Surgery Research Day 2021

19TH ANNUAL WILLIAM C. WOOD RESEARCH SYMPOSIUM
APRIL 1, 2021 | 7:00-11:30 AM | VIRTUAL ZOOM EVENT

Keynote Speaker: Sandra L. Wong, MD, MS
William N. and Bessie Allyn Professor of Surgery and Chair, Department of Surgery,
Geisel School of Medicine, Dartmouth
Professor, Dartmouth Institute for Health Policy and Clinical Practice,
Dartmouth-Hitchcock Medical Center

Department of Surgery
SCHEDULE OF EVENTS

7:00-8:00 AM  Introduction of keynote speaker by Dr. Preeti Subhedar

Beyond Geography: Rural Surgery Disparities
Sandra L. Wong, MD, MS

8:05 AM  Welcome remarks by Dr. Luke Brewster

Oral and Poster Presentations - Session I
Moderators: Drs. Chrystal Paulos and Dina Amin

8:15 AM  Targeting TIGIT: A Key Immunoregulatory Factor in Transplantation
Christina Hartigan, Danya Liu, Mandy L. Ford

8:25 AM  Impact of Current Smoking on Mesenchymal Stem Cell Expansion
Carson Hoffman

8:30 AM  Venous Thromboembolism Occurrence in COVID-19 is Associated with Increased Mortality
Richard A. Meena, Mengya Di, Yue Xie, Xiangqin Cui, Milad Sharifpour, Luke P. Brewster, Yazan Duwayri, Olamide Alabi

8:40 AM  Obtaining Permanent Vascular Access for Veterans: A Problem Analysis
Anna Beth West, Olamide Alabi, Anne Tomolo

8:45 AM  Transient CD4+ T Cell and CD20+ B Cell Depletion Leads to Prolonged Pig-to-Primate Kidney Xenograft Survival
Brendan Lovasik, Abraham J Matar, David A Faber, Dave V Mathews, Cynthia Breeden, Steven C Kims, William H Kitchens, A Joseph Tector, Andrew B Adams

8:55 AM  Pediatric Lower Extremity Vascular Injuries at an Adult ACS-Verified Level 1 Trauma Center
Ahna Weeks, Jason D. Sciarretta, Nathan Klingensmith, Richard Sola, Jonathan Nguyen, Christopher Dente, Ravi Rajani, Elizabeth Benjamin, April Grant

9:05 AM  What is the Orbital Volume of African Americans?
James Jeong, Andrew J. Manhan, Gary Bouloux, Shelly Abramowicz, Dina Amin

9:10 AM  Intestine Specific Occludin Deletion Worsens Gut Permeability Following Sepsis
Tetsuya Yumoto, Zhe Liang, Craig Coopersmith
Oral and Poster Presentations - Session 2

Moderators: Drs. John Calvert and Preeti Subhedar

9:30 AM  Gender Differences in Failure-to-Rescue after Coronary Artery Bypass Grafting
William W. Qu, Jane W. Wei, Jose N. Binongo, William B. Keeling

9:40 AM  The Absence of T Follicular Regulatory Cells Prolongs Germinal Center Reactivity in Transplantation
Emma Crichton, Shan Zeng, I. Raul Badell

9:45 AM  Combined CD11b/CD40 Blockade is Superior to CD40 Blockade Alone in Prolonging Survival in Pig-to-Nonhuman Primate Renal Xenotransplantation
David Faber, Brendan Lovasik, Abraham Matar, Cynthia Breeden, Steven C. Kim, Andrew B. Adams

9:55 AM  Medicaid Expansion Associated with Improved Nonmetastatic Colon Cancer Survival among Patients in the National Cancer Database
Alexandra Reitz, Jeffrey Switchenko, Theresa Gillespie

10:00 AM  Redesigning a More Actionable, Service Line Specific, Surgical Performance Dashboard for Emory University Hospital by Adding Severity of Post-Operative Complications
Francis Simpson, Joe Sharma

10:10 AM  CD103 is a Novel Mediator of Mortality in a Murine Model of Sepsis
David Swift, Cameron Patterson, Zhe Liang, Craig Coopersmith, Mandy Ford

10:20 AM  COVID-19 in the Kidney Transplant Waitlist Population
Aileen Johnson, Chris Larsen, Howard Gebel, Robert Bray

Caroline Medin, Kirsten Baecher, Michael Turgeon, Geetha Mahendran, Terrill Flakes, Keith Delman, Michael Lowe

10:35 AM  Closing remarks by Dr. Randi Smith

10:40 AM  Announcement of the symposium winners by Dr. Luke Brewster

Adjourn
Sandra L. Wong, MD, MS

Sandra L. Wong, MD, MS, FACS, FASCO is the William N. and Bessie Allyn Professor of Surgery and the Chair of the Department of Surgery at Dartmouth-Hitchcock Medical Center and the Geisel School of Medicine at Dartmouth. She is the Senior Vice President of the Surgical Service Line at Dartmouth-Hitchcock Health. She is Professor of The Dartmouth Institute for Health Policy and Clinical Practice.

Her health services research program has been funded by National Institutes of Health, the Agency for Healthcare Research and Quality, and the American Cancer Society. Her work broadly focuses on the quality and costs of care; she is currently working on the development and implementation of systems to integrate patient reported outcomes into oncology care, particularly as it pertains to improving symptom management and on access to care issues, focusing on healthcare disparities.

She has been honored with numerous medical student and resident teaching awards. Dr. Wong has clinical expertise in soft tissue sarcoma and melanoma/skin cancer.

She is Past-President of the Society of University Surgeons, President of the Society of Surgical Chairs and Vice President of the Society of Surgical Oncology. She is an Associate Editor for Annals of Surgery, Annals of Surgical Oncology, and the World Journal of Surgery, and is on the Editorial Boards of Journal of Surgical Oncology and Journal of the American College of Surgeons.
ORAL & POSTER PRESENTATIONS
SESSION 1

8:15 AM

Category: Basic Sciences

#4 - Targeting TIGIT: a key immunoregulatory factor in transplantation
C Hartigan, D Liu, ML Ford

Belatacept, a costimulation blockade therapeutic for the prevention of organ rejection affords improved graft function, longevity, and quality of life for transplant patients compared to calcineurin inhibitor therapy that can be highly toxic, especially in kidney transplants. Despite the long-term efficacy of belatacept, acute rejection mediated by memory T cells remains a high risk. TIGIT is an inhibitory T cell immune receptor with Ig and ITIM domains that can be targeted with agonistic antibodies. Agonistic anti-TIGIT antibodies have been shown to bind to TIGIT expressed on Tregs to enhance their suppressive capacity. We hypothesize that agonistic anti-TIGIT in combination with belatacept can improve graft survival by enhancing the ability of Tregs to suppress alloreactive T cells. Combination therapy of CTLA-4Ig and TIGIT agonism compared to CTLA-4Ig alone prolongs graft survival in a minor antigen mismatch model of skin graft in mice (MST beyond 80 days compared to MST of 24 days, p value=0.0007). In animals where TIGIT is conditionally knocked out on Tregs (Foxp3<sup>Cre</sup>xTIGIT<sup>fl/fl</sup>), the survival benefit of combination CTLA-4Ig + TIGIT agonist is lost compared to wildtype control (MST of 76 days in WT animals, MST beyond 100 days in knock-out, p value = 0.017). Additionally, combination CTLA-4Ig + TIGIT agonism reduces donor-specific CD8 T cells in minor antigen mismatched grafts (~1.5 fold decrease p=0.056) and activated CD8 T cells in fully allogenic grafted tissue (2.7 fold decrease p=0.317). Our data show that the benefit conferred by combining TIGIT agonism with CTLA-4Ig is dependent on Foxp3<sup>+</sup> Tregs.

8:25 AM

Category: Basic Sciences

#3 – Impact of Current Smoking on Mesenchymal Stem Cell Expansion
C Hoffman, M Sasaki, F Li, L Brewster

Introduction
Patients with PAD or diabetes mellitus (DM) are at an increased risk of major amputation which is further multiplied when comorbid (4x) and up to 15x if concurrently smoking. It is critical to find an efficacious therapy.

Methods
Mesenchymal stem cells (MSC) from 11 male patients with PAD and DM undergoing lower limb major amputation were isolated. Five were current smokers. Cells were cultured in either 10% fetal bovine...
serum (FBS) or 5% platelet lysate (PL). Colony forming units (CFU) and doubling time (DT) for each cell passage was calculated. Student’s t-test was used for analysis.

**Results**
No difference in average CFU between PL and FBS (80.9 vs. 65.9, p=0.78) nor when stratified by current smoking (74.7 vs. 75.5, p = 0.97) and not smoking (57.1 vs. 77.1, p = 0.14) for FBS and PL respectively. Average DT was not statistically different (2.3 vs. 1.6, p = 0.06); however, a difference was found when stratified by smoking status (3.4 vs. 1.9, p = 0.02). Cells from current smokers did not reveal a difference when cultured in FBS vs. PL (3.3 vs. 2, p = 0.07); however, significance was found amongst MSC from non-smoking patients (2 vs. 1.3, p = 0.0003).

**Conclusion**
PAD and DM can lead to major amputation especially when comorbid. Our work has shown PL to improve MSC proliferation. This data further shows this trend and identifies a subset of patients (current smokers) that may not receive this benefit.

**Category:** Clinical Sciences

### #33 - Venous Thromboembolism Occurrence in COVID-19 is Associated with Increased Mortality

*RA Meena, M Di, Y Xie, X Cui, M Sharifpour, LP Brewster, Y Duwayri, O Alabi*

**Introduction:** Patients with Coronavirus Disease 2019 (COVID-19) seem to be at high risk for venous thromboembolism (VTE) development, but there is a paucity of data exploring both the natural history of COVID-19 associated VTE and the risk for poor outcomes with VTE development. This investigation aims to explore the relationship between COVID-19 associated VTE development and mortality.

**Methods:** A prospectively maintained registry of patients over 18 years of age admitted for COVID-19 related illnesses within a large academic healthcare network between March and September 2020 was reviewed. Codes from the tenth revision of the International Classification of Diseases (ICD-10) for VTE were collected. The charts of those patients with an ICD-10 code for VTE were manually reviewed to confirm VTE diagnosis.

**Results:** 2552 patients were admitted with COVID-19 related illnesses. 126 (4.9%) of these 2552 patients developed a VTE. A disproportionate percentage of patients of Black race developed a VTE (70.9% VTE versus 57.8% non-VTE, p=0.012). A higher proportion of patients with VTE expired during their index hospitalization (22.8% VTE versus 8.4% non-VTE, p<0.001). On multivariable logistic regression analysis with propensity score weighting, VTE was associated with nearly threefold higher odds of mortality (adjusted odds ratio, 2.85; 95% CI, 1.9 to 4.3; p<0.001).

