight isolated, with no perioperative mortality. Overall 5-, 7.5-, and 10-year survival was: 87.9%, 78.4%, and 68.5%, respectively. Median insulin requirement remained similar over time (Figure 1); however, there was a trend toward lower rates of insulin independence (25.3% vs. 16.7% vs. 11.8%, p=0.21). Glycemic control, measured by median HbA1C, declined from 5- to 7.5-years and then plateaued (7.1 vs. 8.4 vs. 8.5, p=0.03). The majority of patients remained opioid independent throughout the study period (74.0% vs. 70.5% vs. 68.6%, p=0.82). (Figure 1) Furthermore, these trends continued beyond 10-years, with 20 of 26 patients remaining opioid independent and 2 patients remaining insulin independent at a median follow-up of 14.6-years.

Conclusion: This study represents one of the largest series reporting on long-term outcomes after TPIAT, demonstrating excellent long-term pain control. While islet function demonstrated some decline, glycemic control remained stable with some patients insulin independent greater than 10-years post-operatively.


Innsulin Requirement (IU/d)
150
100
50
0
PreOp Insulin
Insulin at D/C
12 months
60 months
90 months
120 months


Narcotic Requirement (MEQ/d)
500
400
300
200
100
0
PreOp MEQ
MEQ at D/C
12 months
60 months
90 months
120 months

37. SHORT- AND LONG-TERM OUTCOMES OF PANCREATIC CANCER RESECTION IN ELDERLY PATIENTS: A NATIONWIDE ANALYSIS

AC Henry, TJ Schouten, LA Daamen, MS Walma, P Noordzij, GA Cirkel, M Los, MG Besselink, OR Busch, BA Bonsing, K Bosscha, RM van Dam, S Festen, B Groot Koerkamp, E van der Harst, IHJT de Hingh, G Kazemier, MS Liem, VE de Meijer, VB Nieuwenhuijs, D Roos, JMJ Schreinemakers, MWJ Stommel, IQ Molenaar and HC van Santvoort for the Dutch Pancreatic Cancer Group

Presenter: Anne Claire Henry MD | Regional Academic Cancer Center Utrecht, Netherlands

Background: The number of elderly patients with pancreatic cancer is growing. Clinical data on the short-term outcomes, rate of adjuvant chemotherapy and survival in these patients are, however, limited. We therefore performed a nationwide analysis.

Methods: Data from the prospective Dutch Pancreatic Cancer Audit were analyzed, including all patients undergoing pancreatic cancer resection between January 2014 to December 2016. Patients were classified into two age groups: < 75 and ≥75 years. Major complications (Clavien-Dindo grade≥3), 90-day mortality, rates of adjuvant chemotherapy and survival were compared between age groups. Factors associated with start of adjuvant chemotherapy and survival were evaluated with multivariable Cox regression and logistic regression analysis.

Results: Out of 836 patients, 198 patients were aged ≥75 years (24%) and 638 patients were aged < 75 years (76%). Median follow-up was 38 (interquartile range [IQR] 31-47) months. Major complications (31% versus 28%; P=0.43) and 90-day mortality (8% versus 5%; P=0.18) did not differ. Adjuvant chemotherapy was started in 37% versus 69% of patients (P< 0.001). Median overall survival was 15 (95% confidence interval [CI] 14-18) months versus 21 (95% CI 19-24; P< 0.001) months. Age ≥75 years was not independently associated with OS (HR 0.96 [95% CI 0.79-1.17]; P=0.71). Age ≥75 years was, however, associated with a lower rate of adjuvant chemotherapy (OR 0.27 [95% CI 0.18-0.40]; P< 0.001).

Conclusion: The rate of major complications and 90-day mortality after pancreatic resection did not differ between elderly and younger patients. Elderly patients were, however, less often treated with adjuvant chemotherapy and their overall survival was shorter.

38. THE INCIDENCE OF DEPRESSION AND ANXIETY PRECEDING A DIAGNOSIS OF PANCREATIC CANCER

NE Davis, JJ Hue, HJ Graor, M Zarei, K Ji, ES Katayama, O Hajihassani, AW Loftus, RK Kyasaram, J Shanahan, A Vaziri-Gohar, JM Winter

Presenter: Nathaniel Davis BS | University Hospitals Cleveland Medical Center, United States

Background: Patients with pancreatic cancer frequently develop depression and anxiety after they learn of their cancer diagnosis. This is likely multifactorial, but may be due to physical and psychiatric stressors that impact mental health, including historically poor survival, chemotherapy toxicities, weight loss, and pain, among others. However, prodromal psychiatric symptoms have been reported as an early warning sign of pancreatic cancer. Relatively few studies have examined this relationship. We aimed to determine the incidence of depression/anxiety preceding a diagnosis of pancreatic neoplasm and compare to the general population. Further, we aimed to determine if prediagnosis depression/anxiety was associated with treatment compliance or survival.

Methods: 1,000 patients with a pancreatic neoplasm from a single institution were identified using International Classification of Diseases (ICD) codes. For each case, two non-cancer age- and sex-matched controls were included. Dates of depression/anxiety diagnosis, identified using ICD codes, were compared to the date of pancreatic neoplasm diagnosis. The medical record was queried to further explore psychiatric symptoms. Multivariable models were performed to determine if prediagnosis depression/anxiety was associated with receipt of treatment or survival.

Results: A greater proportion of patients diagnosed with a pancreatic neoplasm experienced depression/anxiety preceding diagnosis relative to controls (4.5% vs 2.6%, p=0.006) based on ICD codes. However, upon review of the medical record 20.2% of patients with a pancreatic neoplasm exhibited signs of prodromal depression/anxiety, which was greater relative to controls (6.7%, p< 0.001). Females were nearly twice as likely to exhibit prodromal psychiatric symptoms. Prediagnosis depression/anxiety was associated with a reduced likelihood of receiving chemotherapy (OR=0.61, p=0.04), but was not associated with pancreatectomy rates among those with localized disease. There was an association between prediagnosis depression/anxiety and poor overall survival among patients with metastatic disease (HR=1.32, p=0.04). A similar association was not identified among those with localized disease.

Conclusion: The incidence of depression/anxiety among patients with a pancreatic neoplasm is higher than the general population, but may be underestimated by ICD codes. Patients with prediagnosis psychiatric conditions were less likely to receive chemotherapy. The presence of prodromal psychiatric symptoms was also associated with poor survival among patients with metastatic disease. Thus, timely identification and treatment of mental health changes may improve survival outcomes and quality of life.

Table: Summary of depression and anxiety diagnoses among patients with a pancreas neoplasm and non-cancer controls.

	Pancreas Neoplasm	Control	p
N	920	1,994	---
Depression, by ICD code	123 (13.4%)	29 (1.4%)	0.160*
Remote	9 (1.0%)		
Prediagnosis	20 (2.2%)		
Post-diagnosis	94 (10.2%)		
Anxiety, by ICD code	174 (18.9%)	32 (1.6%)	0.018*
Remote	14 (1.5%)		
Prediagnosis	27 (2.9%)		
Post-diagnosis	133 (14.5%)		
Either, by ICD code	240 (26.1%)	51 (2.6%)	0.006*
Remote	20 (2.2%)		
Prediagnosis	41 (4.5%)		
Post-diagnosis	179 (19.5%)		
Either, by documentation Prediagnosis	140 (15.9%)	71 (3.6%)	<0.001
Either, by medications Prediagnosis	140 (15.9%)	76 (3.8%)	<0.001
Either, combined Prediagnosis	186 (20.2%)	134 (6.7%)	<0.001

*Statistical comparisons are between control patients and prediagnosis values among patients with a pancreas neoplasm.

39. VALIDATION OF THE ISGPS RISK CLASSIFICATION SYSTEM FOR POSTOPERATIVE PANCREATIC FISTULA AFTER PANCREATODUODENECTOMY IN A NATIONWIDE COHORT

JA Suurmeijer, AM Emmen, BA Bonsing, OR Busch, F Daams, CH van Eijck, S van Dieren, IH de Hingh, TM Mackay, JS Mieog, IQ Molenaar, MW Stommel, VE de Meijer, B Groot Koerkamp, HC van Santvoort, MG Besselink for the Dutch Pancreatic Cancer Group

Presenter: Anouk Emmen MD | Academic Medical Center, Netherlands

Background: Predicting the risk of postoperative pancreatic fistula (POPF) after pancreatoduodenectomy may be useful for tailored patient management, benchmarking, and clinical studies. Recently, the International Study Group of Pancreatic Surgery (ISGPS) presented a four-tier risk classification based on pancreatic duct size (PD) and pancreatic texture, consisting of categories: A (not-soft texture and PD > 3mm), B (not-soft texture and PD ≤ 3mm), C (soft texture and PD > 3mm), and D (soft texture and PD ≤ 3mm). The aim of this study was to validate the ISGPS classification system for POPF in a nationwide audit.

Methods: All patients after pancreatoduodenectomy were included from the mandatory nationwide Dutch Pancreatic Cancer Audit (2014-2020). Rates of clinically relevant POPF grade B/C according to the ISGPS 2016 definition were calculated in the current cohort for the four ISGPS risk categories (A, B, C, D) and compared to the original ISGPS cohort. In addition, the median updated-alternative Fistula Risk Score (ua-FRS) was calculated for the patients in each risk category. The association between the ISGPS risk categories and POPF were assessed in multivariable regression analysis.

Results: Overall, 3300 patients after pancreatoduodenectomy for all indications were included and categorized in the ISGPS risk categories: A (N = 919), B (N = 420), C (N = 831), and D (N = 1130). The POPF rates in the risk categories (A-D) were 3.5%, 13.6%, 14.4%, and 28.8%, respectively, which differed from the original ISGPS rates (3.5%, 6.2%, 16.6%, 23.3%, see Table 1). Median (IQR) ua-FRS scores for the risk categories (A-D) were 11 (7–14), 24 (18–31), 24 (17–29), and 47 (38–55), respectively. After adjustment for sex, BMI, ASA score and diagnosis, the ISGPS risk categories were independent predictors for pancreatic fistula (OR 1.87 95%CI 1.68-2.08, P < 0.001). However, the risk prediction of pancreatic fistula for category B and type C did not differ significantly (OR: 0.88, 95%CI 0.61-1.26, P value = 0.50).

Conclusion: This nationwide validation of the ISGPS classification for POPF after pancreatoduodenectomy confirmed the risk prediction for the lowest and highest risk category (A and D) but found no clinically relevant difference between the two middle risk categories (B and C). We propose to simplify the ISGPS risk categories from a four- to a three-tier system (e.g., Type A, B, C based on 0, 1, or 2 risk factors) which would require further validation studies.

Table 1. Postoperative pancreatic fistula grade B/C per ISGPS risk category in the current cohort (N = 3300) versus the ISGPS cohort (N = 5533)

	Current validation cohort				ISGPS cohort		
	POPF	No POPF	Rate	ua-FRS score	POPF	No POPF	Rate
Type A	32	887	3.5%	11 (7 - 14)	56	1533	3.5%
Type B	57	363	13.6%	24 (18 - 31)	56	854	6.2%
Type C	120	711	14.4%	24 (17 - 29)	169	847	16.6%
Type D	326	804	28.8%	47 (38 - 55)	471	1547	23.3%

40. INCIDENCE AND RISK FACTORS OF CHYLE LEAK AFTER PANCREATECTOMY: A SINGLE HIGH-VOLUME INSTITUTION EXPERIENCE.

J Ishida, S Rodriguez Franco, T Sugawara, S Grandi, MH Al-Musawi, KL Colborn, A Gleisner, RD Schulick, M Del Chiaro
Presenter: Jun Ishida MD, PhD | University of Colorado, United States

Background: Chyle leak is not a rare complication after pancreatectomy. Limited evidence exists on the chyle leak after pancreatectomy based on the 2017 International Study Group on Pancreatic Surgery (ISGPS) definition.

Methods: A total of 1086 of patients who underwent pancreatectomy for any diseases at the University of Colorado Cancer Center between June 2012 and May 2021 were reviewed. Risk factors for chyle leak were investigated using univariate and multiple regression analyses. Outcomes were assessed based on the grade of the ISGPS definition. Correlation models between volume of drainage fluid and time to drain removal and hospital stay after surgery were conducted.

Results: Chyle leak occurred in 100 patients (9.2%). In the multiple regression, body mass index < 25 kg/m2 (OR 1.66 [95% CI 1.07-2.56]), number of examined lymph node ≥16 (OR 2.47 [95% CI 1.35-4.50]), and time to start diet ≤ 4 days (OR 2.08 [95% CI 1.32-3.27]) were identified as independent risk factors for chyle leak.

Based on the ISGPS classification, there were 5, 93, and 2 patients with grade A, B, and C, respectively. All patients with grade A received only low-fat diet as conservative treatment. In 93 patients with grade B, 28 (30.1%) and 36 (38.7%) patients received total parenteral nutrition and octreotide, respectively. One (1.1%) patient with grade B received percutaneous drainage. All patients with grade C received lymphangiography. Median time to drain removal after surgery was 9 days, 27 days, and 57.5 days in patients with grade A, B, and C, respectively. Median hospital stay after surgery was 10 days, 11 days, and 30.5 days in patients with grade A, B, and C, respectively. Seventy-nine (88.8%) patients with grade B and two (100%) patients with grade C were discharged with drain in place. There was no mortality related to chyle leak (Table).

Peak drain triglyceride concentration was not correlated with time to drain removal after surgery (rho = -0.09, p = 0.39), while it had a weak negative correlation with hospital stay after surgery (rho = -0.23, p = 0.024). However, peak drain output volume had a slight positive correlation with both time to drain removal after surgery (rho = 0.17, p = 0.019) and hospital stay after surgery (rho = 0.27, p = 0.008).

Conclusion: Lower body mass index, number of examined lymph node, and early initiation of diet are independent risk factors for chyle leak after pancreatectomy. The ISGPS definition is useful for detecting the clinically relevant chyle leak and its grading system stratifies the outcomes in patients with chyle leak well.

42. PANCREATIC STELLATE CELLS REGULATE ACINAR CELL ORGANIZATION IN A THREE-DIMENSIONAL CO-CULTURE MODEL

M Bläuer, J Sand, J Laukkarinen
Presenter: Merja Bläuer PhD | Tampere University Hospital, Finland

Background: Culturing cells in three-dimensional (3D) in vitro environments allows them to replicate some of the structures and functions present in normal tissues and tumors in vivo. Various 3D culture models supporting the 3D organization of tumor cells, including pancreatic carcinoma cells, have been described. Given the importance of stromal-epithelial interactions in both normal and cancerous tissues, 3D culture models enabling such interactions provide valuable tools for a variety of biomedical studies. Pancreatic acinar cells and stellate cells and their intercellular communication are central players in exocrine pancreatic pathobiology. The aim of this study was to establish a 3D environment for co-culturing normal pancreatic acinar and stellate cells and to study the effects of stellate cells on the 3D organization of acinar cells in vitro.

Methods: Pancreatic acinar and stellate cells were obtained from mouse pancreatic tissue using the explant outgrowth technique with cell-type-specific culture media and cryopreserved for on-demand use. Sandwich cultures were built in Matrigel matrix in cell culture inserts (24-well format) with a total cell number of 20, 000 per insert. Both acinar and stellate cell monocultures and co-cultures (1:1 cell ratio) were maintained for 4 days and their morphological development was monitored under a phase-contrast microscope.

Results: Within the first day of culture, acinar cell monocultures showed organization into hollow spheroids. As a result of apparent fusion of individual spheroids, continuous expansion in spheroid diameter (>300 µm) was observed. Stellate cells in 3D monocultures showed long membrane protrusions and gradual gathering together to form dense cell masses. In acinar-stellate co-cultures small groups consisting of both cell types were formed. Their organization at day 4 was that of several small (~50 µm) acinar buds emerging from a central core of stellate cells.

Conclusion: A 3D culture environment was established and optimized to support acinar-stellar interactions in vitro. The data demonstrate that the presence of stellate cells is needed to control epithelial organization in 3D culture. Heterotypic cellular interactions prevent uncontrolled growth and fusion of acinar cell spheroids typical of homotypic 3D cultures.

43. TREATMENT WITHIN A MULTIDISCIPLINARY CLINIC INCREASES TREATMENT AND ELIMINATE SOCIOECONOMIC SURVIVAL DISPARITIES FOR PANCREATIC CANCER: A REGIONAL HOSPITAL SYSTEM ANALYSIS

C Rieser, R Hoehn, M Zenati, A Paniccia, A Zureikat

Presenter: Caroline Rieser MD | University of Pittsburgh Medical Center, United States

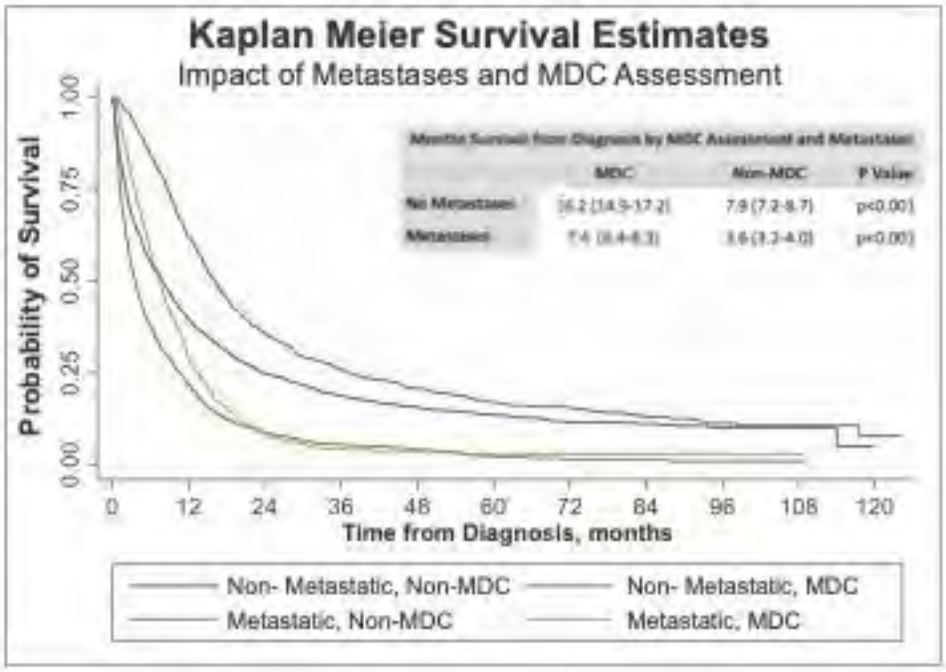
Background: National studies suggest pancreatic cancer patients receive surgery and indicated therapies at surprisingly low rates. Social determinants of health such as socioeconomic status (SES) have been shown to impact treatment and survival. We have previously shown that management by a pancreatic cancer multidisciplinary clinic (MDC) improves outcomes and eliminates socioeconomic disparities in survival for patients undergoing surgery. The aim of this analysis was to examine patient factors that predict referral to MDC and subsequent outcomes for all pancreatic cancer patients treated within a large regional health network.

Methods: We conducted a retrospective cohort study examining all patients diagnosed with pancreatic cancer from 2010-2018 at any of 15 hospitals in our network, including a high-volume pancreatic cancer. Low SES as assessed by the national area deprivation index (ADI) was our primary independent variable of interest. Baseline patient characteristics, oncologic features, treatment, and survival were also evaluated. Predictors of MDC referral were assessed by logistic regression.

Results: During the study period, 4,539 patients were identified with pancreatic cancer. Among these, 1,516 (33.4%) were evaluated in the MDC. Patients seen outside of the MDC were older (70 vs 69 years), less married (34% vs 45%), and had lower rates of private insurance (34% vs 43%; all $p< 0.001$). On adjusted analysis, older age (OR 0.87 per decade), low SES (OR 0.78), travel distance (OR 0.54), and metastatic disease on diagnosis (OR 0.39) were all significant negative predictors of MDC assessment (all $p< 0.05$). Marriage (OR 1.42) and private insurance (OR 1.23) were associated with MDC assessment (both $p< 0.001$). On adjusted analyses, MDC was associated with higher odds of chemotherapy (OR 2.8), surgery (OR 1.75), and radiation treatment (1.89; all $p< 0.001$). Additionally, there were higher odds of clinical trial participation (OR 3.92) and palliative care referral (1.22; both $p< 0.001$). Median survival was longer in the MDC group compared to the non-MDC cohort (13.2 vs 5.9 mos, $p< 0.001$) in when examined by both early stage and metastatic disease (Figure 1A). Examining survival by SES, outside of the MDC, high SES patients had improved survival (6.2 vs 4.1 mos, $p< 0.001$). However, among patients treated within the MDC, there was no survival difference between high and low SES patients (13.6 vs 13.2 mos, $p=0.97$) (Figure 1B).

Conclusion: This analysis is the first to evaluate barriers to MDC referral for patients with pancreatic cancer. We find that an interplay of patient and oncologic factors were associated with MDC assessment. MDC was also associated with higher rates of treatment and improved survival. Addressing barriers to MDC referral could improve care for patients with pancreatic cancer of all stages and help ensure more equitable outcomes.

A)


Kaplan Meier Survival Estimates
Impact of Metastases and MDC Assessment
Probability of Survival
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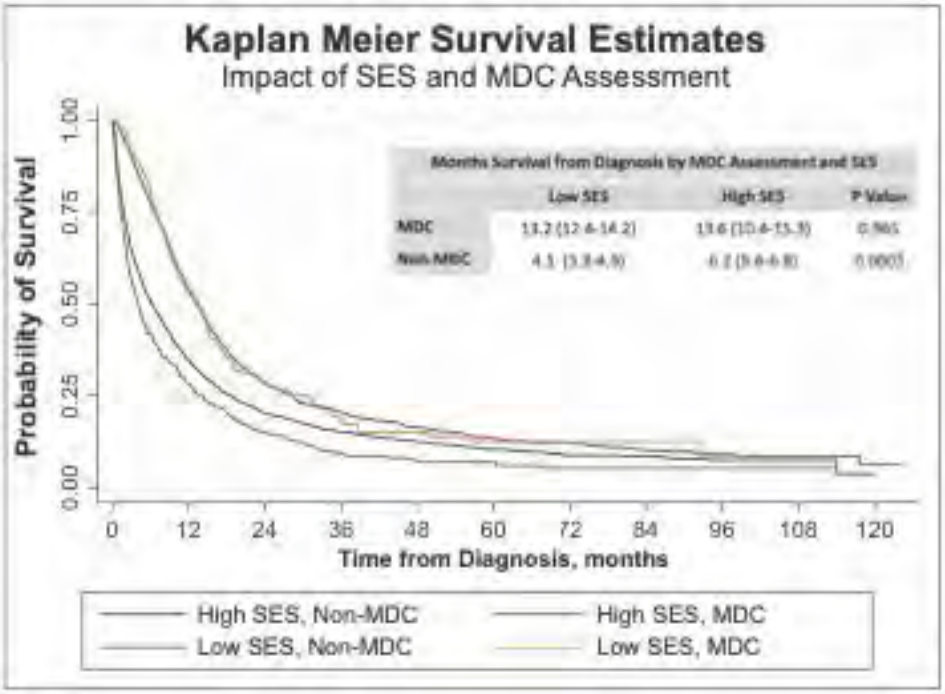
0.25
0.50
0.75
1.00
0
12
24
36
48
60
72
84
96
108
120
Time from Diagnosis, months
Non- Metastatic, Non-MDC
Non- Metastatic, MDC
Metastatic, Non-MDC
Metastatic, MDC

B)


Kaplan Meier Survival Estimates
Impact of SES and MDC Assessment
Probability of Survival
0.00
0.25
0.50
0.75
1.00
0
12
24
36
48
60
72
84
96
108
120
Time from Diagnosis, months
High SES, Non-MDC
High SES, MDC
Low SES, Non-MDC
Low SES, MDC

44. SURVIVAL BENEFIT OF STEREOTACTIC BODY RADIATION THERAPY VERSUS CONVENTIONAL RADIATION THERAPY IN PATIENTS WITH PANCREATIC CANCER

H Patel, M Baker, B Azab

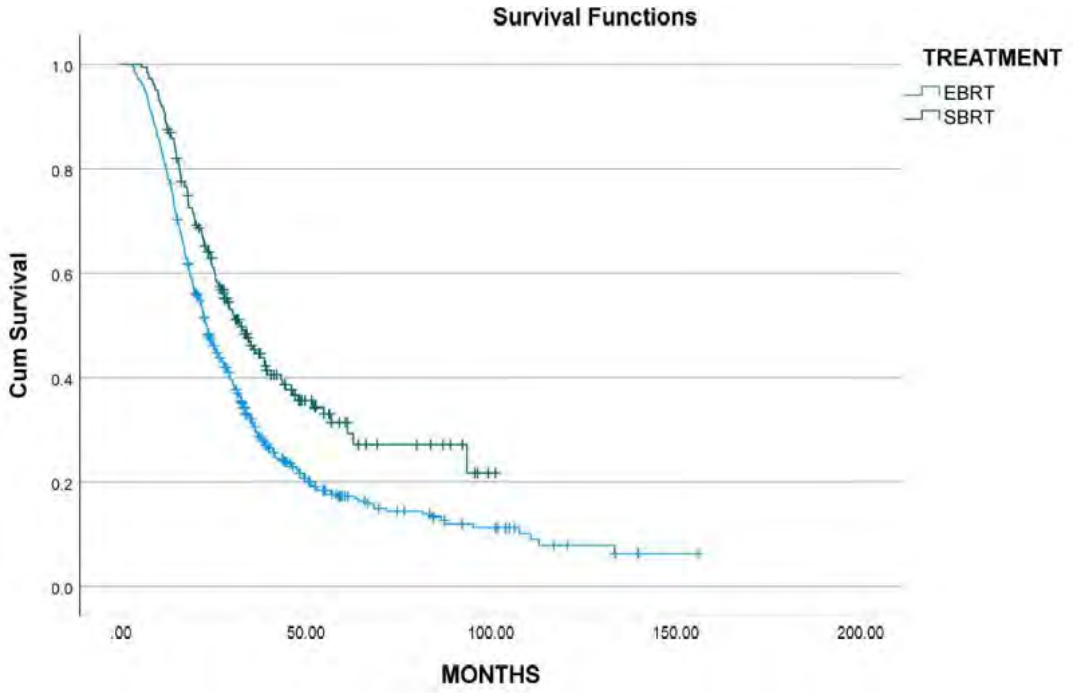
Presenter: Hardik Patel DO | Northwell Health - Staten Island University Hospital, United States

Background: Pancreatic cancer is the seventh leading cause of cancer-related death worldwide, with a higher incidence in developed countries. Despite emerging therapeutic options, mortality remains abysmally high. Neoadjuvant concepts are increasingly being used due to the complication rate of pancreatic surgery and the high rate of primary irresectability. Recent literature suggests utilizing neoadjuvant chemoradiotherapy can increase R0 resection. Neoadjuvant Stereotactic Body Radiation Therapy (SBRT) is gaining increasing interest as it reduces radiation associated toxicity and minimized delay to conventional neoadjuvant chemotherapy as compared to conventional therapy.

Methods: NCDB data were obtained for all patient diagnosed with Pancreatic cancer from 2004 – 2018. Patients included in this study include those who underwent neoadjuvant radiation therapy, neoadjuvant chemotherapy, and had available overall survival metrics recorded. Additionally, patients who had unknown doses of radiation therapy or unknown modality of radiation therapy were also excluded. Overall survival was compared using Kaplan-Meier (log-rank) analysis.

Results: 184 patients were identified who received neoadjuvant SBRT and 467 patients were identified who received neoadjuvant EBRT in the form of Conformal/3-D Conformal therapy or Intensity Modulated Radiation Therapy (IMRT). The median age at the time of diagnosis was slightly higher for SBRT group compared to EBRT (66 vs 64). Patients receiving SBRT received 5 fractions for an average total of 3400cGy. Patients receiving conventional EBRT received 25 fractions for an average total of 4730cGy. Median survival for patients undergoing EBRT compared to SBRT was 23.2 months versus 32.1 months respectively, $p < 0.001$.

Conclusion: Patients who underwent neoadjuvant SBRT compared with conventional EBRT had higher overall median survival. Further clinical study in the form of multi-institutional trials is warranted to establish the role of neoadjuvant SBRT in the treatment of pancreatic cancer.


Survival Functions
TREATMENT
EBRT
SBRT
Cum Survival
1.0
0.8
0.6
0.4
0.2
0.0
.00
50.00
100.00
150.00
200.00
MONTHS

46. PROGNOSTIC VALUE OF CARCINOEMBRYONIC ANTIGEN (CEA) FOR PATIENTS WITH LOCALIZED PANCREATIC CANCER

EP Ward, AN Krepline, KK Christians, CN Clarke, B George, PS Ritch, M Kamgar, P Chisholm, S Doucette, SD O'Connor, WA Hall, BA Erickson, DB Evans, S Tsai

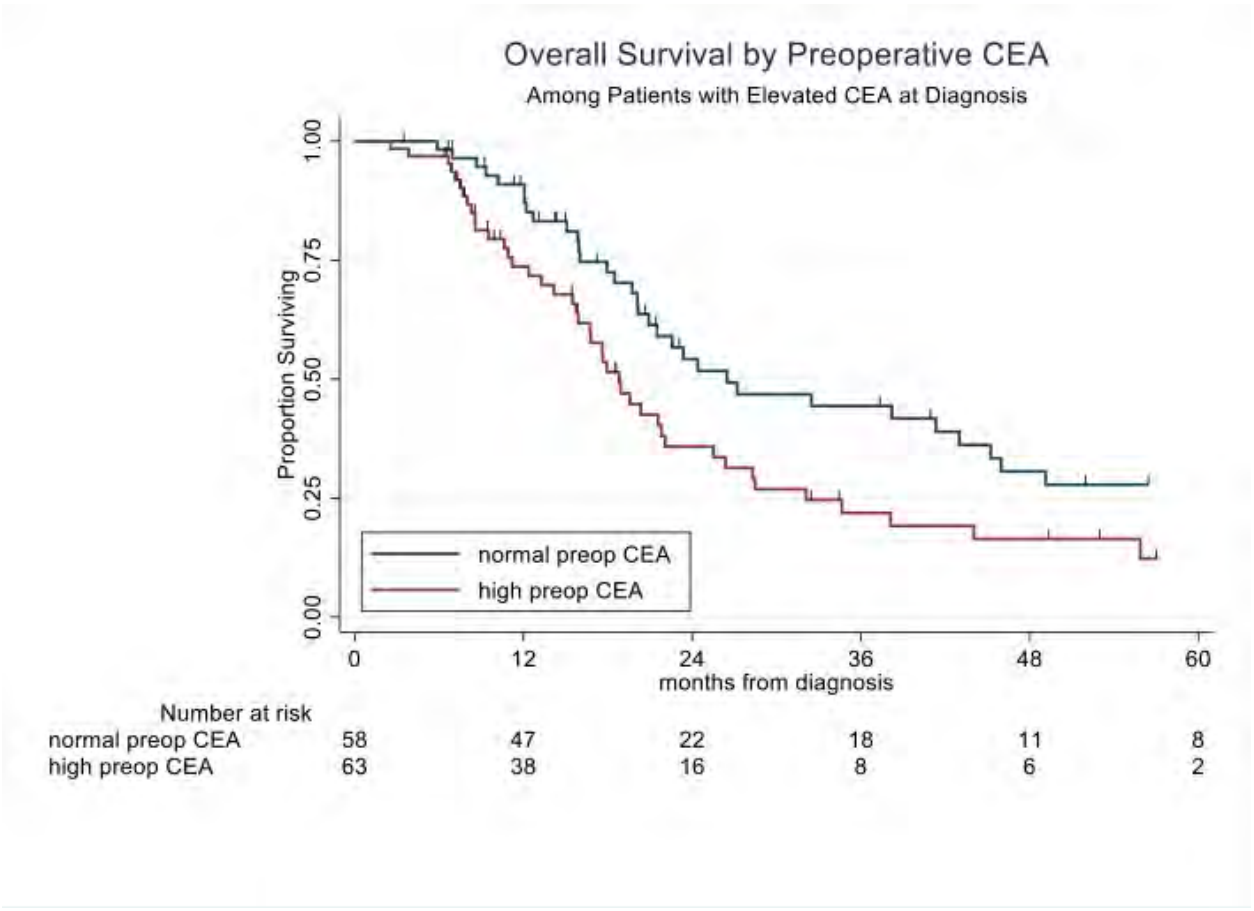
Presenter: Erin P. Ward MD | Medical College of Wisconsin, United States

Background: Carbohydrate antigen 19-9 (CA19-9) is the most common biomarker utilized in pancreatic cancer (PC). However, 20-30% of patients will have a non-informative CA19-9. Carcinoembryonic antigen (CEA) is an alternative biomarker whose utility in PC is not well described.

Methods: Patients with operable PC treated with neoadjuvant therapy from 2009-2019 were identified. CEA and CA19-9 values were abstracted at diagnosis and after neoadjuvant therapy (preop) and classified as high or normal (normal: CEA</= 4.7 ng/mL; CA19-9 </= 35 U/mL).

Results: Of the 415 patients, CEA at diagnosis was high in 123 (30%) and normal in 292 (70%). CA19-9 was non-informative in 113 (27%) patients, of theses, CEA was elevated in 27 (22%). Of the 123 patients with a high CEA at diagnosis, following neoadjuvant therapy, CEA levels normalized in 59 (48%) patients. The median overall survival (mOS) for all 415 patients was 27 months (mo); 31 mo for the 292 patients with a normal CEA at diagnosis and 22 mo for the 113 patients with a high CEA (p=0.004). Of the 123 patients with a high CEA at diagnosis, the mOS was 26 mo for the 59 patients with normal preop CEA and 19 mo for the 64 patients with high preop CEA (p=0.02). On multivariable analysis, elevated preop CEA was associated with a 1.80-fold (95% CI: 1.13-2.89) increased risk of death.

Conclusion: CEA is an important prognostic biomarker in patients with PC and is elevated in 22% of patients with a normal CA19-9. CEA response to neoadjuvant treatment is prognostic of survival.


Overall Survival by Preoperative CEA
Among Patients with Elevated CEA at Diagnosis
Proportion Surviving
0.00
0.25
0.50
0.75
1.00
normal preop CEA
high preop CEA
0
12
24
36
48
60
months from diagnosis
Number at risk
normal preop CEA 58 47 22 18 11 8
high preop CEA 63 38 16 8 6 2

47. BIOTISSUE TRAINING CURRICULUM CORRELATES WITH INTRAOPERATIVE PERFORMANCE FOR ROBOTIC PANCREATICODUODENECTOMY

JD Kraftician, K Kuchta, MS Zenati, S AlMasri, HH Khachfe, M Maalouf, A Desilva, AY Hammad, A Paniccia, KK Lee, HJ Zeh, AH Zureikat, ME Hogg

Presenter: Jasmine D. Kraftician BS | University of Pittsburgh Medical Center, United States

Background: There has been a rise in the use of the robotic platform for minimally invasive pancreatic surgery. Robotic training curricula aim to aid surgeons in attaining robotic proficiency, but their success remains to be examined. We hypothesized that performance on inanimate drills correlates with intraoperative (intra-op) performance during a robotic pancreaticoduodenectomy (RPD).

Methods: Thirty-one surgical oncology fellows participated in a 5-step proficiency-based robotic training curriculum from 2014-2018. The curriculum included inanimate drills of a continuous hepaticojejunostomy (HJ) and gastrojejunostomy (GJ) and operative experience. Video review of biotissue and intra-op performance during these anastomoses was performed. Performance was evaluated by time, errors, and Objective Structured Assessment of Technical Skills (OSATS). Spearman's correlations were calculated for prior experience, biotissue performance, and intra-op performance.

Results: Fellows completed an average of 14.1±10.5 biotissue drills including 5.1±3.7 HJ and 4.3±3.3 GJ. Biotissue GJ and HJ showed a decrease in time and errors, and an increase in OSATS. Longer total time on biotissue GJ and HJ correlated with improvement in time (ρ=-.51) and errors (ρ=-.45). Average errors on biotissue GJ and longer time on the last attempt correlated with lower average intra-operative GJ OSATS (ρ=-.64; ρ=-.66). More errors on the last biotissue GJ correlated with longer average intra-op GJ time (ρ=.58). Errors on the first and average biotissue HJ correlated with lower OSATS for the first intra-op HJ (ρ=-.737; ρ=-.80). The more days separating biotissue and the second intra-op HJ correlated with more time to complete the intra-op HJ (ρ=.92).

Conclusion: The results support correlation between inanimate and intra-op performance which may expedite surgeon proficiency. Further research is warranted to examine whether benefits translate to fewer surgical complications and improved patient outcomes.

	Hepaticojejunostomy				Gastrojejunostomy			
	Time		OSATS[a]		Time		OSATS[a]	
Biotissue	First	Average	First	Average	First	Average	First	Average
First Errors	.64*	.49	-.74*	-.42	.01	-.15	-.32	-.49
Last Errors	.28	.24	-.46	-.08	.28	.58*	-.16	-.19
Average Errors	.57	.03	-.80*	-.43	.11	.18	-.50	-.64*

*$p < .05$

[a]Objective Structured Assessment of Technical Skills

48. SERUM B7-H3 LEVELS AS A NOVEL PROGNOSTIC BIOMARKER TO PREDICT RESECTABILITY IN PDAC PATIENTS TREATED WITH NEOADJUVANT FOLFIRINOX

M Nebbia, S Arya, G Lionetto, M Ventin, V Deshpande, S Ferrone, CR Ferrone
Presenter: Martina Nebbia MD | Massachusetts General Hospital, United States

Background: B7-H3 is a member of the B7 family of immune-regulatory ligands and is a costimulatory molecule promoting the T cell response in vitro. B7-H3 suppresses the tumor antigen-specific immune response, leading to aggressive cancer biology and increased metastatic potential. Specifically, high expression of membranous B7-H3 is an independent predictor of poor survival in PDAC patients. In addition to the membranous form of B7-H3, serum B7-H3 (sB7-H3) has been identified as a potential tumor marker in different cancer types. Several studies have demonstrated an association between increased serum B7-H3 (sB7-H3) levels and poor prognosis in patients with malignancies. The aim of this study was to investigate the ability of sB7-H3 to predict the burden of disease in patients with pancreatic ductal adenocarcinoma (PDAC).

Methods: The B7-H3 sera levels were tested at the time of the operation for PDAC in patients receiving neoadjuvant FOLFIRINOX or no neoadjuvant therapy between April 2016 and April 2019 at our Institution. Serum B7-H3 was measured using an enzyme-linked immunosorbent assay (ELISA). Healthy donors (HD) were used as a negative control. Cox proportional hazards regression model was used to assess disease-free survival (DFS).

Results: In our pilot experiment, we analyzed the sera of patients of 21 patients of whom 1) were treated with neoadjuvant FOLFIRINOX and underwent pancreatic resection (n= 15); 2) were treated with neoadjuvant FOLFIRINOX and deemed inoperable in the operating room due to locally advanced disease (n= 4) or microscopic metastatic disease (n=2); 3) healthy donors (HD) with no history of malignancy as control group. Our preliminary data demonstrate that serum B7-H3 levels are significantly higher in PDAC patients who received neoadjuvant FOLFIRINOX and were unresectable compared to those who were resected (mean 20 ng/mL; range: 0–60.5 ng/mL vs 1.3 ng/mL; range: 0–4 ng/mL; $p< 0.05$). Moreover, higher sB7-H3 was associated with shorter survival in PDAC patients who received neoadjuvant treatment with FOLFIRINOX followed by surgical resection. Serum B7-H3 was not detectable in the control group.

Conclusion: Our preliminary data suggest that serum B7-H3 may be a useful biomarker to assess the burden of disease in PDAC patients. Patients treated with neoadjuvant FOLFIRINOX, but continue to have high levels of sB7-H3, may benefit from additional systemic therapy as this may be a marker of locally advanced or metastatic disease.

49. DOES MINIMALLY INVASIVE SURGERY HAVE DIFFERENT IMPACT ON RECURRENCE AND OVERALL SURVIVAL IN PATIENTS WITH PANCREATIC HEAD VERSUS BODY/TAIL CANCER?

SH Choi, K Kuchta, AE Rojas, D Sood, P Paterakos, MS Talamonti, ME Hogg
Presenter: Sung Hoon Choi MD | Academic Medical Center, United States

Background: The technical difficulty and perioperative outcomes of minimally invasive surgery (MIS) are quite different between pancreatic head cancers and body/tail cancers. Therefore, we aimed to investigate the impact of MIS and tumor location on recurrence and overall survival between patients with pancreatic head versus body/tail cancers.

Methods: This study is a retrospective analysis of patients who underwent curative-intent surgical resection for pancreatic ductal adenocarcinoma between March 2007 to December 2020 at a single institution. The clinical characteristics of the patients and perioperative outcomes, as well as risk factors associated with recurrence and long-term outcomes were compared according to tumor location and operative modality using Kaplan-Meier curves and multivariate analysis.

