Jacobs School of Medicine and Biomedical Sciences
University at Buffalo

Department of Surgery

19th Annual Research Day

THURSDAY, MAY 18, 2023

Steven D. Schwaitzberg, MD
Distinguished Professor and Chairman

W. Alan Guo, MD
Clinical Professor

Introduction

Welcome to the 19th Annual University at Buffalo Department of Surgery Research Day. This day represents an opportunity for all members of the medical community to get a bird's-eye view of the research efforts taking place in the University at Buffalo Department of Surgery.

The Department of Surgery Research Day is our annual celebration of the scientific advancements achieved by our surgeons, scientists, residents, and students. Over the past several years, our Research Day has become much more than a mere celebration; it has become an opportunity for the faculty and residents to strengthen existing partnerships and establish new collaborations across the clinical and academic realm.

There are three cornerstones of academic medicine: clinical expertise, scientific discovery, and clinical teaching. These goals are interdependent. Clinical expertise relies on both scientific discovery and clinical teaching, while scientific discovery, in turn, can be informed by clinical experience. Our Research Day promotes and celebrates these types of exchanges. This year we have a total of 38 abstracts, which include 12 formal oral presentations, 20 poster presentations, and 6 quick shots. Each of these abstracts include research that was conducted by the Department of Surgery medical students, residents, and faculty at all sites, including Buffalo General Medical Center, Erie County Medical Center, Roswell Park Comprehensive Cancer Center, John R. Oishei Children's Hospital, and the VA Medical Center.

Research is an important part of our academic mission. We are making progress developing a strong research base. The faculty at the Department of Surgery at SUNY Buffalo is committed to research in their own careers and to help residents develop as surgeon-scientists through support and mentorship. Our faculty members continue to sit on prestigious editorial boards of national journals, hold extramural funding from national agencies, as well as funding from health care industries.

In this rich academic and collaborative environment, we are committed to developing the future leaders in academic surgery and clinical practice. We hope you enjoy the 19th Annual University at Buffalo Department of Surgery Research Day, as we take the challenge of improving the quality of life for patients by embracing both basic science research and clinical outcomes to tailor new directions in translational research.

Steven D. Schwaitzberg, MD
Distinguished Professor and
Chairman of Surgery

Weidun Alan Guo, MD, PhD
Clinical Professor of Surgery

Jacobs School of Medicine and Biomedical Sciences
University at Buffalo

19th Annual Department of Surgery Research Day
May 18, 2023

Jacobs School of Medicine & Biomedical Sciences

Poster Presentations: 2nd Floor Atrium (Outside Room 2220 A & B)

Oral Presentations: 2nd Floor Room 2220 A & B

AGENDA

6:45 am – 7:45 am:
Grand Rounds
Topic:
Tending the Bridge: Five Steps for Conducting Impactful Surgical Research

Guest Speaker
Scott A. LeMaire, MD, FACS, FAHA, FCCP
Professor and Director of Cardiothoracic Research
Baylor College of Medicine, Houston, TX

7:50 – 8:50 am:
Poster Sessions & Breakfast

8:50 – 9:00 am:
Break

9:00 – 10:12 am:
Oral Presentations #1 – #6

10:12 – 10:22 am:
Break

10:22 – 11:34 am:
Oral Presentations #7 - #12

11:34 – 11:45 am:
Break

11:45 am – 12:15 pm:
Quick Shot Presentations #1 - #6

12:30 – 2:00 pm:
Luncheon & Awards

Jacobs School of Medicine and Biomedical Sciences
University at Buffalo

POSTER PRESENTATIONS

Group 1 – Poster professor: Csaba Gajdos, MD

1. **Feasibility and Safety of Expanding the Criteria for Early Discharge Following Anatomic Lung Resection in the COVID-19 Pandemic Era**
   Authors: Lindsay Nitsche; Ryanne Dugan; Kurt VonFricken; Sandip Saha; T. Robert Qaqish; Yaron Perry
2. **Preservation of the Right Internal Thoracic Artery Graft in Robotic-Assisted Right Middle Lobectomy**
   Authors: Kaity Han-Yung Tung, MD; Ethan Craig, MD; Yaron Perry, MD, FACS
3. **A Case of Intercostal Lung Herniation as a Result of Cardiopulmonary Resuscitation**
   Authors: Alyssa Reese, BA, BS; Ryanne Dugan, PA-C; Yaron Perry, MD, FACS
4. **In Situ Replacement of Infected Femorofemoral Bypass Grafts with Cryopreserved Femoral Vein**
   Authors: Budik, S; Rivero, M; Cherr, GS; Montross, B; Harris, LM; Dosluoglu, HH
5. **Hemoglobin A1c Levels Impact Patency and Adverse Limb Events in Diabetics After Revascularization**
   Authors: Amber Repasky, MD; Mariel Rivero, MD; Brittany Montross, MD; Hasan H. Dosluoglu, MD; Nader D. Nader, MD, PhD
6. **Competition Based Learning: Inspiring Interest in Surgical Skills Development**
   Authors: Nicco Ruggiero, BS (Medical Student); Joseph C. L'Huillier, MD (Resident); Nigel Marine BS (Medical Student); Owen Burns; Farrah Mawani, BS (Medical Student); Muavé Sanders, BS; Adam Abbas, BS (Medical Student); Timothy M. Adams, MD; Byron F. Santos, MD; Yana R. Wirengard, MD; James "Butch" Rosser, MD, FACS
7. **The Impact of a Pediatric Surgery Resident Orientation on Adherence to Guidelines, Narcotic Sparing Postoperative Orders, and Patient Care**
   Authors: Owen Cordero; Cortnie Vaughn; Hector Osei; Joseph L'Huillier; John Woodward; Krystle Bittner; P. Ben Ham III

Jacobs School of Medicine and Biomedical Sciences
University at Buffalo

POSTER PRESENTATIONS

Group 2 – Poster professor: Carroll Harmon, MD

1. **Frailty vs Age: Which One Matters in Geriatric Massive Transfusion Thresholds and Outcomes?**
   Authors: Joseph C. L'Huillier, MD (Resident); Shuangcheng Hua, MS; Heather J. Logghe, MD (Resident); Ajay A. Myneni, MBBS, PhD, MPH; Katia Noyes, PhD, MH; Jihnhee Yu, PhD; W. Alan Guo, MD, PhD

2. **Gun Violence Recidivism in New York State: What Increases the Risk of Being Shot Again?**
   Authors: Joseph C. L'Huillier, MD (Resident); Joseph D. Boccardo, MS; Ajay A Myneni, MBBS, PhD, MPH; Henry L. Taylor Jr., PhD; James Lukan, MD, FACS; Katia Noyes, PhD, MPH

3. **The Price of Riding into the Golden Age: The Worsened Clinical Outcomes of Geriatric Motorcycle Accidents**
   Authors: Eden Nohra, MD; Kabir Jalal, PhD; Joseph C. L'Huillier, MD; W. Alan Guo, MD, PhD

4. **Does Sutton's Law Apply to Trauma Resuscitation?**
   Authors: William H. Kelly, MD; Weidun Alan Guo, MD, PhD; Kabir Jalal, PhD; William J. Flynn Jr., MD

5. **Analyzing Practice Variations Amongst Surgery Residents Caring for Pregnant Trauma Patients**
   Authors: William Kelly, MD, MS; Weidun Alan Guo, MD, PhD, FACS

6. **Specific Stressors, Sleep Patterns, Self-Efficacy, and Burnout Rates Among Physicians at a Single Center**
   Authors: Helen A. Potter MD; Monica S. O'Brien-Irr MS RN; Matthew W. Henninger EdM; Catherine Flanagan-Priore PhD; Peter Winkelstein MD MBA; Linda M. Harris MD

7. **Transcending Gender and Racial Barriers: Dr. Margaret Jessie Chung, the First Chinese American Woman Surgeon and "Mom" to World War II Servicemen**
   Authors: Kaity H. Tung, MD; Steven D. Schwaitzberg, MD, FACS; Weidun Alan Guo, MD, PhD, FACS

Jacobs School of Medicine and Biomedical Sciences
University at Buffalo

POSTER PRESENTATIONS

Group 3 – Poster professor: Linda Harris, MD

1. **Partial Versus Radical Nephrectomy: Comparison of Postoperative Complications**
   Authors: Ali Houjaij, MD; Oussama M. Darwish, MD; Jake Rubin, MD; Csaba Gajdos, MD; Nader D. Nader, MD, PhD

2. **Gender Specific Effects of Body Composition on Intra-Tumoral Proliferation and Inflammation in NSCLC**
   Authors: Yeshwanth Vedire; Sukumar Kalvapudi; R. J. Seager; Grace Dy; Joseph Barbi; Erik Van Roey; Shuang Gao; Mary K. Nesline; Jeffrey M. Conroy; Sai Yendamuri; Sarabjot Pabla

3. **The Effects of Antibiotics on Long-Term Survival and Recurrence Free Survival in NSCLC Lobectomy Patients**
   Authors: Rebecca Korsh; Matthew Carlson; Long Hao Li; Trisha Jupudy; Gabriella Radford; Cole Schoenborn; Johnson Schwede; Rene Bouchard; Sai Yendamuri, MD

4. **Discharge to Home with Chest Tube After Lung Surgery is Associated with a Low Incidence of Empyema**
   Authors: Kaylan Gee; Yeshwanth Vedire; Sukumar Kalvapudi; Holly Meyers; Mark Hennon; Todd Demmy; Chukwumere Nwogu; Sai Yendamuri; Elisabeth Dexter

5. **Looks can be Deceiving: Detection of Regional Differences in Physiologic Perfusion Levels in Human Esophagogastrointestinal Tract Using Laser Speckle Contrast Imaging**
   Authors: Garrett Skinner; Emily Huang; Chris McCulloh; Yao Lui; Alan Harzman; Peter Kim

6. **Inspiring Inspiration: Creation of a Smart Incentive Spirometer**
   Authors: Kai Kumero; Samantha Zavala; Storiya Iqbal; Tasbeeh Malik; William Kelly MD, MS; Brian Quaranto, MD, MS; Gene Yang, MD

Department of Surgery

Poster Presentations Group 1

Feasibility and Safety of Expanding the Criteria for Early Discharge Following Anatomic Lung Resection in the COVID-19 Pandemic Era

Lindsay Nitsche[1]; Ryanne Dugan[1]; Kurt VonFricken[1]; Sandip Saha[1]; T. Robert Qaqish[1]; Yaron Perry[1*]

[1]Jacobs School of Medicine and Biomedical Sciences, Department of Thoracic Surgery
[*]Corresponding author email: yperry@buffalo.edu

Objective: Extended hospital stays lead to poor post-operative outcomes. With the introduction of a novel Corona Virus, the risk of hospital acquired illness is exponentially increased. We hope to expand the previously published next day discharge criteria for patients following anatomic lung resection and show effectiveness and safety.

Methods: The study included patients undergoing anatomic lung resection at the second highest volume institution with respect to COVID-19 in the state. Electronic medical records were reviewed; patients' demographics, co-morbidities, pulmonary function tests, type of resection, pathology, length of stay, perioperative complication, 30-day complication and re-admission rate, and evidence of COVID-19 infection were documented. All patients were in private rooms or with documented COVID-19 negative roommates, staff was wearing masks according to current guidelines. We analyzed what metrics were predictive for safe and effective discharge 36 hours postoperatively.

Results: 21 patients underwent lobectomy, 6 underwent segmentectomy, and all surgeries were performed utilizing a minimally invasive robotic approach. 15/27 patients were discharged within 36 hours and none of these patients got readmitted or experienced mortality within 30 days. These patients had higher predicted DLCO (95% CI [68.7-89.7]) than the longer length of stay group (95% CI [58.0-72.5]) (p=.03). The early discharge group also had higher predicted FEV1 (95% CI [74.7-98.7]) compared to the other patients (95% CI [61.7-74.8]) (p=.01) The early discharge group had an average of 1 comorbid condition while the late discharge group had an average of 2.1 (p=.04). The late discharge group had more postoperative complications (95% CI [0.2-2.1]) than the early discharge group (95%CI [-0.2-0.4]) (p=.02). The late discharge group had a longer chest tube dwell time (95% CI [3.9-5.0]) than the early discharge group (95% CI [1.0-1.8]) (p<.001). No in hospital infection with COVID-19 had occurred.

Conclusions: Based on our results it is safe to consider early discharge for patients who do not suffer from multiple comorbidities or have low predicted pulmonary function test values. With further optimization of post-operative pathways, and the presence of high infection rate of the novel corona virus, guidelines may continue to expand.

Preservation of the Right Internal Thoracic Artery Graft in Robotic-Assisted Right Middle Lobectomy

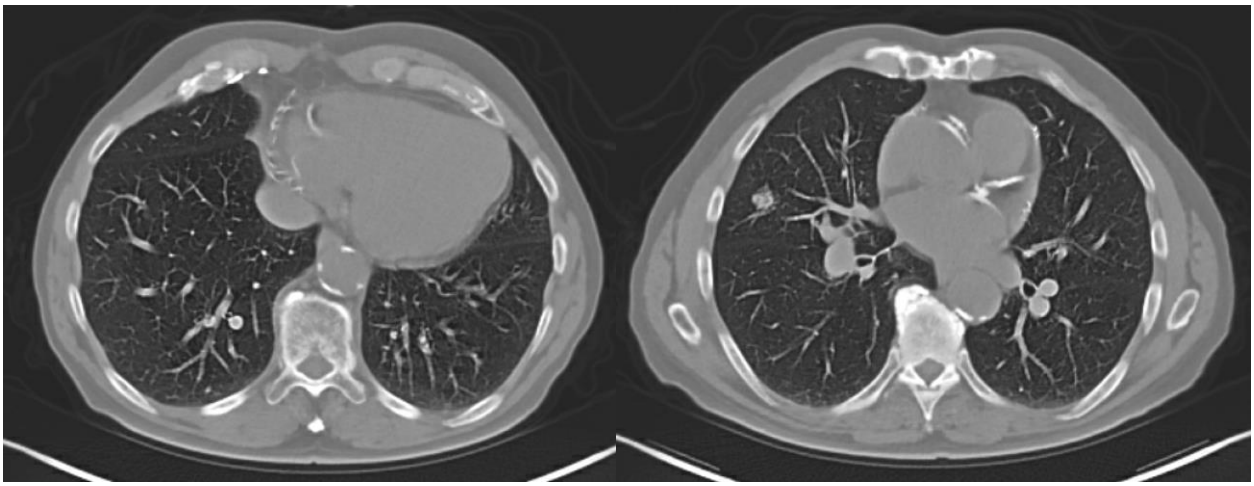
Kaity Han-Yung Tung, MD[1]; Ethan Craig, MD[1]; Yaron Perry, MD, FACS[1]

[1]Department of Surgery, University at Buffalo Jacobs School of Medicine and Biomedical Sciences, The State University of New York, Buffalo, NY 14203, USA

Minimally invasive approaches, such as VATS and RATS, are chosen for their decreased surgical trauma and the sequalae thereafter. Lobectomy after previous cardiac surgery, such as coronary artery bypass grafting (CABG), represents one of those situations.
By taking advantage of the RATS approach, the patient was surgically treated for stage 1A right primary lung adenocarcinoma with previous CABG with RITA graft. Several key decisions led to the safe surgical outcome in this unique case and could be applied and translated to future encounters as well as the more common left sided presentations.

Firstly, preoperative imaging with CT chest with intravenous contrast as well as intraoperative finding of hemoclips along the RITA graft provided adequate localization of the graft to guide the dissection. As shown in the video, the hemoclips were adequately revealed with careful dissection, and along with the pulsatile RITA graft, the ability to localize the graft was not at all compromised from the dense adhesions. Secondly, we would like to emphasize and attribute our ability to complete a formal lobectomy to the robotics approach, which provided the optics and dexterity required to complete an oncologic dissection of the right middle lobe with no compromise to the RITA graft. One could argue leaving behind a margin of lung parenchyma in this case was an option given the distance of the tumor from the graft as suggested by several studies with minimal reported oncologic compromise and infection risk. However, the dexterity of the robotic arms enabled accurate dissection through the dense adhesions along the RITA graft to allow for radical surgical resection.

Lastly, any caliber of injury to this dependent graft could lead to catastrophic consequences; thus, the cardiopulmonary bypass machine and the patient's cardiac surgeon were on standby as our rescue strategy. Bilateral groins were prepped into the operative field as stated above in anticipation of any situation that may arise. In conclusion, RATS approach is a safe option for patients with previous CABG as it enabled accurate dissection by an experienced surgeon.



A Case of Intercostal Lung Herniation as a Result of Cardiopulmonary Resuscitation

Alyssa Reese, BA, BS[1]; Ryanne Dugan, PA-C[2]; Yaron Perry, MD, FACS[2]

[1] University at Buffalo, Jacobs School of Medicine and Biomedical Sciences
[2] Buffalo General Medical Center, Division of Thoracic Surgery

Background: Rib fractures are a well-known risk of cardiopulmonary resuscitation (CPR) in children and adults alike. While fractures of the ribs commonly occur during CPR, herniation of the lung through the intercostal spaces is rare. This clinical vignette details the case of an elderly woman who experienced subcutaneous emphysema and lung herniation following manual CPR.