**Conclusion:** Hospitalized patients of Black race with COVID-19 were more prone to VTE development, and patients with COVID-19 who developed in-hospital VTE had nearly threefold higher odds of mortality. Further emphasis should be placed on optimizing COVID-19 anticoagulation protocols to reduce mortality in this high-risk cohort.
<table>
<thead>
<tr>
<th>Admitted Patients with COVID-19 (N=2552)</th>
<th>Without VTE (n=2426)</th>
<th>With VTE (n=126)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Age (in years, SD)</td>
<td>58.4 (17.5)</td>
<td>60.4 (16.8)</td>
<td>0.216</td>
</tr>
<tr>
<td>Male Birth Sex</td>
<td>1211 (49.9%)</td>
<td>63 (49.6%)</td>
<td>1.000</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td><strong>0.012</strong></td>
</tr>
<tr>
<td>Black</td>
<td>1401 (57.8%)</td>
<td>90 (70.9%)</td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>607 (25.0%)</td>
<td>24 (18.9%)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>417 (17.2%)</td>
<td>13 (10.2%)</td>
<td></td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td>0.313</td>
</tr>
<tr>
<td>Hispanic/Latinx</td>
<td>246 (10.1%)</td>
<td>12 (9.4%)</td>
<td></td>
</tr>
<tr>
<td>Non-Hispanic</td>
<td>1906 (78.6%)</td>
<td>106 (83.5%)</td>
<td></td>
</tr>
<tr>
<td>Not Reported</td>
<td>273 (11.3%)</td>
<td>9 (7.1%)</td>
<td></td>
</tr>
<tr>
<td>Insurance Status</td>
<td></td>
<td></td>
<td>0.930</td>
</tr>
<tr>
<td>Medicaid</td>
<td>134 (5.5%)</td>
<td>6 (4.7%)</td>
<td></td>
</tr>
<tr>
<td>Medicare</td>
<td>977 (40.3%)</td>
<td>55 (43.3%)</td>
<td></td>
</tr>
<tr>
<td>Private</td>
<td>948 (39.1%)</td>
<td>49 (38.6%)</td>
<td></td>
</tr>
<tr>
<td>Uninsured/Self-pay</td>
<td>307 (12.7%)</td>
<td>15 (11.8%)</td>
<td></td>
</tr>
<tr>
<td>Not Reported</td>
<td>59 (2.4%)</td>
<td>2 (1.6%)</td>
<td></td>
</tr>
<tr>
<td>Discharge Disposition</td>
<td></td>
<td></td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Acute Care Transfer</td>
<td>3 (0.1%)</td>
<td>0 (0.0%)</td>
<td></td>
</tr>
<tr>
<td>Against Medical Advice</td>
<td>28 (1.2%)</td>
<td>0 (0.0%)</td>
<td></td>
</tr>
<tr>
<td>Expired</td>
<td>214 (8.8%)</td>
<td>33 (26.0%)</td>
<td></td>
</tr>
<tr>
<td>Home</td>
<td>1544 (63.7%)</td>
<td>56 (44.1%)</td>
<td></td>
</tr>
<tr>
<td>Home with Home Healthcare (HHC)</td>
<td>318 (13.1%)</td>
<td>18 (14.2%)</td>
<td></td>
</tr>
<tr>
<td>Hospice</td>
<td>46 (1.9%)</td>
<td>4 (3.1%)</td>
<td></td>
</tr>
<tr>
<td>Post-Acute Care Transfer</td>
<td>272 (11.2%)</td>
<td>16 (12.6%)</td>
<td></td>
</tr>
<tr>
<td>Hospital Length of Stay (SD)</td>
<td>8.8 (9.6)</td>
<td>13.8 (14.81)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>In-Hospital Mortality</td>
<td>203 (8.4%)</td>
<td>29 (22.8%)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>
#20 - Obtaining Permanent Vascular Access for Veterans: A Problem Analysis

**AB West, O Alabi, A Tomolo**

**Introduction:** The Atlanta VA HCS has a higher prevalence of central venous catheters (CVCs) and lower prevalence of arteriovenous fistulas (AVFs) when compared to desired quality benchmarks. This problem analysis deploys QI tools to determine barriers to reaching these benchmarks and propose initiatives to improve local performance.

**Methods:** Semi-structured interviews with stakeholders elucidated perceived barriers and facilitators to obtaining permanent vascular access. To understand the process for referral from nephrology to vascular surgery, process mapping and validation were completed. Retrospective chart review of Veterans initiated on dialysis via CVC identified factors contributing to their lack of permanent access from which a Pareto chart was constructed to determine which were having the largest impact.

**Results:** The most common barriers to timely permanent dialysis access identified through thematic analysis of twelve stakeholder interviews were 1) patient engagement, 2) inconsistent referral process, and 3) lack of interdisciplinary care coordination. The current referral process takes seven steps, of which three (routine vein mapping, vein mapping interpretation, and class attendance) were identified as low value, and three were identified as inefficient and/or inconsistently carried out (threshold for referral, nurse notification and vein mapping interpretation). The most common factors contributing to CVC as incident access type identified via review of 38 charts were delayed referral to vascular surgery (41%), patient related factors (16%) and acute kidney injury (11%).

**Conclusions:** Following discussion with stakeholders the following initiatives are planned: establishing a standard referral process, development of a care coordination dashboard, and a new patient education program.

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#15 - Transient CD4+ T cell and CD20+ B cell depletion leads to prolonged pig-to-primate kidney xenograft survival

**BP Lovasik, AJ Matar, DA Faber, DV Mathews, C Breeden, SC Kim, WH Kitchens, AJ Tector, AB Adams**

**Introduction:** “Delayed” antibody-mediated xenograft rejection is the one of the most important obstacles to clinical application of pig organ xenografts. The aim of this study was to assess the impact of B cell depletion on kidney xenograft survival.

**Methods:** Rhesus macaques (n=8) with low pre-transplant xenoreactive antibody titers were selected following recipient screening. Selected recipients underwent bilateral nephrectomy and life-sustaining porcine renal xenotransplantation using GGTA1 KO/CD55 transgenic donor pigs. Animals received induction immunosuppression with either CD4 depletion alone or combination CD4 and CD20 depletion;
all recipients received maintenance immunosuppression with anti-CD154 plus mycophenolic acid and steroids.

**Results:** Recipients treated with anti-CD4 induction therapy (n=4) with anti-CD154 experienced prolonged xenograft survival (MST=242 days). Addition of B cell depletion was associated with similarly prolonged survival, with all recipients surviving >50 days (MST>262), including one recipient with survival >870 days. There were no episodes of “delayed” acute graft rejection in the B cell depletion treatment arm, while the CD4-depletion alone treatment arm had one early rejection event. Circulating B cells were effectively depleted with a single dose of anti-CD20 therapy; reconstitution of circulating B cells occurred approximately 50 days post-transplant. Circulating xenoreactive IgM was reduced following CD20 depletion. Rejection events post-CD20 reconstitution demonstrated a predominant activated memory B cell phenotype (CD20+CD27+CD21-) with IgM predominance. Rejection events were also associated with a high frequency of peripheral antibody secreting cell phenotypes (CD138+CD127+) with an immunoglobulin class-switched phenotype. Contrarily, stable graft function was associated with a predominant resident memory B cell phenotype (CD20+CD27-CD21-). Protective immunity against viral reactivation remained intact for recipients treated with combination CD4 & CD20 depletion.

**Conclusions:**
The combination of low pretransplant anti-pig antibody and CD4 depletion with and without CD20 depletion resulted in consistent, long-term xenograft survival, including one recipient with the longest renal xenograft survival reported to date (>870 days). B cell phenotype associated with AMR associated with class-switched ASCs and activated B cells. Further evaluation of the B cell phenotype and the B cell contributions to xenoreactive antibody is crucial for understanding xenograft rejection and pathways for clinical translation of xenotransplantation.

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**8:55 AM**

**Category: Clinical Sciences**

#24- Pediatric Lower Extremity Vascular Injuries at an Adult ACS-Verified Level 1 Trauma Center

Ahna Weeks BA, Jason D. Sciarretta MD, Nathan Klingensmith MD, Richard Sola MD, Jonathan Nguyen DO, Christopher Dente MD, Ravi Rajani MD, Elizabeth Benjamin MD, PhD, April A. Grant MD
Background: While contemporary pediatric vascular injuries remain relatively infrequent, survivors can suffer from lifelong disability. The objective of this study is to evaluate injury patterns and management of pediatric lower extremity vascular injuries (PLEVI) in a busy adult urban Level-I trauma center.

Methods: The trauma registry was queried (1/2009-1/2021) for all patients with noniatrogenic lower extremity vascular injuries in patients less then 18 years of age. Demographics, mechanism of injury, injury severity score (ISS), injury type, operative intervention, limb salvage, concomitant injuries, and outcomes were analyzed.

Results: 32 patients met inclusion criteria. In this cohort, 47 vessels were injured and 27 operative interventions were performed. Mean age was 15.5 ± 2.6 (range, 3-17), majority male (94%), and predominantly from penetrating mechanisms (87.5%). Overall, penetrating injuries had a lower ISS (14 vs. 22, p = 0.06). Nearly half of all patients had concomitant arterial-venous injuries (n=14, 44%) and associated orthopedic fractures (n=15, 47%). All above knee arterial injuries required intervention (n=20). Below knee, shank vessel injuries were less common (17%) with the majority requiring ligation (62%) during orthopedic fixation. All above knee vascular injuries were performed by adult surgeons [8 (40%) trauma surgery, 11 (55%) vascular surgery]. Two patients required unplanned revascularization due to thrombosis. Overall limb salvage was 93% and no deaths occurred during the study period.

Conclusions: PLEVIs are relatively rare and commonly result from firearms. These injuries can be safely managed at adult trauma centers by experienced surgeons with high rates of limb salvage and successful revascularization.