Results: During the study period, 288 patients underwent surgical resection for pancreatic head cancer and 87 patients for body/tail cancer. More patients were treated by an MIS approach in the body/tail group (33.3% vs. 10.1% $p< 0.0001$) than the head group. The baseline characteristics were comparable between both groups including the initial resectability categorization and rate of neoadjuvant therapy; however, the body/tail group was older (71 ± 10 vs. 68 ± 10, $p=0.0209$). The rates of clinically relevant postoperative pancreatic fistula and major postoperative complication were similar between groups. Despite a larger mean tumor size and higher T-stage in the body/tail group, the pathologic AJCC stage was higher in head group with increased N-stage (69.5% vs. 50.0% of ≥N1, $p=0.0030$). R0 resection rates were comparable with 81.3% [head] versus 83.9% [boday/tail] ($p=0.5728$). The receipt of adjuvant chemotherapy was also similar between groups 68.4% [head] vs. 71.3% [body/tail] ($p=0.6128$). There was no difference in local or systemic recurrence patterns according to the primary tumor location and surgical modality. There was no significant difference in disease-free and overall survival between head versus body/tail groups and open versus MIS groups. On sub-group analysis by-stage, the MIS group had a significantly worse disease-free survival in patients with Stage III pancreatic head cancer ($p=0.0203$). On multivariate analysis, vascular resection, adjacent organ resection, lymph node metastasis, and poor differentiation were risk factors of any recurrence, while vascular resection, lymph node metastasis, and R1 resection were for local recurrence.

Conclusion: Recurrence patterns and overall-survival rates of patients were not different in tumor location and surgical approaches. However, care must be taken in the application of MIS in stage III pancreatic head cancer, which showed inferior disease-free survival, but similar overall survival than patients who underwent open surgery.

50. DEFINING THE OPERATIVE TIME THRESHOLD FOR SAFETY IN PATIENTS UNDERGOING ROBOTIC PANCREATICODUODENECTOMY

AM Delman, EC Donovan, KM Turner, J Whitrock, RC Quillin III, SA Shah, SH Patel, SA Ahmad, GC Wilson
Presenter: Eileen Donovan MD | University of Cincinnati, United States

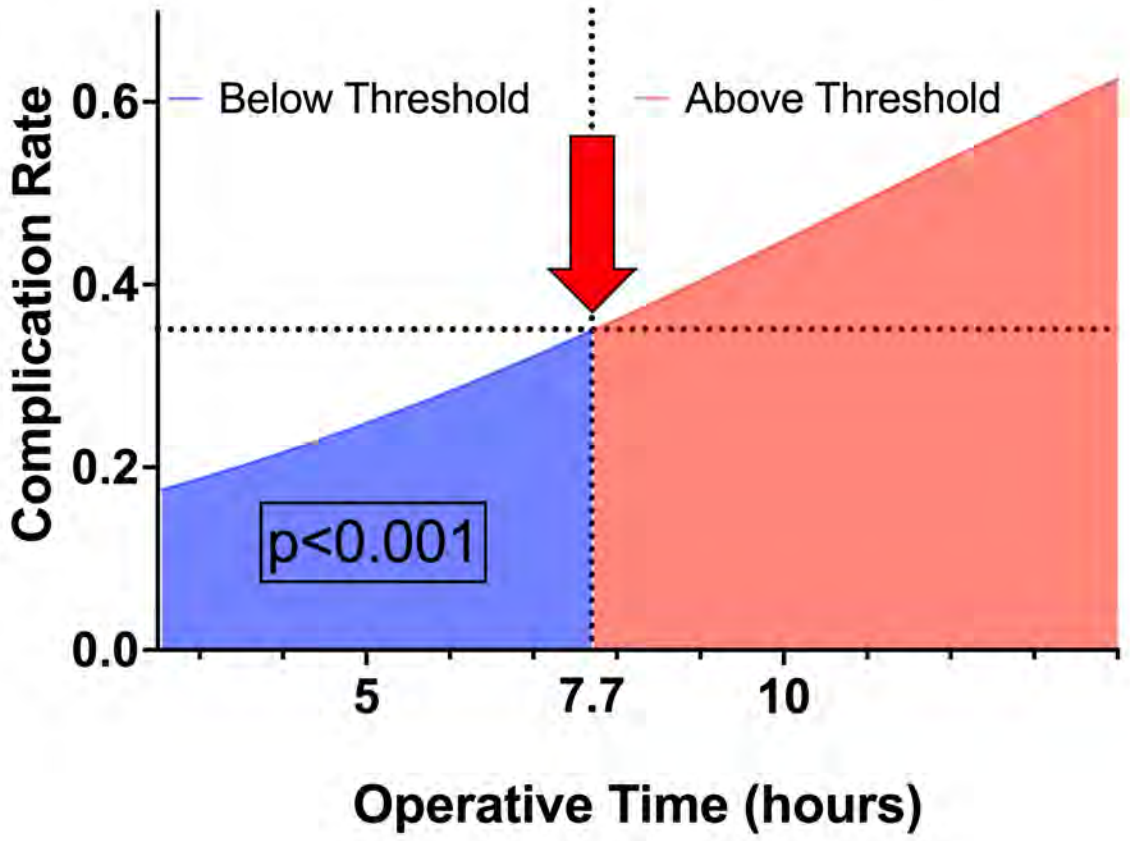
Background: Robotic pancreaticoduodenectomy (RPD) is a safe and efficacious operation in appropriately selected patients. However, the increased complexity of a robotic approach results in longer operative times. It is unknown at what operative time the risks of a longer RPD exceed those of a shorter open pancreaticoduodenectomy (OPD).

Methods: The NSQIP database was queried for patients who underwent RPD and OPD between 2014-2019. Emergent operations and vascular resections were excluded. The benchmark OPD control was defined as the fastest tertile with regards to operative time. Multivariable and sensitivity analysis were employed to identify the operative time threshold (OTT).

Results: 6,270 patients were included in the study with 939 (15.0%) undergoing RPD and 5,331 (85.0%) as a benchmark OPD control. Incidence of major morbidity or mortality was similar in the RPD and OPD cohorts (32.8% vs. 35.1%, p=0.17). The median operative time for RPD was longer than OPD (6.7 vs. 4.1 hours, p< 0.01). Stepwise logistic regression analysis identified operative time as the only variable associated with increased complications in RPD patients (OR: 1.20, 95% CI: 1.12-1.29, p< 0.01). The OTT – the time above which RP patients experience greater than the 35.1% OP benchmark complication rate - was identified as 7.7 hours (FIGURE 1). Furthermore, on subgroup analysis of RPD patients, the slowest tertile had more complications than the middle and fastest tertiles (41.5% vs. 32.2% vs. 24.5%, p< 0.01).

Conclusion: RPD is associated with similar or improved outcomes when the operative time threshold of 7.7 hours is met when compared to OPD.

Operative Time Threshold for Robotic Pancreaticoduodenectomy



51. VIDEO ANALYSIS OF GASTRO-JEJUNOSTOMY TO PREDICT DELAYED GASTRIC EMPTYING AFTER ROBOTIC PANCREATODUODENECTOMY; PRELIMINARY ANALYSIS OF TWO CENTERS

MJW Zwart, B van den Broek, DSJ Paijens, SLM Zwetsloot, A Comandatore, T Geraedts, RJ Schipper, OR Busch, TCK Tran, MD Luyer, J Schreinemakers, JH Wijsman, GP van der Schelling, IHJT de Hingh, JSD Mieog, BA Bonsing, K Takagi, RF de Wilde, L Morelli, HJ Zeh III, AH Zureikat, ME Hogg, B Groot Koerkamp, MG Besselink

Presenter: Diederik Paijens | Academic Medical Center, Netherlands

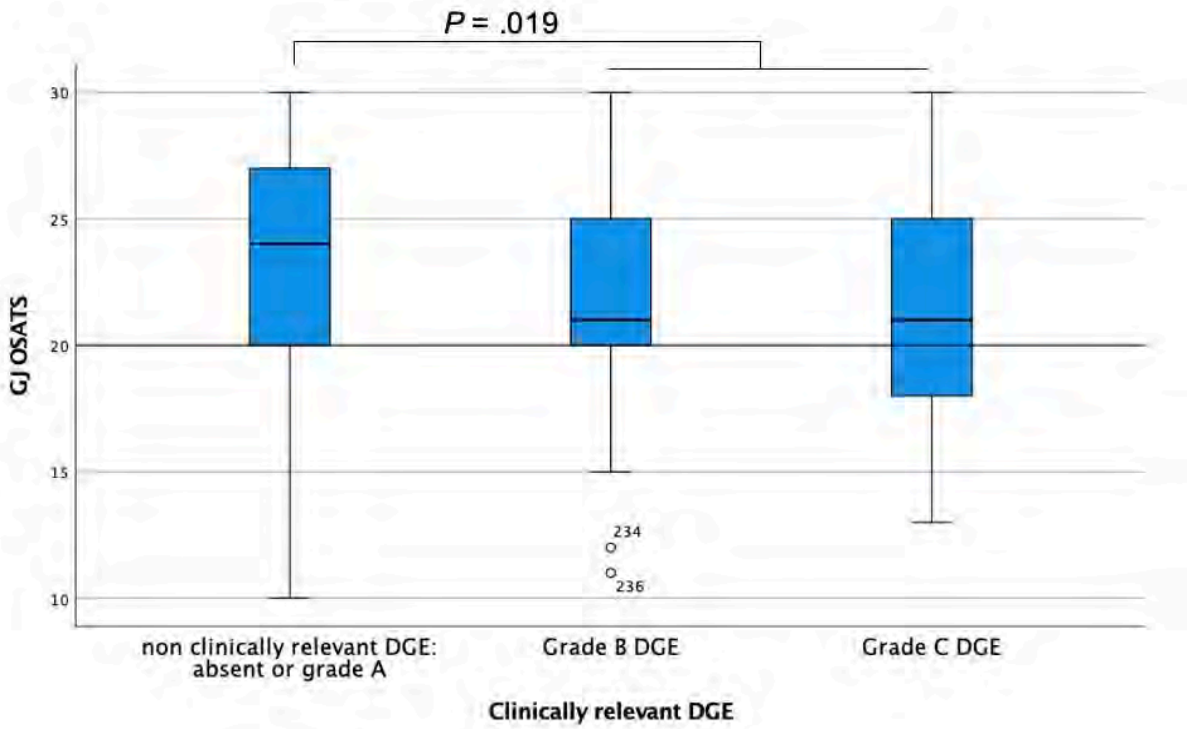
Background: Robotic pancreatoduodenectomy (RPD) has proven to be as safe as open pancreatoduodenectomy (OPD), sometimes even more favorable in terms of overall length of hospital stay and complication rates. However, postoperative incidence of morbidity is still substantial. To this day, improved surgical performance has not yet been linked to a decrease in gastric complications in RPD.

The aim of this study is to identify learning curves for robotic gastrojejunostomy during RPD and the predictive value of the OSATS score for gastrojejunostomy (GJ) complications according to the Birkmeyer and UPMC method.

Methods: Videos of GJ during RPD were analyzed in a retrospective multicenter (LAELAPS-3) cohort by a grader blinded for surgeon and surgical experience. Surgical performance was scored with OSATS. The main outcome measures are the combined OSATS scores over time (learning curve). Secondary outcome is the correlation between OSATS scores and delayed gastric emptying (DGE, ISGPS grade A/B/C).

Results: Between 2017 and 2021, 324 patients underwent RPD with videos of the GJ available in 97 patients. DGE occurred in 42.6% of patients. Mean GJ-OSATS was 22.4 (SD = 5.0). CUSUM analysis of GJ-OSATS identified an inflection point at 47 RPD procedures. The rate of DGE B/C was 41% before and 20% after this inflection point (P=0.005). Overall, patients without DGE had higher OSATS scores (23.4, 95%CI 22.1-24.6) vs patients with DGE (21.1 95%CI 19.6-22.7), this remained consistent for DGE Grade B/C (P=0.019), see Figure 1. When surgical performance was scored > 21, DGE rates were significantly lower (57% vs 25%, P=.006).

Conclusion: Using OSATS to score GJ in RPD is a useful tool for identifying learning curves. Higher OSATS scores correlate with a decreased risk of DGE. OSATS could serve as a tool for assessment of robotic GJ in training programs and during implementation.


P = .019
GJ OSATS
30
25
20
15
10
234
236
non clinically relevant DGE: absent or grade A
Grade B DGE
Grade C DGE
Clinically relevant DGE

52. HYPERGLYCEMIA SENSITIZES PANCREATIC CANCER TO MACROPHAGE-SPECIFIC IMMUNOTHERAPIES: AN UPDATE

JJ Hue, M Zarei, ES Katayama, O Hajihassani, AW Loftus, A Vaziri-Gohar, JM Winter
Presenter: Jonathan J. Hue MD | University Hospitals Cleveland Medical Center, United States

Background: Pancreatic cancer (PC) is resistant to immunotherapies. This may be due to the harsh, hypoglycemic tumor microenvironment which is not conducive to anti-tumor immune cell function. To this point, anti-tumor M1 macrophages are glycolytic and require high concentrations of glucose. Conversely, tumor-associated M2 macrophages rely on mitochondria, which utilize glucose more efficiently. Herein, we attempt to sensitize PC to macrophage-specific immunotherapies by augmenting glucose levels.

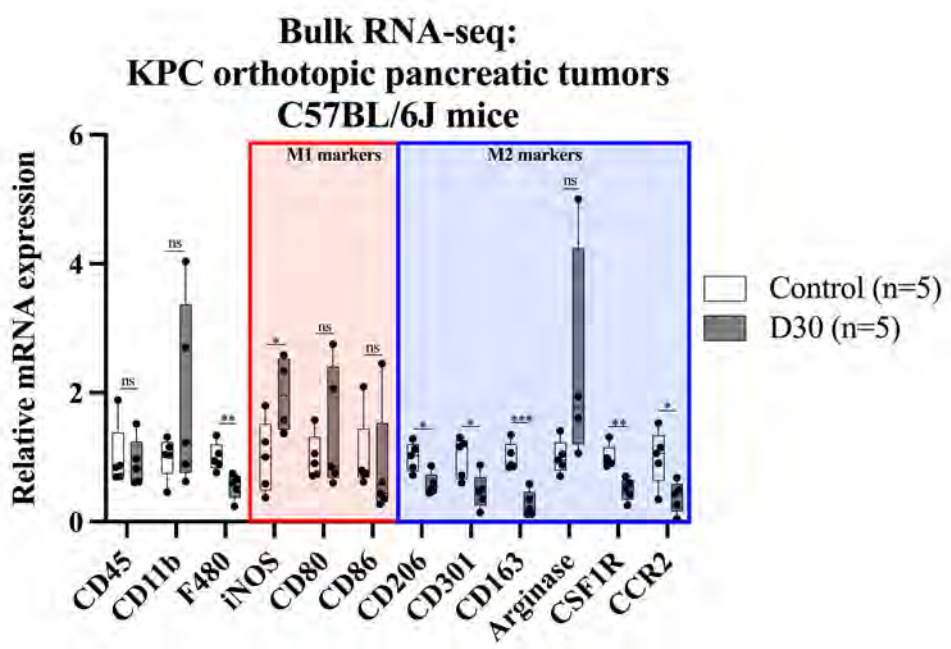
Methods: Murine PC cells (KPC) and macrophages were cultured in hypoglycemic (≤2.5mM) or hyperglycemic (25mM) conditions. Phenotypic (western blot, flow cytometry) and metabolic (seahorse, LC-MS metabolomics) assays were performed in vitro. KPC cells were orthotopically injected into the pancreas of mice for in vivo studies. Bulk RNA-sequencing was performed on tumor-bearing mice provided with regular drinking water or 30% dextrose water (D30). Additionally, tumor-bearing mice were randomized to pexidartinib (a CSF1R inhibitor) or vehicle and received either normal water or D30.

Results: The bidirectional role of macrophages was demonstrated using an in vitro co-culture experiment: M2 macrophages increased KPC cell growth by 30%, whereas M1 macrophages decreased growth by 95%. Further, immunocompromised mice bearing KPC tumors survived a median of 19 days and developed hepatic metastases. However, immunocompetent mice bearing identical tumors survived a median of 45 days ($p< 0.001$) and did not develop metastases.

As glucose concentrations decreased in culture media over time, protein levels of an M1 marker (inducible nitric oxide, iNOS) decreased and an M2 marker (arginase) appeared, suggesting a phenotypic switch. Similarly, M1 macrophages underwent a metabolic shift in hypoglycemic conditions and adopted an M2-like profile (i.e., greater mitochondrial energy production and decreased glycolysis) assessed using both seahorse and LC-MS metabolomics assays. Using bulk RNA-sequencing, tumors of mice provided with regular water or D30 had similar mRNA expression of CD45 (a pan-immune cell marker), but decreased expression of F4/80 (a pan-macrophage marker). In line with our in vitro data, mice treated with D30 had higher expression of iNOS (a M1 macrophage marker) and decreased expression of CD206, CD301, CSF1R, and CCR2 (all tumor-associated M2 markers) (Figure).

Pexidartinib augmented M1 iNOS protein levels and simultaneously decreased M2 arginase levels. On an in vitro flow cytometric analysis, the percentage of M2 macrophages decreased as glucose concentrations were increased (33.7% vs 38.0%), and decreased further when pexidartinib was combined with hyperglycemia (20.5%). Mice treated with pexidartinib and D30 had improved median survival relative to mice receiving pexidartinib alone (median survival: 42 (IQR: 38, 52) vs 34 (IQR: 32, 38) days, $p< 0.05$). Of note, pexidartinib alone did not improve survival as compared to vehicle or D30.

Conclusion: Hyperglycemic conditions promote M1 survival and function, while preventing a switch to an M2 phenotype in both in vitro and in vivo assays. Hyperglycemia appears to sensitize PC to an otherwise ineffective CSF1R inhibitor. We are currently testing the efficacy of D30 and pexidartinib in a model of hepatic metastases and studying effectiveness of D30 combined with PF-4136309, a CCR2 inhibitor. We hope these data further support the concept of increasing peripheral glucose levels to sensitive PC to immunotherapies.


Bulk RNA-seq:
KPC orthotopic pancreatic tumors
C57BL/6J mice
Relative mRNA expression
M1 markers
M2 markers
Control (n=5)
D30 (n=5)
CD45
CD11b
F480
iNOS
CD80
CD86
CD206
CD301
CD163
Arginase
CSF1R
CCR2

53. THE EFFECT OF NEOADJUVANT THERAPY ON IMMUNE PROFILING OF PANCREATIC DUCTAL ADENOCARCINOMA: A PROSPECTIVE STUDY OF THE PREOPANC-1 RANDOMIZED CONTROLLED TRIAL.

D Latifi, W de Koning, SP Lau, F Grevers, C van Dam, CHJ van Eijck, DAM Mustafa on behalf of the Dutch Pancreatic Cancer Group

Presenter: Dana A. Mustafa PhD | Academic Medical Center, Netherlands

Background: The randomized phase III trial (PREOPANC-1) that was performed in 16 centers in the Netherlands compared the effects of preoperative chemoradiotherapy (Gemcitabine and 2.4 Gy radiation) versus immediate surgery for resectable and borderline resectable pancreatic cancer. The outcomes of the secondary endpoints and predefined subgroup analyses suggest an advantage of the neoadjuvant approach. The aim of the present study was to investigate the changes in the immune microenvironment and infiltration caused by the neoadjuvant treatment.

Methods: To that aim, we collected formalin-fixed, paraffin-embedded pancreatic cancer samples from all centers that participated in the PREOPANC -1 trial. We performed targeted gene expression using the PanCancer Immune Profiling panel of NanoString.

Results: Comparing 50 samples of the patient who were subjected to neoadjuvant treatment to 46 treatment-naïve samples showed a distinct genetic profile induced by the neoadjuvant therapy. More than 250 immune-related genes were significantly differentially expressed between the two groups of samples.

The results indicate that neoadjuvant therapy resets the innate immune activation in the tissue samples. A significantly higher infiltration of CD14+, CD33+, CSF1R+, and CD163+, MRC1+ cells were found in samples of the neoadjuvant arm. In contrast, B cells and various subtypes of T cells like CD8+ and FOXP3+ showed a significant decrease in the same samples. Pathway analysis revealed that the neoadjuvant treatment stimulated the expression of genes related to the complement activation, chemotaxis, and wound repair, while genes related to lymphocyte activation and adaptive immune responses were dominant in the treatment-naïve arm.

Conclusion: In conclusion, this is the first comprehensive study to describe the immune-molecular changes as a result of neoadjuvant therapy in a randomized clinical trial. The results reveal the enrichment of the myeloid compartment following neoadjuvant therapy which was significantly associated with a survival benefit for the patients. Studying the personalized effect of neoadjuvant therapy will guide choosing the appropriate combined therapy for pancreatic cancer.

54. DOES ONE CYCLE OF FFX TREATMENT CHANGE THE BLOOD IMMUNE PROFILE IN PDAC PATIENTS?

CWF van Eijck, F van der Sijde, W de Koning, B Groot Koerkamp, CHJ van Eijck, DAM Mustafa
Presenter: Casper W. van Eijck BSc | Erasmus University Medical Center, Netherlands

Background: FOLFIRINOX (FFX) chemotherapy has emerged to become one of the most favorable treatments for pancreatic ductal adenocarcinoma (PDAC). The aim of this study was to investigate the earliest possible effect of FFX in the blood of PDAC patients to create a gene signature capable of predicting the response outcome.

Methods: PDAC patients of different disease stages who received FFX treatment were included in this study. Clinical information including age, gender, the systematic immune inflammation index (SIII), the neutrophil-to-lymphocyte ratio (NLR) and CA19-9 was collected for all patients. The treatment response was repeatedly evaluated following the Response Evaluation Criteria in Solid Tumors (RECIST) criteria 1.1 after every 4 cycles of FFX treatment. Tempus blood samples of PDAC patients were collected before and after the first cycle of FFX treatment. RNA was isolated and profiled using the PanCancer Immune profile panel of NanoString Technology that includes 730 immune-related genes and 40 housekeeping genes. Expression data were analyzed by using the nSolver Advanced Analysis 4.0 software. Paired analysis was conducted, and the adjusted p-value was calculated using the Benjamini-Hochberg method.

Results: In total, 68 patients were included in this study (136 blood samples). FFX treatment induced a significant change in the immune profile of the blood sample: more than 395 genes were differentially expressed when comparing before and after one cycle of FFX samples (p-value 2). Conversely, FFX treatment suppressed the overall cell, NK cell and T cell functions pathway (p-value 2). Moreover, FFX treatment increased the relative abundance of conventional dendritic 2 and monocyte cells ($p < 0.01$). In-depth analysis based on the clinical information and the response to therapy is being performed and the results will be presented at the conference.

Conclusion: This is the first study that describes the earliest effect of FFX chemotherapy on the immune-related genes and cells in blood samples of PDAC patients. The data helps in predicting the response to FFX treatment which avoids giving ineffective but toxic treatment to PDAC patients.

55. VENOUS THROMBOSIS FOLLOWING VASCULAR RESECTION DURING PANCREATICODUODENECTOMY: INCIDENCE AND RISK FACTORS

HH Khachfe, M Maalouf, AY Hammad, S lMasri, A deSilva, I Nassour, H Liu, J Kraftician, KK Lee, AH Zureikat, A Paniccia

Presenter: Hussein H. Khachfe MD | University of Pittsburgh Medical Center, United States

Background: Various techniques have been described for venous resection and reconstruction during pancreaticoduodenectomy (PD), but the incidence of thrombosis associated with each method remains undefined. Our aim is to explore the risks factors and the outcomes associated with different techniques of vein resections employed at our institution during PD and their effect on venous thrombosis.

Methods: Patients who underwent venous resection during PD from 2010 to 2020 were identified. Medical records and imaging were retrospectively reviewed for perioperative outcomes, with particular emphasis on vein patency and thrombosis. Patients who had at least 6 months follow-up were considered.

Results: Two hundred three patients met inclusion criteria and vein thrombosis was identified in 25 (12.3%) patients. The portal vein was the most commonly resected vein (PV; n=109, 53.6%).Tangential resection (n=78, 38.4%) was the most commonly used approach and had the lowest rate of thrombosis (7/78; 8.9%) regardless of if performed along the PV (4/48; 8.3%) or the superior mesenteric vein [(SMV) 2/23; 8.6%]. Vascular conduit (vein graft) reconstructions had the highest rate of thrombosis (n=11/27, 40%), and shortest time to thrombus formation (median: 59 days [49-149], p-value < 0.001). Other median days to thrombosis according to the various resection techniques were 139 [22-288], 119 [66-168]) and 185 [147-222] for tangential, end-to-end, and venorrhaphy respectively. The rate of thrombosis did not vary according to type of operative approach (robotic vs. open; p=0.456), vein resected (PV vs. SMV vs. PV/SMV confluence; p=0.558), or tangential resection technique [hand sewn vs. stapled (p=0.779)]. The use of a vascular conduit was associated with a statistically significant higher rate of thrombosis compared to all other approaches (p value < 0.001). Postoperative administration of antiplatelet/anticoagulant was not associated with thrombosis prevention.

Conclusion: Vascular conduit reconstructions were associated with the highest rate of thrombosis. No difference in thrombosis rate exists between operative approach, type of antiplatelet/anticoagulant given on discharge, and type of vein resection performed.

		Vein Status		
		Patent (n=176) Count (%)	Thrombosed (n=27) Count (%)	p-value
Sex				0.020
	Male	101 (91.8)	9 (8.2)	
	Female	75 (80.6)	18 (19.4)	
Neoadjuvant Chemotherapy		147 (85.4)	25 (14.6)	0.222
Neoadjuvant Radiotherapy		30 (73.2)	11 (26.8)	0.004
Vein Resected	Portal Vein	92 (84.4)	17 (15.6)	0.565
	Superior Mesenteric Vein	55 (91.7)	5 (8.3)	
	PV/SMV Confluence	28 (84.8)	5 (15.2)	
	Jejunal Vein	1 (100)	0 (0)	<0.001
Type of Vascular Resection/Repair	Tangential	71 (91)	7 (9)	
	End-to-End	57 (89.1)	7 (10.9)	
	Vein Conduit	16 (59.3)	11 (40.7)	
	Venorrhaphy	30	2 (6.3)	
	Patch	2 (100)	0 (0)	
Tangential Resection Type				0.779
	Staple	47 (90.4)	5 (9.6)	
	Handsewn	24 (92.3)	2 (7.7)	
Vein Thrombosed	Portal Vein	0 (0)	10 (100)	0.558
	Superior Mesenteric Vein	0 (0)	8 (100)	
	PV/SMV Confluence	0 (0)	7 (100)	
Antiplatelet/Anticoagulation Given on Discharge				0.450
	None	38 (92.7)	3 (7.3)	
	Antiplatelet Alone	73 (82)	16 (18)	
	Anticoagulation Alone	12 (85.7)	2 (14.3)	
	Both	14 (87.5)	2 (12.5)	
Margin				0.217
	R0	113 (89)	14 (11)	
	R1	63 (82.9)	13 (17.1)	
Surgical Approach				0.456
	Open	109 (84.5)	20 (15.5)	
	Robotic	66 (90.4)	7 (9.6)	
	Laparoscopic	1 (100)	0 (0)	

56. COMPARISON OF SHORT-TERM RESULTS BETWEEN SUPERIOR MESENTERIC ARTERY RESECTION AND SUPERIOR MESENTERIC/PORTAL VEIN RESECTION DURING PANCREATECTOMY: A PROPENSITY SCORE MATCHING ANALYSIS

M Ginesini, N Napoli, EF Kauffmann, C Gianfaldoni, A Salomone, C Cappelli, D Campani, F Vistoli, U Boggi
Presenter: Michael Ginesini MD | University of Pisa, Italy

Background: The efficacy of neoadjuvant therapies renews the possibility of resection of peripancreatic arteries during pancreatectomy for cancer. If the vein resection is worldwide accepted, the resection of superior mesenteric artery remains debated because of the high morbidity and mortality. In this analysis we compared pancreatectomies with superior mesenteric vein/portal vein resection (VR-p) and superior mesenteric artery resection (SMA-p) using a propensity score (PS) matching.

Methods: Data were prospectively entered into a database and retrospectively analyzed. Incidence of severe post-operative complications (Clavien-Dindo≥3b) and 90-day mortality were considered the main outcome measures. The PS matching (1-to-1) was performed by using genetic method (R package MatchIt) to balance possible confounders (age, gender, BMI, ASA score, diabetes, heart disease, pulmonary disease, neoadjuvant chemotherapy, preoperative abdominal surgery) between the two groups.

Results: Between 1994 and 2021, 327 patients underwent VR-p and 69 underwent SMA-p at our institution. A summary of baseline characteristics, operative and post-operative results is provided in table 1.

Severe post-operative complications occurred in 48 (14.7%) and 14 (20.3%) patients after VR-p and SMA-p (p=0.24), respectively. The crude odd ratio (OR) was 1.47 (0.76-2.87). Equivalent figures for 90-day mortality were 23 (7%) and 8 (11.6%) (p=0.20). The crude OR was 1.73 (0.74-4.06).

According to PS, 69 Vr-p were matched to 69 SMA-p (table 1). A summary of baseline characteristics, operative and post-operative results is provided in table 1. Severe post-operative complications occurred in 12(17.4%) and 14 (20.3%) patients after VR-p and SMA-p (p=0.66), respectively. The adjusted odd ratio (OR) was 1.21 (0.51-2.84). Equivalent figures for 90-day mortality were 3 (4.4%) and 8 (11.6%) (p=0.13). The adjusted OR was 2.88 (0.73-4.37).

Conclusion: The resection of the superior mesenteric artery for pancreatic cancer remains a challenging operation with a high morbidity and mortality. However, this analysis demonstrates that there are no statistically significant differences with VR-pr. Nevertheless, this procedure is recommendable only in high volume centers for vascular resections during pancreatectomy.

Table 1 - Baseline characteristics, operative and post-operative results

	Before PS				After PS			
	Overall population	**VR-p**	**SMA-p**	**p**	**Overall population**	**VR-p**	**SMA-p**	**p**
Baseline characteristics								
Number (%)	396 (100%)	327 (82.6%)	69 (17.4%)		138 (100%)	69 (50%)	69 (50%)	
Age; median (IQR); year	66.4 (60-73.9)	67.8 (60.8-74.8)	63 (54.4-69.1)	<0.0001	61.2 (54-68.3)	60.9 (53.9-68)	63 (54.4-69.1)	0.82
Gender male; n (%)	220 (55.6%)	185 (56.6%)	35 (50.7%)	0.37	71 (51.4%)	36 (52.2%)	35 (50.7%)	0.86
BMI; median (IQR); Kg/m2	23.7 (21.6-25.6)	23.8 (21.8-25.7)	23.1 (21.3-25)	0.21	23.1 (21.5-24.9)	23 (21.8-24.9)	23.1 (21.3-25)	1.00
ASA; median (IQR)	2 (2-3)	2 (2-3)	2 (2-3)	0.14	2 (2-3)	2 (2-3)	2 (2-3)	0.90
Diabetes; n (%)	106 (26.8%)	82 (25.1%)	24 (34.8%)	0.09	46 (33.3%)	22 (31.9%)	24 (34.8%)	0.72
Heart disease; n (%)	61 (15.4%)	58 (17.7%)	3 (4.4%)	0.003	7 (5.1%)	4 (5.8%)	3 (4.4%)	1.00
Pulmonary disease; n (%)	26 (6.6%)	26 (8%)	0 (0%)	0.01	2 (1.4%)	2 (2.9%)	0 (0%)	0.50
Preoperative abdominal surgery; n (%)	150 (37.9%)	148 (45.3%)	2 (2.9%)	<0.0001	21 (15.2%)	19 (27.5%)	2 (2.9%)	<0.0001
Neoadjuvant chemotherapy; n (%)	87 (22%)	31 (9.5%)	56 (81.2%)	<0.0001	87 (63%)	31 (44.9%)	56 (81.2%)	<0.0001
Surgical procedure								
Pancreaticoduodenectomy; n (%)	231 (58.3%)	224 (68.5%)	7 (10.1%)	<0.0001	52 (37.7%)	45 (65.2%)	7 (10.1%)	<0.0001
Total pancreatectomy; n (%)	144 (36.4%)	82 (25.1%)	62 (89.9%)	<0.0001	82 (59.4%)	20 (29%)	62 (90%)	< 0.0001
Distal pancreatectomy; n (%)	21 (5.3%)	21 (6.4%)	0 (0%)	0.03	4 (2.9%)	4 (5.8%)	0 (0%)	0.12
Post-operative								
Clavien 0; n (%)	126 (31.8%)	109 (33.3%)	17 (24.6%)	0.16	37 (26.8%)	20 (29%)	17 (24.6%)	0.56
Clavien 5; n (0%)	31 (7.8%)	23 (7%)	8 (11.6%)	0.20	11 (8%)	3 (4.4%)	8 (11.6%)	0.21
Clavien >2; n (%)	86 (21.7%)	69 (21.1%)	17 (24.6%)	0.52	32 (23.2%)	15 (21.7%)	17 (24.6%)	0.69
Clavien >3a; n(%)	62 (15.7%)	48 (14.7%)	14 (20.3%)	0.24	26 (18.8%)	12 (17.4%)	14 (20.3%)	0.66
Comprehensive Complication Index; median (IQR)	22.6 (0-33.5)	22.6 (0-33.5)	24.2 (4.4-33.5)	0.23	21.8 (0-33.5)	20.9 (0-33.5)	24.2 (4.4-33.5)	0.29

57. PROSPECTIVE, MULTI-INSTITUTIONAL, REAL-TIME NEXT-GENERATION SEQUENCING OF PANCREATIC CYST FLUID REVEALS DIVERSE GENOMIC ALTERATIONS THAT IMPROVE THE ASSESSMENT OF PANCREATIC CYSTS

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Presenter: Alessandro Paniccia MD | University of Pittsburgh Medical Center, United States

Background: Next-generation sequencing (NGS) of pancreatic cyst fluid is a useful adjunct in the assessment of pancreatic cyst (PC) patients. However, previous studies have been retrospective or single institutional experiences. The aim of this study was to prospectively evaluate NGS on a multi-institutional cohort of PC patients in real-time.

Methods: Within a two-year timeframe, a 22-gene NGS panel (PancreaSeq) was used to evaluate endoscopic ultrasound (EUS)-guided fine-needle aspiration PC fluid from 31 institutions. PancreaSeq results were correlated with EUS findings, ancillary studies, follow-up, and expanded molecular testing of postoperative specimens.

Results: Among 1933 PCs, 1887 (98%) specimens from 1832 patients were satisfactory for PancreaSeq testing. Follow-up was available for 1216 (66%) patients (median, 23 months). Based on 251 (21%) patients with surgical pathology, MAPK/GNAS mutations had 90% sensitivity and 100% specificity for a mucinous cyst. The combination of MAPK/GNAS mutations and TP53/SMAD4/CTNNB1/mTOR gene alterations had 88% sensitivity and 95% specificity for advanced neoplasia. Exclusion of low-level variants and inclusion of cytology improved the sensitivity to 93%. The sensitivities and specificities of VHL and MEN1/LOH alterations were 71% and 100% for serous cystadenomas (SCAs), and 68% and 98% for pancreatic neuroendocrine tumors (PanNETs), respectively. Upon follow-up, SCAs with TP53/TERT mutations often exhibited interval growth, while PanNETs with LOH of ≥3 genes had distant metastasis. None of the remaining 965 patients reported a malignancy. Postoperative testing identified mucinous cysts with BRAF fusions and ERBB2 amplification, and advanced neoplasia with CDKN2A alterations.

Conclusion: Prospective PancreaSeq testing was not only sensitive and specific for mucinous cysts and advanced neoplasia arising from mucinous cysts, but also reveals the diversity of genomic alterations seen in PCs and their clinical significance.

Sensitivities and specificities of PancreaSeq testing and other diagnostic modalities based on 246 diagnostically confirmed pancreatic cysts.

Parameter	Sensitivity (95% CI)	Specificity (95% CI)
IPMN		
MAPK/*GNAS* mutations	95% (0.91 - 0.98)	89% (0.78 - 0.94)
Presence of multiple cysts (n=245)*	54% (0.46 - 0.62)	80% (0.69 - 0.88)
Increased fluid viscosity (n=238)*	79% (0.72 - 0.85)	81% (0.70 - 0.89)
Elevated CEA (n=173)*	74% (0.65 - 0.81)	73% (0.59 - 0.84)
IPMN with advanced neoplasia		
TP53, *SMAD4* and/or mTOR gene alterations	87% (0.78 - 0.93)	76% (0.69 - 0.83)
TP53, *SMAD4, CTNNB1* and/or mTOR gene alterations	89% (0.80 - 0.94)	74% (0.67 - 0.81)
MAPK/*GNAS* mutations with *TP53*, *SMAD4* and/or mTOR gene alterations	84% (0.75 - 0.91)	92% (0.87 - 0.96)
MAPK/*GNAS* mutations with *TP53*, *SMAD4, CTNNB1* and/or mTOR gene alterations	87% (0.78 - 0.93)	91% (0.85 - 0.95)
MAPK/*GNAS* LOH or *TP53*, *SMAD4* and/or mTOR gene AFs = MAPK/*GNAS* AFs	86% (0.76 - 0.92)	95% (0.90 - 0.98)
MAPK/*GNAS* LOH or *TP53*, *SMAD4, CTNNB1* and/or mTOR gene AFs = MAPK/*GNAS* AFs	88% (0.79 - 0.94)	94% (0.89 - 0.97)
Associated clinical symptoms (n=244)*	38% (0.28 - 0.49)	71% (0.64 - 0.78)
Jaundice (n=131)**	31% (0.20 - 0.44)	89% (0.78 - 0.95)
Index cyst size >3.0 cm (n=242)*	56% (0.45 - 0.66)	55% (0.46 - 0.63)
Main pancreatic duct dilatation (n=244)*	71% (0.60 - 0.80)	65% (0.57 - 0.73)
Presence of a mural nodule (n=245)*	44% (0.34 - 0.55)	80% (0.72 - 0.85)
Increasing index cyst size (n=125)*	50% (0.34 - 0.66)	54% (0.43 - 0.65)
Malignant cytopathology***	46% (0.35 - 0.56)	95% (0.90 - 0.98)
IPMN and MCN		
MAPK/*GNAS* mutations	90% (0.85 - 0.94)	100% (0.93 - 1.00)
Increased fluid viscosity (n=238)*	77% (0.70 - 0.83)	92% (0.81 - 0.97)
Elevated CEA (n=173)*	73% (0.64 - 0.80)	94% (0.79 - 0.99)
IPMN and MCN with advanced neoplasia		
TP53, *SMAD4* and/or mTOR gene alterations	88% (0.79 - 0.93)	79% (0.72 - 0.85)
TP53, *SMAD4, CTNNB1* and/or mTOR gene alterations	90% (0.81 - 0.95)	77% (0.70 - 0.84)
MAPK/*GNAS* mutations with *TP53*, *SMAD4* and/or mTOR gene alterations	85% (0.76 - 0.92)	96% (0.91 - 0.98)
MAPK/*GNAS* mutations with *TP53*, *SMAD4, CTNNB1* and/or mTOR gene alterations	88% (0.79 - 0.93)	95% (0.89 - 0.98)
MAPK/*GNAS* LOH or *TP53*, *SMAD4* and/or mTOR gene AFs = MAPK/*GNAS* AFs	87% (0.78 - 0.92)	99% (0.95 - 1.00)
MAPK/*GNAS* LOH or *TP53*, *SMAD4, CTNNB1* and/or mTOR gene AFs = MAPK/*GNAS* AFs	89% (0.80 - 0.94)	98% (0.94 - 1.00)
Associated clinical symptoms (n=244)*	38% (0.28 - 0.48)	72% (0.64 - 0.79)
Jaundice (n=131)**	31% (0.20 - 0.44)	89% (0.78 - 0.95)
Index cyst size >3.0 cm (n=242)*	59% (0.48 - 0.68)	57% (0.48 - 0.65)
Main pancreatic duct dilatation (n=244)*	68% (0.58 - 0.77)	65% (0.57 – 0.73)
Presence of a mural nodule (n=245)*	45% (0.35 - 0.56)	81% (0.74 - 0.87)
Increasing index cyst size (n=125)*	52% (0.37 - 0.67)	56% (0.44 - 0.67)
Malignant cytopathology***	46% (0.36 - 0.56)	97% (0.92 - 0.99)

Abbreviations: AF, allele frequency; CEA, carcinoembryonic antigen; IPMN, intraductal papillary mucinous neoplasm; MCN, mucinous cystic neoplasm

*n designates the number of patients with data available for analysis.

