Surgery Research Conference

2017-2018 Surgery Research Residents Update
June 13, 2018
Research Highlights
2018 MCWAH Research and Quality Award Winners

Nicholas G. Berger, MD

Overall survival after resection of retroperitoneal sarcoma at academic cancer centers versus community cancer centers: An analysis of the National Cancer Data Base

12th Annual Academic Surgical Congress & Surgery

Joseph Helm, MD

Perioperative Blood Transfusions Increase Risk of Surgical Site Infection Development in Ventral Hernia Repairs

International Hernia Congress - America’s Hernia Society
American Association for the Surgery of Trauma

77th Annual Meeting 2018
9/26/18-9/29/18

Abstract Acceptance Notice

Congratulations to:

Savo Bou Zein Eddine, MD
Kelly Boyle, MD
Pam Walsh
Amber Brandolino
Manpreet Bedi, MD
awarded the
Sharon K. Wadina Chair in
Sarcoma Research
Christopher S. Davis, MD, MPH

Assistant Professor
Division of Trauma and Acute Care Surgery

Recipient of the 2018
Milwaukee Academy of Medicine Award
for Excellence in Teaching

This award is given by the Academy and graduating MCW seniors to a physician who distinguishes themselves through exemplary teaching and serves as a role model.
Funding Announcements

Contributions of epithelial-mesenchymal transition (EMT) to promote the metastasis of estrogen receptor-positive breast cancer

Qing Miao, PhD
MCW Cancer Center & WI Breast Cancer Showhouse

Evaluation of Rectal Cancer Response to Neoadjuvant Chemoradiation by 7T MRI

Timothy Ridolfi, MD
MCW Digestive Disease Center
Publications

**Pediatric Surgery**
“National Practice Patterns for Prenatal Monitoring in Gastroschisis: Gastroschisis Outcomes of Delivery (GOOD) Provider Survey.”

**Fetal Diagnosis & Therapy**

“Delivery of small interfering RNA against Nogo-B receptor via tumor-acidity responsive nanoparticles for tumor vessel normalization and metastasis suppression.”

**Biomaterials** (Wang B, Ding Y, Zhao X, Han X, Yang N, Zhang Y, Zhao Y, Zhao X, Taleb M, Miao QR, Nie G)

Factors Known to Influence the Development of Necrotizing Enterocolitis to Modify Expression and Activity of Intestinal Alkaline Phosphatase in a Newborn Neonatal Rat Model.

**European Journal of Pediatric Surgery**
(Rentea RM, Rentea MJ, Biesterveld B, Liedel JL, Gourlay DM)

**General Surgery**
“Perioperative bleeding and blood transfusion are major risk factors for venous thromboembolism following bariatric surgery.”


**Research**
“Co-occurrence of a maternally inherited DNMT3A duplication and a paternally inherited pathogenic variant in EZH2 in a child with growth retardation and severe short stature: atypical Weaver syndrome or evidence of a DNMT3A dosage effect?”


“Distinct epigenetic landscapes underlie the pathobiology of pancreatic cancer subtypes.”


**Transplant & Cardiothoracic Surgery**
“Central ECMO for circulatory failure following pediatric liver transplantation.”

*Perfusion* (Scott JP, Hong JC, Thompson NE, Woods RK, Huffman GM)

**Transplant Surgery**
Donating Another Person's Kidney: Avoiding the Discard of Organs by Retransplantation.

**Transplantation** (Veale J, Lum EL, Cowan NG, Wong M, Skovira K, Armijo M, Danovitch G, Mone T)
Publications

May

**Cardiothoracic Surgery**

“Dissolution is not the solution.” *Journal of Thoracic & Cardiovascular Surgery* (Hossein, AG)

**Pediatric Congenital Cardiac Surgery**


**Surgical Oncology**
“Gallbladder carcinoma: An analysis of the national cancer data base to examine Hispanic influence.” *Journal of Surgical Oncology* (Liu C, Berger NG, Rein L, Tarima S, Clarke C, Mogal H, Christians KK, Tsai S, Gamblin TC)


“Antiproliferative and apoptotic effect of LY2090314, a GSK-3 inhibitor, in neuroblastoma in vitro.” *BMC Cancer* (Kunnimalaiyaan S, Schwartz VK, Jackson IA, Clark Gamblin T, & Kunnimalaiyaan M)

**Vascular Surgery**
Infectious disease experts and patients discuss the diagnosis and treatment of Lyme Disease. The show will also feature the stories of two grateful patients who were willing to share their stories.

Dr. John Fangman
Dr. Joyce Sanchez
Dr. Michael Kron
Jenifer Coburn, PhD
Next Month:

Trauma Surgery Research Update

Terri A. deRoon Cassini, PhD
Marc Anthony De Moya, MD

Wednesday, July 11
5:00-6:00 pm
Location: Cancer Center Conference Room M
Next Month:

Trauma Surgery Research Update

Wednesday, July 11
5:00-6:00 pm
Location: Cancer Center Conference Room M

Terri A. deRoon Cassini, PhD
Marc Anthony De Moya, MD
Surgery Research Conference

Division of Trauma and Acute Care Surgery, Medical College of Wisconsin

Kelly A. Boyle MD
Marc A. De Moya MD
Vascular and Trauma Surgical Specialists Have Equivalent Outcomes with Management of Traumatic Peripheral Vascular Injuries

Division of Trauma and Acute Care Surgery, Medical College of Wisconsin

Kelly A. Boyle MD, Savo Bou Zein Eddine MD, Thomas W. Carver MD, David J. Milia MD, Jeremy S. Juern MD, Rachel S. Morris MD, Lewis B. Somberg MD, Jacob R. Peschman MD, Terri deRoon-Cassini PhD, Marc A. De Moya MD
Introduction

- Incidence of extremity vascular injury ~1-2%
- Significant morbidity and mortality
- Managed by several surgical specialties
- Shackford et al, 2013
  - No difference in limb salvage or graft patency
  - 69.9% general surgeons, 30.1% subspecialty
- He et al, 2015
  - No difference in outcomes
  - 40% trauma surgeons, 37% vascular surgeons
Hypothesis

In patients with extremity vascular trauma, there are equivalent surgical outcomes regardless of surgical specialty performing the vascular repair.
Results

75 patients

- 35 (46.7%) Trauma
- 23 (30.7%) Vascular
- 12 (16.0%) Trauma & Vascular
- 5 (6.6%) Other
## Results