<table>
<thead>
<tr>
<th>Patient Demographics</th>
<th>Number (N=32)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean (±SD) [range]</td>
<td>15.5 (±2.6) [3-17]</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>30</td>
<td>93.8</td>
</tr>
<tr>
<td>Mechanism</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Penetrating</td>
<td>28</td>
<td>87.5</td>
</tr>
<tr>
<td>ISS, mean (±SD) [range]</td>
<td>14.4 (±10.1) [1-41]</td>
<td></td>
</tr>
<tr>
<td>Hospital stay, mean (±SD) [range]</td>
<td>15.6 (±13.4) [1-54]</td>
<td></td>
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<tr>
<td>ICU stay, mean (±SD) [range]</td>
<td>4.2 (±5.8) [0-27]</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Concomitant arterial-venous</th>
<th>Artery</th>
<th>Vein</th>
<th>Artery (%)</th>
<th>Vein (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Injured Vessel</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common femoral</td>
<td>2</td>
<td>1</td>
<td>4.3</td>
<td>2.1</td>
</tr>
<tr>
<td>Superficial femoral</td>
<td>11</td>
<td>9</td>
<td>33.4</td>
<td>19.1</td>
</tr>
<tr>
<td>Deep femoral</td>
<td>1</td>
<td>1</td>
<td>2.1</td>
<td>2.1</td>
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<tr>
<td>Popliteal</td>
<td>6</td>
<td>5</td>
<td>12.8</td>
<td>10.6</td>
</tr>
<tr>
<td>Anterior tibial</td>
<td>2</td>
<td>1</td>
<td>4.3</td>
<td>2.1</td>
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<tr>
<td>Posterior tibial</td>
<td>3</td>
<td>2</td>
<td>6.4</td>
<td>4.3</td>
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<tr>
<td>Peroneal</td>
<td>3</td>
<td>0</td>
<td>6.4</td>
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<table>
<thead>
<tr>
<th>Types</th>
<th>Artery (%)</th>
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<tbody>
<tr>
<td>Artery</td>
<td>91.7</td>
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<tr>
<td>Vein</td>
<td>2.8</td>
</tr>
<tr>
<td>Initial dissection</td>
<td>2.8</td>
</tr>
<tr>
<td>Concomitant with thrombosis</td>
<td>2.8</td>
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<table>
<thead>
<tr>
<th>Surgical Procedures</th>
<th>(N=47)</th>
<th></th>
</tr>
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<tbody>
<tr>
<td>Primary repair</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Interposition grafting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Autogenous saphenous vein grafting</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>PTFE grafting</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Ligation</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>Temporary Shunt</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Coil Embolization</td>
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<td>0</td>
</tr>
<tr>
<td>Fasciotomy</td>
<td>14</td>
<td></td>
</tr>
</tbody>
</table>
Category: Clinical Sciences

#14 – What is the Orbital Volume of African Americans?

J Jeong, A Manhan, G Bouloux, S Abramowicz, D Amin

Purpose
Measurements of orbital volume (OV) are important for reconstructive operations of orbits such as congenital deformities, trauma, and pathology. Successful orbital reconstruction relies on an accurate restoration of OV. The purpose of this study was to identify the OV in African American (AA) population. The specific aims were to compare OV of AAs to Caucasians and right to left OV in the same racial group. This is the first project in available literature which calculates these OVs.

Materials & Methods
The authors implemented a retrospective observational study of successive subjects who received a maxillofacial computed tomography (CT) scan at Grady Memorial Hospital between 2017 and 2020. The primary predictor variable was race. The primary outcome variable was orbital volume. Two independent examiners calculated OV with an open access OsiriX MD software (version 10.0.5; Pixmeo, Switzerland). Inter-rater reliability was calculated. Differences in means between races, genders, and sides were tested using independent samples t-test.

Results
Sixty subjects (120 orbits) with average age of 36.7 years (range, 22 to 78) met inclusion criteria. Male to female ratio was 1:1. Inter-examiner reliability was 0.973. The mean OV of AA and Caucasians was 22.375 cm³ and 23.225 cm³, respectively (p = 0.07). The mean OV in AA and Caucasian males was 23.919 cm³ and 24.168 cm³, respectively (p = 0.71). The mean OV in AA and Caucasian females was 20.832 cm³ and 22.282 cm³, respectively (p = 0.013).

Conclusion
Understanding the average value for OV based on race and gender will assist in preoperative surgical planning of orbital trauma repair and therefore will improve surgical outcome.

Table 1: Mean difference in orbital volume between observer 1 and 2

<table>
<thead>
<tr>
<th>Race (Sex)</th>
<th>Mean Orbital Volume (cm³)</th>
<th>t-test</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Observer 1 (SD)</td>
<td>Observer 2 (SD)</td>
<td></td>
</tr>
<tr>
<td>African American (M)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right Orbit</td>
<td>23.917 (3.50)</td>
<td>23.309 (3.47)</td>
<td>0.478</td>
</tr>
<tr>
<td>Left Orbit</td>
<td>24.447 (3.56)</td>
<td>24.002 (3.38)</td>
<td>0.351</td>
</tr>
<tr>
<td>Caucasian (M)</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>
9:10 AM

Category: Basic Sciences

#22 – Intestine Specific Occludin Deletion Worsens Gut Permeability Following Sepsis  
*T Yumoto, Z Liang, C Coopersmith*

**Background:** Sepsis induces intestinal hyperpermeability, which is mediated by altered tight junction protein expression. Occludin expression is decreased following sepsis although the mechanistic significance of this is unclear.

**Methods:** Age/gender matched mice lacking intestine epithelial-specific occludin (occludin KO<sup>IEC</sup> mice) and controls were subjected to cecal ligation and puncture to induce intra-abdominal sepsis. To assay gut permeability, mice received oral gavage of FD-4 (4 kDa), creatinine (113 Da), and rhodamine B (70 kDa), and five hours before sacrifice to discriminate the leak, pore and unrestricted pathways of intestinal permeability respectively. Mice were sacrificed 12 hours after sepsis. For survival studies, mice were observed for seven days after surgery.

**Results:** FD-4 levels were significantly increased in occludin KO<sup>IEC</sup> mice after sepsis (1545 vs. 1877 ng/mL, P=0.0497), however, rhodamine B, and creatinine levels were not significantly changed. Occludin KO<sup>IEC</sup> mice had a significant increase in protein levels of jejunal ZO-1 without changes in claudin-1, 2, 4 or JAM-A. There was a trend toward higher blood bacterial count in occludin KO<sup>IEC</sup> mice (5.5 vs. 4.4 log CFU/mL, P=0.11). Occludin KO<sup>IEC</sup> mice trended towards worse survival after sepsis (50 % vs. 80 %, p=0.16, n=10 per group).

**Conclusions:** Intestine specific deletion of occludin worsens gut permeability through the leak pathway but not the pore or unrestricted pathways following sepsis. This is associated with a trend towards worsened bacteremia and survival. Our data suggest that occludin may play a role in mediating outcomes from sepsis and targeting tight junctions may represent a therapeutic target in sepsis.
Category: Clinical Sciences

#30 – Gender Differences in Failure-to-Rescue after Coronary Artery Bypass Grafting

WW Qu, JW Wei, JN Binongo, WB Keeling

**Background:** Female patients experience worse outcomes following coronary artery bypass grafting (CABG). We investigated whether rates of failure-to-rescue (FTR), a systems-based quality indicator, were greater in women who underwent CABG.

**Methods:** A retrospective review was conducted on 20,045 patients who underwent isolated, non-emergent CABG between January 2002 and August 2019 at a single academic center. FTR was defined as postoperative death within 30 days after stroke, renal failure, reoperation, and prolonged ventilation. Propensity-score matching was performed utilizing preoperative variables, excluding gender.

**Results:** 4,980 propensity-score matched pairs were identified. Prior to matching, women had increased Society of Thoracic Surgeons predicted risk of mortality (1.9% vs. 0.9%; p < 0.001). In the matched analysis, women experienced higher rates of postoperative stroke (1.9% vs. 1.2%; p = 0.008), prolonged ventilation (13.3% vs. 10.0%, p < 0.001), and 30-day mortality (2.6% vs. 1.8%; p = 0.01). Rates of FTR (females vs. males) following stroke (8.4% vs. 12.9%; p = 0.36), renal failure (26.5% vs. 18.9%; p = 0.11), reoperation (11.7% vs. 11.1%; p = 0.86), and prolonged ventilation (12.2% vs. 10.8%; p = 0.48) were not statistically significant between genders.

**Conclusions:** Women who underwent isolated, non-emergent CABG had statistically similar frequencies of FTR compared to their male counterparts despite experiencing greater rates of morbidity and mortality. Further efforts to narrow the gender outcome gap after CABG should focus on preoperative and intraoperative phases of care instead of postoperative management.

Category: Basic Sciences

#1 – The Absence of T Follicular Regulatory Cells Prolongs Germinal Center Reactivity in Transplantation

ES Crichton, S Zeng, IR Badell

**Purpose:** Alloantibodies result from T follicular helper (Tfh) cell-driven germinal center (GC) reactivity. T follicular regulatory (Tfr) cells have been identified as important regulators of GC responses and antibody formation. Tfr cells may have a role in controlling pathologic donor-specific antibody (DSA) responses and it is therefore important to understand their role in transplantation.
Methods: To examine the Tfr cell response in transplantation, we utilized a murine skin allograft model, defining the kinetics of Tfr cells. A conditional Tfr knockout (KO) mouse was used to study the response to full mismatch skin grafts. The graft-draining lymph node (dLN) cellular and DSA responses in the absence of Tfr cells were evaluated in comparison to wild type (WT) littermate controls.

Results: Tfr cells were detected following transplantation but remained stable over time relative to the dynamic expansion and contraction of their Tfh cell counterparts. On day 10 after skin grafts, no significant differences were observed in the dLN Tfh cell or GC B cell responses between WT and KO recipient mice. However, the frequency of dLN Tfh cells on day 35 after primary allograft was greater in KO mice compared to WT mice (Figure 1.) There were no significant differences in DSA formation between groups.

Conclusions: These findings indicate that the absence of Tfr cells affects the ability of the Tfh response to contract during the primary humoral response to an allograft. As such, Tfr cells could potentially be utilized to therapeutically suppress Tfh cell-driven humoral alloimmunity.

Figure 1.
CD11b, a second ligand for CD154, may provide an additional pathway by which rejection signals can bypass CD40 selective blockade. The aim of this study was to assess the efficacy of combined CD11b/CD40 blockade in preventing rejection in a pig-to-NHP model of renal xenotransplantation.

Methods: Rhesus macaques (n=16) with low pre-transplant xenoreactive antibody titers underwent bilateral nephrectomy and life-sustaining porcine renal xenotransplantation using GGTA1 KO/CD55 transgenic donor pigs. Animals underwent T cell depletion and were assigned to one of three maintenance treatment regimens: anti-CD154 (clone 5C8); anti-CD40 (clone 2C10R4); or combined anti-CD40 plus anti-CD11b (clone M1/70).