**Jaundice was evaluated for patients with a cyst in the pancreatic head, uncinate and/or neck

***Malignant cytopathology was defined as at least suspicious for adenocarcinoma.

58. DISTAL PANCREATECTOMY FISTULA RISK SCORE (D-FRS): DEVELOPMENT AND INTERNATIONAL VALIDATION

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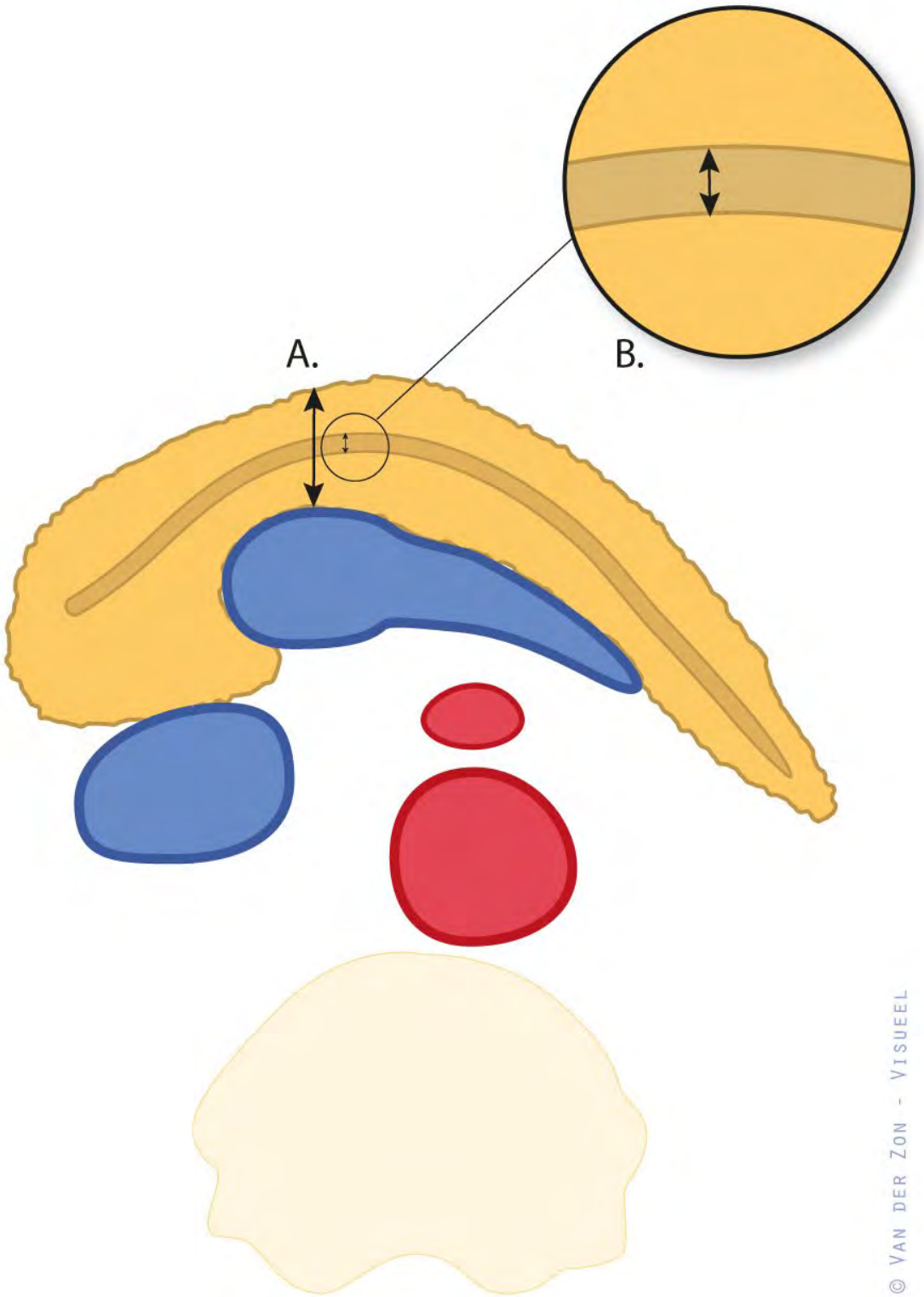
Presenter: Eduard A. van Bodegraven MD | Academic Medical Center, Netherlands

Background: Preoperative estimation of the risk of postoperative pancreatic fistula (POPF) after distal pancreatectomy (DP) can be used for the selection of preventive strategies, for benchmarking across centers, and stratifying patients by baseline risk in clinical studies. The aim was to develop and externally validate the first clinical risk score for POPF after DP.

Methods: Predictive variables for POPF were found using data of patients undergoing DP in two Italian centers (2014-2016) utilizing multivariable logistic regression. A prediction model was designed based on the significant variables. These data were pooled with the data of three Dutch centers and in two US centers (2007-2016). Discrimination and calibration were assessed in an internal-external validation procedure.

Results: Overall, 1336 patients were included, of whom 291 (22%) developed a POPF grade B/C. A preoperative risk score was developed, including two variables: pancreatic neck thickness (OR: 1.14 [95% CI:1.11-1.17] per mm increase) and pancreatic duct diameter (OR: 1.46; [95%CI: 1.32-1.65] per mm increase). The model performed well in the design cohort (AUC: 0.80 (95% CI: 0.76-0.84)) and after internal-external validation (AUC: 0.73 (95% CI: 0.70-0.76)). Three risk groups were identified: low-risk (0-10%), intermediate-risk (10-25%), and high-risk (>25%).

Conclusion: The Distal Fistula Risk Score (D-FRS) is the first externally validated risk score that successfully predicts the risk of POPF after distal pancreatectomy. It can be easily calculated preoperatively using www.pancreascalculator.com. The three distinct risk groups may facilitate personalized treatment.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59. PREDICTING POST-RECURRENCE SURVIVAL FOR PATIENTS WITH PANCREATIC CANCER RECURRENCE AFTER PRIMARY RESECTION: A BI-INSTITUTIONAL VALIDATED RISK CLASSIFICATION

AF van Oosten, LA Daamen, VP Groot, NC Biesma, JR Habib, IWJM van Goor, B Kinny-Koster, RA Burkhart, CL Wolfgang, HC van Santvoort, J He, IQ Molenaar

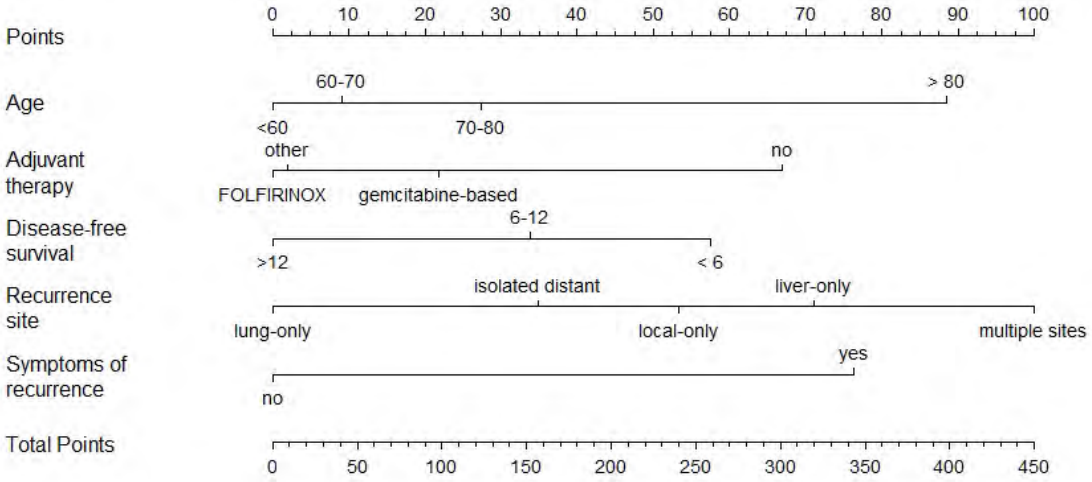
Presenter: Lois A. Daamen MD, PhD | UMC Utrecht, Netherlands

Background: Over 80% of patients will develop disease recurrence after radical resection of pancreatic ductal adenocarcinoma (PDAC). It remains unclear which factors carry prognostic significance at time of recurrence. This study aims to develop and validate a clinical risk score to predict post-recurrence survival (PRS) at time of recurrence in patients with resected PDAC.

Methods: All patients who had recurrence after undergoing pancreatectomy for PDAC at the Johns Hopkins Hospital, between 2016 and 2018, or at the Regional Academic Cancer Center Utrecht between 2014 and 2019 were included. Kaplan-Meier curves were used to estimate PRS. A Cox proportional hazard model was used to develop the risk model in a training set. Based on Akaike's information criterion, predictive variables were selected. Performance of the final model was assessed in a test set after internal validation in 1000 bootstrap samples.

Results: Of 718 resected PDAC patients, 514 (72%) had recurrence after a median follow-up of 32 months. The median overall survival calculated from surgery was 21 months and the median PRS was 9 months. Prognostic factors associated with a shorter PRS were age (hazard ratio [HR] 1.02; 95% confidence interval [95% CI] 1.00 – 1.04; P = 0.02), multiple-site recurrence (HR 1.57; 95% CI 1.08 – 2.28; P = 0.02), and symptoms at time of recurrence (HR 2.33; 95% CI 1.59 – 3.41; P < 0.001). Recurrence-free survival (RFS) longer than 12 months (HR 0.55; 95% CI 0.36 – 0.83; P = 0.004), FOLFIRINOX adjuvant chemotherapy (HR 0.45; 95% CI 0.25 – 0.81; P = 0.01) and gemcitabine-based adjuvant chemotherapy (HR 0.58; 95% CI 0.26 – 0.93; P = 0.02) were associated with a longer PRS. The risk score designed with these variables had a good predictive accuracy (C-index: 0.73).

Conclusion: This study developed and validated a clinical risk score based on an international cohort that can predict PRS in patients who underwent surgical resection for PDAC. This risk score will become available on www.evidencio.com and can help clinicians with patient counseling on prognosis and shared decision-making regarding treatment.


Points
0
10
20
30
40
50
60
70
80
90
100
Age
60-70
> 80
<60
70-80
Adjuvant therapy
other
no
FOLFIRINOX
gemcitabine-based
Disease-free survival
6-12
>12
< 6
Recurrence site
isolated distant
liver-only
lung-only
local-only
multiple sites
Symptoms of recurrence
yes
no
Total Points
0
50
100
150
200
250
300
350
400
450

60. SUCCESSFUL IMPLEMENTATION OF AN OPIOID REDUCTION TOOLKIT IN PANCREATECTOMY PATIENTS SIGNIFICANTLY DECREASES NUMBER OF OPIOIDS PRESCRIBED AND CONSUMED

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Presenter: Ryan Lamm MD | Thomas Jefferson University Hospital, United States

Background: Post-operative opioid prescriptions contribute to the community diversion pool of narcotics at-risk for abuse. Previous efforts have been directed towards opioid reduction in minimally invasive procedures, but few have targeted open surgery, such as pancreatectomy. This study sought to create an opioid reduction toolkit to be used to inform patients and providers on safe opioid practices. The goal was to reduce the number of opioids prescribed and consumed, as well as to inform patients about appropriate disposal techniques.

Methods: A single academic surgical department reviewed opioid treatment patterns for patients undergoing common procedures, including open pancreatectomy, and an opioid reduction toolkit using the data collected was created. Providers were educated on the use of the toolkit and it was implemented as a standard of practice. Data were collected on pancreatectomy patients via telephone interview (performed at 2 weeks post-op) and by reviewing the state prescription drug monitoring program. Outcome variables included morphine milliequivalents (MME) of pills prescribed, MME of pills consumed, number of patients aware of proper unused pill disposal, number of patients requesting refills, and pain scores. As an example of MME, a 5-milligram tablet of oxycodone (Roxicodone) converts to 7.5 MME. Categorical and continuous outcomes were compared within and between groups.

Results: Eighty-one (81) patients were included in the analysis: 24 in the pre-intervention group and 57 in the post-intervention group. There were no significant demographic or clinical differences between the groups. In the pre-intervention group, there was a significant difference in the MME prescribed compared to those that were consumed (225 (225 - 281.3) v 75 (75 - 112.5), p< 0.0001). Based upon this information and following implementation of the toolkit, the number of MME prescribed was significantly reduced from 225 (225 - 281.3) in the pre-intervention group to 108.8 (37.5 - 187.5) in the post-intervention group (p< 0.0001). The post-intervention group was observed to have a significant reduction in the MME consumed compared to the pre-intervention group (7.5 (0 - 112.5) v 75 (75 - 112.5), p=0.0004), while the mean pain score in the post-intervention group, on a scale of 1-10, was 3.3 + 0.5. The number of patients who were aware of how to properly dispose of unused pills significantly increased after toolkit implementation (Pre: 25% v Post: 65%, p=0.001) while those requesting refills did not significantly change (Pre: 17% v Post: 19% v, p=0.781) (Table 1).

Conclusion: Implementing an opioid reduction toolkit successfully reduced the number of postoperative opioids prescribed by the provider and consumed by the patient following discharge after pancreatectomy. Pain scores after surgery remained at an acceptable level, suggesting pain management was not compromised. Patient awareness of the proper way to dispose of unused opioid pills more than doubled. Continued efforts to reduce the opioid discharge prescriptions with education on how to dispose of unused pills can reduce the number of pills available for abuse in the community.

Table 1. Opioid-related outcomes for pre- and post- opioid reduction toolkit implementation

	PRE-INTERVENTION GROUP (N = 24)	POST-INTERVENTION GROUP (N = 57)	*P-VALUE*
MME PRESCRIBED, MEDIAN (IQR)	225 (225 - 281.3)	108.8 (37.5 - 187.5)	*<0.0001*
MME CONSUMED, MEDIAN (IQR)	75 (75 - 112.5)	7.5 (0 - 112.5)	*0.0004*
PATIENTS AWARE OF PROPER DISPOSAL, N (%)	6/24 (25.0)	37/57 (64.9)	*0.001*
NUMBER OF PATIENTS REQUESTING REFILLS, N (%)	4/24 (16.7)	11/57 (19.3)	*0.781*

Abbreviations: MME=Morphine Milliequivalents; IQR=Interquartile Range

61. POSTOPERATIVE PANCREATIC FISTULA TENDS TO BE OF A HIGHER GRADE IN MINIMALLY INVASIVE VS. OPEN PANCREATICODUODENECTOMY: TRUTH OR MYTH?

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Presenter: Samer Naffouje MD | Moffitt Cancer Center, United States

Background: Pancreaticoduodenectomy (PD) remains a complex and highly morbid procedure even in high-volume centers. Several studies have studied the outcomes of open PD (OPD) to minimally-invasive PD (MIPD) and demonstrated comparable short-term outcomes including the rates of postoperative pancreatic fistula (POPF). However, it has been proposed that POPFs following MIPD tend to be of a higher grade and are associated with higher morbidity compared to OPD. The aim of the study is to test this hypothesis.

Methods: NSQIP pancreatectomy 2014-2020 was used for the analysis. Patients who underwent elective PD without concomitant vascular or visceral resection, who had available report on the reconstruction technique, gland texture, duct size and POPF grade were selected. To test the proposed hypothesis, we only included patients who were reported to have POPF following their PD. Clinically-relevant POPF (CR-POPF) was defined as grade B & C.

We matched patients who had OPD to those who had MIPD based on a propensity score model that adjusts for all clinical and demographic variables. Postoperative outcomes were compared between the matched groups using conditional logistic regression and mixed effect modeling.

Results: The initial database contained 47,275 pancreatectomy cases. 3,083 elective PD cases complicated by POPF were selected. 1,498 (48.6%) of POPFs were grade A, 1,400 (45.4%) were grade B, and 185 (6.0%) were grade C. 2,843 patients (92.2%) underwent OPD vs. 240 (7.8%) who underwent MIPD. We performed a multivariable logistic regression for predictors of CR-POPF which concluded male sex, benign indications, neoadjuvant chemotherapy, MIPD, operative time, and pancreaticojejunostomy (PJ) invagination (vs. the standard PJ duct-to-mucosa) as unfavorable predictors of CR-POPF. Additionally, drain placement was significantly associated with lower rates of CR-POPF (HR 0.14 [0.08-0.23]).

We matched 705 OPD patients to 235 MIPD peers (ratio 3:1) based on a propensity score model. In the matched dataset, MIPD patients had higher rates of CR-POPF (54% vs. 47%; p=0.037), with the main difference being attributed to grade C (grades A, B, C were 53%, 44%, 3% in OPD vs. 46%, 45%, 9% in MIPD; p=0.002). MIPD patients also had higher rates of delayed gastric emptying (36% vs. 29%; p=0.041), and reoperation (15% vs. 9%; p=0.006), whereas they had lower rates of postoperative transfusions (9% vs. 15%; p=0.016). No difference was detected in median hospitalization (10 days vs. 11 days; p=0.143) with higher rates of 30-day readmission in the MIPD group (35% VS. 28%; P=0.032). There was no difference in non-POPF overall morbidity (62% vs. 66%; p=0.237), infectious morbidity (38% vs. 39%; p=0.874), or mortality (2% vs. 2%; p=0.783) between the matched groups.

Conclusion: In the occurrence of POPF, rates of CR-POPF are higher in males, MIPD (vs. OPD), and PJ invagination (vs. PJ duct-to-mucosa). Drain placement mitigates the occurrence of CR-POPF by 6.5-fold.

When POPF occurs following MIPD, it tends to be of a slightly higher grade (mostly due to grade C). The postoperative course of OPD and MIPD complicated by POPF is generally comparable with higher tendency for transfusions in OPD and higher rates of readmission in MIPD.

Figure: Comparison of key postoperative outcomes of OPD vs. MIPD in the matched dataset of patients who underwent PD complicated by a POPF. **CR-POPF**: Clinically-Relevant Postoperative Pancreatic Fistula (B&C); **DGE**: Delayed Gastric Emptying; **LOS**: Length of Stay; **MIPD**: Minimally-Invasive Pancreaticoduodenectomy; **OPD**: Open Pancreaticoduodenectomy, **PD**: Pancreaticoduodenectomy. * Statistically significant.

62. EVALUATING THE IMPACT OF PRE-OPERATIVE GERIATRIC-SPECIFIC VARIABLES AND MODIFIED FRAILTY INDEX ON POST-OPERATIVE OUTCOMES AFTER ELECTIVE PANCREATIC SURGERY

WJ Kane, CM Lattimore, FE Turrentine, VM Zaydfudim
Presenter: Christopher Cramer MD | University of Virginia, United States

Background: Geriatric patients represent a growing proportion of the surgical population. Previous studies investigating post-operative outcomes after a broad range of major abdominal operations have demonstrated the utility of geriatric-specific variables (GSVs) and the 5-factor modified frailty index (mFI-5). The goal of this study was to examine the association of pre-operative GSVs and the mFI-5 with post-operative outcomes in patients selected for elective pancreatic surgery.

Methods: Patients in the ACS NSQIP Geriatric Surgery Research File pilot program who underwent elective pancreatic operations between 2014 and 2018 were included. Patients were stratified into three age groups: 65-74, 75-80, and 81 years or older. GSVs were categorized as: whether the patient lives at home or at a facility, use of a mobility aid, history of falls within the past year, and whether a patient can sign their own consent. Three clinically meaningful comorbid conditions scores were calculated for each patient: presence or absence of at least one GSV, a mFI-5 score, and a composite score of the GSV and mFI-5 scores (GSV+mFI-5). Multivariable logistic regression with adjustment for ACS NSQIP calculated risk or morbidity and mortality was performed to evaluate the associations between these geriatric and frailty variables and the post-operative outcomes: morbidity, mortality, need for re-operation, readmission, and discharge destination.

Results: A total of 1266 patients were included in the study: 808 (64%) age 65-74, 302 (24%) age 75-80, 156 (12%) age ≥ 81. A total of 843 (67%) patients underwent pancreatoduodenectomy. The operations were performed for pancreatic adenocarcinoma in 628 (50%) of patients. Patients ≥ 81 years were more likely to have at least one GSV present prior to resection ($p < 0.001$) while the median mFI-5 score was not different between age groups ($p = 0.82$). Patients ≥ 81 years had a greater likelihood of post-operative morbidity (35% vs 31% vs 47%, by age group, $p = 0.004$) and discharge to a facility (12% vs 23% vs 48%, by age group, $p < 0.001$). After adjusting for ACS NSQIP predicted probabilities of morbidity and mortality, patients with the pre-operative presence of at least one GSV were more likely to require a re-operation or to be discharged to a facility (OR 1.81 [95% CI 1.03-3.16] and 3.95 [95% CI 2.91-5.38], respectively). Similarly, the composite GSV+mFI-5 score was also associated with a greater likelihood of re-operation or discharge to a facility (OR 1.87 [95% CI 1.10-3.18] and 3.60 [95% CI 2.68-4.82], respectively).

Conclusion: Pre-operative presence of at least one geriatric-specific variable is significantly associated with the need for re-operation and discharge to a skilled facility following elective pancreatic surgery. Geriatric-specific variables should be considered in joint pre-operative decision making to help address specific needs of the elderly patient surgical population.

63. A COMPARISON OF THE USE OF EXTENDED VENOUS THROMBOEMBOLISM PROPHYLAXIS ON THE RATES OF VENOUS THROMBOEMBOLISM AND POST-PANCREATECTOMY HEMORRHAGE FOLLOWING PANCREATECTOMY FOR MALIGNANCY

JJ Hue, M Elshami, RS Hoehn, LD Rothermel, JB Ammori, JM Hardacre, JM Winter, LM Ocuin
Presenter: Henry J. Stitzel BS | Case Western Reserve University School of Medicine, United States

Background: Venous thromboembolism (VTE) is a major cause of postoperative morbidity and mortality. Guidelines recommend up to 28 days (d) of VTE prophylaxis with enoxaparin after discharge following major abdominal cancer surgery. We compared VTE and post-pancreatectomy hemorrhage (PPH) rates among patients with pancreatic and periampullary cancers treated at our institution prior to and following implementation of routine extended postoperative VTE prophylaxis.

Methods: We identified patients who underwent pancreatectomy for a pancreatic or periampullary malignancy (2004-2021). Common post-pancreatectomy outcomes (length of stay [LOS], clinically relevant postoperative pancreatic fistula [CR-POPF], delayed gastric emptying [DGE], 30/90d mortality rate) were abstracted from patient charts. VTE and PPH rates within 90d of discharge were compared based on the receipt of extended VTE prophylaxis with enoxaparin. Additional subset analyses were performed in patients who received antiplatelet medication at discharge.

Results: A total of 478 patients underwent pancreatectomy for a pancreatic or periampullary malignancy during the study period. Pancreatoduodenectomy was performed in 339 patients (70.9%), distal pancreatectomy was performed in 104 patients (21.8%), and total pancreatectomy was performed in 35 patients (7.3%). Overall, the length of stay was 7d and the unplanned readmission rate was 21.7%. In patients who underwent PD or DP, the CR-POPF rate was 7.4%. For all patients, DGE occurred in 7.0%. The 30/90d mortality rate was 0.8% and 3.1%, respectively.

A total of 22 patients (4.6%) developed a postoperative VTE, 12 (2.5%) of which occurred post-discharge. A total of 25 patients (5.2%) experienced a PPH, 13 (2.7%) of which occurred post-discharge. There was no difference in the development of post-discharge VTE between patients who received extended VTE prophylaxis and those who did not (2.3% vs. 2.6%, p=1.00). There was no difference in post-discharge PPH between patients who received extended VTE prophylaxis as compared to those who did not (3.4% vs. 1.9%, p=0.425). Antiplatelet agents with or without enoxaparin did not appear to be associated with higher VTE (0.0% vs 3.9%, p=0.313) or PPH (4.5% vs. 3.0%, p=0.643) rates.

Conclusion: Extended VTE prophylaxis following pancreatectomy for malignancy does not appear to be associated with differences in post-discharge VTE and PPH rates. These data suggest the use of extended VTE prophylaxis is safe but may not be necessary following pancreatectomy.

64. THE ORGANOTYPIC-LIVER SLIDE CULTURE SYSTEM FOR THE INVESTIGATION OF THE ROLE OF EXOSOMES IN PANCREATIC CANCER

A Comandatore, D Arguedas, C Carpenito, G Di Franco, M Palmeri, N Furbetta, S R Baglio, G Kazemier, M Besselink, E Giovannetti, L Morelli

Presenter: Annalisa Comandatore MD | University of Pisa, Italy

Background: Despite the morphological proximity and common vascular infiltration, the very high frequency of liver metastasis in pancreatic ductal adenocarcinoma (PDAC) is still not fully understood. Recent findings show how cell-to-cell communication through extracellular vesicles (EVs) might explain the formation of metastatic niches in target organs. Metastastic processes are the main responsible for the grim outcome of PDAC and new models are needed to evaluate the role of EVs in such processes. Organotypic models overcome the limitations and costs of in vitro and in vivo models. Moreover, these systems include both tumour cells and the metastatic site/tumour microenvironment (TME) reflecting the physiological and pathological consequences of their interaction with EVs.

The aims of our study were to: 1) evaluate whether EVs are transferred to tumour cells and change their invasive phenotype; 2) establish new models of organotypic liver slice cultures to study the role of EVs in PDAC.

Methods: After characterizing PDAC primary cells according to their metastatic potential, EVs were isolated from the supernatant of the most aggressive primary cell culture (PDAC3). EVs were then isolated using Size Exclusion Chromatography.

Liver tissues from immunocompetent and immunocompromised mice were cut with a vibratome to obtain slices with a thickness of 300 µm. These slices were subsequently incubated with EVs derived from PDAC3. After 24 hours, PDAC cells (previously transduced with Firefly-luciferase) were added to the liver slices, and the adhesion and invasion of these cells was quantified and compared to the control group (slices with cells, EVs, or cells and EVs). through bioluminescence (BLI)after 24-48h Tissues were included in paraffin to perform histopathological studies.

Results: EVs increase the ability of the PDAC cells to migrate as assessed through the wound healing assay (Fig.1). Furthermore, we established an innovative organotypic liver slide model which allows to study EV-educated PDAC cells in the liver metastatic TME. Our studies showed that pre-treatment with EVs increases the invasiveness of PDAC cells (as measured by BLI - Fig.2).

Conclusion: The described method turns out to be a valid and versatile system for the study of liver metastases. The major limitation of the study is represented by the use of liver slices obtained from athymic mice that have an altered immune response and contain cells that may react differently to human EVs when compared to human hepatic TME cells. However, our results may open the way for future studies with human liver metastatic tissues, decreasing the use of expensive organic or animal models. These samples may be obtained during palliative surgery or for occasional intraoperative findings in patients considered resectable prior to surgery. The use of these organotypic tools offers the great opportunity to evaluate the role of EVs in the metastatic context of PDAC.

Fig.1. Wound-healing assay

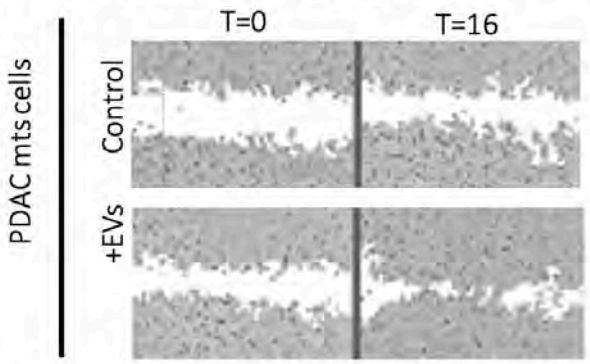
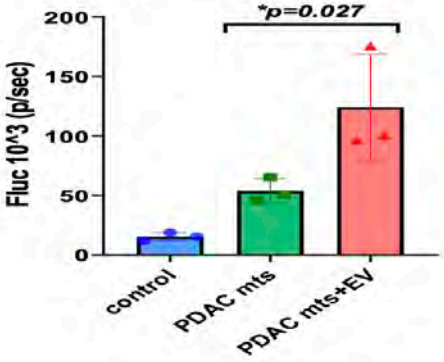


Fig.2. BLI



65. INTRAOPERATIVE BLOOD LOSS ESTIMATION IN HEPATO-PANCREATO-BILIARY SURGERY: AS RELEVANT AS NON-STANDARDIZED. RESULTS FROM A SYSTEMATIC REVIEW AND A WORLDWIDE SNAPSHOT SURVEY

G Perri, G Marchegiani, F Reich, C Bassi, R Salvia
Presenter: Giampaolo Perri MD | University of Verona, Italy

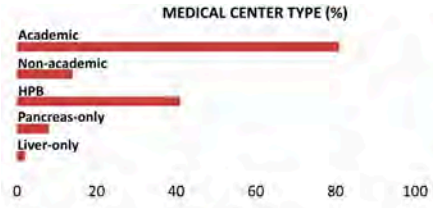
Background: Intraoperative blood loss (BL) is a major quality marker in hepato-pancreato-biliary (HPB) surgery, predictor of perioperative outcomes. However, the method for BL estimation is not standardized. The aim of this study is to picture the current practice of BL estimation in HPB surgery.

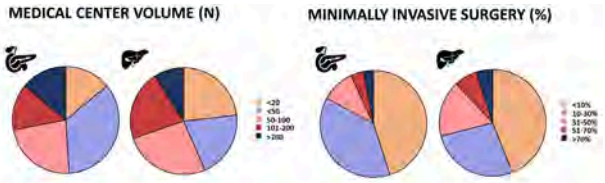
Methods: A systematic review was performed including original studies published between 2006 and 2021, reporting intraoperative BL of patients undergoing pancreatic or hepatic resections. A web-based snapshot survey was distributed globally to all members of the International Hepato-Pancreato-Biliary Association (IHPBA) and its regional chapters.

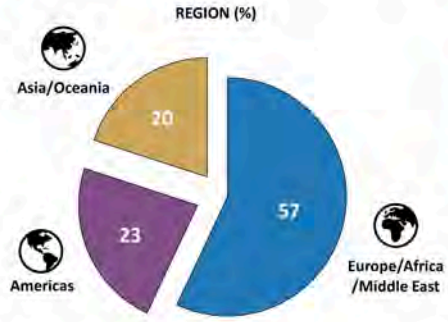
Results: A total of 806 studies were included, 480 (60%) had BL as their primary outcome and 105 (13%) as their secondary. However, 669 (83%) did not specify how BL estimation was performed, and 9 different methods were found among the remaining 136 (17%) studies.

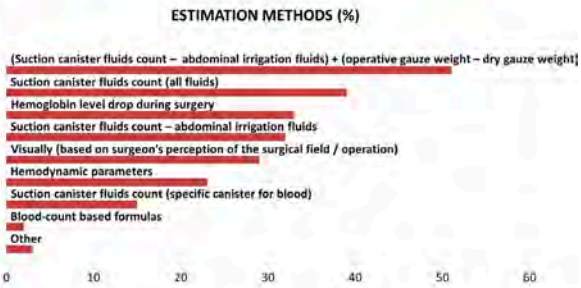
The survey was completed by 252 surgeons. Most of the responders (94%) declared to systematically perform BL estimation and considered BL highly predictive of postoperative complications after pancreatic (73%) and liver (74%) resection. All the 9 methods previously identified in literature were used by responders, with different frequency. A calculation based on suction fluid amounts, operative gauze weight, and irrigation was the most used method both in literature (7%) and among responders (49%). Most responders (83%) felt that BL estimation in HPB surgery needs better standardization.

Conclusion: Standardization of intraoperative BL estimation is urgently needed in HPB surgery, to ensure consistency of reporting and reproducibility.

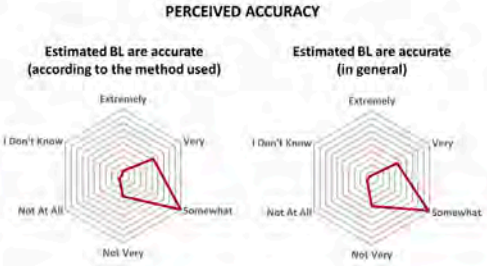

MEDICAL CENTER TYPE (%)
Academic
Non-academic
HPB
Pancreas-only
Liver-only
0
20
40
60
80
100

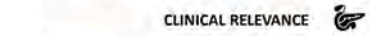

MEDICAL CENTER VOLUME (N)
MINIMALLY INVASIVE SURGERY (%)

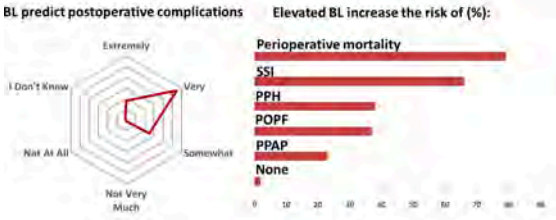

REGION (%)
Asia/Oceania
20
57
23
Americas
Europe/Africa
/Middle East

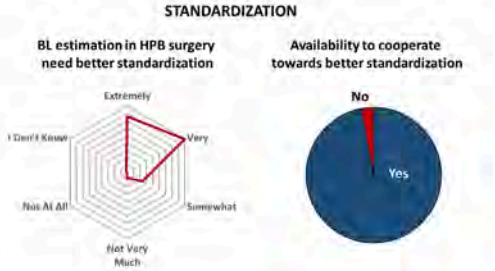

ESTIMATION METHODS (%)
(Suction canister fluids count – abdominal irrigation fluids) + (operative gauze weight – dry gauze weight)
Suction canister fluids count (all fluids)
Hemoglobin level drop during surgery
Suction canister fluids count – abdominal irrigation fluids
Visually (based on surgeon's perception of the surgical field / operation)
Hemodynamic parameters
Suction canister fluids count (specific canister for blood)
Blood-count based formulas
Other
0
10
20
30
40
50
60

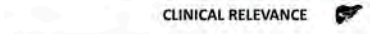

CONSISTENCY & REPORTING
Systematically perform BL estimation
Consistently apply the same BL method
Prospectively report estimated BL
No
Yes

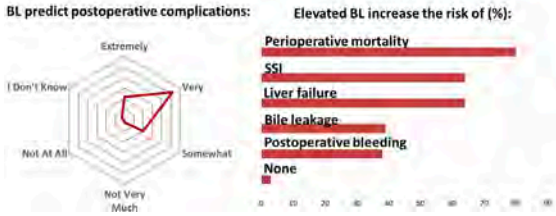

PERCEIVED ACCURACY
Estimated BL are accurate (according to the method used)
Estimated BL are accurate (in general)
Extremely
Very
Somewhat
Not Very
Not At All
I Don't Know


CLINICAL RELEVANCE


BL predict postoperative complications
Elevated BL increase the risk of (%):
Perioperative mortality
SSI
PPH
POPF
PPAP
None
Extremely
Very
Somewhat
Not Very Much
Not At All
I Don't Know


STANDARDIZATION
BL estimation in HPB surgery need better standardization
Availability to cooperate towards better standardization
Extremely
Very
Somewhat
Not Very Much
Not At All
I Don't Know
No
Yes


CLINICAL RELEVANCE


BL predict postoperative complications:
Elevated BL increase the risk of (%):
Perioperative mortality
SSI
Liver failure
Bile leakage
Postoperative bleeding
None
Extremely
Very
Somewhat
Not Very Much
Not At All
I Don't Know

POSTERS

POD 1. VIDEO ANALYSIS OF HEPATICOJEJUNOSTOMY FOR PREDICTING BILIARY COMPLICATIONS AFTER ROBOTIC PANCREATODUODENECTOMY

MJW Zwart, BLJ van den Broek, T Geraedts, RJ Schipper, SLM Zwetsloot, A Comandatore, OR Busch, TCK Tran, MD Luyer, J Schreinemakers, JH Wijsman, GP van der Schelling, IHJT de Hingh, JSD Mieog, BA Bonsing, K Takagi, RF de Wilde, L Morelli, HJ Zeh III, AH Zureikat, ME Hogg, MG Besselink, B Groot Koerkamp

Presenter: Sabrina L. Zwetsloot BSc | Academic Medical Center, Netherlands

Background: Bile leakage contributes up to 10% of morbidity after pancreatoduodenectomy. Previous studies showed that assessment of surgical proficiency is an important component of outcomes but studies focusing on proficiency of robotic hepatico-jejunostomy are lacking. The aim of the current study is to predict bile leak with the OSATS score according to the Birkmeyer and UMPC method in robotic pancreatoduodenectomy.

Methods: Design, Setting, Participants: Retrospective analysis of prospectively collected data of the Dutch LAELAPS-3 multicenter cohort study (January 2017 - October 2021). We included patients who underwent robotic pancreatoduodenectomy for all indications and for whom video recording was available.

Intervention/exposure: Technical performance of robotic hepaticojejunostomy was graded blinded for surgeon and surgical experience using the Objective Structured Assessment of Technical Skills (OSATS) score (attainable scores 6-30).

Main outcomes and measures: HJ-OSATS scores (attainable scores 6-30), total-OSATS (attainable scores 18-90) scores, bile leak (BL, ISGPS grade B/C), learning curve analysis, threshold value for OSATS in minimizing occurrence of bile leakage.

Results: Overall, 190 patients underwent RPD. Bile leak occurred in 7.4% (n=14). Of these, 94 hepaticojejunostomy videos were available for analysis. Median HJ-OSATS was 25.0 [IQR 22–27]. CUSUM analysis showed stabilization of the learning curve after 45 RPD procedures. The quartiles of the HJ-OSATS alone were not correlated with a difference in the proportion of bile leak (Rho=.032, P=.760). However, the total-OSATS quartiles correlated with a significant decrease of CR-BL (Rho=-.215, P=.044). On threshold analysis, HJ-OSATS, above 19 there is a significantly lower risk of bile leak (5% vs 19%, P=.043). On threshold analysis of total-OSATS, above 64 there is a significantly lower risk of CR-BL (1.9% vs 14.3%, P=.027).

Conclusion: This multicenter validation study demonstrates the value of a threshold in HJ-OSATS scoring of surgeons' performance in predicting postoperative bile leakage. Implementation of the OSATS score in RPD teaching should be considered.

POD 2. OVEREXPRESSION OF INTEGRIN ALPHA 2 (ITGA2) CORRELATES WITH POOR SURVIVAL IN PATIENTS WITH PANCREATIC DUCTAL ADENOCARCINOMA

L Schindel, R Braun, L Bolm, M Taylor, V Deshpande, O Schilling, P Bronsert, T Keck, CR Ferrone, UF Wellner, KC Honselmann

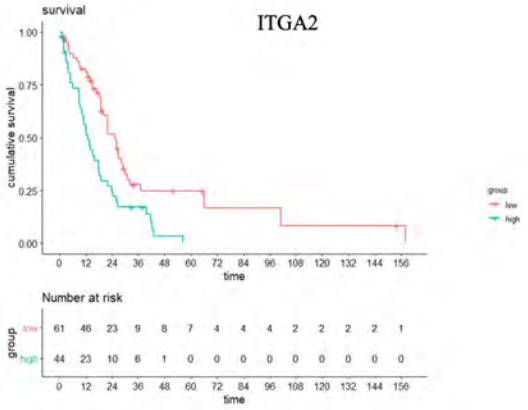
Presenter: Ruediger Braun MD | Academic Medical Center, Germany

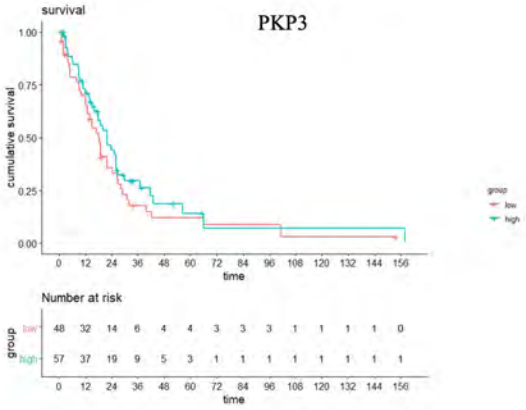
Background: Due to the known malignant potential and the poor overall prognosis of pancreatic ductal adenocarcinoma (PDAC), the identification of new biomarkers is of utmost importance. It has been reported that integrin alpha 2 (ITGA2), plakophilin 3 (PKP3) and adenylate kinase 4 (AK4) are associated with poor survival and more aggressive malignant behavior in multiple cancers, however their role in PDAC is still unknown. Therefore, the aim of this study was to investigate the correlation of ITGA2, PKP3 and AK4 expression with PDAC tumor characteristics and patient survival.

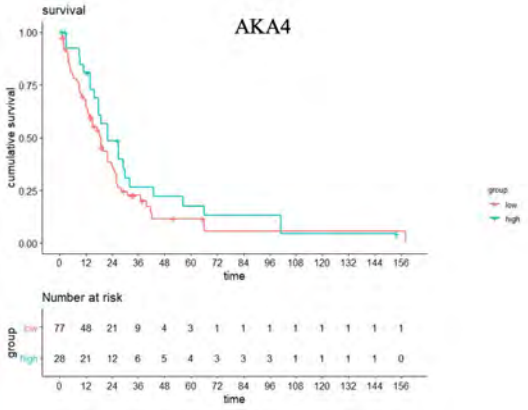
Methods: Of 105 patients undergoing oncological pancreatic resection between 2012-2018, tissue microarrays (TMA) were prepared from formalin-fixed, paraffin-embedded (FFPE) PDAC tissues and immunohistochemically stained with PKP3, AK4 and ITGA2. Clinical and pathological patient data were retrieved from the electronic patient charts and correlated with biomarker staining scores.

Results: ITGA2 expression was high in many PDAC patients with 43%, whereas AK4 and PKP3 expression were high in 28% and 57%, respectively. Overall survival was negatively associated with high ITGA2 expression in comparison to low expression (13 months (95% CI, 10-18 months vs. 25 months (95% CI, 20-30 months) $p< 0.001$)). Expression of AK4 and PKP3 did not correlate with overall survival. Multivariate Cox-regression identified ITGA2 as an independent predictor for shorter overall survival in PDAC among lymph node status and high tumor grade (G3/G4).

Conclusion: ITGA2 is an independent prognostic parameter for survival in resected PDAC patients. PKP3 and AK4 do not appear to have prognostic value for survival in PDAC.


survival
ITGA2
cumulative survival
1.00
0.75
0.50
0.25
0.00
0 12 24 36 48 60 72 84 96 108 120 132 144 156
time
Number at risk
group
low 61 46 23 9 8 7 4 4 4 2 2 2 2 1
high 44 23 10 6 1 0 0 0 0 0 0 0 0 0
0 12 24 36 48 60 72 84 96 108 120 132 144 156
time
group
low
high


survival
PKP3
cumulative survival
1.00
0.75
0.50
0.25
0.00
0 12 24 36 48 60 72 84 96 108 120 132 144 156
time
Number at risk
group
low 48 32 14 6 4 4 3 3 3 1 1 1 1 0
high 57 37 19 9 5 3 1 1 1 1 1 1 1 1
0 12 24 36 48 60 72 84 96 108 120 132 144 156
time
group
low
high


survival
AKA4
cumulative survival
1.00
0.75
0.50
0.25
0.00
0 12 24 36 48 60 72 84 96 108 120 132 144 156
time
Number at risk
group
low 77 48 21 9 4 3 1 1 1 1 1 1 1 1
high 28 21 12 6 5 4 3 3 3 1 1 1 1 0
0 12 24 36 48 60 72 84 96 108 120 132 144 156
time
group
low
high

POD 3. AVERAGE CAUSAL EFFECT OF TOTAL FACILITY HEPATO-PANCREATO-BILIARY MALIGNANCY CASE VOLUME ON SURVIVAL OUTCOMES OF PATIENTS WITH NON-RESECTED PANCREATIC ADENOCARCINOMA

M Elshami, FA Ahmed, H Kakish, JJ Hue, R Hoehn, L Rothermel, J Ammori, J Hardacre, J Winter, L Ocuin
Presenter: Mohamedraed Elshami MD, MMSc | University Hospitals Cleveland Medical Center, United States

Background: We examined the average causal effect of total facility hepato-pancreato-biliary(HPB) case volume on survival outcomes of patients with non-resected pancreatic adenocarcinoma(PDAC).

