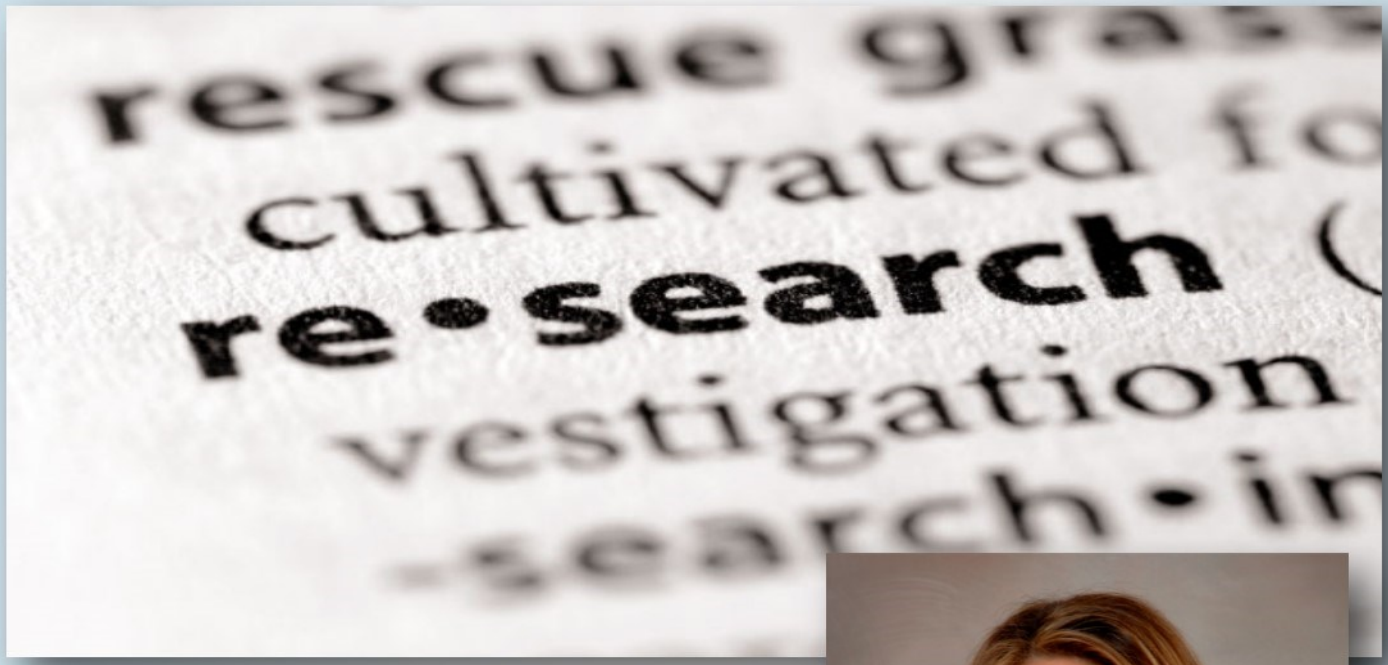
Department of Surgery

29th Annual Research Symposium



Keynote Speaker

Dr. Rosemary Kozar, Ph.D.
Professor of Surgery
& Director of Translational Research
at the University of Maryland
R. Adams Cowley Shock Trauma Center

"What's New in Trauma and Hemorrhagic Shock? Blood"

April 24, 2018 / 7:45 a.m.– 4:00 p.m.
Betty Irene Moore School of Nursing, Lecture Hall 1000

UCDAVIS HEALTH

Agenda

7:45 AM	**Breakfast & Registration**	
8:00 AM	Welcome & Introduction	
	Oral Presentation 1- Lecture Hall 1000:	
8:15 AM	**Melissa Vanover**: Placental Mesenchymal Stromal Cells Improve Forelimb Motor Function in a Rodent Cervical Spinal Cord Contusion Model	Page 8
8:30 AM	**Ivonne Palma**: The Superiority of Plasma Enriched Perfusate for Assessment of Donor Kidneys in an Ex-Vivo Normothermic Perfusion Setting	Page 9
8:45 AM	**Dake Hao**: Engineering autologous stem cell-based vascularized bone graft for in utero treatment of spina bifida	Page 10
9:00 AM	**Tajia Green:** Cryptic exon splicing in the human glucocorticoid receptor in response to lipopolysaccharide stress	Page 11
9:15 AM	**James M. Clark:** Use of Lobectomy is Key to Optimized Survival for Advanced Stage Non-Small Cell Lung Cancer Patients	Page 12
9:30 AM	**Proceed to Quick Shot 1 Session 1- Room 1155**	
9:35 AM	**Carl Beyer:** Proximal Hemodynamic effects of zone 1 versus zone 3 reboa placement: Data from the AAST Aorta Registry	Page 13
9:45 AM	**Brie Nardy:** Pre-injury use of anti-depressants are predictive of opioid use 90 days after discharge in trauma patients	Page 14
9:55 AM	**Megan Gilbert:** Effect of Breast Conserving Therapy Localization Method on Margin Positivity for Invasive Breast Cancer and DCIS	Page 15
10:05 AM	**Sarah Bateni:** Hospital Utilization and Disposition among Patients with Malignant Bowel Obstruction: A Population-Based Comparison of Surgical to Medical Management	Page 16
Session 1 Quick Shot Group 2- Room 2603		
9:35 AM	**Vasiliki Tasouli-Drakou:** Fat Graft Viability: Does Temperature During Lipoaspirate Centrifugation Matter?	Page 17
9:45 AM	**Alicia Gingrich:** Changing Demographics and Management of Soft Tissue Sarcoma in the Elderly: Are we Overtreating or Undertreating this Vulnerable Patient Population?	Page 18
9:55 AM	**Jessica Cox:** Hospital-level Tendency to Admit Elderly Patients with Rib Fractures to an Intensive Care Unit Is Associated with Worse Outcomes	Page 19
10:05 AM	**Monica Grova:** Sarcopenia and the Modified Frailty Index Do Not Predict Morbidity or Survival Following Retroperitoneal Sarcoma Resection	Page 20
10:15 AM	**Laura Galganski:** Establishing a Surgery-Driven Multidisciplinary Pediatric Colorectal Center	Page 21
Session 1 Quick Shot Group 3- Room 3400		
9:35 AM	**Maggie Spruce:** Unplanned Intubations Amongst UC Davis Surgical Patients: What are the Implications for Quality Improvement Interventions?	Page 22
9:45 AM	**Ping Song:** The Use of Post-Surgical Drains in Breast Reductions: A Single Surgeon Experience	Page 23
9:55 AM	**Harris Kashtan:** The Effect of Prolonged Hypothermia on Extremity Ischemia in a Porcine Model (Sus scrofa) of Hemorrhage	Page 24
10:05AM	**Matthew R. Zeiderman:** Fat grafting of the radiated breast for two-stage prosthetic reconstruction	Page 25
10:15AM	**Sabrina Evans:** Prophylactic Implantation of the Impella Left Ventricular Assist Device for High-Risk Cardiac Surgery	Page 26

Agenda

10:30 AM ***Keynote Speaker: Lecture Hall 1000***

Rosemary Kozar MD, PhD
What's New in Trauma and Hemorrhagic Shock? Blood

11:30 AM **Lunch and Proceed to Oral Presentation**

Oral Presentation 2- Lecture Hall 1000

12:00 PM **Mio Yanagisawa:** Increased Effector Function but Decreased Longevity in Canine Natural Killer Cells from Older Donors — Page 27

12:15 PM **Erik DeSoucy:** The Pharmacokinetics of Tranexamic Acid Via Intravenous, Intraosseous and Intramuscular Routes in a Porcine (Sus Scrofa) Hemorrhagic Shock Model — Page 28

12:30 PM **Linda Schutzman**: P-Selectin is Critical for De Novo Pulmonary Arterial Thrombosis After Blunt Thoracic Trauma — Page 29

12:45 PM **Bin Song:** Does Inhalation Injury Have an Impact on the Blood Transfusion after Burn Injury in Children — Page 30

1:00 PM **Proceed to Quick Shot Session 2**

Session 2 Quick Shot Group 4- Room 1155

1:10 PM **Amanda Phares:** Timing of Surgery and Internal Medicine Clerkships and Shelf Examination Scores — Page 31

1:20 PM **Andrew Wishy:** Comparison of Open Arterial Revascularization Using Expandable PTFE Stent Grafts vs Sewn ePTFE Interposition Bypass in an Infected Field Porcine (Sus scrofa) Model — Page 32

1:30 PM **Derek B. Asserson:** Complication rates of gluteal augmentation among autologous fat grafting, implant, and local flap procedures — Page 33

Session 2 Quick Shot Group 5- Room 2603

1:10 PM **Christina Theodorou:** Hate to Burst Your Balloon: REBOA Success Takes More Than a Course — Page 34

1:20 PM **Melissa Vanover:** High Dose Placental Mesenchymal Stromal Cells Provide Neuronal Preservation Following In Utero Treatment Of Ovine Myelomeningocele — Page 35

1:30 PM **Carl Beyer** Cost-Effectiveness of Adjusted Dose Heparin for Venous Thromboembolism Prophylaxis in Critically Injured Trauma Patients — Page 36

1:40 PM **Laura Galganski:** Laparoscopic Retroperitoneal Resection of a Thoracoabdominal Mass — Page 37

Session 2 Quick Shot Group 6- Room 3400

1:10 PM **Jamie E. Anderson:** The Surgical Morbidity and Mortality Conference: A Dying Tradition or Adapting to Current Quality Improvement Environments? — Page 38

1:20 PM **Erik DeSoucy:** Prolonged Field Care – The U.S. Air Force Pararescue Experience — Page 39

1:30 PM **Matthew R. Zeiderman:** Systematic Review of Surgical Treatment for Type II Complex Regional Pain Syndrome: Is Timing Really Everything? — Page 40

1:40 PM **Alicia Gingrich:** Palliative Gastric Cancer Surgery: When is Operative Resection Appropriate? — Page 41

Agenda

1:50-2:00 PM Proceed to Oral Session 3

Oral Presentation 3- Lecture Hall 1000

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2:15 PM	**Kewa Gao:** Co-transplantation of Cord Blood Derived Endothelial Colony-forming Cells with Placental Mesenchymal Stromal Cells Achieved Stable Long-term Engraftment	Page 43
2:30 PM	**Priyadarsini Kumar:** Neuroprotective Effect of Human Placenta-derived Mesenchymal Stromal Cells-Role of Exosomes	Page 44
2:45 PM	**Shevonne Satahoo:** Does Poverty Affect Outcomes in Middle Aged Burn Patients?	Page 45
3:00 PM	**Jonathan Lin:** Endovascular First Treatment is Associated with Improved Amputation Free Survival in Patients with Critical Limb Ischemia	Page 46

3:15-4:00 PM ***Faculty Speaker: Lecture Hall 1000***

Miriam A. Nuño PhD

Long-Term Outcomes in Abusive Head Trauma

4:00 PM **Concluding Remarks**

Welcome

Welcome from the Chairs!

Welcome to the 29th Annual Department of Surgery Research Symposium at the University of California Davis! This program was made possible by collaboration between the Department of Surgery at the University of California Davis and Shriners Hospital for Children Northern California.

This year we are hosting Rosemary Kozar MD, PhD, Professor of Surgery and Director of Translational Research at the University of Maryland R. Adams Cowley Shock Trauma Center. In addition to her role in the AAST, she serves as committee chair for the American College of Surgeons Verification Review Committee of the COT and the Women in Surgery Committee and is past President-elect of the Shock Society.

The 29th Annual Department of Surgery Research Symposium is a forum that unites faculty, residents, fellows, students, and laboratory researchers to share the diverse innovative research being done in the Department of Surgery. The Symposium also provides an opportunity for trainees to hone their research presentation skills as they share their work. Research is a core value of the Department of Surgery and is made possible by the hard work of our faculty, staff, and trainees. Our program includes oral presentations, quick-shot oral poster presentations, and plenary sessions. We will award prizes for the top clinical and basic science oral presentations as well as the best quick-shot oral presentation tonight.

Thank you for joining us today to celebrate research in the Department of Surgery!