Results: Recipients in the anti-CD154 group (n=6) experienced the longest survival (MST=235 days), including three rhesus macaques with extended survival over 300 days (406, 400, 310 days). Treatment with combined anti-CD40/CD11b therapy (n=4) prolonged survival (MST=101 days) compared to treatment with anti-CD40 therapy alone (n=6, MST=6.5 days).

Conclusions: Treatment with anti-CD11b mitigates early xenograft rejection seen with anti-CD40 therapy in a pig-to-NHP model of renal xenotransplantation. Additionally, treatment with anti-CD40/CD11b is statistically similar to treatment with anti-CD154. Together, these data support CD11b as an additional ligand of CD154 through which rejection signals can bypass CD40 blockade.

Category: Clinical Sciences

#19 - Medicaid Expansion Associated with Improved Nonmetastatic Colon Cancer Survival among Patients in the National Cancer Database
A Reitz, J Switchenko, T Gillespie

Introduction
Inadequate insurance is a known contributor to health disparities. In 2010, the Patient Protection and Affordable Care Act expanded Medicaid eligibility in participating states. Medicaid expansion has been associated with improved colorectal cancer screening and earlier stage diagnosis, but its impact on survival among colon cancer patients is unknown. We hypothesized that nonelderly adult patients with invasive, nonmetastatic colon cancer residing in Medicaid expansion states would have better survival rates compared to patients in non-expansion states.

Methods
This retrospective study of 86,413 patients (40-64 years old) undergoing surgical resection for a new diagnosis of invasive, nonmetastatic colon cancer included in the National Cancer Database (NCDB) from January 1, 2010 to December 31, 2015 compared overall survival (OS) in patients in non-expansion states (NES) to Medicaid expansion states (MES). We also examined 30- and 90-day post-operative mortality.

Results
In this sample, 51,297 (59.2%) lived in MES and 35,116 (40.8%) lived in NES. 5-year OS in MES was higher than NES (79.1% vs 77.3%, p<.0001) with early expansion states having the highest OS rate (80.2%). MES
had significantly better 30-day and 90-day post-operative mortality rates than NES (0.87% % vs 0.97%, p=0.021; 1.75% vs 1.5%, p<.001).

**Conclusion**
Among nonelderly adults in the NCDB who underwent surgical resection for a newly diagnosed invasive, nonmetastatic colon cancer living in Medicaid expansion states was associated with improved OS and better 30-day and 90-day postoperative mortality rates. These results may help inform health policies and promote future insurance coverage expansion efforts.

**Figure 1.** Overall survival in nonelderly adults with Stage I-III colon cancer by state Medicaid expansion status

![Overall survival graph](image)

**10:00 AM**

**Category: Clinical Sciences**

**#35 - Redesigning a more actionable, service line specific, surgical performance dashboard for Emory University Hospital by adding severity of post-operative complications**

*F Simpson, J Sharma*

**BACKGROUND:** NSQIP’s dashboards allow for institutions to benchmark outcomes against other participating hospitals. NSQIP treats the severity of all complications as the same and does not account for sequela of complications or incorporate service line specificity, leading to diffuse and potentially misdirected quality improvement (QI).

**METHODS:** A retrospective cohort study was conducted from NSQIP (07/01/2014-06/30/2019). Microsoft® Excel pivot tables were used to assess data trends by service line. Correlations were performed between Clavien-Dindo classes. A novel dashboard was constructed, combining NSQIP outcomes data with severity and benchmarking.
INTERVENTION: Clavien-Dindo classes were mapped to NSQIP variables. All cases were assigned to service lines, and benchmarks were evaluated for 13 different outcomes.

RESULTS: Clavien-Dindo Class 2 and Class 4b complications were most prevalent. Across all cases, Class 2 held a strong positive correlation with Class 4 (+0.88), and Class 4 had a strong positive association with Class 5 (+0.62). Class 2 also had a moderate positive association with Class 3 (+0.30) and Class 5 (+0.30). When benchmarked, ACS, Surgery B, and Vascular were reclassified as outliers (95th percentile) for severe morbidity and complications. Surgery A, Colorectal, and HPB service line morbidities were between the 50th and 95th percentile and approached requiring intervention.

CONCLUSIONS: A novel dashboard was developed and applied to NSQIP data. This dashboard accounted for severity of complications, sequela of complications, and failure to rescue, which were absent from previous dashboards. By benchmarking severity and frequency across 13 outcomes, we may be able to improve quality of care and cost.

![Figure 1: Novel dashboard mock-up. Left: Benchmarked performance by service line via NSQIP morbidity for all complications. Number of complications versus the percent of complications. The size of each bubble is represented by each service line’s contribution to the overall rate of complications. R middle: Clavien-Dindo complications by service line for EUH. Severe complication rates were for Clavien-Dindo class 3-5 while all complications were Clavien-Dindo 2-5. Benchmarks are based on morbidity for each service line. R bottom: benchmarked outcomes by service line providing drill down for potential future quality improvement projects.](image-url)
Alcohol use disorder is a frequent comorbidity among septic patients and is associated with increased mortality, but the mechanisms underlying this are incompletely understood. We hypothesized that chronic alcohol-induced changes in T cell phenotypes may underlie this observation. To investigate this, we performed high-dimensional flow cytometry on T cells isolated from water-drinking vs. alcohol-drinking (12wk) mice at 24h following cecal ligation and puncture. We then performed a machine-driven, exploratory analysis comparing splenic subpopulations within conventional CD4+ and CD8+ T cells and regulatory CD4+ cells. We observed reduced frequency of CD103, an integrin involved in T cell adhesion and migration, expression among naïve CD8+ (1.6±0.2% vs. 2.3±0.2%, p=0.005) and regulatory T cells (2.4±0.1% vs. 4.5±0.2%, p <0.0001) in alcohol-drinking vs. water-drinking mice. This association between reduced CD103 expression and mortality led us to investigate whether reduced CD103 causally impacted sepsis mortality. To test this, water-drinking mice were injected with vehicle or anti-CD103. Mice were sacrificed at 24h and spleens assayed via flow cytometry. Anti-CD103 administration caused reduced frequencies of CD103+CD4+ (0.02±0.01% vs.2.1±0.03%, p=0.0004) and CD103+CD8+ (0.06±0.04% vs. 56.47±1.20%, p<0.0001) cells. To evaluate the effect of CD103 blockade on survival, water-drinking mice underwent CLP with anti-CD103 vs. vehicle administered at 0, 48 and 96h post-operatively. Anti-CD103 resulted in increased mortality (84.2 vs. 45.0% p= 0.0288) compared to controls. Taken together, these results illuminate CD103 as a novel mediator of sepsis mortality and suggest a putative CD103-dependent mechanism for the increased mortality observed during sepsis in the setting of chronic alcohol exposure.
Category: Clinical Science

#8 – COVID-19 in the Kidney Transplant Waitlist Population

A Johnson, C Larsen, H Gebel, R Bray

**Purpose:** Through banked serum samples from transplant candidates across Georgia, we characterize the prevalence, timing, and duration of SARS-CoV-2 seropositivity and investigate the impact on HLA alloantibodies.

**Methods:** We used a Luminex-based assay to detect antibodies against SARS-CoV-2 as well as antibodies against 4 common coronaviruses, SARS-1, and MERS. We selected 400 waitlist candidates from Georgia counties with an above average case rate as of August 2020 and screened the most recent serum sample from each candidate. For positive candidates, we ran sequential historical samples to determine the earliest positive date and subsequently performed a geographic analysis of positive cases. Additionally, we cross-referenced SARS-CoV-2 reactivity with HLA antibody levels.

**Results:** Of 400 candidates, 28 tested positive for antibodies to SARS-CoV-2, a 7% positive rate. In counties with positive candidates, rates were approximately 10x higher than published by the GA department of public health. All 28 patients maintained positive serology for the duration of the testing period. Positive and negative groups had similar distributions of peritoneal and hemodialysis patients. In the 15 patients with positive panel reactive antibody (PRA) testing, there was no apparent change associated with seroconversion.

**Conclusions:** Our analysis of transplant waitlist candidate SARS-CoV-2 serologies demonstrated a higher rate of positivity than that published by the state for the general population. This may be attributed to asymptomatic infections, insufficient testing, or an increased risk in this immune dysregulated population. Seroconversion does not appear to be a risk factor for development of donor specific antibodies in this cohort of patients.
Category: Clinical Sciences

#23 - Do Oncologic Outcomes from Head and Neck versus Truncal and Extremity Melanoma Differ? A Single-Institution Single-Subspecialty Experience

K Baecher, M Turgeon, C Medin, G Mahendran, T Flakes, K Delman, M Lowe

Introduction: Conflicting evidence has been published regarding the outcomes of patients with head and neck (H&N) melanoma. We provide an update of H&N melanoma patients treated in the current era.

Methods: Patients undergoing excision for stage I-II melanoma at Emory University from 2014-2020 were identified. Comparison between H&N and non-H&N lesions was made. Recurrence-free survival, melanoma-specific survival, distant metastasis free survival and overall survival are reported.

Results: 1272 patients were identified. 27.8% (n=354) had primary H&N melanoma. H&N patients were more likely to be male, older, and present with more advanced clinical T stages (all p≤0.05). Median follow-up was 20.9 months (IQR 26.9).

On univariate analysis, H&N location, male sex, and more advanced T, N, and overall clinical stage were associated with worse RFS. On multivariable analyses controlling for sex and stage, H&N melanoma was associated with worse RFS (HR 1.794, CI 1.219-2.641, p=0.003). Within the H&N melanoma cohort, scalp subsite (n=159) was significantly associated with worse RFS compared to non-H&N disease (HR 2.161, CI 1.396-3.344, p<0.001). When patients with scalp lesions were excluded from the H&N group, there was no difference in RFS between H&N and non-H&N groups (p=0.487) (Fig.1).

MSS, DMFS, or OS did not differ based on site in univariate or multivariable analyses (all p>0.05).

Conclusions: Patients with primary head and neck melanoma have similar MSS, DMFS, and OS compared to non-H&N melanoma patients. However, head and neck melanoma patients have worse RFS. This seems to be driven by patients with scalp melanoma.

Fig. 1: (a) RFS of Scalp versus Non-scalp patients (left), and (b) RFS of Non-scalp H&N versus Non-H&N patients (right)
Poster abstracts are arranged in order by category and poster number and can also be viewed by clicking on: [Link to Poster Presentations]

**Basic Sciences**

#7 – Gm2a: A Novel Regulatory Pathway Controlling Alloimmunity  
KM Baecher, M Fribourg, P Cravedi, PS Heeger, ML Ford

Introduction: The inhibitory receptor FcγRIIB regulates CD8+ T cell alloimmunity in a cell-autonomous fashion, and increased expression of FCGR2B was associated with freedom from rejection following tacrolimus withdrawal in the CTOT-09 clinical trial. We sought to identify specific pathways that are upregulated in FcγRIIB+ T cells that promote allograft survival.

