SSAT Residents & Fellows Research Conference

Saturday, May 6, 2023
Room S504, McCormick Place (unless otherwise indicated)
Chicago, Illinois

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2:45 PM SESSION V 30

4:00 PM LEADERSHIP FORUM, NETWORKING SESSION AND ROUNDTABLES

KEYNOTE ADDRESS

Future Scenario Planning to Predict the Future of Surgery

Mary E. Klingensmith, MD

6:00 PM GLOBAL TRAINEE AND LEADERSHIP CONNECTIONS RECEPTION

Grand Park AB
Hyatt Regency
Mccormick Place

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7:30 AM **BREAKFAST AND WELCOME**
Maria Altieri, Chair of Residents and Fellows Committee
Jennifer Tseng, SSAT President

SESSION I

8-minute presentation, 6-minute discussion
Moderators: *Jennifer F. Tseng, MD, MPH*
Mark Talamini, MD

8:00 AM **DISSECTING THE ROLE OF NODAL METASTASES LOCATION IN PANCREATODUODENECTOMY AFTER NEOADJUVANT TREATMENT FOR CANCER: RESULTS FROM A PROSPECTIVE LYMPHADENECTOMY PROTOCOL**
Laura Maggino, MD (Verona, Italy)

8:14 AM **EXTENDING QUALITY IMPROVEMENT FOR PANCREATODUODENECTOMY WITHIN THE HIGH-VOLUME SETTING: THE EXPERIENCE FACTOR**
Samuele Cannas, MD, MS, MM (Philadelphia, PA)

8:28 AM **IMPACT OF A NON-THERAPEUTIC LAPAROTOMY IN PATIENTS WITH LOCALLY ADVANCED PANCREATIC CANCER UNDERGOING SURGICAL EXPLORATION TREATED WITH INDUCTION (M)FOLFIRINOX; A TAPS CONSORTIUM STUDY**
Rutger Theijse, MD (Meibergdreef, Amsterdam)

8:42 AM **DISCORDANCE BETWEEN CONVENTIONAL AND DETAILED LYMPH NODE ANALYSIS IN RESECTED PANCREATIC OR AMPULLARY ADENOCARCINOMAS**
Mohamedraed Elshami, M.D., M.M. ScD (Cleveland, Ohio)

8:56 AM **PANCREATIC CYSTIC NEOPLASMS: STILL HIGH RATES OF PREOPERATIVE MISDIAGNOSIS IN THE GUIDELINES AND EUS ERA**
Anna Burelli, MD (Verona, Italy)

9:15 AM **COFFEE BREAK (30 mins)**

8:00 AM

DISSECTING THE ROLE OF NODAL METASTASES LOCATION IN PANCREATODUODENECTOMY AFTER NEOADJUVANT TREATMENT FOR CANCER: RESULTS FROM A PROSPECTIVE LYMPHADENECTOMY PROTOCOL

Laura Maggino, Gabriella Lionetto, Andrea Bottardi, Sara Nobile, Fabio Casciani, Claudio Luchini, Aldo Scarpa, Claudio Bassi, Giuseppe Malleo, Roberto Salvia

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INTRODUCTION: The role of lymph node (LN) parameters in pancreatoduodenectomy (PD) for cancer has been mainly investigated in the upfront surgery setting. Yet, due to the impact of neoadjuvant therapy (NAT) on nodal status, these results cannot be directly translated to post-NAT PD. This study aimed to examine LN yields and metastases per anatomical stations and how the extension of LN dissection affects nodal staging in post-NAT PD. Lastly, the prognostic role of LN parameters was investigated.

METHODS: An institutional lymphadenectomy protocol was prospectively applied to all post-NAT PDs from June 2013. Lymphadenectomy included stations 5/6/8a-p/12a-b-c-p/13/14a-b/17 and jejunal mesentery LNs. Stations embedded in the PD specimen (13/14/17/jejunal) were defined as first-echelon, those sampled separately (5/6/8/12) as second-echelon. The prognostic impact of LN parameters in N+ patients was evaluated using uni- and multivariable Cox regression. To avoid collinearity, separate multivariable models were designed for each nodal parameter.

RESULTS: Among 288 patients 61% received FOLFIRINOX, 30% Gem-Abraxane. The median number of examined (ELN) and positive LNs (PLN) were 43 and 1, and 185 patients were N+ (64%). The commonest metastatic sites were stations 13 (51%), 14 (34%) and 17 (32%). The overall rates of first and second echelon involvement were 60% and 20%. The median number of ELN and PLN in the first echelon were 29 and 1. The addition of second echelon LNs increased nodal counts by 9 ELN and 0 PLN, resulting in only minor changes in staging.

The median follow-up was 25.1 months, 35.8 in censored cases. At multivariable analysis, second echelon involvement, ≥4 metastatic stations, metastases to station 8 and jejunal mesentery LNs, but not N2 status, were independently associated with survival of N+ patients, along with adjuvant treatment.

The median recurrence-free survival (RFS) was 14.8 months and 176 patients experienced recurrence (71%), among which 41 were local relapses (23%). In N+ patients, nodal echelons, ≥4 metastatic stations and tumor involvement of station 8,14 and jejunal mesentery LNs were independent predictors of RFS, along with Ca 19.9 response, T- and R-status and adjuvant treatment. Distant recurrences incrementally increased with nodal involvement (Figure 1).

CONCLUSION: LN metastases most commonly occur in first-echelon LNs, and first-echelon dissection provides an adequate number of ELN for optimal staging. Examining second-echelon LNs does not improve the staging process substantially. Yet, second-echelon involvement is prognostically relevant, as well as metastases to station 8 and jejunal mesentery LNs. These data have potential implications when assessing surgical indication after NAT. Moreover, intraoperative frozen section of station 8 might help decision-making, especially in technically demanding cases or fragile patients.

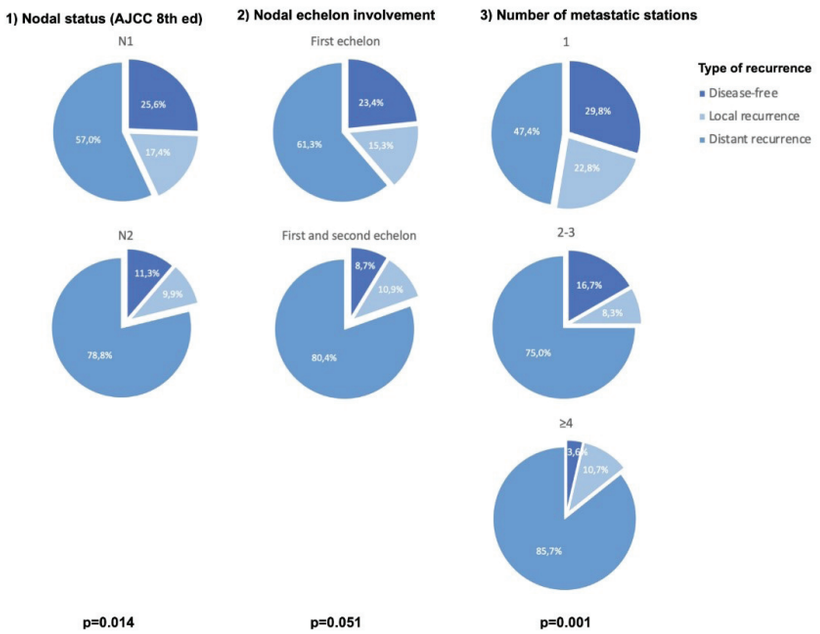

Figure 1: Type of recurrence stratified by nodal parameters in node-positive patients.

8:14 AM

EXTENDING QUALITY IMPROVEMENT FOR PANCREATODUODENECTOMY WITHIN THE HIGH-VOLUME SETTING: THE EXPERIENCE FACTOR

Samuele Cannas[1], Fabio Casciani[2], Charles Vollmer[1]
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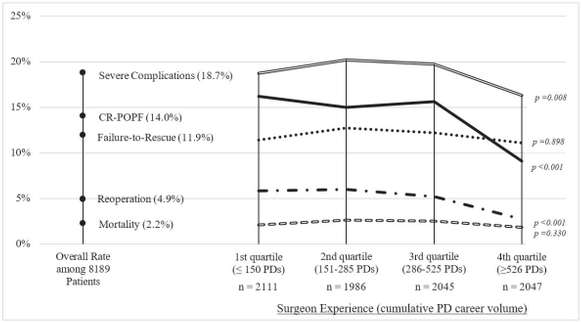
BACKGROUND: The concept of "experience" in surgery remains nebulous and multifactorial, encompassing both the surgeon and the institution as pivotal variables. While a surgeon's career volume seems to be a determinant in improving outcomes for pancreatoduodenectomy (PD), the influence of individual surgeon experience within high-volume institutional settings remains undefined. Within such a framework, the present investigation analyzes the association of cumulative surgeon volume experience with risk-adjusted postoperative outcomes after PDs.

METHODS: A total of 8,189 PDs performed by 82 surgeons at 18 international institutions (median:140 PD/year) were accrued from 2003 to 2020. Surgeon's cumulative PD volume was categorized in 4 quartiles (≤150, 151 to 285, 286 to 525 and ≥526 PDs). Associations of categorical and continuous variables were analyzed with appropriate univariate tests. Fistula Risk Score (FRS)-stratified performance comparisons of postoperative outcomes across each volume quartile were quantified through multivariable analyses. Next, the same methodology was implemented when considering the ten most impactful scenarios (previously defined as a combination of occurrence and severity) for the development of clinically relevant pancreatic fistula (CR-POPF; n = 2,830 patients).

Figure:
Outcomes of pancreatoduodenectomy based on individual surgeon's experience.



RESULTS: Within the overall cohort, 18.7% patients suffered severe complications (Accordion ≥3), 14% developed CR-POPF, 4.8% were reoperated upon, and 2.2% expired. Surgeons performed a median of 68.5 career PDs (IQR 21–136), with a median FRS of 4 (IQR 3–5). When compared with those with less experience, the top-quartile surgeons more often operated on intermediate/high FRS cases (73% vs 61%, p < 0.001); yet, their performance was associated with significant declines in CR-POPF, severe complications, reoperations, and length of stay (8 vs 9 d), whereas mortality and failure-to-rescue were not affected (Figure). This same outcome profile was accentuated even more when considering the most frequent and impactful FRS scenarios that surgeon encounter. In the overall cohort, risk-adjusted models indicate male gender, increasing age, ASA class and FRS, but not surgeon experience, as predictors for severe complications, failure-to-rescue and mortality. Instead, in advanced fistula risk circumstances, upper-echelon experience demonstrates significant reductions in CR-POPF, reoperations and LOS (Table).

CONCLUSION: At specialty institutions, mortality and failure-to-rescue depend primarily on baseline patient and systemic characteristics, while cumulative surgical experience independently impacts pancreatic fistula occurrence and its attendant effects—even more so for riskier PDs. These data suggest an extended learning curve exists for this operation and reinforce the notion that surgeon experience is a key contributor for outcome improvement.

Table:
Surgical outcomes of pancreatoduodenectomy for the top-quartile experienced surgeons (n = 12).

Variable	Multivariable Analysis (Odds Ratio[a] [95% CI], p-value)	
Top-quartile (>525 career PDs)	*FRS < 3 (32% of cases)*	*FRS ≥ 3 (68% of cases)*
CR-POPF	0.53 [0.19-1.47], 0.220	0.66 [0.50-0.87], **0.003**
Severe complications	1.20 [0.68-2.08], 0.522	0.92 [0.70-1.20], 0.529
Reoperation	0.69 [0.25-1.68], 0.444	0.64 [0.42-0.97], **0.036**
Failure-to-Rescue	1.85 [0.42-8.02], 0.407	1.09 [0.58-2.03], 0.792
Mortality	2.12 [0.59-7.32], 0.232	1.01 [0.57-1.76], 0.968
LOS (> 8 days)	0.91 [0.60-1.38], 0.663	0.65 [0.52-0.82], **<0.001**

CR-POPF, clinically relevant fistula; FRS, fistula risk score; LOS, length of stay; PD, pancreatoduodenectomy.
Bold indicates statistical significance (p < 0.05).
[a] OR represents the comparison between the lowest quartile (≤150 PDs; reference) and the top-quartile (>525 PDs).

NOTES

8:28 AM

IMPACT OF A NON-THERAPEUTIC LAPAROTOMY IN PATIENTS WITH LOCALLY ADVANCED PANCREATIC CANCER UNDERGOING SURGICAL EXPLORATION TREATED WITH INDUCTION (M)FOLFIRINOX; A TAPS CONSORTIUM STUDY

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IMPORTANCE: Guidelines recommend surgical exploration in selected patients with locally advanced pancreatic cancer (LAPC) following induction chemotherapy. However, surgical exploration, has potential drawbacks related to surgical risks and treatment breaks, which apply in particular to patients undergoing exploration without resection (i.e., non-therapeutic laparotomy). Data regarding the impact of non-therapeutic laparotomy for LAPC treated with (m)FOLFIRINOX induction chemotherapy could guide aggresiveness of surgeons for this patient population.

OBJECTIVE: To assess the incidence and oncologic impact of a non-therapeutic laparotomy for LAPC treated with (m)FOLFIRINOX induction chemotherapy.

DESIGN: Retrospective cohort study.

SETTING: International multicenter study including patients from 5 referral centers in the USA and The Netherlands (2012–2019).

PARTICIPANTS: Patients diagnosed with pathology-proven LAPC treated with ≥1 cycle (m)FOLFIRINOX (± radiotherapy). Patients with metastatic disease on radiologic (re)staging or clinical deterioration during induction therapy were excluded. Patients undergoing non-therapeutic laparotomy (group A) were compared to those not explored (group B). Patients undergoing resection were assigned to group C.

MAIN OUTCOMES AND MEASURES: 90-day mortality, palliative systemic treatment, and median OS from date of pathology-proven diagnosis.

RESULTS: Overall, 663 patients with LAPC were included, of whom 78 (11.8%) subsequently received a second-line induction chemotherapy after (m)FOLFIRINOX and 413 (66.8%) received radiotherapy. In total, 67 patients (10.1%) were included in group A, 425 patients (64.1%) in group B, and 171 patients (25.8%) in group C. Resection was aborted in 28.2% (n = 67/238) of all surgical explorations, commonly due to occult metastases (n = 30/238, 12.6%). The 90-day mortality in group A was 3.0% (n = 2/67). The proportion of patients receiving palliative therapy did not differ between groups A and B (65.9% vs. 73.1%; P = 0.307). Median OS for groups A and B were 20.4 (95% CI; 15.9–27.3) and 20.2 (95% CI; 19.1–22.7) months respectively (P = 0.752). Median OS in group C was 36.1 (95% CI; 30.5–41.2) months. Corresponding 3-year survival rates for all groups were 25.0%, 21.4% and 51.1%, respectively. Compared to unexplored patients, non-therapeutic laparotomy was not associated with reduced OS (HR = 0.88 [95% CI 0.61–1.27]) in Cox regression analysis.

