Scientific Posters Group I - Basic/Clinical Science

Poster #1
January 12, 2017
1:45 pm-3:00 pm

MANAGEMENT OF ACUTE V/Q MISMATCH IN HEMORRHAGIC SHOCK AND TRAUMA PNEUMONECTOMY (HSTP) USING INHALED NITRIC OXIDE (INO) IN SHEEP

Lars Ola Sjoholm, MD*, Lauren Poole, Andrea Lubitz, Amy J. Goldberg, MD*,
Thomas A. Santora, MD*, Thomas Sharp, Markus Wallner,
Remus Berretta, Jichuan Wu, Marla R. Wolfson, Ph.D.,
Lewis Katz School of Medicine at Temple University

Presenter: Lars Ola Sjoholm, MD

Objectives: HSTP causes an acute increase in pulmonary vascular resistance (PVR) and V/Q mismatch. By relaxing smooth muscle tone, NO may decrease both airway resistance [R] and PVR. We hypothesized that by decreasing R, iNO would improve distribution of inspired gas, ventilation and lung stability, leading both to decreased ventilatory needs and improved NO access to vascular smooth muscle to decrease PVR. Collectively, this could improve V/Q match with less risk of biotrauma/inflammation in HSTP.

Methods: Anesthetized sheep (n=18) were instrumented to assess hemodynamics, gas exchange, and pulmonary mechanics (resistance [R] and compliance [C]). Using lung protective ventilation, sheep were randomized to study gas (iNO 20 ppm n = 9; N_2 placebo [P] n = 9). HS was induced then 15 mins later the resuscitation phase (RP) was initiated:concurrent L hilum ligation, blood re-infusion, study gas. IL ─ 6 was analyzed in plasma and lung. $p< 0.05$ by ANOVA

Results: **Fig 1:** Post RP, R was > baseline (BL) and increased over time with P; with iNO, R was not different from BL and remained < P. While C in both groups was < BL post RP, C remained > with iNO than P. Inspiratory and mean airway pressure increased with P, remained unchanged from BL and < P with iNO. **Fig 2:** Both groups had an initial increase PVR. PVR continued to increase with P; with iNO, PVR decreased back to BL. Initially gas exchange was impaired vs BL in both groups. Post RP, PaO_2, P/F ratio, and VEI were >, shunt, A-aDO_2, and $PaCO_2$ were < with iNO vs P. Plasma and lung IL-6 were < with iNO vs P.

Conclusions: By decreasing R, iNO increased distribution of inspired gas and lung stability thus NO access to decrease PVR, improving V/Q match. Improved lung mechanics decreased ventilatory needs thus biotrauma risk, adding to NOs known anti-inflammatory effects, decreasing the lung and circulatory inflammatory profile. This suggests that iNO may be useful to improve V/Q match, decrease inflammation and morbidity in trauma patients with HSTP.

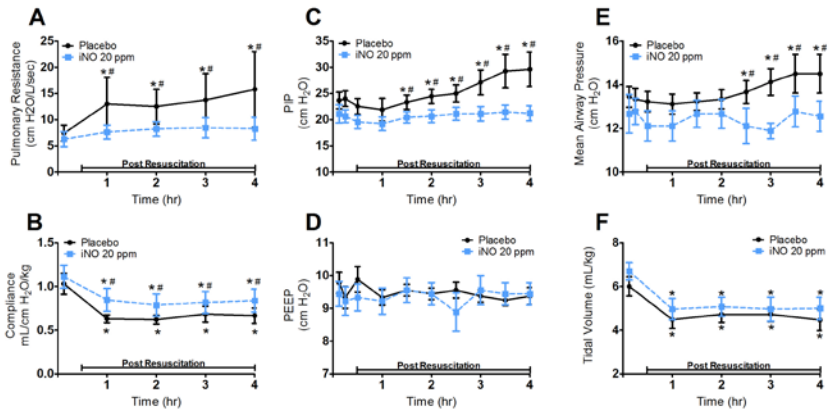


Figure 1**:** Lung mechanics, ventilatory pressures, and tidal volume: lung protective ventilatory strategy. A. Total pulmonary resistance; B. Pulmonary compliance; C. PIP: peak inspiratory pressure; D. PEEP: positive end expiratory pressure; E. Mean airway pressure; F. Tidal volume. Data were analyzed by ANOVA for time and group; * p at least < 0.05 vs BL; # p at least < 0.05 vs group.

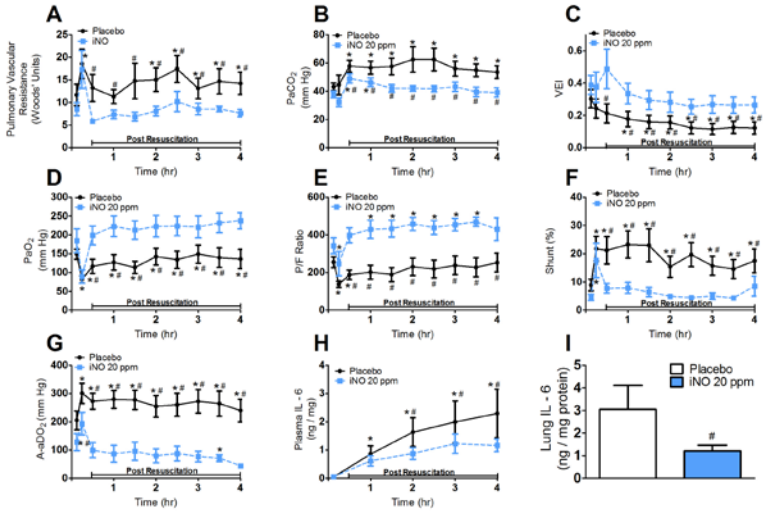


Figure 2: Pulmonary vascular resistance, gas exchange, ventilatory and inflammatory indices. A. pulmonary vascular resistance; B. $PaCO_2$; C. VEI: ventilatory efficiency index; D. PaO_2; E. P/F ratio: $PaO_2/FiO2$; F. Shunt %; G. A-aDO_2: alveolar-arterial oxygen difference; H. Plasma IL - 6; I. Lung tissue IL - 6. Data were analyzed by ANOVA for time and group ;* p at least < 0.05 vs BL; # p at least < 0.05 vs group.

Scientific Posters Group I - Basic/Clinical Science

Poster #2
January 12, 2017
1:45 pm-3:00 pm

USING ANTI-OXIDANT RICH RESUSCITATION FLUID TO REDUCE INFLAMMATORY RESPONSE AND ARDS RISK IN HEMORRHAGIC SHOCK

Cesar Figueroa, MD, Geoffrey Darby, Jacqueline Pham, BS,
Steven Maximus, Earl Steward, Cristobal Barrios, MD*
University of California Irvine

Presenter: Cesar Figueroa, MD

Objectives: ARDS remains a significant source of morbidity and mortality in trauma patients, and activation of the immune response with release of pro-inflammatory cytokines are thought to be factors that cause ARDS in hemorrhagic shock. Large volumes of fluid used during trauma resuscitation may also predispose patients to developing ARDS. We hypothesized that using an anti-oxidant rich resuscitation fluid may decrease the inflammatory response seen in hemorrhagic shock.

Methods: New Zealand white rabbits between 4.4-5.0 kg were used according to an IACUC approved model. Animals were anesthetized, intubated, and hemorrhaged over two minutes for a total blood loss of 12 mL/kg. Labs were drawn before hemorrhage and then at 30 minutes, 1 hour, and 6 hours. A standard fluid bolus with 20 mL/kg was given after the 30-minute lab draw to simulate resuscitation. Additional fluid boluses were given at a dose of 20 mL/kg within the first hour of the experiment and subsequently 10 mL/kg for predetermined blood pressure or heart rate triggers, demonstrating evidence of shock. The fluid was either normal saline (NS) or an antioxidant cocktail (AC) made of vitamins C, E, mucomyst and selenium. Lung, liver, and kidney tissues were harvested at 6 hours. Tissue was then analyzed for TNF and CRP levels.