Sincerely,
Diana L. Farmer, MD, FACS, FRCS
Professor and Chair, Dept. of Surgery
UC Davis Heath
Surgeon-in-Chief, UC Davis Children's Hospital

Tina L. Palmieri MD, FACS, FCCM
Professor and Director, Firefighters Burn Institute Burn Center at the University of California Davis
Assistant Chief of Burns, Shriners Hospital for Children, Northern California

Research Committee


Gregory J. Jurkovich, MD

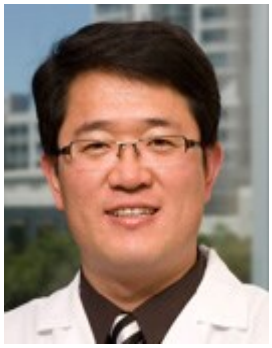

Tina Palmieri, MD


Richard J. Bold, MD

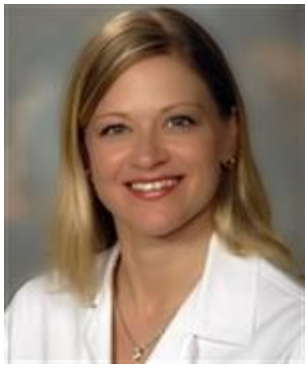

David Greenhalgh, MD


Kiho Cho, DVM, PhD

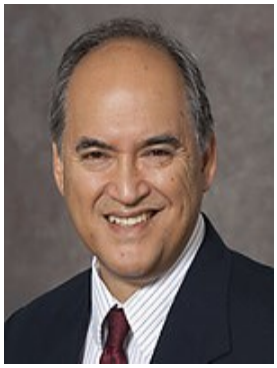

Kent Lloyd, DVM, PhD


Aijun Wang, PhD

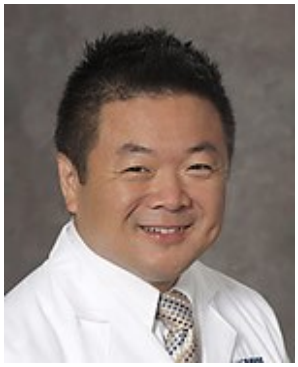

Mohamed Ali, MD

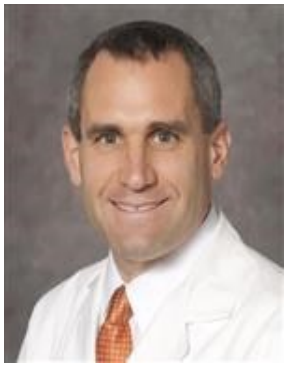

Misty D. Humphries, MD


David Sahar, MD


Richard V. Perez, MD


Joseph Galante, MD


Shinjiro Hirose, MD


Garth H. Utter, MD

Keynote Speaker– Rosemary Kozar MD, PhD

Dr. Rosemary Kozar is currently Professor of Surgery and Director of Translational Research at the University of Maryland R. Adams Cowley Shock Trauma Center. She completed medical school at Temple University School of Medicine then surgical training and surgical critical care at the University of Texas Houston and Temple University while also obtaining a PhD at Baylor College of Medicine. Her research interests are in nutrition in the critically ill and endothelial dysfunction after hemorrhagic shock. She has published over 150 peer-reviewed articles and has been continuously funded by the NIH for almost 15 years. In addition to her role in the AAST, she serves as committee chair for the American College of Surgeons Verification Review Committee of the COT and the Women in Surgery Committee and is past President-elect of the Shock Society.

Faculty Speaker– Miriam Nuño MD, PhD

Dr. Nuño is Associate Professor in Biostatistics at UC Davis and In Residence in the Department of Surgery at the UC Davis School of Medicine. She has a bachelor degree in mathematics from the University of California Riverside, master's degree in mathematics from Claremont Graduate University, and a Ph.D. in Biological Statistical and Computational Biology from Cornell University. She pursued Postdoctoral Fellowships in Biostatistics at Harvard School of Public Health and UCLA. She has nearly 10 years of experience in health services research, observational epidemiological studies, and the applied math modeling in surgical outcomes research and infectious disease applications. She is particularly interested in causal inference in observational studies. From early in her career, she has been involved in developing and maintaining secure databases with the primary aim of improving patient centered outcomes. She co-directed the Center for Neurosurgical Outcomes Research at Cedars-Sinai Medical Center prior to UC Davis in 2017. Her NCBI bibliography lists more than 70 publications and book chapters.

Melissa Vanover

Title: Placental Mesenchymal Stromal Cells Improve Forelimb Motor Function in a Rodent Cervical Spinal Cord Contusion Model

Authors (Pediatric Surgery Dept): MA Vanover, CD Pivetti, P Kumar, K Chung, LA Galganski, DL Farmer, A Wang

Background: Placental mesenchymal stromal cells (PMSCs) improve motor function following in utero application in an ovine model of spina bifida, a congenital form of spinal cord injury. We sought to determine if similar functional improvement would be seen after treatment of acquired cervical spinal cord injury in a rodent model.

Methods: Seven Sprague-Dawley rats underwent a unilateral cervical spinal cord contusion injury using the NYU/MASCIS III Impactor. Three days after injury, the cervical spine was re-exposed and $5x10^5$ PMSCs in 5 µL PBS (n=5) or PBS alone (n=2) was injected intrathecally. Functional tests were performed pre-operatively and for 8 weeks after treatment. Distal forelimb function was evaluated using the validated Irvine, Beattie, Bresnahan (IBB) Forelimb Recovery Scale (range 0-9, 0=complete paralysis, 9=extensive forelimb use).

Results: Initial post-operative functional tests were consistent with a moderate unilateral cervical cord contusion injury for all animals (IBB 0-1). Over 8 weeks post-treatment, significant improvement in ipsilateral forelimb function was seen in animals treated with PMSCs compared to those treated with PBS alone ($p<0.0001$).

Conclusion: Treatment of unilateral cervical spinal cord contusion injury with placental mesenchymal stromal cells during the acute post-injury period resulted in significant improvement in functional recovery of the affected forelimb in this pilot study. Given these promising results, further studies are planned to determine the exact mechanism of action and optimal dosing prior to translation to human trials.

Ivonne Palma

The Superiority of Plasma Enriched Perfusate for Assessment of Donor Kidneys in an Ex-Vivo Normothermic Perfusion Setting

I. P. Palma B.S.[1], I. Palma B.S.[1], Y. Smolin B.S.[1], A. Perry M.D.[1], J.P. McVicar M.D.[1], C. Troppmann M.D.[1], C. Santhanakrishnan M.D.[1], J. Sageshima M.D.[1], R. V. Perez M.D.[1]

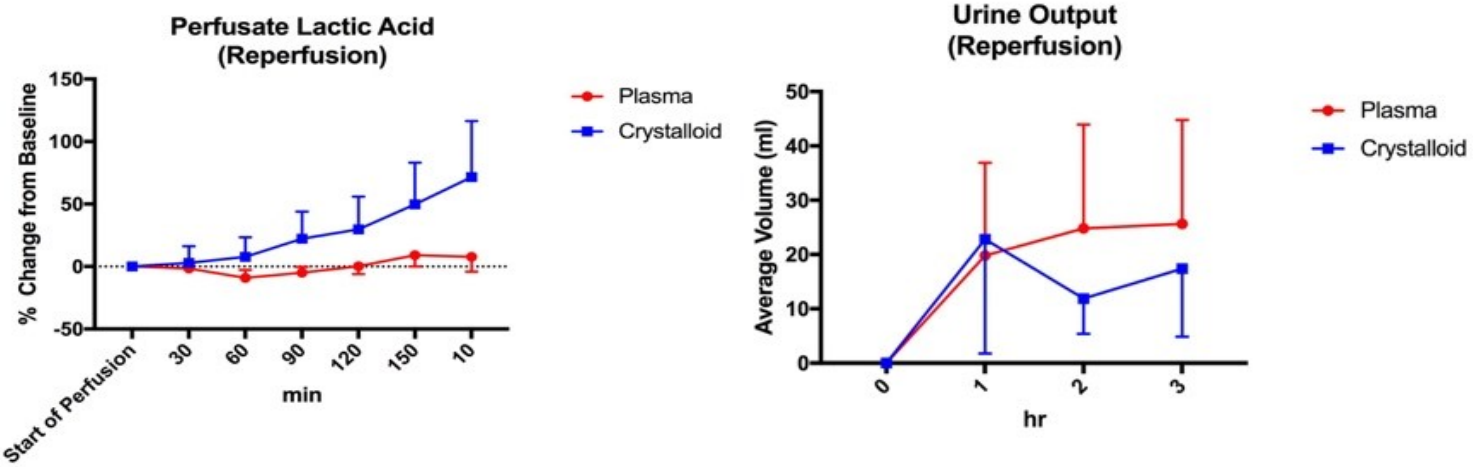
[1]Division of Transplant Surgery

Introduction: Ex-Vivo Normothermic Perfusion (EVNP) has been used to assess and repair marginal organs prior to transplantation but the optimal perfusate composition is unknown. We hypothesize that EVNP with a plasma enriched perfusate may improve metabolism and function of kidneys compared to a crystalloid based perfusate.

Methods: Eight paired sheep kidneys were assessed on EVNP at 37°C perfused with oxygenated packed red blood cells, parenteral nutrition mixed with a 1:1 dilution of either platelet poor plasma or Plasmalyte-A (Crystalloid). After a 3-hour assessment period on EVNP, both groups were perfused with whole blood (WB) for 3 hours. Hemodynamic parameters, urine output, and perfusate samples were serially collected for pH, oxygen, electrolytes, creatinine, and lactate levels.

Results: During the assessment period kidneys perfused with both solutions showed similar gradual improvement in flow and resistance, and a decrease in perfusate lactic acid and creatinine levels over time. The plasma group had higher perfusate sodium levels and gained less weight but made less urine during the assessment period when compared to crystalloid. During the WB reperfusion period, both groups had similar hemodynamic parameters and perfusate creatinine levels decreased in both groups, but the plasma perfused kidneys had more urine output and lower increase in perfusate lactic acid levels compared to the crystalloid kidneys.

Conclusion: EVNP with plasma enriched perfusate resulted in less renal edema and more urine production in an ex-vivo simulated transplanted model. Further studies are needed to investigate potential protective mechanisms of plasma perfusion and whether EVNP with plasma will improve outcomes in a whole animal transplant model.



Dake Hao

Engineering autologous stem cell-based vascularized bone graft for in utero treatment of spina bifida

Dake Hao[1], Ruiwu Liu[2], Christopher Pivetti[1], Priyadarsini Kumar[1], Nicole Brielle Kreutzberg[1], Laura Galganski[1], Kewa Gao[1], Lizette Reynage[1], Kit Lam[2], Diana Farmer[1], Aijun Wang[1]

[1]Surgical Bioengineering Lab, Department of Surgery, UC Davis

[2]Department of Biochemistry and Molecular Biology, UC Davis

Introduction: Spina bifida is a complex disease with significant malformation of bone, muscle and connective tissue overlying the spinal cord that results in severe neural tissue damage and neurological deficits. We demonstrated that in utero transplantation of early gestation placenta-derived mesenchymal stromal cells (PMSCs) during *in utero* repair cures SB-associated motor function deficits at birth in the fetal ovine model. A regenerative bony scaffold is requited to protect the rescued spinal cord and preserve long-term function.

Methods: We compared different culture methods to isolate PMSCs within the time frame of in utero transplantation. We identified two integrin-binding ligands LLP2A and LXW7 against integrin α4β1 and αvβ3 respectively and we tested their function on PMSCs and endothelial cells (ECs), respectively, using cell-binding assay, flow cytometry, Elisa, MTS assay, Capase-3 assay and Western-blot. We further used the established hydroxyapatite/poly (lactide-co-glycolide) (HA-PLG) bony scaffold to evaluate the osteogenic potential of PMSCs in vitro.

Results: The cumulative number of PMSCs obtained reached 1×10^8 on day 14 using the enzyme/explant culture method. LLP2A showed strong binding affinity to PMSCs and significantly enhanced hepatocyte growth factor (HGF) secretion of the PMSCs. LXW7 showed strong binding affinity to ECs, promoted EC proliferation and enhanced the phosphorylation of VEGF receptor 2 (VEGF-R2) and the activation of mitogen-activated protein kinase (MAPK) ERK1/2 in ECs. LXW7 also improved EC survival in hypoxic conditions. PMSCs exhibited high osteogenic potential on the HA-PLG scaffold.

Conclusion: We established an optimal protocol to isolate PMSCs for fetal transplantation. We demonstrated that artificial integrin binding ligands LLP2A and LXW7 enhanced functions of PMSCs and ECs respectively. PMSCs exhibited high osteogenic potential on the established HA-PLG scaffold. In the future, we will conjugate LLP2A and LXW7 to the HA-PLG scaffold for in utero PMSC transplantation to regenerate the bony defect in spina bifida animal models.

Tajia Green

Cryptic exon splicing in the human glucocorticoid receptor in response to lipopolysaccharide stress

Tajia Green, Debora Lim, Stacey Leventhal, Kiho Cho, and David Greenhalgh

Burn Division, Department of Surgery, UC Davis, and Shriners Hospitals for Children

Introduction: Glucocorticoids are widely used in the treatment of numerous inflammatory conditions, including sepsis. Unfortunately, patient response to glucocorticoid therapy can be highly variable. Variations in the human glucocorticoid receptor (hGR) may contribute to the differential patient response, and stressors such as lipopolysaccharide (LPS) may influence hGR isoform expression, particularly hGR splicing patterns.

Methods: Buffy coat was isolated from the blood samples of burn patients collected at admission, every two weeks thereafter, and during septic episodes. Additionally, peripheral blood mononuclear cells (PBMCs) were isolated from leukopaks and treated with LPS. RT-PCR was used to identify novel splice variants in the buffy coat and PBMCs. The function of the hGR splice variant isoforms was assessed by luciferase assay.

Results: RT-PCR screening of buffy coats and PBMCs revealed three novel cryptic exons of 54 bp, 93 bp, and 77 bp. The expression of all three cryptic exons was induced in PBMCs by LPS in a time-dependent manner and peaked at three hours after treatment. Luciferase assays showed that the hGR-54bp and hGR-77bp isoforms were less active than the reference hGRα; however, hGR-93bp displayed hyperactivity that surpassed that of reference hGR in response to higher doses of hydrocortisone treatment.

Conclusions: We have found that inflammatory cells produce variant glucocorticoid receptor isoforms in response to stress. LPS signaling appears to induce these hGR variants, potentially by influencing mRNA splicing. Adjusting the receptor expression, in addition to differential delivery of the ligand, may be an alternative strategy for optimizing the patient's response to stress and injury.