Case Report: A 72-year-old woman with a history of hypertension, hyperlipidemia, chronic obstructive pulmonary disease, gastroesophageal reflux disease, cerebral vascular accident with a left basal ganglia infarct, bladder cancer with urostomy, depression, anxiety, and colon cancer was seen following two cardiac arrests at another facility. While performing CPR during the second cardiac arrest, the patient endured a rib fracture, left lung herniation, and diffuse subcutaneous emphysema that extended from the face to the torso. The patient was intubated and transferred to another hospital. Upon arrival, bilateral chest wall blow holes were placed and bilateral wound vacuum-assisted closure devices were applied. Following partial resolution of the subcutaneous emphysema, the patient was placed under general anesthesia and underwent a flexible bronchoscopy and left video-assisted thoracoscopy. Thoracoscopy revealed lung herniation and penetrating injury as a result of the broken ribs piercing the entrapped lung. The incarcerated anterior upper left lobe and part of the lingula were reduced and the defect in the ribs was closed with two V-Loc sutures endoscopically. The patient experienced no acute issues post-operatively.

Conclusion: In the rare case that a patient experiences lung herniation following CPR, video-assisted thoracoscopy and endoscopic reduction of the incarcerated lung offers a plausible surgical treatment.

In Situ Replacement of Infected Femorofemoral Bypass Grafts with Cryopreserved Femoral Vein

Budik, S.; Rivero, M.; Cherr, GS.; Montross, B.; Harris, LM; Dosluoglu HH

Objective: Management of infected femorofemoral bypass grafts requiring removal include extra anatomic bypass, in situ replacement with femoral vein, GSV or Rifampin-soaked grafts. We previously reported cryopreserved femoral vein (CFV) as our preferred option due to diameter and low morbidity, as it obviates need for femoral vein harvest. The goal of our study is to present updated experience, with longer follow up.

Methods: All patients who had excision of femorofemoral bypass followed by in situ replacement with CFV graft after failed attempts at graft preservation between 10/2002-2/2016 were included.

Results: There were 7 patients (6 male, 1 female, mean age 63±11, 56-86). Five had fem-fem bypass, 2 had axillo-bifemoral bypass performed 12, 18, 30 days, 3, 8, 36 and 54 months prior to infection and replacement with CFV. Cultures included MRSA, Pseudomonas, S epidermidis, S aures, and mixed (Enterococcus fecalis, Pseudomonas aeruginosa, and Escherichia coli), with no growth in one patient. One unrelated perioperative mortality occurred from aspiration after right hemicolectomy for right colon cancer, diagnosed postoperatively due to lower gastrointestinal bleeding. One patient developed early pseudoaneurysm (5 weeks post procedure) repaired with 13mmx5cm Viabahn (Figure 1). All wounds healed. Six patients died of unrelated causes 24 days, 5, 7, 24, 26 and 57 months post repair with patent bypasses, and one patient remained alive with patent graft at 36 months and then was lost to follow up. There were no recurrent infections or aneurysm formation during follow up.

Conclusions: Cryopreserved femoral vein graft is associated with low procedure related morbidity, limb salvage and patency and remains our preferred choice for replacement of infected femorofemoral grafts.

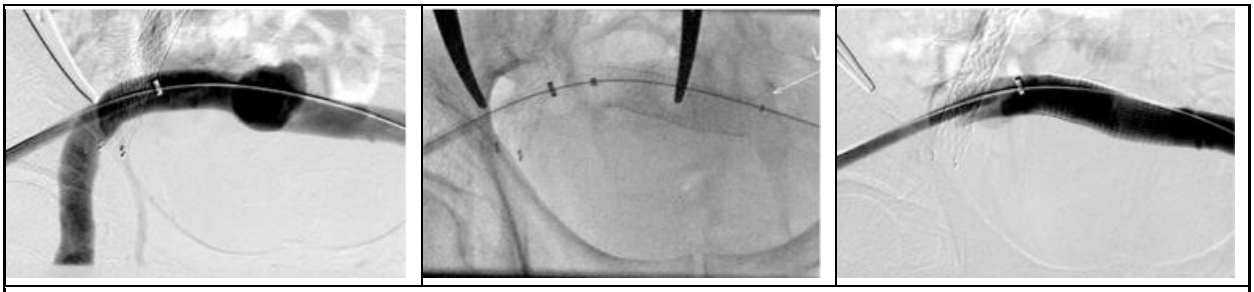


FIG 1 CFV pseudoaneurysm (A) early pseudoaneurysm after in situ replacement of infected femorofemoral bypass graft with CFV. (B) Deployment of 13mmx5cm Viabahn. (C) Completion angiogram demonstrating exclusion of pseudoaneurym

Hemoglobin A1c Levels Impact Patency and Adverse Limb Events in Diabetics After Revascularization

Amber Repasky, MD; Mariel Rivero, MD; Brittany Montross, MD; Hasan H. Dosluoglu, MD; Nader D. Nader, MD, PhD

Background: The effect of poor glycemic control in the perioperative and postoperative period has been reported to be associated with early and late major adverse limb events (MALE); however, these studies were mainly from databases, lacked granular data and were long-term outcomes. We examined the long-term effects of high hemoglobin A1c levels on patency, MALE, limb salvage (LS) and survival after lower extremity revascularization in diabetic patients.

Methods: Patients with diabetes who had revascularization for Rutherford 3 to 6 between May 2001 and December 2018 and patients with an HbA1c of 7 or less were compared to an HbA1c greater than 7 for patency, MALE, survival, LS and amputation-free survival. Null hypotheses were rejected when p-values were <0.05.

Results: Of 706 patients, 699 had HbA1c data (775 limbs), with 311 (357 limbs) in the HbA1c of 7 or less and 388 (418 limbs) in the HbA1c of greater than 7 groups. Patients in HbA1c of greater than 7 were younger (69.9 ± 10.2 vs. 71.7 ± 9.5; P = 0.011), had higher lipid levels, insulin use (70% vs. 49%; P < 0.001), American Society of Anesthesiologists class 4, chronic limb-threatening ischemia (79% vs. 72%; P = 0.019), infrapopliteal interventions (49% vs. 42%; P = 0.005), and less chronic kidney disease (32% vs. 41%; P = 0.023), with no difference in clinical presentation, disease complexity (Trans-Atlantic Inter-Society Consensus C/D [79% vs. 77%]), type of revascularization (24% vs. 18% open, 66% vs. 70% endovascular, 10% vs. 12% hybrid). Postoperative complications were similar. Patency and freedom from MALE rates were significantly lower in the HbA1c of greater than 7.0 group for infrainguinal revascularizations, whereas amputation-free survival and overall survival were similar (Table). In patients with chronic limb-threatening ischemia, LS rates were significantly lower in open revascularized patients (5-year: 64 ± 6 vs. 86 ± 5; P = 0.020), whereas it was similar after endovascular interventions (5-year: 79 ± 4 vs. 77 ± 3; P = 0.631). Seventy patients lost limbs in HbA1c greater than 7.0 vs. 38 in the HbA1c ≤ 7.0 group (P = 0.007). The reason for limb loss was more likely to be related to graft/stent occlusion (25% vs. 3%), whereas infection-related limb loss was the more likely cause in the HbA1c ≤ 7.0 group (66% vs. 44%). In multivariate analysis, HbA1c, level of intervention and Trans-Atlantic Inter-Society Consensus predicted primary patency, HbA1c, insulin use, level of intervention, and angiotensin-converting enzyme inhibitor use were associated with MALE.

Conclusion: A perioperative HbA1c of greater than 7 is associated with poorer patency rates and freedom from MALE, especially at the infrainguinal level of revascularization in diabetics, with no significant impact on survival. LS is impacted after the open approach but not after endovascular revascularization.

Table: Primary patency (*PP*), secondary patency (*SP*), major adverse limb event-free survival (*MALE-FS*), amputation-free survival (*AFS*), and limb salvage (*LS*) in patients with HbA1c levels of 7% or less or greater than 7%.

	PP		SP		MALE-FS		AFS		LS-open CLI only (n = 62)		LS-EV CLI only (n = 101)	
	3 Years	5 Years	3 Years	5 Years	3 Years	5 Years	3 Years	5 Years	3 Years	5 Years	3 Years	5 Years
HemoglobinA1c ≤7 (n = 357)	79 ± 3% (127)*	76 ± 3% (50)	88 ± 2% (146)	87 ± 2% (60)	84 ± 2% (177)	78 ± 3% (95)	54 ± 3% (191)	36 ± 3% (110)	90 ± 5% (31)	86 ± 5% (15)	81 ± 3% (76)	79 ± 4% (38)
Hemoglobin A1c >7 (n = 418)	43 ± 3% (95)	38 ± 3% (34)	71 ± 3% (137)	66 ± 3% (52)	70 ± 3% (179)	64 ± 3% (98)	49 ± 2% (209)	32 ± 2% (124)	69 ± 6% (40)	64 ± 6% (19)	80 ± 3% (96)	77 ± 3% (57)
P value		<.001		<.001		<.001		.576		.020		.631

CLI, Chronic limb-threatening ischemia; *EV*, endovascular.
Numbers in parentheses are the number of patients remaining at that time.

Competition Based Learning: Inspiring Interest in Surgical Skills Development

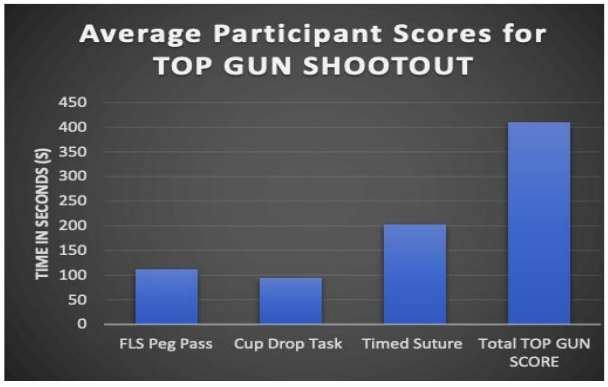
Nicco Ruggiero, BS (Medical Student); Joseph C. L'Huillier, MD (Resident);
Nigel Marine, BS (Medical Student); Owen Burns; Farrah Mawani, BS (Medical Student);
Muavé Sanders, BS; Adam Abbas, BS (Medical Student); Timothy M. Adams, MD;
Byron F. Santos, MD; Yana R. Wirengard, MD; James "Butch" Rosser, MD, FACS

Background: Competition based learning (CBL) involves student-centered teaching that facilitates learning through competitions. The acquisition of Minimally Invasive Surgery (MIS) training occurs mainly in simulation laboratories via independent practice. However, laboratory utilization is low due to an excessive clinical and educational workload. At the 2022 Annual SAGES meeting, we evaluated a CBL experience (TOP GUN Shootout) developed from a modified version of the previously validated TOP GUN Laparoscopic Skills and Suturing Program (TGLSSP). The project was meant to evaluate the impact of the experience on the participants.

Methods: Participants competed in the TOP GUN Shootout (TGS) a technical skills competition. Participant scores (time and errors) were recorded for: Fundamentals of Laparoscopic Surgery (FLS) Peg Pass, Cup Drop Task, and Intracorporeal Suturing. The objective performance of the top three participants was identified. These participants then competed in a final, head-to-head contest to determine a winner. All participants completed a 10-question satisfaction survey on a 7-point Likert scale, with questions assessing 3 domains: 1) capability/confidence in MIS skill performance prior to the competition; 2) applicability and satisfaction with TGLSSP's capacity to develop MIS skills; and 3) interest in seeking additional MIS training and appropriateness of CBL in MIS training. Descriptive statistics were used to evaluate these areas.

Results: Sixty participants competed in the TGS. Forty-three completed the satisfaction survey (72%). Geographically, 13 states and 9 different countries were represented among participants. The average age was 33.7 years, 67% were males and 70% were surgical residents. On average (± SD), participant satisfaction was 4.86 (± 0.29) for Domain 1, 6.22 (± 0.11) for Domain 2, and 6.55 (± 0.13) for Domain 3.

Conclusion: Participants felt an overall lack of confidence in their MIS skills; prior to the 2022 Annual SAGES conference. Participants felt that this brief CBL experience, derived from the TGLSSP, aided in the development of their MIS skills. Furthermore, this brief CBL experience may inspire learners to seek out further training of MIS skills and it can inspire surgical learners to seek further training in technical skills development.



The Impact of a Pediatric Surgery Resident Orientation on Adherence to Guidelines, Narcotic Sparing Postoperative Orders, and Patient Care

Owen Cordero[1]; Cortnie Vaughn[1]; Hector Osei[3]; Joseph L'Huillier[2]; John Woodward[2]; Krystle Bittner[3]; P. Ben Ham III[1,2,3]

[1] Jacobs School of Medicine and Biomedical Sciences, State University of New York at Buffalo, Buffalo, NY
[2] Department of Surgery, State University of New York at Buffalo, Buffalo, NY
[3] Division of Pediatric Surgery, John R. Oishei Children's Hospital, Buffalo, NY

Background: Residents rotating on the pediatric surgery service may be unfamiliar with differences between pediatric and adult guidelines, as well as how to optimize various strategies to improve patient outcomes while minimizing use of narcotics to manage postoperative pain. We hypothesized that a formal resident orientation program would increase adherence to use of IV fluid guidelines and use of narcotic sparing postoperative pain management practices resulting in similar or improved patient outcomes.

Methods: A retrospective chart review was performed for all pediatric patients that underwent laparoscopic appendectomy with the indication of appendicitis prior to and following the implementation of a resident orientation program. The pre-orientation and post-orientation periods were from 8/1/2020 to 11/30 2020 and 8/1/2022 to 11/30/2022, respectively. Our primary outcome measures included adherence to the use of IV fluid guidelines and to recommended postoperative pain orders. We also evaluated patient postoperative pain scores and total postoperative morphine equivalents. Data was analyzed using SPSS (Amork, NY). Two-tailed p-value ≤ 0.05 was considered significant.

Results: Of the 156 patients included, 82 (53%) were in the pre-orientation group and 74 (47%) were in the post-orientation group. Both groups had similar demographics: male (52% vs 58%, $p= 0.477$), non-Hispanic/Latino (85% vs 89%, $p= 0.476$), Caucasian race (72% vs 78%, $p= 0.288$), age [11.9 (3.6) vs 11.8 (3.5), $p= 0.823$] and BMI percentile [60 (34) vs 55 (360, $p= 0.400$]. We observed no differences in postoperative IVF orders or in the accuracy of postoperative analgesic orders; however, there was significant decrease in orders for narcotics (12% vs 8%, $p= 0.021$) with an increased use of gabapentin (0 vs 8%, $p= 0.021$). The change in postoperative analgesic use did not result in a significant difference in the average pain score in the first 24 hours after surgery while on the floor [3 (1.6) vs 2.6 (1.8), $p= 0.093$] between the two groups. In addition, there was a significant increase in the accuracy of discharge analgesic prescribed (81% v 95%, $p= 0.013$).

Conclusions: A formal resident orientation in pediatric surgery may lead to decreased use of narcotics following laparoscopic appendectomy without worsening of average pain score in the first twenty-four hours and lead to more consistent communications to parents. This may lead to less narcotic prescriptions and increase adherence to post discharge counseling and instructions.

Department of Surgery

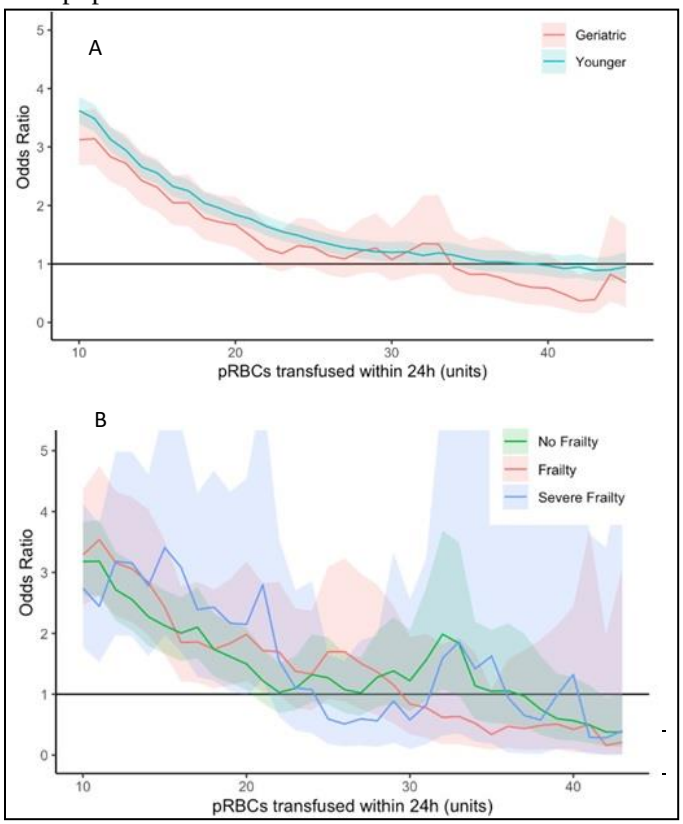
Poster Presentations Group 2

Frailty vs Age: Which One Matters in Geriatric Massive Transfusion Thresholds and Outcomes?