Results: 12 rabbits were used in the NS vs. AC arm. CRP levels were found to be significantly lower in lung tissue samples from the rabbits that received AC fluid compared to NS (17,791 vs 32,239 pg/mg, $p=0.04$). There was no statistical difference in TNF levels in any of the tissue samples, and no difference in CRP in the kidney or liver tissue samples in the AC group.

Conclusions: C-reactive protein levels in lung tissue are decreased when an anti-oxidant rich fluid is used in resuscitation for hemorrhagic shock in a rabbit model. The use of antioxidants and their role in preventing ARDS warrants further investigation.

Notes

Scientific Posters Group I - Basic/Clinical Science

Poster #3
January 12, 2017
1:45 pm-3:00 pm

ELEVATED PEAK PROCALCITONIN IN PERITONEAL FLUID – A PREDICTOR OF ENTERIC FISTULA FORMATION AFTER DAMAGE CONTROL LAPAROTOMY

Rondi Gelbard, MD*, Marcus Darrabie, Christopher J. Dente, MD*,
Stacy Dougherty, MD*, Bryan C. Morse, MS, MD*, Anuradha Subramanian, MD*,
Timothy G. Buchman, MD*, Allan Kirk, Eric Elster, MD, FACS
Emory University School of Medicine

Presenter: Rondi Gelbard, MD

Objectives: Damage control laparotomy (DCL) is associated with an increased risk of developing enteric fistulae (EF) and intra-abdominal infections. The risk of such complications increases not only with failure to achieve definitive closure, but also with each unsuccessful attempt to close. The purpose of this study was to identify independent risk factors for the development of these complications following trauma laparotomy.

Methods: This is a prospective, observational study of trauma patients requiring exploratory laparotomy at an urban Level 1 trauma center. Tissue, serum and peritoneal effluent samples were collected during each operative intervention. Demographic information, as well as local and systemic biomarker and quantitative bacteriology data were compared among patients that developed EF and those that did not. Following single factor analysis, multivariable regression was conducted to identify the risk factors for fistulae formation in these patients.

Results: Eighty-eight patients met inclusion criteria for this study. Fifty patients (56.8%) were closed on the index operation while 38 underwent DCL. Both groups were similar with respect to demographic characteristics and mechanism of injury. Six patients in the DCL group developed EF versus none in the closed group ($p = .005$). Factors independently associated with fistula formation included increased time to facial closure (OR 1.46, $p=0.001$, 95% CI=1.15 – 1.84), increased hospital length of stay (OR 1.21, $p=0.001$, 95% CI = 1.09-1.35) and elevated peak procalcitonin (PCT) concentration in peritoneal fluid (OR=1.23, $p=.013$, 95% CI=1.044-1.452).

Conclusions: Elevated peritoneal PCT levels may help predict the future development of EF in patients undergoing DCL. There is a need for a standardized process to determine when DCL should be used in order to minimize such complications.

Notes

Scientific Posters Group I - Basic/Clinical Science

Poster #4
January 12, 2017
1:45 pm-3:00 pm

INFLAMMATION, NOT OBESITY, DRIVES HYPERCOAGULABILITY FOLLOWING TRAUMA

Jennifer K. Lu, DO, Kahdi Udobi, James Howard, Stepheny Berry, MD, Ashley Bennett, MD*, Michael Moncure, MD*, Justin L. Green, MD, PhD, MBA, FACS*, Robert D. Winfield, MD, FACS*
The University of Kansas School of Medicine - Kansas City

Presenter: Jennifer K. Lu, DO

Objectives: Adipose tissue is pro-inflammatory, and increasing body mass index (BMI) is associated with hypercoagulability. It is unclear whether hypercoagulability is due to excess adipose or inflammation resultant from its presence. We hypothesized that increasing BMI is independently associated with hypercoagulability following trauma.

Methods: Prospectively collected data from a multicenter, multinational trauma research collaborative was analyzed retrospectively. Univariate correlations were carried out between coagulation (PT/INR, PTT, rotational thromboelastometry (ROTEM), thromboelastography (TEG), and rapid TEG (rTEG)) and BMI, and inflammation (leukocyte count, neutrophil count, lymphocyte count, and C-reactive protein) on admission and at 24 and 72 hours following injury. Stepwise linear regression was utilized to determine independent associations between BMI, inflammatory markers, and coagulation.

Results: 557 patients injured between 2010 and 2016 were analyzed. Patients were 74% male with a mean age of 45. 88% sustained blunt trauma with a mean Injury Severity Score (ISS) of 21. Major hemorrhage protocol was activated in 27% of cases, and 80% received TXA. A significant correlation between BMI and coagulation was seen on admission and at 24 hours; however, by 72 hours, BMI only showed a significant relationship with rTEG activated clotting time (ρ=0.208, p=0.024). On linear regression, BMI only showed association with ROTEM clotting time at 24 hours (OR 1.939, p=0.009). Conversely, WBC predominated at 24 hours and CRP showed the strongest relationship 72 hours following injury.

Conclusions: While obesity is a pro-inflammatory state, it is not independently associated with hypercoagulability after trauma. Relationships between adipose tissue, inflammation, systemic inflammation, and coagulation remain uncertain and warrant future study.

Notes

Scientific Posters Group I - Basic/Clinical Science

Poster #5
January 12, 2017
1:45 pm-3:00 pm

CHARACTERISTICS OF BIOFILMS FOUND ON ABDOMINAL WALL MESHES

Stanley B. Wolfe, BS, Dana Gray, Alison M. Wilson, MD*
West Virginia University

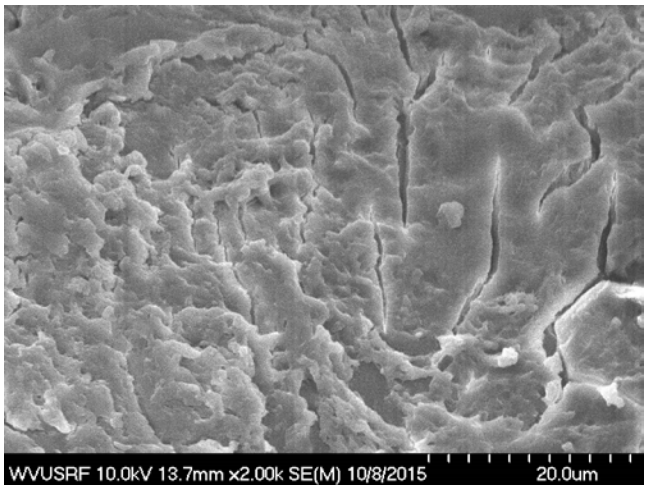
Presenter: Stanley B. Wolfe, BS

Objectives: Biofilms are recognized as a source of chronic or recurrent infections. Standard culturing techniques only sample planktonic bacteria on the biofilm surface which often differ from those within. The objective of this pilot study was to evaluate explanted abdominal wall mesh, both infected and incidental, to evaluate for presence of biofilm. Study of biofilm patterns on abdominal mesh may increase understanding of mesh infections.

Methods: 15 abdominal wall meshes were collected. Each sample was evaluated using 2 methods to identify and stage the biofilm. Confocal Microscopy and SEM were used to visualize and stage biofilm. The biofilm was fragmented and bacteria within the biofilm was analyzed. This was compared to the operative micro results. Additional data included patient age, BMI, smoking status, comorbidities. Surgical and microbiologic data was also collected.