CONCLUSION AND RELEVANCE: Even in experienced hands, about ¼ of surgically explored LAPC patient will remain unresectable. However, non-therapeutic laparotomy does not appear to substantially reduce short- and long-term outcomes compared to similar patients who are not explored.

NOTES

8:42 AM

DISCORDANCE BETWEEN CONVENTIONAL AND DETAILED LYMPH NODE ANALYSIS IN RESECTED PANCREATIC OR AMPULLARY ADENOCARCINOMAS

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BACKGROUND: Long-term survival in patients with localized pancreatic adenocarcinoma (PDAC) or ampullary adenocarcinoma (AA) who undergo resection is rare, even in lymph node (LN)-negative disease. We aimed to assess the frequency of occult metastases (OM) in patients with resected PDAC or AA discovered with a detailed pathologic examination technique on LNs previously considered negative with conventional analysis. We also examined the association between OM and overall survival (OS).

METHODS: Patients with LN-negative disease on conventional pathologic analysis following resection of PDAC or AA from 2010 to 2020 were identified from our institutional database, and those with available tissue for re-analysis were included. LNs were selected for re-examination based on proximity to the tumor and size. Original hematoxylin & eosin slides, three 4-micron-thick sections from deeper levels, and one pan-cytokeratin (AE1/AE3/PCK26) immunostain were examined for each block. The primary outcome was the frequency of OM. The secondary outcome was OS.

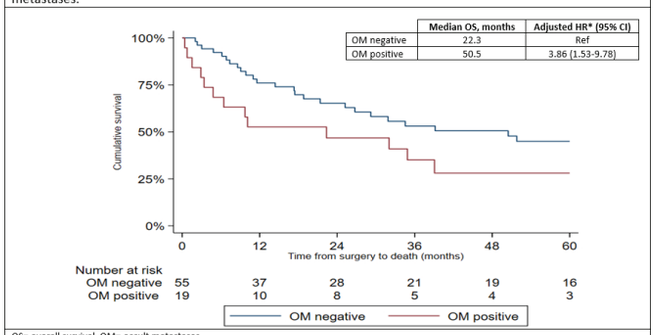
RESULTS: A total of 598 LNs from 74 LN-negative patients (PDAC = 71; AA = 3) were re-examined in detail. A total of 49 patients (66.2%) underwent pancreatoduodenectomy, 17 (23.0%) underwent distal pancreatectomy/splenectomy, and 7 (10.8%) underwent total pancreatectomy. The median LN yield was 19. Sixteen patients (21.6%) had positive surgical margins, 18 (24.3%) had lymphovascular invasion, and 47 (63.5%) had perineural invasion. Twenty-six patients (35.1%) received neoadjuvant therapy and 35 (47.3%) received adjuvant chemotherapy.

On detailed LN analysis, 19 patients (25.7%) had OM. Of these, 9 OM (47.4%) were found only with immunohistochemistry but not on hematoxylin & eosin staining. The number of positive lymph nodes ranged from 1-3. On multivariable analysis, no clinicodemographic or pathologic factors were associated with OM.

The proportion of OM was 10.5% for patients with operative LN yields of <10 LNs, 42.0% for 10–19 LNs, 37.0% for 20–29 LNs, and 10.5% for ≥30 LNs. On conventional pathologic analysis, 3 patients (15.8%) had stage IA disease, 9 patients (26.5%) had stage IB disease, and 7 patients (36.8%) had stage IIA disease, all upstaged to stage IIB on detailed LN analysis.

On survival analysis, patients with OM had an associated decrease in OS as compared to those without OM (median OS: 22.3 vs. 50.5 months; HR = 3.86, 95% CI: 1.53–9.78; Figure).

Figure: Kaplan–Meier curves estimating overall survival among patients who did versus did not have occult metastases.



OS= overall survival, OM= occult metastases.
*Adjusted for age, sex, race, health insurance, margin positivity, lymphovascular invasion, perineural invasion, pathological T stage, pancreatectomy type, receipt of preoperative therapy, receipt of adjuvant chemotherapy, and year of diagnosis.

CONCLUSIONS: There is a high discordance rate between conventional and detailed LN pathologic analysis in resected PDAC and AA. The presence of OM is associated with worse OS. The high rate of occult nodal disease may in part explain poor survival outcomes in patients with node-negative disease.

NOTES

8:56 AM

PANCREATIC CYSTIC NEOPLASMS: STILL HIGH RATES OF PREOPERATIVE MISDIAGNOSIS IN THE GUIDELINES AND EUS ERA

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BACKGROUND: A wrong diagnosis of nature is common in pancreatic cystic neoplasms (PCNs). The aim of the current study is to reappraise the diagnostic errors for presumed PCNs undergoing surgery.

METHODS: All pancreatic resections performed for presumed PCNs at the Verona Pancreas Institute between 2011 and 2020 were analyzed. "Misdiagnosis" was defined as the discrepancy between preoperative diagnosis of nature and final pathology. "Mismatch" was defined as the discrepancy between the preoperative suspect of malignancy (or its absence) and final pathology. Features considered suggestive for malignancy at preoperative work-up and at final pathology are described in Figure 1. Diagnostic errors considered "clinically relevant" implied a potential over- or under-treatment for the patient.

RESULTS: A total of 601 patients were included. Endoscopic Ultrasound (EUS) was performed in 301 (50%) patients. Overall misdiagnosis and mismatch were 19% and 34%, respectively, with no significant benefit for those patients who underwent EUS. The highest rate of misdiagnosis was reached for cystic neuroendocrine tumors (61%) and the lowest for solid pseudopapillary tumors (6%). Several diagnostic errors had clinical relevance, including 7 (13%) presumed serous cystic neoplasms eventually found to be other malignant entities, 50 (24%) intraductal papillary mucinous neoplasms (IPMN) with high-risk stigmata (HRS) revealed to be non-malignant, and 38 (33%) IPMN without HRS revealed to be malignant at final pathology. A preoperative presumption of malignant mucinous cystic neoplasm was correct in only 20 (16%) patients (Table 1).

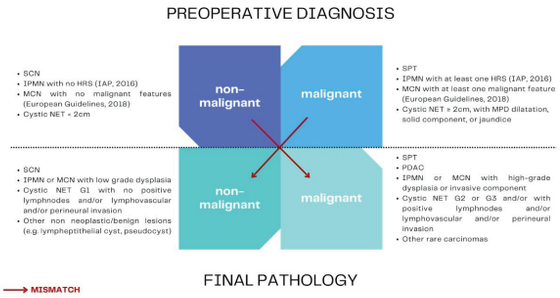

Figure 1: Features of malignancy at preoperative work-up and at final pathology.

HRS, High Risk Stigmata; IAP, International Association of Pancreatology; IPMN, Intraductal Papillary Mucinous Neoplasms; MCN, Mucinous Cystic Neoplasms; MPD, Main Pancreatic Duct; NET, Neuroendocrine Tumor; PDAC, Pancreatic Ductal Adenocarcinoma; SCN, Serous Cystic Neoplasms; SPT, Solid Pseudopapillary Tumor.

CONCLUSIONS: Despite not always clinically relevant, diagnostic errors are still common among resected PCNs when applying International Guidelines. New diagnostic tools beyond EUS are needed to refine diagnosis of those lesions at higher risk for unnecessary surgery or accidentally observed nevertheless being malignant.

NOTES

	Final Pathology, N (%)											
Preoperative diagnosis, N (%)	Overall	SCN	SPT	Cystic NET malignant	Cystic NET non-malignant	MCN malignant	MCN non-malignant	IPMN malignant	IPMN non-malignant	PDAC	Other malignant	Other benign/non-neoplastic
Overall	601	55 (9)	79 (12)	7 (1)	10 (2)	22 (4)	95 (16)	160 (26)	118 (20)	33 (6)	6 (1)	16 (3)
SCN	54	39 (73)	1 (2)	1 (2)	-	1 (2)	4 (7)	4 (7)	-	-	-	4 (7)
SPT	69	1 (1)	64 (95)	1 (1)	1 (1)	-	-	1 (1)	-	-	1 (1)	-
Cystic NET with malignant features	13	3 (23)	5 (39)	2 (15)	*3 (23)*	-	-	-	-	-	-	-
Cystic NET with no malignant features	-	-	-	-	-	-	-	-	-	-	-	-
MCN with malignant features	128	5 (4)	7 (6)	1 (1)	3 (2)	20 (16)	78 (60)	4 (3)	1 (1)	4 (3)	1 (1)	4 (3)
MCN with no malignant features	16	1 (6)	1 (6)	-	-	1 (6)	12 (76)	-	-	-	-	1 (6)
IPMN with HRS	207	4 (2)	-	2 (1)	1 (0)	-	1 (0)	113 (55)	50 (24)	29 (14)	4 (2)	3 (2)
IPMN with no HRS	114	2 (2)	1 (1)	-	2 (2)	-	-	38 (33)	67 (58)	-	-	4 (4)

Table 1: Correct diagnosis and misdiagnosis rate between preoperative diagnosis and final pathology.

HRS, High Risk Stigmata; IPMN, Intraductal Papillary Mucinous Neoplasms; MCN, Mucinous Cystic Neoplasms; NET, Neuroendocrine Tumor; PDAC, Pancreatic Ductal Adenocarcinoma; SCN, Serous Cystic Neoplasms; SPT, Solid Pseudopapillary Tumor. Correct diagnoses are showed inside black-contoured squares. Clinically relevant errors are showed inside grey squares.

SSAT Residents & Fellows Research Conference

Saturday, May 6, 2023
Room S504, McCormick Place
Chicago, Illinois

SESSION II

8-minute presentation, 6-minute discussion
Moderator: *Sharon Weber, MD*

9:45 AM **PREDICTORS OF INSUFFICIENT FUTURE LIVER REMNANT HYPERTROPHY AFTER PORTAL VEIN EMBOLIZATION**
Reed Ayabe, MD (Houston, Texas)

9:59 AM **PREOPERATIVE DETECTION OF HEPATOCELLULAR CARCINOMA'S MICROVASCULAR INVASION ON CT-SCAN BY ARTIFICIAL-INTELLIGENCE AND RADIOMICS ANALYSES**
Simone Famularo, MD, PhD (Rozzano, Italy)

10:13 AM **ADJUVANT CHEMORADIATION IN RESECTED BILIARY ADENOCARCINOMA: A VALIDATION OF SWOG S0809 USING A LARGE NATIONAL DATABASE**
Dana Dominguez, MD (Oakland, California)

10:27 AM **PROSPECTIVE COHORT STUDY OF COMPLIANCE WITH RISK-STRATIFIED POST-HEPATECTOMY PATHWAYS**
Allison N. Martin, MD, MPH (Houston, Texas)

10:45 AM **BREAK (15 minutes)**

9:45 AM

PREDICTORS OF INSUFFICIENT FUTURE LIVER REMNANT HYPERTROPHY AFTER PORTAL VEIN EMBOLIZATION

Reed I. Ayabe[1], Antony Haddad[1], Andrew D. Newton[1], Ruitao Lin[2], Ching-Wei D. Tzeng[1], Yun Shin Chun[1], Bruno Odisio[1], Jean-Nicolas Vauthey[1], Timothy E. Newhook[1], Hop S. Tran Cao[1]
[1]Surgical Oncology, The University of Texas MD Anderson Cancer Center Division of Surgery, Houston, TX, United States; [2]The University of Texas MD Anderson Cancer Center Department of Biostatistics, Houston, TX, United States

BACKGROUND: A standardized future liver remnant (sFLR) <30% and a kinetic growth rate (KGR) <2% are associated with increased risk of hepatic insufficiency and death from liver failure after hepatectomy. Here, we sought to identify clinicopathologic factors associated with inadequate sFLR and KGR to help predict which patients may not achieve sufficient hypertrophy with portal vein embolization (PVE) alone and inform selection for liver venous deprivation (LVD).

METHODS: A prospectively maintained single institution database was evaluated for patients undergoing PVE between 1998 and 2020. Clinicopathologic variables, including age, sex, BMI, a known diagnosis of liver disease, diabetes, cycles of neoadjuvant chemotherapy, liver function tests, baseline sFLR, and extended PVE (segment 4 embolization) were evaluated for associations with sFLR and KGR.

RESULTS: A total of 474 patients were identified who underwent right PVE and had both pre- and post-PVE volumetric assessments. Median patient age was 58 years (interquartile range [IQR] 49–66) and median BMI was 27 kg/m^2 (IQR 25–30). The most common histology was metastatic colorectal cancer (66%) followed by hepatocellular carcinoma (12%) extrahepatic cholangiocarcinoma (7%), and intrahepatic cholangiocarcinoma (4%). Most patients (77%) received neoadjuvant chemotherapy prior to PVE (median 6 cycles [IQR 4–11]). Median baseline sFLR was 22% (IQR 16–29%). A sFLR >30% was achieved in 60% of patients following PVE, while KGR >2% was noted in 58%. 71% of patients ultimately underwent surgery, which involved right hepatectomy in 58% and extended right hepatectomy in 41%. Multiple logistic regression revealed that baseline sFLR (OR 1.39 [95% CI 1.30–1.50]) was predictive of post-PVE sFLR >30%. Extended PVE (OR 0.44 [95% CI 0.25–0.77]) and planned two-stage hepatectomy (OR 0.51 [95% CI 0.32–0.82]) were predictive of KGR <2%. ROC analysis revealed that a baseline sFLR ≥ 19 is 90% sensitive and 78% specific for sFLR > 30% (AUC 0.92) (Figure).

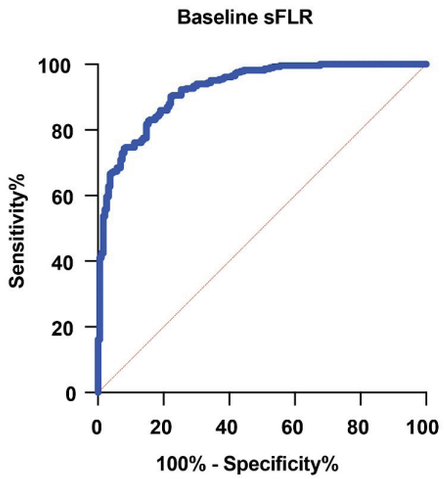

Figure: ROC curve showing prediction of adequate hypertrophy (post-PVE sFLR ≥30%) based on baseline sFLR (AUC 0.92 [95% CI 0.90-0.95]). ROC: receiver operating characteristic; PVE: portal vein embolization; sFLR: standardized future liver remnant; AUC: area under curve.

CONCLUSIONS: Patients with a baseline sFLR <19% or those requiring extended hepatectomy may not achieve adequate hypertrophy with PVE alone. In this subset of patients, LVD should be considered to optimize hepatic regeneration.