James M. Clark

Use of Lobectomy is Key to Optimized Survival for Advanced Stage Non-Small Cell Lung Cancer Patients

James M Clark MD, Robert J Canter, MD, Stina W. Andersen, PhD, Laurel A Beckett, PhD, David T Cooke MD, Lisa M Brown MD, MAS, Elizabeth A David MD, MAS

Purpose: For advanced stage non–small cell lung cancer (NSCLC), increasing data demonstrate an association of therapeutic surgery with improved survival. We sought to characterize the trends and mortality outcomes of surgery, hypothesizing decreased pneumonectomy would be associated with decreased perioperative mortality in surgical patients. **Methods**: Stage IIIA, IIIB, or IV NSCLC patients were selected in the National Cancer Database from 2004-2014, dichotomized into time periods (2004-2008 and 2009-2013). Subset analyses of surgically treated patients assessed the trends in 30-/90-day mortality and overall survival (OS) after sublobar resection (SUBLOBAR), lobectomy/bilobectomy (LOBECTOMY), and pneumonectomy (PNEUMONECTOMY). **Results**: 354,891 patients were identified, and 6% (21,488) had surgery. The surgical cohort was 60% stage IIIA, 16% stage IIIB, and 24% stage IV. For each stage, LOBECTOMY was the most common procedure: stage IIIA 73%, IIIB: 64%, IV: 53%. Across all stages the proportion of patients undergoing LOBECTOMY was unchanged over the study period, but the proportion of stage IIIA patients undergoing PNEUMECTOMY decreased (p=0.006). For stage IIIA, OS was longer in the later time period for each surgical group (p<0.001). For each stage, 30-/ 90-day mortality was lowest for LOBECTOMY but remained constant over time. Across all stages, LOBECTOMY was associated with longer survival when compared to SUBLOBAR or PNEUMONECTOMY (p<0.001) (Figure 1). **Conclusions**: For advanced stage NSCLC, LOBECTOMY is associated with the greatest survival advantage and superior perioperative mortality. Additional improvements in OS are anticipated with reductions in use of pneumonectomy and continued low rates of perioperative mortality.

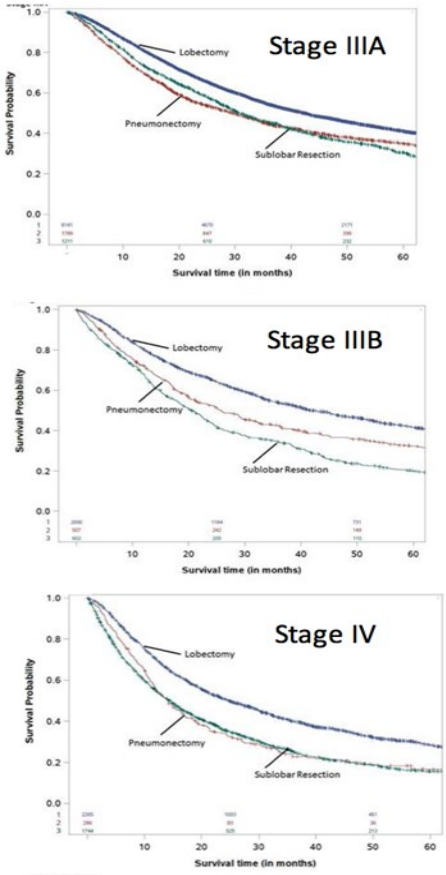


Figure 1. Overall survival for: A. Stages IIIA, B. IIIB, and C. IV

Carl Beyer

PROXIMAL HEMODYNAMIC EFFECTS OF ZONE 1 VERSUS ZONE 3 REBOA PLACEMENT: DATA FROM THE AAST AORTA REGISTRY

Beyer CA, Johnson MA, Galante JM

Division of Trauma, Acute Care, and General Surgery

Introduction: Resuscitative Endovascular Balloon Occlusion of the Aorta (REBOA) has emerged as a promising intervention for non-compressible torso hemorrhage. Current algorithms for REBOA placement recommend obtaining abdominal and pelvic diagnostic imaging to determine placement location. We examined the effects of Zone 1 versus Zone 3 REBOA deployment on proximal hemodynamics in patients enrolled in the American Association for the Surgery of Trauma Aortic Occlusion for Resuscitation in Trauma and Acute Care Surgery (AAST AORTA) Registry.

Methods: The AAST AORTA Registry, which includes patients from 29 different institutions, was queried from November 2013 to November 2017. Patients who received REBOA were included in this analysis if their initial systolic blood pressure (SBP) was less than 90 mm Hg upon arrival and if they were not receiving cardiopulmonary resuscitation (CPR) at the time of balloon placement. Blood pressures before and after the intervention were compared between groups using a t-test and significance was set at less than 0.05.

Results: Of 762 patients in the database, 245 underwent REBOA and 99 patients met inclusion criteria. The initial balloon position was Zone 1 in 55 patients, Zone 3 in 36 patients, and unknown or Zone 2 in 8 patients. The initial SBP was lower in the group that received Zone 1 occlusion compared to Zone 3 occlusion (59±2 mm Hg vs 70±2 mm Hg, $p<0.01$). However, the change in blood pressure was greater after REBOA in the Zone 1 group (58±4 vs 41±4, $p<0.01$). There were no differences in post occlusion SBP (119±4 vs 111±4, $p=0.32$).

Conclusion: Despite a lower initial SBP, patients with Zone 1 placement experienced a larger increase in SBP compared to patients with Zone 3 placement. In the hemodynamically unstable trauma patient, initial Zone 1 occlusion provides maximal support and the greatest chance for stabilization. These data, in conjunction with recent animal data, suggest that clinical algorithms should be updated to reflect the benefit of initial zone 1 placement.

Brie Nardy

Pre-injury use of anti-depressants are predictive of opioid use 90 days after discharge in trauma patients

Brie Nardy, MD

Jamie Anderson, MD MPH

Christine S. Cocanour, MD FACS

Wendy Ziegler, DO

Joseph M. Galante, MD FACS

Objective: Determine risk factors associated with long-term opioid use in trauma patients.

Background:

More deaths are related to opioids in the U.S. than motor vehicle collisions and gun violence. Trauma patients may be at particular risk of opioid dependence, but this population often lacks long-term follow-up.

Methods:

A retrospective cohort study of capitated patients ≥18 years, admitted to a Level 1 trauma center and transferred to their managed care hospital from 2009-2014. Long-term opioid use is defined as use ≥90 days post-discharge based on prescription refill data. Multivariable logistic regression evaluated the impact of age; sex; zip code-based median household income; mechanism of injury; operative status; and history of drug, opioid, selective serotonin receptor inhibitor (SSRI) and benzodiazepine use on opioid use 90 days after discharge.

Results:

331 patients were included in the study and 184 (55.6%) were on opioids at 90 days. Median age was 51 years (range 18-95). The predominant mechanism was blunt (89.4%). Nearly half of patients (43.2%) underwent an operation. There was no difference in 90-day opioid use among patients who were on opioids vs. opioid-naïve patients (50.9% vs 56.5%, p=0.44). On multivariable analysis, only pre-admission SSRI use was predictive of narcotic use longer than 90 days after discharge (OR 2.38 p=0.05).

Conclusions:

Many trauma patients remain on opioids at 90 days. Use of antidepressants predispose trauma patients to long-term use of opioids. Recognition of this risk factor may allow surgeons to alter prescribing practices.

Megan Gilbert

Title: Effect of Breast Conserving Therapy Localization Method on Margin Positivity for Invasive Breast Cancer and DCIS

Gilbert, M. A. BS, Olson, J. MD, Bold, R MD. Surgical Oncology

Introduction: For breast conserving therapy, non-palpable breast tumors require mammographic, ultrasound, or magnetic resonance imaging to identify the lesion for biopsy and then to place a marker for pre-surgical planning. Alternatives to wire-guided localization including radioactive seed localization are gaining popularity and there is ongoing research into the comparative efficacy and margin positivity rate. We determined the margin positivity for our experience with these modalities and also compared the used of concordant and discordant imaging modalities for biopsy and pre-surgical planning.

Method: We performed a retrospective analysis of all patients who underwent wire-localized and seed-localized lumpectomy for DCIS or invasive breast cancer (IBC) at UCDMC from 12/2017 – 5/2016. We compared the margin positivity rate by localization method using the presence of tumor on ink for IBC and <2 mm margins for DCIS.

Results: 156 total patients underwent wire- or seed-localized lumpectomies. Of the 111 patients with IBC, 88 (79%) were wire-localized and 23 (21%) were seed-localized. The rate of margin positivity was 13% for wire-localization and 4% for seed-localization (P = 0.22). For DCIS, of 88 patients, 75 (%) were wire-localized and 13 (%) were seed-localized. The margin positivity was significantly different: 61% for wire-localized and 31% for seed-localized (P = 0.04). Use of the same or different imaging for biopsy and pre-surgical planning did not influence the margin positivity rate.

Conclusion: Seed-localization is safe and in our small series shows an improved margin positivity rate for DCIS. The type of imaging modality and its consistency for biopsy and pre-surgical planning does not influence margin positivity.

Sarah Bateni

Authors: Sarah Bateni, Frederick Meyers, Richard Bold, Robert Canter

Hospital Utilization and Disposition among Patients with Malignant Bowel Obstruction: A Population-Based Comparison of Surgical to Medical Management.

Background: Malignant bowel obstruction (MBO) is a terminal event in end-stage cancer patients. The decision to intervene surgically is complex, given the risk of harm in patients with a limited lifespan and the limited population-based research investigating clinically relevant outcomes. Therefore, we sought to compare hospital utilization and disposition among MBO patients treated with surgical vs. medical management.

Methods: We performed a retrospective analysis of 4,576 hospitalized patients with MBO from 2006-2010 at all California licensed hospitals from the Office of Statewide Health Planning and Development dataset. Hospital-free days (HFD) at 30, 90, and 180 days were calculated. Adjusted-regression and competing risks models were used to compare HFDs, disposition, complications, in-hospital death, and survival for surgically vs. medically treated MBO patients using inverse probability to treatment weighting with propensity scores.

Results: Most patients were treated medically (74.8%) or surgically (25.2%). Surgical patients had higher rates of complications (44.0% vs. 21.3%) and in-hospital death (9.4% vs. 3.8%) with lower rates of disposition to home (75.4% vs. 88.6%) compared to medical patients ($p<0.0001$ all). Surgical patients had fewer 30- and 90-day HFDs compared to medical patients ($p<0.05$). However, at 180-days, there were no differences in HFDs between treatment groups. Additionally, there were no differences in overall survival for surgical and medical patients (6.5 vs. 6.4 months, $p>0.05$).

Conclusions: In this population-based analysis, medically managed MBO patients fared better with respect to less hospital utilization at 30 and 90 days, fewer in-hospital deaths, and more frequent returns to home. These data underscore the impact of surgical management on MBO patients at the end-of-life.

Ivonne Palma, BS

Twelve Hour Ex Vivo Normothermic Perfusion (EVNP) for the Assessment of High-Risk Discarded Deceased Donor Kidneys

I J Palma[1], I Palma[1], Y Smolin[1], S Kabagambe[1], A Perry[1] J Sageshima[1], J. McVicar[1], C. Troppmann[1], C. Santhanakrishnan[1], R V Perez[1].

Department of Transplant Surgery

Background: A brief 1-hour period of EVNP has been used to assess high-risk deceased donor kidneys, with high renal blood flow and immediate diuresis proposed as criteria for deeming an organ as transplantable. The safety and efficacy of longer periods of EVNP for assessment is unknown.

Methods: Eight deceased human kidneys procured for transplantation but discarded were placed on 12 hours of EVNP pressure dependent cardiopulmonary bypass system at 37^0C with packed red blood cells (PRBC), supplemented with nutrition and insulin. Exogenous creatinine (0.06g) was added to the system to assess glomerular filtration. Pump parameters were monitored and blood and urine samples were collected every 30 min and analyzed for pH, oxygen, electrolytes, creatinine, and lactate.

Results: Flow and urine output (UO) were continuously increased and by 8 hours, 5 kidneys were considered transplantable with renal blood flow (>100 cc/hr) and UO (>15 cc/hr). Three kidneys were deemed non transplantable after 12 hours of EVNP.

Conclusion: Prolonged duration of EVNP for 12 hours appears safe and feasible to assess function of high-risk kidneys. Longer periods of EVNP may be useful to optimally assess high risk kidneys.

Derek B. Asserson, MS1

Osteogenic Differentiation of Adipose-Derived Stem Cells: A Review of the Involved Pathways

Author(s): Derek Asserson, [1] Hakan Orbay, [1] David E. Sahar [1,2]

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Purpose: Despite the accumulated experimental data demonstrating the osteogenic differentiation of adipose-derived stem cells (ASCs) clinical use of ASCs to repair bony defects is not common yet. We present a literature review of the pathways that are involved in the osteogenic differentiation of ASCs to better understand the critical elements of the process.

Methods: We carried out a literature search in PubMed and Google Scholar databases using 'adipose-derived stem cells' or 'ASCs' and 'osteogenic differentiation' as search terms. We excluded the duplicate studies, and studies without original data, including reviews. The studies directly examining the pathways involved in osteogenic differentiation were involved.

Results: Our initial search yielded 800 papers. After the application of filters, this number dropped to 34 papers. We reviewed the full text of these 34 studies. The most commonly studied pathway was Bone Morphogenic Protein (BMP) Pathway including Smad and RUNX2 genes. A couple of other factors, namely Noggin, and Tumor Necrosis Factor (TNF)-α, were also implicated in osteogenic differentiation. Other pathways examined, to a lesser extent, were *Wnt, Notch, Hedgehog and ERK.*

Conclusion: BMP is the most well-known of the cytokines involved in osteogenesis. A majority of studies related to ASCs and bone formation has revolved around the BMP pathway.