Results: Meshes from 8 males/7 females with the median age of 56(32-83). The median BMI was 32(23.9-63.0). 7 (46.6%) of the operations were clean and no suspected infection. 13/15 meshes were positive for biofilm (86.6%). Biofilm stages had the following distribution: 2 (13.3%) Stage I, 3 (20%) Stage II, 3 (20%) Stage III, and 5 (38.4%) stage IV biofilm. There was a correlation between biofilm stage for infected cases, but not for clean. Of the samples in which there was bacterial growth there was no correlation between the surface sample and the biofilm sample. Figure 1 demonstrates an advanced biofilm on a mesh. Fig 2 depicts biofilm stage, standard cultures from OR and internal biofilm cultures.

Conclusions: Biofilms are present on abdominal wall meshes. There is discordance between the bacteria on the surface vs within the biofilm. Therapies that impact the surface only, such as antibiotics, are likely to fail. Studies are warranted to understand the role of biofilm on infected and non-infected meshes.



SEM image of advanced biofilm identified on abdominal wall mesh

Biofilm stage	Clinical Lab	Biofilm Lab
3	P asaccharolyticus	NG
4	none	Aerococcus spp.
4	none	Bacillus spp, not anthracis
4	none	Corynebacterium spp.
2	none	NG
3	E. coli	E. faecium
0	none	NG
2	none	NG
0	E. coli	NG
4	E. coli; K. pneumoniae; S. lutetiensis	E. coli; E. avium (group d)
1	none	NG
1	none	NG
2	none	NG
3	E. coli	C. tropicalis; E. faecium
4	S. anginosus group, C. glabrata	S. anginosus; C. glabrata;C. albicans

Biofilm stage compared to OR cultures vs internal biofilm cultures

Scientific Posters Group I - Basic/Clinical Science

Poster #6
January 12, 2017
1:45 pm-3:00 pm

ACCELERATED BIOLOGIC AGING, CHRONIC STRESS, AND RISK FOR SEPSIS AND ORGAN FAILURE FOLLOWING TRAUMA

Elizabeth G. NeSmith, PhD, MSN, ACNP-BC, Regina Simione Medeiros, DNP, MHSA, RN*, Colville Ferdinand, MD, FACS*, Steven B. Holsten, Jr., MD*, Stephen W. Looney, PhD
Augusta University

Presenter: Elizabeth G. NeSmith, PhD, MSN, ACNP-BC

Objectives: In this NIH-funded study, we hypothesized that accelerated biologic aging (defined by decreased telomerase activity resulting from chronic stress) contributes to susceptibility to sepsis and organ failure after trauma, and that these conditions contribute to increased baseline inflammation and decreased magnitude of the inflammatory response to trauma.

Methods: We conducted a prospective, correlational study and enrolled patients (N=114) aged 18-44 with ISS >15 admitted to our Level 1 Trauma Center. We excluded patients with co-morbidities that affect the inflammatory response. Outcomes were differences in baseline inflammatory status, magnitude of the inflammatory response to trauma (measured by daily cytokine trends) SIRS, sepsis, and organ failure. These were compared to telomerase activity, DHEAS levels, chronic stress, demographics, and payor status. Canonical correlation analysis, chi-square, Mann-Whitney-Wilcoxon and Kruskal-Wallis tests were used to access significant associations.

Results: Characteristics assessed at baseline were significantly associated with sepsis and SIRS (Table 1). Minority status was significantly associated with low white blood cell count. There was a significant association of susceptibility to sepsis and organ failure with accelerated biologic aging (Table 2). We found no evidence of chronic stress contributing to baseline inflammation. We demonstrated that accelerated biological aging, defined by reduced telomerase activity, correlated with risk for sepsis and organ failure and that race and payor status were related to outcomes in our sample.

Conclusions: Results may help identify individuals at increased risk for poor outcomes of trauma and inform interventions that may reduce the risk for sepsis and organ failure. Lack of evidence that chronic stress increases baseline inflammation may be related to data collection methods. Further investigations are needed.

Table 1. Significant Correlates for Per-Patient Proportions

Outcome	Characteristic	Category	n	Percentage mean ± S.D.	p-value
Sepsis	How do you primarily pay for health care?	Medicare	1	0.0	0.0372
		Medicaid	4	7.7 ± 9.0	
		Insurance	29	1.9 ± 5.7	
		Self Pay	22	1.5 ± 4.0	
		Don't Know/ Not Sure	32	5.2 ± 7.5	
SIRS ≥ 2	Who is your usual health provider?	Private Doctor	26	34.7 ± 34.1	0.0477
		Community health clinic	10	55.5 ± 19.8	
		Hospital based clinic	7	23.6 ± 37.3	
		Health department	8	66.3 ± 33.2	
		Emergency room	26	40.2 ± 34.3	
Low WBC	Minority	No	65	0.0	0.0463
		Yes	50	1.1 ± 4.5	
High Respiratory Rate	Race	White	72	16.9 ± 18.1	0.0059
		African American	65	29.1 ± 26.30	
		Asian	2	0.0	

Table 2. Canonical Correlations Between Cytokine Summary Measures and Telomerase Variables

Summary Measure for Cytokines	Sample Size	Canonical Correlation	p-value
Peak	97	0.48	< 0.001
Overall (mean)	97	0.45	0.002
Baseline	89	0.38	0.037

Scientific Posters Group II - Behavioral

Poster #7
January 12, 2017
1:45 pm-3:00 pm

UNDERSTANDING THE TRAUMA/ACS WORKFORCE

K. Michael Hughes, DO*, Stanley J. Kurek Jr., DO, FACS*, Ted Bell, MS, Krystal K. Swasey, MPH
WellSpan ─ York Hospital

Presenter: K. Michael Hughes, DO

Objectives: To understand factors related to trauma/acute care surgeons (ACS) career characteristics and expectations.

Methods: EAST members were anonymously surveyed (SurveyMonkey). Data collected included demographics, career expectations and motivators of trauma/ACS. All survey data was analyzed with SPSS using $\chi 2$ or Fisher's exact tests.

Results: 408 (26%) EAST members responded of 1,552 surveyed. 78% of the respondents were male, with a mean age 47, 83% were full-time trauma/ACS, and 84% had an academic affiliation. 70% of surgeons had a Level I affiliation and 26% a Level II; with Level II earning more than Level I (p=.01). Surgeons indicated that 62% used full-salary and 28% salary-plus RVU compensation model. 46% of surgeons reported earning $351K-$475K and 23% >$475K. 58% prefer ownership/cross-cover as a practice model and 41% preferred the shift-work model. 35% of surgeons were very interested in research, 45% somewhat and 20% not at all. 19% had mid-career degrees and 28% planned to pursue a mid-career degree. More senior members (p=.005) and those in leadership (p=.032) had supplemental degrees. At this point in their career 49% of surgeons felt quality of life was "most important" followed by 31% career ambitions and 13% salary. Satisfaction was higher for surgeons practicing >25 years (p=.01). Prominent career satisfiers were patient care and teaching. Greatest detractors were burn-out, bureaucracy, and work environment. 80% would change jobs in the final 10 years of practice; 31% due to family/retirement, 29% professional growth, 24% workload and 7% due to salary.

Conclusions: Trauma/ACS is structured predominantly through full-time employment. Patient ownership remains prevalent, but many prefer a shift-work model. This workforce remains mobile into late career; personal happiness overshadows financial rewards. Burn-out, bureaucracy, and work environment are dominant detractors. This information could be used to help develop Trauma/ACS workforce strategies.