<table>
<thead>
<tr>
<th>Injury Type</th>
<th>Trauma Surgeon N = 35</th>
<th>Vascular Surgeon N = 35</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Popliteal Artery Included</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injury Type</td>
<td>4 (11.4%) Blunt 3 upper extremity 1 lower extremity</td>
<td>13 (37.1%) Blunt 2 upper extremity 11 lower extremity</td>
<td>0.003</td>
</tr>
<tr>
<td></td>
<td>31 (88.6%) Penetrating 5 upper extremity 26 lower extremity</td>
<td>22 (62.9%) Penetrating 6 upper extremity 16 lower extremity</td>
<td></td>
</tr>
<tr>
<td>Popliteal artery injury</td>
<td>0 (0%)</td>
<td>19 (54.3%)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>
# Results

## Popliteal Artery Excluded

<table>
<thead>
<tr>
<th></th>
<th>Trauma Surgeon N = 35</th>
<th>Vascular Surgeon N = 16</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Injury type</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 (11.4%) Blunt</td>
<td>4 (25%) Blunt</td>
<td>NS</td>
</tr>
<tr>
<td></td>
<td>31 (88.6%) Penetrating</td>
<td>12 (75%) Penetrating</td>
<td></td>
</tr>
<tr>
<td>ISS &lt;16</td>
<td>27 (77.1%)</td>
<td>11 (68.8%)</td>
<td>NS</td>
</tr>
<tr>
<td>ISS ≥ 16</td>
<td>8 (22.9%)</td>
<td>5 (31.3%)</td>
<td></td>
</tr>
<tr>
<td>Fasciotomy</td>
<td>14 (40.0%)</td>
<td>7 (43.8%)</td>
<td>NS</td>
</tr>
<tr>
<td>Time to OR</td>
<td>21 (IQR 17 – 36)</td>
<td>69 (IQR 26 – 247)</td>
<td>0.026</td>
</tr>
<tr>
<td>OR duration</td>
<td>231 (IQR 159 – 272)</td>
<td>251 (IQR 194 – 343)</td>
<td>NS</td>
</tr>
</tbody>
</table>
## Results

### Popliteal Artery Excluded

<table>
<thead>
<tr>
<th>Type of repair</th>
<th>Trauma Surgeon N = 35</th>
<th>Vascular Surgeon N = 16</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>19 (51.4%) primary repair</td>
<td>6 (37.5%) primary repair</td>
<td>NS</td>
</tr>
<tr>
<td></td>
<td>8 (21.6%) PTFE</td>
<td>2 (12.5%) PTFE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7 (18.9%) saphenous vein</td>
<td>8 (50%) saphenous vein</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 (2.7%) bovine patch</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Systemic heparin                        | 20 (57.1%)            | 14 (87.5%)             | 0.033   |

| Vascular re-intervention                | In-hospital 30 day 1 year | 1 (2.9%)          | In-hospital 30 day 1 year | 1 (6.3%)          | NS     |
|                                         | 0                      | 1 (2.9%)           | 0                      | 0                 |

| Hospital LOS Median minutes             | 4 (IQR 2 – 7)           | 6.5 (IQR 3.25 – 14.75) | 0.024   |
Conclusion

There are no significant clinical outcome differences between Trauma & Vascular surgical specialists for open peripheral vascular repairs.
Surgery Resident Skill Retention after Focused Assessment with Sonography in Trauma (FAST) Training

Division of Trauma and Acute Care Surgery, Medical College of Wisconsin

Kelly A. Boyle MD, Amber Brandolino BA, Philip N. Redlich MD, PhD, Michael J. Malinowski MD, Robert W. Treat PhD, Thomas W. Carver MD
Methods

- PGY 1 & PGY 2 surgery residents
- Assessed Pre-/Post-training, 1 month, 3 months
- Survey
  - Previous experience, confidence, interim
- Written Assessment (21 questions – 2 versions)
  - US basics or image adjustment (7)
  - Image interpretation (10)
  - FAST specific questions (4)
Methods

• Quality of Ultrasound Images and Competence (QUICk) score
  • Global Rating Scale (GRS)
  • Task Specific Checklist (TSC)

• Image review
  • Video recorded learner’s performance (GRS)
  • Image clips saved of each FAST area (TSC)

• 2 reviewers scored performance retrospectively
Results

- 19 surgery residents
  - 12 PGY 1
  - 7 PGY 2
- 36.8% previous FAST training
- 100% completed 3 months
- No differences noted for year of training
- Previous FAST experience & confidence had no correlation with performance
Conclusion

• At 1 month FAST performance declines (but stabilizes)
  • Knowledge decay is slower
• Massed training does not lead to long term retention

What is the best way to provide FAST education?
Stay Tuned...

- Thoracic Irrigation: AAST MIT
- Quality of Life after Rib Fractures: Ketamine RCT patients
- Vital Capacity as a Predictor of Outcomes in Rib Fracture Patients
- Haemonetics TEG Validation
- Penetrating Torso Trauma: Role of CT Scan
- Management of Zone 2 Retroperitoneal Penetrating Trauma
- Defining Clinically Significant Reduction in Oral Morphine Equivalents
- Redefining the Role of “The Box”
- Review of Spinal Cord Injury MAP Goals
- Trauma / ACS job hours: Structured National Interview
- Pigtail TT vs Large Bore TT RCT
- 35 mm Rule for Observing Pneumothoraces
- Percent Change from Pre-injury BP is an Independent Predictor of Mortality in Elderly Trauma Patients
- Predictors of Fasciotomy Post-Revascularization
- Review of the Management of Traumatic Bile Leaks
- Operation vs Observation for Anterior Abdominal Stab Wounds
- Tracheostomy Pressure Ulcers: Pre / Post Change in Management
- Wound Closure after Abdominal Trauma
- EAST MIT Appendicitis
Thank You!