Sarah B. Bateni, MD

Comparison of the ASA Classification, Charlson Comorbidity Index, and Modified Frailty Index to Predict Postoperative Outcomes among Stage IV Cancer Patients with Bowel Obstruction

Sarah B. Bateni, MD, Richard J. Bold, MD, Frederick J. Meyers, MD, Daniel J. Canter, MD,

Robert J. Canter, MD

Division of Surgical Oncology

Abstract

Introduction: Among patients with disseminated malignancy (DMa), bowel obstruction is frequent and associated with high morbidity. Since preoperative risk stratification is critical, we sought to compare three common risk stratification methods, American Society of Anesthesiology (ASA) classification, the Charlson comorbidity index (CCI) and the modified frailty index (mFI).

Methods: We identified 1,928 DMa patients with bowel obstruction who underwent an abdominal operation from 2007-2012 in the American College of Surgeons National Surgical Quality Improvement Program. Multivariate logistic regression analyses was performed to determine predictors of 30-day serious morbidity, prolonged length of stay (LOS) and 30-day mortality. Receiver operating characteristics' areas under the curves (AUCs) for ASA, CCI and mFI and mortality were assessed.

Results: Serious morbidity and mortality rates were 20.4%, and 14.8%. ASA and CCI scores did not predict serious morbidity or prolonged LOS ($p>0.05$), but did predict mortality ($p<0.05$). MFI did not predict prolonged LOS, but did predict mortality ($p<0.05$). There was no significant difference in ASA, CCI, and mFI AUCs for mortality ($p>0.05$).

Conclusion: ASA, CCI and mFI were limited in their ability to predict postoperative adverse events among DMa patients undergoing surgery for bowel obstruction. These data suggest that a more tailored preoperative risk stratification tool is indicated for this at-risk population.

Kathryn Wagstaff

Causes and treatment of recurrent symptoms after first rib resection for thoracic outlet syndrome

Kathryn Wagstaff, Ralph Davis, Misty Humphries, MD, Julie Freischlag, MD

Introduction: Understanding causes of Thoracic Outlet Syndrome (TOS) treatment failure improves risk counseling and development of post-operative treatment plans. We aimed to classify causes for recurrent symptoms in all patients undergoing first rib resection and anterior scalenectomy for TOS.

Method: Patients presenting to the TOS clinic with recurrent symptoms after prior first rib resection were extracted from a prospective TOS database and classified by the cause of recurrent symptoms and treatment. Outcomes were compared using descriptive statistics.

Results*:* Over a three-year period 156 patients were evaluated and diagnosed with TOS. 22 patients presented for recurrent symptoms after first rib resection. Sixteen were treated for neurogenic TOS, one for arterial TOS, and five for venous TOS. The cause of recurrent symptoms in nTOS patients was repeat injury (n=5), dense scar tissue (n=10), or residual cervical rib (n=1). Four patients with vTOS presented with new onset symptoms including numbness and tingling due to residual posterior ribs (n=3) or extensive scar tissue with calcification (n=1). The final patient presented with pain and swelling after subclavian vein stent thrombosis. In both neurogenic and venous cases where residual rib was present, repeat surgical resection resulted in complete symptom resolution. In the 15 nTOS patients with recurrent symptoms due to scar tissue or recurrent injury, TOS specific physical therapy was more effective at relieving symptoms than nonspecific physical therapy.

Conclusion: Care must be taken with first rib resection for vTOS cases to ensure complete posterior rib resection to prevent new onset neurogenic symptoms. For patients with recurrent nTOS symptoms, a physical therapy protocol designed for TOS with adjunct pain management improves outcomes over use of nonspecific physical therapy.

Ivonne Palma, BS

The Use of a Furosemide Stress Test (FST) for Assessment of Discarded Donor Kidneys in an Ex-Vivo Normothermic Perfusion Model (EVNP)

I J Palma[1], Y Smolin[1], S Kabagambe[1], A Perry[1], I Palma[1], J Sageshima[1], J. McVicar[1], C. Troppmann[1], C. Santhanakrishnan[1], R V Perez[1].

[1]**Department of Transplant Surgery**

Background: Studies have shown that EVNP has the potential to assess viability and function of high-risk deceased donor kidneys. A diuretic response to furosemide has been used clinically to determine which patients will recover from acute kidney injury (AKI).

Methods: Paired human kidneys from 5 deceased donors with AKI initially procured for transplantation but discarded were placed on 3 hours of EVNP pressure dependent cardiopulmonary bypass system at 37^{o}C. Perfusate contained packed red blood cells (PRBC) with or without a one-time dose of Furosemide (10mg), FST+ and FST-, respectively. All kidneys were supplemented with parenteral nutrition and insulin. Exogenous creatinine (0.06g) was added to the system to assess glomerular filtration. Pump parameters were monitored every 15 min. Blood and urine samples were collected every 30 min and analyzed for pH, oxygen, electrolytes, creatinine, and lactate.

Results: Mean donor age was 55 + 12.17 years, kidney donor profile index (KDPI) was 80.2 + 17.2, terminal creatinine was 3.06 + 1.39 mg/dL, and cold ischemia time was 45.52 + 11.9. Response to FST was defined as moderate (urine difference > 15cc/hr), low (urine difference <15cc/hr) or no response. 2 kidneys showed a moderate response to FST in total urine output after 3 hours of EVNP, 2 showed a low response to FST, and 1 had no response to FST. Kidneys that had a moderate response to FST had higher blood flow and lower resistance over time and had lower creatinine and lactate perfusate levels.

Conclusion: Injured kidneys on EVNP may demonstrate both a hemodynamic and diuretic response to FST. The potential usefulness of the FST inevaluating high risk kidneys on EVNP needs further investigation.

Ralph Davis

Early Surgery is as Effective as Delayed Surgery for Patients with Severe Limitations from Neurogenic Thoracic Outlet Syndrome

Vascular Surgery, Ralph Davis, Kathryn Wagstaff, Julie Freischlag MD, Misty Humphries MD

Introduction: Patients with neurogenic Thoracic Outlet Syndrome live with daily discomfort that may affect activities, strain personal relationships, and limit work ability. This study compares outcomes of early first rib resection and anterior scalenectomy to patients who receive delayed surgical treatment.

Methods: All patients presenting for neurogenic Thoracic Outlet Syndrome (nTOS) are enrolled in a prospective database. Patient demographics, personal disability from symptoms, and outcomes after surgery were recorded and compared using Chi-square analysis for categorical variables and test for continuous variables.

Results: Sufficient data for analysis was recorded for 31 nTOS patients, 12 patients received early surgery, while 19 patients underwent TOS specific physical therapy followed by surgery. In the early group 7 patients had symptoms for over one year while 16 patients in the late group (58% vs. 84%, p=0.12) had prolonged symptoms. There were no differences in the mean pain scores (5.6 vs. 4.3, p=0.29) or work ability (6.4 vs. 4.6, p=0.29); however, patients in the early group had symptoms that interfered more with joy of life (6.2 vs. 3.5, p=0.08). Two patients in the late group had complete resolution of symptoms; however, most patients had only partial resolution of symptoms (early=10, late=9, p=0.15). There was also no difference in the number of patients that returned to work in the early vs. late group (5 vs 8, p=0.39).

Conclusion: In this difficult treatment group, understanding personal limitations using objective survey measures aids in post-operative expectation counseling, but pre-operative physical therapy may not offer any additional benefit to patient outcomes.

Guy W. Jensen, MD

Title: The Burden of Intentional Injury from 11 Years of Conflict in Baghdad, Iraq

Jensen, G[1]. Lafta, R[2]., Burnham, G[3]., Haagsma, J.,[4] Hagopian, A[5]., Flaxman, A.[4,5]

UC Davis Department of Surgery, 2. Al Munstansiriya University, College of Medicine, 3. Johns Hopkins School of Public Health, 4. Institute for Health Metrics and Evaluation, 5. University of Washington School of Public Health.

Introduction: The Disability Adjusted Life Year has become the primary metric for the measurement of disability and premature mortality. This study applies the methods of the Global Burden of Disease project to calculate the burden of intentional injuries stemming from 11 years of conflict in Baghdad.

Methods: Lafta et al. completed a randomized cluster household survey to capture information regarding injuries and disabilities from 2003-2014. The Global Burden of Disease (GBD) metrics for life expectancy and disability weights (DW) were applied to this data to calculate the burden of injury stemming from intentional injuries. Global life expectancy as used in the GBD and Iraqi specific life expectancy were utilized in the calculation.

Results: Using the GBD life expectancy tables the 11 years of conflict resulted in 3,729 years of life lost (YLL) for the study sample. When Iraqi life expectancy based on World Bank data was used, the sample populations experienced 2,421 YLLs. Significant progress has been made toward the calculation of years lived with disability, specifically, DWs have been successfully mapped onto the study data based on pattern and mechanism of injury.

Conclusion: The GBD methodology has not previously been applied to conflict populations. This study may serve to establish a methodology for capturing the burden of injury for a population in conflict. Next steps will include completion of the years lived with disability (YLD) calculations, and utilization of Baghdad population estimates to expand the results to the city at large.

Ping Song, MD

Title: Pediatric Consent for Urgent but Non-emergent Procedures:

UC Davis Quality Improvement Initiative

Nguyen, Christine T. BS; Song, Ping MD; Patel, Nirav B. MD; Wong, Michael S. MD

Introduction:

Pediatric consent can present challenges and one such case – KP, a 3-year-old girl was placed under child protective services (CPS) during her stay as her mother was deemed unfit and relatives were unqualified to provide consent. This case study reviews steps taken and obstacles faced in KP's case during the process of obtaining procedural consent.

Methods:

Using our institutional electronic medical record system, in conjunction with our hospital's social worker and risk management team, we reviewed KP's case and identified key obstacles in obtaining consent. We constructed a timeline of her stay, including her prolonged consent process and subsequent treatment course. Furthermore, a cost analysis will be obtained to show the health care cost benefits that can continue to improve the academic health centers.

Results:

We created an easy to access algorithm that we will add to our hospital's Intranet and Risk Management website. The algorithm will help guide residents and physicians to acquire the necessary consent forms in these difficult cases in a timely manner. Included on the website is contact information for the crisis social worker, available 24/7. Lastly, an informational card will be distributed to each incoming class of interns and residents. The card will contain the website information as well as the social worker's and risk management team's contacts.

Conclusion:

Our algorithm streamlines obtaining consent in difficult situations involving pediatric patients by bridging the healthcare system with the legal system under which it operates. The cost benefit analysis (in progress), in addition to the systematic approach we propose will help to improve health care quality while retaining quality of care for our most vulnerable patient population.

Laura Galganski, MD

Early Closure of the Abdomen After Laparotomy for Abdominal Compartment Syndrome in Burn Patients Does Not Lead to Complications

Laura Galganski MD, David Greenhalgh MD, Soman Sen MD, Tina Palmieri MD

Department of Burn Surgery

Introduction: Abdominal compartment syndrome (ACS) is associated with high morbidity and mortality. Few data exist on the sequelae of decompressive laparotomy in burn surgery. Fluid and protein loss, malnutrition, loss of abdominal domain, enteroatmospheric fistulas, ventral hernias and increased hospital stay are all associated with delayed or lack of closure of the open abdomen.

Methods: We conducted a retrospective review of pediatric and adult burn patients with abdominal compartment syndrome admitted to two regional burn centers from 2005-15. Percent total body surface area (TBSA) burn, time and method of diagnosis of ACS, and time to abdominal closure were examined. Complications including death, recurrent abdominal compartment syndrome, repeat laparotomy, deep surgical site infection, fistula formation, and small bowel obstruction following closure were recorded.

Results: Twenty-five patients with isolated burn injuries developed abdominal compartment syndrome (11 adults and 14 children). Mortality rate was 48% (27% in adults, 64% in children). Mean TBSA involved was 67%. The abdominal wall was closed primarily in 10 patients an average of 5 days after laparotomy, with a range of 1-18 days. None of those with primary closure died within 30 days, developed a small bowel obstruction, enteroatmospheric fistula, or deep surgical site infection.

Conclusion: Aggressive closure of the abdomen following laparotomy for ACS after burn injury was safe and likely avoids fluid and protein loss, malnutrition, loss of abdominal domain, enteroatmospheric fistulas and ventral hernias.

Guy W. Jensen, MD

TITLE: Hunger and Interpersonal Violence in School Age Children in Zambia: A Sub-Analysis of the Global School-based Health Survey

Jensen, G.[1], Goodman, L.[1], Farmer, D.L.[2]

UC Davis Department of Pediatric Surgery

Introduction

Children in 6 countries in Sub-Saharan Africa reporting hunger within the past 30 days on the Global School-based Health Survey have previously been demonstrated to have an increased risk of injury due to any cause, using aggregated data. However, the effects of hunger on injury has not been widely assessed with regard to assault or abuse mechanisms, or on a country-specific level.

Methods

The GSHS was conducted by the Ministry of Health in 2004 among 2,257 children in grades 6-10, in cooperation with the U.S. Centers for Disease Control and Prevention (CDC). The data is publicly available through the CDC. Multivariate logistic regression was used to assess the relationship between self-reported hunger, type of injury, and mechanism of injury.

Results

There was a significant association between female gender and reporting hunger ($p<0.01$). Children reporting that over the previous 30 days they had gone hungry “most of the time” or “always” were 2.41 times as likely to report being assaulted or abused over the previous year (95% CI 1.32-4.42) compared to children reporting going hungry “sometimes,” “rarely,” or “never.” This increased risk persisted when controlling for gender (OR= 2.65, 95% CI 1.41-4.99).