Notes

Scientific Posters Group II - Behavioral

Poster #8
January 12, 2017
1:45 pm-3:00 pm

OBSERVATIONAL STUDY USING TRAUMA VIDEO REVIEW TO IMPROVE AND ASSESS CLOSED LOOP COMMUNICATION IN PEDIATRIC TRAUMA

Ibrahim Abd el-shafy, MD, Jennifer Delgado, Francesca Bullaro,
Nathan Christopherson, RN, MBA, CEN, CPEN, NR-Paramedic*, Jose Prince, MD*
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Presenter: Ibrahim Abd el-shafy, MD

Objectives: Good communication is imperative in healthcare and produces a system that is efficient and safe. Trauma care is multidisciplinary and time-sensitive in nature, making the effects of good communication more pronounced. Programs like Crew Resource Management in aviation have been able to systematically prevent errors. Similarly, teamSTEPPS has been promoted in healthcare with a strong focus on communication. We aim to evaluate the ability of closed loop communication to improve time to task completion in pediatric trauma activations.

Methods: Using video review of trauma activations, from an ACS verified level I pediatric trauma center during January 2016 to June 2016, we identified orders articulated by the team leader. We evaluated order audibility, directed responsibility, check-back, and time to completion. Closed loop orders were defined as having all three variables. Statistical analysis was conducted using SAS and comparison was conducted using Mann-Whitney U test.

Results: In total, 51 trauma activation videos were reviewed, with 4.22 mean orders articulated/activation. Of the 215 orders articulated, 205(95.3%) were audible, 68(31.6%) were directed, and 51(23.7%) had check-back. On average each order required 4.18 minutes(min) to be completed. 36(16.7%) orders fit closed loop criteria. Time to task completion was significantly lower for closed loop(1.69 min) compared with non-closed loop(4.68 min) $p<0.0001$).

Conclusions: While the importance of closed loop communication in preventing errors has been established, our study highlights for the first time its importance in improving the efficiency of order completion. To successfully obtain closed loop communication orders should be audible and directed with check-back. We suggest that a standardized closed loop communication system should be taught and utilized by trauma team leaders.

Notes

Scientific Posters Group II - Behavioral

Poster #9
January 12, 2017
1:45 pm-3:00 pm

THE ASSOCIATION OF INJURY AND HOSPITAL STAY TO DEPRESSION AND POSTTRAUMATIC STRESS DISORDER IN ORTHOPEDIC TRAUMA PATIENTS ONE YEAR AFTER INJURY

David Vier, MD, Alan Jones, Evan Rainey, Kenleigh Roden-Foreman,
Monica Bennett, Michael Foreman, Ann Marie Warren
Baylor University Medical Center

Presenter: David Vier, MD

Objectives: Depression and posttraumatic stress disorder (PTSD) are common outcomes after orthopedic trauma, with rates up to 45% and 30%, respectively. Early screening and intervention can have a profound impact on recovery. This study analyzed the link between injury-related and hospital variables and depression and PTSD at time of injury and 12 months later in orthopedic trauma patients.

Methods: Participants included patients ≥18 years admitted to an urban Level I trauma center with orthopedic injuries. Demographic and injury-related variables were taken from the trauma registry. Depression was measured using the Patient Health Questionnaire (PHQ-8) and PTSD symptoms using the Primary Care PTSD screen (PC-PTSD) and PTSD Checklist-Civilian version (PCL-C). Injury-related and hospital variables included total length of stay (LOS), intensive care unit (ICU) LOS, ventilator use (VU), etiology of injury, trauma type, Injury Severity Score (ISS), and Glasgow Coma Scale (GCS) score.

Results: Subjects (N=160) were mostly Caucasian (74%) males (56%) with an average age of 48.1 (SD=16.8). Median ISS was 9 (IQR=5,14). Depression was seen in 28% at baseline and 29% at 12 months. PTSD was seen in 23% at baseline and 21% at 12 months. VU and LOS were associated with depression at baseline and 12 months. PTSD at baseline was associated with etiology of injury, blunt injury, VU, ISS, ICU LOS, and total LOS. PTSD at 12 months was associated with blunt injury, ICU LOS, VU, and total LOS. GCS was not associated with either variable.

Conclusions: Hospital and injury-related variables were significantly associated with depression and PTSD at baseline and 12 months. Rates of depression and PTSD did not change significantly from baseline to follow up. These results highlight the importance of early psychological screening and intervention to improve patients' physical and mental health.

Notes

Scientific Posters Group II - Behavioral

Poster #10
January 12, 2017
1:45 pm-3:00 pm

FOUR-YEAR ANALYSIS OF THE EASTERN ASSOCIATION FOR THE SURGERY OF TRAUMA (EAST) MENTORING PROGRAM

Tanya L. Zakrison, MD, MPH, FRCSC, FACS*, Travis M. Polk, MD, FACS*,
Rachel Dixon, Akpofure Peter Ekeh, MD*, Kirby R. Gross, MD*,
Kimberly A. Davis, MD, MBA, FACS, FCCM*, Stanley J. Kurek Jr., DO, FACS*,
Nicole A. Stassen, MD, FACS, FCCM*, Mayur B. Patel, MD, MPH, FACS*
Ryder Trauma Center, University of Miami Miller School of Medicine

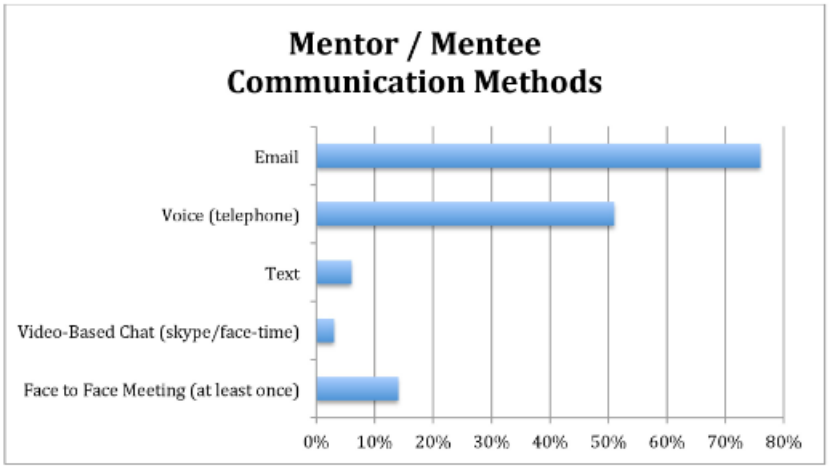
Presenter: Tanya L. Zakrison, MD, MPH, FRCSC, FACS

Objectives: Mentorship programs in surgery have been proposed as a tool to overcome barriers to clinical and academic productivity, research success, and work-life balance. We sought to determine if the Eastern Association for the Surgery of Trauma (EAST) Mentoring Program has met its goals of fostering academic and personal growth in young acute care surgeons.

Methods: With EAST Mentoring Section approval, we analyzed a structured, online questionnaire that was distributed since program inception. We used a mixed methods approach with quantitative & qualitative analysis to understand the goals of the program from mentee / mentor perspectives. We also explored attitudes and barriers regarding the perceived success of this program as a useful tool for mentees for career development.

Results: During 2012-2015, 58 mentoring dyads were paired. 184 surveys were distributed and 108 were returned (57% response rate). Respondents were evenly distributed between mentees and mentors (53 vs. 55, p=0.768). Mentoring relationships focused on research (45%), "sticky situations" (27%), education (18%) or administrative issues (10%). Mentees were more focused on research & education vs. mentors (74% vs. 50%, p=0.040). Mentees felt that goals were "always" or "usually" met vs. mentors (89% vs. 77% p= 0.096). The program was highly regarded for the opportunity to develop beyond one's institution. Barriers to successful mentorship included a lack of time & communication challenges. Most mentorship pairs used email to communicate (Fig 1). Most respondents (91%) planned to continue the relationship beyond the EAST Mentoring Program and recommended the experience to colleagues.

Conclusions: Mentee satisfaction with the EAST Mentoring Program was high. Mentoring is a beneficial tool to promote success amongst EAST's young members, but differences exist between mentee and mentor perceptions. Updating communication tools and goal clarification could benefit the EAST Mentoring Program.