Methods: The National Cancer Database(2004-2018) was queried for patients with HPB malignancies(PDAC, neuroendocrine tumors, hepatocellular carcinoma, biliary tract cancers). The 25th, 50th, and 75th percentiles were determined based on the total annual HPB volume (operative&non-operative) receiving care in treating facilities. Patients with non-operatively managed PDAC were then selected. Median overall survival(OS), stratified by facility percentile and localized vs. metastatic disease, was compared. Inverse probability(IP)-weighted Cox regression was utilized to determine the marginal effect of facility volume on survival outcomes.

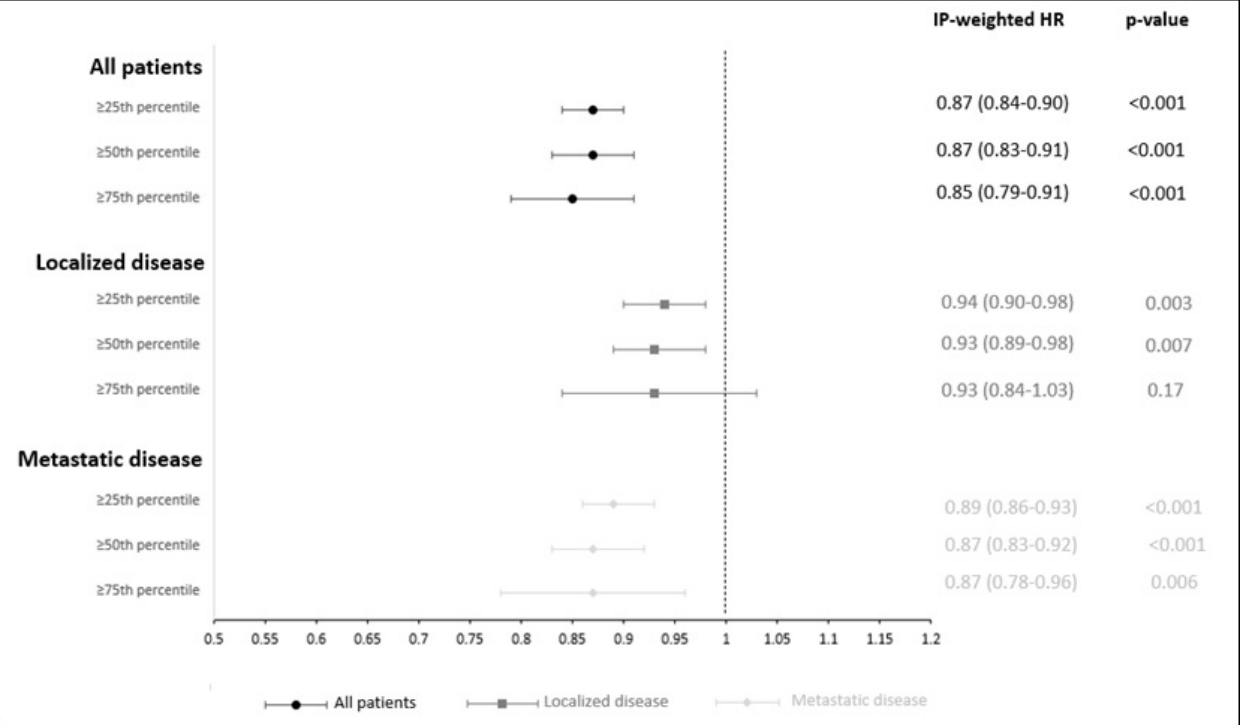
Results: We identified 710,988 patients with HPB malignancies. The 25th, 50th, and 75th percentiles of total annual HPB case volume were 32, 71, and 177 cases/year, respectively. A total of 196,150 patients with non-resected PDAC were included in our analysis. A total of 135,487(69.1%) patients were treated in facilities above the 25th percentile(n=402,30.6%), 82,570(42.1%) in facilities above the 50th percentile(n=152,11.6%), and 37,733(19.2%) in facilities above the 75th percentile(n=45,3.4%). Patients treated at facilities above each percentile threshold were more likely to be younger, have private insurance, have longer travel distances to treating facilities, and receive multiagent chemotherapy than those treated at facilities below percentile thresholds, and facilities above percentile thresholds were more likely to be academic.

Receiving treatment at ≥25th percentile facilities was associated with a higher median OS than receiving treatment at facilities < 25th percentile (5.8 vs. 4.2mos). Receiving treatment at facilities ≥50th or ≥75th percentile was associated with a further increase in the median OS as compared to lower volumes (6.5 vs. 4.5mos and 7.5 vs. 4.8mos, respectively). Treatment at facilities ≥25th percentile was associated with higher 1-/2-/3-year survival rates than treatment at facilities < 25th percentile. There was a further associated increase in 1-/2-/3-year survival rates for patients treated in facilities ≥50th or ≥75th percentile. These findings were consistent in patients with localized or metastatic disease.

Among patients with localized disease, treatment at facilities ≥25th percentile resulted in a lower hazard of death than treatment at facilities < 25th percentile(IP-weighted HR= 0.94, 95% CI: 0.90-0.98;Figure). There was a further improvement in OS in patients treated at facilities ≥50th percentile(IP-weighted HR= 0.93, 95% CI: 0.89-0.98). Among patients with metastatic disease, patients who received treatment at facilities ≥25th percentile had a lower hazard of death than patients treated at facilities < 25th percentile(IP-weighted HR= 0.89, 95% CI: 0.86-0.93). There was a further improvement in OS with treatment at facilities ≥50th or ≥75th percentiles as compared to those treated at facilities below these thresholds(IP-weighted HR= 0.87, 95% CI: 0.83-0.92; IP-weighted HR= 0.87, 95% CI: 0.78-0.96, respectively).

Conclusion: For patients with non-resected PDAC, receiving treatment at facilities with ≥32 HPB malignancy cases/year (25th percentile) may result in improved survival outcomes. Higher annual HPB malignancy case thresholds may result in further improvements in OS. While likely multifactorial in nature, these data suggest consolidation of care of patients with complex HPB malignancies to high-volume specialty centers may be beneficial, even in the non-operative or palliative setting.

Figure: Forest plot showing the average causal effect of total facility hepato-pancreato-biliary malignancy case volume on overall survival of patients with non-resected pancreatic adenocarcinoma, stratified by clinical stage.



IP= inverse probability.

POD 4. POSTOPERATIVE INFECTIOUS COMPLICATIONS WORSEN ONCOLOGIC OUTCOMES FOLLOWING PANCREATICODUODENECTOMY FOR PANCREATIC ADENOCARCINOMA

HH Khachfe, AY Hammad, S AlMasri, I Nassour, H Liu, A deSilva, J Kraftician, KK Lee, AH Zureikat, A Paniccia
Presenter: Hussein H. Khachfe MD | University of Pittsburgh Medical Center, United States

Background: Pancreaticoduodenectomy (PD) remains the only curative option for patients with pancreatic adenocarcinoma (PDAC). However, even with advances in surgical technique and utilization of minimally invasive approaches, and postoperative management guidelines, PD is still associated with a high morbidity and postoperative complication rate. More studies are exploring the effect of short-term complications on long-term oncologic outcomes. Infections are some of the most common types of postoperative complications. As such, the aim of this study was to evaluate the impact of infectious complications on long term survival following PD for PDAC.

Methods: Patients who underwent PD for PDAC between 2010 and 2020 were identified from a single institutional database. Patients were grouped into two categories: those with infectious complications vs those without. Infectious complications included: wound infection (superficial/deep surgical site infection), cholangitis, intrabdominal infection/abscess, bacteremia/sepsis, pneumonia, urinary tract infection (UTI), and clostridium difficile (C. diff) infection. Prolonged length of stay (LOS) was defined as greater than the 75th percentile, which was 10 days. Minor and major complications were classified as Clavien Dindo ≤ 2 and ≥3, respectively. The relationship between postoperative infectious complications and overall survival (OS; from diagnosis) was investigated using Kaplan-Meier and cox-regression multivariate analysis.

Results: Among 655 patients who underwent PD for PDAC, 197 (30%) experienced a postoperative infectious complication. Patients with no infectious complications had a significantly higher rate of neoadjuvant chemotherapy (69.1% vs 59.1%, p=0.014) and lower number of T3-4 stage tumors (63.4% vs 77.7%, p< 0.001). No other significant difference existed between the two groups in terms of demographic or pathologic characteristics. Superficial wound infection was the most common type of infectious complication (n=125, 63.4%). Patients with infectious complications had significantly more minor complications [CD ≤2; (59.4% vs 40.2%, p< 0.001)], major complications [CD ≥3; (37.6% vs 18.8%, p< 0.001)], prolonged LOS (47.2% vs 20.3%, p< 0.001), pancreatic leak (47.2% vs 20.3%, p=0.021), CR-POPF (9.1% vs 4.4%, p=0.017), postoperative bleeding (4.1% vs 1.3%, p=0.026) and reoperation (9.6% vs 2.2%, p< 0.001). Median OS for patients who experienced no complication, non-infectious complication, and infectious complication was 33.3 months, 29.06 months, and 27.58 months respectively. On multivariate analysis, postoperative infectious complications were shown to be an independent predictor of worse OS (HR 1.32, p=0.049).

Conclusion: Postoperative infectious complications independently predict worse oncologic outcome in patients undergoing PD for PDAC. Optimization of effective perioperative strategies aimed to prevent and managing postoperative infectious complications may result in improvement of both short-term recovery and long-term survival.

	Univariate				Multivariate			
		95% CI of HR				95% CI of HR		
	HR	Lower	Upper	p-value	HR	Lower	Upper	p-value
Age	1.022	1.011	1.032	0.000	1.008	0.992	1.024	0.348
Sex (F)	0.958	0.791	1.159	0.656				
CCI Age Adjusted	1.116	1.051	1.186	0.000	1.021	0.926	1.126	0.677
Prior Abdominal Surgery	0.999	0.825	1.209	0.989				
Tumor Size by EUS	0.993	0.878	1.124	0.914				
Neoadjuvant Chemotherapy	0.677	0.557	0.824	0.000	0.899	0.707	1.144	0.387
Neoadjuvant Radiotherapy	0.913	0.700	1.191	0.502				
Preop CA19-9	1.000	1.000	1.000	0.000	1.000	1.000	1.000	0.000
Albumin	0.769	0.636	0.930	0.007	0.887	0.714	1.102	0.280
BMI	0.969	0.951	0.986	0.001	0.978	0.959	0.998	0.029
T3-4	2.122	1.625	2.770	0.000	1.737	1.265	2.384	0.001
Positive LN	1.824	1.458	2.283	0.000	1.347	1.009	1.799	0.044
LVI	1.772	1.398	2.244	0.000	1.235	0.896	1.702	0.198
PNI	1.841	1.378	2.458	0.000	1.085	0.767	1.536	0.643
R1 Margin	1.700	1.364	2.118	0.000	1.748	1.343	2.275	0.000
Adjuvant Chemotherapy	0.572	0.463	0.707	0.000	0.612	0.477	0.784	0.000
Postoperative Complications								
None	**REF**				**REF**			
Non-Infectious	1.265	0.992	1.615	0.059	1.173	0.894	1.541	0.250
Infectious Complications	1.409	1.100	1.804	0.007	1.327	1.002	1.759	0.049

POD 5. IDO1 IS A PROMISING THERAPEUTIC TARGET TO TREAT PANCREATIC CANCER-ASSOCIATED DEPRESSION

JJ Hue, HJ Graor, M Zarei, ES Katayama, K Ji, O Hajihassani, AW Loftus, A Vaziri-Gohar, JM Winter
Presenter: Jonathan J. Hue MD | University Hospitals Cleveland Medical Center, United States

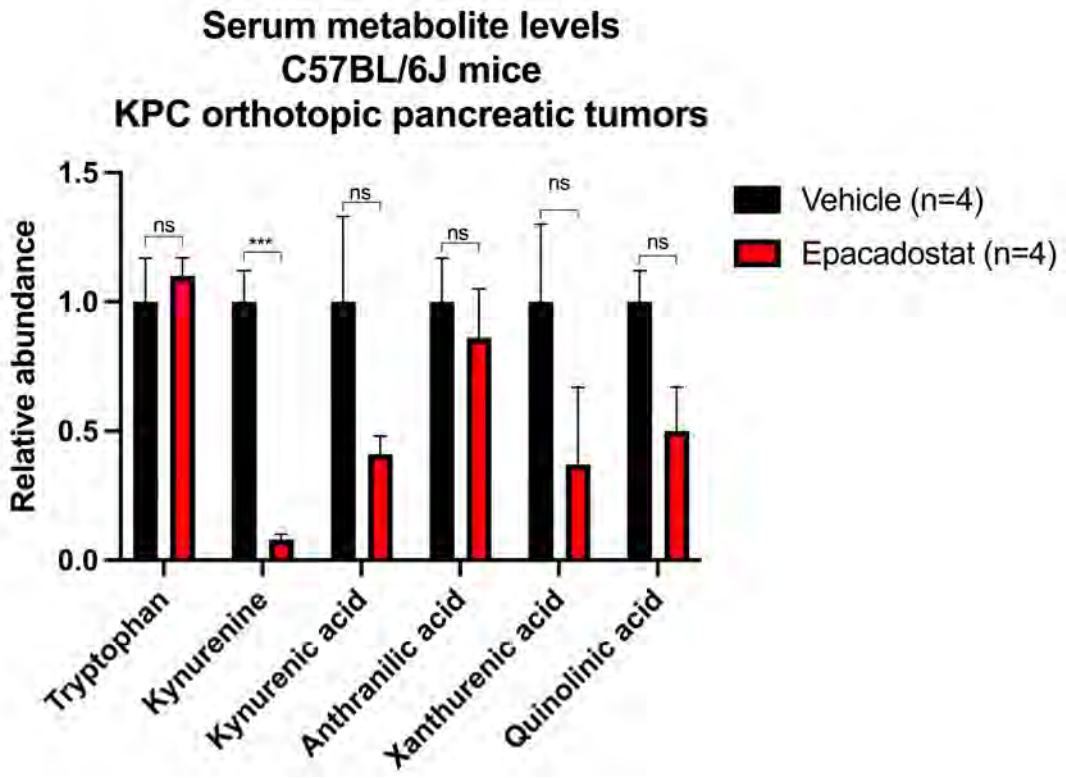
Background: Metabolites of tryptophan degradation are known to alter mood. Kynurenine and downstream metabolites are associated with depression and anxiety, whereas serotonin and melatonin improve mood and sleep, respectively. Their effects specifically in the context of pancreatic cancer have only been superficially examined. Importantly, over 40% of patients with pancreatic cancer are diagnosed with depression, with resulting decreases in quality of life, treatment compliance, and survival outcomes. Herein, we study the role of indoleamine 2,3-dioxygenase 1 (IDO1), an enzyme important in the conversion of tryptophan to kynurenine, in a murine model of pancreatic cancer-associated depression.

Methods: Behavioral tests (open field, forced swim, tail suspension, elevated plus maze) and biochemical assays (LC-MS metabolomics) were utilized to characterize a depressive-phenotype in tumor-bearing mice (relative to non-tumor-bearing mice). Additionally, we determine if pharmacologic blockade of IDO1 impacts mood in tumor-bearing mice.

Results: Data available within a publicly available database (The Cancer Genome Atlas) demonstrate that pancreatic tumors over express IDO1 relative to normal pancreatic tissue in humans. Among patients who underwent a pancreatectomy at our institution, patients with pancreatic ductal adenocarcinoma (n=21) had reduced levels of tryptophan, but higher levels of kynurenine and associated downstream metabolites relative to patients with a benign pancreatic pathology (n=24), quantified by LC-MS.

Immunocompetent mice bearing orthotopic pancreatic tumors exhibit depressive-like behavior relative to non-tumor-bearing mice, as was evidenced by increased immobile times during the forced swim (16.0% vs 8.2%, $p< 0.001$) and tail suspension (24.1% vs 15.4%, $p=0.003$) tests. Murine pancreatic tumors strongly express IDO1, similar to patients. Consequently, serum kynurenine levels in tumor-bearing mice were over twofold higher relative to non-tumor-bearing mice ($p< 0.001$). Tumor-bearing mice treated with epacadostat, an IDO1 inhibitor, exhibited improved mood relative to mice receiving vehicle, as evidenced by decreased immobile times during the forced swim (3.2% vs 6.6%, $p< 0.01$) and tail suspension (25.0% vs 39.3%, $p< 0.01$) tests. There was a 95% reduction in serum kynurenine levels in mice receiving epacadostat relative to mice treated with vehicle ($p< 0.001$, Figure). As confirmatory evidence of on-target activity, tumors of mice treated with epacadostat exhibited a compensatory increase in IDO1 protein levels assessed by Western blotting and immunohistochemistry. Escitalopram, an approved antidepressant, was ineffective at improving mood in tumor-bearing mice during behavioral assays and did not impact kynurenine levels. All treatments were well tolerated. Neither epacadostat, nor escitalopram, impacted overall survival relative to vehicle.

Conclusion: Mice with pancreatic cancer exhibit depressive-like behavior relative to control mice, with an associated increase in serum kynurenine levels. These findings mirror results in patients with pancreatic cancer. Treatment of pancreatic cancer-bearing mice with epacadostat improved depressive-like behaviors and dramatically reduced serum kynurenine levels. In a phase 3 clinical trial (ECHO-301/KEYNOTE-252), epacadostat was ineffective as an anti-cancer agent when combined with pembrolizumab relative to pembrolizumab alone. Our data provide compelling evidence for future studies in mice and patients to repurpose epacadostat as a targeted treatment for pancreatic cancer-associated depression.


Serum metabolite levels
C57BL/6J mice
KPC orthotopic pancreatic tumors
Relative abundance
1.5
1.0
0.5
0.0
ns
***
ns
ns
ns
ns
Vehicle (n=4)
Epacadostat (n=4)
Tryptophan
Kynurenine
Kynurenic acid
Anthranilic acid
Xanthurenic acid
Quinolinic acid

POD 6. FACTORS PREDICTING LONG-TERM DISEASE-FREE SURVIVAL AFTER SURGERY FOR PANCREATIC DUCTAL ADENOCARCINOMA: A NATIONWIDE ANALYSIS

IWJM van Goor, TJ Schouten, DN Verburg, MG Besselink, BA Bonsing, K Bosscha, LAA Brosens, OR Busch, GA Cirkel, RM van Dam, S Festen, B Groot Koerkamp, E van der Harst, IHJT de Hingh, MPW Intven, G Kazemier, M Los, GJ Meijer, VE de Meijer, VB Nieuwenhuijs, D Roos, JMJ Schreinemakers, MWJ Stommel, RC Verdonk, HC van Santvoort, LA Daamen, IQ Molenaar

Presenter: Lois Daamen MD, PhD | Regional Academic Cancer Center Utrecht, Netherlands

Background: Most patients undergoing resection of pancreatic ductal adenocarcinoma (PDAC) develop disease recurrence, contributing to poor survival rates and quality of life. However, approximately 10% of patients do have long-term disease-free survival (DFS) of ≥ 5 years after resection. Factors predictive for long-term survival can guide clinicians in surveillance- and treatment-related decisions, but current information is still limited. In this study, we aimed to identify prognostic factors and develop a predictive model for an DFS of ≥ 5 years after surgery for PDAC.

Methods: This national cohort study was conducted among all patients who underwent PDAC resection in the Netherlands between 2014 and 2016. Patients were excluded in case of macroscopic irradical resection, and complication-related mortality within 90 days after resection. Baseline and perioperative data were collected from the mandatory, prospective Dutch Pancreatic Cancer Audit. Additional follow-up and survival data were collected from the patients' records.

Patients were divided into two groups based on their DFS: < 5 or ≥ 5 years. Missing data was considered missing at random and handled using multiple imputation. Univariate and multivariable Cox proportional hazard analysis was performed to identify factors associated with an DFS of ≥5 years. Akaike's information criterion was used to select the best predictive model. Discrimination was assessed by the concordance index (C-index) and calibration was assessed by calibration plots. Internal validation in 1000 bootstrap samples was performed to correct for optimism. The Youden index was calculated to determine the optimal cut-off value of the final predictive model.

Results: In total, 836 patients with a median follow-up of 67 (95% CI 63-71) months and median overall survival of 21 (95% CI 19-24) months were analyzed. Of these, 611 patients (73%) developed disease recurrence within a median DFS of 12 (95% CI 12-13) months. A total of 81 patients (10%) had an DFS of ≥ 5 years.

The best predictive model identified preoperative carbohydrate-antigen 19-9 level, vascular resection, tumor stage, tumor differentiation, lymphovascular invasion, lymph node status, resection margin status, and adjuvant chemotherapy as associated with DFS of ≥ 5 years (Table 1). Good discriminative ability was achieved with a C-index of 0.70 after correcting for optimism. The calibration slope was 0.989. Based on the optimal cut-off value determined by the Youden index, patients were stratified in two groups based on a score below or above this value. Patients in the low score group had an DFS of 29 (95% CI 25–36) months, while patients in the high score group had an DFS of 12 (95% CI 11–13) months.

Conclusion: The developed and validated predictive model identified multiple factors associated with DFS of ≥ 5 years, which can be used to estimate the chance of long-term DFS after surgery for PDAC.

Table 1. Factors predictive of an DFS of ≥ 5 years based on Akaike's Information Criterion in 836 patients who underwent surgery for PDAC			
	HR*	95% CI	P-value
Preoperative CA 19-9 level (kU/L, < 200 vs. ≥ 200)	1.32	1.12 – 1.56	< 0.01
Vascular resection (no vs. yes)	1.39	1.17 – 1.66	< 0.001
Tumor stage			
- T1 (< 2 cm)	1.63	1.19 – 2.23	< 0.01
- T2 (≥ 2 but < 4 cm)	1.17	0.97 – 1.42	0.09
- T3 (> 4 cm)	Ref	Ref	Ref
Tumor differentiation (well/moderate vs. poor)	1.37	1.16 – 1.63	< 0.001
Lymphovascular invasion (no vs. yes)	1.30	1.08 – 1.57	< 0.01
Perineural invasion (no vs. yes)	1.29	0.99 – 1.70	0.06
Lymph node status			
- N0 (no positive lymph nodes)	1.91	1.51 – 2.43	< 0.0001
- N1 (≥ 1 but < 4 positive lymph nodes)	1.33	1.09 – 1.62	< 0.01
- N2 (≥ 4 positive lymph nodes)	Ref	Ref	Ref
Resection margin status (R0 ≥ 1 mm vs. R1 < 1 mm)	1.28	1.08 – 1.52	< 0.01
Adjuvant chemotherapy (yes vs. no)	1.86	1.57 – 2.21	< 0.0001

PDAC: pancreatic ductal adenocarcinoma; RFS: recurrence-free survival; HR: hazard ratio; CI: confidence interval. * Hazard ratios of an DFS of ≥ 5 years versus < 5 years.

POD 7. IMMUNOMODULATORY EFFECTS OF RINTATOLIMOD (AMPLIGEN®) AFTER FOLFIRINOX THERAPY IN PATIENTS WITH LOCALLY ADVANCED AND METASTASIZED PANCREATIC CANCER: A SINGLE-CENTER NAMED PATIENT PROGRAM

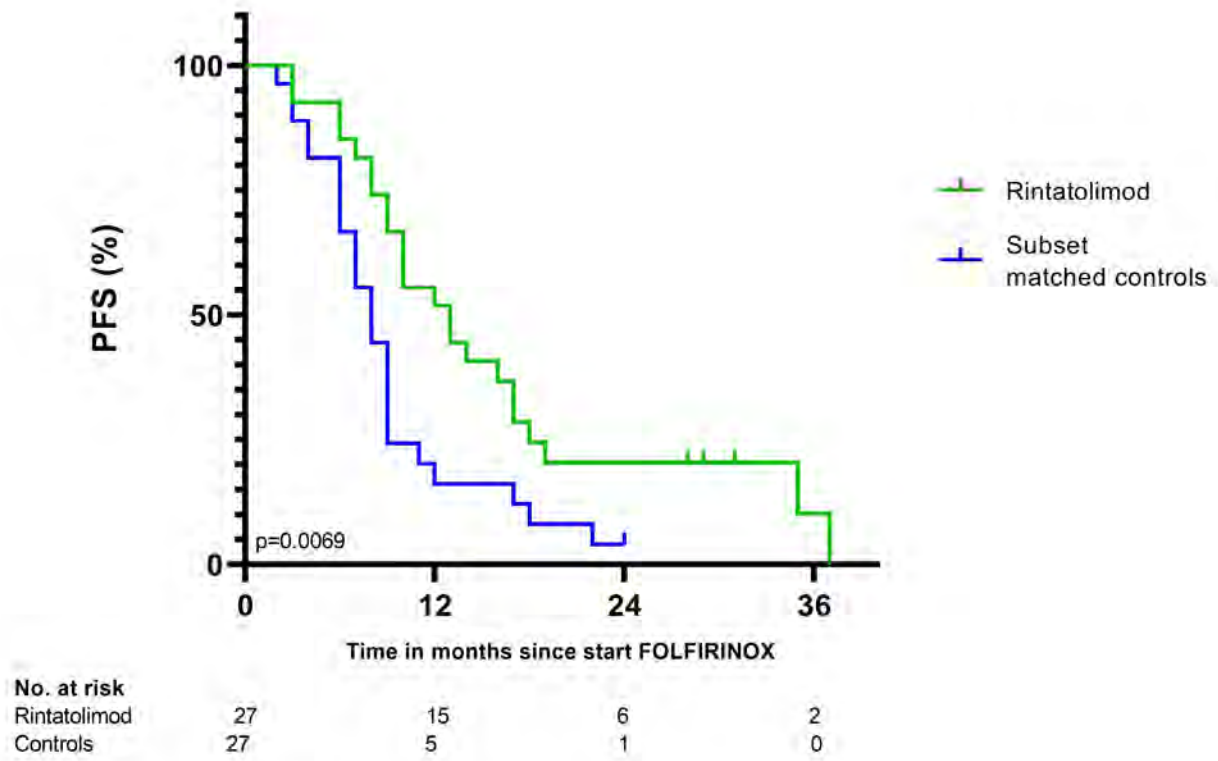
R Brood, D Latifi, AA Oogstvogels, M Moskie, DA Mustafa, RJEMA Debets, CHJ van Eijck
Presenter: Dana A. Mustafa PhD | Erasmus University Medical Center, Netherlands

Background: Treatment with Toll-like receptor 3 (TLR-3) agonist Rintatolimod may induce immunomodulatory effects that improve the progression-free survival in pancreatic cancer patients. The aim of this study was to investigate the benefit of adding rintatolimod to the standard care treatment FOLFIRINOX in pancreatic cancer patients.

Methods: In this single-center named patient program, patients with locally advanced (LAPC) or metastatic disease were treated with rintatolimod (twice per week, max. 400mg intravenous infusion for a total of six weeks). Blood samples were collected before -and six weeks after rintatolimod treatment to measure various immune-related responses. The primary endpoints were the systemic immune response; Systemic-Immune-Inflammation Index (SIII), Neutrophils to lymphocyte Ratio (NLR), and circulating immune cells. Secondary endpoints were progression-free (PFS) and overall survival (OS) compared to matched controls.

Results: Between January 2017 and February 2019, 42 patients were treated with rintatolimod; 27 patients diagnosed with LAPC or metastatic disease, treated primarily with FOLFIRINOX and with stable disease at 6 weeks or more after the last FOLFIRINOX treatment were included in the analysis of this study. Eleven (out of 27) patients whom survived for 12 months or more were considered long-term survivors. The SIII and NLR values in peripheral blood were lower in long-term survivors (n=11) compared to short-term survivors (n=16). B-cells were found to be increased only in long-term survivors after treatment with rintatolimod. Median PFS was 13 months with rintatolimod and 8.6 months in matched controls (n=27) without rintatolimod treatment (hazard ratio 0.52; 95% CI, 0.28-0.90 p=0.007). Median OS was 19 months with rintatolimod treatment and 12.5 months in the matched control group without rintatolimod treatment (hazard ratio 0.51; 95% CI 0.28 – 0.90, p=0.016).

Conclusion: Maintenance therapy with rintatolimod after FOLFIRINOX in patients with stable advanced pancreatic cancer is a novel approach that showed a favorable outcome. A randomized controlled trial is further needed to determine the efficacy of this treatment.


100
50
0
PFS (%)
p=0.0069
0
12
24
36
Time in months since start FOLFIRINOX
Rintatolimod
Subset matched controls
No. at risk
Rintatolimod 27 15 6 2
Controls 27 5 1 0

POD 8. THE IMPACT OF COMPLICATIONS AFTER RESECTION OF PANCREATIC DUCTAL ADENOCARCINOMA ON DISEASE RECURRENCE AND SURVIVAL

AC Henry, IWJM van Goor, A Nagelhout, FJ Smits, MG Besselink, OR Busch, CH van Eijck, BA Bonsing, K Bosscha, RM van Dam, S Festen, B Groot Koerkamp, E van der Harst, IH de Hingh, M van der Kolk, M Liem, VE de Meijer, GA Patijn, D Roos, JM Schreinemakers, F Wit, BA Zonderhuis, LA Daamen, HC van Santvoort and IQ Molenaar for the Dutch Pancreatic Cancer Group

Presenter: Anne Claire Henry MD | Regional Academic Cancer Center Utrecht, Netherlands

Background: Previous studies have shown that complications after resection of pancreatic ductal adenocarcinoma (PDAC) disadvantage long-term survival, mostly explained by failure to start adjuvant chemotherapy. However, the exact causal pathway remains unknown.

Methods: All patients undergoing PDAC resection in the Netherlands were included (2014-2017). Baseline data were extracted from the prospective Dutch Pancreatic Cancer Audit. Recurrence and survival data were collected additionally. The impact of postoperative complications on disease-free survival (DFS) and overall survival (OS) was evaluated using multivariable Cox regression analysis. Causal mediation analysis was performed to decompose the total effect into a direct and indirect effect, via adjuvant chemotherapy as effect modifier.

Results: In total, 1197 patients were included. Median follow-up was 53 (interquartile range (IQR) 27-71) months. Major complications (hazard ratio (HR) 1.18 (95%CI 1.02-1.37) and HR 1.26 (95%CI 1.09-1.45)) and multiple organ failure (HR 2.81 (95%CI 1.70-4.64) and HR 2.78 (95%CI 1.73-4.46)) were associated with shorter DFS and OS, respectively. The causal effect of major complications and MOF on DFS was fully modified by adjuvant chemotherapy (-1.82 (95%CI -2.41 – -1.22) and -2.31 (95%CI -3.47 – -0.85)). For OS, the indirect effect was also significant (-2.18 (95%CI -2.94 – -1.35)) and -2.99 (95%CI -4.58 – -1.02)). Additionally, multiple organ failure had a direct effect on DFS (-9.24 (95%CI -12.60 – -5.01)) and OS (-9.61 (95%CI -14.86 – -3.48)).

Conclusion: Major complications and multiple organ failure have a negative impact on DFS and OS in patients after PDAC resection, almost completely mediated by adjuvant chemotherapy. Prevention and adequate treatment of complications to promote postoperative recovery and increase eligibility for adjuvant treatment might lead to an improved oncological prognosis.

POD 9. IMPLEMENTATION OF A SYSTEM-WIDE MULTIDISCIPLINARY CLINIC IMPROVES STANDARDIZATION OF PANCREATIC CANCER CARE

SA Pasha, L Demyan, D Ding, C Nofi, O Standring, R Parakrama, C Hollweg, T Zawadsky, D Pinto, DK DePeralta, GB Deutsch, JM Herman, DA King, MJ Weiss

Presenter: Shamsher A. Pasha MBBS | Northwell Health Cancer Institute, United States

Background: A single-day comprehensive pancreatic cancer multidisciplinary clinic (PMDC) provides high-quality care for patients with pancreatic cancer. We hypothesized that a centralized PMDC within a geographically large multi-institutional health care system ensures standard of care treatment, shortens time to treatment, and increases use of multimodal therapy.

Methods: Retrospective review of a system-wide cancer registry and PMDC databases. Statistical significance was set at $p< 0.05$.

Results: 411 patients were diagnosed with pancreatic cancer from April 2019 to December 2020. 31% (n=128) of patients were evaluated by a centralized virtual tumor board and evaluated by the regional PMDC team. Characteristics for PMDC patients and patients not reviewed by PMDC are listed in Table 1. There was no difference in age at the time of diagnosis between PMDC and non-PMDC group (69 ± 11 years verses 71 ± 11 years (p=0.319)). Less males were evaluated at PMDC compared to non-PMDC (38% versus 52% p=0.008). There was a greater diversity of patients presented at PMDC (63% vs 52% (p=0.048)). The mean time from diagnosis to first appointment was significantly shorter for PMDC patients compared to non-PMDC patients (4 ± 4d versus 15 days ±22 ($p< 0.001$)). There was no difference in Stage I, II and III between the groups (Table 1). Of Stage I-III patients eligible for neoadjuvant therapy (NAT) with potential curative intent, PMDC patients were more likely to receive NAT (n=14, 20%) than non-PMDC patients (n=6, 5.1% (p=0.001)). PMDC patients were more likely to undergo curative-intent resection (n=28, 40%) than non-PMDC patients (n=36, 30.7% p=0.19) but this did not reach significance. Radiation therapy was administered to 18% (n=23) of PMDC patients compared to 12% (n=35) of non-PMDC patients.

Conclusion: A system-wide PMDC standardizes high-quality pancreatic cancer care across a geographically large health care system by reducing time to treatment and increasing trend in utilization of NAT, radiation, and curative intent resection. Further studies are needed to evaluate surgical and oncological outcomes in patients undergoing standardized care delivery.

Characteristics	PMDC (n=128) % frequencies	Non-PMDC (n=284) % frequencies	p-value
Age	69 ± 11 years	72 ± 11 years	0.319
Sex (Male)	38%	52%	0.008
Race	White - 52% Black or African American - 16% Asian – 7% Other/unknown – 25%	White - 63% Black or African American - 19% Asian – 7% Other/unknown – 12%	0.048 0.720 0.896
Stage	AJCC8 Stage I A/B and II A/B (n=45) 36% AJCC8 Stage III (n=25) 20% AJCC8 Stage IV (n=54) 44%	AJCC8 Stage I A/B and II A/B – (n=75) 27% AJCC8 Stage III (n= 42) 15% AJCC8 Stage IV (n=165) 58%	0.06 0.20 0.007

Table 1: Demographic information for PMDC and Non-PMDC cohorts.

POD 10. DOES GOAL-DIRECTED FLUID MANAGEMENT DURING PANCREATODUODENECTOMY PREVENT DELAYED GASTRIC EMPTYING?

AM Roch, RC Kim, JR Butler, TK Nguyen, EP Ceppa, NJ Zyromski, CM Schmidt, A Nakeeb, MG House
Presenter: Alexandra M. Roch MD, MS | Indiana University School of Medicine, United States

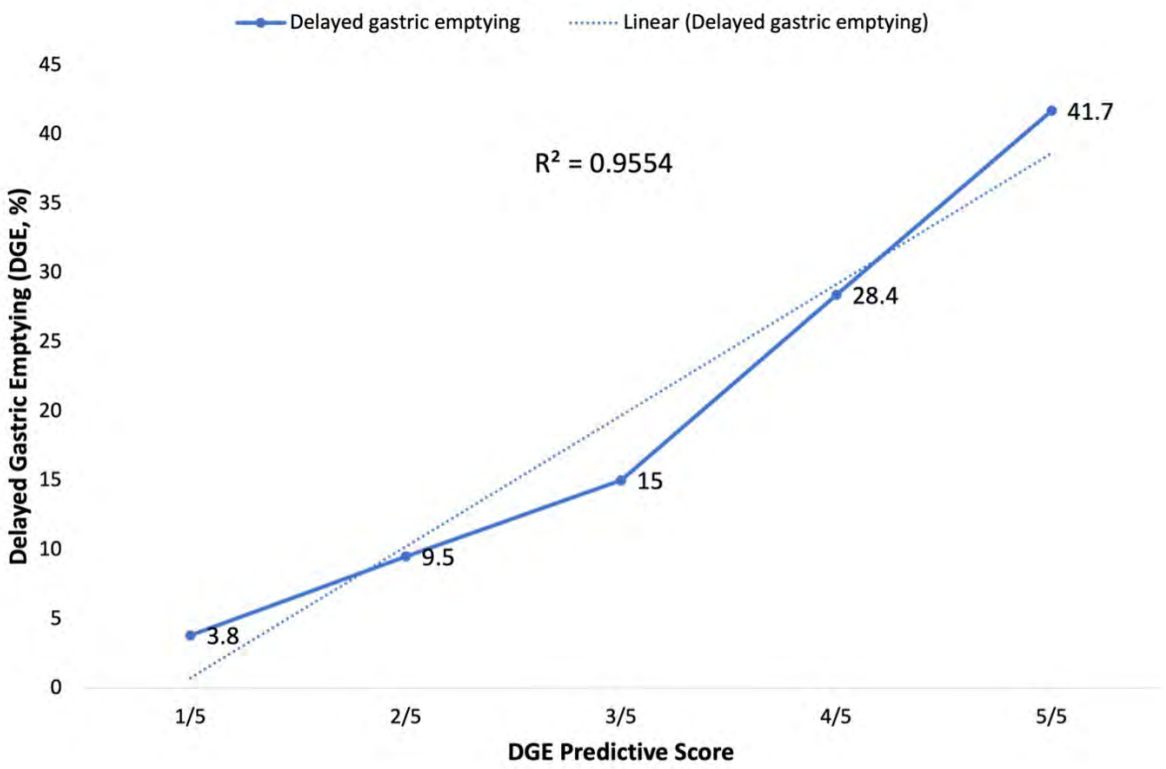
Background: Delayed gastric emptying (DGE) requiring nasogastric decompression is the most common complication following pancreatoduodenectomy in up to 20% of patients. Although not life threatening, DGE is associated with prolonged hospital stay and represents a major economic burden.

We sought to develop an easy risk prediction tool for DGE featuring pre- and intraoperative assessment.

Methods: Patients who underwent pancreatoduodenectomy at a single academic center from 2015 to 2019 were included. Univariable and multivariable logistic regression determined pre- and perioperative predictors of DGE. Receiver operating curves were used to evaluate the optimal cut-off value for continuous variables.

Results: Delayed gastric emptying occurred in 105 of 645 patients (16.3%) and was associated with a significantly longer hospitalization (21 vs. 9 days, p3300mL (1)). Increases in DGE predictive score value were associated with increased risk for DGE (Figure), with an excellent correlation coefficient R2 (0.96). Patients with a score of 1/5 had a 4% risk of developing DGE, while DGE occurred in 42% of patients with a score of 5/5.

Conclusion: This large series describes an easy score to predict DGE after pancreatoduodenectomy. This novel tool will help better adjust peri- and postoperative practices. The liberal use of intraoperative fluids seems to play a central part in the development of DGE, thus goal directed fluid therapy, as already used during hepatectomy, should be strongly considered during pancreatoduodenectomy, especially in patients with soft glands.


Delayed gastric emptying
Linear (Delayed gastric emptying)
Delayed Gastric Emptying (DGE, %)
45
40
35
30
25
20
15
10
5
0
R² = 0.9554
41.7
28.4
15
9.5
3.8
1/5
2/5
3/5
4/5
5/5
DGE Predictive Score

POD 11. SUPERIOR MESENTERIC/PORTAL VEIN RESECTION DURING ROBOT-ASSISTED PANCREATICODUODENECTOMY VERSUS OPEN PANCREATICODUODENECTOMY: A PROPENSITY SCORE MATCHED ANALYSIS

N Napoli, EF Kauffmann, M Ginesini, C Gianfaldoni, A Salomone, F Asta, C Cappelli, D Campani, F Vistoli, U Boggi
Presenter: Niccolo Napoli MD | University of Pisa, Italy

Background: Resection and reconstruction of the superior mesenteric/portal vein (VR) during pancreaticoduodenectomy (PD) has become an accepted procedure in patients with pancreatic tumors, otherwise amenable to radical resection. Recent evidence shows that VR is feasible during robotic operations. We herein provide unadjusted and propensity score (PS) matched analysis of open (O-VRPD) vs robotic (R-VRPD) VR-PD.

Methods: Data were prospectively entered into a database and retrospectively analyzed. Incidence of severe post-operative complications (Clavien-Dindo≥3b) and 90-day mortality were considered the main outcome measures. The PS was performed by using a greedy nearest-neighbor 1-to-1 (caliper= 0.25) matching algorithm (R packahe MatchIt) to balance possible confounders (age, gender, BMI, ASA score, diabetes, heart disease, pulmonary disease and neoadjuvant chemotherapy) between the two groups.