Joseph C. L'Huillier, MD (Resident); Shuangcheng Hua, MS; Heather J. Logghe, MD (Resident); Ajay A Myneni, MBBS, PhD, MPH; Katia Noyes, PhD, MH; Jihnhee Yu, PhD; W Alan Guo, MD, PhD

Introduction: Recent literature has defined transfusion thresholds (TTs), the amount of blood after which the odds of mortality does not improve with additional transfusion, as 53 units of total blood product within 24 hours. However, all patients will not respond to massive transfusion similarly. While older age and frailty are independently linked to health outcomes, their impact on TTs is unknown. We sought to define 24-hour TTs in units of pRBCs for the geriatric population and determine the association of TTs with frailty and age.

Methods: The 2013-2018 TQIP database was queried for adult patients who received ≥ 10 units pRBCs within 24 hours of admission (MTP). Patients were stratified by age (< 65 years old vs ≥ 65 years old). Geriatric adults were further stratified by frailty using the 5-factor modified frailty index. The TT was defined as the point at which the odds of survival between the group receiving 10 more units of blood product and the group receiving 10 fewer units of blood product (reference) than the number of blood product itself was equal to 1 (ie. Survival among those receiving more blood was not different). TTs, calculated using a multiple logistic regression analysis and bootstrapping, and outcomes were compared between: 1) geriatric and nongeriatric adults and 2) geriatric adults of various degrees of frailty.



Results: There were 20,358 adult patients who received MTP. The 24-hour pRBC TT was lower for geriatric adults (n = 2,549; 34 units; 95% CI 30-37) than younger adults (n = 17,809; 39 units; 95% CI 37-44; $p = 0.03$; Fig A). There was no statistical difference in 24-hour pRBC TT between the non-frail (n = 1,313; 37 units; 95% CI 35-59), frail (n = 789; 30 units; 95% CI 24-39), and severely frail (n = 447; 25 units; 95% CI 20-32) geriatric adults ($p > 0.05$; Fig B). As shown in table, multiple logistic regression analysis demonstrated that increased number of pRBC transfusion, age ≥ 65 years old, and frailty were associated with mortality (all $p < 0.01$).

≤ 10	0.24 (0.23-0.26)	<0.0001
11-29	Ref	
> 30	1.78 (1.63-1.94)	<0.0001
Age ≥ 65	1.87 (1.75-1.99)	<0.0001
Degree of frailty		
No frailty	0.46 (0.43-0.50)	<0.0001
Frailty	Ref	
Severe frailty	1.12 (0.99-1.26)	0.0704
ISS (1-point ↑)	1.03 (1.03-1.03)	<0.0001

Conclusion: Age but not frailty impacts TTs for the geriatric population in trauma, while both age and frailty impact mortality. Frailty-related comorbidities reflect chronic disease, which may not be a primary driver for TTs. These results may help optimize MTP utilization and improve outcomes for older trauma patients.

Gun Violence Recidivism in New York State: What Increases the Risk of Being Shot Again?

Joseph C. L'Huillier, MD(Resident); Joseph D. Boccardo, MS; Ajay A Myneni, MBBS, PhD, MPH; Henry L. Taylor Jr., PhD; James Lukan, MD, FACS; Katia Noyes, PhD, MPH

Background: While gun violence incidents (GVI) are on the rise, trends in and factors associated with multiple GVI (recidivism) are limited. We examined demographics and outcomes among patients who were hospitalized for a single and for multiple GVI in New York State.

Methods: The 2005-2020 New York Statewide Planning and Research Cooperative System (SPARCS) database was queried for all patients aged 12-65 years old with a firearm-related hospital encounter. Demographics and outcomes were extracted from SPARCS. Patient home Zip code was used to determine the Social Deprivation Index (SDI) for each patient's living condition. We conducted bivariate and multivariate analyses between ppatients who were stratified into those suffering a single or multiple (encounters >30 days apart)GVI.

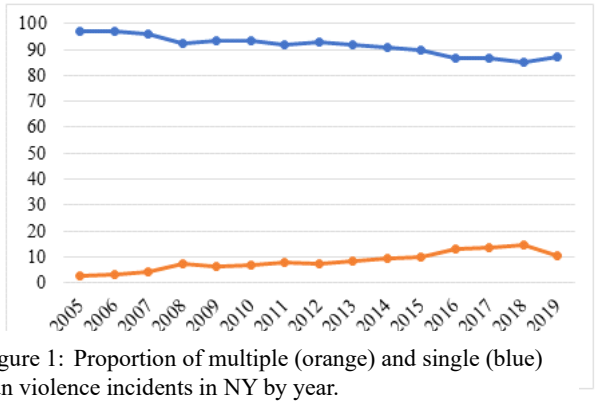


Figure 1: Proportion of multiple (orange) and single (blue) gun violence incidents in NY by year.

	Single Incident n = 38,237	Multiple Incidents n = 3,432	*p*-value
Age at first incident, mean± SD	28.3 ± 10.9	28.5 ± 11.1	0.27
Race, n (%)			
White	5,801 (15.5)	340 (10.0)	<0.01
Black	24,150 (64.5)	2,449 (72.1)	
Other	7,502 (20.0)	608 (17.9)	
Urban residence, n (%)	36,059 (96.8)	3,315 (98.1)	<0.01
Uninsured or Medicaid, n (%)	23,626 (69.1)	2,386 (70.3)	0.14
Discharged to law enforcement after first incident, n (%)	478 (1.3)	55 (1.6)	0.10
Social Deprivation Index of patient's home Zip code, mean ± SD	1.1 ± 0.8	1.2 ± 0.8	<0.01
Below poverty line, % ± SD	22.7 ± 11.0	24.3 ± 10.8	<0.01
Single parent families, % ± SD	23.1 ± 10.4	24.9 ± 10.2	<0.01
< 12 years of education, % ± SD	18.9 ± 8.5	18.8 ± 8.1	0.88
Unemployed, % ± SD	34.9 ± 7.9	36.1 ± 7.7	<0.01

Table 1: Demographics and outcomes between those suffering a single vs multiple GVI in NY

Results: We identified 41,669 gun violence victims among whom there were 38,237 single and 3,432 multiple (median incidents = 2) GVI patients. The proportion of multiple to total GVI by year rose from 2.8% in 2005 to 12.9% in 2019 ($p < 0.01$; Figure 1). Among multiple GVI patients, median [IQR] time from first to second encounter was 209 [69-865] days. Multiple GVI patients were more likely to be people of color (72.1% vs 64.5%, $p < 0.01$) and reside in areas of higher deprivation (12 vs 1.1, $p < 0.01$).

Conclusions: Gun violence recidivism is on the rise in New York State. While gun violence disproportionately affects people of color and underdeveloped communities, the growing issue of gun violence recidivism is even more prevalent amongst these same populations. This represents one of the first statewide analyses of gun violence recidivism, which should guide community level interventions for prevention.

The Price of Riding into the Golden Age: The Worsened Clinical Outcomes of Geriatric Motorcycle Accidents

Eden Nohra, MD; Kabir Jalal, PhD; Joseph C. L'Huillier, MD; W Alan Guo, MD, PhD

Introduction: The number of geriatric motorcyclists is increasing. The risk of lethality in geriatric motorcyclists is increased. The relationships between comorbidities, injury severity, and outcomes in the geriatric compared to younger motorcyclists is unknown. We investigated the differences in comorbidities, injury severity, and outcomes of motorcycle accidents between geriatric and nongeriatric patients.

Methods: The Trauma Quality Improvement Program (TQIP) was queried for all adult patients who were injured in a motorcycle accident from year 2017 to year 2019. Patients aged ≥65 years (geriatric) were compared to those aged <65 years (nongeriatric). Descriptives for the raw and matched data were generated by age group, and chi-squared tests of association and Wilcoxon tests for differences were performed to compare age groups (data not shown). Propensity score matching was then utilized to create two similar groups based on comorbidities, ED vitals, injury severity, and demographics. A Cox hazard model was created to evaluate the effects of patient characteristics on survival. Kaplan-Meier curves were generated to compare survival between groups. A joint test was used as a single test of the effect of age on the model.

Results: In all, there were 7,964 geriatric patients, 98,862 nongeriatric patients, and 4,839 patients in each of the matched groups. Before matching, geriatric patients had a higher percentage of comorbidities, higher ISS, and worse outcomes (Table). Dementia, congestive heart failure, functional status, anticoagulant use, and peripheral arterial disease were unable to be fully matched, likely owing to the disproportionately increased occurrences in the geriatric population compared to the nongeriatric patients. Analysis of the matched data also demonstrated worse outcomes in the geriatric cohort (Table). Both Cox model (p=0.0008; HR = 4.4; 95% CI = 2.3, 8.5) and Kaplan-Meier (p< 0.0001) analyses showed significantly higher mortality among the geriatric group. The joint test shows geriatric age has as highly significant (p=0.0008) and interacts with GCS, thoracic injury, lower extremity, ISS, and smoking (data not shown).

Unmatched cohorts		
Variable	Geriatric (n = 7,964)	Non-geriatric (n = 98,862)
COPD*	667 (8%)	2,025 (2%)
Diabetes*	1,667 (21%)	5,671 (6%)
CHF*	202 (3%)	451 (0%)
HTN*	3,947 (50%)	14,054 (14%)
ISS*	12 (8-17)	10 (5-17)
Hospital LOS*	4 (2-8)	3 (1-6)
Cardiac arrest*	139 (2%)	762 (1%)
Intubation*	167 (2%)	696 (1%)
24-h mortality*	369 (5%)	2,351 (2%)
All mortality*	519 (7%)	4,013 (4%)
Matched cohorts		
Variable	Geriatric (n = 4,839)	Non-geriatric (n = 4,839)
Hospital LOS*	4 (2-8)	3 (1-7)
Cardiac arrest*	82 (2%)	48 (1%)
Intubation*	95 (2%)	66 (1%)
24-h mortality*	210 (4%)	152 (3%)
All mortality*	282 (6%)	194 (4%)

*p<0.01

Conclusion: Geriatric motorcyclists have more comorbidities, higher injury severity, and worse outcomes compared to nongeriatric motorcyclists. Geriatric age is an independent risk factor for poor outcomes among injured geriatric motorcyclists. We ascribe the differences in outcomes to inherent differences in the geriatric versus nongeriatric populations. Overall injury geriatric motorcyclists have a higher ISS. Furthermore, certain injuries may lead to worse prognosis in the geriatric age, such as thoracic, lower extremity, and low GCS. This information should be used to inform geriatric-focused trauma care, as well as public information and injury prevention efforts.

Does Sutton's Law Apply to Trauma Resuscitation?

William H. Kelly, MD; Weidun Alan Guo, MD, PhD; Kabir Jalal, PhD; William J. Flynn Jr., MD

Introduction: When asked why he robbed banks, notorious bank robber Willie Sutton replied, "because that's where the money is." In medicine, Sutton's Law refers to the notion that when working to arrive at a diagnosis, one should first consider the most obvious. With respect to trauma resuscitation, surgeons at our institution have traditionally controlled bleeding by entering the body cavity most likely to contain the source of hemorrhage (Sutton's Law) rather than utilizing resuscitative/ ED thoracotomy (EDT) as is the case at many other institutions. In this paper, we aim to demonstrate our experiences with using this management algorithm.

Methods: The Erie County Medical Center Trauma Registry was utilized to collate a list of 188 patients that required emergent operative intervention because of traumatic injuries. Patients were stratified into 3 groups based on initial systolic blood pressure upon presentation to the emergency department. These patients were then matched to a representative cohort of patients from the Trauma Quality Improvement Program (TQIP). For the purposes of this study, "Resuscitated" and "Survival" are defined as alive after initial OR and at discharge respectively. Independence refers to the patient living at home.

Results: Our data demonstrate that operative resuscitation guided by the principles of Sutton's Law does not lead to a statistically significant difference in outcomes when compared to a national cohort where EDT is readily employed. Direct operative control of hemorrhage was used more commonly in our study population, with similar rates of resuscitation and quality of life.

	Study				**TQIP**				
	EDT	%	OR	%	EDT	%	OR	%	P-Value
SBP=0	1	3	39	97	292	66	230	34	<0.0001
SBP<90	1	2	48	98	110	4	2871	96	NS
SBP>90	0	0	99	0	167	2	6199	98	NS

	Outcome	**Study**	%	**TQIP**	%	P-Value
SBP=0	Resuscitated	5	12.82	81	14.19	0.8126
	Survival	0	0.00	50	8.76	0.0538
	Independent	0	0.00	13	2.28	0.3408
SBP<90	Resuscitated	41	83.67	2452	81.57	0.7062
	Survival	39	79.59	2345	78.01	0.7909
	Independent	28	57.14	1141	37.96	0.0061
SBP>90	Resuscitated	92	95.83	5572	86.85	0.3197
	Survival	86	89.58	5519	86.02	0.6224
	Independent	71	73.96	3000	46.76	<0.0001

Conclusion: Primarily approaching the body cavity most likely to be the location of bleeding achieves resuscitation rates and rates of independent survival comparable to national benchmarks that predicated on the use of ED thoracotomy. Further, definitive operative management offers as many benefits (visualization, staff, equipment, sterility) when compared to initial resuscitation with EDT. Management algorithms based on anatomic exposure and direct repair may be preferable to EDT suggesting that Sutton's Law applies to trauma resuscitation.

Analyzing Practice Variations Amongst Surgery Residents Caring for Pregnant Trauma Patients

William Kelly, MD, MS; Weidun Alan Guo, MD, PhD, FACS

Background: Caring for pregnant trauma patients is relatively rare (7% of pregnancies) and caring for pregnant trauma patients in the advanced stages of pregnancy, where a fetus may be viable following the early delivery, is even more rare. Nonetheless, this is a scenario that surgical trainees are expected to be well versed in, as evidenced by the current ATLS curriculum. Despite this, factors including institution-specific procedural and logistical constraints can result in divergence in the care of the pregnant trauma patient.

Aims: In this study, we aimed to identify institution-specific knowledge gaps in the care of the pregnant trauma patient. We then utilized this information in the creation of a Trauma in Pregnancy practice management guideline specifically tailored to our level 1 trauma center, Erie County Medical Center (ECMC).

Materials and Methods: An eleven question, anonymous survey was administered to all senior residents (post-graduate year 4 or 5) within the University at Buffalo General Surgery residency. The survey utilized multiple question formats including true/false questions, select all that apply and 5-point Likert scale. These questions aimed to assess each participant's knowledge base regarding the management of pregnant trauma patients, as well as the perinatal services available to such patients. Broadly, the questions can be separated into 4 discrete categories: demographic information, knowledge/ experience, practice patterns/ locally available services, and interprofessional relationships.

Results: Of sixteen senior residents surveyed, 100% responded to the survey. None of the survey questions were met with unanimous responses. Six questions examined aspects of the respondent's knowledge base/ experience. Questions surveying the usage and indications of diagnostic tests such as urine beta HCG and the acid elution test were found to have a significant amount of variability. Similarly, there were a range of answers when individuals were queried about the indications for both urgent and perimortem cesarean section delivery. With respect to procedural technique in pregnant trauma patients, zero respondents reported feeling comfortable with performing a perimortem cesarean section, with 2 individuals reporting their level of comfort as "neutral" and the selecting reporting either "uncomfortable" (n=6) or "very uncomfortable" (n=8). Notably, there was a discrepancy amongst respondents regarding the appropriate anatomic landmarks for tube thoracostomy in patients at 23-weeks gestation or greater, with only 12 individuals (75%) indicating that it was "true" that the tube should be placed 1-2 interspaces higher. Three questions aimed to assess practice patterns and locally available services for the care of pregnant trauma patients. There was considerable discrepancy in when respondents would call an obstetrics consult for a pregnant trauma patient. Further, only 6 residents (37.5%) correctly selected "true" when asked if perinatologists can remotely view fetal heart monitoring in real time for patients in the trauma bay or trauma ICU. Perhaps most interestingly, when asked whether ECMC has a clinical practice management guideline for the care of pregnant patients, 87.5% of respondents (n=14) selected "true", despite no such guideline existing. One question addressed the perceived interprofessional relationship between surgery residents and their OB/GYN colleagues. There was a mix of responses, ranging from adversarial to collegial.

Conclusions: Surgical residents are expected to care for pregnant trauma patients when they present in our emergency departments and trauma bays. Despite this, it is apparent that knowledge gaps exist amongst general surgery residents at our institution. Creating institution-specific clinical practice management guidelines for the care of pregnant trauma patients offers the opportunity to ensure that such patients receive the most appropriate and evidence-based care possible.

Specific Stressors, Sleep Patterns, Self-Efficacy, and Burnout Rates Among Physicians at a Single Center

Helen A. Potter, MD; Monica S. O'Brien-Irr, MS, RN; Matthew W. Henninger, EdM; Catherine Flanagan-Priore, PhD; Peter Winkelstein, MD, MBA; Linda M. Harris, MD

Objective: Evaluate self-efficacy, burnout, and specific stressors among clinical faculty at a university-affiliated medical center.