Communication Methods

Scientific Posters Group II - Behavioral

Poster #11
January 12, 2017
1:45 pm-3:00 pm

IDENTIFYING CHRONIC ALCOHOL USE IN EMERGENCY GENERAL SURGERY PATIENTS: A PILOT STUDY

Brent M. Jewett, MD, Joseph V. Sakran, MD, MPH, MPA, FACS*, Pamela Ferguson, Samir M. Fakhry, MD, FACS*, Dulaney Wilson, Jama Olsen, Raymond Anton
Medical University of South Carolina

Presenter: Brent M. Jewett, MD

Objectives: Chronic alcohol use has been associated with post-operative complications. Patient report of chronic alcohol use may not be reliable. This pilot study screened emergency general surgery (EGS) patients for chronic alcohol use using Carbohydrate Deficient Transferrin (CDT) level, a biomarker that can indicate chronic alcohol use, and the Alcohol Use Disorders Identification Test (AUDIT).

Methods: Patients aged 21 and older undergoing EGS on the general surgery inpatient service of a large teaching hospital from July 2014 to June 2016 were invited to participate in this study. The presence of chronic alcohol use was determined with CDT levels and/or AUDIT score. CDT levels above 1.7% were considered positive for chronic alcohol abuse as were AUDIT scores ≥ 8. Medical records were reviewed for demographic and medical data. This study was approved by the IRB.

Results: 176 EGS patients were screened for inclusion in the study and 50% (88) agreed to participate. The enrolled patients had an average age of 45.7 ($\pm$17.9) years and 50% were male. Average hospital length of stay was 3.9 ($\pm$6.7) days and 14 (15.9%) were readmitted within 30 days. 16 (18.2%) patients were positive for chronic alcohol use using CDT level or AUDIT score (table). Patients with chronic alcohol use were significantly more likely to be male (75% vs 44.4%). Race, age group, payer, complication rate and readmission to the hospital (either emergency department or inpatient) did not differ by chronic alcohol use category.

Conclusions: In this pilot study of EGS patients, 18.2% had an indicator of chronic alcohol use. Given the potential for increased post-surgical complications, detection and documentation of chronic alcohol use may allow for more accurate risk stratification in payment models and quality assessments. A larger multi-center study is needed to confirm these findings and provide external validity.

Notes

Scientific Posters Group II - Behavioral

Poster #12
January 12, 2017
1:45 pm-3:00 pm

PTSD SCREENING – TIMING IS EVERYTHING

Michel B. Aboutanos, MD, MPH*, Michel B. Aboutanos, MD, MPH*, Anne Jordan, Stephanie R. Goldberg, MD*, Julie Bivins, Karen Shipman, Luke Wolfe, MS
Virginia Commonwealth University

Presenter: Michel B. Aboutanos, MD, MPH

Objectives: Urban trauma centers are uniquely positioned for PTSD related patient education, screening and prevention in violently injured patients. We hypothesize that in-hospital screening is limited and timing of screening should be redirected to the post-discharge (D/C) phase.

Methods: Between 01/01/2013- 9/30/2015, 11,753 patients were admitted to our Level 1 trauma center. 1,350 (11%) suffered a violent injury. Patients with self-inflicted injuries, injuries related to domestic violence or child abuse were referred to other services and not included in the study. Of the eligible 910 patients, 300 (33%) were provided PTSD education and offered resources for mental health treatment (MHT). At 4-6 weeks post-D/C, patients were contacted and administered a four-item PTSD screening tool and offered referral to MHT.

Results: 300 patients were evaluated of which 277 (92%) provided information and support were regarding PTSD. Only 33 (11%) inpatients expressed PTSD symptoms. 260 (87%) and 248 (83%) declined pre-D/C safety planning and program referrals/resources, respectively. 157(52%) were reached at 4-6 weeks post-D/C and completed the 4-item PTSD screening tool. 113(72%) had GSW, 23 (15%) had stabs, and 21(13%) had assaults. 119 (76%) reported experiencing at least one major symptom of PTSD, and 54 (34%) experienced >2 major symptoms. 94% of patients who developed at least one major symptom of PTSD post D/C refused community based MHT referrals pre-D/C. Post-D/C, patients with at least one PTSD symptom (119) requested MHT treatment referrals at a significantly higher rate than those without symptoms (56; $p < .0001$). Patients with >2 symptoms requested referral information at a higher rate than those with 0-2 symptoms ($p < .0001$).

Conclusions: While trauma centers are asked to provide inpatient PTSD screening, our study highlights the need for post D/C screening and follow up. Most violently injured patients either do not recognize that PTSD will be an issue for them while inpatient or are too distracted (physical injuries / pain) to be receptive to PTSD intervention while inpatient. Trauma centers have a unique opportunity to implement PTSD screening, referral, and post-D/C follow-up to affect change for this at-risk population.

Notes

Scientific Posters Group III - Clinical Trauma

Poster #13
January 12, 2017
1:45 pm-3:00 pm

FACTORS PREDICTING LENGTH OF STAY OF ANTICOAGULATED GERIATRIC FALL VICTIMS WITH NEGATIVE HEAD CTS: OBSERVATION VS. INPATIENT ADMISSION?

Shea C. Gregg, MD*, Kathleen O'Neill, Walter Cholewczynski, MD*, Alisa Savetamal, MD*, Roselle E. Crombie, Kristen Glasgow, Paul P. Possenti, PA-C*, Roseanne Prunty, Andrew Stone, Andrea Castillo, Nabil A. Atweh, MD*
Bridgeport Hospital - Yale NHH

Presenter: Shea C. Gregg, MD

Objectives: Anticoagulated, geriatric patients who fall and strike their head have a risk of delayed intracranial hemorrhage(ICH) and variable lengths of stay(LOS) when admitted. Our purpose was to determine what factors could predict longer lengths of stay to aid in the decision of observation vs. inpatient admit status.

Methods: We queried our "Falls on Anticoagulation" database for admits between 1/2012-6/2015 at our Level II Trauma Center. Based on protocol, patients with negative head CTs are admitted who are >65 years old, fall on anticoagulation, AND present with one of the following: history of head strike, GCS<14, external signs of head/face trauma, INR >3.5, or focal neuro deficits. Odds ratios (OR) were calculated for risk factors potentially contributing to LOS ≤2 days (observation status) and >2 days (inpatient status).

Results: Over 3.5 years, 231 patients were admitted. Forty-five(19%) had LOS≤2 days and 186(81%) had LOS>2 days(Average LOS:5.8 days). Average ages did not differ(p=0.3). Factors associated with LOS≤2 days included: Ability to walk greater than 100ft(OR=2.90;CI:1.32-6.32), fall at a care facility (OR=2.08;CI:1.04-4.17) and injuries isolated to the head and face(OR=2.71;CI:1.30-5.65). Factors associated with LOS>2 days included: use of ambulatory assistive device(OR=3.52;CI:1.31-9.49) and injuries to areas other than the head or face(OR=7.7;CI:2.3-25.8). Non-significant risk factors included: falls at home, direct thrombin inhibitors, age≥75, >10 presenting medications, weight loss or gain>5 lbs., and ground level vs. falls from a height (bed, stairs, etc.). No patients had evidence for delayed ICH.

Conclusions: Predicting shorter hospital stays for this population can be valuable for resource utilization. Functional ability, fall location, and anatomic location of injuries should be considered when deciding to admit as observation or inpatient status.

Notes

Scientific Posters Group III - Clinical Trauma

Poster #14
January 12, 2017
1:45 pm-3:00 pm

ROUTINE COMPUTED TOMOGRAPHY AFTER RECENT OPERATIVE EXPLORATION FOR PENETRATING TRAUMA: WHAT INJURIES DO WE MISS?