• Division of Trauma & Acute Care Surgery
  • Marc de Moya, MD
  • Thomas Carver, MD
  • David Milia, MD
  • Rachel Morris, MD
  • Terri deRoon-Cassini, PhD
  • Colleen Trevino, MSN, FNP, PhD
  • Pam Walsh
  • Amber Brandolino
  • Savo Bou Zein Eddine, MD
Mentor: Dr. Jon Gould

Research Projects

- Readmission Timing
- Paraesophageal Hernia Repair Outcomes
- Postdischarge VTEs after Bariatric Surgery
Very Early vs. Early Readmissions in General and Vascular Surgery Patients
Very Early vs. Early Readmissions in General and Vascular Surgery Patients

- Readmissions
- Quality metric
  - 2012 Hospital Readmission Reduction program
- Hospital Rankings
- FMLH: 72 hour interest
Hypothesis

Very early readmissions (0-3 days after discharge) have a different cause than early readmissions (4-30 days after discharge)
METHODS

- NSQIP 2014-2015
- Prior to discharge variables
- Stepwise logistic regression
- Multinominal Logistic Regression
- Relative Odds-Ratio
RESULTS

All patients 842,316

No readmission 788,208 93.6%

30 day readmission 54,108 6.4%

Readmission 0-3 days 13,360 24.7%

Readmission 4-30 days 40,748 75.3%
Number of readmissions by day

- X-axis: Post discharge day
- Y-axis: Number of patients
### RESULTS – any 30 day readmission

<table>
<thead>
<tr>
<th>ANY READMISSION</th>
<th>Odds Ratio (95% Confidence Interval)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgical Specialty (Vascular)</td>
<td>1.14 (1.10-1.17)</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>Sex (male)</td>
<td>1.02 (1.00-1.04)</td>
<td>0.1155</td>
</tr>
<tr>
<td>Comorbidities, 3 or more</td>
<td>1.49 (1.45-1.52)</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>Inpatient surgery</td>
<td>1.53 (1.48-1.58)</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>Operative time &gt; 60 minutes</td>
<td>1.27 (1.24-1.30)</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>Postoperative Length of Stay: 3-7 days</td>
<td>1.81 (1.77-1.86)</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>Postoperative Length of Stay: 8-30 days</td>
<td>1.99 (1.93-2.06)</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>ASA 3-5</td>
<td>1.45 (1.42-1.49)</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>Wound Class 2- Clean Contaminated</td>
<td>1.15 (1.12-1.18)</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>Wound Class 3- Contaminated</td>
<td>1.18 (1.14-1.23)</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>Wound Class 4- Dirty/infected</td>
<td>1.19 (1.15-1.24)</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>Severe complication prior to discharge</td>
<td>0.98 (0.94-1.02)</td>
<td>0.2598</td>
</tr>
</tbody>
</table>

*p < 0.0001
## RESULTS - very early readmission

<table>
<thead>
<tr>
<th></th>
<th>Odds Ratio (95% Confidence Interval)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex (male)</td>
<td>1.128 (1.083-1.175)</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>Comorbidities, 3 or more</td>
<td>0.905 (0.858-0.954)</td>
<td>0.0002*</td>
</tr>
<tr>
<td>Surgical Specialty - Vascular</td>
<td>0.764 (0.713-0.819)</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>Operative time &gt; 60 minutes</td>
<td>1.108 (1.051-1.168)</td>
<td>0.0001*</td>
</tr>
<tr>
<td>Postoperative Length of Stay: 3-7 days</td>
<td>0.845 (0.799-0.893)</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>ASA 3-5</td>
<td>0.895 (0.851-0.941)</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>Wound Class 2- Clean Contaminated</td>
<td>1.241 (1.173-1.313)</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>Wound Class 3- Contaminated</td>
<td>1.271 (1.179-1.370)</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>Severe Complication prior to Discharge</td>
<td>1.414 (1.299-1.540)</td>
<td>&lt;0.0001*</td>
</tr>
</tbody>
</table>

*p < 0.001
Nearly 1 in 4 readmissions is within 3 days of discharge.

Serious complication during index admission is most significant risk factor for very early readmission.
- 40% increase risk

Quality Improvement
- Transition of Care
- High Risk Patients
The Impact of Preoperative Anemia and Malnutrition on Outcomes in Paraesophageal Hernia Repair
The Impact of Preoperative Anemia and Malnutrition on Outcomes in Paraesophageal Hernia Repair

- Complications
  - Hypoalbuminemia
    - Diet modification → weight loss
  - Anemia
    - 9-15% incidence
    - Cameron lesions

- Impact in other surgeries
The Impact of Preoperative Anemia and Malnutrition on Outcomes in Paraesophageal Hernia Repair

- NSQIP database 2011-2015
  - Laparoscopic
  - Open
  - Thoracic
  - Thoracoabdominal

- Anemia
  - Preoperative hematocrit
    - <36% females
    - <39% males

- Malnutrition
  - Preoperative albumin
    - <3.5 g/dL
RESULTS

Anemia
- 13,139 patients
- 23.1% anemia

Malnutrition
- 7,943 patients
- 13.9% hypoalbuminemia

Both Anemia and Malnutrition
- 6,102 patients
- 4.5% both anemia and hypoalbuminemia

MCW SURGERY
knowledge changing life
The Impact of Preoperative Anemia and Malnutrition on Outcomes in Paraesophageal Hernia Repair

**Figure 1: Morbidity and mortality in setting of anemia**

- Urinary Tract Infection
- Venous Thromboembolism
- Myocardial Infarction
- Pneumonia
- Reoperation
- Readmission
- Mortality

* p<0.05
The Impact of Preoperative Anemia and Malnutrition on Outcomes in Paraesophageal Hernia Repair

Figure 2: Morbidity and mortality in setting of malnutrition

- Surgical Site Infection
- Urinary Tract Infection
- Venous Thromboembolism
- Myocardial Infarction
- Acute Kidney Injury
- Pneumonia
- Reoperation
- Readmission
- Mortality

* $p < 0.05$
The Impact of Preoperative Anemia and Malnutrition on Outcomes in Paraesophageal Hernia Repair

Figure 3: Morbidity and mortality in setting of anemia and malnutrition

- Surgical Site Infection
- Urinary Tract Infection
- Venous Thromboembolism
- Myocardial Infarction
- Acute Kidney Injury
- Pneumonia
- Reoperation
- Readmission
- Mortality

* p<0.05
RESULTS

Postoperative Length of Stay

- Anemic: 4.1 days
- Not anemic: 2.8 days
  - p < 0.0001

- Malnourished: 6.1 days
- Not malnourished: 3.1 days
  - p < 0.0001

- Anemic and Malnourished: 6.7 days
- Neither: 3.0 days
  - p < 0.0001
The Impact of Preoperative Anemia and Malnutrition on Outcomes in Paraesophageal Hernia Repair

- Anemia and hypoalbuminemia associated with increased morbidity, mortality, length of stay
- Target nutritional deficits to optimize patient outcomes
- Realistic expectations regarding risk of repair during preoperative education
Practice Patterns Regarding Extended Chemoprophylaxis for Venous Thromboembolism following Bariatric Surgery in the United States
Practice Patterns Regarding Extended Chemoprophylaxis for Venous Thromboembolism following Bariatric Surgery in the United States