Methods: We cross-referenced the list of ~1009 differentially expressed genes (DEG) in FcγRIIB+ vs. Fc RIIB- CD8+ murine T cells with the list of transcripts that were differentially expressed in patients who were stable vs. rejected off immunosuppression in the CTOT-09 cohort. In subsequent mechanistic studies, Gm2a−/− mice and WT littermate controls received BALB/c skin grafts and alloimmune responses were assessed via flow cytometry.

Results: Affymetrix gene array and subsequent CellCODE deconvolution analyses revealed that Gm2a, an essential cofactor associated with sphingolipid processing, was differentially expressed in FcγRIIB+ vs. FcγRIIB- CD8+ T cells. To examine the role of Gm2a in suppression of alloimmune responses in vivo, cohorts of Gm2a−/− and WT mice were grafted with allogeneic skin grafts and treated with a baseline immunosuppressive regimen. The Gm2a−/− mice developed rejection of their skin grafts significantly sooner than their WT counterparts. We then analyzed splenocytes post-transplant, which revealed Gm2a−/− mice demonstrated increased frequencies of TNF-expressing CD8+ T cells, decreased frequencies of IL-2 and IL-10-expressing CD8+ T cells, and fewer NKT cells relative to WT controls.

Conclusion: Our results from human renal transplant patients and experimental mouse models suggest that Gm2a may be a novel and critical immunologic mediator of transplant tolerance.

#17 - FcyRIIB/ Fgl2 Axis is a Novel Regulator of T cell Apoptosis and Mortality during Sepsis  
JC Anyalebechi, M Xue, KN Morrow, CM Coopersmith, ML Ford

Sepsis accounts for almost 20% of all global deaths. While a hallmark feature of sepsis-induced immune dysregulation is induction of T cell apoptosis, the mechanisms governing this process are poorly understood. We recently showed that the inhibitory receptor FcγRIIB can function in a cell-autonomous manner to regulate T cell responses via induction of apoptosis in models of transplantation and anti-tumor immunity. However, the role of T cell-expressed FcyRIIB in sepsis-induced T cell apoptosis has never been explored. Moreover, our recently published data demonstrate that FcγRIIB signaling on T cells is initiated through ligation of the immunosuppressive cytokine fibrinogen-like protein 2 (Fgl2). We hypothesized that FcγRIIB-mediated T cell apoptosis could be mediated via a rise in serum Fgl2 during
sepsis. To test this, sepsis was induced via cecal ligation and puncture (CLP). Flow cytometry performed 24h post-operatively demonstrated that FcγRIIB was expressed on 8.1% of circulating CD4+ T cells and 10.0% of circulating CD8+ T cells. Serum Fgl2 levels measured 24h post-operatively were significantly elevated in septic mice (480.8 ng/mL) compared to healthy mice (151.3 ng/mL, p=0.001), suggesting a putative mechanism for FcγRIIB-mediated T cell apoptosis specifically in sepsis. Finally, to determine if increased exposure to Fgl2 resulted in increased mortality during sepsis, we utilized Fgl2-overexpressing transgenic mice in a CLP model. Data show that mortality was significantly accelerated in Fgl2-overexpressing mice relative to wild-type controls (p=0.02). Taken together, these data establish a novel role for the FcγRIIB-Fgl2 axis in promoting T cell apoptosis, immune dysfunction, and mortality during sepsis.

#18 - Highly Potent, Activated FcγRIIB+ CD8+ T Cells Are Negatively Impacted by PD-1 Immune Checkpoint Blockade

KB Bennion, M Tariq, M Ford

As the success of immune checkpoint blockade (ICB) in the clinic increases, variability in patient response underscores the need to identify factors leading to differential therapeutic success. The effector CD8+ T cell response has been characterized as a critical factor in patient response to ICB, namely in PD-1 therapy. We recently showed that the inhibitory receptor, FcγRIIB, functions in a cell-intrinsic manner to temper the highly activated CD8+ T cell response to antigen in vivo. As ICB utilizes Fc-containing antibodies, we hypothesize that these antibodies could bind FcγRIIB on CD8+ T cells and elicit counterproductive negative signaling. In stage IV melanoma patients receiving nivolumab, an αPD-1 antibody, we observed a decrease of FcγRIIB+ CD8+ T cells after the first treatment cycle, suggesting that nivolumab may contribute to the decrease of these cells. To understand the interaction between αPD-1 therapy and FcγRIIB+ cells, healthy human PBMCs were incubated with nivolumab in vitro. Intriguingly, we found that stimulated FcγRIIB+ cells were more proliferative at baseline, but that they did not undergo a proliferative burst similar to FcγRIIB+ cells after incubation with nivolumab (p<0.05). When FcγRIIB+ cells were incubated with αPD-1 fab, we saw an increase in frequency of Ki67+ FcγRIIB+ cells (p<0.05) with no difference in FcγRIIB+ cells. This suggests that FcγRIIB+ CD8+ T cells are nonresponsive to αPD-1 antibody in vitro, but that response can be restored using αPD-1 lacking an Fc-region. Targeting or otherwise manipulating FcγRIIB signaling may potentiate highly activated CD8+ T cells to improve patient response to ICB.

Clinical Sciences

#2 – The Impact of COVID-19 Pandemic on Burn Admissions at a Major Metropolitan Burn Center

J Codner, R De Ayala, RM Gayed, CK Lamphier, R Mittal

The impact of the COVID-19 pandemic on admission patterns and outcomes at a burn center is still largely unknown. The aim for this study was to determine how the COVID-19 pandemic affected the epidemiology of burn admissions at a major metropolitan burn center.

This retrospective cohort study examined how the COVID-19 pandemic impacted burn volumes and time to presentation. All burn admissions were included from January 20th – August 31st for the years 2020, 2019, & 2018. The COVID-19 pandemic group included admissions from 1/20/2020-8/31/2020 and was compared to the non-pandemic group comprised of admissions from 1/20-8/31 in 2018 and 2019. Subgroup analysis was performed according to meaningful dates during the COVID-19 pandemic including the 1st US COVID-19 case, shelter in place, and state reopening orders.
Admission volumes were 403 patients in the COVID-19 pandemic group compared to a mean of 429 patients in the non-pandemic group, which correlated to a 5.8% decrease in volume during the pandemic. The pandemic group showed an increase in time to presentation of 1 day (p<0.0001). Subgroup analysis demonstrated stable admission volumes and an increase in time to presentation of 1 day (P<0.0001) at each time point. During shelter-in-place orders, higher rates of operative intervention were noted (45.6% vs 27%, p=0.013).

During the pandemic there were stable admission volumes, delayed time to admission, and an increase in operative burns during shelter in place orders. This reinforces the need to maintain appropriate burn center staffing and resources during the COVID-19 pandemic.

Table I. Burn demographic, admission, & hospital data during pandemic vs non-pandemic years

<table>
<thead>
<tr>
<th>Study Variables</th>
<th>COVID-19 Pandemic</th>
<th>Non-Pandemic</th>
<th>Total</th>
<th>P-value</th>
</tr>
</thead>
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<td>858 (429)</td>
<td>126</td>
<td></td>
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<tr>
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<td></td>
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</tr>
<tr>
<td></td>
<td>38.0 (19.2-55.5)</td>
<td>36.6 (20.1-53.8)</td>
<td>44</td>
<td>37.1 (19.8-54.5)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Male</td>
<td>252 (62.5)</td>
<td>538 (65.9)</td>
<td>42</td>
<td>790 (64.8)</td>
</tr>
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<td>Female</td>
<td>151 (37.5)</td>
<td>277 (34.0)</td>
<td>42</td>
<td>428 (35.1)</td>
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<td>Pediatric Burn Missing</td>
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<td>21 (3.2)</td>
<td>23 (2.3)</td>
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<td>108 (9.8)</td>
<td>0.744B</td>
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<td>7 (1.0)</td>
<td>16 (1.5)</td>
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<tr>
<td>Total BSA Missing</td>
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<td>4.5 (2-9)</td>
<td>5 (2-9)</td>
<td>0.289A</td>
</tr>
<tr>
<td>Required OR</td>
<td>150 (37.2)</td>
<td>312 (36.4)</td>
<td>462 (36.6)</td>
<td>0.768B</td>
</tr>
<tr>
<td>ICU Admit</td>
<td>60 (14.9)</td>
<td>185 (21.6)</td>
<td>245 (19.4)</td>
<td>0.005B</td>
</tr>
<tr>
<td>LOS (&lt;20% TBSA)</td>
<td>2 (1.5)</td>
<td>3 (1.8)</td>
<td>1.5 (1.3)</td>
<td>&lt;0.0001A</td>
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<td>Mortality Missing</td>
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<td>0 (0-1)</td>
<td>0 (0-1)</td>
<td>&lt;0.0001A</td>
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<tr>
<td>Injury to Admit</td>
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<td></td>
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<tr>
<td>(&gt;Same day) Yes</td>
<td>236 (68.0)</td>
<td>187 (35.4)</td>
<td>503 (43.7)</td>
<td>0.0001B</td>
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<tr>
<td>No</td>
<td>111 (32.0)</td>
<td>341 (64.6)</td>
<td>647 (56.3)</td>
<td>111</td>
</tr>
<tr>
<td>Missing</td>
<td>56</td>
<td>55</td>
<td>111</td>
<td></td>
</tr>
</tbody>
</table>

Categorical variables are presented as number (Column Frequency %), Continuous variables are presented as Median (Interquartile Range), Non-Pandemic Admission Volumes are presented as number (2 year mean)

Abbreviations: Volume (Vol), Total Body Surface Area (TBSA), Operation (OR), Intensive Care Unit (ICU), Length of Stay (LOS)
COVID-19 Pandemic Group: (1/20/20-8/31/20) burn admissions
Non-Pandemic Group: (1/20/18-8/31/18 & 1/20/19-8/31/19) burn admissions
A. Wilcoxon rank sum two-sample test
B. Chi-square test
#5 – Length of Stay and Time to Full Diet in Bowel Resections for Inflammatory Bowel Disease vs. Neoplasmic and Diverticular Disease

CE Hutchison, VO Shaffer, TJ Paul Olson, S Emani, J Sharma, JK Srinivasan

Introduction

Enhanced recovery protocols (ERPs) are shown to improve outcomes in colorectal patients, including patients with inflammatory bowel disease (IBD). However, research comparing these outcomes in IBD vs. other colorectal patients is limited. Limited studies suggest patients receiving bowel resections for IBD have longer hospital stays and slower diet tolerance. We aim to compare these outcomes in patients receiving elective bowel resections for IBD vs. non-IBD indications.