April Mendoza, MD, MPH, Christopher A. Wybourn, MD, Anthony G. Charles, MD,
Andre Campbell, Bruce A. Cairns, MD*, M. Margaret Knudson, MD
University of California San Francisco

Presenter: April Mendoza, MD, MPH

Objectives: Patients with penetrating trauma who cannot be stabilized undergo operative intervention without preoperative imaging. In such cases, post-operative imaging may reveal additional injuries not identified during the initial exploration. The purpose of this study is to explore the utility of post-operative CT imaging in the setting of penetrating trauma.

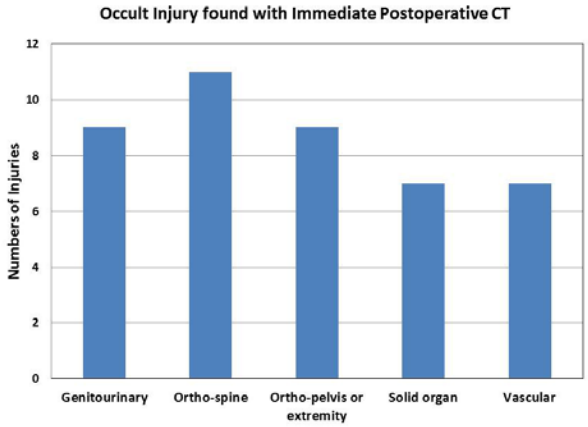
Methods: This was a retrospective analysis between of patients with penetrating trauma treated at an urban level 1 trauma center between 2010-2015. Patients were included if they underwent an emergent laparotomy without preoperative imaging, and were excluded if they had prior imaging or concomitant blunt trauma. For the purposes of this study, occult injury was defined as a CT scan finding not mentioned in the first operative report. Descriptive statistics were utilized to compare patient characteristics who had received imaging immediately post-operatively to those who had not received imaging.

Results: During the 5-year study period, 328 patients underwent laparotomy for penetrating trauma of which 230 met the inclusion criteria. Eighty-five patients (37%) underwent CT scanning immediately post-operatively with occult injuries identified in 38 (45%). The most frequent occult injuries were orthopedic and genitourinary. Importantly, 18 of these 38 patients (47%) required intervention for these occult injuries. Those selected for immediate post-operative imaging were more likely to have sustained gunshot wounds and were significantly more severely injured (higher ISS and longer LOS) when compared to patients that did not receive immediate imaging.

Conclusions: We recommend the use of immediate post-operative abdominal CT after emergent laparotomy as part of the tertiary survey especially when there is a high index of suspicion for spine or genitourinary injuries and in patients who have sustained ballistic penetrating injuries.

Table 1		
Demographic Data	n=85	n=145
	Immediate Postoperative CT	No Immediate CT
Age(y)*	28 (15-92)	31 (9-81) p=0.06
Male	79 (92.9)	134 (92.4) p=0.5
GSW	**61 (71.8)**	**38 (26.2) p<0.001**
ISS*	**17 (1-57)**	**9 (1-34) p<0.001**
LOS(days)*	**11 (1-135)**	**7 (1-81) p=0.0001**

*Designates data given as medians with parentheses indicating interquatertile ranges
All other data given as number of patients with parentheses indicating percentages



Immediate postoperative imaging diagnose orthopedic and genitourinary injuries more often, but solid organ and vascular injuries were also identified.

Scientific Posters Group III - Clinical Trauma

Poster #15
January 12, 2017
1:45 pm-3:00 pm

DO VENTED CHEST SEALS (CSS) DIFFER IN EFFICACY?

Bijan S. Kheirabadi, PhD, Irasema Terrazas, Nahir Miranda,
Amber Voelker, Francoise Arnaud, Michael Dubick
US Army Institute of Surgical Research

Presenter: Bijan S. Kheirabadi, PhD

Objectives: Hemopneumothorax (HPTX) is the second leading cause of potentially preventable death among combat casualties. We investigated the ability of five FDA-approved vented CSs to seal a bleeding chest wound and prevent tension HPTX in a swine model.

Methods: Following instrumentation, an open chest wound was created in the left thorax of spontaneously air-breathing anesthetized pigs (n=26, 42 kg). Autologous blood was collected (no anticoagulant) and infused instantly (~225 mL) into the pleural cavity to produce HPTX. The chest wounds were then sealed with CSs. The sealant strength and venting function of CSs were then challenged by infusion of 50 mL more blood directly into the chest wound (behind CSs) and repetitive air injections (0.25 L every 10 min up to 2 L) into the pleural cavity. Tension HPTX was defined as intrapleural pressure (IP) $\geq$ +1 mmHg, and >20% deviation in baseline hemodynamic, respiration and blood oxygenation values.

Results: Open chest wound with HPTX (IP~-0.7 mmHg) caused labored breathing and declines in PaO_2 and SvO_2 ($P<0.01$). Sealing the wounds with the CSs restored IP, and improved breathing and oxygenation (Fig 1, 2). Subsequent blood infusion into the wound and intrapleural air injection produced CS-dependent responses. CSs with one-way valves (Bolin and SAM) did not evacuate the blood efficiently; pooled blood either detached the CSs from skin and leaked out (75%), or clotted and clogged the valve and led to tension HPTX (25%). Conversely, double-layer CSs with venting channels allowed escape of blood and air from the pleural cavity maintaining IP and blood oxygenation near normal level. Success rates were 100% for Sentinel and Russell (6/6); 67% for HyFin (4/6); 25% for SAM (1/4); and 0% for Bolin (0/4) CS.

Conclusions: The sealant and valve function of vented CS differed widely in the presence of bleeding chest wounds. Medics should be equipped with more effective CSs for treating HPTX.

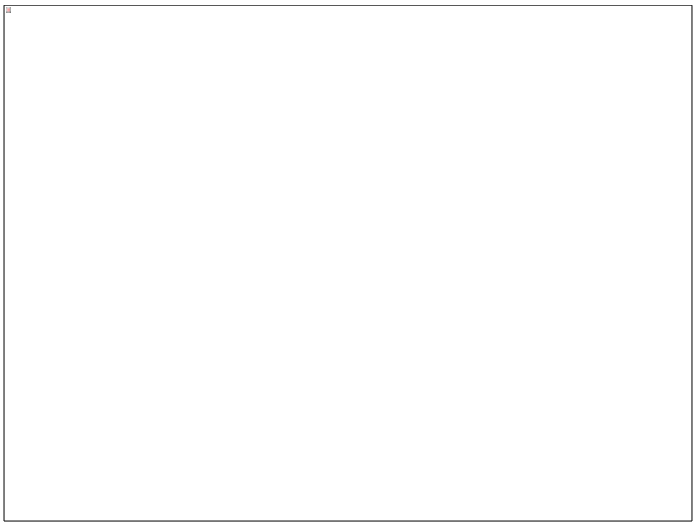


Figure 1. Inspiration intrapleural pressure (IP) measured during experiment. IP was recorded directly by a catheter inserted into pleural space in left thorax and connected to a manometer. Testing of Bolin and SAM CSs were terminated early due to CS detachment from skin or development of tension HPTX. áµ p<0.01 vs. Baseline; + *p*<0.05 vs. Russell or Sentinel; **p*<0.05 vs. HyFin, Russell or Sentinel.