Conclusion

Self-reported hunger appears to be associated with being the victim of assault, attack, or abuse in children in Zambia. Future analysis and study is warranted to further assess whether this is the result of risky food seeking behavior, competition, or other poverty-related factors.

Sean Judge, MD

TITLE: Hunger and Interpersonal Violence in School Age Children in Zambia: A Sub-Analysis of the Global School-based Health Survey

Jensen, G.[1], Goodman, L.[1], Farmer, D.L.[2]

UC Davis Department of Pediatric Surgery

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James C. Becker, MD

Secondary Renal Injury In The Absence Of Shock In A Murine Pulmonary Contusion Model Of Trauma

James Chin Becker MD*, Robert R. Rigor, PhD, Ian E. Brown MD, Ph.D.,

Joseph M. Galante MD

UCDMC Department of Surgery, Division of Trauma

Introduction: In severe trauma, tissue factor is mobilized on leukocytes resulting in persistently elevated serum tissue factor levels. The clinical consequences of this tissue factor mobilization are unknown. We hypothesized that injury-mediated systemic tissue factor mobilization in severe trauma drives microvascular thrombosis and resultant parenchymal inflammation in distant uninjured organs.

Methods: A weight drop model of pulmonary contusion was developed. Mice were subjected to sham surgery (n=3), 15% hemorrhage (n=2), pulmonary contusion (n=3), or combined hemorrhage with contusion (n=4). Leukocytes were purified from terminal blood and analyzed by flow cytometry for expression of tissue factor (CD142). Frozen kidney sections were prepared for hematoxylin-eosin (H&E) staining and immunohistochemistry staining for fibrin and the inducible adhesion molecule ICAM-1.

Results: $CD11b^{+}$ leukocytes in blood collected from mice after lung contusion demonstrated a significant increase in tissue factor expression compared to sham uninjured mice. Kidney sections were stained with hematoxylin and eosin or immunostained for fibrin, and underwent double-blinded evaluation. This demonstrated significantly more clot in tissues collected from mice with lung contusion, compared to shams. Co-localization of ICAM-1 with fibrin staining in mice after hemorrhage, contusion, or combined injury was significantly increased compared to sham mice.

Conclusions: We have demonstrated early tissue factor mobilization after pulmonary contusion resulting in renal microvascular thrombosis with associated inflammation. This may represent a previously undescribed effector of distant organ injury, early after trauma.

Maria Ceja–Rodriguez

Hospital Wound and Revascularization Volume Does Not Decrease Lower Extremity Amputations for Ischemic Wounds

Vascular Surgery

Maria Ceja-Rodriguez, Yu-Fung Lin, Chin-Shang Li, Joy Melnikow, Misty D. Humphries

OBJECTIVE: Studies of patients with lower extremity amputations due to peripheral artery disease suggest treatment in regions with higher volume of revascularization procedures may have a lower risk of amputation. We hypothesize that patients with lower extremity (LE) ischemic ulcers evaluated at hospitals with high volume ulcer management and revascularization experience have decreased risk of major amputation.

METHODS: Using statewide data we characterized all hospitals by volume of lower extremity ulcers seen yearly as low, medium, and high. Hospitals were categorized by revascularization procedures as none, low, medium, or high. Multivariable logistic regression was performed to study how hospital volume affects a patient's risk of major amputation at 1 year.

RESULTS: From 2005 to 2013, 87,316 patients with LE ulcers were evaluated at 328 California hospitals. Of those patients, 35,989 had peripheral artery disease (PAD) and 51,327 had PAD + Diabetes Mellitus (DM). The 1-year major amputation rate was 4.1% in the PAD group and 13% in the PAD/DM group ($p<0.001$). In both the PAD and PAD/DM populations, evaluation at a high volume wound hospital did not decrease the risk of amputation at 1 year (PAD OR= 1.07, 0.93-1.2, PAD/DM OR= 0.94, 0.87-1.01). In addition, treatment at a high-volume revascularization hospital did not decrease the risk of amputation at 1 year (PAD OR= 0.98, 0.66-1.47, PAD/DM OR = 0.92, 0.76-1.11). Patients were hospitalized in 74,207 (85%) cases, while 5,396 (6%) were seen in the emergency room and 7,713 (8%) were treated completely in the outpatient center. Patients that could be treated completely in the outpatient setting were less likely to undergo amputation compared to those that required hospitalization or presented to the emergency room (OR= 1.21, 1.11-1.32 & 1.34, 1.18-1.51 respectively).

CONCLUSIONS: Patients with ischemic ulcers and diabetes have a threefold higher risk of amputation than those with PAD alone; patients treated entirely in outpatient settings were likely to have early disease presentation and were less likely to need amputation. Early identification of high risk wounds through implementation and dissemination of specialty wound classification systems may be able to expedite outpatient care and decrease amputation rates.

Meryl A. Simon, MD

Title: The Effect of Hypothermia on Limb Ischemia-Reperfusion Injury in a Porcine (Sus scrofa) Trauma Model.

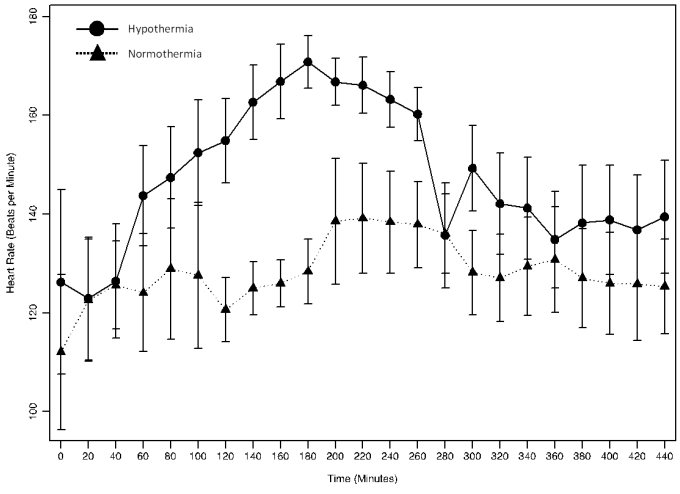
Authors: Meryl A. Simon, MD, Anders J. Davidson MD, Guillaume Hoareau DVM, Emily Tibbits MD, Erik DeSoucy MD, Lee-Way Jin MD, J. Kevin Grayson DVM, PhD, M. Austin Johnson MD, PhD, Timothy K. Williams MD.

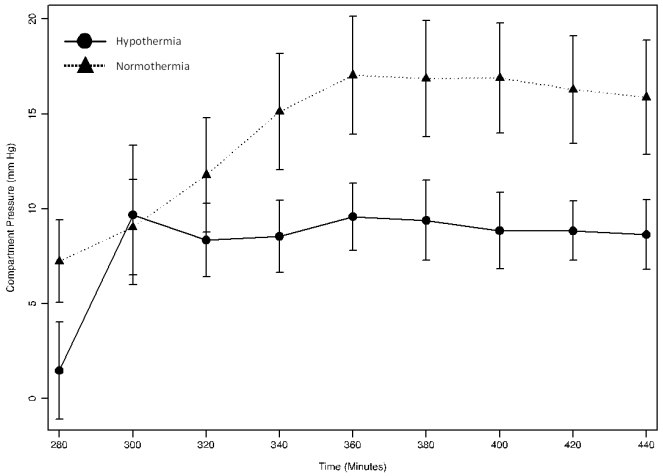
Introduction: We hypothesized that the use of external regional hypothermia would decrease ischemic burden and mitigate reperfusion injury in a swine trauma model.

Methods: 12 swine were anesthetized, instrumented, underwent a 15% total blood volume hemorrhage, and were randomized to hypothermia or normothermia (control). An aortic occlusion balloon was inflated in zone III to create complete lower extremity ischemia for 4 hours, followed by deflation, transfusion of shed blood, and 3 hours of automated critical care. Physiologic parameters were continuously recorded, and laboratory and pathology samples were obtained at predetermined intervals.

Results: There were no significant differences between groups at baseline or during the initial 30 minutes of hemorrhage. Maximum Creatine Kinase was significantly lower in the hypothermia group (median [interquartile range] = 3,445 U/mL [1,022] compared to the normothermia group (22,544 U/mL [7,951]) ($p = 0.004$). Serum myoglobin and histopathology results are pending. Additionally, mean arterial blood pressure and heart rate (Figure 1) were significantly higher among the hypothermic animals through the occlusion period ($p = 0.006$ and 0.05, respectively) and compartment pressures (Figure 2) were significantly lower during critical care ($p = 0.03$).

Conclusion: In an animal model of tourniquet simulated complete lower extremity vascular occlusion, external regional hypothermia decreased markers of muscle damage and improved heart rate and mean arterial pressure.





Nirav Patel, MD, MS, JD

Plastic Surgeon Wannabes: Dangers of Non-Core Aesthetic Providers

Nirav Patel, MD, MS, JD[1], Demetrius Coombs, BS[2] and Lee Pu, MD, PhD, FACS[1]

(1) Division of Plastic Surgery, UC Davis Medical Center, Sacramento, CA

(2) Drexel University College of Medicine, Philadelphia, PA

Introduction: Demand for aesthetic surgery in the U.S. is ever-increasing. The modern era demonstrates commoditization of plastic surgery. Market growth has enabled "non-core" providers to operate beyond scopes of practice, resulting in severe patient harm, or death. Confusion persists over what constitutes a "plastic" versus "cosmetic surgeon." Many states grant medical licenses enabling physicians to perform any procedure. Non-core physicians often employ various techniques to lure patients and advertise competitive prices. Patients incompletely understand training differences and may seek cosmetic surgeons to save money.

Methods: We reviewed the literature, highlighting egregious offenses impacting patient safety.We conducted state-by-state analysis of jurisdictions allowing non-core providers to practice aesthetic surgery. We analyzed membership of ABCS, comparing them to ASPS, ASAPS, AAFPRS, and ASOPRS. Our analysis afforded an understanding of what cosmetic procedures non-core providers are permitted to perform and where.

Results: A proportion of physicians trained in IM, EM, pediatrics, urology, and anesthesia practice beyond their scope. Out of scope practice remains greatest in the Southeastern U.S. and lowest in the Northeast. Numbers for ABCS were not publically available. In Nevada, dentists and dental hygienists seek to administer Botox and dermal fillers. Optometrists were blocked in California, Delaware, Illinois, and Alaska from performing certain procedures. In Georgia and Louisiana, proposed legislation will require advertising as 'board-certified.' Legislation in Maryland will demand use of accredited facilities.

Conclusion: The ABMS does *not* include the ABCS. We advocate for accredited facilities, insurers, and hospitals requiring ABMS board-certified providers and encourage laws that require physicians specify their certifications. Specialty societies should engage in advocacy on local, state, and national levels. The permissive climate in aesthetic surgery threatens patient safety. Progressive legislation is imperative to ensure patients' well-being. Our findings provide incentive to the ASPS and ASAPS to declare a unifying position on scope of practice and patient safety, and encourage more rigorous regulation in aesthetic surgery.

Abhishek Jairam, BA

Department of Plastic and Reconstructive Surgery

Title: Pressure Sores and SIRS: UC Davis Quality Improvement Initiative

Authors: Abhishek Jairam, BA; Ping Song, MD; Nirav B. Patel MD, MS, JD; Michael S. Wong, MD.

Background: The National Pressure Ulcer Advisory Panel estimates pressure sore care to approach $11 billion annually, with a cost of between $500 and $70,000 per individual pressure sore. It is not uncommon for pressure sores to be treated as the primary health concern for patients prior to managing more life-threatening underlying pathologies that may be exacerbating the patients' wounds. We aim to identify patients that met systemic inflammatory response syndrome (SIRS) criteria at Emergency Department presentation that were referred to Plastic and Reconstructive Surgery (PRS) for pressure sore debridement prior to a complete medical work-up. We hypothesize that a restructuring of the ED triaging system would help conserve hospital resources, reduce costs of pressure sore management, and improve patient care and outcomes by first treating primary, underlying pathologies.

Methods: This is a retrospective chart review of 21 patients from June to December 2016 who presented to the UCD ED with a pressure sore, met SIRS criteria, but obtained a plastic surgery consult prior to a full medical work-up. We defined SIRS based on standardized criteria: Temp > 100.4°F or < 96.8 °F, Pulse > 90, RR > 20 or PaCO2 < 32 mm Hg, WBC > 12,000, < 4,000, or > 10% bands.

Results: 66.67% of patients (14/21) met SIRS criteria at ED presentation for their pressure sores. Of these SIRS patients, 42.9% (6/14) had urosepsis, 35.7% (5/14) had sepsis of unknown origin, 35.7% (5/14) had osteomyelitis, 7.1% (1/14) had a urinary tract infection, 7.1% (1/14) had acute respiratory distress syndrome, and 7.1% (1/14) had necrotizing fasciitis. The mean pulse and WBC counts for SIRS patients were 107.4 and 17.0, respectively.

Conclusion: As many as 66.7% of patients admitted into the UCD ED with pressure sores also met SIRS criteria and received a PRS consult prior to a full medical work-up. We propose a new algorithm for triaging pressure sore patients be established in the UC system that prioritizes a medical work-up to exclude systemic infection prior to a Plastic Surgery consult in order reduce cost, conserve resources, and improve patient care.

Laura F. Goodman, MD

Pediatric Surgical Capacity in Mongolia

Laura F. Goodman MD[1], Sarnai Erdene[2], Diana L. Farmer MD[1], Erdenetsetseg Chuluun MD[2]

1. University of California Davis Health, Department of Surgery, Division of Pediatric Surgery

2. Mongolian National University of Medical Sciences Department of Surgery

Introduction: Mongolia has only one major children's hospital. This study is a national evaluation of pediatric surgical capacity.