- No consensus regarding optimal VTE prevention after bariatric surgery
- High risk patients
  - Extended chemoprophylaxis recommended
  - Little supporting data
Practice Patterns Regarding Extended Chemoprophylaxis for Venous Thromboembolism following Bariatric Surgery in the United States

- Truven Health MarketScan Research database
  - Insurance database
  - Encounters
- Laparoscopic sleeve gastrectomy or Roux-En-Y gastric bypass
- 90 days postoperative

- Logistic regression
  - Impact of anticoagulation administration on VTE
- State variation
Practice Patterns Regarding Extended Chemoprophylaxis for Venous Thromboembolism following Bariatric Surgery in the United States

- N = 104,421
- Outpatient chemoprophylaxis 11.3%
  - Enoxaparin 88%
- VTE after discharge 1.3%
  - Majority within one month
  - 29% within first week of discharge
## Practice Patterns Regarding Extended Chemoprophylaxis for Venous Thromboembolism following Bariatric Surgery in the United States

<table>
<thead>
<tr>
<th>Condition</th>
<th>Odds Ratio</th>
<th>95% Confidence Interval</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outpatient anticoagulation</td>
<td>2.05</td>
<td>1.80-2.34</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>IVC filter placement</td>
<td>15.61</td>
<td>7.62-32.01</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Hypercoagulable disorder</td>
<td>13.64</td>
<td>11.26-16.53</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Age ≥ 60</td>
<td>2.25</td>
<td>1.73-2.92</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Female sex</td>
<td>0.76</td>
<td>0.68-0.86</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Injectable anticoagulation during admission</td>
<td>0.69</td>
<td>0.43-1.08</td>
<td>0.107</td>
</tr>
<tr>
<td>Metabolic syndrome</td>
<td>1.05</td>
<td>0.77-1.42</td>
<td>0.770</td>
</tr>
</tbody>
</table>

*p < 0.05
Practice Patterns Regarding Extended Chemoprophylaxis for Venous Thromboembolism following Bariatric Surgery in the United States

- Practice patterns by state
  - Significant variability
- Outpatient chemoprophylaxis
  - 0.49%-37.42%
- VTE rates
  - 0.39%-2.46%
Thank you

- Dr. Gould
- Department of Surgery
- Quality Department
- Committee members
  - Quality Minute
  - Rothman Index
  - Discharge When Medically Ready
  - FMLH Safety & Adverse Events Committee
  - Accountable Care Teams
Surgery Research Conference

Jacqueline Blank MD
Research Projects, 2016-2018

- 7T MR imaging of rectal cancer
- Auricular Neurostimulation for Postoperative Pain Control
  - Froedtert Hospital & VAMC
- Young Patients with Rectal Cancer and Correlation with BMI
  - MARCH Consortium
  - SHOW Database
- IV Acetaminophen Meta-Analysis
- Induction Chemotherapy in Rectal Cancer
- 5HT in Low Anterior Resection Syndrome
- LifeBond
- Iatrogenic Aortic Graft Infections
- Spinal Cord Injury Unit research (VA)
- Medical student projects:
  - Rates of Postoperative Urinary Retention after Hyperbaric Spinal Anesthesia
  - Management of Horseshoe Abscesses
  - Predictors of Anal Condyloma Burden in HPV
  - Imaging Characteristics of Patients with Ulcerative Colitis
  - Rates of Hand-assisted Laparoscopic Surgery
  - Retroileal Routing of Colorectal Anastomoses
- Medical student teaching opportunities:
  - Clerkship Orientation
  - Suture Clinic
  - Professor Rounds
Initial Experience with 7T MR Imaging of Rectal Cancer: A Promising Technology for Superior Staging

Jacqueline Blank MD,1 Nicholas Berger MD,1 Paul Knechtges MD,2 Robert Prost PhD,2 Carrie Peterson MD MS,1 Kirk Ludwig MD,1 Timothy Ridolfi MD1

1. Division of Colorectal Surgery, Medical College of Wisconsin
2. Department of Radiology, Medical College of Wisconsin
Introduction

Stage II-III → ChemoRT → 7T MRI

Signal = $\sqrt{\Delta T}$

increase in spatial resolution:
152% over 3T
216% over 1.5T

10-30% Complete Response - Observe

Surgery
Methods

- Phase 1: 7T Imaging of excised rectal specimens
  - Feasibility
  - Identify ideal 7T sequences
  - Radiologist interpretation of T, N status compared to pathology

- Phase 2: Identify ideal 3T sequences for comparison to 7T MRI

- Phase 3: 7T MR imaging
7T MRI
Conclusions

- Minimal discrepancy between 7T MRI radiologic interpretation and post-neoadjuvant chemoradiation pathologic interpretation

- 7T MRI holds promise in accurately staging post-treatment rectal cancer and possibly predicting response to neoadjuvant therapy
Auricular Neurostimulation for Non-Pharmacologic Post-Operative Pain Control: A Randomized Controlled Trial

Jacqueline J Blank MD,1 Ying Liu PhD,2 Ziyan Yin MS,2 Christina M Spofford MD PhD,3 Timothy J Ridolfi MD,1 Kirk A Ludwig MD,1 Mary F Otterson MD MS,1 Carrie Y Peterson MD MS1

1. Division of Colorectal Surgery, Medical College of Wisconsin
2. Division of Biostatistics, Medical College of Wisconsin
3. Department of Anesthesiology, Medical College of Wisconsin
Introduction

• Opioids are the cornerstone for postoperative pain control
  • Adverse effects:
    • Distension
    • Ileus
    • Constipation
    • Hallucinations
    • Nausea
    • Bladder dysfunction
    • Addictive potential
    • Decreased respiratory drive

• Up to 10% of previously opioid-naïve patients may become dependent on opioids after colorectal surgery

• The United States has seen an alarming increase in the illicit use of opioid medications
  • 2015: over 33,000 deaths due to opioid overdoses
Introduction
Introduction
Introduction

CNs V, VII, IX, X

Nucleus Tractus Solitarius

Periaqueductal gray
- Aversive behavior
- Cardiovascular changes
- Micturition
- Antinociceptive modulation

Hypothalamus
- Feeding
- Reproduction
- Stress response

Amygdala
- Sensory input
- Physical and emotional comfort
Hypothesis

- The use of the BRIDGE device, a percutaneous electrical nerve field stimulator, will cause decreased narcotic consumption
Methods

• Double-blind, placebo-controlled randomized trial
  • ClinicalTrials.gov: NCT02892513