Results: Between May 2011 and December 2021, 151 patients underwent VR-PD at our institution including 36 R-VRPD and 115 O-VRPD (table 1). A summary of operative and post-operative results is provided in table 2. Severe post-operative complications occurred in 6 (16.7%) and 17 (14.8%) patients after R-VRPD and O-VRPD, respectively (p=0.78). The crude OR was 1.15 (0.42-3.19). Equivalent figures for 90-day mortality were 3 (8.3%) and 6 (5.2%) (p= 0.45). The crude OR was 1.65 (0.39-6.97).

According to PS, 35 R-VRPD were matched to 35 O-VRPD (table 1). A summary of operative and post-operative results is provided in table 2. The incidence of severe post-operative complications did not differ (p=0.73) as well as the mortality (p=0.24). The adjusted OR was 1.60 (0.41-6.26) and NA (NA-NA) for severe post-operative complications and mortality, respectively.

To note that the rate of R0 resection (54.6% vs. 37.1%; p= 0.22) and median number of harvested nodes (46.5, IQR= 36.8-62.3 vs. 43, IQR= 34-56; p= 0.16) do not differ statistically significantly between R-VRPD and O-VRPD, respectively.

Conclusion: In selected patients, R-VRPD is feasible and achieve results comparable with O-VRPD in terms of both post-operative morbidity/mortality and histopathologic results. 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 since enrollment of a large number of patients at a single center is expected to require several years.

Table 1 - Baseline characteristics

	Before PS				After PS			
	Overall population	**O-VRPD**	**R-VRPD**	**p**	**Overall population**	**O-VRPD**	**R-VRPD**	**p**
Number (%)	151 (100%)	115 (76.2%)	36 (23.8%)		70 (100%)	35 (50%)	35 (%)	
Age; median (IQR); year	69.4 (61.5-75)	70.9 (62.8-76)	66 (55.5-71)	0.002	66 (59.8-71)	64.5 (61.2-74)	66 (57-71)	0.50
Gender male; n (%)	66 (43.7%)	67 (58.3%)	18 (50%)	0.38	40 (57.1%)	22 (62.9%)	18 (51.4%)	0.33
BMI; mean±SD; Kg/m2	24.4±3.2	24.4±0.30	24.3±0.5	0.74	24.3±3.2	24.5±0.6	24.2±0.6	0.68
ASA; median (IQR)	3 (2-3)	3 (2-3)	2.5 (2-3)	0.05	2.5 (2-3)	2 (2-3)	3 (2-3)	0.64
Neoadjuvant chemotherapy; n (%)	22 (14.6%)	19 (16.5%)	3 (8.3%)	0.29	4 (5.7%)	1 (2.9%)	3 (8.6%)	0.61

Table 2 - Operative, post-operative and histopathological results

	Before PS				After PS			
	Overall population	**O-VRPD**	**R-VRPD**	**p**	**Overall population**	**O-VRPD**	**R-VRPD**	**p**
Operative								
Operative time; mean±SD; minutes	554.4±107.5	537±9.6	610±17.2	<0.0001	570.2±91.5	529.3±13.9	611.1±13.9	<0.0001
Jump-graft for venous reconstruction; n (%)	20 (13.2%)	11 (9.6%)	9 (25%)	0.02	14 (20%)	5 (14.3%)	9 (25.7%)	0.37
Post-operative								
Lenght of hospitalization; median (IQR); days	19 (13-26)	20 (14-27)	15.5 (11.3-22)	0.07	18 (14-26)	19 (14-28)	16 (12-22)	0.14
Clavien 0; n (%)	48 (31.8%)	35 (30.4%)	13 (36.1%)	0.52	22 (31.4%)	10 (28.6%)	12 (34.3%)	0.61
Clavien 5; n (0%)	9 (6%)	6 (5.2%)	3 (8.3%)	0.45	3 (4.3%)	0 (0%)	3 (8.6%)	0.24
Clavien >2; n (%)	35 (23.2%)	28 (24.4%)	7 (19.4%)	0.54	13 (18.6%)	6 (17.1%)	7 (20%)	0.76
Clavien >3a; n(%)	23 (15.2%)	17 (14.8%)	6 (16.7%)	0.78	10 (14.3%)	4 (11.4%)	6 (17.1%)	0.73
Cr-POPF; n (%)	15 (9.9%)	14 (12.2%)	1 (2.8%)	0.12	6 (8.6%)	5 (14.3%)	1 (2.9%)	0.20
Grade C POPF; n (%)	3 (2%)	2 (1.7%)	1 (2.8%)	0.56	1 (1.4%)	0 (0%)	1 (2.9%)	1.00
PPH; n (%)	29 (19.2%)	18 (15.7%)	11 (30.6%)	0.05	17 (24.3%)	6 (17.1%)	11 (31.4%)	0.26
Grade B/C DGE; n (%)	32 (21.2%)	21 (18.2%)	11 (30.6%)	0.12	17 (24.3%)	6 (17.1%)	11 (31.4%)	0.26
Redo-surgery; n (%)	16 (10.6%)	10 (8.7%)	6 (16.7%)	0.18	8 (11.4%)	2 (5.7%)	6 (17.1%)	0.26
Histopatological	pop gen	open	robot	p				
Malignant tumor; n (%)	147 (97.4%)	111 (96.5%)	36 (100%)	0.57	68 (97.1%)	33 (94.3%)	35 (100%)	0.49
Pancreatic ductal adenocarcinoma; n (%)	119 (78.8%)	87 (75.7%)	32 (88.9%)	0.11	56 (80%)	25 (71.4%)	31 (88.6%)	0.13
Harvested nodes; median (IQR)	44 (34-57)	44 (33-59)	42.5 (34.3-54.8)	0.44	45 (36-60)	46.5 (36.8-62.3)	43 (34-56)	0.16
Metastati nodes; median (IQR)	3 (1-6.3)	3 (1-6.3)	2 (1-6.8)	0.95	3 (1-7)	4 (1-7.3)	2 (1-7)	0.59
Oncological radicality (R0); n (%)	77 (52.4%)	63 (56.8%)	14 (38.9%)	0.06	31 (44.3%)	18 (54.6%)	13 (37.1%)	0.22
Vascular infiltration; n (%)	73 (48.3%)	54 (47%)	19 (52.8%)	0.54	30 (42.9%)	12 (34.3%)	18 (51.4%)	0.15
Lenght of vascular infiltration; median (IQR); mm	1 (0.5-1.5)	1 (0.63-1.9)	1 (0.5-1)	0.08	1 (0.5-1)	0.7 (0.6-1)	1 (0.5-1)	0.64

POD 12. CONTEMPORARY REPORT OF CLINICAL OUTCOMES AFTER TOTAL PANCREATECTOMY: NINE YEAR EXPERIENCE AT A HIGH VOLUME PANCREAS CENTER

L Kowal, D Moskal, G Sun, B Im, J Williamson, B Wummer, S Bansal, N Allanoff, F Ponzini, R Lamm, S Cannaday, A Nevler, W Bowne, H Lavu, C Yeo

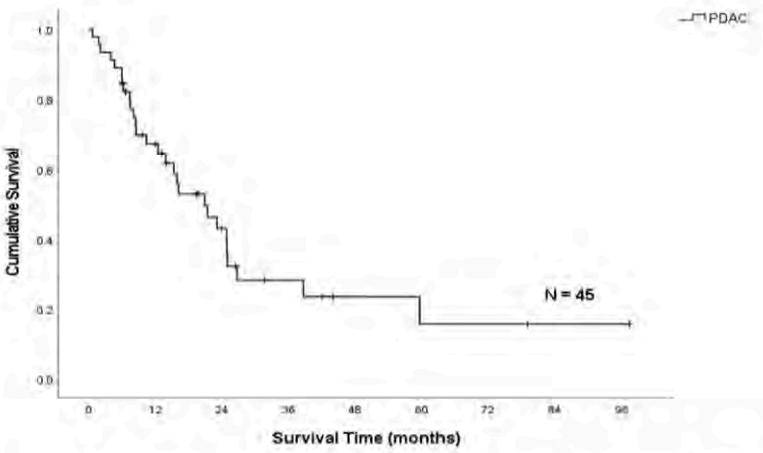
Presenter: Luke L. Kowal | Thomas Jefferson University Hospital, United States

Background: Surgeons rarely perform total pancreatectomy due to concern for significant perioperative morbidity, mortality and poor oncologic outcomes. Our study seeks to further characterize patient, clinicopathologic factors and report clinical outcomes at a high-volume pancreas center to assess appropriateness of this procedure in a highly-select cohort of patients.

Methods: From 2013 to 2021, the authors conducted a retrospective review of 51 consecutive patients, identified by our Institutional Review Board- approved database, who underwent total pancreatectomy. Demographics, perioperative factors, tumor / treatment related variables, and survival were recorded and analyzed. Survival analysis was performed by Kaplan-Meier actuarial method.

Results: Total pancreatectomy cases consisted of only 3% (51/1,859) of the pancreas resections performed during the study period at our institution. Patients had a median age of 68 years (range, 61-75 years) and were 49% female. 88% (45/51) of patients underwent total pancreatectomy for pancreatic ductal adenocarcinoma (PDAC). Non-PDAC patients (n=6) included IPMN (3), neuroendocrine (2) and duodenal AC (1). The median operative time and EBL were 518 min (range, 337- 961 min) and 700 mL (range, 100- 6400 ml), respectively. Postoperatively, median length of stay was 6 days (range, 5-9 days) as per our accelerated pancreatectomy recovery pathway. Overall, thirty patients (59%) developed complications during the postoperative period, most frequent being delayed gastric emptying in 29% (15/51), chyle leak 12% (6/51) and cardiovascular 12% (6/51). Readmission rate was 27% (14/51). Thirty and ninety-day mortality was 2 % (1 patient) and 4 % (2 patients), respectively. Within our PDAC cohort, median survival time was 21.3 months (Figure 1). Among patients with adequate follow-up,1-year and 3-year survival was 64% (25/39) and 19% (6/32), respectively. Remarkably, amongst this study group, survivorship included two 5 - year survivors. Patients undergoing total pancreatectomy for non-PDAC had a composite average survival of 60 months (95% CI; 40.8- 79.7 months).

Conclusion: Our institutional experience demonstrates that total pancreatectomy, although rarely performed, can be a safe and potentially effective treatment option. Indeed, oncologic outcomes are predicated by the underlying pathology, but in highly-selected patients, benefits of resection with longer survival are possible as shown in this modern series.



Time (months)	12	24	36	48	60
Cumulative Deaths	14	22	26	27	28
Cumulative Censored	6	11	13	15	15

Figure 1. Survival after total pancreatectomy for PDAC patients. Kaplan-Meier curves showing total pancreatectomy cohort survival (N=45). The median survival was 21.3 months. *Abbreviations:* PDAC = pancreatic ductal adenocarcinoma

POD 13. OCCURRENCE OF DELAYED GASTRIC EMPTYING AFTER ROBOTIC PYLORUS PRESERVING PANCREATODUODENECTOMY: A COMPARISON WITH THE TRADITIONAL OPEN APPROACH

C Carpenito, N Furbetta, G Di Franco, M Palmeri, S Guadagni, D Gianardi, M Bianchini, A Comandatore, LM Fatucchi, M Picchi, G Di Candio, L Morelli

Presenter: Annalisa Comandatore MD | University of Pisa, Italy

Background: One of the most frequent complications after pancreaticoduodenectomy is the delayed gastric emptying (DGE), being the reported incidence up to 61%. Among the consequences of DGE there are prolonged hospital stay, increased costs, reduced quality of life and need of parenteral or enteral feeding. The use of robot da Vinci for pancreaticoduodenectomy (RPD) is a safe and technically feasible and resulted associated with some advantages compared to the traditional open approach (OPD). Our aim is to evaluate the impact of a fully robotic approach on the occurrence of DGE following pancreaticoduodenectomy.

Methods: Delayed gastric emptying (DGE) was defined as the requirement or re-insertion of a nasogastric tube (NGT) after postoperative day (POD) 3 or failure to start oral diet by POD 7 and subdivided into grade A, B or C in order of increasing severity according to the International Study Group of Pancreatic Surgery (ISGPS). A clinically relevant DGE was defined as a DGE grade B or C. From January 2009 to December 2021, we performed at our Institute 385 open or robotic PD. RPD group is composed by 32 pylorus-preserving pancreaticoduodenectomy (PpPD) and only 8 Whipple's operation. Therefore, we selected two comparable groups among all PpPD using a one-to-one case-control design according to sex, age and American Society of Anesthesiologists score, obtaining a Robotic PpPD (R-RpPD) group and an open PpPD (O-PpPD) group, and compared each other's. The incidence and severity of DGE between these two groups of patients were compared.

Results: We obtained for the retrospective matched cohort study two comparable group composed by 30 patients for each group. A clinically relevant DGE was reported in a lower percentage of cases in the R-PpPD group: 3/30 cases (10%) versus 10/30 cases (33.3%), p=0.028. No difference in terms of post-operative complications, incidence and grade of post-operative pancreatic fistula was reported between the two groups. The median length of hospital stay was significantly shorter in the R-PpPD group: 10 days versus 15 days, p=0.013.

Conclusion: The use of robot is associated to a lower incidence of DGE after PrPD, probably due to the less traumatism of the minimally invasive approach. Moreover, the lower incidence of DGE could contribute to the shorter length of hospital stay of the RPD.

POD 14. HYPERGLYCEMIA IS ASSOCIATED WITH IMPROVED SURVIVAL AMONG PATIENTS WITH METASTATIC PANCREATIC CANCER TREATED WITH CHEMOTHERAPY

JJ Hue, A Vaziri-Gohar, ES Katayama, O Hajihassani, AW Loftus, M Zarei, JM Winter
Presenter: Jonathan J. Hue MD | University Hospitals Cleveland Medical Center, United States

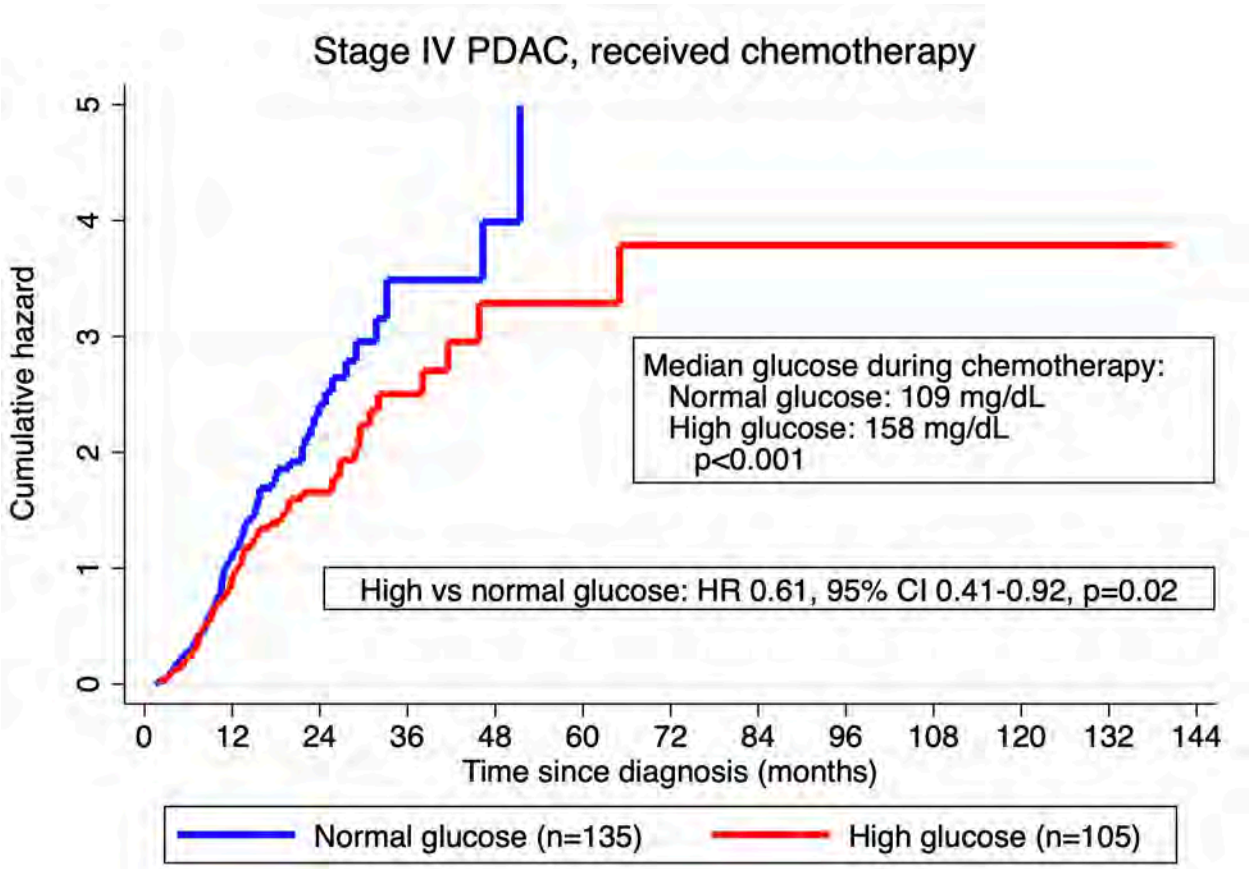
Background: Most patients with metastatic pancreatic ductal adenocarcinoma (PDAC) succumb to the disease within one year of diagnosis, even with current multi-agent chemotherapy regimens. However, there are some patients who respond well to these same regimens. To date, predictors and drivers of chemotherapy response remain elusive. Preclinical data from our lab show that pancreatic cancer cells cultured in high glucose are more sensitive to chemotherapy. These data were validated in murine models of pancreatic cancer. We aimed to determine if peripheral glucose levels were associated with survival among patients with metastatic PDAC.

Methods: All patients diagnosed with metastatic PDAC at our institution were identified (2010-2020). Patients were first stratified by the receipt of chemotherapy. We utilized raw glucose values to group patients as follows: high glucose (defined as at least one glucose value >200 mg/dL after diagnosis) and normal glucose (defined as all glucose values ≤200 mg/dL). Multivariable Cox proportional hazards regressions were used to determine if glucose levels were associated with overall survival, after adjusting for clinical data and chemotherapy details (i.e., specific regimen and number of cycles).

Results: A total of 401 patients were included: 60% (n=240) received chemotherapy and 40 % (n=161) received supportive care. Patients who did not receive chemotherapy were significantly older (72 vs 66 years, p< 0.001), had a higher median Charlson comorbidity index (10 vs 9, p< 0.001), and a reduced proportion of patients with ECOG performance status of 0 (48.8% vs 84.6%, p< 0.001). Most patients in both groups presented with isolated hepatic metastases (62.1% vs 60.8%, p=0.28) and median CA19-9 values at diagnosis were also similar between groups (1340 vs 987 U/mL, p=0.32). Over 66% of patients received FOLFIRINOX or gemcitabine with nab-paclitaxel. As expected, median survival was greater for patients who received chemotherapy as compared to supportive care (8.4 vs 1.7 months, p< 0.001).

Approximately 42% of all patients were in the high glucose group, and this was nondifferential based on the receipt of chemotherapy (p=0.36). Patients with high glucose who received chemotherapy had an associated survival advantage relative to those with normal glucose (HR=0.61, p=0.02), when controlling for comorbidities, performance status, site of metastatic disease, CA 19-9 at diagnosis, chemotherapy regimen, and the number of cycles (Figure). A similar survival association was not identified among those who only received supportive care (HR=0.99, p=0.97).

Conclusion: Higher glucose levels during chemotherapy were associated with improved survival among patients with metastatic PDAC treated with chemotherapy. We hypothesize that higher peripheral glucose levels may result in higher glucose concentrations in the tumor microenvironment, with resulting alterations in cancer cell proliferation or metabolism that enhance chemotherapy efficacy. These data require further investigation to determine if a novel therapeutic combination (i.e., induced hyperglycemia and multi-agent chemotherapy) could improve outcomes in this difficult to treat disease.


Stage IV PDAC, received chemotherapy
Cumulative hazard
0
1
2
3
4
5
Median glucose during chemotherapy:
Normal glucose: 109 mg/dL
High glucose: 158 mg/dL
p<0.001
High vs normal glucose: HR 0.61, 95% CI 0.41-0.92, p=0.02
0
12
24
36
48
60
72
84
96
108
120
132
144
Time since diagnosis (months)
Normal glucose (n=135)
High glucose (n=105)

POD 15. ROBOTIC VERSUS LAPAROSCOPIC DISTAL PANCREATECTOMY IN PATIENTS WITH RESECTABLE PANCREATIC CANCER: AN INTERNATIONAL RETROSPECTIVE COHORT STUDY

JW Chen, TME van Ramshorst, S Lof, B Al-Sarireh, B Bjornsson, U Boggi, F Burdio, G Butturini, R Casadei, A Coratti, M D'Hondt, S Dokmak, B Edwin, A Esposito, JM. Fabre, G Ferrari, FS Ftériche, GK Fusai, B Groot Koerkamp, T Hackert, A Jah, JY Jang, EF Kauffmann, T Keck, A Manzoni, MV Marino, Q Molenaar, E Pando Rau, P Pessaux, A Pietrabissa, Z Soonawalla, RP Sutcliffe, L Timmermann, S White, VS Yip, A Zerbi, M Abu Hilal, MG Besselink

Presenter: Jeffrey W. Chen MD | Academic Medical Center, Netherlands

Background: RDP is increasingly used as alternative for LDP in patients with resectable pancreatic cancer, but comparative multicenter studies confirming its safety and efficacy are lacking.

Methods: An international retrospective cohort study of RDP and LDP for resectable pancreatic cancer in 33 experienced centers (≥50 MIDP for all indications) from 11 countries (2010-2019). Primary outcome was R0-resection. Secondary were lymph node yield, major complications, conversion rate and overall survival.

Results: In total, 542 patients were included (103 RDP and 439 LDP). The R0 resection rate was comparable (76% RDP vs 69% LDP, P=0.40). The lymph node yield was higher after RDP (18 vs 16, P=0.021). Major complications occurred more frequently after RDP (26% vs 16%, P=0.019), but statistical significance disappeared after multivariable logistic regression (OR 1.41, 95% CI 0.75-2.65, P=0.29). RDP was associated with lower conversion rates (5% vs 17%, P=0.001), without emergency conversions. LPD was associated with shorter operating time (290 vs 240 min, P< 0.001) and shorter hospital stay (10 vs 8 days, P=0.001). The 90-day mortality (2% vs 1%, P=0.27) and overall survival (22 [95% CI, 12-32] vs 29 [95% CI, 24-34] months, P=0.60) did not differ significantly between RDP and LDP, respectively.

Conclusion: This international multicenter study in experienced centers found largely similar outcomes after RDP and LPD for resectable pancreatic cancer. Although lymph node yield and conversion rate appeared favorable after RDP, LPD was associated with shorter operating time and hospital stay. The specific benefits associated with each approach should be assessed in multicenter randomized trials.

POD 16. PANDORA-2 PROTOCOL; INTERVENTION STUDY TO IMPROVE QUALITY OF LIFE IN PATIENTS WITH SMALL (≤2 CM) NON-FUNCTIONAL PANCREATIC NEUROENDOCRINE TUMORS

JW Chen, CM Heidsma, AF Engelsman, EJM Nieveen van Dijkum
Presenter: Jeffrey W. Chen MD | Academic Medical Center, Netherlands

Background: Current guidelines changed the treatment strategy for small (≤2cm) non-functioning pancreatic neuroendocrine tumors (NF-pNET) from tumor resection to an active surveillance strategy. The previous PANDORA-1 (2021) study showed excellent clinical outcomes after a median follow-up of 17 months, where 89% of patients had pNETs without any tumor growth and only 3% of patients had tumor growth leading to a resection. Despite these results, the quality of life (QoL) was decreased at baseline and during follow-up. Furthermore, there was suboptimal adherence to the advised surveillance protocol. The current PANDORA-2 study strives to improve the QoL for these patients by reducing the burden of the previous protocol and by introducing a supportive care intervention.

Methods: A nation-wide multicenter intervention study. Patients follow a reduced intensity protocol with 6 moments of radiological imaging instead of 13, spread out over 10 years. The diagnosis will be made using both a 68Ga-DOTATATE-scan and a CT- or MRI-scan. At 3 months patients undergo endoscopic ultrasonography with fine-needle biopsy, to confirm the size and diagnosis, as well as to determine tumor grade. In the second half of this study, patients will also follow an additional supportive care intervention. Finally, a cost-benefit analysis will be performed.

Results: This study introduces a new follow-up protocol designed to improve patients' QoL and their adherence to protocol while maintaining tumor control. Additionally, a supportive care intervention will be added to study its augmenting effect.

Conclusion: The life expectancy of patients with small NF-pNET is almost unchanged and should therefore be with the best QoL.

POD 17. MANAGEMENT AND OUTCOMES OF MIXED ADENONEUROENDOCRINE CARCINOMA OF THE AMPULLA OF VATER: A SYSTEMATIC REVIEW AND POOLED ANALYSIS OF 56 PATIENTS

IA Ziogas, PT Tasoudis, KS Rallis, RD Schulick, M Del Chiaro

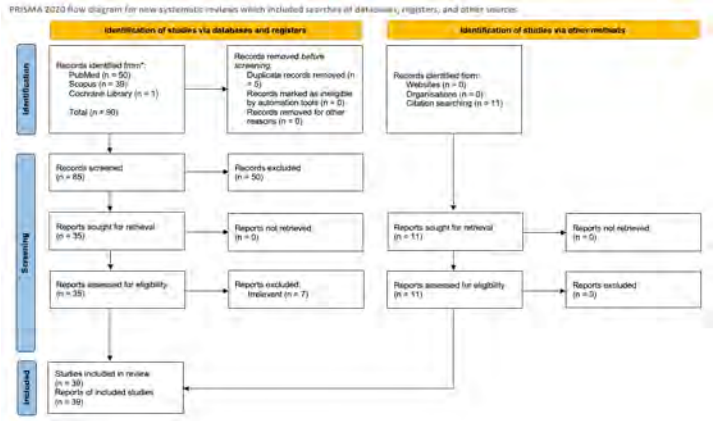
Presenter: Ioannis A. Ziogas MD | University of Colorado, United States

Background: Tumors of mixed neuroendocrine and nonneuroendocrine histology are classified as collision, combined, or amphicrine and can occur in most organs, including the hepato-pancreato-biliary tract. Given the rarity of mixed adenoneuroendocrine carcinoma (MANEC) of the ampulla of Vater, the patient characteristics, management, and outcomes remain unclear. We sought to systematically review the worldwide literature on ampullary MANECs.

Methods: Eligible studies were identified through a systematic search of the MEDLINE (via PubMed), Scopus, and Cochrane Library databases (end-of-search-date: January 5th, 2022) according to the PRISMA 2020 statement.

Results: A total of 39 studies reporting on 56 patients with MANEC were included. The median age was 63 (interquartile range [IQR]: 51-69) years and 55.6% were male (n=25/45). Most had combined tumors (64.4%; n=29/45), followed by collision (24.4%; n=11/45), and amphicrine tumors (11.1%; n=5/45). The most common presenting symptoms were jaundice (75.6%; n=31/41), pain (54%; n=22/41), and weight loss (41.5%; n=17/41). More than half had lymph node metastasis (56.8%; n=25/44), yet only 7.9% had distant metastasis (n=3/38). Tumor resection (i.e., mostly pancreaticoduodenectomy) was performed in 96.3% (n=52/54) followed by adjuvant chemotherapy in 61.8% (n=21/34). Nearly half experienced disease recurrence (47.2%; n=17/36) over a median follow-up of 12 (IQR: 3-16) months, and 42.1% (n=16/38) died over a median follow-up of 12 (IQR: 4-18) months. The most common cause of death was disease progression/recurrence in 81.3% (n=13/16), followed by myocardial infarction while on chemotherapy, liver failure due to liver disease and portal hypertension (tumor-free), and tumor lysis syndrome each in one patient (6.3%).

Conclusion: Early diagnosis and management of ampullary MANEC is challenging yet crucial to improve outcomes since most patients are diagnosed at an advanced disease stage and have unfavorable outcomes. Multicenter granular data are warranted to further understand and improve outcomes in these patients.



POD 18. THE IMPORTANCE OF B CELLS IN THE TUMOR MICROENVIRONMENT OF PATIENTS WITH PANCREATIC CANCER

HM Aziz, L Saida, W de Koning, A Stubbs, Y Li, K Sideras, J Feliu, M Mendiola, CHJ van Eijck, DAM Mustafa
Presenter: Dana A. Mustafa PhD | Academic Medical Center, Netherlands

Background: Only 10% of pancreatic ductal adenocarcinoma (PDAC) patients survive longer than five years. Factors underlining long-term survivorship in PDAC are not well understood. Therefore, we aimed to identify the key players in the tumor immune microenvironment (TIME) associated with long-term survivorship in PDAC patients.

Methods: The immune-related gene expression profiles of resected PDAC tumors of patients who survived and remained recurrence-free of disease for ≥36 months (long-term survivors, n=10) were compared to patients who had survived ≤6 months (short-term survivors, n=10) due to tumor recurrence. Validation was performed by spatial analysis of immune cells using the GeoMx™ Digital Spatial Profiler. Additional validation was performed using an independent cohort of samples consisting of 12 long-, and 10 short-term survivor patients.

Results: B cells were found to be significantly increased in the TIME of long-term survivors by gene expression profiling (p=0.018). The high tumor infiltration of B cells was confirmed by spatial protein profiling in the discovery and the validation cohorts (p=0.01 and p=0.01, respectively). The infiltration of B cells was found to be mainly in the stromal compartment of the tumor and was exclusively found in between tumor cells in long-term survivors.

Conclusion: This is the first comprehensive study that connects the immune landscape of gene expression profiles and protein spatial infiltration with the survivorship of PDAC patients. We found higher infiltration of B cells in TIME of long-term survivors which highlights the importance of targeting B cells and B cell-based therapy for future personalized immunotherapy in PDAC patients.

POD 19. MANAGEMENT OF ADENOCARCINOMA OF THE PANCREATIC TAIL IN THE ELDERLY

J Hue, M Elshami, R Hoehn, L Rothermel, J Ammori, J Winter, L Ocuin, J Hardacre
Presenter: Christina Boutros DO | Case Western Reserve University School of Medicine, United States

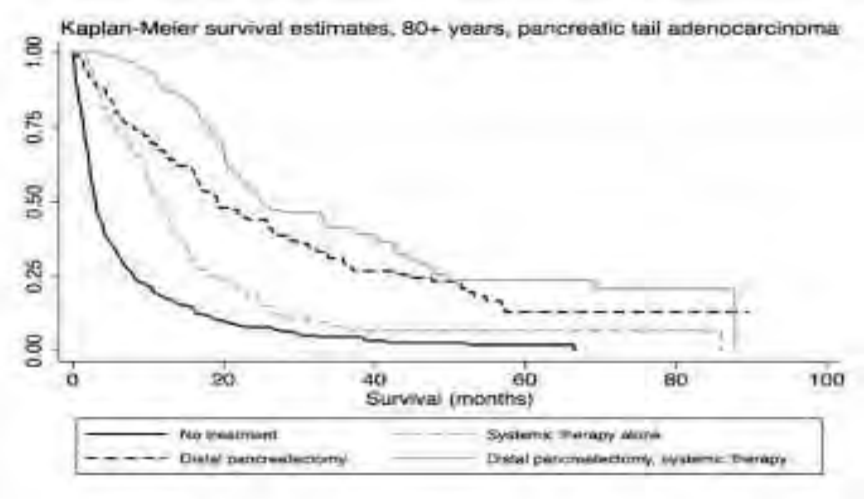
Background: The elderly makes up an increasing proportion of the general population. Past studies have demonstrated that octogenarians with adenocarcinoma of the pancreatic head can achieve reasonable survival with multimodal therapy. An analysis specific to octogenarians with adenocarcinoma of pancreatic tail has not been published to date.

Methods: We identified patients ≥60 years with localized adenocarcinoma of the pancreatic tail in the National Cancer Database (2011-2017). Patients were grouped by age (60-79 and ≥80 years) and categorized by treatment regimen: no treatment, systemic therapy alone, distal pancreatectomy alone, or distal pancreatectomy with systemic therapy. Postoperative outcomes and survival were analyzed.

Results: 3171 patients were included: 76% were 60-79 years and 24% were ≥80 years. Nearly 44% of octogenarians did not receive any treatment, relative to 20% of younger patients. Only 22% of all octogenarians received systemic therapy in addition to pancreatectomy, relative to 55% of the younger cohort ($p< 0.001$). 61% of octogenarians with stage I disease did not receive any treatment versus only 33% of the younger cohort ($p< 0.001$). Among patients with stage I-II disease, 59% of the younger cohort received multimodal therapy relative to just 25% in the octogenarian group ($p< 0.001$). 0% of octogenarians with stage III disease received multimodal therapy.

The 30-day postoperative mortality rate of patients age 60-79 and ≥80 years was similar (2.3% vs 2.9%, $p=0.55$); however, the 90-day mortality rate among octogenarians was greater (3.9% vs 8.5%, $p< 0.001$). Median survival for octogenarians was 3.0 months without treatment, 12.0 months with systemic therapy, 19.2 months with distal pancreatectomy, and 24.9 with systemic therapy and pancreatectomy. Four-year survival rates were 2.0%, 6.8%, 23.4%, and 25.7%. Age ≥80 was associated with poor survival on multivariable hazards regression (HR=1.11, $p=0.04$). Multimodal therapy was associated with a survival advantage relative to distal pancreatectomy (HR=0.62, $p< 0.001$), while systemic therapy alone was associated with poor survival (HR=1.81, $p< 0.001$).

Conclusion: There are significant age disparities in the management of adenocarcinoma of the pancreatic tail, especially early stage disease. Resection appears to play a key role in the management of octogenarians with adenocarcinoma of the pancreatic tail. While multimodal therapy was associated with improved median survival relative to distal pancreatectomy alone, the four-year survival rate of surgically managed patients was similar, independent of systemic therapy. Shared decision making should be employed to balance the chance for long-term survival with the significant risk of early postoperative mortality.


Kaplan-Meier survival estimates, 80+ years, pancreatic tail adenocarcinoma
1.00
0.75
0.50
0.25
0.00
0
20
40
60
80
100
Survival (months)
No treatment
Systemic therapy alone
Distal pancreatectomy
Distal pancreatectomy, systemic therapy

POD 20. RADICAL ANTEGRADE PANCREATOSPLENECTOMY (RAMPS): DOES ADRENALECTOMY ALTER OUTCOMES?

CH Davis, T Beninato, AM Laird, MS Grandhi, J Beane, S Pitt, HA Pitt

Presenter: Catherine H. Davis MD, MPH | Rutgers Cancer Institute of New Jersey, United States

Background: Radical antegrade modular pancreatosplenectomy (RAMPS) was first described in 2003 by Strasberg et al. The technique has oncologic superiority compared to a standard distal pancreatectomy (DP). For tumors invading into the adrenal gland, a posterior RAMPS takes the left adrenal gland en bloc with the pancreas specimen. The aim of this analysis is to determine whether addition of adrenalectomy (posterior RAMPS) alters the outcomes of DP.

Methods: The American College of Surgeons (ACS) National Surgical Quality Improvement Program (NSQIP) Procedure-Targeted Pancreatectomy database was accessed from 2014 to 2019. Patients with pancreatic ductal adenocarcinoma (PDAC) undergoing DP with adrenalectomy were compared to patients having a standard DP. 30-day outcomes were analyzed between groups using multivariable regression.

Results: 3,467 patients with PDAC underwent DP; 159 (4.6%) also underwent adrenalectomy. Posterior RAMPS patients were younger (65.6 vs. 67.5 years, p=0.03), less often white (65.4% vs. 76.8%, p< 0.01), had lower BMI (26.6 vs. 27.7, p=0.03), and higher T stage (T3-4 76.9% vs. 57.5%, p< 0.01). On multivariable analysis controlling for age, race, and BMI, posterior RAMPS patients had worse perioperative outcomes including more transfusions (OR 2.78, p< 0.01), serious morbidity (OR 1.45, p=0.04), prolonged hospital stay (OR 1.36, p< 0.05), and less optimal pancreatic surgery (OR 0.61, p< 0.01) (Table).

Conclusion: Radical antegrade modular pancreatosplenectomy with adrenalectomy (posterior RAMPS) is associated with worse perioperative outcomes compared to a standard distal pancreatomy (DP). Improved long-term oncologic outcomes must be weighed against higher perioperative morbidity when selecting patients for this more extensive surgical resection.

Table: Odds of Individual Postoperative Outcomes and Optimal Pancreatic Surgery (OPS) with Posterior RAMPS versus Standard Distal Pancreatectomy (DP)

Outcome	Odds Ratio	p-value
Death[1]	0.72	0.745
Serious Morbidity[1]	1.45	0.036
Percutaneous drainage[1]	1.11	0.710
Reoperation[1]	0.62	0.361
Length of stay>75th percentile[1]	1.36	0.049
Readmissions[1]	1.44	0.068
OPS[2]	0.61	0.004

[1]Factors included in definition of "Optimal Pancreatic Surgery";
[2]OPS: Optimal pancreatic surgery

P 22. A NOVEL TOOL TO PREDICT NODAL METASTASIS IN SMALL PANCREATIC NEUROENDOCRINE TUMORS – A MULTICENTER STUDY

AA Javed, A Pulvirenti, J Zheng, T Michelakos, Y Sekigami, S Razi, CA McIntyre, E Thompson, DS Klimstra, V Deshpande, AD Singhi, MJ Weiss, CL Wolfgang, JL Cameron, AC Wei, AH Zureikat, CR Ferrone, J He, Pancreatic Neuroendocrine Disease Alliance (PANDA)

Presenter: Ammar A. Javed MD | Johns Hopkins University School of Medicine, United States

Background: NF-PanNETs display a wide range of biological behavior and ND is associated with metastatic disease and poorer survival. The aim was to develop a tool to predict nodal disease in patients with small (≤2cm) Non-functional pancreatic neuroendocrine tumors (NF-PanNETs).

Methods: A multicenter retrospective study was performed on patients undergoing resection for small NF-PanNETs. Patients with genetic syndromes, metastatic disease at diagnosis, neoadjuvant therapy or positive resection margin were excluded. Factors associated with ND were identified to develop a predictive model. Internal validation was performed using bootstrap with 1000 resamples.

Results: ND was observed in 39 (11·1%) of the 353 patients included. Presence of ND was significantly associated with lower 5-year disease-free survival (71·6% vs 96·2%, p< 0·001). Two predictors were strongly associated with ND: G2 grade (OR:3·51, 95%CI:1·71-7·22, p=0·001) and tumor size (per mm increase, OR:1·14, 95%CI:1·03–1·25, p=0·009). Adequate discrimination was observed with an area under curve of 0·71 (95%CI:0·63–0·80). Based on risk distribution three risk groups of ND were identified; low (< 5%), intermediate (≥5% to < 20%), and high (≥20%) risk. The observed mean risk of ND was 3·7% in the low-risk, 9·6% in the intermediate-risk, and 30·4% in the high-risk patients (p< 0·001). The 10-year disease free survival in the low-, intermediate-, and high-risk groups was 100%, 88·8%, and 50·1%, respectively.

Conclusion: Our model using tumor grade and size can predict ND in small NF-PanNETs. Integration of this tool into clinical practice could help guide management of these patients.

P 23. NECROTIZING PANCREATITIS-ASSOCIATED ANXIETY, DEPRESSION, AND STRESS: INCIDENCE, RISK FACTORS, AND TARGETS FOR INTERVENTION

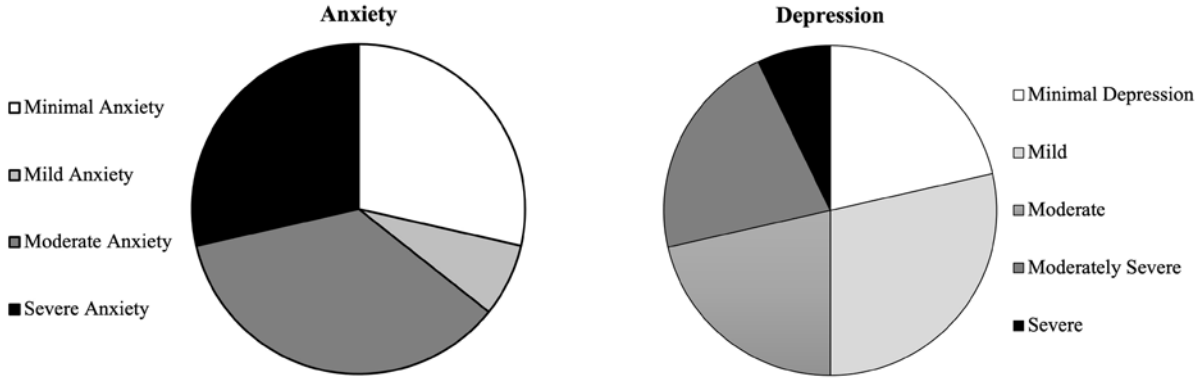
S McGuire, T Maatman, K McGreevy, A Montero, E Ceppa, M House, A Nakeeb, T Nguyen, C Schmidt, N Zyromski
Presenter: Sean McGuire MD | Indiana University School of Medicine, United States

Background: Mental health sequelae of necrotizing pancreatitis are unknown. We sought to prospectively quantify symptoms of anxiety, depression, and post-traumatic stress disorder (PTSD) in patients with necrotizing pancreatitis.