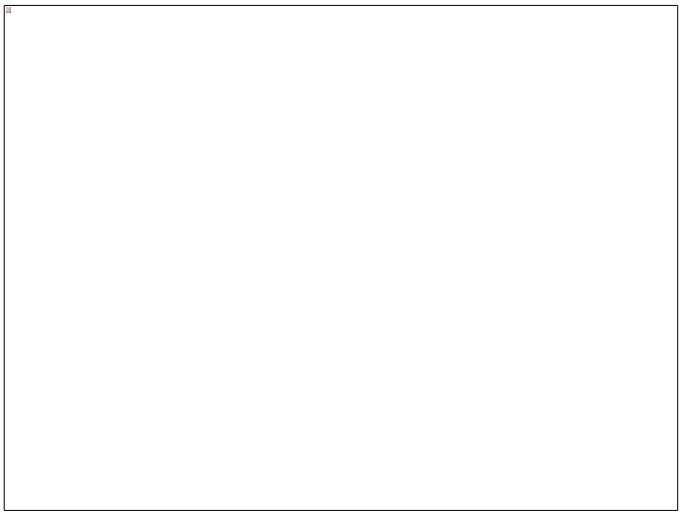


Figure 2. Arterial partial pressure of oxygen (PaO_2) of the pigs following hemopneumothorax (HPTX), chest seal (CS) application, and each intrapleural air injection. Experiments with all four Bolin and 3 of 4 SAM CSs were terminated early due to adhesive failure of CSs (detachment from skin) or development of tension HTX. φ p<0.01 vs. Baseline; + *p*<0.05 vs. Russell or Sentinel; **p*<0.05 vs. Russell.

Scientific Posters Group III - Clinical Trauma

Poster #16
January 12, 2017
1:45 pm-3:00 pm

MANAGEMENT OF TRAUMATIC SUBARACHNOID HEMORRHAGE (SAH) BY THE TRAUMA SERVICE: ARE REPEAT CT SCANNING & ROUTINE NEUROSURGICAL CONSULTATION NECESSARY?

Stephen Cooper, BS, Kimberly Bethea, Trevor Skrobut, Karen Herzing, Akpofure Peter Ekeh, MD*
Wright State University

Presenter: Stephen Cooper, BS

Objectives: The need for repeat Head CT and specialty consultation after mild Traumatic Brain Injuries (TBI) has been questioned. Management of Traumatic SAH involves brief admission to the Trauma Service, neurologic checks, Neurosurgical consultation and a repeat Head CT within 24 hours to identify progression or resolution. We reviewed TBI patients specifically with SAH to determine the typical progression of the pathology and the need for Neurosurgical involvement & repeat CT imaging.

Methods: All patients who presented to a Level I Trauma Center with Traumatic SAH and a Glasgow Coma Score (GCS) between 13-15 over a 5 year period (Jan 2010 to Dec 2014) were identified from the Trauma registry. Demographic data, initial and follow up CT findings, Injury Severity Score (ISS), admission GCS, Length of Stay (LOS), readmissions and Emergency Department return visits within one month were obtained from patient charts. Patients with other traumatic brain lesions on the initial CT were excluded.

Results: There were 301 patients (male, 48.5%), mean age 60.9 and mean ISS 8.4. Average time between the 1st and 2nd CT was 11.3 hrs. The majority of patients - 178 (59.1%) had extracranial injuries, while 123(40.8%) were isolated SAH. In all, 275 patients (90.8%) had either no change or an improvement/resolution on follow up CT scan. Only 26 patients (8.6%) had either worsening or new findings on CT. All patients had Neurosurgical consultation.

Conclusions: Less than 10% of SAH patients had worsening of their head injury on repeat CT scanning. Given the low acuity of this population and the tendency towards resolution without intervention, Acute Care Surgeons can manage this group of TBI patients without the need for routine Neurosurgical consultation. Repeat CT scanning continues to have utility as it may identify new lesions, deterioration or the need for further management.

	No CT Change/ Resolution	**Worsening CT/ New lesion**	P value
Number of patients	275	26	
Mean age	61.1 (± 19.9)	59.5 (± 23.1)	0.713
Mean Admission GCS	14.8 (±0.54)	14.7 (±0.55)	0.315
Mean ISS	8.3 (± 5.4)	8.5 (± 8.5)	0.889
Mean LOS	3.5 (±5.3)	4.8 (±7.24)	0.271
1 month return to ED	11 (4%)	0	0.370
Readmission	22 (8%)	3 (11.5%)	0.534

Scientific Posters Group III - Clinical Trauma

Poster #17
January 12, 2017
1:45 pm-3:00 pm

EFFECT OF A TIME TO HEAD COMPUTED TOMOGRAPHY PROTOCOL ON TRAUMATIC BRAIN INJURY OUTCOMES: A QUALITY IMPROVEMENT METRIC

Andrew R. Luhrs, MD, Tareq Kheirbek, MD*, Jayson Marwaha, Stephanie Luekel,
Andrew Stephen, Daithi Heffernan, Charles A. Adams Jr., MD*
Rhode Island Hospital

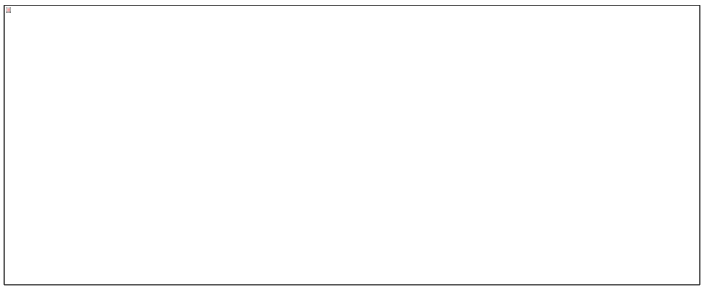
Presenter: Andrew R. Luhrs, MD

Objectives: Traumatic brain injury (TBI) is a leading cause of mortality and disability. Intuitively, early identification of TBI by means of head computed tomography (CTH) should expedite operative decision-making and improve outcome; however, there are no guidelines for time-sensitive CTH. We hypothesized that implementing a protocol of early CTH in TBI patients would improve outcome.

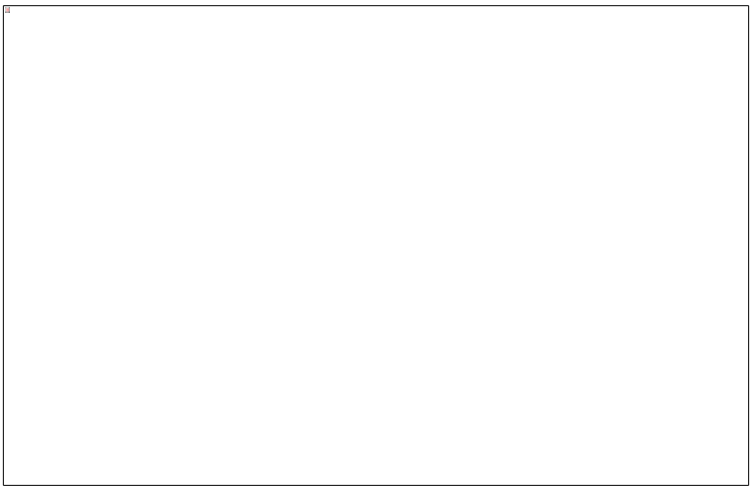
Methods: In January 2015, our level 1 trauma center instituted a multidisciplinary protocol to obtain a CTH within 30 min from arrival for patients with suspected TBI with GCS $\leq$ 13. Compliance with this protocol and its effect on outcome were monitored. Our quality improvement registry was retrospectively queried for patients with head AIS $\geq$3, evaluated between Mar 2012 and Dec 2015. Categorical data were analyzed using Chi-square and continuous data were analyzed using Wilcoxon-Rank Sum test. Multiple regression analysis was used for predicting mortality as a primary outcome.

Results: A total of 1873 patients were identified using the above criteria. Patients who were evaluated PRE (n=1452) and POST (n=421) protocol were similar in demographic and physiologic characteristics, injury mechanisms, hospital length of stay. Among patients who presented directly from the scene with GCSâ‰¤13 (n=347), time to CTH was significantly lower (median 35 min vs. 77 min; p<0.001) and goal of 30 min to CTH was met more frequently (35.4% vs. 1.5%, p<0.001) in the POST group. There were lower odds of mortality POST-protocol (OR 0.65, 95%CI 0.43-0.99) adjusting for age, gender, ISS and GCS. Among patients who underwent EVD placement, time to EVD was significantly shorter POST-protocol (median 159 min vs. 307 min; p=0.01) adjusting for age, gender, AIS and GCS.