• Inclusion criteria:
  • Patients ≥ 18 years
  • Froedtert Hospital & Zablocki VAMC
  • Elective bowel resection
    • Laparoscopic, open
    • Small bowel, colon

• Exclusion criteria:
  • History of narcotic abuse
  • Emergent procedures, ICU admission, prolonged intubation
  • History of seizures, CVA, cerebral aneurysms
  • Presence of implanted on-demand device
Methods

• Active and inactive devices randomized by manufacturer

• Device placed preoperatively, remained for 5 days

• Primary outcome:
  • Total inpatient narcotic consumption

• Secondary outcomes:
  • VAS scores, anxiety scores, nausea, return of bowel function, hospital length of stay, complications, readmissions, narcotic use at 2 weeks and 30 days
  • Blood and saliva samples BID
Results

209 Assessed for eligibility

156 Excluded
- Not meeting inclusion criteria
- Refused to participate
- Other reasons (patient factors)

53 Randomized

28 Assigned to receive active device
  28 Received active device as assigned
  0 Did not receive active device

0 Lost to follow up
5 Discontinued intervention
  2 Intractable nausea
  3 patient request

28 Included in analysis
  0 Excluded from analysis

25 Assigned to receive sham device
  24 Received sham device as assigned
  1 Device removed

0 Lost to follow up
6 Discontinued intervention
  3 Intractable nausea
  3 patient request

24 Included in analysis
  1 Excluded from analysis
## Results – baseline characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>All patients N=52</th>
<th>Active device N=28</th>
<th>Inactive device N=24</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td>58.6 ± 11.7</td>
<td>56.0 ± 11.5</td>
<td>61.5 ± 11.5</td>
<td>0.095</td>
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<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Male</td>
<td>30 (55.8%)</td>
<td>14 (50%)</td>
<td>15 (62.5%)</td>
<td>0.366</td>
</tr>
<tr>
<td>Female</td>
<td>23 (44.2%)</td>
<td>14 (50%)</td>
<td>9 (37.5%)</td>
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</tr>
<tr>
<td><strong>BMI</strong></td>
<td>28.9 ± 5.8</td>
<td>29.5 ± 6.6</td>
<td>28.1 ± 4.6</td>
<td>0.415</td>
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<tr>
<td><strong>Indication for surgery</strong></td>
<td></td>
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<tr>
<td>Adenoma</td>
<td>8 (15.4%)</td>
<td>4 (14.3%)</td>
<td>4 (16.7%)</td>
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<tr>
<td>Cancer</td>
<td>21 (40.4%)</td>
<td>13 (46.4%)</td>
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<tr>
<td>Diverticulitis</td>
<td>10 (19.2%)</td>
<td>5 (17.9%)</td>
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<tr>
<td>IBD</td>
<td>7 (13.5%)</td>
<td>5 (17.9%)</td>
<td>2 (8.3%)</td>
<td></td>
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<tr>
<td>Prolapse</td>
<td>1 (1.9%)</td>
<td>0 (0%)</td>
<td>1 (16.7%)</td>
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<tr>
<td>Other</td>
<td>5 (9.6%)</td>
<td>1 (3.6%)</td>
<td>4 (16.7%)</td>
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</tr>
<tr>
<td><strong>Comorbidities</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DM2</td>
<td>5 (9.6%)</td>
<td>2 (7.1%)</td>
<td>3 (12.5%)</td>
<td>0.514</td>
</tr>
<tr>
<td>HTN</td>
<td>23 (44.2%)</td>
<td>12 (42.9%)</td>
<td>11 (45.8%)</td>
<td>0.829</td>
</tr>
<tr>
<td>CAD</td>
<td>1 (1.9%)</td>
<td>0 (0%)</td>
<td>1 (4.2%)</td>
<td>0.275</td>
</tr>
<tr>
<td>Prev cancer</td>
<td>5 (9.62%)</td>
<td>1 (3.6%)</td>
<td>4 (16.7%)</td>
<td>0.110</td>
</tr>
<tr>
<td>Obesity</td>
<td>20 (38.46%)</td>
<td>12 (42.9%)</td>
<td>8 (33.3%)</td>
<td>0.482</td>
</tr>
<tr>
<td>IBD</td>
<td>8 (15.4%)</td>
<td>5 (17.9%)</td>
<td>3 (12.5%)</td>
<td>0.594</td>
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</table>
## Results – baseline characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>All patients N=52</th>
<th>Active device N=28</th>
<th>Inactive device N=24</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Procedure</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ileocectomy</td>
<td>2 (3.8%)</td>
<td>1 (3.6%)</td>
<td>1 (4.2%)</td>
<td>0.884</td>
</tr>
<tr>
<td>SBR</td>
<td>4 (7.7%)</td>
<td>3 (10.7%)</td>
<td>1 (4.2%)</td>
<td></td>
</tr>
<tr>
<td>TAC</td>
<td>2 (3.8%)</td>
<td>1 (3.6%)</td>
<td>1 (4.2%)</td>
<td></td>
</tr>
<tr>
<td>R hemi</td>
<td>13 (25.0%)</td>
<td>7 (25.0%)</td>
<td>6 (25.0%)</td>
<td></td>
</tr>
<tr>
<td>L hemi</td>
<td>4 (7.7%)</td>
<td>3 (10.7%)</td>
<td>1 (4.2%)</td>
<td></td>
</tr>
<tr>
<td>Sigmoid</td>
<td>15 (28.8%)</td>
<td>7 (25.0%)</td>
<td>8 (33.3%)</td>
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<tr>
<td>LAR/APR</td>
<td>8 (15.4%)</td>
<td>3 (10.7%)</td>
<td>5 (20.8%)</td>
<td></td>
</tr>
<tr>
<td>Ext R</td>
<td>3 (5.8%)</td>
<td>2 (7.1%)</td>
<td>1 (4.2%)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>1 (1.9%)</td>
<td>1 (3.6%)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Mode (final)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HAL</td>
<td>37 (71.2%)</td>
<td>22 (78.6%)</td>
<td>15 (62.5%)</td>
<td>0.106</td>
</tr>
<tr>
<td>Open</td>
<td>9 (17.3%)</td>
<td>2 (7.1%)</td>
<td>7 (29.2%)</td>
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<tr>
<td>Robotic</td>
<td>6 (11.5%)</td>
<td>4 (14.3%)</td>
<td>2 (8.3%)</td>
<td></td>
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<tr>
<td><strong>Ostomy</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>13 (25%)</td>
<td>6 (21.43%)</td>
<td>7 (29.17%)</td>
<td>0.5246</td>
</tr>
<tr>
<td>No</td>
<td>39 (75%)</td>
<td>22 (78.57%)</td>
<td>17 (70.83%)</td>
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<tr>
<td><strong>Early termination of device</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>10 (19.2%)</td>
<td>5 (17.9%)</td>
<td>5 (20.8%)</td>
<td>0.786</td>
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## Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>All patients N=52</th>
<th>Active device N=28</th>
<th>Inactive device N=24</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total inpatient narcotic use (OME/ day)</td>
<td>90.56 ± 49.79</td>
<td>90.79 ± 54.93</td>
<td>90.30 ± 43.03</td>
<td>0.9721</td>
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<tr>
<td>Need for opioid reversal</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
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<tr>
<td>Need for RAAPS consult</td>
<td>1 (1.9%)</td>
<td>0</td>
<td>1 (4.2%)</td>
<td>0.275</td>
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<tr>
<td>Return of bowel function (postoperative day)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First flatus</td>
<td>3.2 ± 1.1</td>
<td>3.3 ± 0.9</td>
<td>3.1 ± 1.2</td>
<td>0.482</td>
</tr>
<tr>
<td>First bowel movement</td>
<td>3.3 ± 1.1</td>
<td>3.4 ± 1.0</td>
<td>3.2 ± 1.1</td>
<td>0.436</td>
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</table>
# Results