Methods

This is a retrospective study of 1002 elective bowel resections at a tertiary institution from 2014-2019. Diagnosis associated with surgery was determined by ICD code. Primary outcomes were time to tolerance of general diet and length of stay (LOS). Groups were defined as IBD (Crohn's or Ulcerative Colitis) and non-IBD (diverticulitis and neoplasm). Means and rates were compared using independent samples t-test and Pearson’s Chi Square as appropriate.

Results

In univariate analysis, IBD patients had a mean LOS of 8.78 days vs. 6.23 for non-IBD (p<0.001); IBD had mean time to tolerance of full diet of 8.41 days vs. 4.34 for non-IBD (p<0.001) (Table 1). However, in multivariate regression, IBD diagnosis did not significantly predict these outcomes.

Conclusion

IBD patients receiving bowel resections have longer hospital stays and slower diet tolerance than non-IBD colorectal patients. However, this difference is better explained by clinical factors and not IBD diagnosis alone. Well-powered institutional studies with the ability to control for detailed clinical variables are important to elucidate these relationships.

Table 1: Univariate Comparison of Length of Stay, Time to Full Diet, NG insertion, and Readmission Rates for IBD vs. Neoplasm and Diverticular Disease

<table>
<thead>
<tr>
<th></th>
<th>IBD Patients (n=193)</th>
<th>Non-IBD Patients (n=581)</th>
<th>Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of Stay (days)</td>
<td>8.78 (SD 6.59)</td>
<td>6.23 (SD 5.407)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Mean time to tolerance of general diet</td>
<td>8.41 (12.67)</td>
<td>4.34 (5.010)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Rate</td>
<td>Left OR with NG</td>
<td>17.6%</td>
<td>7.71%</td>
</tr>
<tr>
<td>Rate</td>
<td>Required NG reinsertion for post-op ileus</td>
<td>15.0%</td>
<td>13.0%</td>
</tr>
<tr>
<td>Rate</td>
<td>Required NG reinsertion for post-op ileus after CLD POD 0 (n=570)</td>
<td>14.3%</td>
<td>10.2%</td>
</tr>
<tr>
<td>Rate</td>
<td>30-day readmission</td>
<td>11.9%</td>
<td>9.6%</td>
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</tbody>
</table>
#6 – Predictors of Immediate Post-Mastectomy Reconstruction: A National Cancer Database Analysis

D Danko, Y Liu, F Geng, TW Gillespie

INTRODUCTION: The aims of this study is to use the National Cancer Database (NCDB), to determine how patient, clinical, and facility factors play a role in decision making post-mastectomy, and what factors influence or predict: 1) receipt of immediate breast reconstruction; and 2) type of immediate breast reconstruction (implant-based, autologous, or combination).

METHODS: A total of 457,139 female patients with TIS-T3, N0-N1, M0 breast cancers were identified in the NCDB from 2004-2016 who received immediate reconstruction post-mastectomy. Univariate and multivariate analyses were conducted to identify characteristics associated with immediate breast reconstruction and type of reconstruction.

RESULTS: Immediate breast reconstruction was associated with white race, younger age, higher incomes, completion of higher education, urban residence, less comorbidities, in situ disease, T0-T2 staging, zero or <4 lymph node involvement, and facility location in the New England and Atlantic areas (all Odds Ratios (OR) >1.10). Negative predictors of immediate breast reconstruction were insurance status of uninsured, government, and unknown (all ORs <0.51). Implant-based reconstruction was associated with non-black race, uninsured status, completion of higher education, undifferentiated disease, and T0-T2 staging (all ORs >1.10). Tissue-based reconstruction was associated with unknown insurance, higher incomes, facilities in metro areas, and those located in the New England, Atlantic, and West Central regions (all ORs >1.10).

CONCLUSIONS: These findings confirm some previous studies defining patient, clinical, and facility factors that affect decision making, but also raise new questions relating to impact of third-party payor on receipt and type of reconstruction post-mastectomy for breast cancer leading to potential disparities.

#9 – Optimal Timing of Administration of Direct-Acting Antivirals for Patients with Hepatitis C-Associated Hepatocellular Carcinoma Undergoing Liver Transplantation


Introduction
In patients with hepatitis C (HCV) associated hepatocellular carcinoma (HCC) undergoing liver transplantation (LT), the optimal timing of direct-acting antivirals (DAA) administration to achieve sustained virologic response (SVR) and improved oncologic outcomes remains unknown.

Methods
The United States HCC Liver Transplantation Consortium (2015-2019) was reviewed for patients with primary HCV-associated HCC who underwent LT and completed DAA therapy at 19 institutions. Primary outcomes were SVR and HCC recurrence-free survival (RFS).
Results
Of 744 patients, 655 were within Milan criteria. SVR was associated with improved 5-year RFS (93% vs 76%, p<0.01). Patients who received DAAs pre-LT, 0-3 months post-LT, and ≥3 months post-LT had SVR rates of 92%, 92%, and 82%, and 5-year RFS of 93%, 94%, and 87%, respectively.

On subgroup analysis of 408 HCV treatment-naïve patients (no previous interferon therapy), patients who achieved SVR with DAAs had improved 5-year RFS (93% vs 74%, p<0.01) (Figure-1A). Patients who received DAAs pre-LT, 0-3 months post-LT, and ≥3 months post-LT had SVR rates of 91%, 93%, and 77% (p<0.01) and 5-year RFS of 94%, 100%, and 84% (p=0.02) (Figure-1B).

Conclusions
The optimal timing of DAA therapy appears to be 0-3 months after liver transplantation for HCV-associated HCC, given increased rates of SVR and improved RFS. Delayed administration after transplant should be avoided. A prospective randomized controlled trial is warranted to validate these results.

![Figure 1](image)

Kaplan-Meier analysis comparing RFS for patients who achieved SVR (red) vs did not achieve SVR (blue) (Panel A) and for DAAs administered 0-3 months post-liver transplant (red), pre-liver transplant (blue), and ≥3 months post-liver transplant (green) for s (Panel B)

#10 – Management and Outcomes after Upper Versus Lower Extremity Vascular Trauma

**L Gallo, LS Kao, CR Ramos, RR Rajani, J Benarroch-Gampel**

**INTRODUCTION:** While significant literature exists regarding peripheral vascular injury management, the vast majority focuses on lower extremity (LE) arterial injury. The purpose of this study is to compare management and outcomes of upper extremity (UE) and LE traumatic vascular injuries.

**METHODS:** Patients who underwent operative repair of traumatic vascular extremity injuries were identified from the trauma registry of a level I trauma center. A retrospective review (2011-2019) was conducted. Demographics, injuries patterns, management and outcomes were compared between patients with UE versus LE vascular injuries.

**RESULTS:** 535 patients were included. Patients with UE vascular injuries (n=234) were more likely to be female (16.7% vs 9%,P=.007), have a pre-hospital tourniquet (21.8% vs 12%,P=.002), have associated nerve injuries (40.2% vs 4.7%,P<.0001) or present with bleeding (76.1% vs 64.1%,P=.002). There was no
difference in age, race, or mechanism of injury. UE injuries were more likely to be managed with vessel ligation (38% vs 17.6%, P<0.0001) or primary reanastomosis (12.4% vs 5.6%, P=0.009), but less likely to have concomitant fasciotomies (13.3% vs 56.5%, P<0.0001). Postoperatively, UE trauma was associated with persistent nerve deficits (21.7% vs 10%, P=0.002), while LE injuries had a higher incidence of 30-d limb loss (5.7% vs 1.3%, P=0.008). There were no differences in mortality or graft-patency rates between groups.

CONCLUSION: UE injuries are associated with a lower limb-loss rate but increased prevalence of neurological deficits after vascular trauma compared to LE injuries. A high level of suspicion is paramount to intraoperatively identify associated nerve injuries to improve functional outcomes.

#13 - Through the Ages: Thoracoabdominal Trauma and Blunt Traumatic Diaphragm Rupture
H Saeb, N Klingensmith, R Smith, K Archer-Arroyo, R Sola, C Butler, K Udobi, J Nguyen, P Ayoung-Chee, E Benjamin, SR Todd, JD Sciarretta

Background: Traumatic diaphragm ruptures (TDR) are uncommon diagnoses preceding high-impact blunt mechanisms. We hypothesized that in patients with TDR, difficulty in diagnosis may result in increased respiratory complications.

Methods: The trauma registry of an urban level I trauma center was queried (1/2010 - 12/2020) for adult patients with blunt thoracoabdominal trauma. Patients were stratified based on age (young adults [18-35 yrs]; middle age [36-60 yrs]; older adults [>60 yrs]). Univariate analysis was performed using Chi-square or Fisher Exact test. Multivariable analysis was performed using logistic regression.

Results: Of 44,434 trauma patients, 98 (0.22%) had a TDR. Patients with the largest TDR defect had a higher ISS (p<0.05), and mortality rate. Time to OR was delayed in 12 patients. On multivariable analysis, increased time to OR was associated with increased pneumonia (p<0.03), ventilator days (p<0.0386), ICU (p<0.022) and hospital LOS (p<0.02) On subgroup analysis, middle age patients were most likely to have large TDR (p<0.001) while older patients were more likely to have chronic respiratory failure based on tracheostomy rates (p<0.002) and were more likely to need skilled care on discharge (p<0.02).

Conclusions: TDR is associated with a high injury burden and mortality. A high index of suspicion for TDR is critical as patients with increased time to surgical intervention were more likely to develop pneumonia with an increase in ICU and hospital LOS. While middle-age patients were more likely to have a higher ISS and a larger rupture, elderly patients required more care and interventions during their hospital stay.

<table>
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<tr>
<th></th>
<th>15-35 years n= 13</th>
<th>36-60 years n= 46</th>
<th>&gt; 61 n= 39</th>
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<td>BMI</td>
<td>27.34 ± 8.6</td>
<td>32.6 ± 12.46</td>
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<td>ISS</td>
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<td>33.79 ± 9.54</td>
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<td>3.91 ± 0.42</td>
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<td>AIS (abdomen)</td>
<td>3.03 ± 1.14</td>
<td>3 ± 1.2</td>
<td>3.33 ± 1</td>
</tr>
</tbody>
</table>
#16 - A Quality Improvement Project from the Atlanta VA Health Care System: Standardizing Discharge Opioid Prescriptions within General Surgery

E Falconer, J Pollock, A Tomolo

**Introduction:** 42-71% of opioids prescribed postoperatively remain unused creating a large potential for diversion into the community. Despite published procedure-specific recommendations for discharge opioid prescriptions, the Atlanta VA Health Care System (AVAHCS) lacked standardized recommendations. This Quality Improvement (QI) aimed to standardize and reduce non-adherence to discharge opioid prescribing recommendations for common general surgery procedures from 75% in September 2019 to 30% by March 2020.