Methods: Adult patients with active necrotizing pancreatitis were prospectively screened for anxiety using the General Anxiety Disorder-7 (GAD7), depression using the Patient Health Questionnaire-9 (PHQ9), and PTSD using the PTSD Checklist for DSM-5 (PCL5).

Results: Fifteen patients were screened at an average of 3.5 mos. after disease onset. Positive screening for anxiety and depression was extremely common: 73% met criteria for anxiety and 80% met criteria for depression (Figure). PTSD was less common (13%) at this screening timepoint. Prior mental health diagnoses, time from disease onset to screening, readmission profile, and mechanical intervention profile were not risk factors for the development of anxiety, depression, or PTSD symptoms. Patients diagnosed with anxiety and/or depression had more severe necrotizing pancreatitis: computed tomography severity index (CTSI) was higher in patients with anxiety (6.7 ± 2.1 vs 6.5 ± 1.0, $p = 0.05$) and depression (6.9 ± 2.0 vs 5.7 ± 0.6, $p = 0.04$). Infected necrosis, ICU admission, and organ failure were higher in patients with anxiety and depression though not reaching statistical significance. Patients are currently being enrolled in a mindfulness-based intervention.

Conclusion: Necrotizing pancreatitis carries a high risk of impaired mental health. Severe disease carries a higher risk of impaired mental health. Identifying and treating impaired mental health during necrotizing pancreatitis disease course should be standard.



P 24. THE ROLE OF MARGIN CLEARANCE ON PROGNOSIS AMONG STAGE IIB AND III PANCREATIC DUCTAL ADENOCARCINOMA PATIENTS ACCORDING TO STANDARDIZED HISTOPATHOLOGICAL EVALUATION.

R Ahola, E Zwart, B Kurlinkus, A Halimi, BS Yilmaz, G Belfiori, K Roberts, R Pande, P Maisonneuve, C Verbeke, GO Ceyhan, J Laukkarinen

Presenter: Reea Ahola MD, PhD | Tampere University Hospital, Finland

Background: The aim of a pancreatic resection for pancreatic ductal adenocarcinoma (PDAC) is R0 resection. The proportion of R0 is depended on the histopathologic slicing technique. The aim of this study was to analyse the effect of margin widths on survival and recurrence among PDAC patients whose specimens were analysed according to a standardized axial method.

Methods: Multicentre databases were searched for pancreatic resections performed for stage IIB PDAC between 2012 and 2017. Patients with R2 resection or neoadjuvant therapy were excluded. The TNM-classification was updated according to the 8th version and stage IIB and stage III were analysed separately. Data on demographics, histopathology and oncologic treatment was recorded. The overall survival (OS) and disease free-survival (DFS) was analysed according to the minimum reported margin clearance (MRM) cutoffs 0mm, 0.5mm, 1mm and 2mm. Both uni- and multivariate analysis were performed.

Results: The study population consisted of 302 stage IIB and 360 stage III PDAC patients. Among stage IIB patients 22% had an MRM of 0 mm, 59% over 0.5mm, 36% over 1mm and 12% over 2mm. Sixty-six percent of them received adjuvant therapy. Multivariable analysis showed that preoperative larger tumour size, not receiving adjuvant therapy and poor differentation stage were associated with shorter OS. Among stage III 22% of the patients had an MRM of 0mm, 54% over 0.5mm, 33% over 1mm and 7.8% over 2mm. Sixty-one percent of patients with stage III disease received adjuvant therapy. Multivariable analysis showed that not receiving adjuvant therapy, male sex was, ASA-class 3-4 and high preoperative CA19-9 value were associated with shorter OS.

Multivariate analysis showed that among stage IIB patients, shorter DFS was associated with larger tumour size. Among stage III, shorter DFS was associated with high preoperative CA19-9 value, not receiving adjuvant therapy and MRM under 0.5mm.

Conclusion: Overall MRM seems to not play a dominant role in the overall survival of PDAC among patients with nodal involvement. Receiving of adjuvant therapy is associated with longer OS.

P 26. SHOULD SERUM CA125 BE USED IN CLINICAL PRACTICE AS PREDICTIVE MARKERS OF SURVIVAL IN PANCREATIC DUCTAL ADENOCARCINOMA?

N Napoli, EF Kauffmann, M Ginesini, C Gianfaldoni, A Salomone, A Di Dato, M Caradonna, M Vimercati, C Cappelli, D Campani, F Vistoli, U Boggi

Presenter: Niccolo Napoli MD | University of Pisa, Italy

Background: Carbohydrate antigen 125 (CA 125) encoded by mucin 16 (MUC16) and up-regulated by KRAS/ERK axis (Mol cancer Res, 2017) is emerging as a new serum marker of poor prognosis in pancreatic ductal adenocarcinoma (PDAC) (Oncotarget, 2016), probably promoting pancreatic cancer cell motility and development of distant metastasis (Sci Rep, 2013).

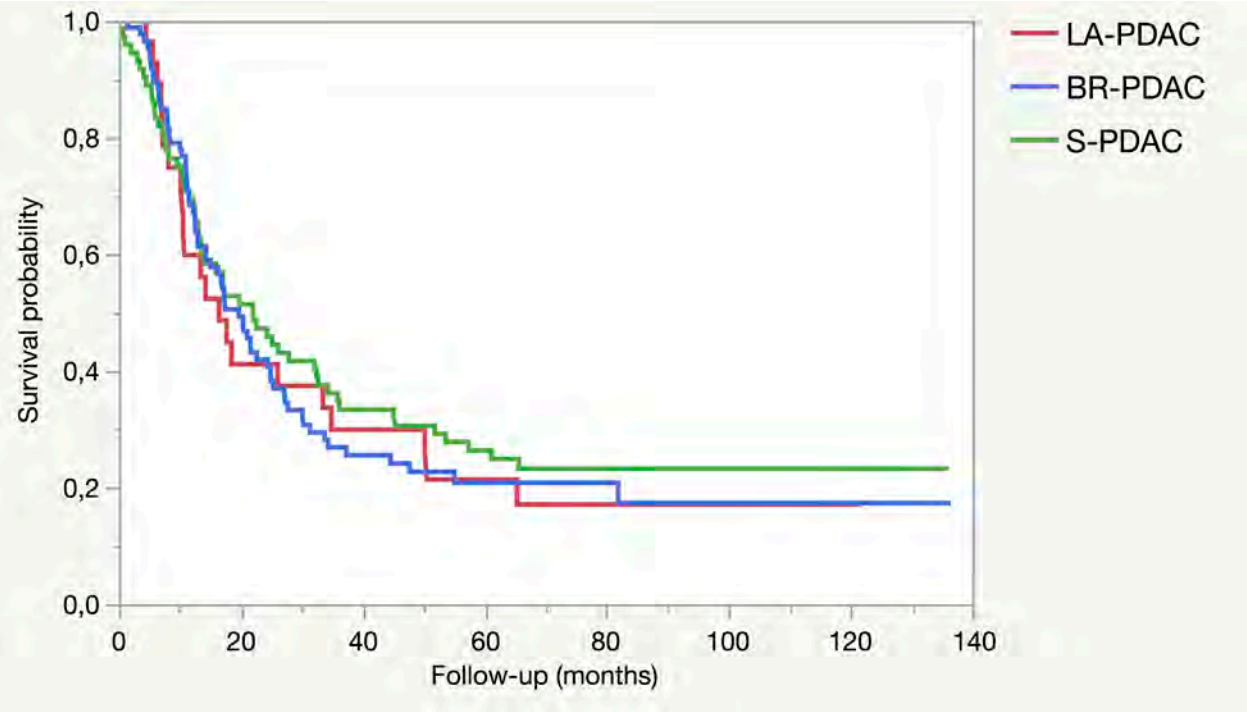
Nevertheless, it appears strange that this marker has not yet been extensively introduced into clinical practice to evaluate the survival of patients with PDAC. To further investigate this role, herein we evaluated its ability to predict survival in our patient underwent surgical resection for PDAC, taking into account the stage of neoplasm.

Methods: Data regarding patients with PDAC underwent pancreatic resection at our institution between 2010 and 2016 were prospectively collect and retrospectively analyzed. Only patients with all preoperative and follow-up data available were considered. Patients operated before 2010 were excluded due to the lack of effective neoadjuvant therapies for locally advanced PDAC. Patients operated after 2016 were excluded due to the short duration of follow-up. Kaplan-Meier curve and Log-rank test were used to evaluate the overall survival (OS) in patient with standard (S-PDAC), borderline (BR-PDAC) and locally advanced (LA-PDAC) PDAC. Cox proportional-hazard regression was used to evaluate the role of CA125 in predicting survival. The last value of CA125 before surgery was considered.

Results: We considered 188 patients with PDAC underwent to pancreaticoduodenectomy (n=118; 62.8%) and total pancreatectomy (n=70; 37.2%). Seventy-three (38.8%) S-PDAC (localized to the pancreas), 87 (46.2%) BR-PDAC and 28 (14.9%) LA-PDAC were included. The median OS was 22.1 (10.3-61), 19.7 (11.1-44.6) and 16.4 (8.1-50.5) months in the S-PDAC, BR-PDAC and LA-PDAC (p=0.75), respectively (figure 1). Preoperative serum level of CA125 predicted survival in patient with BR-PDAC (RR= 6.17, IQR=1.20-22.4, p=0.01) and LA-PDAC (RR=18.7, IQR=2.42-123.1, p=0.003), but not in S-PDAC (RR= 4.53, IQR=0.57-18.26, p=0.13).

Conclusion: In our patient cohort serum level of CA125 predicts OS in BR-PDAC and LA-PDAC, but not in S-PDAC. Probably, in the first two groups the up-regulation of CA125/MUC16 favors the onset of distant micro-metastases, which lead to a poor long-term prognosis despite the effective neoadjuvant chemotherapy and the radical surgery. In the latter group, this pattern fails to affect prognosis with the same significance.

Even if these results need to be confirmed in large series, they suggest as the serum level of CA125 should be introduced extensively into clinical practice of PDAC.


1,0
0,8
0,6
0,4
0,2
0,0
Survival probability
0
20
40
60
80
100
120
140
Follow-up (months)
LA-PDAC
BR-PDAC
S-PDAC

P 29. AN AGE-BMI COMPOUND VARIABLE PREDICTS MORBIDITY AND MORTALITY FOLLOWING WHIPPLE: A NSQIP ANALYSIS

HH Khachfe, AY Hammad, S AlMasri, H Liu, A deSilva, KK Kraftician, K Lee, AH Zureikat, A Paniccia
Presenter: Hussein H. Khachfe MD | University of Pittsburgh Medical Center, United States

Background: Pancreaticoduodenectomy (PD) is the surgical therapy of choice for periampullary lesions including pancreatic head tumors and select iatrogenic and inflammatory conditions. We sought to explore the impact of age and BMI in determining outcomes of PD.

Methods: The ACS-NSQIP pancreatectomy targeted file was used to identify PDs from 2014-2019. Patients were stratified into eight different categories according to a compound age-BMI variable and risk-adjusted. Age of 65 years was set for young vs elderly. Obesity was classified as class I (BMI 30-35), class II (BMI 35-40), and class III (BMI >40). Young-normal/overweight-(BMI< 30) was considered as the reference group.

Results: A total of 6,727 patients who underwent PD were included in our study. Thirty-day mortality occurred in 119 (1.7%) patients, with the highest rate in elderly obese-class II in 13 (5.95%). Overall morbidity was evident in 49.1% (n=3305) of patients. Elderly-obese class II patients also had the highest rate of any complication at 61.9% (n=135). On multivariate analysis, elderly-obese class II patients had the highest risk of developing any complication (OR 1.92, p-value < 0.001), while elderly-obese class III (OR 7.91, p-value < 0.001) had the highest risk for 30-day mortality. Young-obese class III patients demonstrated the highest risk (OR 2.43, p-value < 0.001) for development of clinically relevant postoperative pancreatic fistula. Male sex and Hispanic race are predictors for morbidity and mortality.

Conclusion: Patients may be stratified preoperatively based on a combined age-BMI variable. Sex and Hispanic race are also major predictors of adverse postoperative outcomes. Further refinement of the compound variable might still be necessary, but the current model allows for improved risk stratification of patients undergoing PD.

		Overall Morbidity				CR-POPF			
			95% CI				95% CI		
		Odds Ratio	Lower	Upper	p-value	Odds Ratio	Lower	Upper	p-value
Sex (Female)		0.82	0.74	0.91	0.88	0.72	0.63	0.83	<0.001
Race	White	**REF**				**REF**			
	African American	0.98	0.81	1.18	0.88	0.72	0.55	0.96	0.025
	Other	1.20	1.01	1.43	0.036	1.28	1.07	1.53	0.006
Type of Whipple	Classic w PJ	**REF**				**REF**			
	Classic w/o PJ	1.10	0.71	1.71	0.668	0.89	0.51	1.56	0.692
	PP w PJ	0.97	0.87	1.08	0.688	1.29	1.12	1.48	<0.001
	PP w/o PJ	1.14	0.71	1.83	0.586	0.66	0.31	1.39	0.283
Approach	Open	**REF**				**REF**			
	Laparoscopic	0.79	0.62	1	0.059	0.77	0.55	1.09	0.146
	Robotic	0.90	0.73	1.83	0.586	0.87	0.66	1.15	0.352
Age-BMI Category	Young-Normal	**REF**				**REF**			
	Young-Obese Class I	1.1	0.91	1.33	0.322	1.33	1.04	1.69	0.019
	Young-Obese Class II	1.36	1.02	1.8	0.032	1.64	1.18	2.29	0.003
	Young-Obese Class III	1.58	1.11	2.25	0.01	2.43	1.65	3.58	<0.001
	Young-Underweight	1.26	0.75	2.11	0.378	0.97	0.47	2	0.944
	Elderly-Normal	1.13	1	1.28	0.046	0.86	0.73	1.01	0.076
	Elderly-Obese Class I	1.48	1.22	1.78	<0.001	1.49	1.19	1.87	0.001
	Elderly-Obese Class II	1.92	1.43	2.58	<0.001	1.57	1.09	2.19	0.014
	Elderly-Obese Class III	1.70	1.03	2.78	0.035	2	1.17	3.44	0.011
	Elderly-Underweight	0.80	0.51	1.29	0.371	0.633	0.3	1.32	0.227

P 30. PANCREATIC CANCER INCIDENCE AND MORTALITY: 27-YEAR TRENDS FROM THE PENNSYLVANIA CANCER REGISTRY

J Pham, W Wong, V Walter, C Vining, M Dixon, J Peng
Presenter: Jonathan Pham BS | Penn State College of Medicine, United States

Background: Pancreatic cancer (PC) is one of the deadliest malignancies, with an estimated 331,000 deaths annually worldwide. In the United States, there were an estimated 60,430 new cases and 48,220 deaths in 2021, an increase of 37.2% and 28.0%, respectively, over 10 years. This study aims to examine incidence and mortality from pancreatic cancer using a state-wide cancer registry, focusing on disparities in race, gender, and urban/rural residency.

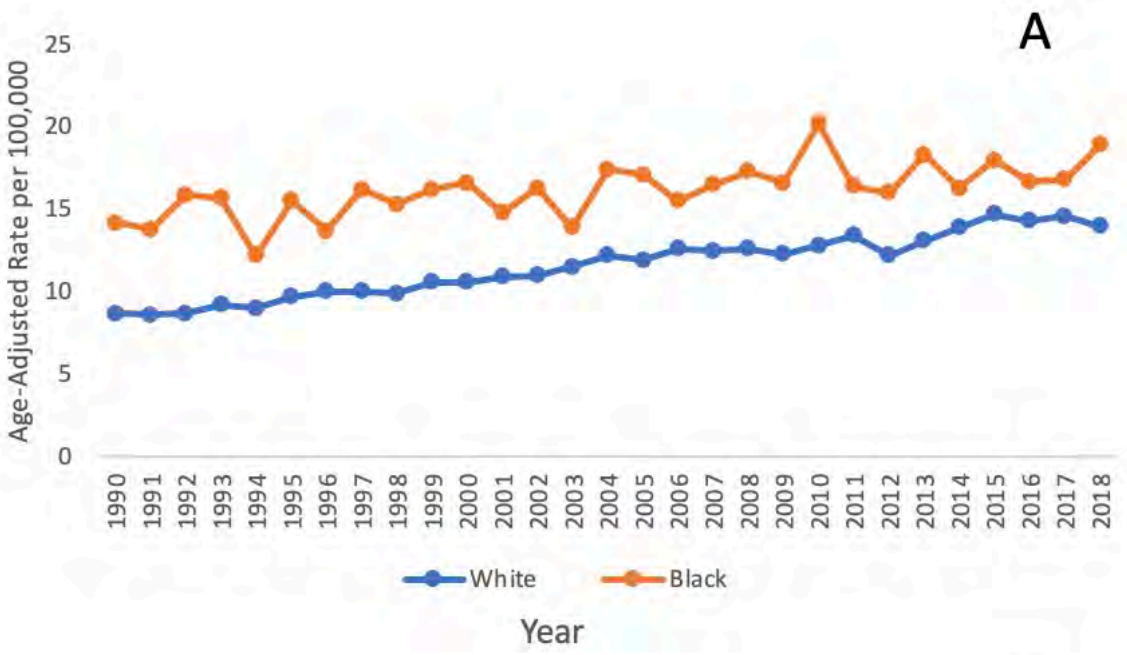
Methods: The Pennsylvania Cancer Registry (PCR) captures all cancer cases diagnosed or treated in the state. The age-adjusted incidence, stage at diagnosis, and mortality from pancreatic cancer from 1990-2018 were examined. The JoinPoint Trend Analysis software was used to model annual precent changes (APC) based on age-adjusted rates.

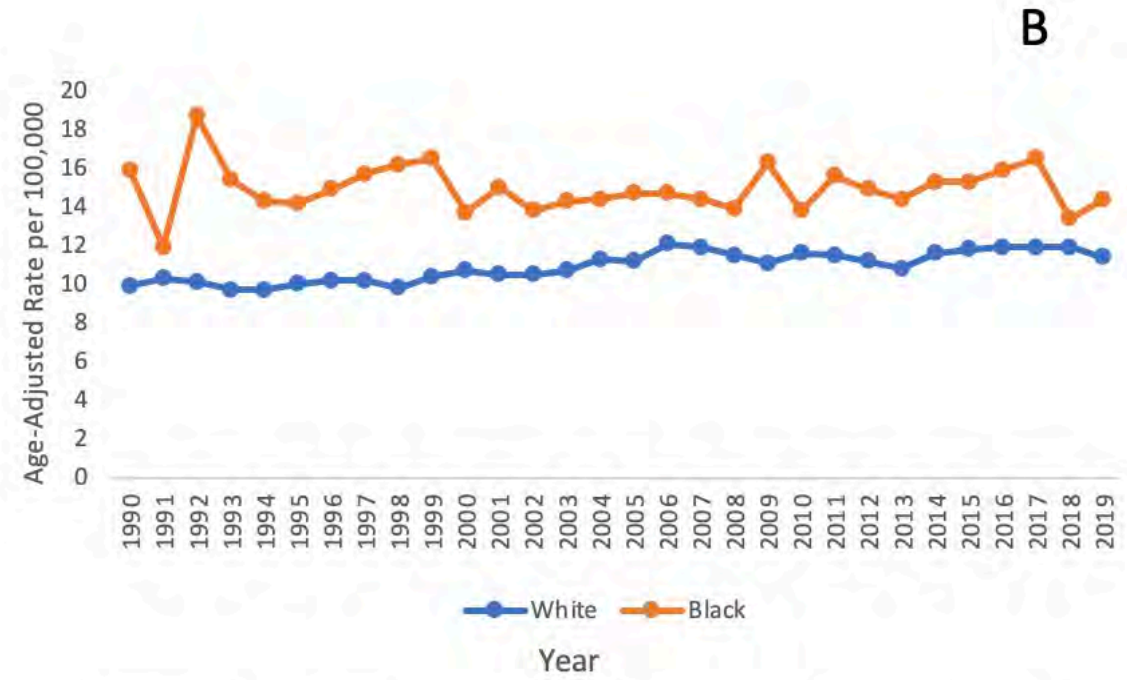
Results: In total, 53,148 cases of PC were recorded in Pennsylvania. Overall, 94.9% were over the age of 50, 50.5% were male, 88.6% were white, and 27.5% resided in a rural county. For all years, the stage at diagnosis was local in 10.1%, regional in 32.3%, and metastatic in 45.7%. From 1990 to 2018, the proportion of local disease decreased from 16.7% to 15%, while regional disease increased from 27.5% to 28.9%, and distant disease increased from 44.5% to 45.6%.

Over the study interval, the overall age-adjusted incidence rates increased from 9.1 to 14.4 cases per 100,000 (58.2% increase, APC 1.8, 95% CI 1.60-2.00). Age-adjusted incidence rate of localized disease remained stable (APC 1.5, 95% CI -0.07-3.80). Age-adjusted incidence of regional disease increased from 2.5 to 4.1 cases per 100,000 (64.0% increase, APC 1.9, 95% CI 0.0-3.9). Age-adjusted incidence of distant disease increased from 4.0 to 6.6 cases per 100,000 (65.0% increase, APC 2.0, 95% CI 0.2-3.9). In terms of race, the age-adjusted incidence for white patients increased from 8.7 to 14.0 (60.9% increase, APC 2.0, 95% CI 1.6-2.3) while the incidence for black patients increased from 14.2 to 18.9 (33.1% increase, APC 0.8, 95% CI 0.4-1.2).

Over the study interval, the overall age-adjusted pancreatic cancer mortality rate increased from 10.2 to 11.7 cases per 100,000 (14.7% increase, APC 0.7, 95% CI 0.50-0.80). The age-adjusted mortality rate for white patients increased from 9.9 to 11.4 (15.2% increase, APC 0.7, 95% CI 0.5-0.8) while mortality rate for black patients remained stable (APC -0.1, 95% CI -0.4-0.3). While there were increases in both PC incidence and death rates, there was no difference between rural counties and urban counties.

Conclusion: Both the incidence and mortality rates of PC across Pennsylvania have increased over the past three decades, in line with trends nationally and globally. Between 1990 and 2018, the overall incidence increased by 58.2% while the mortality increased by 14.7%. Future studies are warranted to determine the cause of increased mortality rate of white patients compared to black patients.





[A] Pancreatic Cancer Incidence in Pennsylvania over time by race. (White: APC 2.0 95% CI 1.6-2.3) (Black: APC 0.8, 95% CI 0.4-1.2) [B] Pancreatic Cancer Mortality in Pennsylvania over time by race. (White: APC 0.7. 95% CI 0.5-0.8) (Black: APC -0.1, 95% CI -0.4-0.3)

P 33. PANCREATECTOMY FOR INTRADUCTAL PAPILLARY MUCINOUS NEOPLASM: HAS ANYTHING CHANGED IN NORTH AMERICA?

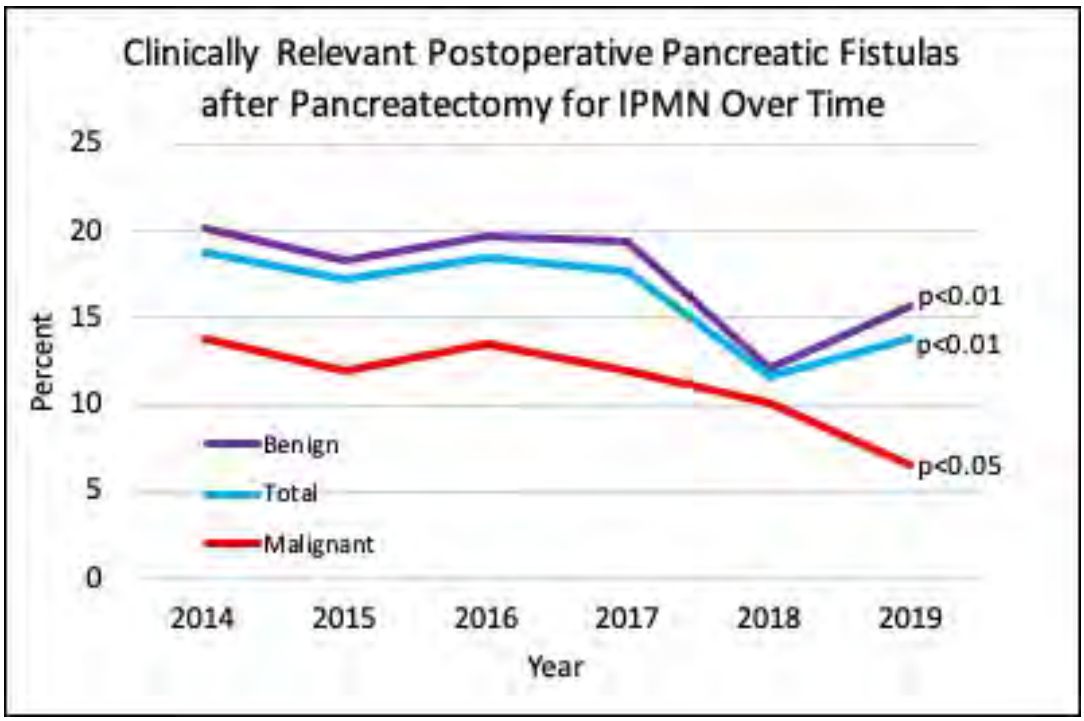
CH Davis, RC Langan, MS Grandhi, TJ Kennedy, DA August, HR Alexander, HA Pitt
Presenter: Catherine H. Davis MD, MPH | Rutgers Cancer Institute of New Jersey, United States

Background: Over the past decade, multiple guidelines and institutional reports have been published for the management of intraductal papillary mucinous neoplasm (IPMN). However, continental data on management are lacking. The aim of this study was to determine whether pancreatectomy procedures, IPMN pathology, or outcomes have changed.

Methods: The ACS-NSQIP Procedure Targeted Pancreatectomy database was queried for patients with IPMN from 2014-2019. Cases were stratified by surgical pathology and tumor stage/cyst size as well as surgical procedure. The proportion of pancreatectomies performed for IPMN was characterized by year. 30-day morbidity, including clinically relevant postoperative pancreatic fistula (CR-POPF) was measured. Mann-Kendall trend tests were performed to assess surgical trends and associated outcomes over time.

Results: A total of 3,912 patients with IPMN were identified. Procedures performed included pancreatoduodenectomy (54%), distal pancreatectomy (36%), total pancreatectomy (6%), and enucleation (1%). Operative approach was open in 71%, laparoscopic in 17%, and robotic in 11%. 21% of cases demonstrated malignancy (T0: 11%; T1: 33%; T2: 22%; T3: 33%; T4: 2%). 79% of cases were benign (cyst size 5cm:13%). Serious morbidity and mortality occurred in 30% and 1.5% of cases, respectively. Over time, no change was observed in use of pancreatectomy for IPMN (average 10%) or in pathology, stage, or cyst size. Robotic approach increased from 9% to 17% with a decrease in laparoscopic (20% to 15%) and open approaches (72% to 68%, p=0.016). While no change was observed over time in morbidity or mortality, the rate of CR-POPF decreased significantly (19% to 14%, p< 0.001, Figure).

Conclusion: Despite changing guidelines, no change was observed over a six-year period in North America in the percentage of pancreatectomies performed for IPMN or in IPMN characteristics. However, significantly more IPMN patients are undergoing robotic pancreatectomy, and postoperative pancreatic fistula rates are improving. Pancreatectomy for IPMN is safe and can be performed with acceptable morbidity and mortality.


Clinically Relevant Postoperative Pancreatic Fistulas after Pancreatectomy for IPMN Over Time
25
20
15
10
5
0
Percent
2014
2015
2016
2017
2018
2019
Year
Benign
Total
Malignant
p<0.01
p<0.01
p<0.05

P 34. ENDOSCOPIC ULTRASOUND VERSUS COMPUTED TOMOGRAPHY EVALUATION OF VEIN INVOLVEMENT FOR PANCREATIC DUCTAL ADENOCARCINOMA

N Syed, CC Vining, ME Dixon, MT Moyer, JS Peng
Presenter: June S. Peng MD | Penn State College of Medicine, United States

Background: The concordance between endoscopic ultrasound (EUS) and computed tomography (CT) for vein involvement in pancreatic ductal adenocarcinoma (PDAC) is relatively unknown. The current literature provides conflicting results regarding the sensitivity of EUS compared to CT for detecting vein involvement. This study aims to evaluate the accuracy and concordance of EUS and CT in the modern era of surgical management and high quality CTs.

Methods: This retrospective analysis included patients who underwent upfront Whipple for PDAC and had EUS evaluation including vascular involvement between January 2010 and November 2021 at a single academic center. Patients who underwent neoadjuvant treatment or whose EUS report did not comment on vessel involvement were excluded. Patients at our center routinely undergo neoadjuvant therapy unless a tissue diagnosis cannot be obtained or the primary lesion is resectable per National Comprehensive Cancer Network (NCCN) guidelines. CT images were over-read by a surgical oncologist to ascertain vascular involvement. EUS and CT results were compared to vascular resection at surgery. Concordance was calculated using Cohen's kappa.

Results: A total of 34 patients were included with an average age of 68 years (SD 9.3) and body mass index of 28.9 kg/m2 (SD 6.2). Nineteen patients were female (54%). Preoperative CTs were performed as triphasic pancreatic protocol scans in 25 patients (73.5%). Six patients (17.6%) required vein resection at surgery, including 3 superior mesenteric vein (50%), 2 portal vein (33.3%), and one vein confluence (16.7%). One portal vein resection required an interposition graft and the rest of the vein resections were closed primarily. Pathology showed T4 disease in one patient (3%), T3 in 7 (20.6%), and T2 in 21 (61.8%). Node positive disease was found in 26 patients (76.5%) and margin positive disease in 11 patients (32.4%). The sensitivity and specificity of EUS for vein resection was 66.7% and 67.9%, respectively. The sensitivity and specificity of CT for vessel involvement was 50.0% and 35.7%. The positive predictive value (PPV) and negative predictive value (NPV) for EUS was 28.6% and 90.4%. The PPV and NPV for CT was 14.3% and 76.9%. The observed proportionate agreement is 68.7% (24/35), while the probability of random agreement is 47.2%. Cohen's kappa was 0.4.

Conclusion: In this study, EUS was more sensitive than CT in detecting vein involvement in PDAC, although neither test was perfect. The level of concordance between EUS and CT was moderate, indicating their complementary value in assessing vein involvement in patients with PDAC. Templated reporting of EUS by gastroenterologists and CT by radiologists with specific focus on vascular involvement may improve the performance of these modalities for vascular involvement and could better guide treatment for patients.

P 36. COST-EFFECTIVENESS OF STAGING LAPAROSCOPY AND PERITONEAL CYTOLOGY IN PANCREATIC ADENOCARCINOMA

N Panse, R Trivedi, V Prasath, S Arjani, RJ Chokshi
Presenter: Neal Panse | Rutgers New Jersey Medical School - Newark, United States

Background: Pancreatic adenocarcinoma (PDAC) is associated with poor survival and high treatment cost. Initial staging is commonly performed with computed tomography (CT). While it is a fairly sensitive imaging modality, CT imaging is unable to capture very small regions of disease or micro-metastases. Performing a laparoscopy and peritoneal cytology at the time of diagnosis may improve accuracy of diagnostic staging and allow for optimization of treatment regimens. This has the potential to better target high-morbidity treatments to those who are most likely to benefit from them, and to prioritize quality of life in others by avoiding ineffectual interventions. In this study, we performed a decision tree analysis comparing cost-effectiveness of staging techniques: CT alone vs CT with diagnostic laparoscopy and cytology in biopsy-proven PDAC.

Methods: A decision tree was constructed comparing CT alone vs CT with laparoscopy and cytology. Branch-point probabilities, survival, and utility weights were obtained from the published literature. Costs were determined using 2021 Medicare payment rates. Effectiveness was measured in quality-adjusted life years (QALYs) and calculated using the declining exponential approximation of life expectancy (DEALE) method. Results were verified by performing one-way, two-way, and probabilistic sensitivity analyses for each branch-point probability around its 95% confidence interval.

Results: The CT with laparoscopy and cytology arm had a higher percentage of patients with metastases at initial staging (48.0%) than CT alone (20.3%). CT alone yielded 1.75 QALYs at $35,770.80 and had an ICER of $2,105.31/QALY over CT with laparoscopy and cytology, which produced 1.49 QALYs at $35,236.32 (Figure 1). Thus, CT alone was more cost-effective. All sensitivity analyses using 95% confidence intervals for each branch-point did not show any benefit in performing CT with laparoscopy and cytology.

Conclusion: Diagnostic laparoscopy and cytology results, in addition to standard CT results, upstaged some patients and revealed a greater proportion of patients to have metastatic disease. These patients did not receive high-cost, high-morbidity neoadjuvant therapy and possible surgery, thereby improving their quality of life. Even so, our analysis shows CT alone to be the more cost-effective strategy. This suggests that in patients with metastatic disease which is not conventionally detectable, there may be some therapeutic role of treatment with curative intent. Limitations include an inability to account for potentially higher rates of R0 resection in surgical candidates who have undergone laparoscopy and cytology at staging. The model also did not account for possible increased survival in patients with R0 resection following invasive staging. Further research evaluating changes in survival time and success rate of R0 resection in patients who underwent diagnostic laparoscopy and cytology is warranted.

Base Case	Cost ($)	QALYs	Cost ($)/QALY	ICER
CT with laparoscopy and cytology	35,236.32	1.49	23,648.54	-
CT alone	35,770.80	1.75	20,440.46	2,105.31

Figure 1. Cost-effectiveness of CT alone and CT with laparoscopy and cytology. Abbreviations: QALY, quality-adjusted life-year. ICER, incremental cost-effectiveness ratio (change in cost($)/change in QALYs).

P 37. PREVALENCE AND PROGRESSION OF INTRADUCTAL PAPILLARY MUCINOUS NEOPLASMS OF THE PANCREAS IN SOLID ORGAN TRANSPLANT RECIPIENTS: A SYSTEMATIC REVIEW

T Sugawara, FS Rodriguez, A Kalra, J Ishida, S Grandi, MH Al-Musawi, RD Schulick, M Del Chiaro
Presenter: Toshitaka Sugawara MD, PhD | University of Colorado, United States

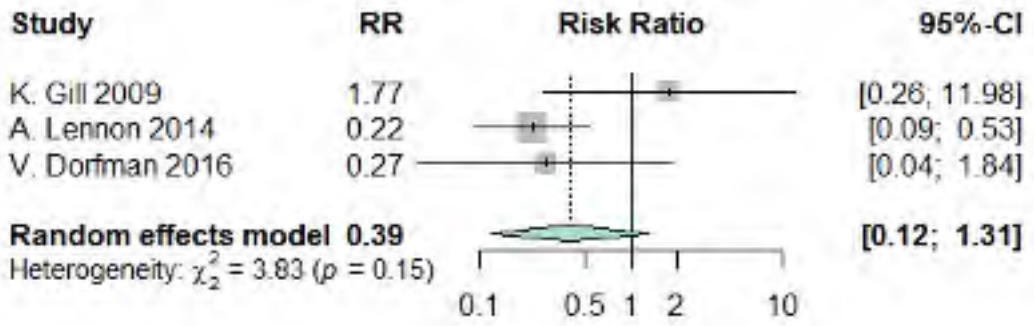
Background: It has been reported that there is an increased risk of cancer in the transplanted population related to the chronic use of immunosuppressive drugs. Intraductal papillary mucinous neoplasm (IPMN) is considered a neoplasm with malignant potential. Overall, malignancy has been reported in up to 62.2% of resected main duct and 24.4% of branch duct IPMN lesions. This study aimed to determine the prevalence of IPMN in all solid organ transplant recipients and addresses the impact of chronic immunosuppressive therapy on their clinical courses.

Methods: This study follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guideline. The PubMed, Embase, Scopus, and Google Scholar were searched, and data were extracted from relevant studies. As the primary outcome, the relative risk ratios of progression of IPMN on imaging studies in case-control studies were pooled using the random-effects model. In addition, the prevalence of IPMN in each study was extracted.

Results: Two authors identified 93 potentially relevant studies. Among these publications, 12 studies met the inclusion criteria. Eight studies included liver transplant recipients, three studies included all solid organ transplant recipients, and 1 study included pancreas transplant patients. Seven studies included only branch duct IPMN. In total, 291 IPMN patients were included from 8220 immunosuppressed patients. The median follow-up time was 37.5 months (range: 13-64 months). There were 9 studies that reported the prevalence of IPMN; the median percentage was 3.2%, ranging from 0.3% to 25%. The mean progression rate, any progression, from 11 studies was 17% (range: 0-88%).

We used case-control studies (n=3), comparing IPMN in transplant patients and IPMN in immunocompetent patients, for sub-analysis. The immunosuppressed group was younger (61y [57-64] vs 68y [64-70], P = 0.05), more male (53.5% vs 36.4%, P = 0.002), and more diabetes (37.7% vs 18.8%, P = 0.003) patients than the other group. Overall, the pooled relative risk ratio for progression risk associated with transplantations was 0.39 (CI 95% 0.12-1.31)] (Fig).

Conclusion: The present study showed that the prevalence and progression of IPMN in immunosuppressed patients might be the same as for immunocompetent patients. However, the number of evidence about this topic is limited, and the results are highly heterogeneous. Furthermore, the median follow-up time of included studies is short. Therefore, our findings encourage further studies to assess the management of IPMN in immunosuppressed patients, especially addressing the new incidence of IPMN in all solid organ transplant recipients and the impact of chronic immunosuppressive therapy on their clinical courses. Additionally, we propose that future studies should also assess whether the degree of immunosuppression (as measured by the dose and type of medication used) influences IPMN incidence/progression.


Study
RR
Risk Ratio
95%-CI
K. Gill 2009
1.77
[0.26; 11.98]
A. Lennon 2014
0.22
[0.09; 0.53]
V. Dorfman 2016
0.27
[0.04; 1.84]
Random effects model
0.39
[0.12; 1.31]
Heterogeneity: χ^2_2 = 3.83 (p = 0.15)
0.1
0.5
1
2
10

P 38. BILE VOLATILE ORGANIC COMPOUNDS IN THE DIAGNOSTICS OF BILIARY OBSTRUCTION AND PANCREATIC CANCER

V Teränen, S Nissinen, A Roine, A Antila, A Siiki, Y Vaalavuo, P Kumpulainen, N Oksala, J Laukkarinen
Presenter: Ville Teränen MD | Tampere University Hospital, Finland

Background: Detection of volatile organic compounds (VOCs) from bodily fluids with field asymmetric waveform ion mobility spectrometry (FAIMS) and related methods has been studied earlier in various settings. Preliminary results have been discovered for example in the detection of prostate, colorectal and ovarian cancer from urine samples. In this study, our primary aim was to differentiate pancreatic cancer from benign tumors of the pancreas by using bile samples obtained during endoscopic retrograde cholangiopancreatography (ERCP). Secondarily we aimed to differentiate all pancreatic region malignancies from all kinds of benign causes of biliary obstruction.

Methods: Bile sample was successfully aspirated from 93 patients during ERCP in Tampere University Hospital and patient records were prospectively followed up for at least two years after ERCP. Bile samples were analyzed using Lonestar chemical analyser (Owlstone, UK) employing an ATLAS sampling system and a split flow box. Conclusive diagnoses and data from analysis were matched and divided into two subcategories to be compared. Statistical analysis was performed using linear discriminant analysis (LDA) and support vector machines (SVM).

Results: Benign pancreatic lesions (n=9) were differentiated from pancreatic cancers (n=8) with correct rate of 88 % by LDA classification model. All kinds of benign causes of biliary obstruction (n=75) were differentiated from all pancreatic region cancers (n=19) with correct rate of 76 % by SVM model.

Conclusion: Analysing bile VOCs with FAIMS shows promising capability in the detection of pancreatic cancer and other malignant tumors causing biliary obstruction.