Methods: Clinical faculty were invited to complete an anonymous survey including the General Self Efficacy Scale, Copenhagen Burnout Survey, Insomnia Severity Index, Perceived Stress Scale, and a series of questions regarding work and social stressors. Analysis was by Chi-Square and independent student T-test.

Results: Of 115 respondents, 52% were male, 84% Caucasian, median age 51 years. Fifty-three percent have been in practice for >20 years and 64% were in a medical field. Males were more likely to answer "exactly true" that they could find several solutions when confronted with a problem (48% vs. 25%; *P* <.001). Males were more likely answer "exactly true" that if in trouble they could think of a solution (39% vs.18%; *P*= .032) as were medical doctors vs. surgeons (38% vs. 15%; *P* =.038). Males were more likely to report emotional exhaustion (36% vs.10%; *P* =.027), as were those in practice ≤10 years (65% vs. 43% vs. 30%; *P*=.003). Surgeons reported physical exhaustion more frequently (41% vs. 19%; *P* =.013). Females were more likely to report they were seldom/never tired of working with patients (80% vs. 61%; *P* =.027) and were more likely to be dissatisfied/very dissatisfied with their sleep pattern (50% vs. 25%; *P* =.009). Most respondents (72%) indicated confidence in handling personal problems and 53% felt on top of things fairly/very often but this was more common in males (67% vs. 40; *P* =.046). However, 38% reported being nervous/stressed fairly/very often and 13% felt difficulties were piling up so high they could not control them. Top work concerns were dealing with insurers, hospital mandates, clinical work volume, and adequate support staff. Top personal concerns included time with spouse/children, other family, maintaining friendships and exercise.

Conclusions: Despite possessing high levels of self-efficacy, burnout is high amongst physicians of all fields and stages of practice. The medical profession and hospitals must take heed to this and provide the resources that physicians need. EMR seems to be problematic for older physicians, and adequate support may be a gender issue. Common work-related stressors include dealing with insurers, hospital mandates and adequate support staff and may be good sources to target intervention for relief.

Transcending Gender and Racial Barriers: Dr. Margaret Jessie Chung, the First Chinese American Woman Surgeon and "Mom" to World War II Servicemen

Kaity H. Tung, MD; Steven D. Schwaitzberg, MD, FACS; Weidun Alan Guo, MD, PhD, FACS

Background: Since Ancient Greece, there are records of practicing female physicians. However, throughout United States history, women continued to jump through hurdles to practice medicine. In addition, the mindset of non-white individuals being inferior in terms of qualification and capability prevailed, posing additional challenges for minorities to pursue careers in medicine, let alone succeeding in the field of surgery. Gender and racial disparities were magnified by female and non-white physicians each comprising only less than 5% of the physician workforce in the early 20th century.

Synopsis: As the eldest of eleven children and child of immigrant parents in the early 1900s, Dr. Chung carried the weight of her family as she faced racial discrimination growing up in the America under the Chinese Exclusion Act. Yet her dream to become a medical missionary motivated her to obtain her medical degree from the University of Southern California on scholarship in 1916. Being the only woman and non-white student in her class, she assimilated by dressing in masculine clothing and referring to herself as "Mike" in attempt to minimize prejudice. She further experienced social injustice by being denied medical missionary to China and surgical residency. However, with perseverance, she first worked as a surgical nurse in Los Angeles, and then secured a training opportunity with Dr. Bertha Van Hoosen in Chicago, becoming one of her "surgical daughters." After completion of her residency, Dr. Chung returned to her root and opened a practice in San Francisco, hoping to address the healthcare disparity in her own community by bridging the gap between Western medicine and the Chinese community. She then worked as a trauma and plastic surgeon at the Santa Fe Railroad Hospital in Los Angeles, treating occupational injuries sustained by blue-collar railroad workers. Her skills, humanistic manner, gender, and racial background resonated with the immigrant population, who grew to entrust her with their health. When America joined World War II, she organized fundraisers and lobbied Congress to allow women to join the Army. Despite strong resistance and multiple failures, Dr. Chung succeeded in establishing the Women Accepted for Volunteer Emergency Service (WAVES), which allowed women of different ethnicities to serve in the Navy as commissioned officers. Behind these achievements, Dr. Chung retained a compassionate heart, caring and cooking for the pilots she recruited and adopting them as her sons. She remains to this day as the first American born Chinese female surgeon and the proud "mom" of many World War II veterans.

Historical Significance: With unfaltering interest in surgery, altruism, and patriotism, Dr. Chung transcended gender and racial barriers, making her a role model for many who came after and of similar backgrounds. She shattered the stereotype of an early 20th century Asian American woman, and served as an advocate for reducing healthcare disparities, advancing gender and racial equity and inclusion in the profession of medicine and in military service.

Department of Surgery

Poster Presentations Group 3

Partial Versus Radical Nephrectomy: Comparison of Postoperative Complications

Ali Houjaij, MD; Oussama M. Darwish, MD; Jake Rubin, MD; Csaba Gajdos, MD;
Nader D. Nader, MD, PhD

Background: Partial nephrectomy is the preferred treatment method for certain kidney tumors owing to its nephron-preserving benefit. We aimed to compare the occurrence and importance of complications after radical (RN) or partial (PN) nephrectomy for localized renal cell carcinoma (RCC).

Methods: All RCC cases were extracted from the National Surgical Quality Improvement Program between 2005-2017. All-cause mortality was the primary endpoint that defined a failure-to-rescue (FTR) after the occurrences of complications. Propensity score matching (PSM) was performed to adjust for confounding variables between the two groups. The exclusion criteria included patients on dialysis, those with distant metastases, and those with concurrent procedures. Null hypotheses were rejected when p-values were <0.05.

Results: The database included 24,830 patients, with 22,015 in the RN group and 2,815 in the PN. Following PSM, 2,226 patients after PN were matched 1:1 to an equal number of patients who underwent RN. Overall, postoperative complications occurred in 20.5% after RN, more frequent than 15.9% after PN ($P<0.001$). While the mortality rates were similar, patients were more likely to experience blood transfusion and reintubation after RN. In both groups, cardiac and respiratory complications were associated with FTR, leading to mortality. Excessive bleeding (requiring transfusion) was also a significant cause of death after RN but not after PN.

Conclusion: When planning PN or RN, patients should be counseled on the risks of their selective procedure and the potential increased mortality risk with certain complications. These risks should be weighed against the benefit of those cancer surgeries.

Gender Specific Effects of Body Composition on Intra-Tumoral Proliferation and Inflammation in NSCLC

Yeshwanth Vedire[2#]; Sukumar Kalvapudi[2]; R. J. Seager[1]; Grace Dy[2]; Joseph Barbi[3]; Erik Van Roey[1]; Shuang Gao[1]; Mary K. Nesline[1]; Jeffrey M. Conroy[1]; Sai Yendamuri[2]; Sarabjot Pabla[1*]

[1] OmniSeq Inc., Buffalo, NY
[2] Department of Thoracic Surgery, Roswell Park Comprehensive Cancer Center, Buffalo, NY
[3] Department of Immunology, Roswell Park Comprehensive Cancer Center, Buffalo, NY

Background: Differential outcomes in lung cancer have been previously studied in the context of body composition, though results have been shown to be dependent on the body composition metric employed. There still exists a gap in understanding the role of gender and body composition on tumor microenvironment and eventual response or resistance to check point inhibition in non-small cell lung cancer (NSCLC). Here we demonstrate the combined effects of gender and body composition on several clinically relevant biomarkers of immune response in NSCLC.

Methods: BMI was measured as the ratio of body mass to height. The complete cohort of 409 NSCLC patients, was subdivided into groups jointly defined by BMI high (≥25; N=245; Female=140; Male=105) and low (<25; N=164; Female=92; Male=72) and gender. Tumor inflammation based on the expression of 161 immune response genes, tumor cell proliferation was assessed for all patients based on the expression of 10 cell proliferation genes, and PDL1 based on the expression of PDL1 IHC as well as by targeted RNA-seq. Associations between these joint body composition-gender groups and tumor cell proliferation, tumor inflammation, and PDL1 expression were assessed using Kruskal-Wallis and Wilcoxon Rank-Sum tests for overall and pairwise tests, respectively.

Results: We observed an overall significant association of gender-BMI with tumor inflammation (p=5.8e-07). Pairwise analysis revealed that within female subgroup, high BMI females had significantly higher tumor inflammation compared to females with low BMI (p=0.0096). Additionally, high BMI females had significantly higher tumor inflammation compared to high BMI males (p=0.0023). Also, low BMI females had significantly higher tumor inflammation compared to low BMI males (p=0.0252) suggesting that females have significantly higher tumor inflammation over males when accounting for BMI. We also observed an overall significant association of gender-BMI with cell proliferation (p=0.002). Across both genders, low BMI trended towards higher proliferation (female p=0.07; male p=0.07). Even though PD-L1 expression by IHC was not associated with gender-BMI groups(p=0.52), PD-L1 expression by RNA-Seq was significantly associated with gender-BMI (p=0.0012). High BMI females had significantly higher PDL1 expression compared to low BMI females (p=0.0122). No such difference was observed in the male-BMI subgroups.

Conclusion: We demonstrate a significant association of body mass index and gender with biomarkers of immune response in NSCLC. This relationship is distinctly present within both genders and body mass index categories. In particular, tumor inflammation and PDL1 expression is more strongly associated with body composition in females than in males. Additional studies are required to better understand the mechanisms underlying these effects and their role in response to checkpoint inhibitors in NSCLC.

The Effects of Antibiotics on Long Term Survival and Recurrence Free Survival in NSCLC Lobectomy Patients

Rebecca Korsh[1]; Matthew Carlson[1]; Long Hao Li[1]; Trisha Jupudy[1]; Gabriella Radford[1]; Cole Schoenborn[1]; Johnson Schwede[1]; Rene Bouchard[1]; Sai Yendamuri, MD[2]

[1] Nichols High School
[2] Department of Thoracic Surgery, Roswell Park Comprehensive Cancer Center

Objective: Lung cancer is the leading cause of cancer-related deaths nationwide and is responsible for over 100 thousand deaths every year. The most common surgical treatment for early-stage non-small cell lung cancer (NSCLC) patients is lobectomy. NSCLC patients are also likely to experience additional illnesses requiring antibiotic treatment, which may affect a patient's response and recovery to a lobectomy. Multiple studies suggest antibiotics have detrimental effects on NSCLC patients undergoing immunotherapy, but few studies have examined the relationship between lobectomies, antibiotic administration, and long-term outcomes. Studies in other cancer models lead us to hypothesize that antibiotics negatively affect the overall survival and recurrence free survival of NSCLC lobectomy patients.

Methods: NSCLC patients treated with a lobectomy at Roswell Park Comprehensive Cancer Center between 2008 and 2015 were retrospectively analyzed. Only patients whose full antibiotic history 30 days prior to 5 years after the lobectomy was known were included in the analysis. Patients were divided into two groups, those who had and hadn't received antibiotics. The response variables overall survival (OS) and recurrence free survival (RFS) and their connection to antibiotic administration were analyzed through the Cox proportional hazards regression modeling of univariate and multivariate analysis. A comparison of OS and RFS between patients who had and had not received antibiotics was created using Kaplan-Meier plots. The significance level of the Kaplan-Meier plots, the univariate analysis, and the multivariate analysis was $p<0.05$.

Results: A total of 578 patients met the inclusion criteria, 388 of whom did not receive antibiotics while the other 190 patients were administered antibiotics. The Kaplan Meier curves accounting for covariates demonstrate significant differences in long-term outcomes between those who did and did not receive antibiotics (Figure 1) According to multivariate analysis (Table 1, not included), the overall survival of NSCLC patients was negatively affected by the admission of antibiotics (HR = 1.94, 95% CI: 1.331-2.827). The recurrence-free survival of NSCLC patients was also negatively affected by antibiotic administration (HR = 2.086, 95% CI: 1.351 - 3.220).

Conclusion: For NSCLC patients treated with a lobectomy, antibiotic administration compromises both overall survival and recurrence free survival.

Discharge to Home with Chest Tube After Lung Surgery is Associated with a Low Incidence of Empyema

Kaylan Gee[1]; Yeshwanth Vedire[1]; Sukumar Kalvapudi[1]; Holly Meyers[1]; Mark Hennon[1]; Todd Demmy[1]; Chukwumere Nwogu[1]; Sai Yendamuri[1]; Elisabeth Dexter[1]

[1]Department of Thoracic Surgery, Roswell Park Comprehensive Cancer Center, Buffalo, NY

Background: Discharge to home with a chest tube is not uncommon after lung surgery and facilitates earlier return to home and decreased length of stay. Previous reports have suggested empyema rates of 10 -16% with this management strategy. We sought to verify this observation in our patient population.

Methods: All patients undergoing surgical resections except pneumonectomy (wedge, segmentectomy, lobectomy) from 2015-2022 were included. The relationship between age, gender, extent of resection, FEV1, smoking status and surgical approach (VATS, robotic and Open) with discharge with a chest tube was examined.

Results: N=2604. 183 patients were discharged to home with a chest tube. Sex (Males=8.8% vs. females=5.8%; p=0.003), smoking status (current=8.2% vs. former=7.4% vs. never=3.1%; p=0.006), decreased %predFEV_1 (p=0.04) and %predDLCO (p=0.02), surgical approach (robotic=13.6% vs. Open=9% vs. VATS=6%; p<0.001), and extent of resection (lobectomy =8.5%; segmentectomy = 6.4% wedge resection = 4.2%; p<0.001) were associated with discharge with a chest tube. Only 7 (3.9%) patients who were discharged with a chest tube developed an empyema over 30 days. Logistic regression modelling showed that a female gender (p=0.001), lower DLCO (p=0.01), robotic approach (p<0.001), and a lobectomy (p=0.001) were associated with a higher risk of discharge with a chest tube.

Conclusion: In contrast to previous reports, we show that discharge to home with a chest tube is associated with an empyema rate of only 3.9%. This modality of patient management is safe.

Looks can be Deceiving: Detection of Regional Differences in Physiologic Perfusion Levels in Human Esophagogastrointestinal Tract using Laser Speckle Contrast Imaging

Garrett Skinner; Emily Huang; Chris McCulloh; Yao Lui; Alan Harzman; Peter Kim

Objective of the technology or device: Different tissues from esophagus to anus have different vascular density and blood flow, which may account for varying functional outcomes in anastomotic complications. Real-time assessment of perfusion can be accomplished using indocyanine green (ICG) dye and more recently using laser speckle contrast imaging (LSCI). Here we report significant variance in baseline physiologic perfusion levels of different regions of intestine in real-time from esophagus to rectum using LSCI.

Description of the technology and method of its use or application: ActivSight™ is an LSCI imaging module that shows surface level tissue perfusion by detecting movement of red blood cells within 1mm of tissue surfaces. The laser signal can be quantified and standardized across patients using relative perfusion units (RPU), which analyzes raw data in the context standardized high and low endpoints. LSCI and RPU analysis are first used to measure the baseline perfusion of healthy tissues throughout the esophagogastrointestinal (EGI) tract to demonstrate their natural variances due to anatomic and physiologic factors. Then these data are then used to precisely assess the distribution of ischemia of the gastric conduit in esophagectomy.

Preliminary results if available: RPU of 59 regions in 42 patients throughout the EGI tract are measured. The most highly perfused tends to be the small bowel [71.48% RPU +/- 8.65] while perfusion of the left colon and rectum are significantly lower. Perfusion of the gastric conduit in esophagectomy is measured to estimate the distance from the ischemic tip that the conduit returns to baseline perfusion of the stomach [49.44%, 17mm from the tip] and is compared to the naked-eye assessment in white light imaging that was unable to determine level of ischemia.

Conclusions and future directions: Our results demonstrate that tissues which have lower baseline perfusion tend to have higher anastomotic complication rates. RPU analysis applied to esophagectomy shows a precise distribution of ischemia in the gastric conduit despite inability to identify this in standard white light imaging. This could inform intraoperative decision making based on more accurate and precise perfusion assessment when planning the anastomosis.

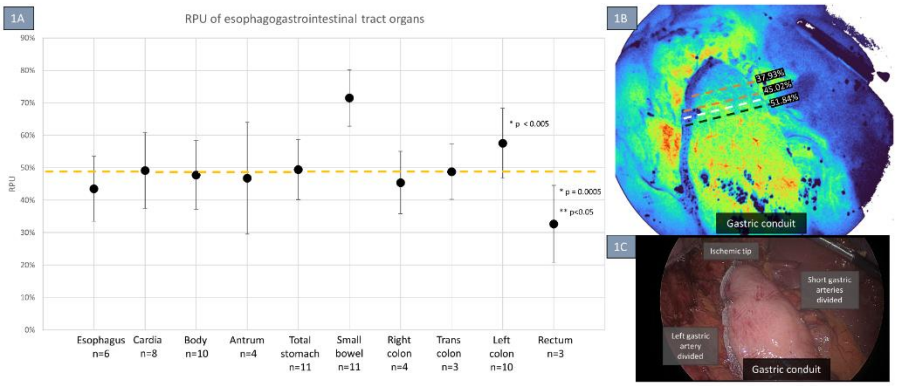


Figure 1A: LSCI quantification and relative perfusion analysis shows physiologic baseline perfusion of gastrointestinal organs from the esophagus to rectum. Relative perfusion units (RPU) are calculated by placing raw LSCI data in context of a standardized hot signal (surface level capillary) and cold signal (coldest tissue in the scene). Yellow line shows the average perfusion level of all structures combined [49.24%]. RPU of the left colon and rectum are significantly lower than the small bowel (*) [p<0.005, p=0.0005] and rectum is significantly lower than left colon (**) [p<0.05]. **1B** RPU analysis is used to assess perfusion of the gastric conduit during esophagectomy. Orange lines show at which distances from the ischemic tip RPU falls below baseline perfusion of the stomach [49.44%,], green lines show which are above. The white estimates when perfusion of the gastric conduit returns to baseline perfusion of the stomach [17mm]. **1C** is the associated RGB image that details the blood supply that has been divided and inability to visualize tissue ischemia precisely.