NOTES

9:59 AM

PREOPERATIVE DETECTION OF HEPATOCELLULAR CARCINOMA'S MICROVASCULAR INVASION ON CT-SCAN BY ARTIFICIAL-INTELLIGENCE AND RADIOMICS ANALYSES

Simone Famularo[1,2,3], Matteo Donadon[4], Camilla Penzo[5], Matteo Bortolotto[6], Cesare Maino[7], Flavio Milana[1,3], Jacques Marescaux[2], Michele Diana[2,8], Fabrizio Romano[6,7], Felice Giuliante[9], Francesco Ardito[9], Gian Luca Grazi[10], Guido Torzilli[1,3]

[1]Department of Surgery, Hepatobiliary and General Surgery Division, IRCCS Humanitas Research Hospital, Rozzano, Lombardia, Italy; [2]IRCAD France, Strasbourg, Grand Est, France; [3]Humanitas University, Milan, Italy; [4]Università del Piemonte Orientale, Novara, Italy; [5]Pole d'Expertise de la Regulation Numérique (Perique), Paris, France; [6]Universita degli Studi di Milano-Bicocca, Milano, Lombardia, Italy; [7]Ospedale San Gerardo, Monza, Lombardia, Italy; [8]Laboratoire des Sciences de l'Ingenieur de l'Informatique et de l'Imagerie, Illkirch, Grand Est, France; [9]Fondazione Policlinico Universitario Agostino Gemelli IRCCS, Roma, Lazio, Italy; [10]Istituto Regina Elena, Roma, Lazio, Italy

INTRODUCTION: Microvascular invasion (MVI) is the main risk factor for overall mortality and recurrence after surgery for hepatocellular carcinoma (HCC). Its diagnosis can be made only postoperatively on the histological specimen. The aim of this preliminary study was to train machine-learning models to predict MVI on preoperative CT scan (Figure 1).

METHODS: Clinical data and 3-phases CT scans were retrospectively collected among 4 Italian centres. DICOM files were manually segmented to detect the liver and the tumor(s). An already available segmentation algorithm (Nnunet) was retrained to obtain automatic detection focused on HCC. An implementation was added to automatically extract radiomics features from the tumoral, peritumoral (among 5 mm from the tumor margin) and healthy liver areas in each phase. Performance comparison between manual and algorithm segmentations was measured by intersection over union (Jaccard Index). Data obtained were explored and principal component analysis (PCA) was performed to reduce the dimensions of the dataset, keeping only the PC's explaining 95% of the variability. After normalization, data were divided between training (70%) and test (30%) sets. Random-Forest (RF), fully connected MLP Artificial neural network (neuralnet) and extreme gradient boosting (XGB) models were fitted to predict MVI. Hyperparameters tuning was made per each model to reduce the out-of-bag error. Prediction accuracy was estimated in the test set and employed as the study end-point.

RESULTS: Between 2008 and 2022, 218 consecutive preoperative CT scans of patients affected by HCC and submitted to surgery were collected with the relative clinical data. At the histological specimen, 72 (33.02%) patients had MVI. The Jaccard index between manual and algorithm segmentations was overall 90%. First and second order radiomics features were extracted, obtaining 672 variables per patient. After data exploration, PCA selected 58 dimensions explaining >95% of the variance. After standardization and normalization, RF, neuralnet and XGB were fitted to predict the presence of MVI. Tuning parameters were: 1) RF: n.tree = 500, mtry = 30; 2) Neuralnet: 2 hidden layer with 40 and 20 neurons, learning rate = 0.001, threshold for termination = 1%, activation function = sigmoid; 3) XGB: nrounds = 100, max_depth = 3, eta = 0.3. The models were then fitted in the testset to estimate prediction accuracy by confusion-matrix. RF was the best performer (Acc = 98.4%, 95% CI: 0.91–0.99, Sens: 95.2%, Spec: 100%, PPV: 100% and NPV: 97.7%, Figure 2).

CONCLUSION: Our model allowed an impressive prediction accuracy of the presence of MVI at the time of HCC diagnosis, never reached until now. This could lead to change the treatment allocation, the surgical extension and the follow-up strategy for those patients. The algorithm will be freely distributed online for medical purpose.

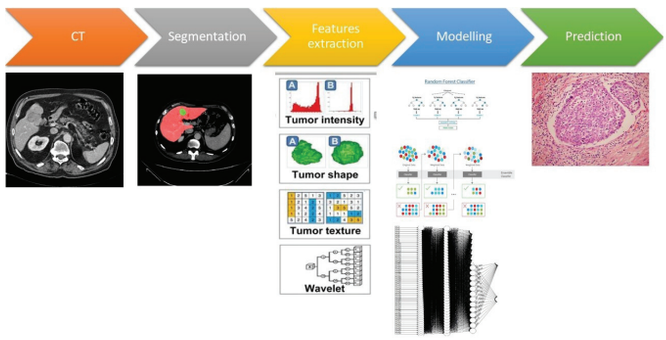

Figure 1: The steps of the study. From 3-phases CT scans, automatic segmentation of the liver and the tumor were obtained by a modified Nnunet. Automatic radiomics features extraction were obtained, and 3 models (RF, ANN and XGB) were fitted to predict MVI.

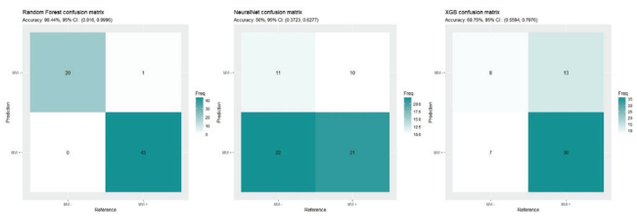

Figure 2: Confusion matrices per each model investigated, reporting the accuracy and the number of true and false positive and negative cases identified.

10:13 AM

ADJUVANT CHEMORADIATION IN RESECTED BILIARY ADENOCARCINOMA: A VALIDATION OF SWOG S0809 USING A LARGE NATIONAL DATABASE

Dana Dominguez, Yi-Jen Chen, Daneng Li, Gagandeep Singh, Yuman Fong, Laleh G. Melstrom
City of Hope, Duarte, CA, United States

INTRODUCTION: There is a paucity of evidence supporting the use of adjuvant radiation therapy in resected biliary cancer. National guidelines recommend the consideration of use in patients with positive margins after resection, however, supporting evidence comes mainly from a phase II trial of 79 patients, SWOG S0809, which demonstrated that the use of adjuvant chemoradiation was well tolerated and resulted in an overall median survival of 35 months. We aimed to use a large national database to evaluate the use of adjuvant chemoradiation in resected extrahepatic bile duct and gallbladder cancer.

METHODS: Using the National Cancer Database (NCDB), we selected patients from 2004–2017 with pT2-4, pN0-1, M0 extrahepatic bile duct or gallbladder adenocarcinoma with either R0 or R1 resection margins, and examined factors associated with overall survival using Cox proportional hazards model. We also examined overall survival in a subset of patients who received adjuvant chemo- and radiotherapy (CRT) using the Kaplan-Meier method and log rank test.

RESULTS: Overall, 4,997 patients with gallbladder or extrahepatic adenocarcinoma with available survival information meeting the SWOG S0809 criteria were selected from the NCDB, 469 of whom received both adjuvant chemo- and radiotherapy. Of the CRT cohort, all patients received multiagent chemotherapy, 211 (45.0%) had extrahepatic cholangiocarcinoma and 258 (55.0%) had gallbladder cancer, the majority were pT3 (n = 281, 59.9%), pN1 (n = 323, 68.9%), and had an R0 resection (n = 387, 82.5%). Median overall survival in patients undergoing CRT was 36.9 months, and was not different between primary sites (p = 0.841). Patients with a R1 margin had abbreviated overall survival compared to patients with an R0 resection (41.8 months vs 24.1 months, p < 0.001). On multivariable cox regression analysis of all patients who underwent resection agnostic to adjuvant therapy, age, insurance status, Charlson-Deyo comorbidity index, T-stage, N-stage, lymphovascular invasion, margin status, chemo- and radiotherapy were all associated with overall survival. Adjuvant chemoradiation compared to chemotherapy alone showed an overall survival benefit for patients with either R0 (41.8 vs 30.8 months, p < 0.001) or R1 (24.1 vs 20.2 months, p < 0.001) resections.

CONCLUSION: Using a large national database, our data validates the findings of SWOG S0809 with a similar median overall survival in patients receiving chemoradiation. Patients receiving CRT had improved overall survival compared to patients receiving chemotherapy only after both R0 and R1 resections. These data further support the consideration of adjuvant multi-modal therapy in resected biliary cancers, regardless of margin status.

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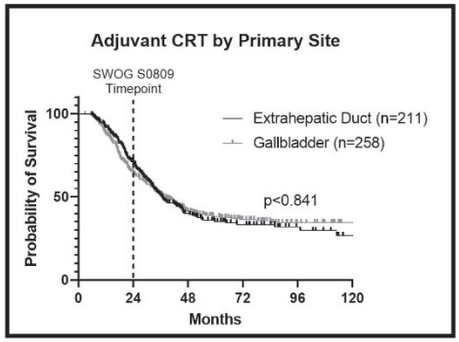
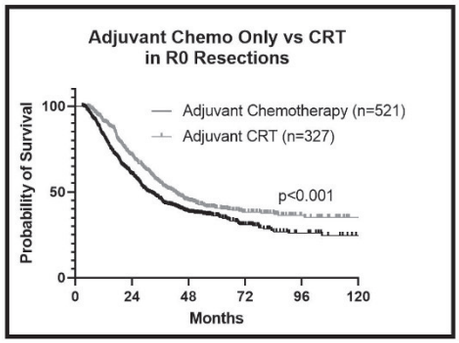
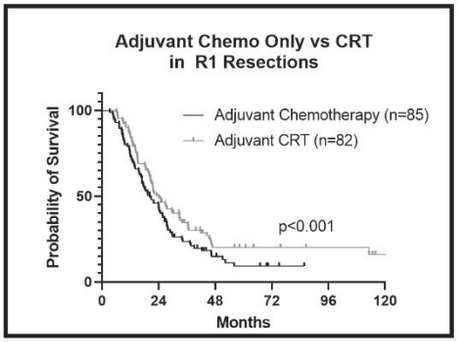






10:27 AM

PROSPECTIVE COHORT STUDY OF COMPLIANCE WITH RISK-STRATIFIED POST-HEPATECTOMY PATHWAYS

Allison N. Martin, Timothy E. Newhook, Elsa M. Arvide, Whitney L. Dewhurst, Anny M. Jin, Hop S. Tran Cao, Yun Shin Chun, Jean-Nicolas Vauthey[1], Ching-Wei D. Tzeng
Surgical Oncology, The University of Texas MD Anderson Cancer Center Division of Surgery, Houston, TX, United States

BACKGROUND: Although enhanced recovery pathways (ERPs) have been established as safe and effective care strategies in hepatobiliary surgery, compliance with ERP components may or may not be correlated with outcomes such as length of stay (LOS).

METHODS: Variables for a cohort of hepatectomy patients on our previously published risk-stratified post-hepatectomy pathways (RHPSPs) were prospectively collected (6/14/22 to 11/18/22). Compliance with pathway components, reasons for deviations, and 90-day postoperative outcomes were prospectively reviewed by one faculty and three advanced practice providers biweekly and compared with index hospitalization LOS.

RESULTS: Among 103 patients, 11 (10.7%) were on the minimally invasive (MIS) pathway with median LOS 2 days (interquartile range, IQR 1–2), 39 (37.9%) were low-intermediate risk pathway with median LOS 3 days (IQR 3–4), 27 (26.2%) were high-risk pathway with median LOS 4 days (IQR 3–5), and 26 (25.2%) were combination operations with median LOS 5 days (4–6). The goal LOS was 2–3 days for low-intermediate risk patients and 3–4 days for high-risk patients. Pathway compliance was perfect for 56 patients (54%); the remaining 47 patients had at least one instance of pathway deviation (46%). By pathway, only 1 (9%) MIS patient, 16 (41%) low-intermediate risk patients, 13 (48%) high-risk patients and 17 (65%) combination surgery patients experienced a pathway deviation ($p = 0.015$). Patients with at least one pathway deviation had an increased median LOS compared to those with perfect compliance (LOS 5 [IQR 4–6] vs. LOS 3 [IQR 2–3.5], $p = 0.018$).

Linear regression demonstrated postoperative compliance factors associated with increasing LOS included postoperative days until advancement to solid food (coefficient 1.86, 95% confidence interval [CI] 1.1–2.6), $p < 0.001$), days until solid food was tolerated for 24 hours (coefficent 1.6, 95% CI 0.7–2.6, $p = 0.002$), and days to complete conversion to oral medications (coefficent 0.82, 95% CI 0.02–1.6, $p = 0.045$). Other traditional compliance factors, including simply clear liquid diet tolerance, discontinuation of intravenous fluids (but not all intravenous medications), bladder catheter removal, and return of flatus, were not associated with reduced LOS (all $p > 0.30$).

CONCLUSIONS: Despite imperfect compliance, median LOS for patients treated with risk-stratified post-hepatectomy pathways remains favorable for both low-intermediate and high-risk patients. Combination operations require further optimization and process improvements to identify barriers to pathway compliance and better outcomes. Focusing on the straightforward goals of solid food and oral medications may be associated with expedited discharge after hepatectomy.

NOTES

SSAT Residents & Fellows Research Conference

Saturday, May 6, 2023
Room S504, McCormick Place
Chicago, Illinois

SESSION III

8-minute presentation, 6-minute discussion
Moderator: *R. Matthew Walsh, MD*

11:00 AM **FAST TRACK PATHWAY TO ACCELERATED CHOLECYSTECTOMY VERSUS STANDARD OF CARE FOR ACUTE CHOLECYSTITIS (FAST) PILOT TRIAL**
Lily Park, MD (Hamilton, Canada)

11:14 AM **HEPATECTOMY BEFORE PRIMARY TUMOR RESECTION AS PREFERRED APPROACH FOR SYNCHRONOUS LIVER METASTASES FROM RECTAL CANCER**
Harufumi Maki, MD (Houston, Texas)

11:28 AM **PAVING A PATH TO GENDER PARITY: RECENT TRENDS IN PARTICIPATION OF WOMEN IN AN ACADEMIC SURGERY SOCIETY**
Jenny H. Chang, MD (Cleveland, Ohio)

11:42 AM **NISSEN VERSUS TOUPET FUNDOPLICATION QUALITY OF LIFE OUTCOMES COMPARED BY INTRAOPERATIVE ENDOFLIPTM DISTENSIBILITY INDEX RANGE**
Vanessa VanDruff, MD (Chicago, Illinios)

12:00 PM **LUNCH & TRAINEE JEOPARDY!**

11:00 AM

FAST TRACK PATHWAY TO ACCELERATED CHOLECYSTECTOMY VERSUS STANDARD OF CARE FOR ACUTE CHOLECYSTITIS (FAST) PILOT TRIAL

Lily J. Park[1,2], Flavia K. Borges[1,2], Rahima Nenshi[1,2], Pablo E. Serrano[1], Paul Engels[1], Kelly Vogt[3], Emily Di Sante[2], Jessica Vincent[2], Kate Tsiplova[2], P.J. Devereaux[1]

[1]McMaster University, Hamilton, ON, Canada; [2]Population Health Research Institute, Hamilton, ON, Canada; [3]Western University Schulich School of Medicine & Dentistry, London, ON, Canada

BACKGROUND: The timing to surgery for acute cholecystitis (AC) remains variable, ranging anywhere from early (<7 days) to delayed surgery (>7 days). Accelerated surgery for AC may result in better outcomes by reducing patient exposure to inflammatory, hypercoagulable, and stress states. We undertook a pilot trial to determine the feasibility of providing accelerated care (i.e., surgery within 6 hours of diagnosis) compared to standard care among patients with calculus AC.