<table>
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<th>Variable</th>
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<th>Active device N=28</th>
<th>Inactive device N=24</th>
<th>P-value</th>
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</thead>
<tbody>
<tr>
<td>Hospital length of stay (days)</td>
<td>5.0 ± 3.7</td>
<td>4.7 ± 1.8</td>
<td>5.5 ± 5.2</td>
<td>0.662</td>
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<tr>
<td>Complications</td>
<td>7 (13.5%)</td>
<td>3 (10.7%)</td>
<td>4 (16.7%)</td>
<td>0.531</td>
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<tr>
<td>Readmissions (30 days)</td>
<td>3 (5.8%)</td>
<td>2 (7.14%)</td>
<td>1 (4.17%)</td>
<td>0.650</td>
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<tr>
<td>Discharge destination</td>
<td></td>
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<tr>
<td>Home</td>
<td>51 (98.1%)</td>
<td>28 (100%)</td>
<td>23 (95.8%)</td>
<td>0.275</td>
</tr>
<tr>
<td>LTACH</td>
<td>1 (1.9%)</td>
<td>0</td>
<td>1 (4.2%)</td>
<td></td>
</tr>
<tr>
<td>Narcotic use</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 weeks</td>
<td>5 (11.9%)</td>
<td>2 (9.1%)</td>
<td>3 (15.0%)</td>
<td>0.555</td>
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<tr>
<td>30 days</td>
<td>1 (3.3%)</td>
<td>1 (5.9%)</td>
<td>0</td>
<td>0.374</td>
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## Results – subgroup analyses

<table>
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<th>Inactive device</th>
<th>P-value</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>OME/day</td>
<td>N</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>14</td>
<td>98.97 ± 66.19</td>
<td>15</td>
</tr>
<tr>
<td>Female</td>
<td>14</td>
<td>82.60 ± 44.42</td>
<td>9</td>
</tr>
<tr>
<td><strong>BMI</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 20</td>
<td>1</td>
<td>30.2</td>
<td>0</td>
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<tr>
<td>20-25</td>
<td>7</td>
<td>100.98 ± 73.80</td>
<td>4</td>
</tr>
<tr>
<td>25-30</td>
<td>8</td>
<td>100.59 ± 60.19</td>
<td>13</td>
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<tr>
<td>30-35</td>
<td>6</td>
<td>59.65 ± 31.59</td>
<td>5</td>
</tr>
<tr>
<td>&gt;35</td>
<td>6</td>
<td>107.06 ± 42.14</td>
<td>3</td>
</tr>
<tr>
<td><strong>BMI</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not obese (BMI &lt; 30)</td>
<td>16</td>
<td>96.36 ± 64.66</td>
<td>17</td>
</tr>
<tr>
<td>Obese (BMI&gt;30)</td>
<td>12</td>
<td>83.35 ± 43.29</td>
<td>7</td>
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</table>

1. Mann Whitney U test
2. Kruskal-Wallis
## Results – subgroup analyses

<table>
<thead>
<tr>
<th>Variable</th>
<th>Active device</th>
<th>Inactive device</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>OME/day</td>
<td>N</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 40</td>
<td>4</td>
<td>142.64 ± 70.24</td>
<td>1</td>
</tr>
<tr>
<td>40-50</td>
<td>2</td>
<td>135.53 ± 59.21</td>
<td>3</td>
</tr>
<tr>
<td>50-60</td>
<td>10</td>
<td>94.82 ± 44.88</td>
<td>5</td>
</tr>
<tr>
<td>60-70</td>
<td>10</td>
<td>69.80 ± 47.40</td>
<td>6</td>
</tr>
<tr>
<td>&gt;70</td>
<td>2</td>
<td>27.08 ± 19.55</td>
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<tr>
<td><strong>Mode of operation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Open</td>
<td>2</td>
<td>29 ± 1.70</td>
<td>7</td>
</tr>
<tr>
<td>HAL/ Robotic</td>
<td>26</td>
<td>95.54 ± 55.23</td>
<td>17</td>
</tr>
<tr>
<td><strong>Smoking status</strong></td>
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</tr>
<tr>
<td>Never smoker</td>
<td>13</td>
<td>90.12 ± 60.12</td>
<td>13</td>
</tr>
<tr>
<td>Present/past smoker</td>
<td>11</td>
<td>105.06 ± 50.41</td>
<td>7</td>
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<td><strong>Diagnosis</strong></td>
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<td></td>
<td></td>
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<tr>
<td>Cancer/ polyp</td>
<td>17</td>
<td>73.19 ± 50.37</td>
<td>12</td>
</tr>
<tr>
<td>Benign disease</td>
<td>11</td>
<td>117.98 ± 55.21</td>
<td>12</td>
</tr>
</tbody>
</table>

1. Mann Whitney
2. Kruskal-Wallis
3. student’s T
Conclusions

• No overall benefit for neurostimulation regarding postoperative narcotic consumption, subgroup analysis suggests
  • patients older than 60 years
  • open incisions

might benefit from neurostimulation.
Rectal Cancer in Young Patients: Is Obesity Truly a Risk Factor?