Inspiring Inspiration: Creation of a Smart Incentive Spirometer

Kai Kumero; Samantha Zavala; Storiya Iqbal; Tasbeeh Malik; William Kelly, MD, MS;
Brian Quaranto, MD, MS; Gene Yang, MD

Introduction: Pulmonary hygiene is a mainstay of care for patients in many fields of medicine. Patients who have undergone a surgical procedure or who have sustained a bony thoracic injury are at risk of complications due to atelectasis and consequently, are at risk of morbidity and mortality. While incentive spirometers are a commonly utilized tool in the armamentarium of the clinician for the management of such pulmonary sequelae, their effectiveness is predicated on use. One main challenge, consequently, is that is difficult to reliably assess how often individuals are using their spirometer.

Methods: Working in collaboration with the members of the University at Buffalo Department of Biomedical Engineering and Department of Surgery, we developed a prototype sensor system that accurately collects incentive spirometer usage data and transmits it to a receiver for storage. The sensor allows for collection of use data including frequency of use, inspiratory volumes and allows for these values to be trended.

Results: Utilizing our system, we are able to obtain accurate and replicable data pertaining to an individual's usage of the incentive spirometer device. Our system is able to reliably detect inspiratory volumes and has the ability to store and transmit this data to a receiver for longitudinal monitoring.

Conclusion: This device has tremendous potential to take an already nearly ubiquitous tool and utilize it to obtain objective clinical data. Being able to view usage trends in real time has the potential to allow clinicians to identify patients who are on the verge of impending respiratory decline. Additionally, it has the potential to aid in assessing a patient's level of pain control based on their ability and willingness to take deep breaths after surgery or injury.

Department of Surgery

Oral Presentations

9:00 am – 11:34 am

Break 10:12 - 10:22 am

Jacobs School of Medicine and Biomedical Sciences
University at Buffalo

ORAL PRESENTATIONS

9:00 - 9:12 am

1. **Utility of 30-day Computed Tomography Scan Following Elective Endovascular Aortic Aneurysm Repair**
   Authors: Budik, S.; O'Brien, M.; Koenig, J.; Tanga, C.; Montross, B; Khan, S.; Dosluoglu, HH; Harris, LM; Dryjski, M.
   Presenter: Sarah Budik, MD

9:12 - 9:24 am

2. **Does Gene Expression of BRCA1 Has Any Clinical Relevance in Breast Cancer?**
   Authors: Kohei Chida; Masanori Oshi; Itaru Endo; Kazuaki Takabe
   Presenter: Kohei Chida, MD

9:24 - 9:36 am

3. **Redefining the "Geriatric" Age: Outcomes Following Massive Transfusion in Trauma**
   Authors: Joseph C. L'Huillier, MD (Resident); Shuangcheng Hua, MS; Heather J. Logghe, MD (Resident); Ajay A. Myneni, MBBS, PhD, MPH; Katia Noyes, PhD, MH; Jihnhee Yu, PhD; W Alan Guo, MD, PhD
   Presenter: Joseph C. L'Huillier, MD

9:36 - 9:48 am

4. **Comparison of Traditional White Light Imaging (WLI) Visual Assessment of Bowel Perfusion to Laser Speckle Contrast Imaging (LSCI) with Quantification and Indocyanine Green (ICG) in Minimally Invasive Left-Sided Colorectal Resections**
   Authors: Garrett Skinner; Yao Liu; Alan Harzman; Syed Husain; Alessandra Gasio; Lisa Cunningham; Amber Traugott; Kayla Diaz; Chandler Lowe; Matthew Kalady; Emily Huang
   Presenter: Garrett Skinner, MD

9:48 - 10:00 am

5. **Association Between Second Victim Syndrome and Burnout Among Physicians at a Single Center**
   Authors: Helen A. Potter, MD; Monica S. O'Brien-Irr, MS, RN; Matthew W. Henninger, EdM; Catherine Flanagan-Priore, PhD; Peter Winkelstein, MD, MBA; Linda M. Harris, MD
   Presenter: Andrew Rogers, MD

10:00 - 10:12 am

6. **Do Short Term Surgical Outcomes Predict Long-Term Oncological Outcomes in Cancer Care? – Implications for Ranking Systems in Oncology**
   Authors: Mark Hennon; Adrienne Groman; Steven Nurkin; Moshim Kukar; Kristopher Attwood; Sai Yendamuri
   Presenter: Mark Hennon, MD

10:12 - 10:22 am **Break**

10:22 - 10:34 am **7. On the Journey to Measure Expertise – What Can Functional Imaging Tell Us?**
Authors: Joseph C. L'Huillier, MD (Resident); Yaoyu Fu, PhD; Cara B. Jones, BA; Ajay A. Myneni, MBBS, PhD, MPH; Suvranu De, ScD; Lora Cavuoto, PhD; Anirban Dutta, PhD; Clairice A. Cooper, MD, MHPE, FACS; Steven D. Schwaitzberg, MD, FACS
Presenter: Joseph C. L'Huillier, MD

10:34 - 10:46 am **8. Invasive Lobular Carcinoma (ILC) has Higher Immune Response than Invasive Ductal Carcinoma (IDC) in ER-Positive Breast Cancers**
Authors: Gabrielle Yee; Rongrong Wu; Takashi Ishikawa; Kazuaki Takabe
Presenter: Gabrielle Yee, MD

10:46 - 10:58 am **9. Association of Age and Frailty with Clinical Outcomes in Geriatric Patients with Rib Fractures**
Authors: Kevin Todd, MD (Resident); Joseph C. L'Huillier, MD (Resident); Kabir Jalal, PhD; Heather Logghe, MD (Resident); Jeffrey Jordan, MD, PhD; William Flynn, MD; W Alan Guo MD, PhD
Presenter: Heather Logghe, MD

10:58 - 11:10 am **10. Obesity Induced Pulmonary Regulatory T-Cell (Treg) Activation Promotes Lung Carcinogenesis**
Authors: Sukumar Kalvapudi; Yeshwanth Vedire; Randall Smith; Joseph Barbi; Sai Yendamuri
Presenter: Sukumar Kalvapudi, MD

11:10-11:22 am **11. Peribiliary Gland Injury by Floxuridine may be an Early Mechanistic Insult En-Route to Biliary Sclerosis**
Authors: Carrie E. Ryan, MD; Stephanie N. Gregory, MD; Martha Teke, MD; Leila Sarvestani, MD; Kirsten Remmert, PhD; Yuri Lin, BS; Jacob T. Lambdin, MD; Emily C. Smith, PhD; Ashley Rainey, BS; Sarfraz R. Akmal, BS; Stephie Lux, BS; Tracey Pu, MD; Kenneth Luberice, MD, MS; David E. Kleiner, MD, PhD; Jonathan M. Hernandez, MD
Presenter: Carrie E. Ryan, MD

11:22 - 11:34 am **12. Contemporary Outcomes for Resected Type 1-3 Gastroesophageal Junction Adenocarcinoma: A Single Center Experience**
Authors: Zachary E. Stiles; Brendan L. Hagerty; Maureen Brady; Sarbajit Mukherjee; Steven N. Hochwald; Moshim Kukar
Presenter: Zachary E. Stiles, DO, MS

Utility of 30-day Computed Tomography Scan Following Elective Endovascular Aortic Aneurysm Repair

Budik, S.; O'Brien, M.; Koenig, J.; Tanga, C.; Montross, B; Khan, S.; Dosluoglu, HH; Harris, LM; Dryjski, M.

Objective: Current guidelines recommend routine 30-day computed tomography (CT) surveillance following endovascular abdominal aortic aneurysm repair (EVAR). Six-month CT surveillance can be eliminated if the 1-month scan shows no concerning endoleak or sac enlargement. We evaluated the utility of skipping the one-month CT and obtaining the initial follow-up CT at one year following EVAR in patients treated within the instruction for use (IFU) and who have normal completion angiogram.

Methods: All elective EVAR at a university affiliated center over a 5-year period were identified. Patient demographics, compliance with graft manufacturer's IFU, operative findings, and follow-up CT results were collected. Compliance with IFU and/or presence of any endoleak on the completion angiogram was correlated with need for re-intervention for repair of endoleak within one year of EVAR.

Results: There were 138 EVARs. Eighty-four (61%) were fully compliant with IFU; 89(64%) met aortic IFU, 122 (88%) limb IFU. Mean follow-up (FU) was 37 + 22 months. Surveillance CT was available for 125 (91%) with 30-day CT in 89 patients (64%). Intra-operative completion angiogram demonstrated 3 (2.1%) type Ia and 33 (24%) type II endoleaks with no type Ib, III, or IV. The 3 type Ia endoleaks resolved within 2 months of EVAR and occurred in cases not fully compliant with IFU. Forty-five percent of cases were fully compliant with IFU and had no evidence of any endoleak on the intraoperative completion angiogram. Reintervention within 12 months was required in 2(1.4%) non- IFU compliant patients; one for new type1b endoleak at 2 months and one for symptomatic type II endoleak at 5 months. Reintervention was not required among EVAR completed within IFU without endoleak on intraoperative completion vs non-compliant (0% vs 2.9% P= 0.19) Sensitivity 100%, specificity 46%, NPV 100%.

Conclusions: Reintervention within the first year of EVAR occurred only in those not performed within IFU or with documented endoleak on intraoperative completion angiogram. Using these criteria, initial CT surveillance could be safely delayed to one year in nearly half of EVAR patients while reserving 30-day imaging for those that fail to meet these criteria.

Does Gene Expression of BRCA1 Have Any Clinical Relevance in Breast Cancer?

Kohei Chida[1]; Masanori Oshi[1,2]; Itaru Endo[2]; Kazuaki Takabe[1,2]

[1]Department of Surgical Oncology, Roswell Park Comprehensive Cancer Center, Buffalo, NY 14263, USA

[2]Department of Gastroenterological Surgery, Yokohama City University, Yokohama, Kanagawa 236-004, Japan

Introduction: BRCA1 participates in DNA repair, and its mutation is well studied; however, little is known about the clinical relevance of BRCA1 gene expression. Given that enhanced DNA repair aggravates cancer cell proliferation, we hypothesized that breast cancer with high BRCA1 gene expression is associated with aggressive biology and worse survival.

Methods: A total of 6245 breast cancer patients were analyzed from three large independent cohorts; METABRIC (n = 1903), GSE96058 (n = 3273), and The Cancer Genome Atlas (TCGA, n = 1069). We used gene set enrichment analysis (GSEA) and gene set variation analysis (GSVA) for biological analysis, and xCell to calculate the fraction of immune and stromal cells.

Results: BRCA1 gene expression was higher in breast cancer without BRCA1 mutation, strongly correlated with DNA repair activity, but not with BRCA2 gene expression. Surprisingly, there were no survival differences regardless of subtype. High BRCA1 gene expression was associated with cancer cell proliferation by Nottingham histological grade, proliferation score, and significant enrichment of cell proliferation-related gene sets. High BRCA1 gene expression was associated with higher homologous recombination deficiency, intratumor heterogeneity, and altered fraction; however, not with mutation rates nor neoantigens. Furthermore, high BRCA1 gene expression was associated with less infiltration of CD8 T cells, dendritic cells, regulatory T cells, and B cells and with more Th1 cells. On the other hand, low BRCA1 gene expression breast cancer enriched aggressive malignant phenotype gene sets such as Epithelial Mesenchymal Transition, Angiogenesis and Hypoxia, Cancer Stem Cells (NOTCH, WNT, and HEDGEHOG signaling), TGF-beta signaling, Androgen response, and chronic inflammation (TNF-alpha and IL-6 signaling).

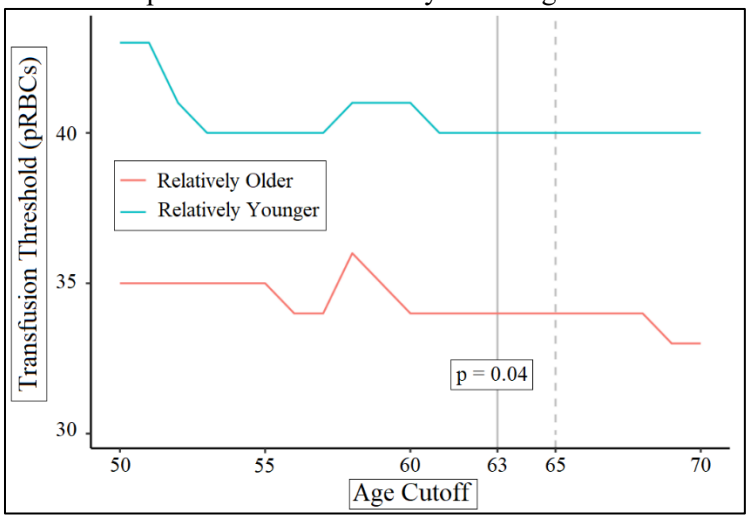
Conclusion: BRCA1 gene expression was not associated with survival in breast cancer when it was with enhanced cancer cell proliferation and a less aggressive phenotype.

Redefining the "Geriatric" Age: Outcomes Following Massive Transfusion in Trauma

Joseph C. L'Huillier, MD (Resident); Shuangcheng Hua, MS; Heather J. Logghe, MD (Resident); Ajay A. Myneni, MBBS, PhD, MPH; Katia Noyes, PhD, MH; Jihnhee Yu, PhD; W Alan Guo, MD, PhD

Introduction: The effect of aging on the body's response to massive transfusion (MTP) is unknown. While Medicare defines "geriatric" as people aged ≥ 65 years old, this definition is arbitrary. As the U.S. population ages, trauma systems must evolve to optimize geriatric outcomes. We sought to determine a new, physiologically-based, geriatric age cutoff related to MTP and describe outcomes among geriatric and non-geriatric patients following MTP.

Methods: The 2013-2018 TQIP database was queried for all adult patients who received ≥10 units of pRBCs within 24 hours of admission. A bootstrap analysis using multiple logistic regression was conducted to determine the amount of pRBCs transfused after which point additional transfusion no longer improved mortality (transfusion threshold, TT) for various age cutoffs. The age cutoff at which the TT for those relatively older and relatively younger was statistically significant was used to define the new "geriatric" age for MTP. Outcomes were then compared between the newly defined geriatric and nongeriatric patients.



Results: There were 20,172 adults who received MTP. The difference in TT first became significant when the age cutoff was 63 years (Figure 1). The TT for patients aged ≥63 years (geriatric, n = 2,870) vs <63 years (nongeriatric, n = 17,302) was 34 and 40 units, respectively ($p = 0.04$). Geriatric patients had better GCS (9 [3-15] vs 6 [3-14], $p < 0.01$) and higher admission SBP (95 [71-120] vs 90 [64-117], $p < 0.01$). Geriatric patients had a lower admission HR (91 [69-111] vs 106 [74-128], $p < 0.01$) and higher AIS-Abdomen (3 [2-4] vs 4 [3-4], $p < 0.01$) with no difference in pRBC:FFP ratio (1.95 ± 1.72 vs 1.89 ± 1.67, p = 0.08). Nevertheless, outcomes for the geriatric patients were worse (Table 1). On multiple logistic regression analysis, age ≥ 63 years (HR 2.00, $p < 0.01$) and pRBCs > 30 units (HR 2.09, $p < 0.01$) were independent predictors of mortality.

Outcomes, n (%)	Geriatric, ≥ 63 years (n = 2,870)	Non-Geriatric, <63 years (n = 17,302)
Complications		
Acute kidney injury*	**306 (14.3)**	1,525 (12.3)
Cardiac Arrest*	**628 (29.4)**	3,333 (26.8)
Myocardial Infarction*	**63 (3.0)**	78 (0.6)
Hosp LOS, median [IQR]*	5 [1-20]	**10 [1-25]**
24-hour mortality*	**777 (28.8)**	4,285 (26.0)
In-hospital mortality*	**1,731 (61.7)**	7,724 (45.4)
Discharge Disposition		
Home/self care*	69 (7.3)	**2,959 (35.4)**
Skilled nursing facility*	**270 (28.6)**	827 (9.9)

* Denotes $p < 0.01$.

Conclusion: The new geriatric age for MTP is 63 years. Despite suffering less severe injury, physiologically "geriatric" patients have worse clinical outcomes. Both geriatric age and amount of blood transfused predict mortality. These results may help optimize MTP utilization and improve clinical outcomes of older trauma patients.