METHODS: Adult patients with AC requiring surgery were randomized to receive accelerated surgery or standard care. The primary feasibility outcome included recruitment of 1 patient per site per month, ≥95% follow-up at 90 days, and determining timelines of accelerated surgery. The secondary outcome was a composite of major perioperative complications (all-cause mortality, reinterventions and reoperations, various intra- and post-operative complications, cardiovascular events, venous thromboembolism, bleeding) within 90 days of randomization. Other outcomes included individual components of the composite, length of hospital stay, readmissions, surgery duration, and feasibility of drawing preoperative point-of-care N-terminal-pro hormone BNP (NT-proBNP) in ≥90% of patients. Analysis included descriptive statistics and cox proportional hazards models to calculate hazard ratios (HR) and 95% confidence interval (CI) for outcomes with time to event data.

RESULTS: Sixty patients were randomly assigned to accelerated surgery (N = 31) and standard care (N = 29) across 4 Canadian hospitals. There was ≥1 patient recruited per site per month. All patients completed 90 day follow up. The median time and interquartile range (IQR) from diagnosis to surgery in the accelerated arm was 5.8 [4.4–11.1] hours versus 20.3 [6.8–26.8] hours in the standard care arm. A major perioperative complication occurred in 9/31 (29.0%) patients in the accelerated and 4/29 (13.8%) patients in the standard care arm (HR 2.42, 95% CI 0.74–7.91). The main contribution was from 5/31 (16.1%) versus 1/29 (3.4%) postoperative endoscopic retrograde cholangiopancreatography performed in the accelerated versus standard care arm, respectively (HR 5.11, 95% CI 0.60–43.9). Of note, 4/31 and 3/29 patients in the accelerated and standard care groups underwent intraoperative cholangiogram. Between both groups, there were no differences in surgery duration (mean (standard deviation): 86.8 (30.0) vs. 86.4 (32.3) minutes), length of hospital stay (median [IQR]: 2.0 [1.0–3.0] vs. 2.0 [2.0–3.0] days), readmissions (2/31 vs. 4/29), or cardiovascular events (2/31 vs. 1/29). Preoperative NT-proBNP was drawn in 57/60 (95.0%) patients.

CONCLUSION: These results demonstrate the feasibility of a trial comparing accelerated and standard care among patients requiring surgery for AC and supports a definitive trial.

NOTES

11:14 AM

HEPATECTOMY BEFORE PRIMARY TUMOR RESECTION AS PREFERRED APPROACH FOR SYNCHRONOUS LIVER METASTASES FROM RECTAL CANCER

Harufumi Maki, Reed I. Ayabe, Yujiro Nishioka, Tsuyoshi Konishi, Timothy E. Newhook, Hop S. Tran Cao, Yun Shin Chun, Ching-Wei D. Tzeng, Y. Nancy You, Jean-Nicolas Vauthey
Department of Surgical Oncology, The University of Texas MD Anderson Cancer Center, Houston, TX, United States

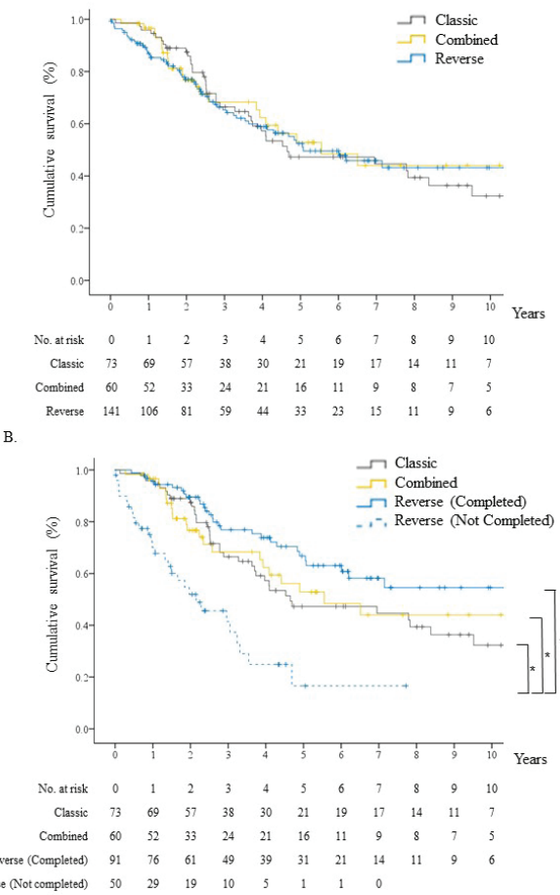
BACKGROUND: For patients with synchronous liver metastases (LM) from rectal cancer, consensus on surgical sequencing is lacking. We compared outcomes between the reverse (hepatectomy first), classic (primary tumor resection first), and combined (simultaneous hepatectomy and primary tumor resection) approaches.

METHODS: A prospectively maintained database was queried for patients with rectal cancer LM diagnosed before primary tumor resection who underwent hepatectomy for LM from January 2004 to April 2021. Clinicopathological factors and survival were compared between the three approaches.

RESULTS: Among 274 patients, 141 (51%) underwent the reverse approach; 73 (27%), the classic approach; and 60 (22%), the combined approach. Higher carcinoembryonic antigen level at LM diagnosis and higher number of LM were associated with the reverse approach. Combined-approach patients had smaller tumors and underwent less complex hepatectomies. Larger LM, BRAF mutation, and TP53 mutation were independently associated with worse overall survival (OS) (p = 0.001, 0.001 and 0.048, respectively). Although 35% of reverse-approach patients did not undergo primary tumor resection, OS did not differ between groups (Figure 1), and 82% of reverse-approach patients did not require diversion during follow-up. RAS/TP53 co-mutation was independently associated with lack of primary resection with the reverse approach (odds ratio: 0.16, 95% CI: 0.038–0.64, p = 0.010).

CONCLUSION: The reverse approach results in survival similar to that with the combined and classic approaches and may obviate primary rectal tumor resections and diversions that do not improve oncologic outcome but affect quality of life. RAS/TP53 co-mutation is associated with lower rate of completion of the reverse approach.

Figure 1 A.



B.

Figure 1: Overall survival of patients with synchronous liver metastases from rectal cancer by treatment approach (A) and by treatment approach with the reverse approach subdivided according to whether or not it was completed (B). * p < .001.

NOTES

11:28 AM

PAVING A PATH TO GENDER PARITY: RECENT TRENDS IN PARTICIPATION OF WOMEN IN AN ACADEMIC SURGERY SOCIETY

Jenny H. Chang[1], Varisha Essani[3], Sara Maskal[1], Mir Shanaz Hossain[1], Nicole E. Brooks[1], Ajita Prabhu[1], Sharon Lum[2], R. Matthew Walsh[1]
[1]Surgery, Cleveland Clinic, Cleveland, OH, United States; [2]Loma Linda University, Loma Linda, CA, United States; [3]Case Western Reserve University, Cleveland, OH, United States

INTRODUCTION: The proportion of women surgeons is steadily increasing, although the number of women in surgical leadership and research has not. The Society for Surgery of the Alimentary Tract (SSAT), a global association of academic gastrointestinal surgeons, pledged its commitment to diversity and inclusion with the creation of a task force and diversity symposium in 2016. Our study sought to evaluate the temporal trend of gender representation in leadership and research presented at SSAT.

METHODS: Publicly available SSAT meeting programs from 2010–2022 were reviewed to assess gender proportions within leadership positions (officers and committee chairs), invited speakerships moderators and speakers, clinical symposium moderators and speakers, committee panel session moderators and speakers, and contributions to scientific sessions (moderator, first author and senior author). Verified individual professional profiles (e.g., LinkedIn, Doximity, affiliate institution websites) were analyzed to categorize gender as women, men, or not available. Identification of sex was deferred. Descriptive and trend analyses using linear regression and chi-squared testing were performed.

RESULTS: A total of 5,493 individuals were reviewed, of which 1,182 (21.5%) were identified as women and 4,113 (74.7%) as men. 209 (3.8%) did not have an available gender profile. The trend in total women participation is demonstrated in Figure 1 with an increase of 1.04% per year (R^2 = 0.81), comparable to published US trend on active women surgeons. There was a statistically significant difference in the total proportion of women engagement before and after the task force creation in 2016 (18.6% vs 27.1%, $p < 0.0001$), although the increase was 1.93% per year (R^2 = 0.96) prior to 2016 compared to 1.15% (R^2 = 0.64) after. When analyzed by category, annual increases in the proportion of women were demonstrated in: leadership (2.22%, R^2 = 0.50), invited speakerships (2.11%, R^2 = 0.46), invited speakerships moderators (1.35%, R^2 = 0.16), clinical symposium moderator (1.25%, R^2 = 0.37), clinical symposium speaker (2.09%, R^2 = 0.63), committee panel session moderator (2.81%, R^2 = 0.25), scientific session moderators (1.06%, R^2 = 0.25), There was no increase seen in committee panel session speakers (0.51%, R^2 = 0.01). 1,595 abstracts were reviewed, with an increase in proportion of first author (1.18%, R^2 = 0.42), but no change in the proportion of women senior author (0.02%, R^2 = 0.00).

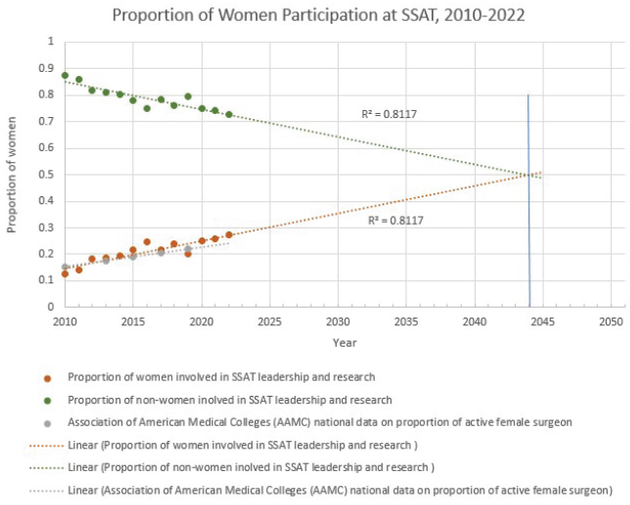


Figure 1: Trend in total participation of women and non-women (men and not avaliable) at SSAT as well as Association of American Medical College (AAMC) national data on proportion of active surgeons who are women.

CONCLUSION: There has been an encouraging upward trajectory in women participation at SSAT over the past 13 years. However, if persistent at the current trend, gender parity will not be attained until 2044. Active promotion of gender diversity through creation of a task force or annual diversity symposium, as modeled by SSAT, is an effective tool to improve gender parity, but substantial opportunity for improvement remains.

NOTES

11:42 AM

NISSEN VERSUS TOUPET FUNDOPLICATION QUALITY OF LIFE OUTCOMES COMPARED BY INTRAOPERATIVE ENDOFLIPTM DISTENSIBILITY INDEX RANGE

Vanessa N. VanDruff[1,2], Julia R. Amundson[1], Stephanie Joseph[2,3], Simon Che[2], Christopher J. Zimmermann[2], Shun Ishii[2], Kristine Kuchta[2], Herbert M. Hedberg[2], Michael Ujiki[2]
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INTRODUCTION: Toupet fundoplication (TF) has been shown to have fewer adverse effects compared to Nissen fundoplication (NF), however, it is unknown whether the advantages of TF persist when comparing outcomes by the distensibility of post-fundoplication lower esophageal sphincter (LES). Therefore, we aimed to compare quality of life (QOL) outcomes between NF and TF according to distensibility index (DI) measured by intraoperative endoluminal impedance planimetry.

METHODS: This is a retrospective study of a prospectively maintained database of patients who underwent laparoscopic NF or TF, intraoperative EndoFLIP, and self-reported QOL outcomes postoperatively at 3-weeks, 6-months, 1-year, and 2-years using RSI, GERD-HQRL, and dysphagia surveys. Comparisons were made using chi-square and Wilcoxon rank-sum tests.

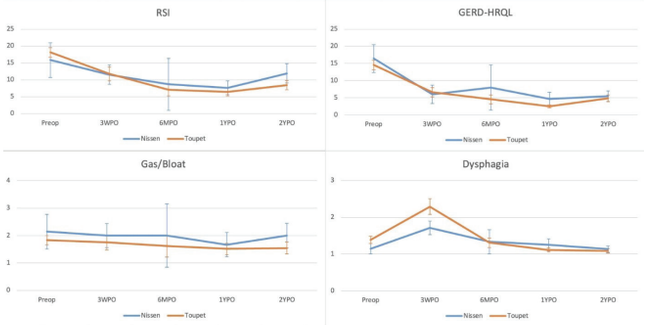
RESULTS: From 2018 to 2021, 303 patients were analyzed (68% female) who underwent NF (n = 80) and or TF (n = 223) for treatment of GERD, including paraesophageal hernia which represented 65% of cases. Of those who returned postoperative surveys, at 30mL fill-volumes, there were a total of 20 NF versus 25 TF with DI <2.0 mm^2/mmHg, 32 NF versus 71 TF with DI 2.0–3.5 mm^2/mmHg, and 13 NF versus 89 TF with DI > 3.5 mm^2/mmHg. At the optimal DI range of 2.0–3.5 mm^2/mmHg at 30 mL fill, no statistical differences were found on analysis at 3-weeks, 6-months, 1-year, and 2-year timepoints when evaluating RSI, GERD HQRL, gas-bloat, and dysphagia scores. No statistical differences were found on QOL comparisons of NF versus TF within DI ranges <2.0 mm^2/mmHg or DI > 3.5 mm^2/mmHg at any timepoint (Table 1). At 40 ml fill volume, there was a total of 20 NF versus 25 TF at DI < 2.0 mm^2/mmHg, 32 NF versus 71 TF with DI 2.0–3.5 mm^2/mmHg, and 13 NF versus 89 TF at DI > 3.5 mm^2/mmHg. Analysis of postoperative surveys demonstrated no statistical differences when comparing RSI, GERD-HQRL, gasbloat and dysphagia scores of NF versus TF according to DI range <2.0 mm^2/mmHg, 2.0–3.5 mm^2/mmHg (Figure 1), or >3.5 mm2/mmHg at any postoperative timepoint.