P 39. A NEW POTENTIAL PROGNOSTIC BIOMARKER AND TARGET IN HEPATO-PANCREATO-BILIARY CANCERS: THE GLUCOSE TRANSPORTER-1

A Comandatore, R Balsano, C Carpenito, LNC Boyd, R Gaeta, M Capula, M Palmeri, G. Di Franco, N Furbetta, G Kazemier, E Giovannetti, L Morelli

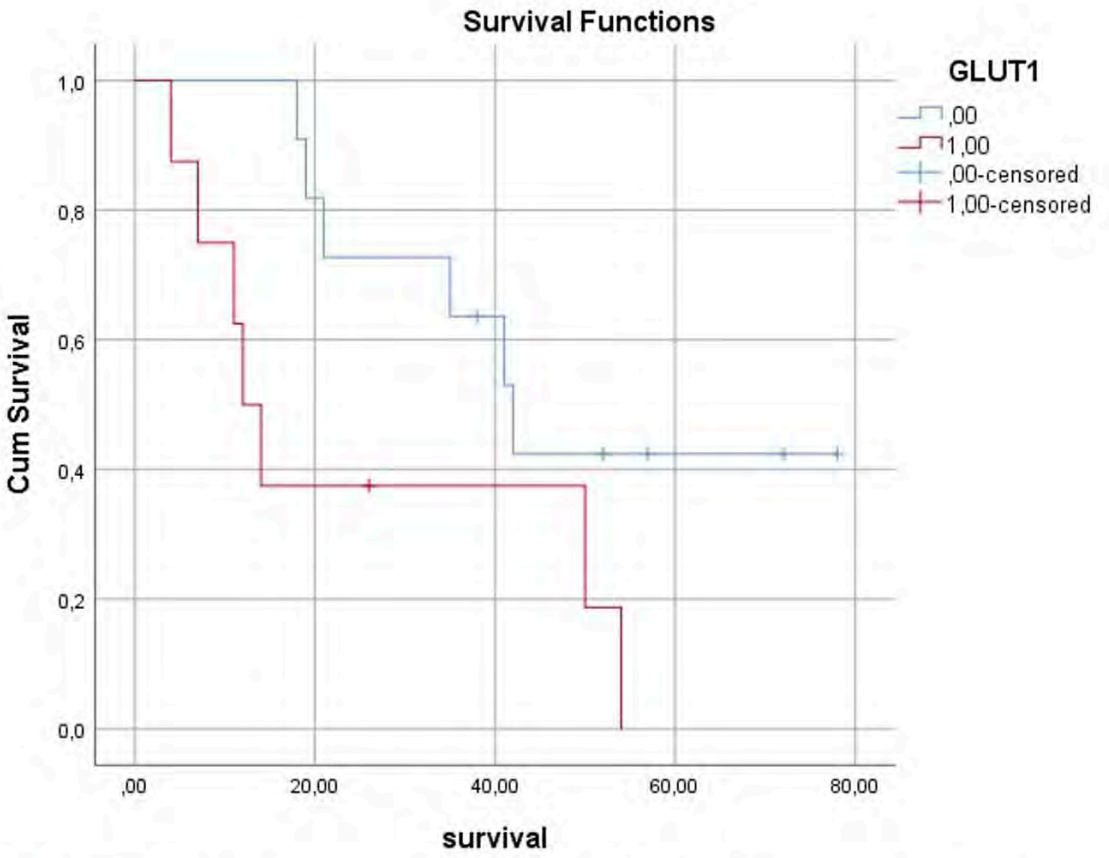
Presenter: Annalisa Comandatore MD | University of Pisa, Italy

Background: The increased expression of the glucose transporter-1 (GLUT-1) in tumor tissue is related to the formation of hypoxic areas that result in metabolic alterations and ultimately lead to its overexpression. Although in pancreatic ductal carcinoma (PDAC) many studies have already established a correlation between GLUT-1 overexpression and a reduced Overall Survival (OS),changes in metabolism in extrahepatic cholangiocarcinoma (EC) are not yet investigated. The aim of our study was to determine the level of GLUT-1 expression in tissues of patients diagnosed with extrahepatic cholangiocarcinoma and then correlate this data with clinical outcome. In addition, we also evaluated the activity of new drugs inhibiting GLUT-1 in EC cell lines.

Methods: Tissues from n=23 radically-resected patients (n=16 Male, n=7 Female) were used to assess GLUT-1 expression by immunohistochemistry of tissue microarrays (TMAs). Staining for GLUT-1 was scored in accordance with both the intensity and the percentage of cells expressing this transporter. SPSS-IBM-26 software was used for statistical analysis. The activity of new anti-GLUT-1 compounds was assessed by Sulforhodamine-B assay using EGI1 and TFK1 cells.

Results: OS was ssignificantly shorter in patients with high GLUT-1 expression when compared to that of patients with low GLUT-1 expression (25.5 vs.50.3 months, p=0.045 Fig.1). The GLUT-1 inhibitor PGL14 showed antiproliferative activity in EC cells comparable to the promising activity shown in PDAC cells.

Conclusion: These results demonstrate the prognostic role of GLUT-1 in patients with EC and pave the way to new studies on of the efficacy of GLUT-1 inhibitors.



Fgiure 1. Kaplan-Meyer curves of EC patients grouped according to low (legend-0-blue) vs. high expression (legend-1-red) of GLUT-1

P 41. PROGNOSTIC FACTORS FOR ISOLATED LOCAL RECURRENCE AFTER RESECTION OF PANCREATIC DUCTAL ADENOCARCINOMA: A NATIONWIDE ANALYSIS

IWJM van Goor, PCM Andel, FS Buijs, MG Besselink, BA Bonsing, K Bosscha, LAA Brosens, OR Busch, GA Cirkel, RM van Dam, S Festen, B Groot Koerkamp, E van der Harst, IHJT de Hingh, G Kazemier, M Los, GJ Meijer, VE de Meijer, VB Nieuwenhuijs, D Roos, JMJ Schreinemakers, MWJ Stommel, RC Verdonk, HC van Santvoort, IQ Molenaar, LA Daamen, MPW Intven

Presenter: Lois Daamen MD, PhD | Regional Academic Cancer Center Utrecht, Netherlands

Background: Disease recurrence after resection of pancreatic ductal adenocarcinoma (PDAC) remains one of the biggest challenges in PDAC management. Almost all patients develop PDAC recurrence at a certain moment during postoperative follow-up. Of these patients, about 20% develops isolated local recurrence (ILR) within a median disease-free interval of 12 months. The prognosis of this specific subgroup is favorable compared to patients with systemic disease recurrence. Therefore, these patients might specifically benefit from additional (local) treatment, possibly improving survival and quality of life. To enable early treatment of ILR, early detection of disease recurrence is of great importance. Patients at risk for developing ILR, therefore might particularly benefit from standardized post-operative surveillance. To identify patients at risk for developing ILR after PDAC resection, we aimed to identify factors predictive for ILR in this study.

Methods: This national cohort study was conducted among all patients who underwent PDAC resection in the Netherlands (2014-2019). Patients were excluded in case of complication-related mortality within 90 days after resection, and macroscopic irradical resection. Furthermore, patients were excluded if the recurrence site was unknown. Baseline and perioperative data were collected from the mandatory, prospective Dutch Pancreatic Cancer Audit. Additional data on follow-up and survival was collected from the patients' records.

Patients were divided into two groups based on their initial recurrence location: ILR or distant metastases (whether or not combined with synchronous local recurrence). Patients without disease recurrence were censored at date of last follow-up. Missing data was considered missing at random and handled using multiple imputation. Survival rates were estimated and compared using Kaplan-Meier curves and the log-rank test, respectively. Multivariable cause-specific competing risk analysis was performed to identify prognostic factors for ILR. Akaike's information criterion was used to select the best predictive model. The discriminative ability was determined by the concordance index (C-index) and calibration by calibration plots, both corrected for overfitting by interval validation in 1000 bootstrap samples. The optimal cut-off value of the final predictive model was determined by the Youden index.

Results: In total, 1729 patients with a median follow-up of 35 (95% CI 34-36) months were analyzed. 1164 patients (67%) developed disease recurrence. Among these, 248 patients (21%) presented with ILR within a median disease-free interval of 15 (95% CI 14-16) months. Their median overall survival (OS) was 26 (95% CI 26-27) months, compared to a median OS of 16 (95% CI 16-17) months in patients who had distant metastases at initial presentation.

Factors independently associated with ILR were vascular resection, perineural invasion, lymph node status, resection margin status, and adjuvant chemotherapy (Table 1). After correcting for optimism, the best predictive model had a C-index of 0.66 and the slope of the calibration plots was 0.981. Based on the optimal cut-off value determined by the Youden index, patients were stratified in two groups.

Conclusion: The developed predictive model for ILR, based on the prognostic factors identified in this study, can be used to identify patients at risk for developing ILR and guiding clinicians in their surveillance-related decisions.

Table 1. Significant factors predictive of isolated local recurrence based on Akaike's Information Criterion in 1729 patients who underwent PDAC resection			
	HR*	95% CI	P-value
Vascular resection (yes vs. no)	1.85	1.41 – 2.43	< 0.001
Perineural invasion (yes vs. no)	1.47	1.00 – 2.16	< 0.05
Lymph node status - N0 (no positive lymph nodes) - N1 (≥ 1 but < 4 positive lymph nodes) - N2 (≥ 4 positive lymph nodes)	 Ref 1.64 2.16	 Ref 1.18 – 2.27 1.48 – 3.15	 Ref < 0.01 < 0.001
Resection margin status (R1 < 1 mm vs. R0 ≥ 1 mm)	1.50	1.15 – 1.95	< 0.01
Adjuvant chemotherapy (yes vs. no)	0.65	0.49 – 0.86	< 0.01
PDAC: pancreatic ductal adenocarcinoma; ILR: isolated local recurrence; HR: hazard ratio; CI: confidence interval. * Hazard ratios of ILR at initial presentation.			

P 43. "COLD TRIANGLE ROBOTIC PANCREATODUODENECTOMY": TECHNIQUE, POSTOPERATIVE COMPLICATIONS AND PATHOLOGICAL RESULTS.

EF Kauffmann, N Napoli, M Ginesini, C Gianfaldoni, F Asta, A Salamone, F Vistoli, U Boggi
Presenter: Emanuele Federico Kauffmann MD | University of Pisa, Italy

Background: In pancreatoduodenectomy (PD) for pancreatic cancer the triangle procedure improves the rate of negative margin resections. The R0 resection is crucial to improve the prognosis. The clearance of the perineural tissue along the peripancreatic arteries could be challenging and performed with sharp dissection or with the help of energy devices. Sharp clearance of all soft tissue included in the space lined by the common hepatic artery/celiac trunk, the superior mesenteric artery (SMA), and the superior mesenteric/portal vein (triangle operation) may improve the rate of negative margin resection in pancreatoduodenectomy for pancreatic cancer. We herein present the technique of "cold" triangle robotic pancreaticoduodenectomy

Methods: Basically, a radical and en-bloc clearance of the mesopancreas should be performed by a four-step procedure. Dissection is carried out using only robotic scissors. During the first step perivascular triangle dissection begins with division of the gastroduodenal artery and lateral-to-medial dissection along the hepatic artery, then along the right side of the celiac trunk until the diaphragmatic crus. In the second step, after a wide Kocher maneuver, the origin of the SMA and the celiac trunk are identified, cranial to the left renal vein. The lymphatic tissue above the left renal vein and the right ganglion are removed en-bloc with the specimen. In the third step the peritoneum behind the third duodenal portion is opened. The first jejunal loop is mobilized to the right side of the mesenteric vessels and finally divided. During the fourth step, the divestment of the SMA proceeds until the inferior pancreato-duodenal artery is visualized and ligated. The divestment is performed without energy devices to reduce the risk of diathermic injury and late bleeding. Usually, a right approach is employed with a bottom-to-up dissection. The Clavien-Dindo classification was used to grade the severity of post-operative complications. Post-pancreatectomy hemorrhage (PPH) delayed gastric emptying (DGE), chylous fistula were classified accordingly to ISGPS criteria and collected as ideally associated with the surgical technique. In this analysis we considered patients from August 2009 to September 2021 underwent robot-assisted PD for pancreatic cancer.

Results: This technique was developed in 252 procedures and was employed in 127 RPDs for pancreatic cancer. The median operative time was 540 (470-585) minutes. No conversion occurred due to troublesome dissection or bleeding. Reoperation was needed in 14 patients (9.4%), out of these 11 (8.6%) were for bleeding, one (0.8%) for intestinal volvulus, 2 (1.6%) for fluid collections not amenable of percutaneous drainage. No pseudoaneurysm of the gastroduodenal artery was observed, one patient was reoperated for bleeding and only one case (0.8%) of erosive bleeding from the superior mesenteric artery probably due to thermal injury was reported. The chyle leak rate was 3.2%. The mortality, excluding the first 33 patients of the population to complete the learning curve, was 5/219 (2.3%). The rate of R1 resection (circumferential margins at 1mm) was 44.1%. The median number of examined lymph nodes was 42 (33-51).

Conclusion: Cold" Triangle RPD allows to achieve satisfactory pathology parameters with a acceptable risk of post-pancreatectomy surgical complication.

Length of staying, median (IQR)	17 (12-24)
90 days mortality, N° (%)	9 (7.1)
90 days mortality in the whole experience, N° (%)	10 (3.9)
90 days mortality in the whole experience after completion of the learning curve, N° (%)	5(2.3)
Extraluminal PPH, N° (%)	11 (8.6)
Chylous fistula, N° (%)	4 (3.2)
Delayed gastric emptying (DGE), N° (%) - **Grade A** - **Grade B** - **Grade C**	52 (40.9) 18 (14.2) 21 (16.5) 13 (10.2)
Post-operative complication, N° (%) - **Clavien 0** - **Clavien I** - **Clavien II** - **Clavien III** - **Clavien IIIa** - **Clavien IIIb** - **Clavien IVa**	 33 (26) 19 (15) 47 (37) 15 (11.8) 8 (6.3) 7 (5.5) 4 (3.2)
CCI, median (IQR)	20.9 (0-36.2)
Reoperations, N° (%)	14 (11%)

P 45. EFFECT OF INSURANCE STATUS ON PERIOPERATIVE OUTCOMES AND TIME TO INITIATE ADJUVANT THERAPY AFTER ROBOTIC PANCREATICODUODENECTOMY: A PROPENSITY-SCORE MATCHED ANALYSIS

S Ross, H Jacoby, I Sucandy, K Crespo, C Syblis, P Vasanthakumar, A Rosemurgy
Presenter: Harel Jacoby MD | Digestive Health Institute Tampa, United States

Background: Socioeconomic factors are known to impact oncological outcomes in patients undergoing hepaticopancreaticobiliary operations for cancer and may delay initiation of adjuvant therapy. The effect of having Medicaid/Uninsured, and to a lesser extent Medicare, is thought to negatively impact patients 'postoperative course, but this is unestablished, especially for patients undergoing robotic cancer operations. This study was undertaken to determine the impact of insurance status on perioperative outcomes and time to initiate adjuvant therapy in patients undergoing robotic pancreaticoduodenectomy.

Methods: With IRB approval, we prospectively followed 212 patients who underwent robotic pancreaticoduodenectomy for pancreatic adenocarcinoma. Patients were stratified by their health insurance status (i.e., Private, Medicare, and Medicaid/Uninsured). Patients were 2:2:1 propensity-score matched by age, BMI, ASA class, tumor size, and 8th edition AJCC staging. Perioperative variables were compared utilizing 3x2 contingency tables and an ANOVA of independent measures. Statistical significance was accepted at a p-value≤0.05 and the data are presented as median(mean±SD).

Results: 25% patients had private insurance, 70% had Medicare, and 5% had Medicaid or were uninsured (Table). Previous intra-abdominal operations were frequent and conversions to 'open' pancreaticoduodenectomy, intra-operative complications, and R1 resections were infrequent (Table). Before the propensity-score matching, patients with Medicare were oldest (p< 0.0001) (Table). Following propensity-score matching, no differences were found in the pre-, intra-, and short-term postoperative variables among patients, including time to initiation of adjuvant treatment (Table).

Conclusion: In our hepatopancreaticobiliary program, health insurance status does not predict perioperative outcomes or time to initiation of adjuvant therapy after robotic pancreaticoduodenectomy. Differences in outcome for patients stratified by insurance status purported by many with 'open' pancreaticoduodenectomy is abrogated by the robotic approach.

	Before Matching				After Matching			
	Private	Medicare	Medicaid/Uninsured	Total | P-Value	Private	Medicare	Medicaid/Uninsured	Total | P-Value
Number of Patients	54	148	10	212	20	20	10	50
Age (years)	62 (62±10.2)	72 (73±8.7)	62 (60±10.0)	**p<0.0001**	61 (62±7.9)	65 (67±9.0)	62 (60±10.0)	p=0.13
Sex (M/W)	28/26	85/63	5/5	p=0.73	11/9	9/11	5/5	p=0.82
BMI (kg/m2)	27 (27±6.1)	27 (27±3.8)	25 (25±5.1)	p=0.40	26 (26±4.6)	27 (26±4.3)	25 (25±5.1)	p=0.91
Previous Abdominal Operations (n)	26 (48%)	87 (59%)	3 (30%)	p=0.11	9 (45%)	11 (55%)	3 (30%)	p=0.43
ASA	3(3±0.6)	3 (3±0.7)	3 (3±0.5)	p=0.29	3 (3±0.5)	3 (3±0.5)	3 (3±0.5)	p=0.96
Intraoperative Variables								
Operative Duration (min)	404 (418±95.5)	416 (426±91.7)	421 (437±130.4)	p=0.81	398 (422±100.3)	403 (398±348.1)	421 (437±130.4)	p=0.57
Estimated Blood Loss (mL)	200 (278±342)	200 (319±365.6)	175 (266±240.9)	p=0.71	200 (219±163.1)	250 (346±348.1)	175 (266±240.9)	p=0.32
Conversions to Open (n)	3 (6%)	24 (16%)	1 (10%)	p=0.13	3 (15%)	3 (15%)	1 (10%)	p=0.92
Intraoperative Complications (n)	1 (2%)	9 (6%)	0	-	0	0	0	p=1.00
Lymph Nodes Harvested (n)	14 (15±6.0)	14 (15±4.6)	15 (16±6.5)	p=0.55	14 (16±7.3)	11 (13±3.5)	15 (16±6.5)	p=0.21
Margin Status (R0/R1)	53/1	140/8	10/0	-	20/0	18/2	10/0	-
AJCC Staging (%)	I (17%), II (66%), III (17%), IV (0%)	I (21%), II (64%), III (12%), IV (3%)	I (20%), II (60%), III (20%), IV (0%)	-	I (20%), II (60%), III (20%), IV (0%)	I (20%), II (60%), III (20%), IV (0%)	I (20%), II (60%), III (20%), IV (0%)	p=1.00
Tumor Size (cm)	3 (3±1.5)	3 (3±1.0)	2 (3±1.0)	p=0.60	3 (3±1.2)	3 (3±0.9)	2 (3±1.0)	p=0.31
Postoperative Variables								
Postoperative Complications (n)	5 (9%)	26 (18%)	1 (10%)	p=0.31	0	4 (20%)	1 (10%)	-
Clavien-Dindo Score (≥III)	III (2), IV (1), V (2)	III (7), IV (9), V (10)	III (1)	-	0	III (2), IV (1), V(1)	III (1)	-
In-Hospital Mortality (n)	2 (4%)	9 (6%)	0	-	0	1 (5%)	0	-
Length of Stay (days)	5(7±5.3)	5 (8±12.3)	7 (10±8.3)	p=0.48	5 (6±3.8)	5 (8±6.1)	7 (10±8.3)	p=0.21
Readmissions within 30 days (n)	5 (9%)	14 (9%)	3 (30%)	p=0.11	2 (10%)	0	3 (30%)	-
Time to Adjuvant Therapy (weeks)	7 (8±3.9)	7 (8±3.6)	7 (8±4.2)	p=0.96	6 (7±3.2)	5 (7±3.1)	7 (8±4.2)	p=0.83

P 46. COMPARISON OF ONCOLOGIC OUTCOMES BETWEEN OPEN AND LAPAROSCOPIC DISTAL PANCREATECTOMY FOR PANCREATIC DUCTAL ADENOCARCINOMA USING DATA FROM THE KOTUS-BP NATIONAL DATABASE

H Kim

Presenter: Hongbeom Kim | Seoul National University College of Medicine, Korea

Background: Despite the lack of high-level evidence, laparoscopic distal pancreatectomy (LDP) is frequently performed in patients with pancreatic ductal adenocarcinoma (PDAC) owing to advancements in surgical techniques. The aim of this study was to investigate the long-term oncologic outcomes of LDP in patients with PDAC via propensity score matching (PSM) analysis using data from a large-scale national database.

Methods: A total of 1202 patients who were treated for PDAC via distal pancreatectomy across 16 hospitals were included in the Korean Tumor Registry System-Biliary Pancreas. The 5-year overall (5YOSR) and disease-free (5YDFSR) survival rates were compared between LDP and open DP (ODP).

Results: ODP and LDP were performed in 846 and 356 patients, respectively. The ODP group included more aggressive surgeries with higher pathologic stage, R0 resection rate, and number of retrieved lymph nodes. After PSM, the 5YOSRs for ODP and LDP were 37.3% and 41.4% (p = 0.150), while the 5YDFSRs were 23.4% and 27.2% (p = 0.332), respectively. Prognostic factors for 5YOSR included R status, T stage, N stage, differentiation, and lymphovascular invasion.

Conclusion: LDP was performed in a selected group of patients with PDAC. Within this group, long-term oncologic outcomes were comparable to those observed following ODP.

P 48. ASSESSING THE IMPACT OF PREOPERATIVE CORTICOSTEROID THERAPY IN PATIENTS UNDERGOING PANCREATICODUODENECTOMY USING THE NATIONAL SURGICAL QUALITY IMPROVEMENT PROGRAM (NSQIP)

S Alvi, Shahzaib, M Abdimajid, Y Sekigami, M Goodman, M Hertl, H Aziz
Presenter: Saba Alvi MD | Tufts University School of Medicine, United States

Background: The purpose of this study is to evaluate the effectiveness of preoperative glucocorticoid use on reducing postoperative complications of pancreaticoduodenectomy.

Methods: A retrospective analysis of patients undergoing pancreaticoduodenectomy was performed using the NSQIP database (2014-2019). In addition, we utilized propensity score matching to compare patients on preoperative steroids to those who were not. Outcomes measured include 30-day complications and mortality, need for readmission, a prolonged hospital length of stay, delayed gastric emptying, and pancreatic fistula.

Results: After Propensity score matching, there were 438 patients in the steroid group and 876patients in the no steroid group. There was no difference in pancreatic fistula (23.8% vs. 21.7%; p-0.3), delayed gastric emptying (21.1% vs.20.1%; p-0.06), major complications (31.8% vs. 30.1%; p-0.1), and mortality (3.5% vs. 3.2%; p-0.6) between the two groups.

Conclusion: Glucocorticoids did not reduce the incidence of overall complications, postoperative fistula, and delayed gastric emptying following pancreaticoduodenectomy.

Pancreas specific complications			
	Steroids	No Steroids	p-value
Complications			
Mortality	3.5%	3.2%	0.6
Readmission	15.8%	14.7%	0.3
prolonged LOS	11.5%	10.5%	0.5
Pancreatic Fistula	23.8%	21.7%	0.3
Reoperation	6.3%	5.9%	0.5
Delayed Gastric Emptying	21.1%	20.1%	0.6

LOS- Length of Stay

P 49. OPTIMAL PAIN MANAGEMENT AFTER OPEN WHIPPLE: COMPARISON OF EPIDURAL VERSUS INTRATHECAL (IT) MORPHINE PLUS TRANSVERSUS ABDOMINIS PLANE (TAP) BLOCK VERSUS TAP BLOCK ALONE

JM Collins, A Hu, ME Dixon, JS Peng

Presenter: June S. Peng MD | Penn State College of Medicine, United States

Background: There has been significant interest in opioid-sparing analgesia after surgery with use of epidural analgesia (EA), spinal or intrathecal (IT) blocks, and regional blocks. The optimal approach for pain control after open pancreatectomy is not known and the current study aims to evaluate our single-institution experience.

Methods: We examined institutional outcomes using three pain management approaches after open pancreatoduodenectomy: 1) EA, 2) IT morphine plus TAP (IT+TAP), and 3) TAP alone. Sequential patients who underwent pancreatoduodenectomy via upper midline incision for neoplastic or pre-neoplastic disease between July 2020 and November 2021 were included. EA utilized bupivacaine and hydromorphone infusion, IT morphine was administered at 150-200 mcg, and TAP blocks utilized liposomal bupivacaine. Postoperatively, all patients were managed according to a standardized pathway which included intravenous and oral acetaminophen. Demographics and outcome variables were compared using non-parametric Kruskal-Wallis and Fisher's exact tests.

Results: A total of 30 patients were identified for inclusion, with demographics and outcomes summarized in Table 1. There were no statistically significant differences in baseline characteristics. Postoperative pain scores were comparable, and median morphine milligram equivalent (MME) use during hospitalization was 20.0 for EA, 24.3 for IT+TAP, and 170.0 for TAP (p= 0.257). There was a non-significant trend in postoperative fluid bolus requirement, which was given in 33.3% in EA, 10.0% in IT+TAP, and 60.0% in TAP (p=0.131). Foley removal was earlier in the IT+TAP group (p=0.001).

Conclusion: In this analysis, the use of EA versus IT+TAP resulted in similar pain scores and narcotic usage during admission. IT+TAP was associated with earlier Foley removal. Further studies including larger, randomized studies are needed to determine optimal approach to pain management after open Whipple.

Table 1

	Total n=30	Epidural n=15	IT+TAP n=10	TAP n=5	p-value
Age	66.0 (58.0, 70.0)	67.0 (54.0, 69.0)	64.0 (59.0, 70.0)	68.0 (61.0, 73.0)	0.810
Body mass index (kg/m^2)	28.3 (23.6, 31.9)	28.5 (23.6, 32.1)	26.7 (22.6, 30.5)	29.0 (26.6, 39.9)	0.474
Gender					0.885
Female	11 (36.7)	6 (40.0)	3 (30.0)	2 (40.0)	
Male	19 (63.3)	9 (60.0)	7 (70.0)	3 (60.0)	
POD 1 mean pain score	2.8 (1.0, 4.3)	1.2 (0.4, 4.5)	2.8 (1.8, 3.1)	3.4 (3.4, 6.0)	0.209
POD 3 highest pain score	5 (3, 7)	6 (1, 7)	5 (2, 8)	5 (5, 5)	0.982
POD 3 lowest pain score	0 (0, 3)	2 (0, 4)	0 (0, 3)	0 (0, 0)	0.260
Any oral narcotics[a]	23 (76.7)	10 (66.7)	9 (90.0)	4 (80.0)	0.534
Any IV narcotics[a]	15 (50.0)	5 (33.3)	6 (60.0)	4 (80.0)	0.139
MME[a]	24.3 (13.0, 54.0)	20.0 (0.0, 45.0)	24.3 (14.0, 54.0)	170.0 (20.0, 341.5)	0.257
MME per day[a]	4.1 (1.9, 9.0)	4.0 (0.0, 9.0)	4.1 (2.6, 6.3)	34.0 (4.0, 48.8)	0.219
POD Foley removal	2 (1, 2)	2 (2, 4)	1 (1, 2)	2 (2, 2)	**0.001**
Length of stay (days)	5 (5, 7)	6 (5, 7)	5 (5, 6)	6 (5, 7)	0.585
POD 0-1 bolus[b]	9 (30.0)	5 (33.3)	1 (10.0)	3 (60.0)	0.131

Reported as median (IQR) or number (%) with significant p-values reported in **bold**. IT, intrathecal morphine; TAP, transversus abdominis plane block; POD, postoperative day; IV, intravenous; MME, oral morphine milligram equivalents.
a During admission.
b Any crystalloid or colloid bolus administered postoperatively prior to 11:59 PM on POD 1.

P 50. PLASMA SOLUBLE UROKINASE-TYPE PLASMINOGEN ACTIVATOR RECEPTOR (P-SUPAR) REFLECTS THE INFLAMMATORY RESPONSE AFTER PANCREATIC SURGERY.

A Aronen, J Aittoniemi, R Huttunen, A Siiki, A Antila, J Sand, J Laukkarinen
Presenter: Anu Aronen MD | Sigrid Jusélius Foundation, Finland

Background: Surgical trauma depress cell mediated immunity and may increase the risk of postoperative complications. Plasma soluble urokinase-type plasminogen activator receptor (P-suPAR) is a novel biomarker which is affected by several systemic inflammatory conditions. It is elevated in pancreatic cancer (Loosen et al., Carcinogenesis 2019) and in acute alcohol-induced pancreatitis (Nikkola et al. Pancreas 2017). Postoperatively, P-suPAR remains unchanged in patients with perioperatively diagnosed positive blood culture (Rabensteiner et al. GMS Inf Dis 2016) and in patients undergoing coronary bypass (Gozdzik et al. Plos One 2014). Our aim of this study was to investigate P-suPAR levels before and after pancreatic surgery.

Methods: One hundred seventy-six patients planned to undergo pancreatic surgery for suspected malignant or premalignant lesion were recruited to this study. Patient-related comorbidities, preoperative laboratory values, surgical parameters, postoperative complications and final histopathology were registered. P-suPAR values were analyzed preoperatively, and on postoperative day (POD) one and three. One hundred fifty patients [median age 67 (range 33-84) years, 50% male] underwent a surgical procedure. The operation was pancreaticoduodenectomy in 83, distal pancreatectomy in 27 and total pancreatectomy in 23 patients. 17 patients did not undergo pancreatic resection due to a metastasized or advanced disease.

Results: P-suPAR values were significantly decreased on postoperative days 1 [median 3.2 (IQR 2.5-3.9) ng/mL; p< 0.001] and 3 [3.2 (2.7-4.1) ng/mL; p< 0.001] when comparing to preoperative values [3.7 (3.1-4.7) ng/mL], unlike CRP or white blood cell count (WBC). Furthermore, P-suPAR values were significantly lower in patients who developed a postoperative pancreatic fistula [2.6 (2.1-3.4) ng/mL] compared to patients with no fistula [3.2 (2.6-3.8) ng/mL; p=0.007]. There was no difference in other complications.

Conclusion: Unlike many inflammatory cytokines, P-suPAR is decreased after pancreatic resection. This differs from the previous findings after non-pancreatic surgery. In this study group, P-suPAR level decreases significantly after pancreatic surgery. Furthermore, P-suPAR level in the first postoperative day after pancreatic surgery is significantly lower in patients who develop postoperative pancreatic fistula. These findings differ from the kinetics of other inflammatory markers and are entitled to further investigation and interest. In addition, different pancreas-specific inflammatory and immunological mechanisms behind various postoperative complications remain as the subject of future studies.

P 51. VASCULAR PANCREATIC SURGERY WITH VENOUS AND ARTERIAL CONDUITS: REFLECTIONS ON TECHNIQUE, POSTOPERATIVE AND ONCOLOGIC OUTCOMES

B Kinny-Köster, JR Habib, MA Al Efishat, AF van Oosten, S Shoucair, AA Javed, JL Cameron, CR Shubert, RA Burkhart, KJ Lafaro, WR Burns, J He, CL Wolfgang

Presenter: Benedict Kinny-Köster MD | NYU Langone Health, United States

Background: Improved systemic control from new neoadjuvant chemotherapy in pancreatic cancer has increased the importance of margin-negative resections. To achieve this in patients with locally advanced pancreatic cancer, it is sometimes necessary to resect substantial segments of arteries and veins. That creates the need to provide extensive vascular conduits with often greater than 6 cm of length to bridge defects for revascularization.

Methods: We identified 63 implanted conduits (41% autologous vessels) in 56 pancreatic surgeries for underlying malignancies (89% adenocarcinoma) between October 2013 and July 2020 in our prospectively maintained database. Analyzed outcomes with R0 resections were postoperative complications and oncologic survival.

Results: For vascular reconstruction, 25 arterial and 38 venous conduits have been used during 39 pancreatoduodenectomies, 15 distal pancreatectomies and 3 total pancreatectomies. The arterial hepatic inflow and venous mesenteric drainage reconnecting the distal superior mesenteric vein were the primarily bridged systems (96% and 95% of conduits). Of the 50 patients with adenocarcinoma, 92% underwent neoadjuvant chemotherapy and 86% received neoadjuvant radiation. An R0 rate (>1 mm margin) of 78% was achieved. A Clavien-Dindo grade ≥IIIb complication was apparent in 29% of the patients, while the median Comprehensive Complication Index was 29.6. While the 90-day mortality rate was 9%, the median postoperative oncologic survival reached 40 months.

Conclusion: Vascular pancreatic surgery is increasingly required due to improved preoperative systemic control to resect the primary tumor burden. Optimization of surgical techniques for segmental vascular reconstruction with conduits is becoming critically important in carefully selected patients to achieve favorable oncologic outcomes.

P 52. THE INFLUENCE OF SARCOPENIA AND SYSTEMIC INFLAMMATION ON SURVIVAL IN RESECTED PANCREATIC CANCER

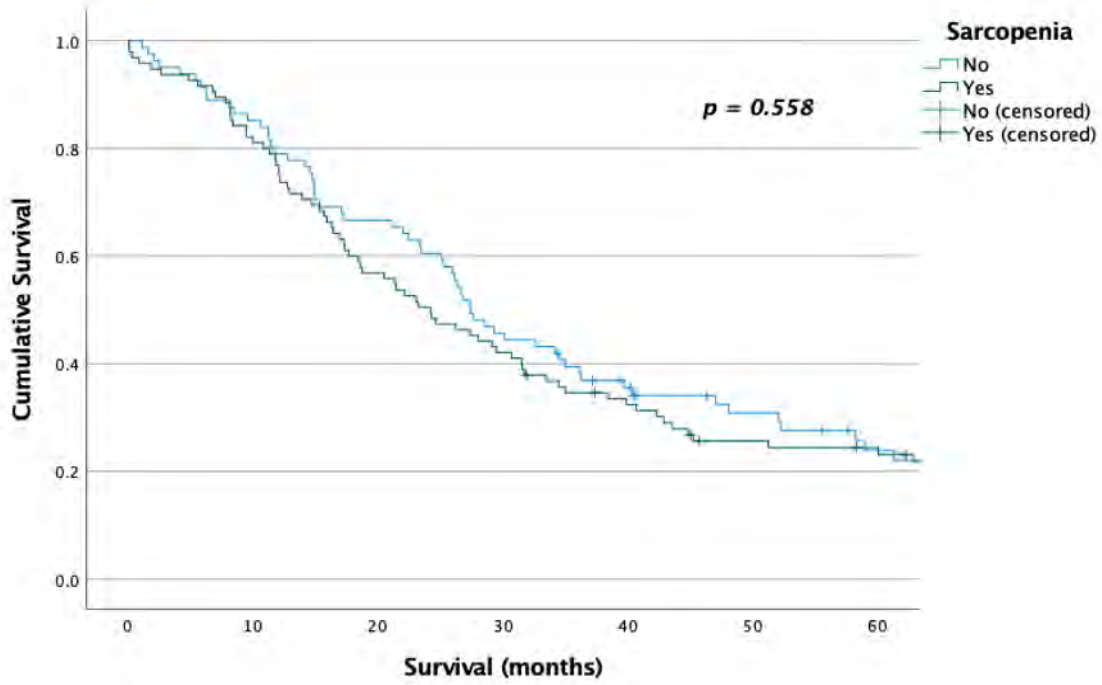
A Bryce, S Dreyer, DK Chang
Presenter: Nigel Jamieson MD, PhD | University of Glasgow, United Kingdom

Background: Sarcopenia, cachexia and systemic inflammation are early hallmarks of pancreatic cancer which hamper systemic therapy and accelerate the terminal stages of the disease. These conditions are more prevalent in pancreatic cancer than other cancer types, and ultimately cause patients' demise. The relationship between sarcopenia (cachexia associated loss of skeletal muscle mass) and the systemic inflammatory response has been demonstrated in other cancer types using image-based body composition analysis, along with the significant impact of this relationship on outcomes and survival. We sought to determine the impact of sarcopenia and systemic inflammation on survival as part of a wider study assessing the contribution of tumour molecular features to tumour-host interaction in pancreatic cancer.

Methods: Retrospective analysis of a prospectively maintained database of patients with pancreatic cancer undergoing resection with curative intent within the West of Scotland Pancreatic Unit was undertaken. Body composition analysis was performed with single slice cross-sectional skeletal muscle index measurement at the L3 lumbar vertebra from pre-operative computed tomography using Slice-o-Matic software. This was compared to validated thresholds for defining sarcopenia. Validated pre-operative systemic inflammatory response measures were curated (modified Glasgow Prognostic Score [mGPS] and neutrophil-lymphocyte ratio [NLR]) along with survival data. Patients undergoing palliative bypass, those with metastatic disease at resection or those with tumours other than pancreatic ductal adenocarcinoma were excluded.

Results: 176 patients were identified who underwent resection between 2008 and 2019. Mean age was 64 years and 49% were male. 71 patients (40%) underwent neoadjuvant treatment and 105 patients (60%) had up-front resection. Median post-operative survival of the entire cohort was 26.3 months and 95 patients were defined as sarcopenic (54%). Sarcopenia was not associated with worse survival versus non-sarcopenia (median survival 24.2 months vs 27.4 months, p = 0.558). mGPS was raised in 52 patients (30%) however this was also not associated with overall survival versus patients with normal mGPS (median survival 26.2 months vs 26.6 months, p = 0.193). There was also no significant difference in survival in patients with raised NLR, or in patients with sarcopenia across both the up-front resection group and the neoadjuvant group.

Conclusion: Pancreatic cancer represents a complex biological process with survival likely influenced by tumour biology and the relationship between tumour epithelium and the tumour microenvironment. This study demonstrates no survival difference in patients with sarcopenia as defined by validated body composition measures. Systemic inflammation, as defined by mGPS and NLR, also had no impact on survival. Survival has previously been shown to be influenced by sarcopenia in all patients with pancreatic cancer, suggesting selection of "fitter" patients for resection in our cohort. Further understanding of tumour biology is needed to determine the relationship between tumour epithelium, tumour microenvironment, cachexia and systemic inflammation. Analysis of this relationship is ongoing and we envisage presenting results of this research in conjunction with this abstract if selected for presentation.


Sarcopenia
No
Yes
No (censored)
Yes (censored)
p = 0.558
Cumulative Survival
1.0
0.8
0.6
0.4
0.2
0.0
0
10
20
30
40
50
60
Survival (months)

P 53. SANTORINI'S DUCT IPMN: SHOULD IT BE ADDED AS A NEW HIGH-RISK CRITERION?

M Machado , M Autran
Presenter: Marcel C. Machado MD | University of São Paulo, Brazil

Background: Intraductal papillary mucinous neoplasm of the pancreas (IPMN) originates from the ductal epithelium of the pancreas and can progress to an invasive cancer. Since not every IPMN tend to be aggressive, development of guidelines to with recommendations to observe or to surgically treat those patients is needed. IPMN has been classified into two groups: main-duct (Wirsung duct) and branch-duct types. The main-duct IPMNs are considered as more aggressive while branch-type are benign or low-grade lesions, however, no mentions are made related to Santorini's duct (SD) IPMN that has been so far considered as a branch-type lesion in the literature. The main objective of this study is to present a case of Santorini's duct IPMN with high-grade dysplasia and invasive carcinoma, review of the literature and to propose the inclusion of this type of IPMN as a high risk criterion in the IPMN guidelines.

Methods: We reviewed all papers reporting IPMN in the SD. We found a total of 21 cases, including ours.

Results: Sixteen patients (76.2%) presented with malignant disease at diagnosis. In our case on histological evaluation a well-defined intraductal mucinous neoplasm originating in the Santorini's duct with minor invasive component and exuberant exudative/suppurative inflammatory process in organization, surrounded by fibrosis was found (the set of neoplasia and inflammatory and fibrous changes measures 4.3 cm). Microscopic neoplastic extension: invasive adenocarcinoma is restricted to the pancreas, the intraductal component extends to the minor duodenal papilla and the fibrous inflammatory process adheres the pancreas to the duodenum. Neoplastic involvement was not detected in the main pancreatic duct, in the greater duodenal papilla and in the choledochal duct.

Conclusion: Due to its malignant behavior, similar to the main pancreatic duct, Santorini's IPMN should be included as a high-risk criterion in the guidelines for the management of intra ductal papillary mucinous neoplasm of the pancreas .

P 56. ROLE OF INFLAMMATORY AND NUTRITIONAL MARKERS IN PREDICTING COMPLICATIONS FOLLOWING PANCREATICODUODENECTOMY

R Jotheeswaran, H Singh, J Kaur, R Nada, T D Yadav, V Gupta, S S Rana, R Gupta
Presenter: Rajeshwar Jotheeswaran MD | Postgraduate Institute of Medical Education And Research, India

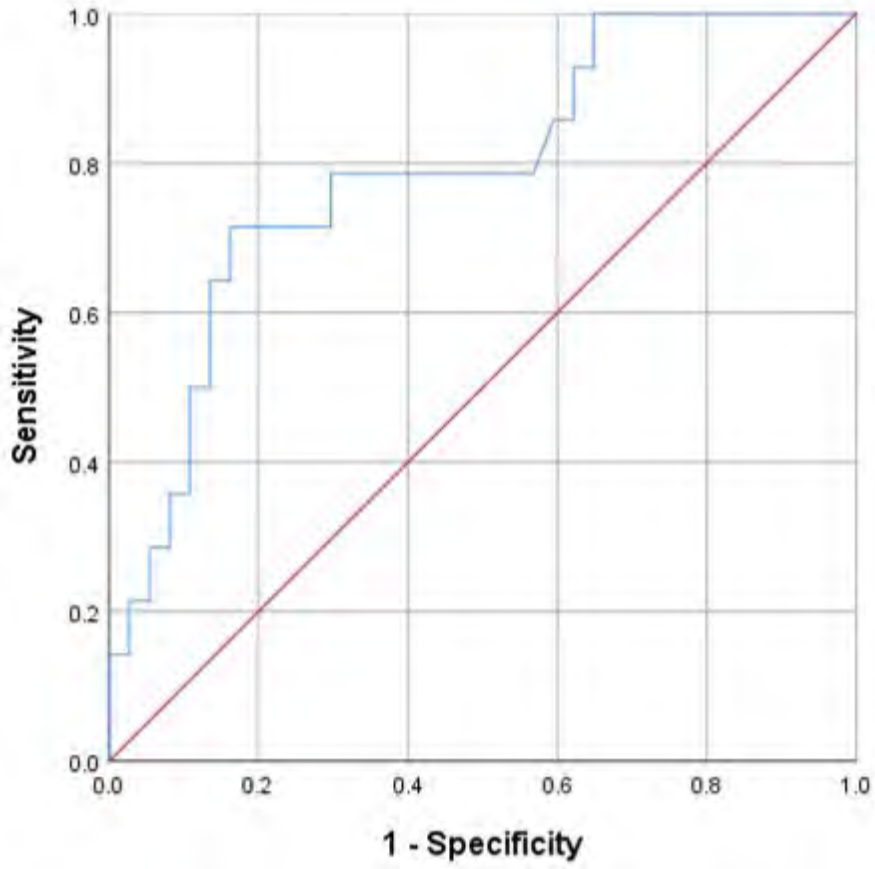
Background: Pancreaticoduodenectomy (PD) is attended with considerable morbidity and mortality. Early recognition of patients likely to develop severe postoperative complications will allow timely institution of tailored approach. Present study was planned to predict post-operative complications using inflammatory and nutritional markers measured early in the post-operative period.