Comparison of Traditional White Light Imaging (WLI) Visual Assessment of Bowel Perfusion to Laser Speckle Contrast Imaging (LSCI) with Quantification and Indocyanine Green (ICG) in Minimally Invasive Left-Sided Colorectal Resections

Garrett Skinner; Yao Liu; Alan Harzman; Syed Husain; Alessandra Gasio; Lisa Cunningham; Amber Traugott; Kayla Diaz; Chandler Lowe; Matthew Kalady; Emily Huang

Purpose/Background: The role of ICG in intraoperative perfusion assessment remains controversial. Real-time quantification of tissue perfusion using LSCI, which measures tissue blood flow via coherent laser light scatter from red blood cells without intravenous dye, may provide more precise information for surgical decision-making and reduce anastomotic complications in colorectal surgery. This study compares clinical utility of perfusion assessment using LSCI, ICG fluorescence, and WLI in assessing the line of ischemic demarcation (LOD) in left-sided colorectal resections.

Methods/Interventions: An interim analysis (IRB#2021H0218) was performed on 21 consecutive patients undergoing left colorectal resection (9 LAR; 9 sigmoidectomy; 3 left colectomy) for diverticulitis and cancer. LOD was assessed using LSCI, ICG, and WLI after devascularization but before transection of proximal colon. Post-hoc analysis included 1) measuring length of margin discordance between modalities and 2) Calculating relative perfusion units (RPU) by placing raw LSCI data in context with standardized high and low values.

Results/Outcomes: In 16 of 21 cases, assessment of LOD using WLI was similar to LSCI and ICG (mean: 0.15cm +/- 0.38). Surgeons identified different LOD in 5 of 21 cases using either LSCI or ICG. The mean difference was 3.80 cm (+/- 4.03) more distal than WLI (p=0.078). RPU analysis detected a 10mm more distal LOD when compared to the surgeon heat-map interpretation, with 18.71% lower RPU at the LOD (p<0.0005).

Conclusion/Discussion: In this interim analysis of left-sided colorectal resections, advanced visualization using LSCI/ICG identified different colonic LOD in 25% of cases compared to WLI alone; an average additional difference of 4cm of viable bowel was detected, potentially impacting intraoperative decisions. RPU quantification showed more sensitive and precise assessment of perfusion margins compared to heat-map interpretation suggesting a potential role for computer vision and artificial intelligence in intraoperative ischemic margin assessment.

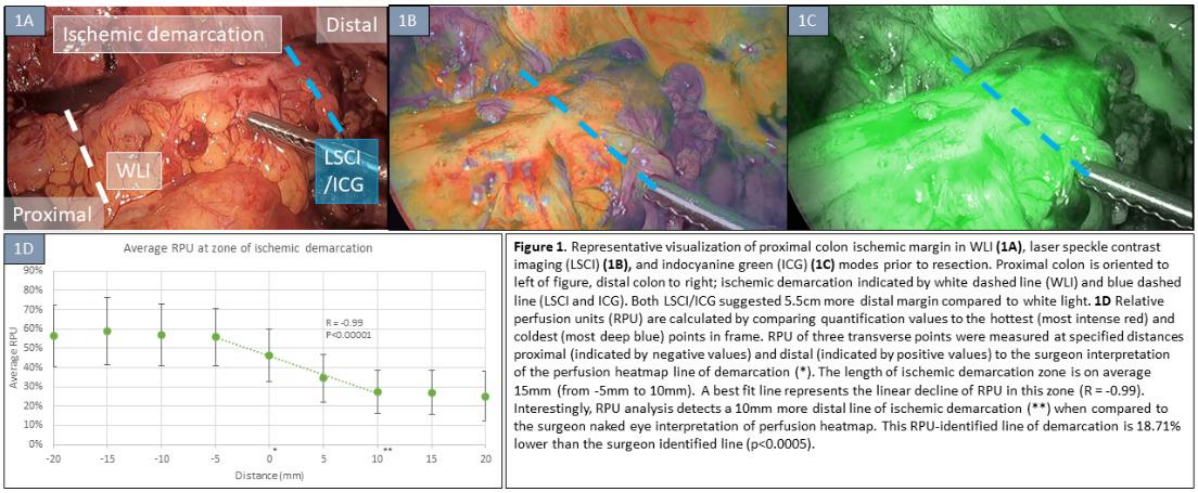


Figure 1. Representative visualization of proximal colon ischemic margin in WLI **(1A)**, laser speckle contrast imaging (LSCI) **(1B)**, and indocyanine green (ICG) **(1C)** modes prior to resection. Proximal colon is oriented to left of figure, distal colon to right; ischemic demarcation indicated by white dashed line (WLI) and blue dashed line (LSCI and ICG). Both LSCI/ICG suggested 5.5cm more distal margin compared to white light. **1D** Relative perfusion units (RPU) are calculated by comparing quantification values to the hottest (most intense red) and coldest (most deep blue) points in frame. RPU of three transverse points were measured at specified distances proximal (indicated by negative values) and distal (indicated by positive values) to the surgeon interpretation of the perfusion heatmap line of demarcation (*). The length of ischemic demarcation zone is on average 15mm (from -5mm to 10mm). A best fit line represents the linear decline of RPU in this zone (R = -0.99). Interestingly, RPU analysis detects a 10mm more distal line of ischemic demarcation (**) when compared to the surgeon naked eye interpretation of perfusion heatmap. This RPU-identified line of demarcation is 18.71% lower than the surgeon identified line (p<0.0005).

Association Between Second Victim Syndrome and Burnout Among Physicians at a Single Center

Helen A. Potter, MD; Monica S. O'Brien-Irr, MS, RN; Matthew W. Henninger, EdM; Catherine Flanagan-Priore, PhD; Peter Winkelstein, MD, MBA; Linda M. Harris, MD

Objective: "Second Victim Syndrome" refers to the negative mental and emotional after-effects physicians may experience following adverse patient outcomes. We evaluated the impact of "Second Victim" status on physician self-efficacy, burnout, perceived stress and sleep patterns.

Methods: Physicians at a university hospital voluntarily participated in an anonymous survey which included SV status, General Self-Efficacy Scale (GSE), Copenhagen Burnout Inventory (CBI), Perceived Stress Scale (PSS) and Insomnia Severity Index (ISI). Total possible survey points were: GSE:40, CBI:95, PSS:40, ISI:28. Student t-test for independent samples and Mantel-Haenszel were used to compare second victims with non-second victims.

Results: Of the 115 respondents, 85 (74%) provided Second Victim status: 48% female, 93% non-Hispanic white, 35% surgeons, 53% in practice $\geq$ 20 years. There were 24 (28%) self-reported Second Victims. Demographics were similar between groups. GSE scores were comparable: Second Victim vs. Non-Second Victim: (31.4 vs. 32.6; *P*=.13), but fewer Second Victims reported that they could accomplish their goals; (79.2 vs. 88.7%; *P*=.03). Overall, 56% of physicians had CBI scores consistent with moderate burnout. CBI scores were similar for both groups: (56.6 vs. 52.4; *P*=.17). Work-related burnout scores (0-100): (56.7 vs. 52.9; *P*=.42) and personal burnout scores (0-100): (53.3 vs. 46.1; *P*=.13) were comparable, but Second Victims more commonly reported patient-related burnout: (38.5 vs. 28.3; *P*=.035). Second Victims responded "Often" or "Always" more frequently to questions regarding patients being "hard to work with" (8.3% vs. 1.6%; *P*=.03), "frustrating" (12.5% vs. 3.3%; *P*=.02), "draining energy" (16.7% vs. 5%; *P*=.018), or "wondering how long they could continue to work with patients" (16.7% vs.11.5%; *P*=.039). There was no difference in mean PSS for lack of control:(11.7 vs. 10.5; *P* = .28) or ability to cope with existing stressors:(10.0 vs. 10.6; *P* =.34). Mean insomnia scores were comparable: (9.4 vs. 7.7; *P* = .22) but Second Victims experienced problems with waking too early more often: (29.2% vs. 14.5%; *P*=.01). Official debriefing, individualized counseling or coaching to cope with the event were top resources desired by SVs (54%). Mandatory time off or mandatory meetings with a psychiatrist/psychologist were least favored (8%).

Conclusions: Over 25% of physicians have experienced SV sequalae which do not distinguish by demographics. Despite high level GSE, moderate burnout was present in >50% of physicians irrespective of SV status. Patient-related burnout was particularly evident among SVs. These numbers are alarming and should be promptly addressed by medical societies and hospitals. A valuable starting point may be offering individualized counseling for all physicians.

Do Short Term Surgical Outcomes Predict Long Term Oncological Outcomes in Cancer Care? – Implications for Ranking Systems in Oncology

Mark Hennon; Adrienne Groman; Steven Nurkin; Moshim Kukar; Kristopher Attwood; Sai Yendamuri

Roswell Park Comprehensive Cancer Center, Buffalo, NY

Background: Transparency in outcomes as well as program rankings depend on peri-operative outcomes and have gained interest. It is unclear if short-term outcomes correlate with long term oncologic outcomes.

Methods: The National Cancer Database (NCDB; 2004-2020) was used. For centers treating patients greater than the median number of patients for each cancer, a short-term metric (STM) based on the difference between observed and predicted mortality (30 and 90 days), unplanned 30-day readmissions and hospital length of stay adjusted for age, race, sex, Charlson-Deyo Score, income, insurance, grade and analytic stage was calculated using a logistic regression model. A similar long-term metric (LTM) was calculated using overall survival. Correlations between STM and LTM were calculated. Metrics were used to rank centers into deciles and visual plots were created to assess concordance.

Results: 945, 1011, 1009, 935, and 1014 centers were included for analysis for colon, rectal, esophageal, pancreatic and gastric cancer respectively. These centers treated 658,844, 240,497, 135,998, 376,419 and 179,131 patients with 530,681, 132,570, 36,662, 89,587 and 76,942 operative cases for colon, rectal, esophageal, pancreatic and gastric cancer cases respectively. The correlation between STM and LTM were 0.38 ($P<0.001$), 0.15 ($P<0.001$), -0.02 ($P=0.49$), 0.05 ($P=0.15$) and 0.03 ($P=0.29$) for these cancers respectively. Visual plots for each disease site showed poor concordance between STM and LTM rankings (Figure 1).

Conclusions: Correlation between surgical outcomes and long-term oncological outcomes is modest to non-existent depending on site of disease. Cancer care ranking systems weighted on short term metrics may not inform patients sufficiently to choose care.

On the Journey to Measure Expertise – What Can Functional Imaging Tell Us?

Joseph C. L'Huillier, MD (Resident); Yaoyu Fu, PhD; Cara B. Jones, BA;
Ajay A. Myneni, MBBS, PhD, MPH; Suvranu De, ScD; Lora Cavuoto, PhD; Anirban Dutta, PhD;
Clairice A. Cooper, MD, MHPE, FACS; Steven D. Schwaitzberg, MD, FACS

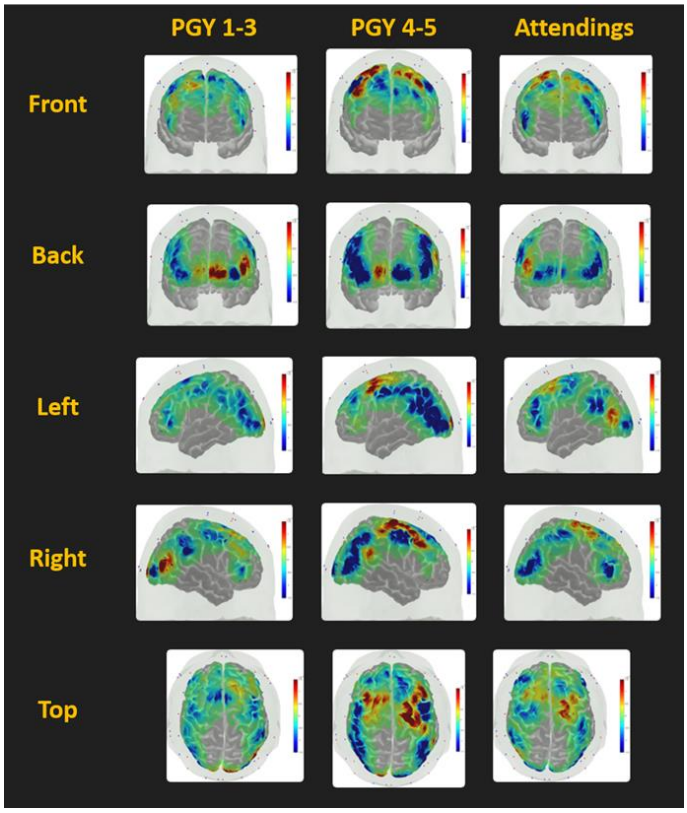
Introduction: We previously correlated experience level with motor cortex and supplementary motor area activation during laparoscopy. Whether brain activation patterns correlate with cognitive surgical task expertise is unknown. We compared the functional neuroimaging responses during simulated operative dictation— a cognitive surgical task— by experience level.

Methods: Junior (PGY 1-3s) and senior (PGY 4-5s) residents and attendings were recruited. Demographics including case numbers were collected. After a baseline rest period, participants were asked to dictate a simulated operative note for an open inguinal hernia repair with mesh. Functional near infrared spectroscopy (fNIRS) data were recorded from the prefrontal, sensorimotor, and occipital brain areas. The hemodynamic response based on changes in oxyhemoglobin (HbO) and deoxyhemoglobin concentrations during the task relative to the pre-task baseline for each participant were calculated. Group-level differences in HbO were evaluated using a general linear model with significance set at $p < 0.05$ and a false discovery rate set at $q < 0.05$.

Results: Thirty participants, ten from each of the three experience levels, were recruited. Average case numbers varied by experience level (Table). Areas of event-related increased activation (red) and decreased activation (blue) relative to pre-event baseline are shown between groups (Figure). Senior residents showed significantly greater activation of the right frontal area, premotor and supplementary motor area, and parietal areas than junior residents, while attendings showed overall significantly decreased activation of medial frontal areas compared to junior and senior residents.

Case numbers, n ± SD	PGY 1-3s (n = 10)	PGY 4-5s (n = 10)	Attendings (n = 10)
Total major*	158 ± 140	612 ± 212	5760 +/- 3388
Open inguinal hernia repair*	6 ± 7	20 ± 8	500 +/- 394
Lap inguinal hernia repair*	10 ± 12	24 ± 14	1070 +/- 1205

* Denotes $p < 0.01$.



Conclusion: Functional neuroimaging responses during the cognitive task of simulated operative dictation differ by skill level. This study represents the first brain imaging analysis of cognitive function connecting mental imagery, brain activation, and a cognitive surgical task linked to previously performed motor tasks.

Invasive Lobular Carcinoma (ILC) has Higher Immune Response than Invasive Ductal Carcinoma (IDC) in ER-Positive Breast Cancers

Gabrielle Yee [1,2]; Rongrong Wu [1,3]; Takashi Ishikawa [3]; Kazuaki Takabe [1,2,3,4,5,6]

[1]Breast Surgery, Department of Surgical Oncology, Roswell Park Comprehensive Cancer Center, Buffalo, NY, USA
[2]Department of Surgery, Jacobs School of Medicine and Biomedical Sciences, State University of New York, Buffalo, NY, USA
[3]Department of Breast Surgery and Oncology, Tokyo Medical University, Tokyo, Japan
[4]Department of Gastroenterological Surgery, Yokohama City University Graduate School of Medicine, Yokohama, Japan
[5]Department of Surgery, Niigata University Graduate School of Medical and Dental Sciences, Niigata, Japan
[6]Department of Breast Surgery, Fukushima Medical University School of Medicine, Fukushima, Japan.

Abstract: Invasive lobular carcinoma (ILC) and invasive ductal carcinoma (IDC), two major pathological diagnoses of breast cancer, are known to have different clinical characteristics. However, few studies have described the differences between ILC and IDC within ER-positive/HER2-negative subtypes, particularly at the molecular level.

Methods: Using data from TCGA and METABRIC, we analyzed ILC and IDC ER-positive/HER2-negative breast cancer patients with Stage I-III (TCGA n=584, METABRIC n=1355).

Results: There was no significant difference in disease-free survival, disease specific survival, nor overall survival between ILC and IDC in either cohort. Nottingham histological grades were significantly lower in ILC consistently in both cohorts (both $p<0.01$). Cell proliferation score and MKi67 expression were significantly lower in ILC in TCGA ($p<0.001$) but not validated in METABRIC. Cell proliferation-related gene sets in the Hallmark collection (E2F targets, G2M checkpoint, MYC targets V1, and MTORC1 signaling) were significantly enriched in IDC consistently in both cohorts (all NES > 1.4, FDR < 0.12). Despite our anticipation given the strong relationship with less cell proliferation, ILC appeared to have a lower trend of pathological complete response (pCR) in GSE20194 and GSE140494 cohorts; however, this was not statistically significant in neither cohort. ILC was associated with larger tumor size and had more Stage III and less Stage I disease than IDC in both cohorts ($p<0.001$). In contrast, ILC was significantly associated with less intratumor heterogeneity, homologous recombination deficiency, fraction altered, silent and non-silent mutation rate compared to that of IDC in TCGA (all $p<0.001$). There was no difference in neither single nucleotide variant nor indel neoantigens between IDC and ILC. However, multiple immune cells were significantly infiltrated in ILC, including naive CD4 T cells, effector memory CD4 T cells, and conventional dendritic cells (all $p<0.02$ in both cohorts). Regulatory T cells, helper type I T cells, and both M1 and M2 macrophages were significantly less infiltrated in ILC (all $p<0.04$ in both cohorts). ILC was associated with overall increased immune cytolytic activity compared to IDC consistently in both cohorts ($p<0.005$). In the tumor microenvironment, the stromal fraction score and the infiltration of stromal cells were found to be significantly higher in ILC in both cohorts (all $p<0.003$).