CONCLUSION: Impedance planimetry appears to be an objective measure of the physiology of the LES before, during, and after fundoplication. NF is comparable to TF when compared according to DI range, suggesting that QOL outcomes are dependent on post-fundoplication LES distensibility rather than type of fundoplication.

Table 1. Comparing Nissen and Toupet QOL metrics according to DI range at 1- and 2- year timepoints.

	DI <2.0mm2/mmHg			DI 2.0-3.5mm2/mmHg			DI ≥ 3.5mm2/mmHg		
	Nissen	Toupet	p-value	Nissen	Toupet	p-value	Nissen	Toupet	p-value
	Mean ± SD	Mean ± SD		Mean ± SD	Mean ± SD		Mean ± SD	Mean ± SD	
30mL fill									
1 Year	N=10	N=9		N=12	N=30		N=4	N=44	
RSI	12.6±9.8	7.4±8.7	0.1297	5.1±5.5	6.3±7.5	0.8118	6.3±3.8	7.2±7.7	0.6938
GERD-HRQL	6.0±7.0	4.0±4.2	0.5625	2.4±2.5	2.8±3.2	0.9286	4.8±4.3	3.2±3.6	0.3037
Gas/Bloat	1.8±1.1	1.7±1.2	0.8994	1.6±0.9	1.5±1.4	0.7740	2.0±0.8	1.8±1.1	0.7418
Dysphagia Score	1.1±0.3	1.1±0.3	0.9389	1.1±0.3	1.1±0.3	0.8453	1.0±0.0	1.0±0.2	0.7630
2 Years	N=9	N=9		N=21	N=14		N=6	N=18	
RSI	11.0±10.0	7.2±8.4	0.5047	11.4±11.6	5.8±5.1	0.4772	10.7±6.9	8.0±7.5	0.2842
GERD-HRQL	8.3±9.5	5.7±9.7	0.3036	4.8±6.1	4.4±4.5	0.5073	2.3±2.5	2.7±3.6	0.7590
Gas/Bloat	2.0±1.6	1.0±1.1	0.1590	1.5±1.4	1.7±1.1	0.4261	1.5±1.6	1.4±1.3	0.9452
Dysphagia Score	1.2±0.7	1.0±0.0	0.3173	1.1±0.5	1.1±0.3	0.7815	1.0±0.0	1.1±0.3	0.4038
40mL fill									
1 Year	N=1	N=6		N=9	N=35		N=5	N=48	
RSI	0.0±0.0	7.2±10.4	0.2030	7.6±5.8	6.4±6.9	0.4709	3.8±2.4	7.9±8.2	0.4183
GERD-HRQL	0.0±0.0	4.5±5.2	0.2994	4.6±5.8	2.5±2.5	0.4753	5.2±4.9	3.5±3.7	0.5432
Gas/Bloat	0.0±0.0	1.5±1.4	0.2947	1.7±1.3	1.5±1.2	0.7523	2.0±1.0	1.9±1.2	0.8014
Dysphagia Score	1.0±0.0	1.0±0.0	1.0000	1.3±0.5	1.1±0.3	0.3233	1.2±0.4	1.1±0.2	0.2820
2 Years	N=3	N=5		N=15	N=22		N=6	N=21	
RSI	4.7±4.2	2.3±2.6	0.2710	11.9±10.7	8.4±6.4	0.6028	9.3±9.1	7.3±8.2	0.5976
GERD-HRQL	4.0±5.3	2.2±4.4	0.4240	5.5±5.8	4.9±4.5	0.9613	1.2±0.8	3.0±3.4	0.2720
Gas/Bloat	1.3±1.2	0.4±0.9	0.2169	2.0±1.7	1.5±1.0	0.5259	1.0±0.6	1.6±1.4	0.4334
Dysphagia Score	1.0±0.0	1.2±0.4	0.4386	1.1±0.4	1.1±0.3	0.6873	1.0±0.0	1.1±0.3	0.4408

Figure 1. Nissen versus Toupet Quality of Life at Final 40mL DI 2.0 - 3.5 mm^2/mmHg



NOTES

SSAT Residents & Fellows Research Conference

Saturday, May 6, 2023
Room S504, McCormick Place
Chicago, Illinois

SESSION IV

8-minute presentation, 6-minute discussion

Moderators: *Anne Lidor, MD, MPH*
Jayleen Grams, MD, PhD

1:15 PM **THE IMPACT OF SOCIAL RISK FACTORS ON THE PRESENTATION, TREATMENT AND SURVIVAL OF PATIENTS WITH HEPATOCELLULAR CARCINOMA AT AN URBAN, ACADEMIC SAFETY-NET HOSPITAL**
Kelsey Romantoski, MD (Boston, Massachusetts)

1:29 PM **VALIDATION AND RECALIBRATION OF RISK-STRATIFIED PANCREATODUODENECTOMY DRAIN FLUID AMYLASE REMOVAL CRITERIA**
Artem Boyev, DO (Houston, Texas)

1:43 PM **THE ROLE OF THE GASTROINTESTINAL MICROBIOME IN FOREGUT LEAKS**
Lucas Fair, MD (Dallas, Texas)

1:57 PM **SLEEVE GASTRECTOMY INHIBITS TUMOR FORMATION IN A MOUSE MODEL OF FAMILIAL ADENOMATOUS POLYPOSIS**
Cullen F. Roberts, MD (Boston, Masachusetts)

2:11 PM **THE UTILITY OF SYMPTOM ASSOCIATION PROBABILITY (SAP) IN PREDICTING OUTCOME AFTER LAPAROSCOPIC FUNDOPLICATION IN PATIENTS WITH ABNORMAL ESOPHAGEAL ACID EXPOSURE**
Donata Vaiciunaite, MD (Pittsburgh, PA)

2:30 PM **COFFEE BREAK (15 minutes)**

1:15 PM

THE IMPACT OF SOCIAL RISK FACTORS ON THE PRESENTATION, TREATMENT AND SURVIVAL OF PATIENTS WITH HEPATOCELLULAR CARCINOMA AT AN URBAN, ACADEMIC SAFETY-NET HOSPITAL

Kelsey S. Romatoski[1], Manal Dia[1], Marianna V. Papageorge[1], Alison P. Woods[1,2], Sophie H. Chung[1], Avneesh Gupta[3], Christina LeBedis[3], Teviah Sachs[1], Arpan Mohanty[4]

[1]General Surgery, Boston Medical Center, Boston, MA, United States; [2]Johns Hopkins University, Baltimore, MD, United States; [3]Boston Medical Center Department of Radiology, Boston, MA, United States; [4]Boston Medical Center, Boston, MA, United States

INTRODUCTION: Social risk factors impact the diagnosis, management and survival of patients with hepatocellular carcinoma (HCC). This is relevant as the incidence of HCC increases nationally, particularly among non-white, immigrant patients, yet receipt of treatment and overall outcomes for HCC continue to have disparities based on race, ethnicity, and socioeconomic status. We evaluated the relationship between social determinants of health and presentation, treatment and survival of patients with HCC at an urban, safety-net hospital.

METHODS: A single institution retrospective chart review of patients with all stages of HCC from January 2009 through May 2019 was conducted. Demographic, disease, and treatment characteristics were obtained. Chi-square and Wilcoxon tests were used for categorical and continuous variables, respectively. Univariate analysis was used to evaluate stage at presentation, receipt of intervention (resection, ablation, TACE), receipt of systemic therapy and median overall survival. Survival between stage at diagnosis was compared using Kaplan-Meier methods.

RESULTS: 388 patients with HCC were identified; median age was 61 years and 83.2% were male. Patients had an overall similar sociodemographic distribution for presentation of early versus late disease. However, commercial insurance status resulted in diagnosis at earlier stage (24.7% early stage vs 13.3% late stage; p = 0.014) while safety-net/no insurance was a significant risk factor for advanced presentation at diagnosis (9.9% early stage vs 17.6% late stage; p = 0.014). Higher level of education (high school and above) was associated with increased intervention for all stages of disease (70.1% vs no education/unknown 29.9%; p = 0.048) as was origin of mainland USA (60.3% vs other countries/unknown 39.7%; p = 0.018). No sociodemographic differences were seen for receipt of treatment, intervention or systemic therapy, for patients with early stage disease. Patients with late stage disease who had a higher level of education were more likely to receive intervention (73.0% vs no education/unknown 27.0%; p = 0.049). Receipt versus lack of systemic therapy was associated with employment status (unemployed/unknown 40.3% vs 17.5%; retired 40.3% vs 65.0%, employed 19.4% vs 17.5%; p = 0.002). Median survival was not impacted by any examined sociodemographic factors.

Association between social determinants of health and stage at presentation

	Early Stage (0-A) N = 223	Late Stage (B-D) N = 165	p-value
Race			0.9952
Black (%)	72 (32.3%)	54 (32.7%)	
White (%)	84 (37.7%)	62 (37.6%)	
Other (%)	67 (30.0%)	49 (29.7%)	
Ethnicity			0.2225
Hispanic (%)	46 (20.6%)	26 (15.8%)	
Non-Hispanic (%)	177 (79.4%)	139 (84.2%)	
Insurance status			**0.0140**
Commercial (%)	55 (24.7%)	22 (13.3%)	
Medicare (%)	48 (21.5%)	38 (23.0%)	
Medicaid (%)	98 (44.0%)	76 (46.1%)	
Safety-net / None (%)	22 (9.9%)	29 (17.6%)	
Education status			0.3514
High School and above (%)	152 (68.2%)	105 (63.6%)	
None / Unknown (%)	71 (31.8%)	60 (36.4%)	
Employment status			0.2686
Employed (%)	54 (24.2%)	30 (18.2%)	
Unemployed / Unknown (%)	122 (54.7%)	92 (55.8%)	
Retired (%)	47 (21.1%)	43 (26.1%)	
County of Origin			0.6156
USA (%)	126 (56.5%)	89 (53.9%)	
Other/Unknown (%)	97 (56.5%)	76 (46.1%)	

Impact of social determinants of health on stage specific survival (median overall, months)

	All Stages (0-D) N = 388	p-value	Early Stage (0-A) N = 223	p-value	Late Stage (B-D) N = 165	p-value
Race		0.8395		0.7061		0.8724
Black	34.8		56.8		15.5	
White	36.0		62.6		13.0	
Other	44.1		58.3		10.9	
Ethnicity		0.7365		0.6590		0.1740
Hispanic	35.6		58.3		5.0	
Non-Hispanic	36.0		57.0		14.6	
Insurance status		0.8192		0.6112		0.5937
Commercial	36.0		50.5		10.6	
Medicare	56.8		58.3		12.8	
Medicaid	33.6		47.1		15.5	
Safety-net / None	29.5		62.6		7.1	
Education status		0.8803		0.3191		0.1509
High School and above	36.0		57.0		15.5	
None / Unknown	41.3		58.3		9.1	
Employment status		0.5464		0.0782		0.3125
Employed	28.9		50.5		7.1	
Unemployed / Unknown	47.1		68.3		12.8	
Retired	33.6		38.4		30.2	
Country of Origin		0.8605		0.4544		0.1666
USA	38.4		57.0		15.5	
Other/Unknown	34.8		58.3		9.8	

CONCLUSION: Despite clear evidence of disparities in the diagnosis and care of patients with HCC in the literature, our data show that an urban academic safety net hospital is able to mitigate the impact of social determinants of health for these patients. Urban safety-net hospitals with a focus on vulnerable patient populations are able to provide outcomes on par with those seen on the national level and should serve as a care system model to address disparities in HCC care.

1:29 PM

VALIDATION AND RECALIBRATION OF RISK-STRATIFIED PANCREATODUODENECTOMY DRAIN FLUID AMYLASE REMOVAL CRITERIA

Artem Boyev, Ahad M. Azimuddin, Timothy E. Newhook, Jessica E. Maxwell, Laura R. Prakash, Morgan L. Bruno, Whitney L. Dewhurst, Elsa M. Arvide, Yi-Ju Chiang, Michael P. Kim, Naruhiko Ikoma, Rebecca A. Snyder, Jeffrey E. Lee, Matthew Katz, Ching-Wei D. Tzeng

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BACKGROUND: Post-pancreatoduodenectomy patients at our institution are managed on risk-stratified pancreatectomy care pathways preoperatively determined by risk of clinically relevant postoperative pancreatic fistula (CR-POPF). We previously published cut-off ranges for drain fluid amylase on postoperative day (POD) 1 (DFA1) and POD 3 (DFA 3) to encourage timely drain removal. The aim of this study was to validate and recalibrate our cut-off values using a prospective cohort of patients managed immediately after implementing those DFA thresholds.

METHODS: We performed a single-institution prospective cohort study of consecutive patients who underwent pancreatoduodenectomy from DFA1/DFA3 threshold implementation in February 2019 to April 2022. Ninety-day postoperative complications were prospectively graded and reported according to the ACCORDION system and International Study Group on Pancreatic Surgery definitions. Patient characteristics, perioperative details, and DFA1/DFA3 (measured in U/L) were compared between care pathways. Receiver Operating Characteristic (ROC) curve analysis was performed to determine optimal cut-off values based on preoperative risk stratification.

RESULTS: In total, 267 patients underwent 228 (85%) open and 39 (15%) robotic procedures, with 173 (65%) patients stratified into low-risk and 94 (35%) into high-risk pathways. Seven (4%) low-risk patients and 21 (22%) high-risk patients developed CR-POPF. Of 147 patients with drains removed before/on POD3, only 1 (0.7%) developed CR-POPF in the prospective cohort recalibration. CR-POPF was excluded with 100% sensitivity if DFA1 <286 (area under curve, AUC = 0.893, p = 0.001) or DFA3 <97 (AUC = 0.856, p = 0.002) in low-risk patients. DFA1 <137 (AUC = 0.786, p < 0.001) or DFA3 <56 (AUC = 0.819, p < 0.001) were 100% sensitive in ruling out CR-POPF in high-risk patients. Our previous DFA1 cut-offs of 100 in low-risk patients and <26 in high-risk patients were 100% sensitive, while our DFA3 cut-offs of 300 (low-risk) and 200 (high-risk) had 57% and 91% sensitivity.