Jacqueline J Blank MD,¹ Rasika Deshpande BS,² Kirk A Ludwig MD,¹ Carrie Y Peterson MD MS,¹ Timothy J Ridolfi MD¹

1. Division of Colorectal Surgery, Medical College of Wisconsin
2. Medical College of Wisconsin
Introduction

- Rates of rectal cancer are increasing in younger patients
  - Delay in diagnosis
  - More aggressive tumor biology
- Reason for increase in younger population?
  - Obesity epidemic
  - Unidentified genetic risk factors

From: https://www.cdc.gov/nchs/data/hestat/obesity_adult_13_14/obesity_adult_13_14.htm
• Patients diagnosed with rectal cancer before age 40, 2008-2017
• Physical measurements, health history, physical activity, sleep, environmental, socioeconomic, mental health
  • 2008-2013: adults 21-74
  • 2014-2016: all ages
  • 2017: resampling of 2008-2013 respondents
• Biorepository
  • Serum, plasma, urine, DNA samples
  • 2018: soil, dust, water, appliance surfaces
<table>
<thead>
<tr>
<th></th>
<th>MCW Surgery</th>
<th>MARCH</th>
<th>N=1117 No diagnosis of rectal adenocarcinoma</th>
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</thead>
<tbody>
<tr>
<td><strong>Age at Diagnosis (range)</strong></td>
<td>34.39 (24.80-39.84)</td>
<td>34.72 (18.83-40.50)</td>
<td>30.86 (18-40)</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male (%)</td>
<td>13 (68.42)</td>
<td>274 (54.15)</td>
<td>602 (44.85)</td>
</tr>
<tr>
<td>Female (%)</td>
<td>6 (31.58)</td>
<td>232 (45.85)</td>
<td>616 (55.15)</td>
</tr>
<tr>
<td><strong>Smoking status</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Past or present (%)</td>
<td>7 (36.84)</td>
<td>112 (22.13)</td>
<td>439 (39.30)</td>
</tr>
<tr>
<td>Never (%)</td>
<td>11 (57.89)</td>
<td>162 (32.02)</td>
<td>678 (60.70)</td>
</tr>
<tr>
<td>Missing data (%)</td>
<td>1 (5.26)</td>
<td>187 (36.96)</td>
<td>0</td>
</tr>
<tr>
<td><strong>DM2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (%)</td>
<td>2 (10.53)</td>
<td>8 (1.58)</td>
<td>39 (3.49)</td>
</tr>
<tr>
<td>No (%)</td>
<td>16 (84.21)</td>
<td>497 (98.22)</td>
<td>1078 (96.51)</td>
</tr>
<tr>
<td>Missing data</td>
<td>1 (5.26)</td>
<td>1 (0.19)</td>
<td>0</td>
</tr>
</tbody>
</table>
Conclusion

• Patients with rectal cancer may not necessarily have a higher BMI than non-rectal cancer peers
  • Dose-response relationship vs threshold BMI?
  • Are all rectal cancer patients more obese than previously?
  • Time exposed to obese BMI?
Thank you!

• Dr. Kirk Ludwig
• Dr. Mary Otterson
• Dr. Carrie Peterson
• Dr. Tim Ridolfi

• Kathryn Hoffman
• Sam Wolff
• Sarah Lundeen
• Kim Spitz
• Deb Andris
• Jean Gilomen
Clinical Outcomes of Patients with Localized Pancreatic Cancer Treated with Neoadjuvant Therapy

Chad Barnes, MD
Division of Surgical Oncology
Medical College of Wisconsin
Milwaukee, WI

Surgery Research Conference
June 13, 2018
Treatment Sequencing for Pancreatic Cancer (PC)

- **PC is a systemic disease at diagnosis**
  - Over 60% have nodal metastases\(^1\)
  - Over 70% develop recurrent PC\(^2\)
  - Median of 6.9 months to first recurrence without systemic therapy\(^3\)

- **Adjuvant (postoperative) therapy**
  - Recommended for all PC stages\(^4\)
  - Improves disease-free and overall survival (OS) for patients treated with a surgery-first approach\(^3\)

---

1. Basturk et al. ASO 2015
3. Oettle et al. JAMA 2013
4. NCCN 2017

---

\(^1\) Basturk et al. CONKO-001
\(^2\) 6.9 mo
\(^3\) 77%
Limitations of a Surgery-First Approach

Approximately 50% of patients do not receive adjuvant therapy due to perioperative complications, failure to recover from surgery or early disease recurrences.¹,²

SEER Database:
Preoperative (Neoadjuvant) Therapy

Goals: Identify patients with clinically occult metastatic disease and to avoid a potentially morbid operation

Criteria for Surgery: Absence of metastatic disease progression

Median OS for patients who completed all therapy: 34 mo
Neoadjuvant Treatment Sequencing

Benefits:
• Early delivery of systemic therapy
• Improved tolerability of multimodality therapy
• Enrichment of the population of patients undergoing surgery
• Improved overall survival for patients who completed all therapy

Unanswered Questions:
• Pre- and postoperative prognostic factors for patients who complete all therapy
• Survival benefit of additional adjuvant therapy
• Patterns of treatment failure after completion of all therapy

MCW Data

Completed all therapy: 45 mo
Not resected: 8 mo

Christians et al. Surgery 2016
Presentation Outline

• Prognostic value of nodal status

• Survival impact of adjuvant therapy following neoadjuvant therapy and surgery

• Patterns of treatment failure upon completion of multimodality therapy

• How to improve preoperative risk stratification using FDG-PET/CT imaging
Survival by N Stage

6th/7th AJCC Nodal Staging

<table>
<thead>
<tr>
<th>N Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N0</td>
<td>No regional lymph node metastases</td>
</tr>
<tr>
<td>N1</td>
<td>Regional lymph nodes metastases</td>
</tr>
</tbody>
</table>

8th AJCC Nodal Staging

<table>
<thead>
<tr>
<th>N Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N0</td>
<td>No regional lymph node metastases</td>
</tr>
<tr>
<td>N1</td>
<td>1-3 regional lymph node metastases</td>
</tr>
<tr>
<td>N2</td>
<td>≥4 regional lymph node metastases</td>
</tr>
</tbody>
</table>

Better prediction of patient outcomes using the new AJCC lymph node staging classification
Impact of Treatment Sequencing N Stage

**SURGERY-FIRST**

![Cumulative Survival Graph](image1)

**NEOADJUVANT**

![Proportion Surviving Graph](image2)