Conclusion: In ER-positive/HER2-negative breast cancer, ILC has higher immune response and immune cell infiltration than IDC. ILC is also less proliferative and presents at a more advanced stage than IDC. There were no differences in achieving pCR after neoadjuvant chemotherapy nor survival differences between ILC and IDC.

Association of Age and Frailty with Clinical Outcomes in Geriatric Patients with Rib Fractures

Kevin Todd, MD (Resident); Joseph C. L'Huillier, MD (Resident); Kabir Jalal, PhD; Heather Logghe, MD (Resident); Jeffrey Jordan, MD, PhD; William Flynn, MD; W Alan Guo MD, PhD

Introduction: Rib fractures are a major cause of morbidity and mortality in the geriatric trauma population. Although age and frailty have both been shown to be associated with poor outcomes in geriatric patients with rib fracture, no studies have been conducted to assess the degree of association of each factor. In this study, we sought to investigate 1) differences in outcomes by degree of frailty when matched on other parameters; and 2) whether age or frailty is more predictive of mortality.

Methods: The 2013–2018 TQIP database was queried for all geriatric patients (age ≥ 65) who sustained at least one rib fracture. All TQIP data is de-identified, thus IRB approval was exempted for this study. Patients with a non-thoracic AIS score of ≥ 2 were excluded from the analysis. The patients were then stratified into three frailty groups (no frailty, moderate frailty, and severe frailty) based on the modified frailty index (mFI). The three groups were propensity score matched based on demographics, ED admission vital signs, and injury parameters. Outcomes including mortality, hospital length of stay (LOS), ventilator days, ICU LOS, and rate of discharge to home were compared between the matched groups. A Cox proportional-hazard model was generated to examine the impact of each individual variable, namely age and frailty, and their interaction on mortality.

Results: In total, 102,307 geriatric patients were included in the study with 23,825 non-frail, 39,017 moderately frail, and 39,465 severely frail patients. Pairwise comparisons of the matched data showed higher mortality, longer ICU stay, increased number of ventilator days, and a decreased likelihood of discharge to home ($p < 0.001$) in the severely frail group versus the non-frail and moderately frail groups. There was an increased number of ventilator days ($p < 0.0001$) and decreased likelihood of discharge to home ($p = 0.0078$) in the moderately frail group compared to the non-frail group, however there was no difference in mortality ($p = 0.0796$) or ICU length of stay ($p = 0.625$). There was also a significantly longer length of stay when comparing the non-frail group to the moderately frail ($p < 0.0001$) and severely frail groups ($p < 0.0001$), however there was no significant difference in length of stay between the moderately frail and severely frail groups ($p = 0.0889$). While the raw Cox model showed an association between both age ($p < 0.0001$) and frailty ($p < 0.0301$) and decreased survival, the matched Cox proportional hazard regression analysis revealed that only age was associated with significantly worse survival ($p<0.0001$), as shown in the table. There was no association between frailty and survival ($p=0.2215$) in the matched Cox model.

	Non-frail	*Mod frail*	*Severely frail*
Mortality	1.72%	1.66%	2.91%
LOS (days)	4.24	4.71	5.71
Ventilator days	5.84	6.73	7.08
ICU days	3.91	4.19	4.84
Discharge home	69.6%	63.4%	53.8%

Parameter	**HR (95% CI)**	***p***
Age	details n/a here	<.0001
Frailty	details n/a here	0.2215
Age*frailty	details n/a here	0.4625
Male sex	1.251 (1.11-1.41)	0.0002
SBP	0.988 (0.986-0.991)	<.0001
Resp rate	1.023 (1.015-1.031)	<.0001
ISS	1.029 (1.02-1.037)	<.0001
GCS	0.97 (0.93-1.013)	0.1708
RTS	0.581 (0.513-0.658)	<.0001
AIS (chest)	1.05 (0.989-1.115)	0.1071

Conclusion: These results suggest that severe frailty is associated with poorer outcomes including increased length of ICU stay, longer ventilator time, and more frequent discharge to rehab than non-frailty and frailty. These results also show that chronological age, and not frailty, is associated with a worse survivorship following rib fractures in geriatric patients. While age remains a critical factor to consider when prognosticating the risk of mortality, overall outcomes in geriatric traumatic rib fractures will require attention to both chronological and physiological ages.

Obesity Induced Pulmonary Regulatory T-Cell (Treg) Activation Promotes Lung Carcinogenesis

Sukumar Kalvapudi[1]; Yeshwanth Vedire[1]; Randall Smith[2]; Joseph Barbi[2]; Sai Yendamuri[1]

[1]Department of Thoracic Surgery, Roswell Park Comprehensive Cancer Center, Buffalo, NY
[2]Department of Immunology, Roswell Park Comprehensive Cancer Center, Buffalo NY

Background: The relationship between obesity and lung carcinogenesis is ill-defined. We sought to clarify this relationship using both clinical and preclinical modeling.

Methods: As body mass index (BMI) is not the best measure of obesity, fat measurements using CT scans of patients undergoing screening for vs. those with lung cancer, stratified by gender, were compared. Urethane induced lung tumor burden in age-matched lean (normal) and diet induced obese (DIO) male mice was compared. Differences in lung immune contexture before tumor induction were measured using high-dimensional multispectral flow cytometry.

Results: N= 726 (F=334, Cancer+ = 62; M= 392, Cancer+ = 49,). Patients with cancer had a higher CT scan measured fat in both females (307 cm^2 vs. 243 cm^2; P=0.01) and males (365 cm^2 vs. 306 cm^2; P=0.02). Logistic regression models for prediction of cancer included only age and obesity, but not smoking or race. Obese mice had a greater tumor burden (fig 1A). Obesity is associated with decreased activation (increased PD-1+ Ki67+) of effector Tcells with increased exhaustion (increased PD-1+ Ki67- levels). Immunosuppressive Treg and eTreg frequency and activation (increased % of PD-1+ eTregs) as well as eTreg/effector CD8+ ratio was greater with obesity (fig 1B). Obesity results in global changes (Fig 1C) in lung immune cell frequency and activation state.

Discussion: We demonstrate that obesity is associated with lung carcinogenesis in both clinical cohorts as well as preclinical models. This phenomenon is associated with Treg related immunosuppression in the lung, thereby setting the stage for development of novel chemoprevention strategies.

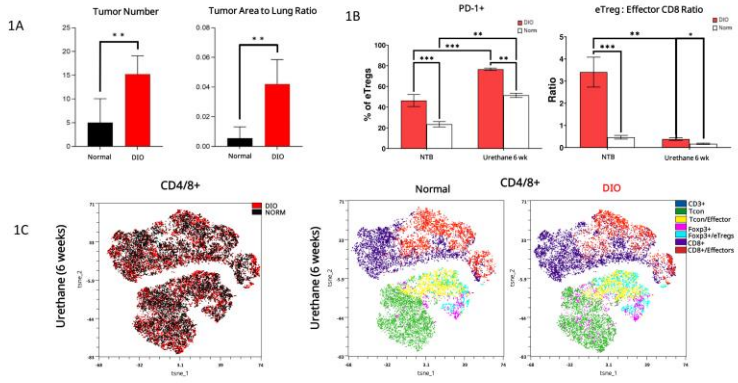


Figure Legends

Figure 1A. Obesity increased tumor burden in urethane induced lung carcinogenesis model. DIO = Diet induced obesity

Figure 1B. Immune cells from non-tumor bearing and urethane treated lungs of diet induced obese (DIO) and normal weight control mice (n=3/group) were assessed by multi-color flow cytometry for immune profiling. **P*<0.05; ***P*<0.01; ****P*<0.001; *****P*<0.0001 using one-way ANOVA and post-hoc Tukeys multiple comparisons test.

Figure 1C. Global Immune changes within the lungs of urethane treated lungs of DIO and Norm mice. tSNE plots (equally concatenated per group with 4000 iterations and a perplexity of 40 were constructed using collective data in OMIQ software. Overlaying grouped data (black:normal weight and red: DIO) highlighted differences in cell population frequencies of CD4/8+ Tcells between the groups. Further overlayed Tcell populations highlight differences in effector populations between DIO and Norm in urethane treated mice.

Peribiliary Gland Injury by Floxuridine may be an Early Mechanistic Insult En-route to Biliary Sclerosis

Carrie E. Ryan, MD; Stephanie N. Gregory, MD; Martha Teke, MD; Leila Sarvestani, MD; Kirsten Remmert, PhD; Yuri Lin, BS; Jacob T. Lambdin, MD; Emily C. Smith, PhD; Ashley Rainey, BS; Sarfraz R. Akmal, BS; Stephie Lux, BS; Tracey Pu, MD; Kenneth Luberice, MD, MS; David E. Kleiner, MD, PhD; Jonathan M. Hernandez, MD

Introduction: Hepatic artery infusion pumps (HAIP) are being increasingly employed in the management of metastatic colorectal cancer and cholangiocarcinoma secondary to encouraging response rates in most patients. However, efficacy is limited in many patients by biliary toxicity. Little is known about the early (and possibly intervenable) mechanism(s) of toxicity.

Methods: Cystic ducts were obtained from patients who underwent cholecystectomy at the time of HAIP placement. Standard histopathologic techniques were used to compare cystic ducts to archival common bile duct/common hepatic duct samples to gage potential differences. Cystic ducts were perfused for four days *ex vivo* using oxygenated autologous plasma in a custom perfusion circuit. Floxuridine (FUDR) was added to the perfusate in a dose escalation manner to determine cellular susceptibilities and matrix alterations using standard histopathology, immunohistochemistry (IHC), and immunofluorescence. On IHC, SOX9 antibody was used to stain stem cells, CD31 for endothelial structures, γH2a.x for DNA damage. HALO software was utilized to analyze IHC stains.

Results: When compared to common bile duct/common hepatic duct samples, cystic ducts had a similar density of stromal cells, lymphocytes, endothelium, and similar matrix composition suggesting suitability as a surrogate to study floxuridine-mediated toxicity. Next, cystic ducts were evaluated following perfusion in our system to understand any potential alterations/injury associated with the transition from *in vivo* to *ex vivo*. Fifteen cystic ducts were evaluated. We observed consistent cell numbers, cell morphology, cell orientation and density as well as extracellular matrix composition and morphology. We perfused 15 cystic ducts with escalating doses of FUDR (5μM, 15μM, 30μM) for 4 days. Peribiliary gland damage was observed in 8/8 ducts treated with 30μM(Figure) and in 4/5 ducts treated with 15μM. IHC imaging demonstrated stem cells (SOX9 positive cells) localized in the peribiliary glands. There was a significant decrease in the number of SOX9 cells positive cells in peribiliary glands when treated with 30μM ($p=0.01$) but not for 15μM ($p=0.69$). Double staining for CD31 and γH2a.x, demonstrated a significant increase in γH2a.x staining ($p=0.0003$) but no difference on double stained cells of CD31 and γH2a.x ($p=0.834$). Double staining of SOX9 and γH2a.x demonstrated a similar increase in γH2a.x but also an increase in double staining of SOX9 and γH2a.x ($p<0.001$), demonstrating damage localized to peribiliary glands.

Discussion: We developed an ex-vivo perfusion system that provides a vehicle to understand the early events in FUDR-mediated injury using excised cystic ducts. We have demonstrated that FUDR-mediated injury is predominantly localized to peribiliary glands. SOX-9 expressing stem cells within the peribiliary glands appear most susceptible to FUDR-mediated injury.

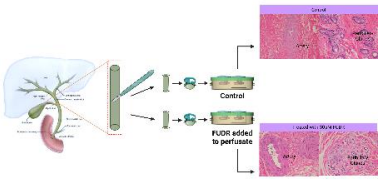


Figure 1

Contemporary Outcomes for Resected Type 1-3 Gastroesophageal Junction Adenocarcinoma: A Single Center Experience

Zachary E. Stiles[1]; Brendan L. Hagerty[1]; Maureen Brady[1]; Sarbajit Mukherjee[2]; Steven N. Hochwald[1]; Moshim Kukar[1]

[1]Department of Surgical Oncology, Roswell Park Comprehensive Cancer Center

[2]Department of Medical Oncology, Roswell Park Comprehensive Cancer Center

Introduction: Surgical resection remains the mainstay of treatment for tumors of the gastroesophageal junction (GEJ). However, contemporary analyses of the Western experience for GEJ adenocarcinoma are sparsely reported.

Methods: Patients with GEJ adenocarcinoma undergoing surgical resection from January 2012 to January 2022 at a single institution (Roswell Park Comprehensive Cancer Center) were analyzed within a prospectively maintained database and grouped based on Siewert subtype. Pathologic and treatment related variables were assessed with relation to outcomes.

Results: 299 patients underwent resection: 160 (53.5%) with type I, 114 (38.1%) with type II, and 25 (8.4%) with type III tumors. 56.9% had clinical evidence of nodal disease and most received neoadjuvant therapy (84.9%). 86% of cases were performed in a minimally invasive fashion. Anastomotic leak occurred in 6.4% and 30/90-day mortality in only 0.7%/2.3%. The rate of grade 3 or greater morbidity was lower for the last 5 years of the study when compared the 1st 5 years (28.0% vs 49.3%, $p<0.001$), as was median length of stay (7 vs 8 days, $p<0.001$). Positive margins were found in 3.3% and complete pathologic response was noted in 19.1% of those receiving neoadjuvant therapy. One- and 3-year overall survival (OS) progressively decreased with increased stage: Stage 0/1 91.6%/74.9%, Stage II 90.8%/75.5%, Stage III 87.2%/55.4%, Stage IV 58.3%/23.3%, $p<0.001$. There was a significantly greater number of signet ring type tumors among type III tumors (44.0%) compared to type I/II tumors (11.3/13.2%, $p<0.001$). Otherwise, there was no difference in the distribution of pathologic features among Siewert subtypes. Notably, there was a significant difference in 3-year OS based on Siewert classification: type I 58.8%, type II 77.1%, type III 86.3%, $p=0.011$. Even after multivariable adjustment for other prognostic factors (age, margin status, nodal status, depth of invasion), survival for type I tumors remained worse (HR 3.7, $p=0.033$).

Conclusion: In this large, single institutional series, post operative outcomes for patients with resected GEJ adenocarcinoma improved over time with the increased use of minimally invasive approaches. On multivariable analysis, type I tumors were an independent predictor of poor survival. This warrants further study.

Department of Surgery

Quick Shot Presentations

11:45 am – 12:15 pm

Jacobs School of Medicine and Biomedical Sciences
University at Buffalo

QUICK SHOT PRESENTATIONS

11:45 - 11:50 am

1. **Effectiveness Of Web-Based Patient Education Tools Used Prior To Kidney Transplant Evaluation**
   Authors: M. D. Handmacher, MD; A. Solbu, PhD; L. Kayler, MD, MS
   Presenter: Matthew Handmacher, MD

11:50 - 11:55 am

2. **Angioembolization in Trauma: A Comparison of Radial, Brachial and Femoral Access**
   Authors: Ariel Prieto Valdes, MD; Monica S. O'Brien-Irr, NP; Raphael Blochle, MD; James Lukan, MD; Brittany Montross, MD; Hasan Dosluoglu, MD; Linda Harris, MD; Maciej Dryjski, MD, PhD; Sikandar Z. Khan, MBBS
   Presenter: Ariel Prieto Valdes, MD

11:55 - 12:00 pm

3. **Differences Across the Pond: Mechanisms of Injury and Outcomes of Traumatic Brain Injury in Portugal and the United States**
   Authors: Eduarda Sá-Marta; Kabir Jalal; João Vasco Santos; Alberto Freitas; José Luís Alves; Weidun Alan Guo
   Presenter: Eduarda Sa-Marta, MD

12:00 - 12:05 pm

4. **Use of Veno-Veno Bypass for Resection of Pheochromocytomas and Paragangliomas**
   Authors: Carrie E. Ryan, MD, MS; Stephanie N. Gregory, MD; Jacob T. Lambdin, MD; Cathleen Hannah, RN; A. Leila Sarvestani, MD; Martha Teke, MD; Naris Nilubol, MD; Jeremy L. Davis, MD; Andrew M. Blakely, MD: Jonathan M. Hernandez, MD
   Presenter: Carrie E. Ryan, MD

12:05 - 12:10 pm

5. **Challenging Dogma by Skipping the Emergency Department Thoracotomy: A Propensity Score Matched Analysis of the TQIP Database**
   Authors: Joseph C. L'Huillier, MD (Resident); Kabir Jalal, PhD; Eden Nohra, MD; Joseph D. Boccardo, MS; Olatoyosi Olafuyi, BS; Marcy Bubar Jordan, PhD; Ajay A. Myneni, MBBS, PhD, MPH; Steven D. Schwaitzberg, MD, FACS; Katia Noyes, PhD, MPH; Clairice A. Cooper, MD, MHPE, FACS
   Presenter: Joseph L'Huillier, MD

12:10 - 12:15 pm

6. **Optimizing First-Person Viewpoint Video Capture for the Operating Room**
   Authors: Brian R. Quaranto, M.D; Michael Lamb, Ph.D; Dylan Tanzer, M.D; Stephen Chiang, M.D; Ajay Panchal, M.D; Timothy Adams, M.D; Steven D. Schwaitzberg, M.D
   Presenter: Brian R. Quaranto, MD

Effectiveness Of Web-Based Patient Education Tools Used Prior To Kidney Transplant Evaluation

M. D. Handmacher, MD, General Surgery Resident, University at Buffalo

A. Solbu, PhD, Clinical Research Coordinator, Erie County Medical Center

L. Kayler, MD, MS, Principal Investigator, Transplant Surgery Attending, Erie County Medical Center

Purpose: We initiated a practice improvement feasibility project to determine whether delivery of web-based information could be integrated into routine clinical care.