CONCLUSION: Risk-stratified post-pancreatoduodenectomy DFA thresholds can effectively and safely guide early POD1/POD3 drain removal. Previously identified cut-off values appear overly restrictive for DFA1 and overly liberal for DFA3. As a learning health system, we further propose recalibrating our drain removal thresholds to DFA1 ≤300, DFA3 ≤100 in low-risk patients and DFA1 ≤100, DFA3 ≤50 in high-risk patients. This methodology can be implemented at other centers to develop institution-specific criteria for early drain removal.

NOTES

Amylase Cut-Off	Amylase Value	p-value	AUC	95% CI	Cutoff (U/L)	Sensitivity %	Specificity %
Low-Risk							
2019	DFA1				100	100%	70%
Proposed	DFA1	0.001	0.893	0.840-0.945	286	100%	82%
					304	90%	83%
					401	80%	86%
2019	DFA3				300	57%	88%
Proposed	DFA3	0.002	0.856	0.747-0.965	97	100%	60%
					108	90%	60%
					196	80%	80%
High-Risk							
2019	DFA1				<26	100%	6%
Proposed	DFA1	<0.001	0.786	0.667-0.904	137	100%	18%
					651	90%	45%
					1035	80%	58%
2019	DFA3				200	91%	51%
Proposed	DFA3	<0.001	0.819	0.707-0.931	56	100%	21%
					229	90%	54%
					363	80%	66%

Table 1: Drain fluid amylase cut-offs on POD1 (DFA1) and POD3 (DFA3) for Low-Risk and High-Risk patients. The first "2019" value is the value currently in use. The next three "Proposed" values are cut-off values from analysis of the study recalibration data. Sensitivities of 100%, 90%, and 80% are displayed.

1:43 PM

THE ROLE OF THE GASTROINTESTINAL MICROBIOME IN FOREGUT LEAKS

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INTRODUCTION: Leaks of the gastrointestinal tract are a devastating complication that can occur after foregut operations. It has been suggested that the pathogenesis of foregut leaks is directly influenced by the gut microbiome. The purpose of this study was to evaluate the composition of the microbiome within and between patients with gastrointestinal leaks to better understand the pathogenesis of these leaks.

METHODS: Patients undergoing interventions for gastrointestinal leaks from October 2021 to October 2022 were included in this study. During endoscopic and surgical interventions for gastrointestinal leaks, both microbial and host samples were collected. Genomic DNA of microbial samples were extracted and amplified. PCR products were sequenced using Illumina Nextera protocol. Effective sequence of bacterial 16S-rRNA gene was clustered into OTUs for analysis.

RESULTS: A total of 196 samples were collected from 16 patients (13 females; 3 males) with 49 samples used for the 16S analysis. The majority (56.2%) of patients required multiple interventions for their leaks, while a smaller portion (43.8%) underwent a single intervention. 42/49 samples (85.7%) included in the 16S analysis were from patients requiring multiple interventions with a mean of 4.6 interventions performed per patient in this group. In the entire cohort, Firmicutes was consistently the most abundant bacteria present. For patients that required multiple interventions, the microorganism composition changed over the course of treatment. At the index procedure, Firmicutes and Actinobacteria were on average the most abundant phyla present. By the end of treatment, Firmicutes remained dominant. However, abundances of Bacteroidetes and Proteobacteria increased, and the abundance of Actinobacteria decreased. Notably, there was a significant reduction in the Firmicutes to Bacteroidetes ratio by the end of treatment. In one patient who was not progressing well clinically, they were noted to have an increase in their Firmicutes to Bacteroidetes ratio and a much higher abundance of Proteobacteria when compared to other patients.

CONCLUSIONS: In conclusion, data from our study indicates that the Firmicutes to Bacteroidetes ratio of the gut microbiome significantly changed throughout the treatment of gastrointestinal leaks. A better understanding of this ratio and its role in gastrointestinal leaks could allow for more effective prevention and treatment strategies.

NOTES

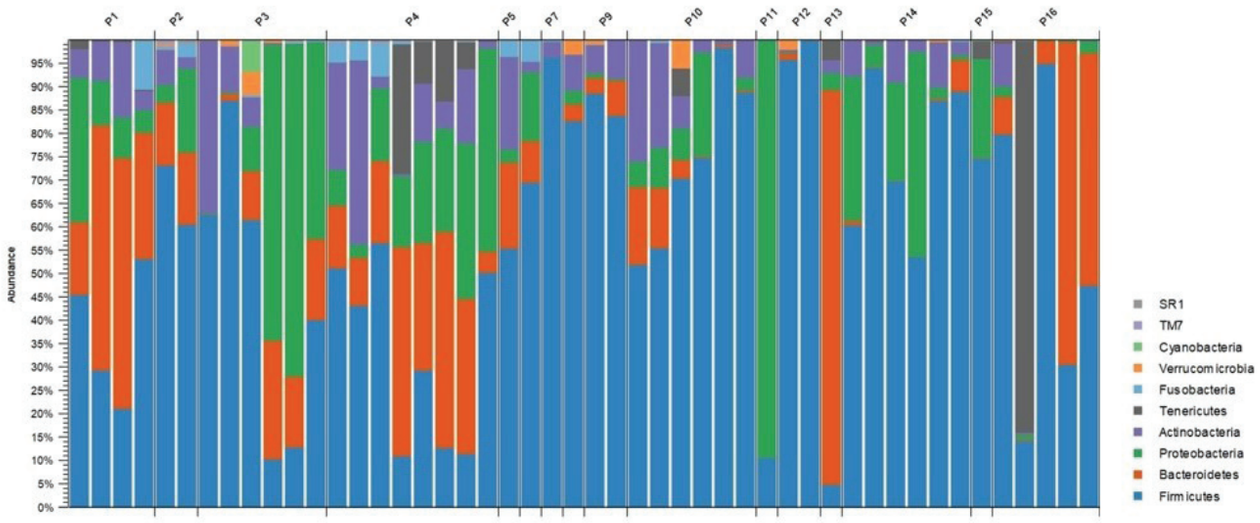

Figure 1. Relative abundance of phyla in a cylindrical accumulative graph of bacteria in the microbial samples. The horizontal ordinate (P1-P16) represents the samples correlating with each patient. The longitudinal ordinate represents the relative abundance of each phyla.

1:57 PM

SLEEVE GASTRECTOMY INHIBITS TUMOR FORMATION IN A MOUSE MODEL OF FAMILIAL ADENOMATOUS POLYPOSIS

Cullen F. Roberts, James N. Luo, Andrei Moscalu, Yingjia Chen, Ali Tavakkoli, Eric G. Sheu

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INTRODUCTION: Existing human studies have shown conflicting effects of bariatric surgery on colorectal cancer (CRC) risk. These equivocal findings are likely due in part to the heterogeneity of CRC. We have previously found that sleeve gastrectomy (SG) leads to increased colonic tumor growth in a mouse model of colitis-associated cancer, but the effect of SG on genetic CRC syndromes such as Familial Adenomatous Polyposis (FAP) remains unknown. In the murine analogue of FAP, mice with a mutated Adenomatous Polyposis Coli (APC) allele, known as APC^{Min}, develop gastrointestinal (GI) tumors predominantly in the small bowel. Here we examine the effects of SG on tumor formation in APC^{Min} mice.

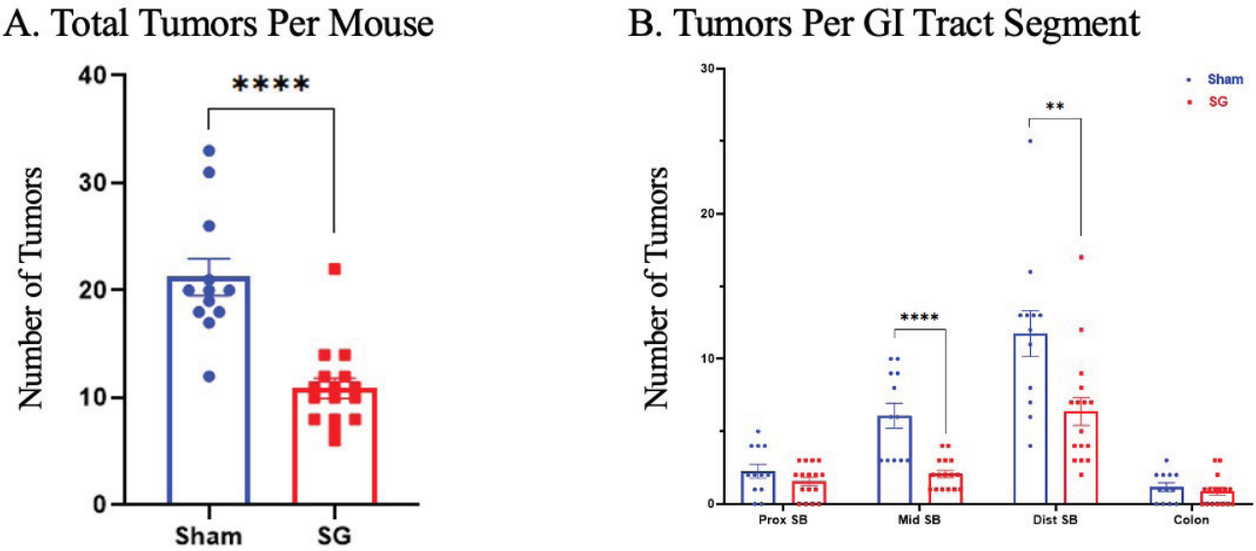
METHODS: Thirty 12-week-old C57BL/6J-APC^{Min} mice were randomized to SG (n = 18) or sham (n = 12) operation. Five days postoperatively, the mice were begun on a high-fat diet to promote tumor formation. Mice were weighed daily for the first postoperative week and then at three-to-four day intervals until sacrifice 25 days after surgery. At sacrifice, tumors were counted in the colon and proximal, mid, and distal small bowel, and tumor numbers in SG and sham mice were compared using t-tests. Small bowel samples were analyzed for mRNA expression of five cytokines: IL-1b, IL-6, IL-23, IL-33, and TNFa. Additionally, RNA sequencing (RNA-Seq) was performed on colonic tissue to identify transcriptional differences between SG and sham mice.

RESULTS: SG mice developed significantly fewer GI tumors than sham mice (10.9 vs 21.3; $p < 0.0001$; Figure 1A) with fewer tumors in the mid small bowel (1.7 vs 5.5; $p < 0.0001$; Figure 1B) and distal small bowel (6.8 vs 12.8; $p < 0.01$; Figure 1B). TNFa expression was significantly lower in SG mice while IL-1b, IL-6, and IL-23 trended lower. RNA-Seq showed upregulation of 209 genes and downregulation of 107 genes in SG mice compared to sham mice, and transcriptional pathway analysis demonstrated decreased expression of major histocompatibility complex (MHC) class I associated genes in SG mice compared to sham mice.

CONCLUSIONS: SG protects against APC-related tumors. SG is associated with a reduction in intestinal inflammatory cytokines and MHC class I pathways, highlighting a potential role of cell-mediated immunity in tumor control after SG.

NOTES

Figure 1. Tumor count, sham vs SG
Graphs shows data as means ± SEM. ** $p < 0.01$, **** $p < 0.0001$.



2:11 PM

THE UTILITY OF SYMPTOM ASSOCIATION PROBABILITY (SAP) IN PREDICTING OUTCOME AFTER LAPAROSCOPIC FUNDOPLICATION IN PATIENTS WITH ABNORMAL ESOPHAGEAL ACID EXPOSURE

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INTRODUCTION: Abnormal DeMeester score on esophageal pH-monitoring is a well-established predictor of favorable outcome for antireflux surgery (ARS). Esophageal pH monitoring also facilitates analysis of the temporal association between symptoms and reflux episodes. This association can be expressed with several symptom-reflux association indices, symptom association probability (SAP) being the most reliable. SAP is often used as an adjunct to DeMeester score during risk stratification prior to ARS. However, the utility of SAP in predicting ARS outcome has not been well established. The aim of this study was to determine the impact of SAP as an adjunct to DeMeester score in predicting outcomes after fundoplication for GERD.

METHODS: Records of patients who underwent primary (full or partial) fundoplication at our institution from 2015 to 2021 were reviewed. Patients with a preoperative DeMeester score > 14.7 on Bravo pH monitoring and a documented SAP for up to 3 symptoms were included. The SAP was considered positive if the calculated value was >95%, indicating the likelihood of a chance association between the reflux event and the symptom was <5%.

Patients completed the gastroesophageal reflux disease health-related quality of life (GERD-HRQL) questionnaire pre- and postoperatively. Favorable outcome was defined as freedom from proton pump inhibitor (PPI) and patient satisfaction at 1 year postoperatively. The presence and number of positive SAP, as well as positive SAP for individual symptoms and combined typical and atypical symptoms were evaluated for an association with surgical outcomes.

RESULTS: The final study population consisted of 360 patients (72.2% female) with a median (IQR) age of 60.0 (52–67). At a median (IQR) follow-up of 24.1 (13–46) months, 88.2% patients achieved favorable outcome, freedom from PPI was 88.9%, satisfaction was 86.7%, and 74.1% had at least 50% improvement in their GERD-HRQL score.

SAP was positive in 264 (73.3%) patients, of which 127 (48.1%) had one SAP positive symptom, 107 (40.5%) had two SAP positive symptoms, and 30 (11.4%) had all three SAP positive symptoms. There was no association between having at least one positive SAP symptom and favorable outcome ($p = 0.500$), freedom from PPI ($p = 0.448$), satisfaction (0.567), or 50% improvement in GERD-HRQL ($p = 0.375$). There was no difference in favorable outcome between patients with one, two or all SAP positive symptoms (0.721). No association with favorable outcome was found among patients with positive SAP for typical symptoms ($p = 0.872$) and atypical symptoms ($p = 0.819$) or any of the individual symptoms.

CONCLUSION: Symptom association probability did not add any value to a positive DeMeester score for risk stratification prior to antireflux surgery. These findings suggest that SAP should not be used in surgical decision-making in patients with objective evidence of reflux.