Methods: Data was collected using the PediPIPES (pediatric personnel, infrastructure, procedures, equipment, and supplies) tool at 10 general hospitals and 3 regional diagnostic and treatment centers (RDTCs). Procedure questions pertained to children <18 years. Fisher's exact test was used where appropriate.

Results: Every hospital had general surgeons (2-7) and pediatricians (3-9) but only five (38%) had pediatric surgeon(s). One facility had no anesthesiologist; the others had 2-13.

Pediatric hospital beds numbered 12-50, median 25. All facilities had consistent running water and electricity. All had laboratories. All but one had a blood bank. All but one facility had postop units. Eight of 10 general hospitals and all RDTCs had a NICU. All but 3 had pediatric ventilators.

All facilities reported treating open and closed factures, abscess, and burns. All facilities did laparotomy, appendectomy, bowel resection and anastomosis, stoma creation and closure, hernia repair. Nine removed foreign body, 9 treated testicular torsion, 11 did orchiopexy. Nine did thoracotomy and four repaired abdominal wall defect. One site repaired esophageal atresia. Nine reported laparoscopic surgery, and four did pyloromyotomy. All facilities provided regional, spinal, ketamine, and general anesthesia. There were no significant differences between RDTC and general hospital procedures, except non-operative treatment of clubfoot, which was not available at RDTCs.

All facilities had basic OR equipment (lights, cautery, drapes, etc.). Nine had pediatric surgical instruments always available and 11 had suture. Nine had pediatric endotracheal tubes, 5 had ≤12 french (fr) nasogastric tubes, 3 had urinary catheters ≤6 fr. Only 1 facility had chest tubes ≤12 fr. Eight had any endoscope. Twelve had pulse oximetry, 12 had apnea monitors.

Conclusions: Basic infrastructure was universally available at the surveyed facilities, as were surgeons. Patterns of procedure availability and equipment limitations may be further explored, however, as the data indicate a shortage of appropriately sized consumable supplies to treat all age ranges at all centers.

Andrea Kulinich

A Patient Derived Xenograft Model for Childhood Vascular Anomalies

Author(s): Andrea Kulinich, [1] David E. Sahar, [1,2] Craig W. Senders, [3] Hakan Orbay [1]

[1]UCDMC Surgical Bioengineering Laboratory; [2]UCDMC Division of Plastic Surgery; UCDMC Department of Otolaryngology [3]

Introduction: Our group previously presented a novel, nanoparticle based treatment for childhood vascular anomalies. Previously, we used an animal model that was established using mouse hemangioendothelioma cells. Currently, we are working on a patient derived xenograft (PDX) model using human vascular anomaly specimens in order to obtain a more clinically relevant model.

Methods: We obtained samples from a childhood vascular malformation removed from a patient at UC Davis Children's Hospital. We used half of the sample for explant cultures to obtain a cell line. The other half was cut into approximately 0.5 mm pieces and implanted to the dorsum of NSG mice (n=3) surgically. The tumor growth was followed by digital caliper measurements for seven weeks.

Results: Post-operative pathological exam revealed that the tumor was an arteriovenous malformation. We observed a heterogeneous population of cells in the explant cultures two weeks later. Some of the cells exhibited large cytoplasm and round nuclei resembling vascular endothelial cells in cell cultures. Tumor growth rate made a peak approximately three weeks after implantation and all the tumors started to regress after fourth week. By the end of seventh week there were no detectable tumors on the animals. The maximum average tumor volume was 159.4 ± 14.0 mm^3.

Conclusion: Our initial results suggest that it is possible to obtain a vascular anomaly cell line from human samples. PDX animal model showed limited growth most likely due to the growth patterns of vascular malformations. Faster growing anomalies, such as infantile hemangiomas may yield faster growing tumors.

Melissa Vanover

Title: High Cost of Pediatric Falls from Buildings

Melissa Vanover, Jacob Stephenson, Shinjiro Hirose

Department of Pediatric Surgery

Introduction: Pediatric accidental falls from buildings were widely publicized in the 1970s in New York and found to be easily prevented with cheap window guards (average $20-40). The number of accidental falls requiring hospitalization in California steadily decreased until the early 2000s, but has plateaued at approximately 150-200 per year.

Method: The UC Davis Trauma One Database was used to identify children less than 14 years old who were admitted to UC Davis between October 2012 and May 2016 with diagnosis code E882 (ICD-9) or W13 (ICD-10). Patients were excluded who fell less than 10 feet or if fall height was not provided. Cost data was obtained from Vizient.

Progress: 121 children were admitted to UCD after falling more than 10 feet from a building. Most of these children were boys (58%) with an average age of 4 years old. Most falls occurred at home (77%) with an average estimated fall height of 17 feet (1-2 stories). Loss of consciousness was reported or suspected in 42% of children. Head CT was performed for 91% of children, and intubation required for 19%. The most common injuries were contusions or abrasions (64%), TBI (54%), skull or facial fractures (50%), and extremity fractures (20%). Surgical procedures were required for 33% of admitted children, and some form of therapy was required for 16%. The average length of stay was 2.6 days. However, for the 44 children admitted to the ICU (36%), the average ICU stay was 2.7 days with an average total stay of 4.8 days. For children who required a ventilator, the average number of ventilators days 3.9 days. Most children were able to be discharged home (91%); however, 7 children required inpatient rehab (6%), and 1 child died. Cost information was available for 74 patients with an average cost of hospitalization of $12,766 and average associated charges of $113,454. Most children (75%) were insured by MediCal.

Conclusion: Children who fall from higher than 1 story are often toddlers, which results in frequent head injuries. While most children were discharged home, admission to the ICU, need for ventilatory support, and surgery were common. The high cost of hospitalization, for both the family and society, far outweighs the cost of a window guard.

Robert J. Doiron, MD

Title: Successful implementation and improvements identified with in-situ simulated adult trauma resuscitation scenarios

Authors: Doiron, R*; Julie, I^; Galante, JM*; Kiefer^, M; Al-Jahany, M^; Pe, M^; Schegg, T^; Salcedo, ES*

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Introduction: In-situ simulation trauma resuscitation cases were started as a quality improvement (QI) project in 2014. As part of inter-disciplinary education and QI, the goals were to identify system and provider level points of improvement for all teams caring for critically injured trauma patients.

Methods: Two cases per month, derived from cases the trauma committee on QI identified, were deployed as real-time activations (in-situ) with the ACS accredited Center for Virtual Care staff using high fidelity mannequins (Laerdal 3G SimMan) to run the scenarios. Structured debriefing took place focusing on leadership, technical trauma resuscitation skills and communication. Surveys evaluating communication, video review data, and surveys obtaining participant perceptions and feedback were collected.

Results: In-situ simulations were implemented successfully. The team members noted improved use of personal protective equipment, closed-loop communication, team leader identification, nursing communication and technical skills (*ie*. use of pelvic binders), and upgrading acuity when criteria was met. Video review data support these findings (statistical analysis is pending). In addition, identification of system issues with crowd control and relocating necessary equipment occurred. Trauma and EM faculty, and RN educators consistently identified that chief residents communicated clearly and medically accurate information. Closed loop communication was performed less effectively. Survey data from participants indicate the education benefit and perceived improvements in clinical practice.

Conclusion: We illustrated the feasibility of using in-situ simulations with cases based on specific QI events. Our next steps will be to continue the current simulations, emphasize effective closed loop communication, continue to review videos of the scenarios to evaluate for improvements over time and identify additional system issues. Additionally, we are identifying pre- and post- intervention clinical data from the trauma committee's QI database related to these QI cases, which will help track behavior changes in clinical practice.

Matthew R. Zeiderman, MD

Decreased incidence of small bowel obstruction following flap based abdominoperineal reconstruction.

Matthew R. Zeiderman MD, Katharine Hinchcliff MD, Linda M. Farkas MD, David E. Sahar MD; Divisions of Plastic & Colorectal Surgery

Introduction: Small bowel obstruction (SBO) is a common sequela in patients who undergo abdominoperineal resection or pelvic exenteration; the problem may be exacerbated when patients receive neoadjuvant radiation therapy for associated malignancy. We hypothesize that reconstruction with a vascularized musculocutaneous rectus abdominis or gracilis flap decreases incidence of SBO for these patients by 1) decreasing pelvic dead-space and lowering risk of bowel strangulation and obstruction, and 2) providing healthy vascularized tissue to the wound bed, which promotes healing and decreases adhesion formation.

Methods: The UC Davis Cancer Database was manually reviewed for all patients who underwent abdominoperineal resection and pelvic exenteration (2004-present). Closure method, complications, and patient demographics were recorded.

Results: Forty-four patients were identified. Six underwent flap reconstruction. Thirty-eight had primary closure. Nine patients with primary closure developed bowel obstruction (24%). One bowel obstruction was documented in the flap group. (15%) (p=0.26, OR 1.55, CI 0.16-15.0)

Conclusions: The trends in this small sample indicate a clinically significant 24% incidence of bowel obstruction in patients whose extirpation was closed primarily, as compared to one in six patients (15%) who had flap reconstruction (p= 0.26; OR 1.55, CI 0.15-15.0). Primary closure demonstrated SBO as a notable complication (p=0.26), but a statistically significant conclusion cannot be drawn with this sample size. Expanded database searches in collaboration with other institutions would yield more conclusive results with increased study power.

3-Dimensensional Modeling of the Stomach To Address Complications After Sleeve Gastrectomy

Jawad T. Ali MD[1], Julian R. Perks PhD[2], Brandon Dyer MD[2], Mohamed R. Ali MD[1]

1. Dept of Surgery, Foregut and Endometabolic Surgery, 2. Dept of Radiation Oncology

Introduction: Twisting and stenosis of the gastric lumen are devastating complications after sleeve gastrectomy leading to severe dysphagia. Treatment planning is difficult due to complex anatomy and limited revisional options. 3-Dimensional (3D) modeling based on computed tomography (CT) can help in understanding the specific anatomical layout of the sleeve gastrectomy as well as help in planning future interventions including endoscopic dilation or stent placement and revision to Roux-en-y gastric bypass.

Methods: Initial modeling was performed on a CT scan of a normal stomach distended with oral contrast for feasibility (Figure 1). We then modeled the stomach of a patient with luminal stenosis and twisting after sleeve gastrectomy for help with treatment planning (Figure 2). Using Pinnacle software, contours were made of the gastric lumen that was distended with oral contrast on axial CT slices. These slices were interpolated to create a 3D model using Raystation. We have discussed 3D printing these models with the Biomedical Engineering Department.

Preliminary results: Initial results show feasibility of our method of creating 3D models from CT data. Also, the model of the post-gastrectomy patient was useful in planning future interventions.

Conclusions: 3D modeling of patients with stenosis or twisting after sleeve gastrectomy shows promise in helping visualize anatomical details and plan future treatment. We will continue to develop this technique and add to our patient series.

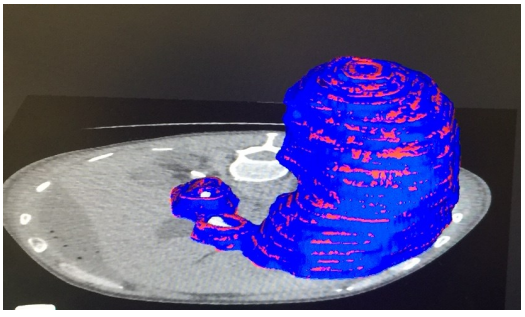


Figure 1. 3D model of normal stomach

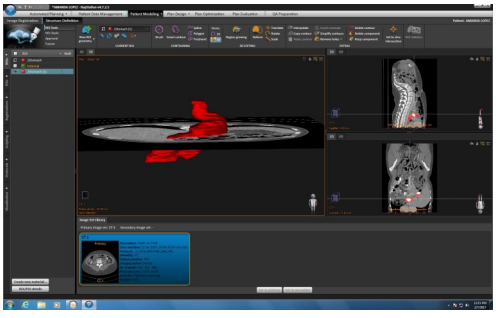


Figure 2. 3D model of stomach with stenosis after sleeve gastrectomy

Andrew M. Perry, MD

The Impact of the Kidney Allocation System on Outcomes for Kidneys with KDPI > 85%

A Perry, J Sageshima, C Santhanakrishnan, J McVicar, C Troppmann, A De Mattos and R Perez

Division of Transplant Surgery

Introduction: Single center outcomes were examined to assess the impact of the implementation of the Kidney Allocation System (KAS) on outcomes for kidneys with KDPI >85%.

Methods: A retrospective analysis was performed for all kidney transplants performed at a single center using kidneys with KDPI > 85% between 3/2012 and 7/2016. Kidneys from donors < 20 kg were excluded. Recipient outcomes and donor characteristics for transplantations prior to KAS were compared to those after its implementation on Dec 4, 2014.

Results: Kaplan-Meier curves show no statistical difference in allograft survival. 6-month graft survival before and after KAS was 92.2% and 97.6%, respectively. Imports increased from 71% to 95% (p=.002). Cold ischemia time (CIT) was unchanged overall, but was lower in regional imports (Table 1). DCD donors increased from 13.7% to 38.1% (p=.007). Comparing a 20-month period before and after KAS, the rate of transplants of >85% KDPI kidneys increased (mean 1.3/month vs 2.5/month).

Conclusion: With implementation of KAS there was an increase in importation of high KDPI kidneys, and more efficient regional utilization suggested by improved CIT with regional imports. Graft survival was unchanged, and exceeded KDPI expected outcomes.