**Methods:** The modified Model for Improvement was used as the project framework. An interprofessional team performed literature review of publications and developed institutional discharge opioid recommendations for common general surgery procedures. QI tools used included: literature review, stakeholder interviews, Cause and Effect Diagram, Process Map, and a Pareto Chart. Discharge prescriptions standardized to an oral morphine equivalent (OME) from the Corporate Data Warehouse. Three sequential Plan-Do-Study-Act cycles were implemented. Data was analyzed using descriptive statistics and statistical process control charts.

**Results:** An NP-chart examined cases of non-adherence to discharge opioid recommendations, with a baseline average of 75%. After project onset, there were sustained special cause signals and reduction of non-adherence to 25%. The equivalent of 340 oxycodone IR 5 mg tablets were not dispensed and no increase in refill rate was observed.

**Conclusion:** By increasing adherence to standardized recommendations, less opioids were prescribed to Veterans, and subsequently less opioids were available to divert into the community. The results of this pilot have generated interest in disseminating to other surgical specialties.

(Figure on next page)
#26 - Female Gender is Associated with Increased Thrombus Burden within Stent-Graft Following TEVAR

MC Kuo, RA Meena, CR Ramos, J Benaroch-Gampel, BG Leshnower, Y Duwayri, WD Jordan Jr, RR Rajani

Introduction: Mural thrombus within stent-grafts develops at an unclear incidence following thoracic endovascular aortic repair (TEVAR). The significance of this phenomenon is unknown, as are risk factors for development of intra-graft thrombus. Narrower grafts are hypothesized to be a risk factor for thrombus development.

Methods: A retrospective analysis was performed of a multicenter health-care system including all patients who underwent TEVAR (2011-2019) with at least one year of subsequently available surveillance imaging. Measurements were obtained via direct off-line computed tomography angiography. Patent intra-graft diameter was compared to baseline and interval change values were normalized to time to follow-up. Primary outcome measure was rate of intra-graft thrombus formation.

Results: 208 patients met inclusion criteria (94 women, 114 men) with median follow-up of 822 days. Mean (SD) annual rate of % intra-graft diameter reduction was 10.5% (7.7) for women and 7.6% (5.6) for men (p= .0026). Multivariate analysis demonstrated female gender (p= .0283) was a significant predictor of intra-graft thrombus formation. Narrower aortas were not independently associated with thrombus formation, nor was use of anti-platelet or anti-coagulation medications. High rates of thrombus formation were associated with increased need for any re-intervention (p= .0249). Kaplan-Meier estimate demonstrated a significant gender-associated difference in high rates of intragraft thrombus formation (p= 0.000103).

Conclusions: In this analysis, female gender is shown to be a significant non-modifiable risk factor for intra-graft thrombus development following TEVAR. Development of thrombus is not benign; such findings were associated with increased need for re-intervention. Surveillance following TEVAR must account for patient-specific variations in complication risk.
#27 - Trauma admission rates in Metro Atlanta following the killing of George Floyd: an interrupted time series analysis

AN Mora, CN Morrison, J Beard, RN Smith

Introduction: Considering potential stressors from the COVID-19 pandemic and increased awareness of racial injustice and police brutality, we were interested in whether these events impacted trauma hospital admission rates compared to rates from the preceding 4.5 years.

Methods: We conducted an interrupted time series analysis for trauma admissions due to assault between January 1, 2016 and October 29, 2020 at Grady Memorial Hospital. The interruption variables of interest were the start of COVID-19 lockdown in Atlanta and the killing of George Floyd. We assessed temporal associations using Poisson regression.

Results: There were a total of 5,811 emergency department admissions for assault during the study period (252 weeks). The 229 weeks prior to the George Floyd killing had a mean 22.0 admissions per week (SD = 6.0), and in the 23 weeks after the protests there was a mean of 33.2 admissions per week (SD = 5.8). The pandemic lockdown was not associated with a change in admissions (incidence rate ratio
[IRR] = 0.93; 95%CI: 0.80, 1.08), but the protests were significantly associated with a 40% increase in admission counts per week (IRR = 1.40; 95%CI: 1.20, 1.64) (Figure 1).

**Conclusion:** In the five months following the killing of George Floyd, there was a mean increase of 11.2 trauma admissions per week compared to historical rates. Further studies are warranted to assess the length of time until regression to the mean historical admission rate and to determine potential reasons for this increase, such as assessing neighborhood-level stress and other contextual factors.

![Figure 1. Observed trauma assault admissions per week (grey line) between January 1, 2016, and October 29, 2020 (n = 252 weeks) and fitted Poisson regression (red line). First dotted line is start of COVID-19 lockdown (March 16, 2020) and the second dotted line is George Floyd's death (May 25, 2020).](image)

**#28 - High Frequency of Thyroid Pathology in Patients Undergoing Parathyroidectomy**  
*A Sweeney, C Weber, S Patel, N Saunders, J Codner, J Sharma*

**Background:** Coexisting thyroid pathology in patients undergoing de-novo parathyroidectomy (PTX) for primary (PHPT), secondary (SHPT) and tertiary (THPT) hyperparathyroidism can lead to intraoperative complexity, reoperations and missed pathology. The aim of this study was (1) to evaluate types and rates of concomitant thyroid disease in patients undergoing parathyroidectomy and (2) to examine the impact of routine preoperative localization studies on the detection of thyroid disease and rates of concomitant thyroidectomy (THYx).

**Methods:** In this single-center, observational cohort study, a retrospective analysis was performed on a prospectively maintained database of 2,078 patients who underwent de-novo PTX for PHPT, SHPT and THPT at Emory University Hospital between 1993 and 2018. Demographics, localization study results, outcomes, pathology and disease type were evaluated. Student t-tests were used to determine clinical
significance for continuous variables and outcomes; chi-square tests were used for categorical variables and outcomes.

**Results:** Thyroid cancer was identified in 3.4% of PHPT, 2.1% of SHPT and 4.6% of THPT (p=0.465); a multinodular goiter was identified in 22.6%, thyroiditis in 9.5%, colloid nodule in 3.1% and adenoma in 2.0% of patients undergoing THYx. Overall, thyroid nodules were identified in 25.8% (409/1585) of PHPT, 36.1% (70/194) of SHPT, and 32.1% (35/109) of THPT patients (p < 0.05). Parascans identified 9.2% of thyroid nodules. Routine preoperative neck ultrasound decreased the rate of THYx from 27.7% (484/1779) to 20.3% (50/292) and the rate of completion thyroidectomy from 7.13% (127/1779) to 3.77% (11/292) (p = 0.015 & p = 0.041 respectively).

**Conclusion:** Routine preoperative ultrasound improves identification of co-occurring thyroid pathology and decreases rates of unnecessary lobectomy and completion thyroidectomy. Co-occurrence of thyroid lesions is much higher in patients undergoing PTX for PHPT, SHPT, and THPT compared to the general population. Given these findings, further studies are indicated to elucidate a potential biological link between these related endocrine organs.

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**#32 - Recuperation of Patient-Reported Quality of Life After Esophagectomy**

*A Bonanno, M Dixon, J Binongo, SD Force, MS Sancheti, A Pickens, D Kooby, CA Stailey, MC Russell, K Cardona, MM Shah, TW Gillespie, F Fernandez, O Khullar*

**Introduction:** Esophagectomy is often necessary for management of benign and malignant diseases. However, it carries significant risk of morbidity and can have a significant impact on quality of life (QOL). Patient reported outcomes (PRO) are the ideal method for obtaining health-related QOL metrics after surgery. The aim of this study was to describe patterns of change and recovery in QOL PRO one year after esophagectomy.

**Methods:** Patient-reported QOL scores measuring physical function, pain intensity, and dyspnea severity were obtained from esophagectomy patients during all thoracic surgery clinic visits. PRO were obtained using NIH-sponsored PROMIS (Patient-Reported Outcomes Measurement Information System) from April 2018-December 2019. Mean PRO scores over the first 200 days after surgery were compared with baseline PRO scores using mixed effects modeling with a compound symmetry correlational structure.

**Results:** Sixty-nine esophagectomy patients with PRO results were identified. Reasons for esophagectomy were malignancy (89.9%), end-stage achalasia (5.8%), and stricture (4.3%). PRO scores showed considerable declines initially after surgery. When comparing mean PRO scores at visits ≤30 days post-surgery to mean preoperative PRO scores, physical function scores had declined by 26.8% (p<0.001), while dyspnea severity and pain intensity scores had increased by 26.7% (p<0.001) and 23.6% (p<0.001), respectively. At 150-200 days post-surgery, mean physical function scores and dyspnea severity were still 10.6% (p=0.065) and 24.6% (p=0.003) worse than mean preoperative levels, respectively.

**Conclusions:** There are considerable declines in QOL scores immediately after esophagectomy, with recovery lasting nearly a year. These results are of considerable importance when counseling patients regarding esophagectomy. Further long-term follow-up is needed to determine recovery beyond 1 year.
INTRODUCTION: Antiplatelet therapy after operative repair of traumatic arterial injuries of the extremities remains a frequently used adjunct to facilitate patency. This is despite a paucity of supporting data. We here seek to evaluate the efficacy of antiplatelet therapy in preventing early graft and limb-related complications after operative repair of traumatic arterial injuries of the extremities.

METHODS: Patients who underwent operative repair of traumatic arterial injuries of the extremities were identified from the trauma registry of a level I trauma center. A retrospective chart review (2011-2018) was conducted. Patients with primary amputation were excluded. The use of adjunctive antiplatelet (Aspirin) therapy postoperatively was at the discretion of the treating physician. The primary outcome measure was the incidence of 30-day graft patency. Additional limb-specific outcomes were also collected.