NOTES

SSAT Residents & Fellows Research Conference

Saturday, May 6, 2023
Room S504, McCormick Place
Chicago, Illinois

SESSION V

8-minute presentation, 6-minute discussion

Moderators: *Vic Velanovich, MD*
Antonio Picon, MD

2:45 PM **MANOMETRIC IDENTIKIT OF A FUNCTIONING AND EFFECTIVE FUNDOPLICATION IN THE HIGH-RESOLUTION MANOMETRY ERA**
Arianna Vittori, MD (Veneto, Italy)

2:59 PM **FEASIBILITY AND SAFETY OF TAILORED LYMPHADENECTOMY USING SENTINEL NODE NAVIGATED SURGERY WITH A HYBRID TRACER OF TECHNETIUM-99M AND INDOCYANINE GREEN IN HIGH-RISK T1 ESOPHAGEAL ADENOCARCINOMA PATIENTS**
Charlotte Frederiks, MD (Meibergdreef, Amsterdam)

3:13 PM **MUCOSA-ADHERENT BACTERIA REGULATE THE HEALING OF COLONIC ANASTOMOTIC WOUNDS IN COLORECTAL CANCER SURGERY**
Rou Hajjar, MD (Montreal, Canada)

3:27 PM **RATES OF SURGERY FOR STRICTURING CROHN'S DISEASE IN THE BIOLOGIC ERA**
Kush Fansiwala, MD (Los Angelos, California)

3:41 PM **IMMUNOREACT 8: IMMUNE MARKERS AS PREDICTORS OF LOCAL TUMOR SPREAD IN PATIENTS UNDERGOING TRANSANAL EXCISION FOR RECTAL CANCER**
Giulia Becherucci, MD (Verona, Itlay)

4:00 PM **LEADERSHIP FORUM, NETWORKING SESSION AND ROUNDTABLES**

KEYNOTE SPEAKER: Mary E. Klingensmith, MD, Accreditation Council for Graduate Medical Education

KEYNOTE ADDRESS: ***Future Scenario Planning to Predict the Future of Surgery***

6:00 PM **GLOBAL TRAINEE AND LEADERSHIP CONNECTIONS RECEPTION** **Grand Park AB, Hyatt Regency McCormick Place**

2:45 PM

MANOMETRIC IDENTIKIT OF A FUNCTIONING AND EFFECTIVE FUNDOPLICATION IN THE HIGH-RESOLUTION MANOMETRY ERA

Luca Provenzano, Matteo Santangelo, Giovanni Capovilla, Arianna Vittori, Loredana Nicoletti, Francesca Forattini, Giulia Nezi, Michele Valmasoni, Andrea Costantini, Mario Costantini, Renato Salvador
Universita degli Studi di Padova, Padova, Veneto, Italy

BACKGROUND: Assessing patients following Laparoscopic Fundoplication (LF) can be challenging. The role of High-Resolution Manometry (HRM) performed after LF is still unclear and debated. We sought to determine the HRM parameters of a functioning fundoplication and evaluate whether HRM could discriminate it from a tight or a defective one.

METHODS: Patients who underwent laparoscopic Nissen (LN) or Toupet (LT) fundoplication for GERD between 2009-2022 were included. Symptoms were scored using a dedicated symptom score (SS). HRM and 24-h pH monitoring (pH) were performed before and 6 months after surgery, regardless of patients' symptoms; >3 cm hiatal hernias were excluded. LF failure was defined as GERD symptom recurrence (SS >8) and/or an abnormal 24h-pH. The study population was divided in 5 groups: LN and LT patients with normal 24h-pH (LN pH- and LT pH+, respectively), LN and LT patients with pathological 24h-pH (LN pH+ and LT pH+ groups, respectively) and patients having a postoperative dysphagia score with an intensity ≥2 (Dysph group). LES parameters (resting pressure, IRP, total and abdominal length), and esophageal body function were reviewed by 2 experts (RS, GC). Differences in the postoperative HRM metrics between groups were evaluated, irrespective of preoperative ones.

RESULTS: During the study period, 123 patients (M:F = 84:39) having pre- and postoperative HRM were recruited (Figure 1): 89 showed no objective sign of GERD recurrence after LN (LN pH-: 41 patients) or LT (LT pH-: 48 patients); 21 showed an abnormal postoperative 24h-pH after LN (LN pH+: 15 patients) and LT (LT pH+: 6 patients). Five patients (all had LN) reported postoperative dysphagia (Dysph). Eight patients with GERD symptoms despite a normal 24h-pH were excluded from further analysis. LES resting pressure and total and intra-abdominal lengths were significantly lower in the LN pH+ group compared to the LN pH-, as well as LES resting pressure and abdominal length in the LT pH+ group compared to the LT pH-. The percentage of ineffective swallows was significantly higher in the LT pH- compared to LN pH-. No other differences were detected in the esophageal body motility. Furthermore, LT pH- patients showed a significantly lower LES resting pressure and IRP compared to LN pH-. Conversely, IRP was significantly higher in Dysph compared to LN pH-. All data are showed in Table 1.

CONCLUSION: This study provides the benchmark HRM values for an effective LF and confirms that the evaluation of the neo-sphincter with HRM improves the clinical assessment of symptoms recurrence and can discern patients with a well-functioning wrap from those showing GERD recurrence for an ineffective one. Moreover, IRP significantly correlated with the occurrence of postoperative dysphagia. Even if effective, LT was associated with significantly lower LES resting pressure and IRP than LN.

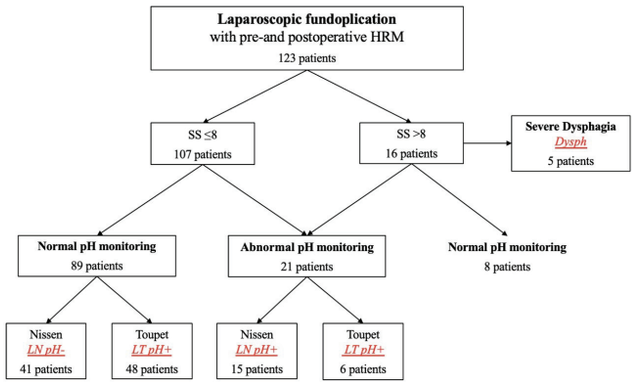

Figure 1. Study population flowchart

Postoperative HRM Parameters	LN pH-	LN pH+	*p-value* LN pH- vs LN pH+	LT pH-	LT pH+	*p-value* LT pH- vs LT pH+	*p-value* LN pH- vs LT pH-	Dysph	*p-value* LN pH - vs Dysph
Lower Esophageal Neo-Sphincter									
LES resting pressure	25.2 (9.4-48.5)	17.3 (5.2-36.6)	**0.039**	20 (9.7-37.8)	12.5 (1.7-24)	**0.05**	**0.027**	30.5 (23.3-56.6)	0.07
LES total length	32 (16.9-49.3)	23 (17-41.9)	**0.017**	29 (18-45.9)	21 (15.5-46.2)	0.19	0.07	48 (18-50)	0.496
LES abdominal length	16.5 (0-35.2)	0 (0-14.8)	**<0.001**	16.5 (3-30.7)	0.3 (0-8.5)	**<0.001**	0.75	16 (4.4-21.2)	0.71
IRP	10.3 (3.5-19.9)	10.9 (2.8-26.2)	0.74	8.6 (1.9-17.6)	5.45 (0.9-12.8)	0.28	**0.009**	19,3 (16.8-32.1)	**<0.001**
Esophageal body									
% peristaltic swallows*	88.7 (30-100)	68.7 (0-100)	0.78	77.1 (0-100)	21.7 (0-100)	0.15	0.30	100 (20-100)	0.4229
% simultaneous swallows*	3.9 (0-20)	5.3 (0-32)	0.59	4 (0-26.5)	0 (0-0)	0.006	0.92	0 (0-80)	0.8281
% failed swallows*	11.4 (0-50)	5.3 (0-23)	0.42	10 (0-40)	16.7 (0-85)	0.11	0.84	0 (0-0)	0.1587
% ineffective swallows*	2 (0-20)	5.7 (0-86)	**0.01**	9 (0-66.5)	21.7 (0-80)	0.35	**0.05**	0 (0-0)	>0.999
DCI	1003.6 (252.7-2552.2)	708.5 (115.1-2552.4)	0.15	712 (177.8-3462.9)	204 (126-699.7)	**0.005**	0.07	2042.5 (1918-3439.4)	0.06

HRM = high-resolution manometry; SS = symptom score; LN = laparoscopic Nissen; LT = laparoscopic Toupet; pH = 24h-pH monitoring. Data expressed as median (IQR).

Table 1. Postoperative HRM parameters of the study population

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FEASIBILITY AND SAFETY OF TAILORED LYMPHADENECTOMY USING SENTINEL NODE NAVIGATED SURGERY WITH A HYBRID TRACER OF TECHNETIUM-99M AND INDOCYANINE GREEN IN HIGH-RISK T1 ESOPHAGEAL ADENOCARCINOMA PATIENTS

Charlotte Frederiks[1,3], Anouk Overwater[1,3], Jacques Bergman[2], Roos E. Pouw[2], Bart De Keizer[3], Roel J. Bennink[2], Lodewijk A. Brosens[3], Sybren L. Meijer[2], Richard van Hillegersberg[3], Mark I. Van Berge Henegouwen[2], Jelle Ruurda[3], Suzanne S. Gisbertz[2], Bas L. Weusten[1,3]
[1]Sint Antonius Ziekenhuis, Nieuwegein, Netherlands; [2]Amsterdam UMC Locatie AMC, Amsterdam, North Holland, Netherlands; [3]Universitair Medisch Centrum Utrecht, Utrecht, Utrecht, Netherlands

BACKGROUND: Sentinel node navigated surgery (SNNS) might offer a less invasive alternative to esophagectomy to tailor the extent of lymphadenectomy in patients with high-risk T1 esophageal adenocarcinoma (EAC). This is the first study to investigate the feasibility and safety of a new treatment strategy, consisting of radical endoscopic resection of the tumor followed by SNNS.

METHODS: In this prospective, multicenter pilot study, 10 patients underwent SNNS in two tertiary hospitals after radical endoscopic resection of a high-risk T1 EAC (i.e., deep submucosal invasion ≥500 µm, poor differentiation, and/or lymphovascular invasion) without the clinical presence of lymph node or distant metastases (i.e., cN0M0). A hybrid tracer of technetium-99m nanocolloid and indocyanine green (^{99m}Tc-ICG-nanocolloid) was injected endoscopically around the resection scar the day before surgery, followed by preoperative imaging. During thoracoscopy and laparoscopy, sentinel nodes (SNs) were identified using a thoracolaparoscopic gammaprobe and fluorescence-based detection and subsequently resected (Figure 1). Endpoints were surgical morbidity, incidence of gastroesophageal functional disorders, rate of detectable SNs, and number of resected (tumor-positive) SNs per patient.

RESULTS: Localization and dissection of SNs was feasible in all patients (10 male, median age 69), with a median of 3 SNs (range 1–7) on preoperative imaging and a median of 3 SNs (range 1–6) during surgery. The concordance between preoperative imaging and intraoperative detection was high. In one patient (10%), dissection was considered incomplete after two SNs could not be identified due to a lack of ICG fluorescence. In four patients (40%), additional peritumoral SNs were resected after fluorescence-based detection. These SNs were not detected on preoperative imaging or intraoperatively with the laparoscopic gammaprobe as a result of the high background radioactivity of the injection site. Total procedure time was median 125 minutes (range 46–213), and patients were hospitalized for a median of 2 days (range 1–3). One patient (10%) experienced neuropathic thoracic pain related to surgery, while none of the patients developed functional disorders. In two patients (20%), a metastasis was found in one of the resected SNs. Both patients are undergoing strict endoscopic and radiologic follow-up, which was determined in a multidisciplinary meeting based on patient's older age (n = 1) and patient's choice in combination with micrometastasis (n = 1).

CONCLUSION: SNNS with ^{99m}Tc-ICG-nanocolloid appears to be a feasible and safe instrument to tailor lymphadenectomy in patients with high-risk T1 EAC who underwent a prior radical endoscopic resection. The exact position of this new strategy in the treatment algorithm for high-risk T1 esophageal cancer needs to be studied in future research with long-term follow-up.

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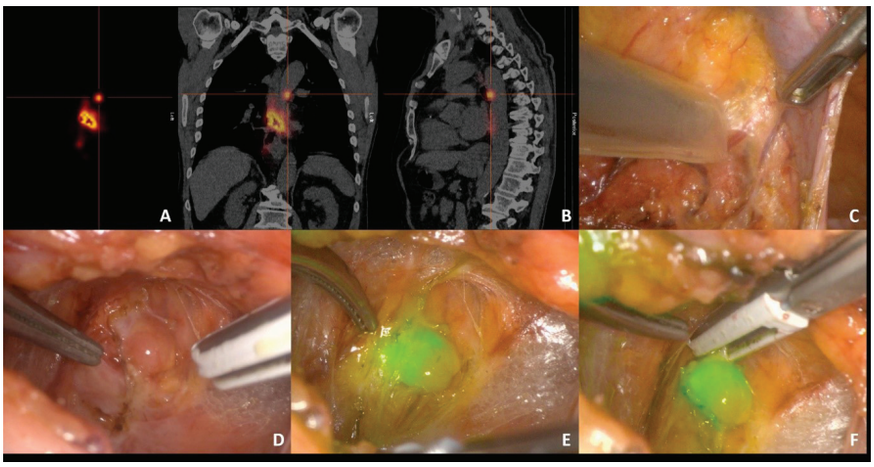

Figure 1: Identification of sentinel node located at the aortopulmonary window.

A) Lymphoscintigraphy 2 hours after endoscopic injection of the hybrid tracer showed the injection site and an intrathoracic sentinel node. B) This was combined with a SPECT/CT to detect the sentinel node location. C) The laparoscopic gammaprobe confirmed high radioactivity uptake during the thoracic phase of surgery, D) after which the sentinel node could be identified. E) The sentinel was also clearly visualized as indocyanine green positive when the camera view was switched to near-infrared. F) Subsequently, laparoscopic resection of the sentinel node was performed under near-infrared vision.

3:13 PM

MUCOSA-ADHERENT BACTERIA REGULATE THE HEALING OF COLONIC ANASTOMOTIC WOUNDS IN COLORECTAL CANCER SURGERY

Roy Hajjar[1,2], Emmanuel Gonzalez[3], Gabriela Fragoso[2], Manon Oliero[2], Ahmed A. Alaoui[1,2], Annie Calvé[2], Hervé Vennin Rendos[2], Souad Djediai[4], Thibault Cuisiniere[2], Patrick Laplante[2], Claire Gerkins[2], Ayodeji S. Ajayi[2], Khoudia Diop[2], Nassima Taleb[2], Sophie Thérien[2], Frédéricke Schampaert[2], Hefzi Alratrout[5], François Dagbert[5], Rasmy Loungnarath[5], Herawaty Sebajang[5], Frank Schwenter[5], Ramses Wassef[5], Richard Ratelle[5], Éric Debroux[5], Jean-François Cailhier[1,2], Bertrand Routy[1,2], Borhane Annabi[4], Nicholas J. Brereton[1], Carole S. Richard[1,5], Manuela M. Santos[1,2]

[1]Surgery, Universite de Montreal, Laval, QC, Canada; [2]Centre Hospitalier de l'Universite de Montreal Centre de Recherche, Montreal, QC, Canada; [3]McGill University, Montreal, QC, Canada; [4]Universite du Quebec a Montreal, Montreal, QC, Canada; [5]Centre Hospitalier de l'Universite de Montreal, Montreal, QC, Canada

INTRODUCTION: Anastomotic leak (AL) is a major complication in colorectal cancer (CRC) surgery, and is associated with increased mortality and morbidity. Recent evidence has suggested that the gut microbiota may be involved in the healing of colonic anastomoses in patients undergoing surgery for CRC. Data on the causal link between the pre-operative gut microbiota and AL in CRC patients remains scant. Our objective was to further characterize this link.