Tajia L. Green, BS

Identifying the source of hyperactivity in the hGR-S1(-349) human glucocorticoid receptor isoform

Tajia L. Green, Stacey M. Leventhal, Debora Lim, Kiho Cho, David G. Greenhalgh

Burn Division, Department of Surgery, UC Davis, and Shriners Hospitals for Children

Introduction: Naturally occurring variations in the human glucocorticoid receptor (hGR) may contribute to variable patient responses to steroid treatment. Our previously reported naturally occurring variant, hGR-S1(-349A), retains intron H between exons 8 and 9 and is missing an adenosine at position 349 which results in early protein termination. The putative protein has a truncated transactivation domain and lacks the DNA and ligand binding domains. hGR-S1(-349A) has no baseline activity but is hyperactive after steroid treatment in comparison to the NCBI reference hGR. Interestingly, when the novel 3' UTR created by the early termination is removed, the activity is lost. The observed hyperactivity may potentially result from a variant isoform that starts at one of the hGR-D alternative translation start sites. However, due to the retained H intron, the C-terminus would significantly differ from the previously reported hGR-D isoforms.

Methods: A series of constructs will be created for hGR-S1(-349A) with the 316 (D1), 331 (D2), and 336 (D3) translation start sites. Subsequently, their activity will be tested in a luciferase assay.

Results: Preliminary Western blot data has identified the possible expression of these novel hGR-D isoforms from the hGR-S1(-349A) construct.

Conclusion: Information from these experiments will allow us to determine if alternative splicing, in combination with alternative translation, contributes to the variability observed in the response to steroids. Understanding these mechanisms may be important in developing personalized care regimens for patients with inflammatory conditions.

John R. Mark

Title: Are Patients with Critical Limb Ischemia Ready for Telemedicine?

John R. Mark; Maria Ceja Rodriguez, BA; Julie Ann Freischlag, MD; Joy Melnikow, MD, MPH; Misty D. Humphries, MD; Vascular Surgery Division

Introduction: Patients with critical limb ischemia (CLI) may face numerous barriers to care including distance and burden of coordinating travel required for multiple inpatient and outpatient visits. We aimed to investigate perceptions and attitudes of patients with CLI to the possibility of providing vascular care through telemedicine.

Method: Patients being treated for Rutherford Class 5 CLI underwent semi-structured interviews with questions focused on current ulcer issues, comfort with current health providers, ability and willingness to see specialists outside their region, and comfort with health care provided through technology. A mixed-methods approach was used to compare responses and develop themes for a larger patient survey.

Results: Eleven patients with a mean age of 60 y/o (35-79 years) were interviewed. Nine patients had internet at home, and 6 of these felt comfortable using technology on their own. Eight patients expressed a "lack of trust" regarding seeing an unknown provider over the internet. Four of these believed an endorsement from their primary care provider could change this perception, but remained "unsure they could form a relationship" with the provider through the internet. Themes of uncertainty for seeing a provider through the internet centered around "security of personal information", "ability to maintain confidentiality" of the visit, and limited ability to "get to know" the provider.

Conclusion: Primary care provider recommendation can improve patient willingness to use technology, but attention must be placed on development of the patient-provider relationship through telemedicine. Using themes developed from this qualitative study, we plan to develop a survey applicable to all patients with CLI to understand their concerns and technological capabilities.

Chad M. Bailey, MD

Title: Dog Bites in the United States from 1958 to 2016: A Systematic Review

Authors: Chad M. Bailey, MD; Katherine M. Hinchcliff, MD; Lee L. Q. Pu, MD, PhD (Division of Plastic Surgery)

Introduction:

Significant effort has been devoted to determining how best to minimize dog bites severe enough to require medical attention. The purpose of this systematic review is to summarize data regarding breed implicated and methods of breed reporting in the peer-reviewed literature on dog bites in the United States.

Methods:

Peer-reviewed articles were identified using PubMed (MEDLINE), EMBASE, Scopus, Google Scholar and the Cochrane Library by two authors (C.M.B and K.M.H.) using the search term “dog bite.” Inclusion criteria included articles with >1 patient reported, report population in the United States, breed identification attempted and trauma sustained from a dog bite. Data regarding patient age, bite location, breed and method of breed identification were extracted and tabulated.

Results:

Prior to 1980, the majority of reported dog bites reported in the literature were attributed to the German Shepherd breed (68.4%). From 1981-2000 German Shepherds still accounted for the largest minority of breeds identified (20.1%), with mixed breeds (19.6%) and Pit Bull type breeds (14.1%) accounting for the 2nd and 3rd largest minorities. Since 2001, Pit Bull type breeds have accounted for the largest subset of dog bites reported in the medical literature (37.5%), with mixed breeds (13.3%) and German Shepherds (7.1%) accounting for the 2nd and 3rd largest minority groups during this same time period. In 1989 the city of Denver banned Pit Bull type breeds within their jurisdiction. Since 2001, literature from the Denver metropolitan area accounted for 34.7% of all dog bites with breed identified in peer-reviewed literature. In that time period, 5.7% of bites in Denver, CO were attributed to Pit Bull type breeds compared to 54.4% in the United States when reports from Denver, CO were excluded.

Conclusions:

To our knowledge, this is the first summary of breed responsible for severe dog bites reported in the peer-reviewed literature, as well as the first report anywhere evaluating the breed specific legislation in the United States. Our data suggest that breed specific legislation may be effective in reducing the incidence of dog bites attributed to breeds that are regulated.

Melissa Loja, MD, MAS

SYSTEMIC ANTICOAGULATION IN THE SETTING OF VASCULAR EXTREMITY TRAUMA

Melissa N. Loja, M.D., M.A.S.; Joseph M. Galante, M.D.; Misty Humphries, M.D.; Stephanie Savage, M.D., M.S.; Timothy Fabian, M.D.; Thomas Scalea, M.D.; John B. Holcomb, M.D.; Nathaniel Poulin, M.D.; Joseph DuBose, M.D.; Todd E. Rasmussen, M.D.; and the AAST PROOVIT Study Group

ABSTRACT

Introduction: There is conflicting data regarding if patients with vascular extremity trauma who undergo surgical treatment need to be systematically anticoagulated. We hypothesized that intraoperative systemic anticoagulation (ISA) decreased the risk of repair thrombosis or limb amputation after traumatic vascular injury of the extremities.

Methods: We analyzed a composite risk of repair thrombosis and/or limb amputation (RTLA) between patients who did and did not undergo ISA during arterial injury repair. Patient data was collected in the American Association for the Surgery of Trauma PROspective Vascular Injury Treatment (PROOVIT) registry. This registry contains demographic, diagnostic, treatment, and outcome data.

Results: Between February 2013 and August 2015, 193 patients with upper or lower extremity arterial injuries who underwent open operative repair were entered into the PROOVIT registry. The majority were male (87%) with a mean age of 32.6 years (range 4-91) and 74% injured by penetrating mechanism. 63% of the injuries were described as arterial transection and 37% had concomitant venous injury. 62% of patients underwent ISA. RTLA occurred in 22 patients (11%) overall, with no significant unadjusted difference in these outcomes between patients who received ISA and those that did not (10% vs. 14%, $p = 0.3$). On multivariable logistic regression analysis, ISA did not prove an independent predictor of RTLA. There was, however, significantly higher total blood product use noted among patients treated with ISA versus those that did not receive ISA (median 3 units vs. 1 unit, $p = 0.003$).

Discussion: In this multicenter prospective cohort, intraoperative systemic anticoagulation was not associated with a difference in rate of repair thrombosis or limb loss; but was associated with an increase in blood product requirements. Our data suggest there is no significant difference in outcome to recommend for or against routine use of ISA for repair of traumatic arterial injuries.

Anders J. Davidson, MD

Comparison of Direct Site Endovascular Repair Utilizing Expandable PTFE Stent Grafts Vs. Standard Vascular Shunts in a Porcine (Sus Scrofa) Model

Anders J. Davidson, MD, Lucas P. Neff, MD, Erik S. DeSoucy, MD, Meryl A. Simon-Logan, MD, Christopher M. Abbot, MD, James B. Sampson, MD, Timothy K. Williams, MD

Introduction: The small diameter of temporary vascular shunts for vascular trauma management may restrict flow and result in ischemia or early thrombosis. We have previously reported a clinical experience with direct, open surgical reconstruction using expanded polytetrafluoroethylene (ePTFE) stent grafts to create a "sutureless" anastomosis as an alternative to standard temporary vascular shunts. We sought to characterize patency and flow characteristics of these grafts compared to standard shunts in a survival model of porcine vascular injury.

Methods: 12 Yorkshire-cross swine received a 2cm long near-circumferential defect in the bilateral iliac arteries. A14-French Argyle shunt was inserted into one randomly assigned artery, with a self-expanding ePTFE stent deployed in the other. At 72 hours, conduit patency was evaluated by angiography. Arterial flow measurements were obtained at baseline, immediately after intervention, and after 72 hours via direct measurement with perivascular flow meters. Blood pressure proximal and distal to the conduits and arterial samples for histopathology were obtained during the terminal procedure.

Results: Angiography revealed no difference in patency at 72 hours (P=1.0). While there was no difference in baseline arterial flow between arteries (P=0.63), the stent grafts demonstrated significantly improved blood flow compared to shunts both immediately after intervention (390±36mL/min vs 265±25mL/min, *p*=0.002) and at 72 hours (261±29mL/min vs 170±36mL/min, *p*=0.005). The pressure gradient across the shunts was greater than that of the stent grafts (11.5mmHg IQR[3-19] vs. 3mmHg IQR[3-5], *p*=0.013). The speed of deployment was similar between the two devices.

Conclusion: Open "sutureless" direct site repair using commercially available stent grafts to treat vascular injury is a technically feasible strategy for damage control management of peripheral vascular injury and offers increased blood flow when compared to temporary shunts. Furthermore, stent grafts may offer improved durability to extend the window until definitive vascular repair. The combination of these traits may improve outcomes after vascular injury.

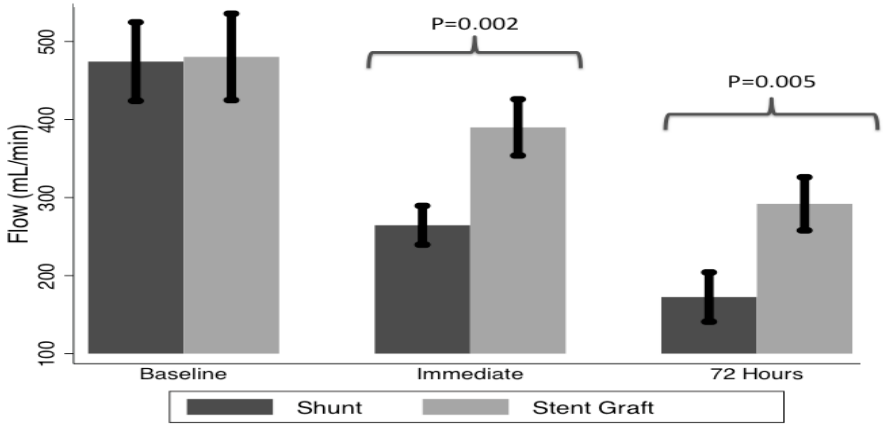


Figure 1: Flow rates at baseline, immediately after device placement, and after 72 hours. (error bars denote SEM)

Sean Judge, MD

Serum CRP and Neutrophil:Lymphocyte Ratio Do Not Predict Survival in Soft Tissue Sarcoma Patients Receiving Neoadjuvant Radiotherapy

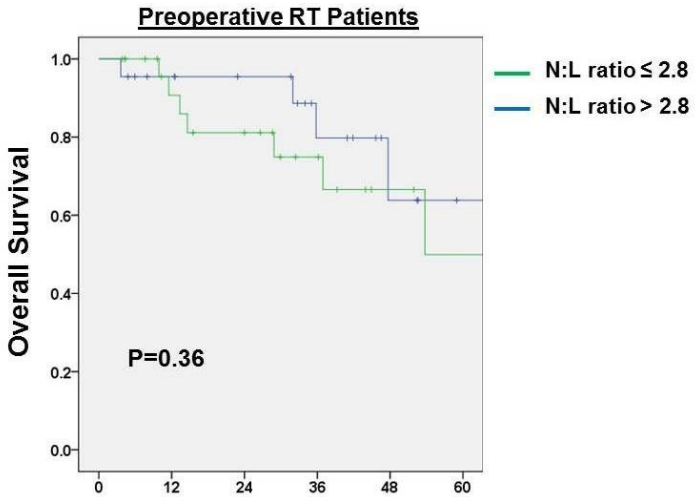
Mio Yanagisawa, Sean Judge, Chin-Shang Li, Nana Wang, Steven Thorpe, Amanda Kirane, Richard J. Bold, Arta M. Monjazeb, Robert J. Canter

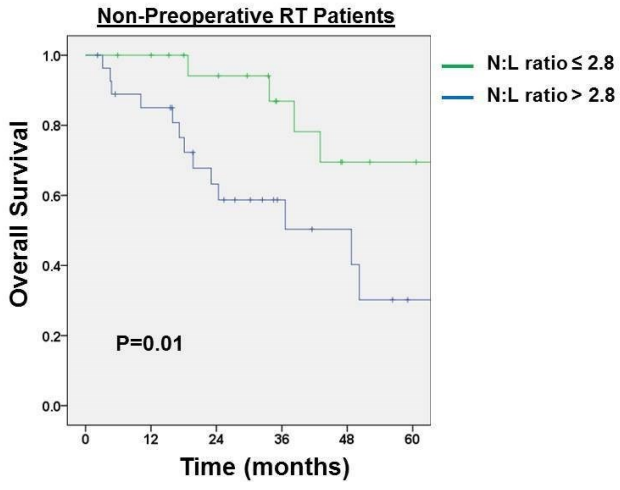
Introduction: Serum C-reactive protein (CRP) and neutrophil:lymphocyte (N:L) ratio have been identified as independent predictors of overall survival (OS) in soft tissue sarcoma (STS) patients undergoing surgical resection with adjuvant therapy. Neoadjuvant radiotherapy (NRT) has the potential to alter the inflammatory milieu of the host. We investigated the prognostic/predictive value of these inflammatory markers in STS patients and explored whether NRT alters their predictive ability.