RESULTS: 472 patients were identified; 54% (n=255) received postoperative antiplatelet therapy. There was no difference in age, gender, race, injury severity score, mechanism of injury or pre-hospital
tourniquet use between groups. Patients who received antiplatelet therapy were more likely to have lower versus upper extremity injuries (61.6% vs 41%, P<0.0001), have an ischemic versus hemorrhagic presentation (40.4% vs 24.4%, P=0.0002), have a concomitant venous injury (44.3% vs. 33.2%, P=0.01), have an arterial repair versus ligation (92.2% vs 44.7%, P<0.0001) or required concomitant fasciotomies (47.4% vs 28.1%, P<0.0001). There was no difference in 30-day limb loss rate (3.9% vs 3.7%, P=.9) or graft thrombosis (3.6 vs 3.2%, P=0.8) between patients who received antiplatelet therapy and who did not. The use of antiplatelet therapy was associated with an increased incidence of postoperative hematoma requiring re-exploration (4.7% vs 1.4%, P=0.04). In the subgroup analysis of patients who underwent arterial repair instead of ligation (n=332), aspirin was given to 70.8% (n=235) of patients. Similar to the overall cohort, there was no difference in 30-day limb loss (3.4% vs 6.2%, P=0.25) or graft thrombosis (6% vs 6.2%, P=0.93) between patients who received antiplatelet therapy versus those who did not. At last follow up, 50% of patients remained on antiplatelet therapy.

CONCLUSIONS: The use of adjunctive antiplatelet therapy did not improve early limb- or graft-related outcomes after operative repair of traumatic arterial injuries of the extremities. In the absence of available prospective data, aspirin should be used selectively following such repairs.

#36 - Trauma First Responder Course Impact on Layperson Knowledge in Santa Cruz, Bolivia

**EK Ludi, AC Reitz, M Jackson, G Moraes, P Peñaranda, LL Quiroga, EF Gutierrez, M Swaroop**

**Introduction:** Injuries significantly contribute to the global burden of death and disability. Prehospital trauma systems incorporating trained layperson responders can significantly reduce mortality. We hypothesized that attending the Trauma Responders Unify to Empower the Community (TRUE-Bolivia) course would improve participants’ confidence in their ability to assist trauma victims and their first responder skills knowledge.

**Methods:** TRUE-Bolivia is a four-hour didactic and practical course teaching basic airway management, bleeding control, and safe handling in minimal-resource environments. A baseline demographic survey, 9-question pre- and post-course knowledge assessment, and a post-course evaluation were distributed. Statistical analysis was performed with SAS v9.4.

**Results:** Twenty-two TRUE-Bolivia courses were taught in Santa Cruz from November 2018 through October 31, 2019, with a total of 329 participants completing the entire course. Average age of participants was 35.9 years (n=304), and 79% were male (n=257/327). Mean confidence in first responder abilities on a five-point Likert scale increased from 2.9 pre-course to 4.2 post-course (t-Test: p < 0.01), and mean percentage correct on the knowledge assessment increased from 33.0% to 68.0% (t-Test: p < 0.01). On 6-12-month follow-up, knowledge and confidence remained high with the majority of respondents reporting witnessing a traumatic event and providing some form of first aid.

**Conclusions:** Participants confidence and knowledge improved after attending the TRUE-Bolivia course and was retained long-term. Courses, such as this one, prepare laypeople to respond to emergency events and can empower them to get involved at the scene.
**Clinical Sciences**

#11 - Did Medicaid Expansion Mitigate Disparities in Post-Mastectomy Reconstruction Rates?

*A Goldenberg, L Willcox, D Abolghasemi, R Jiang, Z Wei, C Arciero, M Yanagisawa, PD Subhedar*

**Introduction:** Patient and socioeconomic factors both contribute to disparities in post-mastectomy reconstruction (PMR) rates. We sought to explore PMR patterns across the US and to determine if PMR rates were associated with Medicaid expansion.

**Methods:** The NCDB was used to identify women who underwent PMR between 2004-2016. The data was stratified by race, state Medicaid expansion status, and region. A multivariate model was fit to determine the association between Medicaid expansion and receipt of PMR.

**Results:** In comparison to Caucasian women receiving PMR in Medicaid expansion states, African American (AA) women in Medicaid expansion states were less likely to receive PMR (OR 0.96 [0.92-1.00] p<0.001). Patients in the Northeast (NE) had better PMR rates vs any other region in the US, for both Caucasian and AA women [Caucasian NE ref, Caucasian South 0.80 (0.77-0.83) vs AA NE 1.11 (1.04-1.19), AA South (0.60 (0.58-0.63), p<0.001]. Interestingly, AA patients residing in the NE had the highest receipt of PMR 1.11 (1.04-1.19), even higher than their Caucasian counterparts residing in the same region (ref). Rural AA women had the lower rates of PMR vs rural Caucasian women [0.40 (0.28-0.58) vs 0.79 (0.73-0.85), p<0.001].

**Discussion:** Racial disparities in PMR rates persisted despite Medicaid expansion. When stratified by region, however, AA patients in the NE had higher rates of PMR than AA women in other regions. The largest disparities were seen in AA in the rural US. Breast cancer disparities continue to be a complex problem that was not entirely mitigated by improved insurance coverage.

**See next page for common reference table**
### Table 4: Common Reference Table: Factors Associated with Receipt of Reconstruction Stratified by Race

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<th>Covariate</th>
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<th>African American</th>
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<td>184 (34.6)</td>
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#27 – Trauma Admission Rates in Metro Atlanta following the Killing of George Floyd: An Interrupted Time Series Analysis

AN Mora, CN Morrison, J Beard, RN Smith

**Introduction:** Considering potential stressors from the COVID-19 pandemic and increased awareness of racial injustice and police brutality, we were interested in whether these events impacted trauma hospital admission rates compared to rates from the preceding 4.5 years.

**Methods:** We conducted an interrupted time series analysis for trauma admissions due to assault between January 1, 2016 and October 29, 2020 at Grady Memorial Hospital. The interruption variables of interest were the start of COVID-19 lockdown in Atlanta and the killing of George Floyd. We assessed temporal associations using Poisson regression.

**Results:** There were a total of 5,811 emergency department admissions for assault during the study period (252 weeks). The 229 weeks prior to the George Floyd killing had a mean 22.0 admissions per week (SD = 6.0), and in the 23 weeks after the protests there was a mean of 33.2 admissions per week (SD = 5.8). The pandemic lockdown was not associated with a change in admissions (incidence rate ratio [IRR] = 0.93; 95%CI: 0.80, 1.08), but the protests were significantly associated with a 40% increase in admission counts per week (IRR = 1.40; 95%CI: 1.20, 1.64) (Figure 1).

**Conclusion:** In the five months following the killing of George Floyd, there was a mean increase of 11.2 trauma admissions per week compared to historical rates. Further studies are warranted to assess the length of time until regression to the mean historical admission rate and to determine potential reasons for this increase, such as assessing neighborhood-level stress and other contextual factors.

![Figure 1. Observed trauma assault admissions per week (grey line) between January 1, 2016, and October 29, 2020 (n = 252 weeks) and fitted Poisson regression (red line). First dotted line is start of COVID-19 lockdown (March 16, 2020) and the second dotted line is George Floyd’s death (May 25, 2020).](image-url)
#29 – Ultra Massive Blood Product Transfusion: Using Machine Learning, Could We Model a Cut Off?

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**Objectives:** The primary objective was to determine if machine learning can assist in finding a point at which it becomes futile to transfuse blood products after a patient has already received 20 units of packed Red Blood cells (pRBC’s) or Whole Blood (WB).

**Methods:** This was a retrospective chart review of patients admitted to the only level 1 Trauma Center in Atlanta, GA from May 2018 to May 2020 who received greater than 20 units pRBC’s or WB within a 24-hour period (n=104). A predictive model was created using Machine Learning (ML) with Multiple Regression with Lasso and Logistic Regression to predict the primary endpoint of All-Cause Mortality, and the secondary endpoints of Hours of Survival Post Transfusion, Hospital Length of Stay (LOS), ICU LOS and Days of Mechanical Ventilation. P < 0.5 and R² > 0.6 was considered significant. After the model was created, an interactive user interface was designed to input individual patient data to predict Mortality.

**Results:** Among the 14 variables considered, the results were consistent with other studies showing that no independent variable was consistent with the primary or secondary outcome markers. Next, we modeled our outcomes using all 14 variables to determine a relationship. For all-cause mortality, the logistic regression accuracy score ranged from 0.809 to 0.857 (Figure 1). When modeling the Hours Survival Post Transfusion, Hospital LOS, ICU LOS, and Days of Mechanical Ventilation, R² values were 0.54, 0.62, 0.54 and 0.59. According to Kaplan-Meier analysis and Hours of Survival, the majority of patients who ultimately passed, passed within 3 hours of transfusion initiation.

**Conclusion:** In conclusion, despite the small cohort size used to train the models, ML based techniques remain promising as a model for guiding the cessation of treatment among this studied population as Mortality was predicted with high accuracy and an interactive user interface was developed. As trauma databases increase in size, greater ML based techniques such as Neural Networks can be employed to guide treatment.

![Product-Limit Survival Estimates](image-url)

Figure 1. Kaplan Meier Analysis showing decrease in survival probability over time. Notice the change in slope after initial 2 hours after transfusion.
#31 – In Vitro System to Detect Alloreactive CD8+ T Cells in Transplant Recipients

**AB Morris, E Peek, A Hadley, CP Larsen**

**Introduction**

T cell-mediated rejection is a significant factor that leads to graft damage and loss in transplant recipients; however, prediction of alloreactive T cells remains elusive due to the intricate interaction of the recipient T cell receptor and donor peptide-MHC complex. To understand the phenotype and function of alloreactive T cells in humans, we developed an in vitro system to detect HLA-A2-alloreactive CD8+ T cells using K562 cells that express the HLA Class I molecule HLA-A2:01 and the costimulatory molecule CD86.

**Methods and Results**

Using these K562-A2+ cells, we find that HLA-A2-negative individuals harbor a mean precursor frequency of 1.53% (n=5) of alloreactive T cells against HLA-A2-expressing K562 cells. Furthermore, alloreactive HLA-A2-specific CD8+ T cells exhibited a ~30-fold expansion in culture, indicating robust divisional capacity. Monoclonal antibody treatment blocking HLA-A2 (clone BB7.2) completely abrogated proliferation of CD8+ T cells in HLA-A2 negative individuals (25% divided vs 2%), confirming HLA-A2 allospecificity. In addition, T cell proliferation depended on costimulation through CD28 via CD86 ligation, as therapeutic blockade with anti-CD86 completely abrogated proliferation in HLA-A2 negative individuals (1% divided).

**Conclusions**

Based on these data, we hypothesize that use of this in vitro system will allow for the detection and expansion of alloreactive T cells in transplant recipients. Further work elucidating the peptides presented by these K562-A2+ cells will contribute to novel tools that will aide our understanding of the presence, phenotype, and function of alloreactive T cells in transplant recipients.
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