<table>
<thead>
<tr>
<th>Stage</th>
<th>N (%)</th>
<th>Median Survival</th>
</tr>
</thead>
<tbody>
<tr>
<td>N0</td>
<td>52 (23)</td>
<td>35 mo</td>
</tr>
<tr>
<td>N1</td>
<td>90 (40)</td>
<td>21 mo</td>
</tr>
<tr>
<td>N2</td>
<td>85 (37)</td>
<td>18 mo</td>
</tr>
</tbody>
</table>

**Basturk et al. Ann Surg Oncol 2015**

<table>
<thead>
<tr>
<th>Stage</th>
<th>N (%)</th>
<th>Median Survival</th>
</tr>
</thead>
<tbody>
<tr>
<td>N0</td>
<td>179 (61)</td>
<td>46 mo</td>
</tr>
<tr>
<td>N1</td>
<td>85 (29)</td>
<td>30 mo</td>
</tr>
<tr>
<td>N2</td>
<td>29 (10)</td>
<td>25 mo</td>
</tr>
</tbody>
</table>

**Medical College of Wisconsin**
Nodal Status Conclusions

- The new AJCC N staging enhanced patient risk stratification

- Neoadjuvant therapy resulted in superior local-regional disease control

- Neoadjuvant therapy was associated with an improved survival
How to improve the survival of patients with persistent disease after neoadjuvant therapy and surgery?

No significant difference in overall survival with or without additional adjuvant therapy.

- Node positive disease
- Positive resection margins
- Persistent elevation of postoperative CA19-9

$p = 0.26$
Impact of Adjuvant Therapy on Survival after Neoadjuvant Therapy

LN Negative Patients

<table>
<thead>
<tr>
<th></th>
<th>Proportion Surviving</th>
<th>Months from Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Adjuvant</td>
<td>Adjuvant</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>0.00</td>
<td>1.00</td>
<td>12</td>
</tr>
<tr>
<td>0.25</td>
<td>0.75</td>
<td>24</td>
</tr>
<tr>
<td>0.50</td>
<td>0.25</td>
<td>36</td>
</tr>
<tr>
<td>0.75</td>
<td>0.50</td>
<td>48</td>
</tr>
</tbody>
</table>

p = 0.87

Multivariable Hazards Analysis

<table>
<thead>
<tr>
<th></th>
<th>HR</th>
<th>95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjuvant Therapy</td>
<td>0.36</td>
<td>0.20-0.66</td>
<td>0.002</td>
</tr>
</tbody>
</table>

LN Positive Patients

<table>
<thead>
<tr>
<th></th>
<th>Proportion Surviving</th>
<th>Months from Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Adjuvant</td>
<td>Adjuvant</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td>0</td>
</tr>
<tr>
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</tr>
<tr>
<td>0.75</td>
<td>0.50</td>
<td>48</td>
</tr>
</tbody>
</table>

p = 0.01
Impact of Adjuvant Therapy on Survival after Neoadjuvant Therapy

Conclusion: The survival benefit of adjuvant therapy after prior neoadjuvant therapy may be stage dependent.
Characterizing Patterns of PC Recurrence

LOCAL
- Pancreas
- Resection bed
- Perivascular

REGIONAL
- Peritoneum
- Abdominal wall

SINGLE SITE DISTANT
- Liver
- Lung
- Bone
- Ovary
- Lymph Nodes

MULTISITE
More than one organ site with recurrent disease
Patterns of First Disease Recurrence

The median disease-free survival was 18 months for all patients and 10 months for patients who recurred.
Neoadjuvant therapy was associated with lower rates of recurrence. However, if patients recurred, the timing and patterns of first disease recurrence were similar.
### Post Recurrence Survival by Treatment Sequencing

***PATIENTS WITH DISEASE RECURRENCE ONLY***

<table>
<thead>
<tr>
<th></th>
<th>Recurrence Rate</th>
<th>Time to First Recurrence (Months)</th>
<th>Survival after Recurrence (Months)</th>
<th>Overall Survival (Months)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NEOADJUVANT</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MCW (2017)</td>
<td>56%</td>
<td>10</td>
<td>11</td>
<td>26</td>
</tr>
<tr>
<td><strong>SURGERY FIRST</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wangjam (2015)</td>
<td>83%</td>
<td>10</td>
<td>5</td>
<td>18</td>
</tr>
<tr>
<td>Groot (2018)</td>
<td>79%</td>
<td>12</td>
<td>8</td>
<td>21</td>
</tr>
</tbody>
</table>

Fewer PC recurrences after neoadjuvant therapy and patients live longer after recurrence
Patterns of Recurrence Conclusions

- Fewer patients have disease recurrence after neoadjuvant therapy and surgery as compared to upfront surgical resection.

- However, if disease recurs the location and timing of recurrence(s) are similar to those observed with a surgery first approach.

- Median survival of ~1 year following the first disease recurrence.
How do we identify which patients are at risk for poor treatment outcomes prior to surgery?

**Preoperative Prognostic Factors:**
- Age
- Performance status
- Stage/Resectability
- CA 19-9 level

**Postoperative Prognostic Factors:**
- Age
- Performance status
- AJCC stage (TNM)
- Grade
- PNI/LVI
- Margin status
- Perioperative complications

Original article

*Role of $\text{SUV}_{\text{max}}$ obtained by $^{18}\text{F-FDG PET/CT}$ in patients with a solitary pancreatic lesion: predicting malignant potential and proliferation*

*Hu et al. Nucl Med Comm 2013*
Prognostic Value of FDG-PET SUV

FDG-PET may provide important insights about tumor biology which may be used to predict outcomes.

Neoadjuvant Therapy

Pretreatment PET SUV
SUV Cutpoint: 7.5

Posttreatment PET SUV
SUV Cutpoint: 3.5

p = 0.03

p = 0.02

MCW Surgery
knowledge changing life
Conclusions: Monitoring of dynamic quantitative endpoints such as FDG avidity and CA19-9 may be important surrogate endpoints for assessment of treatment efficacy and may improve prognostication.
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- Ronald Burklund Eich PC Research Fund
- WeCare Fund
- American Cancer Society Pilot Grant
- Dept of Veterans Affairs
- NIH/NCI
- Batterman Foundation
- Lockton Fund
Next Month:

The Division of Research would like to announce

Department of Surgery Research Conference
This month’s feature:

Terri A. deRoon Cassini, PhD    Marc Anthony De Moya, MD

Trauma Surgery Research Update

Wednesday, July 11th
5:00-6:00 pm
Location: Cancer Center Conference Room M

Questions? eschneidler@mcw.edu