Methods: Patients undergoing PD between June 2019 and November 2020 were included. Postoperative pancreatic fistula (POPF), delayed gastric emptying (DGE), and post-operative pancreatic hemorrhage (POPH) were graded according to the International Study Group of Pancreatic Fistula and the International Study Group of Pancreatic Surgery. We also documented other complications like wound infection, intraabdominal collection and non-surgical complications. Nutritional and inflammatory markers were analyzed on postoperative day (POD) 1 and 3 Patients were followed up for a period of 30 days or till discharge whichever was longer.

Results: Patients undergoing PD between June 2019 and November 2020 were included. Postoperative pancreatic fistula (POPF), delayed gastric emptying (DGE), and post-operative pancreatic hemorrhage (POPH) were graded according to the International Study Group of Pancreatic Fistula and the International Study Group of Pancreatic Surgery. We also documented other complications like wound infection, intraabdominal collection and non-surgical complications. Nutritional and inflammatory markers were analyzed on postoperative day (POD) 1 and 3 which included albumin and Prognostic Nutritional Index (PNI), procalcitonin, C-Reactive Protein (CRP), Systemic Immune Inflammation Index (SIII), Neutrophil Lymphocyte Ratio (NLR), Platelet Lymphocyte Ratio (PLR), serum and drain fluid Interleukin- 6 (IL6), serum and drain fluid Tumor Necrosis Factor alpha (TNF α), drain fluid lactate, pyruvate, glucose, lactate/pyruvate, urine trypsinogen-2 and modified Glasgow Prognostic Score (mGPS). Patients were followed up for a period of 30 days or till discharge whichever was longer.

Conclusion: Drain fluid IL6 and Urine trypsinogen-2 on POD3 can rule out occurrence of CR-POPF.

Fig.1: ROC curve for Drain Fluid IL 6 on POD3:



P 57. COMPARING POST- OPERATIVE OUTCOMES FOR PANCREATIC DUCTAL ADENOCARCINOMA: NEOADJUVANT THERAPY VERSUS UPFRONT SURGERY

T Almerey, D Hyman, A Mujkanovic, J Stauffer
Presenter: Tariq Almerey MD | Mayo Clinic, Jacksonville, United States

Background: Optimal outcomes regarding upfront surgery versus neoadjuvant therapy (chemotherapy and radiation) for pancreatic ductal adenocarcinoma (PDAC) is debated. There is concern that neoadjuvant therapy may result in worsened postoperative outcomes. Our study objectives were to show the impact of neoadjuvant chemotherapy on post-operative morbidity and mortality.

Methods: Pancreatic resections for PDAC between 1/1/2010-12/31/2020 were included in this retrospective review. Data pertaining to 90-day complications were obtained and graded according to international consensus guidelines. Clavien-Dindo scores were retroactively assigned to each subject with an associated 90-day complication. Categorical variables were compared by Fisher's Exact Test.

Results: 370 subjects who underwent pancreatic resection for PDAC were included in this review. There was no significant difference in the rate of major morbidity between subjects who received upfront surgery and neoadjuvant therapy (15.5% vs 20.3%). Similarly, there were no significant differences in the rates of mortality (3.4% vs 2.9%), post-operative pancreatic fistula (9.5% vs 10.9%), or postpancreatectomy hemorrhage (6.9% vs 6.5%) respectively.

Conclusion: The role of neoadjuvant therapy for resectable disease in the management of PDAC is controversial. We show that postoperative outcomes are not worsened by the use of neoadjuvant therapy prior to pancreatic resection for PDAC. Further research is needed to reveal which patient subgroups may benefit from the use of neoadjuvant therapy.

P 58. ANALYZING HOW PERIOPERATIVE VARIABLES PREDICT SURVIVAL IN ROBOTIC DISTAL PANCREATECTOMY AND SPLENECTOMY FOR PATIENTS WITH ADENOCARCINOMA OR NEUROENDOCRINE PATHOLOGY

S Ross, I Sucandy, H Jacoby, J Primus, K Crespo, C Syblis, A Rosemurgy
Presenter: Harel Jacoby MD | Digestive Health Institute Tampa, United States

Background: This study was undertaken in patients with adenocarcinomas and neuroendocrine tumors to determine whether perioperative variables predict survival following a robotic distal pancreatectomy and splenectomy.

Methods: We prospectively followed 67 patients who underwent robotic distal pancreatectomy and splenectomy for adenocarcinoma or neuroendocrine tumor. Employing a correlation matrix, we established associations between perioperative variables. Utilizing the Cox-model of Proportional Hazards, we eliminated covariance in determining the significance and influence of perioperative variables on survival. Data are presented as median(mean±SD).

Results: Of the 38 patients with adenocarcinoma, a correlation matrix denoted significance between tumor size and mortality (p=0.01) and significance between operative duration and LOS (p=0.003) and operative duration and complications with Clavien-Dindo score≥III (p=0.006). Sex, age, BMI, ASA class, operative duration, EBL, occurrence of serious complications [Clavien-Dindo score≥III], length of stay (LOS), and readmission within 30 days did not influence patient survival. By Cox Model, only tumor size was a predictor of duration of survival (p=0.03). (Table)

Utilizing the correlation matrix for the 29 patients with neuroendocrine tumors, we determined that men (p=0.04) and positive margins (p=0.002) correlated with higher mortality; men also had a greater BMI (p=0.01), ASA class (p=0.009), and operative duration (p=0.01) while positive margin status increased LOS (p=0.003). By Cox Model, there were no significant associations or influences between perioperative variables and duration of survival.

Conclusion: For patients with adenocarcinoma who underwent robotic distal pancreatectomy and splenectomy, only tumor size had a significant association with duration of survival. For patients with neuroendocrine tumors, male patients and patients with positive margins correlated with higher mortality, but none of the perioperative variables tested influenced duration of survival. Tumor size can be used to predict duration of survival for patients with adenocarcinoma, while there are no perioperative variables that predict duration of survival for patients with neuroendocrine tumors.

	Adenocarcinoma	Neuroendocrine Tumor
Number of Patients (n)	38	29
Age (years)	73(70±10.2)	57(57±9.4)
Sex (M/W)	22/16	13/16
BMI (kg/m^2)	27(27±5.2)	30(30±6.4)
Previous Abdominal Operations (n)	16	15
ASA Class	3(3±0.5)	3(3±0.6)
Intraoperative Variables		
Operative Duration (min)	306(301±93.7)	221(246±94.7)
Estimated Blood Loss (mL)	120(181±160.4)	100(154±172.6)
Positive Margin Status (n)	4	1
Intraoperative Complications (n)	1	0
Tumor Size (cm)	4(4±2.0)	2(3±2.3)
Postoperative Variables		
Postoperative Complications (n)	6	0
Clavien-Dindo Score (≥III)	3	0
In-Hospital Mortality (n)	0	0
Length of Stay (days)	4(6±4.2)	4(5±2.2)
Readmissions within 30 days (n)	2	3

P 59. SURGICAL RESECTION OF SPORADIC PANCREATIC NEUROENDOCRINE TUMORS: A TWO-DECADE EXPERIENCE AT A LARGE VOLUME CANCER CENTER

BJ Kim, N Ikoma, MP Kim, CD Tzeng, JE Lee, MHG Katz, J Maxwell
Presenter: Bradford J. Kim MD, MHS | University of Texas MD Anderson Cancer Center, United States

Background: Neuroendocrine tumors (NET) are indolent, although an estimated 50% of patients present with metastatic disease. Surgical resection may be reasonable in well-selected patients at every disease stage; but for patients with pancreatic NETs (PNETs), operative risk must be carefully balanced with the risk of progression or recurrence. The objective of this study was to determine post-pancreatectomy long-term outcomes in PNET patients undergoing resection.

Methods: From 2000-2020, clinicopathologic information was collected for patients undergoing resection for sporadic PNETs (inherited PNETs excluded) at a large volume cancer center. Surgical complications were prospectively tracked (from 2011) using the Modified Accordion Grading System (MAGS; Major Complication:Grade≥3).

Results: Among 392 resected PNET patients, 52.6% were male with a median age of 57 years (IQR:48-66). Twenty percent of patients presented with metastatic disease. Operations performed included enucleation (7.7%), distal pancreatectomy (56.9%), central pancreatectomy (4.3%), pancreaticoduodenectomy (30.1%), and total pancreatectomy (1.0%). Median tumor size was 3 cm (IQR:1.9-5.0), with an R0 resection rate of 90.8%. Twenty-nine percent of all patients had a major complication. Rates of delayed gastric emptying, pancreatic fistula, and postoperative transfusion were 12.8%, 46.8%, 7.7%, respectively. Median length of stay was 8 days (IQR 6-11). Concurrent hepatic metastatectomy was performed in 12% of patients with a major complication rate of 7.1%. Median overall survival (OS) of all patients was 171 months. Nonmetastatic PNET patients had improved OS compared to metastatic patients (179 months vs.103 months, $p< 0.001$, Figure).

Conclusion: PNET resection is safe and can be associated with prolonged survival. Further, resection of the primary PNET and associated metastatic disease is not associated with increased morbidity in selected patients and may achieve long-term survival.

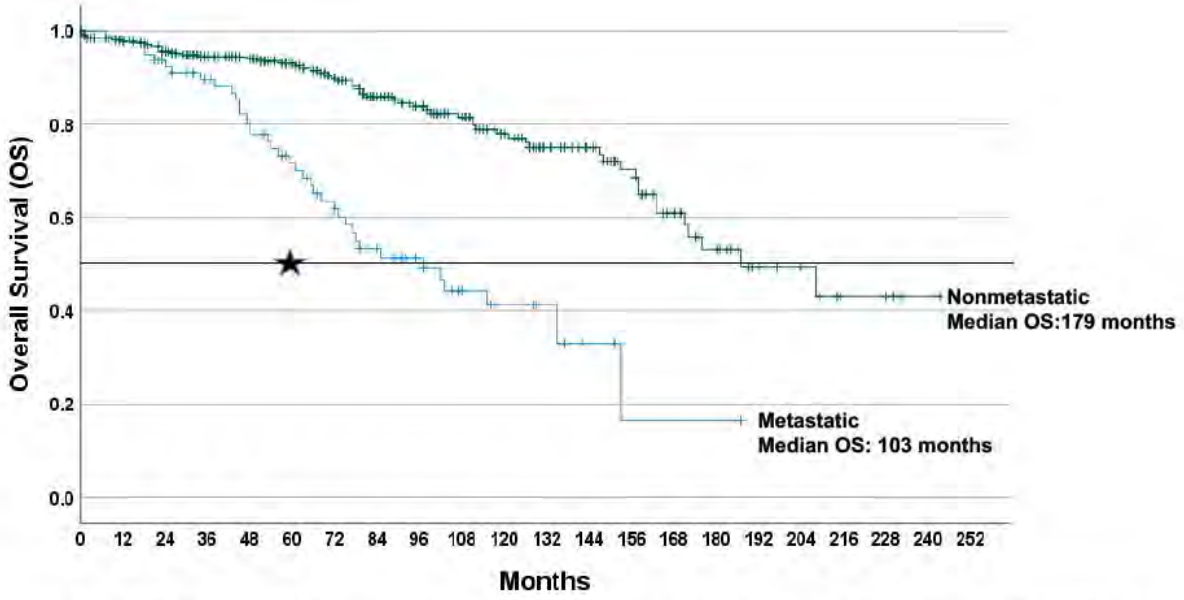


Figure Legend: Median survival for resected metastatic and nonmetastatic PNETs at MD Anderson Cancer Center compared to median OS of all advanced PNET according to SEER analysis (2000-2012).

P 60. THE FIRST 40 CONSECUTIVE FULLY ROBOTIC PANCREATODUODENECTOMY PERFORMED BY A SINGLE SURGEON WITHOUT CONVERSION TO OPEN SURGERY: A CASE- SERIES

C Carpenito, N Furbetta, M Palmeri, G Di Franco, S Guadagni, D Gianardi, M Bianchini, A Comandatore, C Gianfaldoni, M Mastrangelo, M Cammarata, G Di Candio, L Morelli

Presenter: Annalisa Comandatore MD | University of Pisa, Italy

Background: Several studies have compared robotic pancreatoduodenectomy (RPD) and open pancreatoduodenectomy (OPD), showing that robotic RPD is a feasible and safe procedure for both benign and malignant pathologies. Technical challenges of minimally invasive surgery limited the diffusion of the RPD despite some studies have demonstrated that RPD reduces estimated blood loss and length of post-operative stay in comparison to OPD and that RPD is associated with better oncological outcomes respect to OPD. Furthermore, the reported learning curve for RPD performed by a single surgeon ranges from 20 to 100 cases, and a rate of conversion to open surgery ranges from 1.1% to 5.1%. We report our experience, with the first 40 consecutive fully RPD with the use of the da Vinci Xi, performed between 2018 and 2021 by a single surgeon with previous experience in pancreatic surgery and in robotic surgery for other indications.

Methods: The first 40 consecutive RPD performed between May 2018 to December 2021 by the same operator with the da Vinci Xi were retrospective analyzed. At the beginning of the series, the surgeon was already highly experienced in pancreatic surgery (> 400 procedures) and in minimally invasive surgery (both laparoscopic and robotic surgery, > 800 procedures). The only surgical exclusion criterion for RPD was the presence of vascular involvement (borderline resectable or locally advanced tumors). Intraoperative and perioperative outcomes were evaluated, including previous abdominal surgery and BMI.

Results: No conversion to open surgery was reported. Eighteen out of 40 patients (45%) had undergone previous abdominal surgery, 14 of 40 (35%) had a BMI between 25 kg/m2 and 30 kg/m2 and 3 of 40 (7,5%) had a BMI greater than or equal to 30 kg/m2. Mean operative time was 434,9 $\pm$ 112,1 mins while mean console time was 282,7 $\pm$ 39,5 minutes. Thirty-two out of 40 (80%) were pylorus preserving PD while the remaining 8 (20%) were Whipple procedures. All the procedures were performed with a fully robotic technique, both for the resective phase and for the reconstructive phase, including all anastomoses (pancreatojejunostomy, hepaticojejunostomy and duodenojejunostomy or gastrojejunostomy). The median postoperative stay was 10 days [8-21,75], 15 out of 40 patients were discharged within POD 8.. Five patients (12,5%) had major complications (grade 3 Clavien-Dindo or above), while only 2 (5%) clinically relevant (both grade B) POPFs were encountered. There was no 30-day mortality.

Conclusion: In our experience, RPD is a technically feasible and safe procedure for pancreatic and periampullary tumours. Previous experience in pancreatic and minimally invasive surgery, both laparoscopic and robotic surgery, together with the use of the da Vinci Xi, seem to play a significant role to flatten the specific learning curve for RPD, and to reduce the risk for conversion to open surgery.

P 61. COMPLETE PANCREATIC DUPLICATION: CASE REPORT AND REVIEW OF THE LITERATURE

N Lluis, Y Curbelo, P Inampudi, D Asbun
Presenter: Nuria Lluis MD | Miami Cancer Institute, United States

Background: Complete pancreatic duplication is an extremely rare anatomic variant. We describe a case report of an incidentally found complete pancreatic duplication with an inverted orientation and separate ductal system, as well as a review of the literature.

Methods: The patient's medical chart and imaging were reviewed. A literature search was performed in PubMed of English-written articles describing pancreatic anatomic variants.

Results: A 24-year-old female with a past medical history of nephrolithiasis and Crohn's disease on biological treatment underwent a follow-up MR enterography after experiencing mild abdominal pain during the past four months. Imaging revealed the presence of a complete pancreatic duplication. The accessory pancreas was located in the left hemiabdomen, slightly more inferiorly than the dominant pancreas. The head was oriented laterally, and associated with the first jejunal loops. Neither the dominant pancreas or the accessory pancreas were associated with peripancreatic inflammatory stranding. No pancreatic ductal dilatation or glandular calcifications were noted.

Fusion or duplication variants may arise from the pancreatic ductal system. Head/body or tail bifurcations, looped or N-shaped head, ring configuration of the head, and anomalous origin of the uncinate process are amongst rare variants of duplication described in the literature. The complete duplication of pancreatic parenchyma is much less commonly described. The incidence of pancreatitis in patients with duplication anomalies does not appear to be higher than that of the general population.

Conclusion: The identification of asymptomatic congenital pancreatic variants is rarely reported. To the best of our knowledge, this is the first report of a large heterotopic pancreatic duplication lodged between jejunal loops with inverse orientation and a separate ductal system.

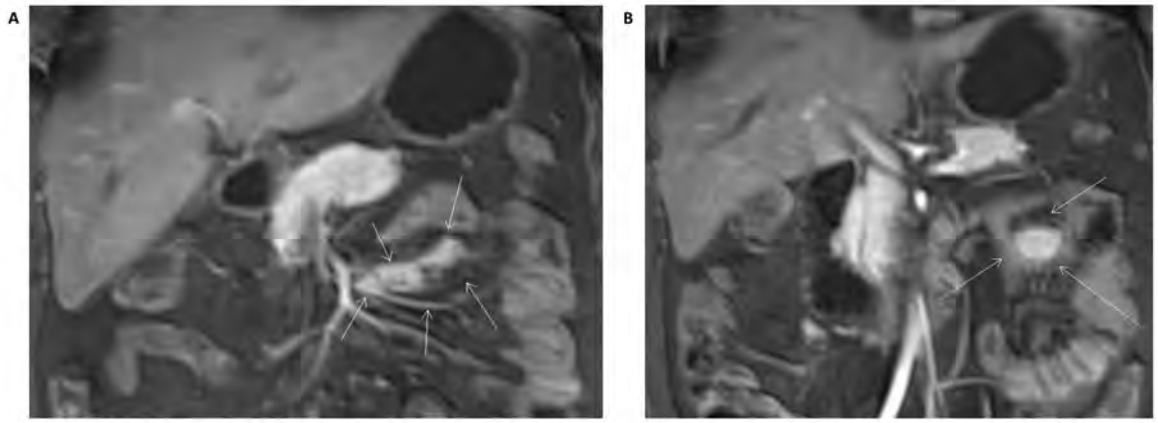


Figure 1. Complete pancreatic duplication. A) Coronal post-contrast T1-weighted images at the arterial phase show the accessory complete pancreas situated in the left hemi-abdomen, slightly more inferiorly than the dominant pancreas. B) The head is associated with the first jejunal loops. Neither the dominant or the accessory pancreas show peripancreatic inflammatory stranding.

P 62. BUTYRYLCHOLINESTERASE CONTROLS THE CANINE PANCREAS DIGESTIVE ENZYMES SYNTHESIS RATE BY CONTROLLING THE NUMBER OF ACH RECEPTORS OCCUPIED. THIS EXPLAINS HOW TOXIC ACINAR CELL DAMAGE CAUSES PANCREATITIS

T Dressel

Presenter: Thomas D. Dressel BME MS MD | University of Minnesota, United States

Background: We developed a canine model for acute pancreatitis, induced by intravenous injection of the anticholinesterase, (O,O-Diethyl-O-(2-isopropyl-6-methyl-4-pyrimidinyl) phosphorothioate), Diazinon, 75 mg/ kg. Butyrylcholinesterase (BCHE) is synthesized, stored, and secreted by the canine acinar cells in an active form.

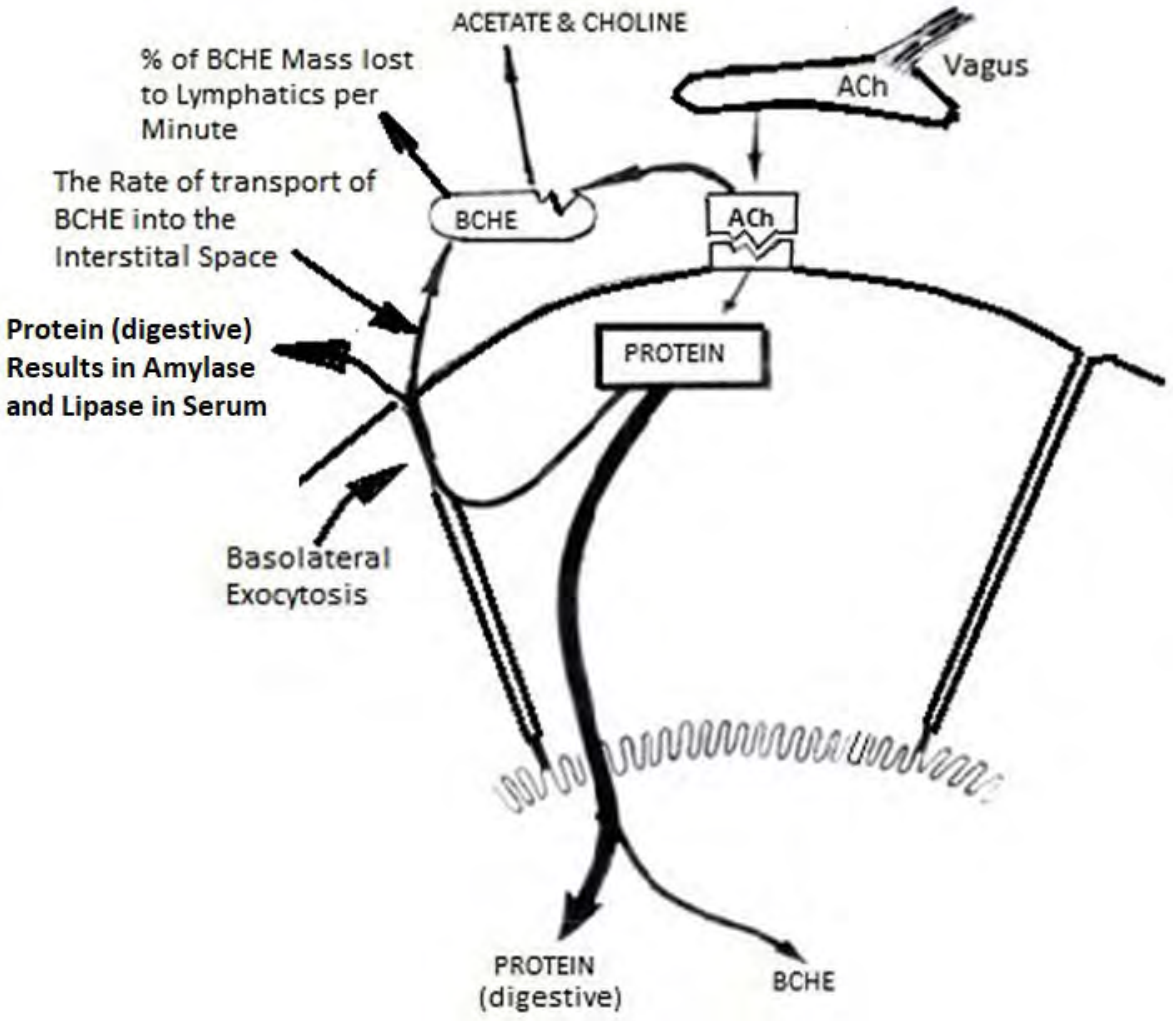
Methods: The principals control theory are applied to a model of the pancreatic lobule that incorporates the low level, dose dependent basolateral transport of pancreatic enzymes and BCHE into the interstitial space. This basolateral transport mechanism is responsible for the nonzero amounts of serum amylase and lipase seen under physiologic levels of pancreatic stimulation. Unlike the neuromuscular junction, where there is a fixed amount of membrane bound acetylcholinesterase, in the canine pancreas interstitial space, there is a variable amount of water soluble butyrylcholinesterase.

Results: The mass of BCHE present in the interstitial space is a dynamic balance between the rate of basolateral transport of BCHE into, and the diffusion out of, the interstitial space. In the steady state, (constant rate of ACh released by the Vagus nerve), the mass of BCHE in the interstitial space = the rate of basolateral transport of BCHE into the interstitial space, divided by the percentage rate of loss of BCHE into the lymphatics. For example, if the transport rate of BCHE into the interstitial space is one mg/ minute, and the percentage rate of loss of BCHE to the lymphatics is 10 % of the mass per minute, then the mass of BCHE in the interstitial space is (one mg/min)/(0.1/min) = 10 mg.

Conclusion: This negative feedback model gives insight into the pathogenesis of pancreatitis. In a steady state, the rate of Vagal ACh released into the interstital space is constant. And there is a perfect balance between the rate of release of ACh into the interstital space and the rate of hydrolysis of ACh by the BCHE activity. The ACh receptor occupancy is constant. Any toxic insult to the acinar cells that reduces the rate of digestive enzyme output, initially results in a decrease in the rate of transport of BCHE into the interstitial space, and a reduction of the amount of BCHE in the interstital space, which causes ACh receptor occupancy to increase, which then increases the rate of enzyme synthesis. The amount of BCHE in the interstital space increases until there is again just enough BCHE to hydrolyze all of the ACh entering the interstital space. This control mechanism acts like “cruise control” for the rate of digestive enzymes synthesis, in that it restores the rate of protein synthesis present before the toxic insult, but it requires a greater number of ACh receptors occupied to do so. If the toxic damage is severe enough to cause the increase in receptor occupancy to result in hyperstimulation, then it predisposes the pancreas to pancreatitis.

The human pancreas doesn’t synthesize BCHE, but Diazinon causes pancreatitis in humans. The human pancreas must synthesize a different secretagogue specific inhibitory enzyme. It's an unknown, water soluble, serine protease enzyme, synthesized, stored, and secreted in an active form.

Closed Loop Model of Canine Pancreatic Lobule With BCHE as the Secretagogue Specific Inhibitory Enzyme



P 63. CAN WE COMPARE THE RESULTS OF THE TREATMENT OF RESECTABLE AND BORDERLINE PANCREATIC CANCER.

I Zhvitiashvili, R Alibegov, O Sergeev
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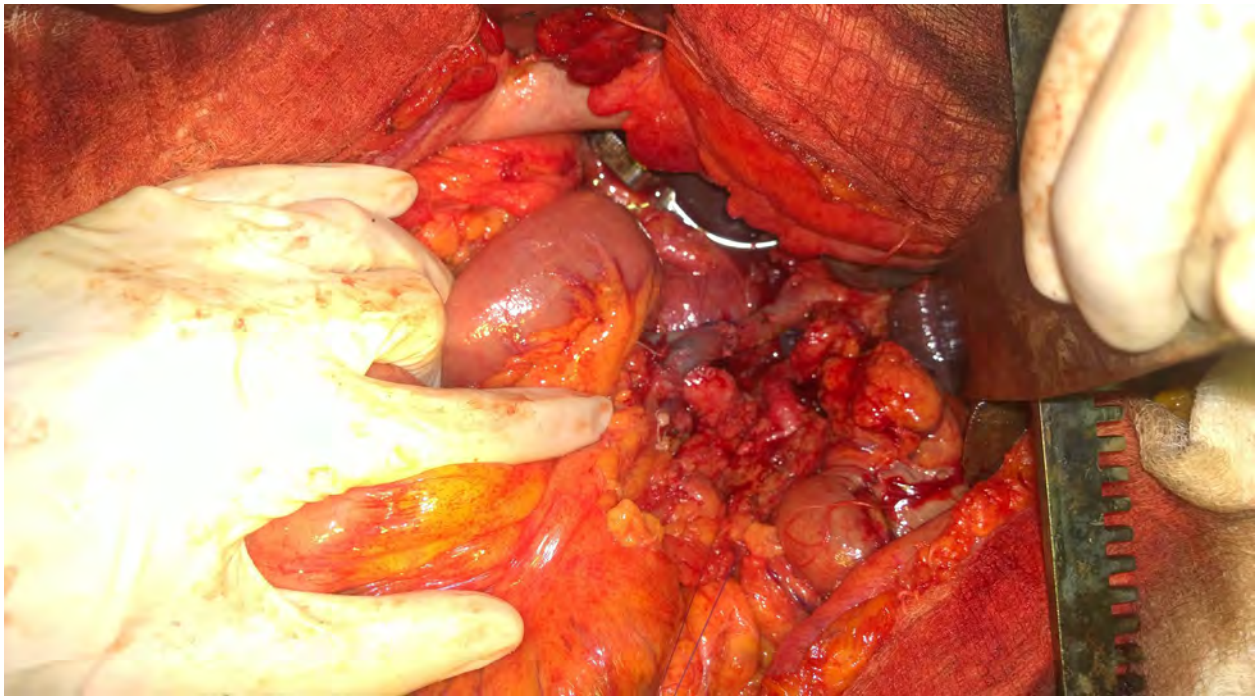
Background: Surgical treatment of pancreatic cancer (PC) is one of the most difficult problem of surgery. Currently, there is a large range of surgical procedures on the pancreas and methods of combined treatment, but the problem remains relevant to this day.

Methods: We analyzed the results of surgical treatment of 191 patients with PC. St.I-16 (8.4%), St.II – 108 (56.5%), and St.III – 62 (32.4%), St.IV-5 (2.6%). Men-132 (69,1%), women – 59 (30.9%), age - 61.1±6.7 years. Localization of tumor: head of pancreas – 170, distal tumors - 19, total lesion - 2. Pancreatoduodenectomy (PD) was performed in 170 patients, 18 patients undergone distal pancreatic resection: RAMPS – 13, Kimura's procedure – 1, Warshaw – 1, Applbey – 3; total pancreatectomy - 2. In cases of vascular invasions was performed: portal vein (PV) resection – 2, resection superior mesenteric vein (SMV) – 6, resection of the porto-mesenteric junction - 8, resection of the side wall of PV/SMV – 4, graft implantation – 3, plastic of the SMA – 1, celiac trunk resection – 3. Patients are divided into 2 groups: 1st - standard PD - 164, 2nd - operations with blood vessels resection - 27.

Results: Morbidity and mortality rates were evaluated within 30 days after surgery. Pancreatic fistula (PF) - 14.7% (28): gr. A-14, gr. B-10, gr. C-4. Bile lekage – 6.3% (12), pancreatitis – 2.6% (5), delayed gastric emptying – 4.2% (8), bleeding – 8,4% (gr. A-6, gr. B-6, gr. C-4), abscess - 3.7% (7), wound infection – 3.7% (7), others – 7,9% (15). Morbidity -51.3% (98), and mortality - 4.7% (9). In 1st gr. Morbidity and mortality rate is 50,6% (83) and 4,3% (7), in 2nd gr. – 55.5% (15) and 7.4% (2) respectively. PF in 1st gr. – 14.6% (24), 2nd gr. – 14.8% (4). R1 resections in the 1st group - 4 (2.4%), 2nd gr. – 2 (7,4%). Long-term results: overall survival – 23.5 months, relapse-free survival – 17.1 months. In the 1st gr. - 26.8 and 18.9 months accordingly, in the 2nd – 20.2 and 16.4 months. One year survival – 54.3%, 3-years-17.1%, 5-years - 11.4%.

Conclusion:. Surgical treatment patients with borderline resectable PC is more difficult and is accompanied by slightly worse immediate results. Performing vascular resection during tumor invasion with the achievement of marginR0 allows for comparable rates of overall and relapse-free survival.

Patients from the 2nd group had at least the 3 stage of the tumor at the time of surgery, that's why the morbidity and mortality rate was higher. But all these patients undergone radical surgical treatment, which allowed almost equalize the long-term survival in both groups.



P 64. CYTOREDUCTION WITH HIPEC FOR ADENOCARCINOMA FOLLOWING COMPLETION PANCREATECTOMY FOR RECURRENT IPMN

NL Lad, GB Deutsch, S Anantha, MJ Weiss, D DePeralta, R Zaidi
Presenter: Neha Lad MD | Northwell Health Cancer Institute, United States

Background: We present a unique case of recurrent IPMN which after complete resection presented with mucinous adenocarcinoma in the resection bed which was treated with HIPEC with Mitomycin C, and cystoreduction. The patient initially presented at the age of 37years with pancreatic head IPMN for which he underwent pancreatoduodenectomy in 2017. Intraoperative frozen section of neck margin was negative. Postoperative recovery was uneventful. Final pathology revealed IPMN with extensive high grade dysplasia at neck margin, intrapancreatic rupture with mucin extrusion, PanIN3 , 0/24 LN, pTisN0. He was lost to follow up and presented 1.5yr later with SBO which resolved with conservative management. Surveillance MRI in 2019 showed increased cystic dilation of pancreatic duct at pancreticojejunostomy and an additional cyst concerning for recurrent disease which was confirmed on EUS which revealed acellular mucin but no dysplastic cells. The patient underwent completion pancreatectomy, final pathology showed extensive high grade dysplasia, no invasive malignancy, 0/17LN, an implant at anastomotic site with mucin and high grade dysplasia. Surveillance imaging 10 months after completion pancreatectomy revealed 2.4cm lesion in the area of pancreatic with an adjacent smaller lesion, mildly PET avid. After discussion at tumor board regarding local therapy, on follow up image 3 months later, the lesion increased in size to 3.8cm superior to portal vein in the resection bed. Patient underwent exploratory laparotomy, resection of periportal mass, peritoneal cystic lesion, and HIPEC in Feb 2021. Pathology was consistent with abundant mucin fragment with minute focus of adenocarcinoma, mucinous epithelium with high grade dysplasia. He received 12 cycles of gemcitabine and Xeloda which was well tolerated. Currently remains no evidence of disease on most recent follow up 12 months after cytoreduction and HIPEC.

P 65. SURVIVAL ASSOCIATED WITH STAGING CT AND DIAGNOSTIC LAPAROSCOPY AND CYTOLOGY IN PANCREATIC ADENOCARCINOMA: A CASE SERIES

N Panse, R Trivedi, V Prasath, S Arjani, RJ Chokshi
Presenter: Neal Panse | Rutgers New Jersey Medical School - Newark, United States

Background: Pancreatic cancer has a 5-year survival rate of approximately 10% and incidence has been trending upwards for the past 20 years. Patients with localized disease are treated with curative intent using a combination of surgical resection and systemic therapy. Diagnostic staging is performed with computed tomography (CT). While CT imaging effectively identifies extent of gross disease, micro-metastases cannot be captured. Performing laparoscopy and peritoneal cytology at the time of diagnosis can uncover disease in peritoneal fluid that is not perceptible by CT. However, additional staging may delay neoadjuvant therapy and its benefits are unclear. Laparoscopy and cytology may improve accuracy of cancer staging and avoid futile surgery in patients with metastatic disease.

Methods: This is a single-center retrospective review of eight patients with non-metastatic pancreatic cancer diagnosed from 2017-2020. Patients were staged using CT and subsequently underwent diagnostic laparoscopy and cytology. Patient demographics, clinicopathologic status, treatment course, and survival was also obtained.

Results: Eight patients met study criteria. One patient had resectable disease by CT while seven had locoregional disease (Table 1). All patients had negative laparoscopies. The patient with resectable disease and four with locoregional disease had negative cytologies as well. Of the remaining three patients with locoregional disease, two cytologies showed atypical cells, and one was positive for micro-metastases. Among five total patients with a negative laparoscopy and negative cytology, two underwent surgical resection. No surgical resections were aborted due to disease spread. None of the three patients with atypical or positive cytology underwent resection. The two patients who underwent resection received neoadjuvant chemotherapy and remain alive, with an average of 22.0 months since diagnosis. The patient with negative laparoscopy and positive cytology received chemotherapy and remains alive, with 21.8 months since diagnosis.

Conclusion: This study found similar average survival in two patients with R0 resection following negative laparoscopy and cytology, and a patient with systemic therapy following negative laparoscopy and positive cytology. Laparoscopy and cytology may have spared the cytology-positive patient a non-therapeutic surgery, thereby maximizing quality of life. Evidence in published literature also suggests that cytology-positive patients do not show significant survival benefit with resection. Despite potential benefits associated with more accurate staging, universal laparoscopy and cytology may increase risk of disease progression due to delayed initiation of neoadjuvant therapy, particularly in patients with resectable lesions. Further research to determine which patients would most benefit from invasive staging is warranted.

Table 1. Patient demographics

Category	Variable	n=8
Age at Diagnosis (years)		65.6 (range 56 - 77)
Race		
	White	2 (25%)
	Non-White	6 (75%)
Comorbidities		
	HTN	6 (75%)
	DM	6 (75%)
Smoking History		
	Yes	4 (50%)
	No	4 (50%)
Alcohol Use		
	Yes	4 (50%)
	No	4 (50%)
Tumor Location		
	Head	6 (75%)
	Body/Tail	2 (25%)
Resectability by CT		
	Resectable	1 (12.5%)
	Locoregional	7 (87.5%)
	Metastatic	0 (0%)

P 66. RECURRENT METASTATIC SOLID PSEUDOPAPILLARY NEOPLASM OF THE PANCREAS FOLLOWING ABDOMINAL TRAUMA TREATED BY CYTOREDUCTIVE SURGERY

B Wummer, I Wu, S Song, R Lamm, S Cannaday, W Jiang, A Nevler, DG Mitchell, H Lavu, WB Bowne, CJ Yeo
Presenter: Brandon Wummer BSc | Thomas Jefferson University Hospital, United States

Background: Solid pseudopapillary neoplasm (SPN) is a rare pancreatic tumor that most commonly arises in young women with non-specific clinical symptoms. Although SPNs typically display indolent behavior with a favorable natural history, pancreatic trauma leading to tumor disruption may result in occult peritoneal seeding providing a mechanism for development of metastatic disease.

In this report, we present the case of a patient with SPN metastasizing throughout the abdomen and pelvis nearly 16 years after resection of a SPN discovered incidentally following blunt pancreatic trauma sustained during an acrobatic cheerleading accident. In September of 2004 the patient, age 16, underwent an exploratory laparotomy, distal pancreatectomy and splenectomy for a transection of the body of the pancreas with a large left retroperitoneal hematoma. Pathology revealed a 1 x 4 cm laceration in the spleen; an 8 cm hemorrhagic portion of adipose tissue and 5 x 3 x 0.5 cm mass lesion with an area of surface disruption in the distal portion of the pancreas. The resection margin showed no evidence of involvement and 3 resected lymph nodes that were negative for tumor. The sections obtained from the capsular margin of the neoplasm showed the neoplasm to be present at the margin, however, there was no evidence of adherent soft tissue or vascular structures that would imply invasion of these structures. Since 2004, the patient has been followed by serial imaging which revealed peritoneal nodularity slowly growing (Figure 1A and 1B). In 2020, at age 30, 13 ova were harvested and banked. Following confirmatory diagnostic studies for metastatic SPN, complete resection of macroscopic tumor was recommended and thereafter performed by complete cytoreductive surgery (CCRS): exploratory laparotomy, lysis of adhesions, cholecystectomy, omentectomy, resection of the splenic flexure of the colon with en bloc tumor nodules and colocolostomy, limited distal pancreatectomy, and pelvic peritonectomy with resection of tumor nodules (from the right paracecal area, the posterior cul-de-sac area, the anterior cul-de-sac bladder flap region, and the right broad ligament). The peritoneal cancer index (PCI) was 11. Histopathology revealed a characteristic pseudopapillary growth pattern and positive nuclear beta-catenin staining consistent with recurrent SPN. A Pan Cancer 42 gene panel identified only a CTNNB1 mutation for beta catenin whose molecular pathway has been reported as aberrant during SPN tumorigenesis. The patient currently remains without evidence of disease progression 2 years after CCRS.

Conclusion: Although rarely reported, metastatic disease does occur with SPNs. Blunt trauma is a means for tumor rupture and disease dissemination. CCRS offers a treatment option for SPN with peritoneal metastasis that may provide durable oncologic benefit.

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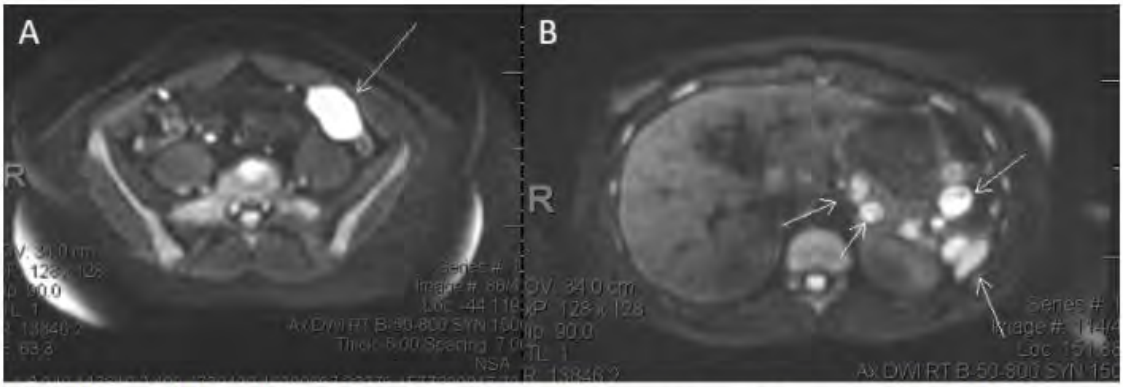
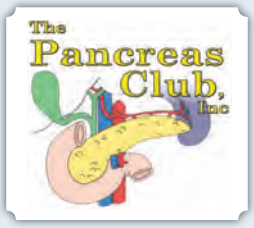
Figure 1



MRI MRCP 1/10/2020. Axial diffusion weighted images with b value = 800. White arrows show peritoneal metastasis.



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