Methods: From November 2007 to December 2015, 98 patients with intermediate or high grade STS of all anatomic sites were identified from a prospective tumor registry database. Clinical, pathological, and treatment variables, including CRP and N:L ratios pre- and post-NRT were correlated with OS. Parametric and non-parametric statistics were used as appropriate.

Results: Median age was 62.8 (range 6.1-87.9), and 46% were female. 55% of tumors were extremity, 20% trunk, and 18% retroperitoneal, while median tumor size was 9.5 cm (range 0.7-60.0). Undifferentiated pleomorphic sarcoma was most common (36%), followed by liposarcoma (18%), leiomyosarcoma (8%), and other. 80% of tumors were high grade. 50% received NRT. Baseline characteristics were similar between the NRT and non-NRT cohorts with the exception of site (extremity 75% NRT vs. 35% non-NRT, P=0.0002). NRT and non-NRT cohorts also demonstrated similar baseline CRP levels (median 0.4 vs 0.7, P=0.10) and N:L ratios (median 2.8 vs. 3.4, P=0.16). Multivariate analysis of all patients revealed histologic grade, tumor size, and baseline N:L ratio to be significant predictors of OS. Subgroup analysis of NRT patients demonstrated no significant association of baseline N:L ratio baseline CRP, post-treatment N:L ratio or CRP with OS.

Conclusion: Our data suggest that the utility of baseline CRP and N:L ratio as predictors of poor clinical outcome may not apply to STS patients receiving neoadjuvant RT.





Heath Charvet

Fat Grafting and Cancer Risk in Post-Mastectomy Breast Reconstruction

Author(s): Heath Charvet, [1] Hakan Orbay, [2] Katharine Hinchcliff, [1] Andrea Kulinich, [2] Derek Asserson, [2] David E. Sahar [1,2]

[1]UCDMC Division of Plastic Surgery; [2]UCDMC Surgical Bioengineering Laboratory

Purpose: We present our data on the interaction of human breast cancer cells (BCCs) and adipose-derived stem cells (ASCs) and a summary of the recent basic science and clinical literature to better understand the safety of breast fat grafting from an oncological perspective.

Methods: We examined the *in vitro* interaction of both banked and freshly isolated BCCs, and ASCs using an *in vitro* migration assay. For the *in vivo* arm of the study we used a xenograft model. We injected banked BCCs to 4th mammary fat pads of nude mice in group I, BCCs + ASCs in group II, BCCs + fat grafts in group III, and BCCs + fat grafts + ASCs in group IV. We followed up the tumor growth with digital caliper measurements, and performed histological analysis after two weeks of survival. For literature review, we searched the published literature in PubMed and Google Scholar databases from January 2010 to December 2014. In total, 16 clinical and 9 basic science studies were reviewed.

Results: ASCs increased the *in vitro* migration of both banked and fresh BCCs. The tumor growth rate in group IV was significantly larger compared to other groups ($P<0.05$). However, fat grafts and ASCs did not increase the tumor growth rates significantly when injected with BCCs separately (groups II&III). The overall reported rate of local breast cancer recurrence after fat grafting was 2.2% in the literature. This was comparable to the published breast cancer recurrence rates (5.2 - 10.6%).

Conclusion: There are no reports on increased risk of breast cancer recurrence associated with fat grafting to the breast. Our *in vivo* results support the clinical studies partially resolving the controversy on the safety of post-mastectomy fat grafting.

Debora Lim, BS

The Universal hGR: A Dynamic and Visual Data Mining Tool for Polymorphisms in the Human Glucocorticoid Receptor

Debora Lim, Stacey Leventhal, Sally Nguyen, Victoria Chew, Tajia Green, Kiho Cho,

and David Greenhalgh

Burn Division, Department of Surgery, UC Davis, and Shriners Hospitals for Children

Introduction: Natural variations in the human glucocorticoid receptor (hGR) gene may be an underlying factor in the diversity of burn patient response to injury and treatment. Creating a visual organization platform for the multiple, but scattered, hGR gene polymorphism data allows us to quickly survey and pinpoint “hotspots” for further study.

Methods: Information regarding hGR polymorphisms is collected from various volunteer and patient groups. For this initial prototype, Microsoft Excel is used to create the Universal hGR system. Unique identifiers are assigned to each clone and each polymorphism so the data can be tracked to its source. All SNPs, insertions, and deletions (including differential splicing events) will be noted. A dynamic numbering system will also be created to quickly locate the polymorphism after adding new annotations in the Universal hGR.

Progress/Results: The Universal hGR, which includes all the polymorphisms we noted in our study, can be visualized in a single location. Using filters, the sequence view can be customized to display specific insertions and/or deletions. A separate documentation key is also created to track our current database of over 1300 distinct polymorphisms.

Conclusion: This global visualization and mining tool for the hGR gene allows rapid identification of positions that may be linked to specific phenotypes. This tool will help us to efficiently coordinate our investigative efforts to understand the involvement of stress in individual patient responses to burn injuries. This system can be readily adapted to study other genes and their disease pathologies.

Andrew M. Perry, MD

Kidney Size Does Not Matter: Should the Decision to Split Pediatric En Bloc Donor Kidneys Be Based On Donor Weight Rather than Kidney Length?

A. Perry, J. Woloszyn, J. McVicar, J. Sageshima, R. Perez, C. Troppmann and C. Santhanakrishnan

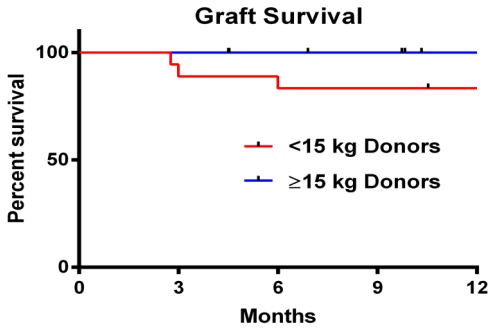
Division of Transplant Surgery

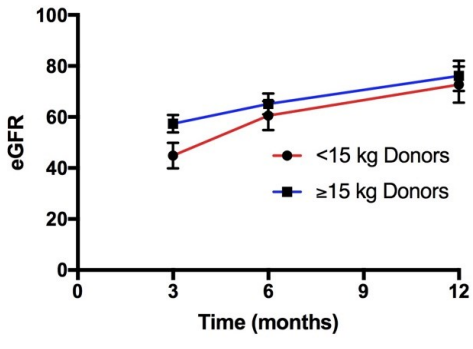
Introduction: Deceased donor kidneys from pediatric donors have been used with good results. However, there is little consensus on the criteria used to safely split pediatric en bloc kidneys for transplantation as solitary pediatric kidneys.

Methods: We analyzed our large single-center experience with single kidney transplants from pediatric donors <20 kg performed 2005-2016 (n=46). Kidney length was used as a selection criteria to determine suitability for splitting.

Results: Overall 1-year graft survival was 92%. There were 3 graft losses, all from donors < 15kg and none from donors ≥15kg. All losses were due to primary non-function, and there were no thrombotic events. Biopsies of the 3 failed kidneys showed evidence of hyperperfusion injury.

Conclusion: Our experience suggests that pediatric kidneys recovered en bloc should be split based on donor weight rather than kidney length. Donor weight ≥15 kg thus appears to be a superior criterion to identify en bloc kidneys that can be safely split. As donor weight is a readily available pre-recovery parameter, it could be easily incorporated into the existing organ allocation algorithms.





Laura Galganski, MD

Incidence and Outcomes of Burned Trauma Patients with Cervical Spine Injuries

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Introduction Cervical spine injuries (CI) carry significant morbidity and mortality. Therefore, cervical spine immobilization is used liberally in trauma patients. Cervical collars are not without associated morbidity of pressure ulcers, pain, and increased intracranial pressure. Minimal literature exists on cervical spine injuries in burn patients, including the appropriate criteria for placement and removal of collars.

Methods The National Trauma Database was queried from 2007 to 2012 to identify all burned patients with and without cervical spine injuries. Characteristics collected included age, gender, mortality, length of stay, days in intensive care, ventilator days, percentage of total body surface area (TBSA) burn, and presence of inhalational injury.

Results A total of 38,475 patients were identified with burn injuries. 345 of these patients (0.90 %) had CI. The average age of patients with CI was similar to those without (41.7 vs 43.8 years). Male patients were the majority (75.1% with CI vs 72.6%). Fewer inhalational injuries were present in those with CI (3.8% vs 8.0%). Distribution of patients with CI across % TBSA was similar: 0-10% TBSA (68.7 vs 72.7), 11-20% (14.5 vs 15.1), 21-30% (7.2 vs 5.2), 31-40% (2.9 vs 2.5), 41-50% (1.7 vs 1.4), 51-60% (2.0 vs 0.8).

	Mortality	Length of stay, d	Ventilator days	ICU stay, d
With CI, % (SD)	12.5	19 (22.4)	13.0 (14.4)	16.0 (18.8)
Without CI, % (SD)	6.5	10.3 (17.0)	11.2 (18.2)	11.6 (19.0)

SD – standard deviation, d – days

Conclusion Cervical spine injuries are uncommon in burn patients, however the associated mortality is higher and length of stay is notably longer. This data can be used to determine criteria for placement and removal of collars in the burn subset of trauma patients.

Erik S. DeSoucy, DO

Acute Kidney Injury in Combat Injured Patients with Acute Traumatic Brain Injury

Erik DeSoucy DO and Ian Stewart MD

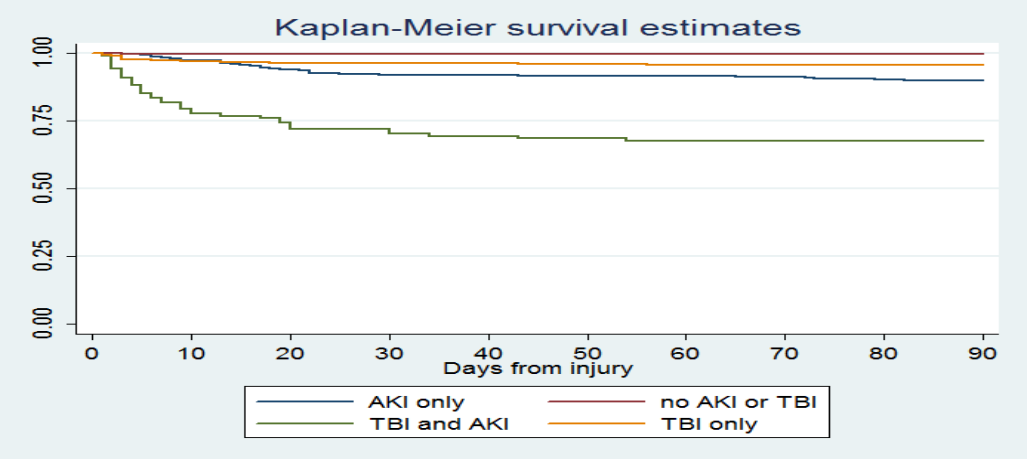
Introduction: The incidence, risk factors and mortality associated with acute kidney injury (AKI) in trauma patients with traumatic brain injury (TBI) is not known. There is literature to suggest patients who suffer a TBI are at increased risk of AKI, but there have not been any retrospective studies looking at this population.

Methods: Data was obtained from Department of Defense Trauma Registry, the Armed Forces Medical Examiner System and the Composite Health Care System. Inclusion required a battle injury from 1Feb2002 to 1Feb2011 requiring ICU care. Also, they must have survived evacuation out of theater and had creatinine checked to evaluate for AKI. AKI was defined using the KDIGO criteria for creatinine and was assessed for up to 30 days after injury. We compared rates of AKI and 90-day mortality between patients with and without head injuries.

Results: In the cohort of 6,011 patients, 3,830 patients meet inclusion criteria of which 787 had TBI. AKI occurred in 15.4% of patients with TBI and 11.9% of patients without (p=0.01). Ninety-day mortality was higher in patients with TBI compared to patients without (8.5% vs 1.5%, respectively, p<0.001). This may be expected due to the discrepancy in average Injury Severity Scale (26 vs 13 respectively, p<0.001) however the TBI cohort had fewer patients with AIS>2 in a body region other than head (51.5% vs 70.2%, p<0.001). For the development of AKI, the presence of TBI was not significant (HR 1.30, CI 0.83-2.04, p=0.246). However, both TBI and AKI independently presented significant increases in mortality (HR 3.96, CI2.67-5.87, p<0.001 and HR 8.44, CI 5.53-12.87, p<0.001 respectively).

Conclusion: The presence of TBI did not increase the likelihood of developing AKI in the traumatized patient, however both TBI and AKI individually presented a marked increase in the risk of death at 90 days. The question remains whether early therapy to preserve or replace renal function, in trauma patients with AKI, will result in improved mortality or if the presence of AKI is simply a marker for severity of injury and worse prognosis.

Figure 1. Kaplan-Meier survival curve comparing AKI and TBI alone to patients with both TBI and AKI



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