Methods: The web-based information utilized educational videos and response questions. We delivered web-links via email or text and login instructions to adults referred to a single transplant center. Reminders were sent weekly for 5 weeks alongside offers of technical support. Non-completers viewed the resource in clinic. Outcomes between remote completers and non-completers were patient usage of the technology and reasons for non-completion, time to kidney transplantation, provider perceptions, challenges incorporating the technology, and site adaptations to improve delivery.

Results: We enrolled 210 adults with a mean age of 56 years; 87% (183/210) accepted the web-based information invitation and 71% (149/210) completed it remotely. The most common reasons patients declined remote viewing was limited use of email and text. Completers were significantly more likely to have lower EPTS (47% vs 55%, p=0.021) and not require dialysis (38% vs. 16%, p=0.001) and lived in zip codes of less deprivation (p=0.015) but had similar time-totransplantation (see Figure). No other patient factors (age, race, gender, prior kidney transplant) were associated with remote completion of the web-based material. Transplant staff thought remote implementation increased visit efficiency and patient engagement. In-clinic implementation was burdensome for staff and for patients due to technology use difficulties and long duration, resulting in delivery adaptations in the clinic that avoided patient use of technology and minimized digital education duration.

Conclusions: Routine delivery of web-based information prior to evaluation is feasible for most patients and has high stakeholder acceptability. In-clinic implementation of digital education should not assume technology facilitation from staff or long patient engagement.

Angioembolization in Trauma: A Comparison of Radial, Brachial and Femoral Access

Ariel Prieto Valdes, MD; Monica S. O'Brien-Irr, NP; Raphael Blochle, MD; James Lukan, MD; Brittany Montross, MD; Hasan Dosluoglu, MD; Linda Harris, MD; Maciej Dryjski, MD, PhD; Sikandar Z. Khan, MBBS

Objective: Angioembolization is a well-established technique for hemorrhage control in trauma patients. While femoral access has been traditionally used, brachial and radial access are being increasingly utilized. However, there is paucity of data for upper extremity access in the treatment of traumatic injuries. This study seeks to ascertain whether radial and brachial artery access are safe and feasible alternatives to femoral access for angioembolization.

Methods: Retrospective review of all angioembolization procedures completed for treatment of traumatic abdominal or pelvic arterial injuries at a major trauma center over the period January 2014-December 2022. Cases were categorized and compared by access site: trans-Radial/Brachial vs Femoral. Comparisons were completed by Chi Sq and Student T test for independent samples.

Results: A total of 117 procedures were identified 47 Femoral, 39 Radial and 31 Brachial. Majority (71%) patients were males, mean age was 51 (16-97) years. There were no significant differences between groups in terms of gender (P= .49), age (P= .36) or medical comorbidities. Fourteen percent (14%) of patients in the Radial/Brachial group suffered penetrating injury vs 31.9% of patients in the Femoral group (P= .023). Eighty-nine percent (89%) of angioembolization via Radial/Brachial access involved hepatic or splenic arteries, while 51% of angioembolization via Femoral access involved pelvic vessels (P <.001). Total fluoroscopy time (seconds): 1014 vs. 639; P= .01 and radiation dosage (Gy): 1.6 vs. .99; P= .045 were significantly higher in the Radial /Brachial group. There were no significant differences in postop complications Radial/Brachial 98.5% vs Femoral, embolization (0% vs 2.1%: P= .22), access site hematoma (1.4% vs. 2.1%; P= .78), pseudoaneurysm (1.4% vs. 0%; P= .42), wound infection (0% vs. 2.1%; P= .22), limb ischemia (0% vs. 2.1%; P= .22), return to OR for access related complication (2.9% vs 2.1%; P= .82). There were no access vessel dissections, thrombosis or strokes. Ninety one percent (91%) in both groups required ICU admission. There was no significant difference in mortality between the groups (16.2% vs. 26.7%).

Conclusions: Angioembolization for traumatic injuries through radial and brachial access is safe and feasible, and comparable to femoral access. Although the radiation dose was higher in the Brachial/Radial group, the total fluoroscopy time was low. Patient selection is key, and the choice of access should be based on the patient's anatomy and the location of the lesion.

Differences Across the Pond: Mechanisms of Injury and Outcomes of Traumatic Brain Injury in Portugal and the United States

Eduarda Sá-Marta[1]; Kabir Jalal[2]; João Vasco Santos[3]; Alberto Freitas[3]; José Luís Alves[4]; Weidun Alan Guo[5]

[1] Resident, Department of Neurosurgery, Braga Hospital, Portugal
[2] Department of Biostatistics, University at Buffalo, New York
[3] Faculty of Medicine, University of Porto, Portugal
[4] Department of Neurosurgery, Coimbra University Hospital Center, Portugal
[5] Department of Surgery, University at Buffalo, New York

Introduction: Traumatic brain injury (TBI) is common in both Portugal (PT) and the United States (US), but no comparative data is available. The aim of this study is to compare the mechanisms and clinical outcomes between the two countries.

Methods: The 2017 US TQIP and Portuguese National Hospital Morbidity Database were queried for patients with severe TBI. ICDPIC-R (GEM max and min) was used to generate AIS of Portuguese patients. The two cohorts were matched using Propensity Score for outcome comparison.

Results: In the unmatched data, there were a lower percentage of younger (aged 16-35 yr.) and a higher percentage of older geriatric (aged ≥75yr) adults, as well as a lower percentage of AIS head scores 3 and 5, and a higher percentage of AIS head score 4, in PT than in the US (all $p<0.01$). While firearm, motor vehicle occupant and assault were less common, motorcycle accident and fall were more common in the PT cohort (all $p<0.001$). In the matched data, the median (IQR) hospital LOS was longer in PT than in the US [9 (4,19) vs 4 (2,7), $p<0.0001$]. However, no difference in mortality was noted. The discharge data is shown in Table.

Conclusion: This study demonstrates a significant difference in the mechanisms and clinical outcomes in TBI between PT and the US. The results provide evidence of opportunities to improve prevention and quality measures. Our data are in favor of mitigation strategies to reduce firearm injuries in the US, and motorcycle injuries in PT. The Portuguese data may also provide a glimpse on how the epidemiology of traumatic brain injury might change in the future in the US with the aging population.

	US (n=1,516)	PT (n=765)	OR (95% CI)	*p*
Home	474 (33.74%)	383 (50.07%)	0.51 (0.42-0.61)	<.0001
Inpatient	33 (2.35%)	204 (26.67%)	0.07 (0.04-0.10)	<.0001
Home Care	106 (7.54%)	1 (0.13%)	62.34 (10.89-2488.56)	<.0001
Left AMA	23 (1.64%)	3 (0.39%)	4.23 (1.27-22.05)	0.0109
Hospice	69 (4.91%)	0 (0%)	NA	<.0001
PHMC*	449 (31.96%)	35 (4.58%)	9.80 (6.83-14.21)	<.0001
LTMC**	21 (1.49%)	1 (0.13%)	11.59 (1.86-480.02)	0.0024

*PMHC: Post-Hospital Medical Care; **LTMC: Long Term Medical Care

Use of Veno-Veno Bypass for Resection of Pheochromocytomas and Paragangliomas

Carrie E. Ryan, MD, MS; Stephanie N. Gregory, MD; Jacob T. Lambdin, MD;
Cathleen Hannah, RN; A. Leila Sarvestani, MD; Martha Teke, MD; Naris Nilubol, MD;
Jeremy L. Davis, MD; Andrew M. Blakely, MD: Jonathan M. Hernandez, MD

Introduction: Tumors with inferior vena cava (IVC) involvement present a surgical challenge, especially those with episodic hormone release where alterations in vascular tone may occur in a dynamic fashion. Veno-Veno (VV)-bypass allows for prolonged vascular isolation of segments of the IVC with controlled hemodynamics during cross-clamping. We present our experience employing VV-bypass to aid IVC reconstruction due to invasive pheochromocytomas and paragangliomas.

Methods: With IRB approval, patients who were placed on VV-bypass for tumor resection from 2021 - 2022 were followed prospectively. Perioperative data were collected. Data are presented as median (mean ± standard deviation).

Results: Five patients underwent resection utilizing VV bypass; 80% were female. The length of IVC resected was 5 (4.6 ± 1.8) cm. Two patients had primary repairs, two required interposition grafts, and one received patch repair. Time on bypass pump was 66 (80 ± 48) minutes, and length of operation was 415 (404 ± 96) minutes. All patients received an R0 resection. Total ICU stay was 3 (3.8 ± 8) days. Three patients experienced a postoperative acute kidney injury, including two patients who required en bloc nephrectomy. Patients were followed up for 9 (9.6 ± 7) months, at this time all patients were alive, but two patients developed disease recurrence.

Conclusions: VV-bypass is a valuable technique that should be included in the armamentarium of surgical oncologists. This adjunct may be useful for patients in whom IVC cross-clamping may result in unpredictable hemodynamics secondary to variable catecholamines release.

Challenging Dogma by Skipping the Emergency Department Thoracotomy: A Propensity Score Matched Analysis of the TQIP Database

Joseph C. L'Huillier, MD (Resident); Kabir Jalal, PhD; Eden Nohra, MD; Joseph D. Boccardo, MS; Olatoyosi Olafuyi, BS; Marcy Bubar Jordan, PhD; Ajay A. Myneni, MBBS, PhD, MPH; Steven D. Schwaitzberg, MD, FACS; Katia Noyes, PhD, MPH; Clairice A. Cooper, MD, MHPE, FACS

Introduction: The Emergency Department thoracotomy (EDT) is a last-ditch effort to resuscitate trauma patients in extremis, but survival rates are poor. Recent studies have demonstrated the benefit of direct to operating room interventions, but none have investigated skipping the EDT in favor of OR intervention. In our study, we sought to: 1) compare outcomes between patients who underwent EDT vs ORT and vs sternotomy after propensity score matching (PSM); and 2) identify specific patient populations (ie. cardiac arrest in the pre-hospital setting) that may benefit from either EDT or OR intervention.

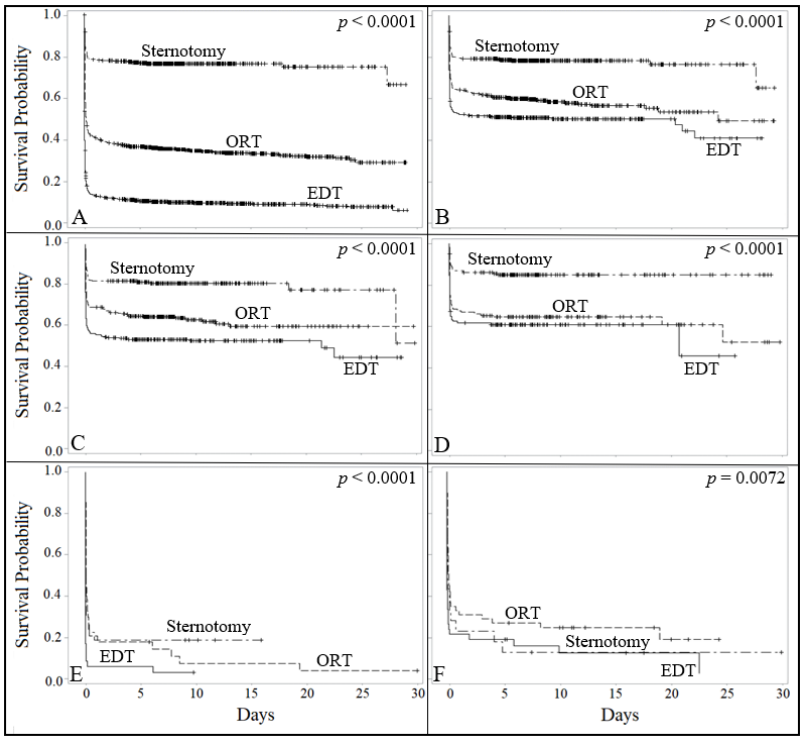


Figure 1: Kaplan Meier survival curve analyses between EDT (solid line), ORT (dashed line), and sternotomy (irregular dashed line) for: A) All unmatched patients; B) All matched patients; C) SBP ≥ 90 (n = 843); D) 0 < SBP < 90 (n = 421); E) SBP = 0 (n = 97); F) Pre-hospital cardiac arrest (n = 108). *p*-values represent comparisons between all three groups.

Methods: The 2016-2020 TQIP database was queried for adult patients who underwent EDT, ORT, or sternotomy within 60 minutes of ED arrival. All three groups were propensity-score matched on demographics, admission ED vital signs, mechanism of injury, and injury parameters. Outcomes between the three matched groups were compared on multivariate logistic regression. Kaplan-Meier survival curves were generated for the unmatched and matched groups. Sensitivity analyses for subgroups were conducted for the following: systolic blood pressure (SBP) ≥ 90; 0 < SBP < 90; SBP = 0; and those who experienced pre-hospital cardiac arrest.

Results: There were 5,174 EDT patients, 1,826 ORT patients, and 627 patients. After matching, there were 454 EDT and sternotomy patients and 453 ORT patients. In-hospital mortality was higher with EDT vs ORT (HR 1.883, $p < 0.01$) and vs sternotomy (HR 4.212, $p < 0.01$). On sensitivity analyses, the survival benefit with ORT and sternotomy held for patients with SBP ≥ 90, 0 < SBP < 90, and SBP = 0. For patients who experienced a pre-hospital cardiac arrest, ORT ($p < 0.01$) and not sternotomy ($p = 0.23$) had a survival advantage over EDT. Improved survival was despite a longer time to procedure for EDT (median [IQR], 0.35 [0.17-0.57] hours) vs ORT (0.65 [0.47-0.80] hours, $p < 0.01$) and vs sternotomy (0.56 [0.38-0.73] hours, $p < 0.01$). The percentage of patients discharged to home was lower with EDT (n (%), 173 (38)) vs ORT (207 (46)) and vs sternotomy (258 (57)).

Conclusion: Skipping the EDT in favor of OR intervention may be associated with an improvement in outcomes including survival.

Optimizing First-Person Viewpoint Video Capture for the Operating Room

Brian R. Quaranto, M.D; Michael Lamb, Ph.D; Dylan Tanzer, M.D; Stephen Chiang, M.D; Ajay Panchal, M.D; Timothy Adams, M.D; Steven D. Schwaitzberg, M.D

[1] Department of Surgery, Jacobs School of Medicine and Biomedical Sciences, SUNY at Buffalo, Buffalo, NY, USA

As surgeons, we have a unique vantage point that few others will ever see - sometimes even others in the operating room assisting in the surgery.

The first-person viewpoint (FPV) of the surgeon has clear advantages for demonstrating operative techniques for educational purposes and is now easily accomplishable with commercially available action cameras.

While there are dozens of reports in the published literature and thousands of videos online describing successful uses of these devices to document surgeries, there is limited guidance on best practices for setting up these devices for video capture in the dynamic and challenging environment of the operating room.

In this video-based presentation, we describe our institution's approach to developing and optimizing an array of FPV video capture systems for the operating room.

First, we discuss the myriad challenges the surgeon encounters when attempting to film FPV video in the operating room and generalizable strategies to address these issues.

Next, we summarize the current state of our portable, widely commercially available, head-mounted FPV capture system using the GoPro Hero 10 Black (GoPro, Inc, San Mateo, CA), including specific recommendations to reproduce our results. This includes pre-operative preparation of the camera system, intra-operative considerations to optimize capture, and a focus on technical post-production issues. We highlight the development of a post-processing stabilization algorithm for the operative field, a novel color grading for intraoperative footage, and new approaches for collaborative video editing.

Finally, we discuss the horizon of other FPV video solutions we have created locally and collaborations with startup ventures and media production houses. We summarize the interval developments of our novel gimbal-stabilized head-mounted stereoscopic FPV camera and present initial findings from our new "Macro-Jib" camera that allows for extreme close-ups in deep spaces and through tiny incisions. Lastly, we look to the future of intelligent head-mounted camera systems through the lens of our work with startup company Hybridwerx Inc., and their "Angles" camera system platform.