METHODS: We collected fecal samples before surgery and mucosal samples during surgery in CRC patients undergoing a colorectal resection with anastomosis. The gut microbiota in these samples was analyzed using the Anchor 16 pipeline. The preoperative microbiota of patients with and without AL was transplanted into mice that then underwent a surgical colonic anastomosis. The fecal and mucosal microbiota of these mice was analyzed as well. Bacteria correlated with healing parameters, and showing different levels between patients with and without AL, were isolated, and supplemented to mice that were then subjected to colonic surgery. Their mechanism of action on key repair mechanisms was assessed *in vitro*.

RESULTS: The pre-operative microbiota of patients with AL led to poor anastomotic healing in mice, to a poorly restored gut barrier function with higher bacterial translocation, and to a weakened anastomotic wound matrix with lower collagen and fibronectin. Differences in the composition of the gut microbiota of patients with and without AL were detected before surgery. These differences were transferable to mice by fecal microbiota transplantation, with 24 differentially abundant species. Two bacterial strains were strongly correlated with healing parameters, and whose role in intestinal health was unknown. These strains were isolated and labeled *Pg kh35* and *Ao kh33*. When supplemented to mice, *Pg Kh35* improved anastomotic healing, strengthened the wound matrix and restored the gut barrier, while supplementation with *Ao kh33* had a deleterious effect. Most importantly, both were detected in the mucosa of mice and patients, after the administration of antibioprophylaxis and bowel preparation, and their levels were different between patients that later did or did not develop AL. Mechanistically, *Pg kh35* exerted a beneficial effect by secreting a compound that upregulates the *peroxisome proliferator-activated receptor gamma* (PPAR-γ) in the colon, which promotes repair and alleviates inflammation, while *Ao kh33* had the opposite effect.

CONCLUSION: The preoperative microbiota of patients with CRC is causally linked to the risk of developing AL. We unveiled how several mucosal bacteria, that are resistant to the preoperative bowel decontamination, may influence anastomotic healing. These findings pave the way toward clinical trials in which the gut microbiota may be modulated before surgery to improve outcomes.

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3:27 PM

RATES OF SURGERY FOR STRICTURING CROHN'S DISEASE IN THE BIOLOGIC ERA

Kush M. Fansiwala[1], Shaya Noorian[1], Ellen Spartz[1], Lauren C. DeDecker[1], Andrew R. Roney[1], Joanna Turkiewicz[2], Christopher Soriano[1], Elizabeth Dente[1], Alejandro Sarabia Gonzalez[1], Siotame Lasitani[1], Jamie O. Yang[1], Jenny S. Sauk[3], Mary Kwaan[1], Berkeley N. Limketkai[3]

[1]University of California Los Angeles David Geffen School of Medicine, Los Angeles, CA, United States; [2]LA Medical Center Olive View, Sylmar, CA, United States; [3]Center for Inflammatory Bowel Diseases, Vatche & Tamar Manoukian Division of Digestive Diseases, University of California Los Angeles, Los Angeles, CA, United States

INTRODUCTION: Prior studies have demonstrated declining rates of surgery for both ulcerative colitis (UC) and Crohn's disease (CD) with the advent of biologic therapies. Although current biologic agents cannot reverse existing fibrotic strictures, limited data suggest that early control of intestinal inflammation might prevent progression toward stricturing disease. Given the unclear overall impact of biologics on stricturing disease, we hypothesized and evaluated whether nationwide rates of surgery for obstruction in the setting of CD decreased since the introduction of infliximab for CD in 1998.

METHODS: The National Inpatient Sample from 1998–2018 was queried to identify patients with CD and those who underwent bowel resection surgery using ICD-9 and ICD-10 codes in all diagnosis and procedure positions. Those who underwent surgery were further stratified into surgery for indication of obstruction. Both emergency and elective admissions for surgery were included for small bowel and colon resections. Longitudinal trends were plotted and tested for trends while adjusting for age, sex, race, comorbidity, primary payer, income quartile, hospital bed size, and hospital type.

RESULTS: A total of 291,692 patients with CD were admitted for surgery out of 3,472,436 total hospitalizations for CD. Those admitted for surgery were younger (44.25 vs. 49.37 years; $p < 0.01$) and more likely to be male (46% vs. 41%; $p < 0.01$). Table 1 further outlines differences in demographics between the surgical and non-surgical hospitalizations, with significant differences in race, Charlson comorbidity index, primary payer, income quartile, and hospital characteristics between the two groups. From 1998–2018, the proportion of all hospitalized CD patients who underwent any IBD-related surgery decreased from 12.0% to 6.5%, (p trend < 0.01), while the proportion of CD surgeries for only obstruction significantly increased from 10.8% to 26.4% (p trend = 0.02). In adjusted analyses, there was a trend for decrease in all surgeries (OR 0.98, 95% CI 0.97–0.98; p trend < 0.01) and increase in surgeries obstructive indication (OR 1.02, 95% CI 1.0–1.03; p trend = 0.03) per year.

CONCLUSION: In the era of biologics, there has been a significant decrease in the rate of hospitalized CD patients undergoing surgery; of those hospitalizations, however, a larger proportion underwent surgery for obstructive indication. Our findings suggest that advances in medical therapy may have decreased overall surgical rates, yet have had a limited impact on stricturing disease, leading to continued reliance on surgical treatments.

Table 1: Patient and hospital characteristics for hospitalizations for Crohn's Disease from 1998-2018

	Surgery (n=291692)	Non-surgical hospitalizations (n=3180744)	P-value
Mean age (years, SD)	44.25 (0.15)	49.37 (0.10)	<0.01
Sex (n, %)			<0.01
Male	135477 (46.5)	1295949 (40.7)	
Female	155907 (53.5)	1883438 (59.3)	
Race (n, %)			<0.01
White	201118 (83.5)	2198989 (81.4)	
Black	22077 (9.2)	299046 (11.1)	
Other	17624 (7.3)	202299 (7.5)	
Charlson Comorbidity Index (n, %)			<0.01
0	221207 (75.8)	1879510 (59.1)	
1 to 2	56773 (19.5)	968043 (30.4)	
3+	13711 (4.7)	333190 (10.5)	
Primary payer (n, %)			<0.01
Medicare	60095 (20.7)	1150972 (36.3)	
Medicaid	30834 (10.6)	433888 (13.7)	
Private	178933 (61.5)	1334441 (42.0)	
Other	21119 (7.3)	25455 (8.0)	
Zip code income quartile (n, %)			<0.01
1st	49131 (17.1)	672644 (21.6)	
2nd	68440 (23.9)	787379 (25.2)	
3rd	77169 (26.9)	807950 (25.9)	
4th	92013 (32.1)	852048 (27.3)	
Region (n, %)			0.12
Northeast	63936 (21.9)	702272 (22.1)	
Midwest	80498 (27.6)	821752 (25.8)	
South	103061 (35.3)	1180917 (37.1)	
West	44197 (15.2)	475804 (15.0)	
Hospital bedsize (n, %)			<0.01
Small	31028 (10.7)	450069 (14.2)	
Medium	65047 (22.3)	821096 (25.9)	
Large	194971 (67.0)	1901810 (59.9)	
Hospital location/teaching (n, %)			<0.01
Rural	19825 (6.8)	346359 (10.9)	
Urban nonteaching	83753 (28.8)	1097466 (34.6)	
Urban teaching	187467 (64.4)	1729149 (54.5)	

Figure 1: Annual percentages of all bowel resection surgeries in hospitalized Crohn's disease patients and obstruction-related surgery amongst all hospitalized Crohn's disease bowel resection surgeries from 1998-2018

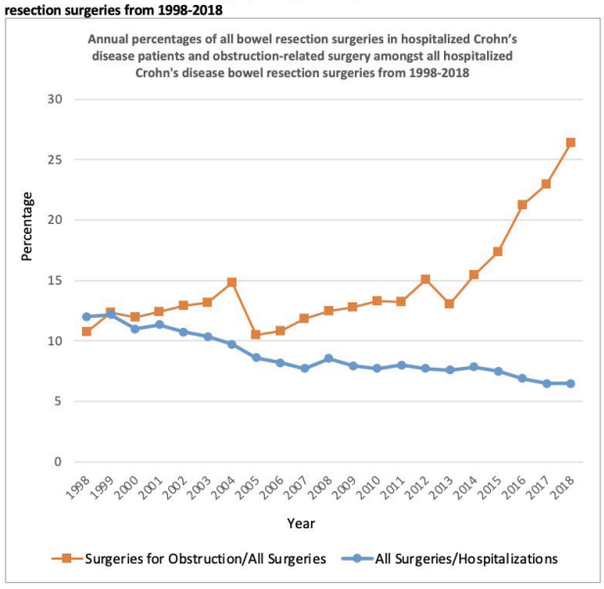

Figure 1: Annual percentages of all bowel resection surgeries in hospitalized Crohn's disease patients and obstruction-related surgery amongst all hospitalized Crohn's disease bowel resection surgeries from 1998–2018.

3:41 PM

IMMUNOREACT 8: IMMUNE MARKERS AS PREDICTORS OF LOCAL TUMOR SPREAD IN PATIENTS UNDERGOING TRANSANAL EXCISION FOR RECTAL CANCER

Giulia Becherucci[1], Cesare Ruffolo[1], Melania Scarpa[2], Astghik Stepanyan[1], Isacco Maretto[1], Ottavia De Simoni[2], Roberta Salmaso[1], Gaya Spolverato[1], Silvia Negro[1], Imerio Angriman[1], Andromachi Kotsafti[1], Chiara Vignotto[1], Federico Scognamiglio[1], Maurizio Zizzo[3], Francesco Marchegiani[1], Luca Facci[1], Francesca Bergamo[2], Stefano Brignola[1], Gianluca Businello[1], Vincenza Guzzardo[1], Luca Dal Santo[1], Carlotta Ceccon[1], Marco Massani[4], Anna Pozza[4], Ivana Cataldo[4], Tommaso Stecca[4], Angelo Dei Tos[1], Vittorina Zagonel[2], Pierluigi Pilati[2], Boris Franzato[2], Antonio Scapinello[2], Beatrice Salmaso[5], Giovanni Pirozzolo[6], Andrea Porzionato[2], Marco Agostini[2], Quoc Riccardo Bao[1], Francesco Cavallin[1], Barbara Di Camillo[1], Romeo Bardini[1], Ignazio Castagliuolo[1], Salvatore Pucciarelli[1], Matteo Fassan[1], Marco Scarpa[1]

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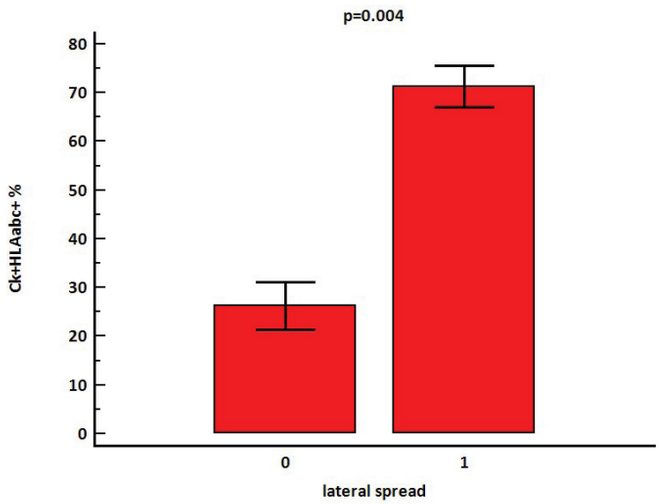
INTRODUCTION: Trans anal excision (TAE) of rectal cancer can be considered as definitive treatment if the infiltration depth is T1 or lower, and the lesion is completely included within the resection margin. Moreover, it can be used as an alternative approach in case of a complete response to neoadjuvant therapy. The immune microenvironment within the bowel mucosa plays a role in the immune surveillance mechanisms against carcinogenesis. Our aim was to analyze the immune microenvironment in healthy rectal mucosa as possible predictor of tumor infiltration depth, lateral tumor spread, and complete response to neoadjuvant therapy of rectal cancer undergoing TAE.

METHODS: This study is a sub-analysis of data from the IMMUNOREACT 1 and 2 trials (NCT04915326 and NCT04917263) including all the patients who underwent TAE of rectal cancer. In this multicentric study, we collected healthy mucosa surrounding the rectal cancer. A panel of immune markers was retrospectively investigated at immunohistochemistry: CD3, CD4, CD8, CD8beta, Tbet, FoxP3, PD-L1, MSH6, and PMS2 and CD80. A prospective analysis was performed with flow cytometry to determine the proportion of epithelial cells expressing CD80, CD86, CD40, HLA ABC or HLA DR and the proportion of activated CD8+ T cells, CD4+ Th1 cell, and T reg.

RESULTS: A total of 64 patients with rectal cancer who were treated with TAE were analyzed: 41 in the retrospective cohort and 23 in the prospective cohort. In our study group, tumor infiltration depth over T1 stage was observed in 10 patients, lateral tumor spread in 8 patients, and complete response to neoadjuvant therapy in 19 ones. Deep tumor spread (over pT1 stage) was associated with a high CD8+/FoxP3+ T cells ratio ($p = 0.07$), low CK+CD80+ mean fluorescence intensity (MFI) ($p = 0.032$), high CK+CD86+ cell rate ($p = 0.008$) and high CK+HLA-I + cell rate ($p = 0.038$). Accuracy for predicting tumor infiltration depth was AUC = 0.9 for CD8+/FoxP3+ T cells ratio, AUC = 0.89 for CK+CD80+ MFI, AUC = 0.98 for CK+CD86+ cell rate and AUC = 0.98 for CK+HLA-I + cell rate. Accuracy for predicting lateral tumor spread was AUC = 0.82 for CD8+CD38+ T cell rate, AUC = 0.82 for CK+CD80+ MFI, and AUC = 0.96 for CK+HLA-I + cell rate. Accuracy for predicting complete response was AUC = 0.90 for CK+CD86+ cell rate, and AUC = 0.8, $p = 0.017$ for CK+HLA-I + cell rate.



CONCLUSION: In our series, patients with locally spreading rectal cancer that should undergo further surgery to complete rectal cancer treatment show higher antigen presentation within the healthy rectal mucosa surrounding the cancer. However, lymphocyte activation and co-stimulation are lower suggesting weak immune surveillance mechanisms. Similarly, In case of lack of complete response to neoadjuvant therapy, there is a higher antigen presentation by epithelial cells but low cytotoxic T cell activation.

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