Conclusions: Implementing a protocol of early CTH for TBI optimized performance of the trauma team and improved outcomes. Time to CTH should be used as a quality metric in TBI.



Multiple regression analysis showing crude and adjusted odds ratios for mortality and other co-variates POST protocol.OR= odds ratio, CI: confidence interval.



Characteristics of patients PRE and POST protocol presenting directly from the scene with GCS ≤13

Scientific Posters Group III - Clinical Trauma

Poster #18
January 12, 2017
1:45 pm-3:00 pm

COMBAT VASCULAR SURGERY IN OIF/OEF: 2001-2016

Zsolt T. Stockinger, MD, FACS*, Caryn A. Turner
DoD Joint Trauma System

Presenter: Zsolt T. Stockinger, MD, FACS

Objectives: Vascular surgery constitutes approximately 6% of surgical procedures performed for combat injuries, yet general surgeons are increasingly unfamiliar with vascular surgery. This study examines the numbers and type of vascular surgical procedures performed during OEF/OIF.

Methods: A retrospective analysis of the Department of Defense Trauma Registry (DoDTR) was done for performance improvement purposes for all Role 2 and Role 3 Military Treatment Facilities, from January 2001 to May 2016. ICD-9 vascular procedure codes were grouped by location as abdominal, thoracic , peripheral , shunt and not otherwise specified (NOS); and definitive procedures were grouped as ligation , primary repair , graft and other (OTH.) Ligation as part of an amputation was excluded. Grafts were further subdivided by type: synthetic (SYNTH), autologous (AUTOL), and unknown.

Results: A total of 12,348 vascular surgical procedures were identified: Abdominal (1,036), Extremity (3,675), Thoracic (284), Shunt (785), and NOS (6,568); 11,061 definitive procedures were identified: Ligation (4,162), Primary Repair (1,660), Graft (1,263), and Other (3976); 1,263 grafts were identified: Synthetic (74), Autologous (896), and UNK (293). The majority of procedures (9,973, 80.7%) were performed at Role 3 facilities, and a higher proportion of grafts were done at Role 3. Vascular caseload was extremely variable over the 15 year study period.

Conclusions: While ligation remains the most common definitive vascular procedure performed for combat trauma, the need for repair including grafting is significant at both the Role 2 and Role 3 levels. Vascular therefore remains a necessary skill set for the deployed U.S. military surgeon; military general surgeons need to train in and sustain these skills.

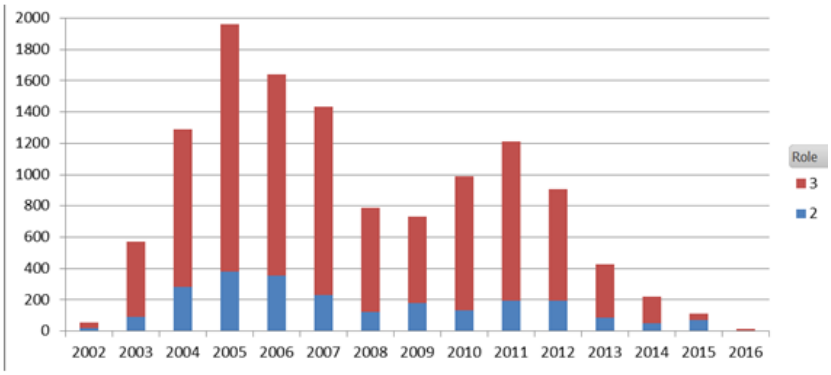


Fig 1: Sum of vascular procedures performed by year.

	Role 2	Role 3	Total
Ligation	40.41%	36.98%	37.63%
Primary Repair	12.62%	15.56%	15.01%
Graft	5.54%	12.78%	11.42%
Other	41.43%	34.68%	35.95%

Table 1: Proportion of definitive procedures performed by facility role.

Scientific Posters Group IV - Emergency General Surgery

Poster #19
January 12, 2017
1:45 pm-3:00 pm

PREDICTORS OF SURGICAL SITE INFECTION FOLLOWING MESH REPAIR OF ACUTELY INCARCERATED VENTRAL AND GROIN HERNIAS

Tyler Loftus, MD, Kristina Go, Janeen Jordan, MD*, Chasen Croft, MD*,
Philip Efron, MD*, R. Stephen Smith, Frederick Moore, MD*,
Alicia M. Mohr, MD*, Scott C. Brakenridge, MD, MSCS, FACS*
University of Florida

Presenter: Tyler Loftus, MD

Objectives: Mesh placement during repair of acutely incarcerated hernias is associated with high rates of surgical site infection (SSI) with subsequent repair failure. The utility of preoperative computed tomography (CT) in this setting is unclear. We hypothesized that CT evidence of bowel wall compromise would predict subsequent SSI.

Methods: We performed a 4-year retrospective analysis of 50 consecutive patients who had mesh repair of acutely incarcerated ventral or groin hernias. We analyzed comorbidities, physiologic derangement, CT scan findings, operative management, and herniorrhaphy-specific outcomes within 180 days. We performed univariate correlation and multiple logistic regression to identify risk factors for SSI.

Results: Patient characteristics are listed in Table 1. Seventy percent of the preoperative CT scans had complicating features, including fluid in the hernia sac (36%), fat stranding (36%), bowel wall edema (16%), free peritoneal fluid (14%), bowel wall hyperemia (12%), and mesenteric edema (4%). SSI rates were significantly higher among patients who had CT evidence of fluid in the hernia sac (56% vs. 19%, p=0.012). Ventral hernia and bowel resection were associated with SSI on univariate analysis, but excluded from the multivariate model due to collinearity with BMI (r=0.44) and heart rate/sac fluid (r=0.35, 0.31), respectively. Independent predictors of SSI were CT evidence of fluid in the hernia sac (OR 8.3 (95% CI 1.7-41)), initial heart rate ≥90 (OR 6.3 (1.1-34)), and BMI ≥35 (OR 5.8 (1.2-28)) (model AUC 0.81 (95% CI 0.69-0.84)).

Conclusions: Over half of all patients with CT scan evidence fluid in the hernia sac developed a SSI. CT evidence of fluid in the hernia sac was the strongest predictor of SSI, followed by heart rate and BMI. Preoperative CT scan may help to identify a subgroup of patients who would benefit from primary herniorrhaphy or biologic mesh placement.

	n = 50
Age (years)	58 ±15
ASA class	3.0 ±0.6
ASA class III or IV	42 (84%)
Active smoker	14 (28%)
Body mass index	35 ±12
Prealbumin (mg/dl)	9.3 ±4.5
HbA1c (%)	7.6 ±2.1
Max glucose within 24 hours of incision (mg/dl)	157 ±63
Hernia type	
Inguinal	27 (54%)
Ventral	20 (40%)
Femoral	2 (4%)
Inguinal and femoral	1 (2%)
Recurrent hernia	13 (26%)
Antibiotics within 30 minutes of incision	50 (100%)
Inadequate antibiotic dose	6 (12%)
Inadequate antibiotic re-dosing	10 (20%)
Bowel resection	5 (10%)
Antibiotics covered enteric organisms	4 (80%)
Intraoperative T_{min} (°C)	36.1 ±0.6
Synthetic mesh repair	34 (68%)
Biologic mesh repair	16 (32%)
Duration of operation (minutes)	201 ±79
SSI within 180 days	16 (32%)
Superficial SSI	4 (8%)
Deep or organ/space SSI	12 (24%)

Table 1: Patient characteristics (ASA: American Society of Anesthesiology; data are presented as mean ±standard deviation or n (%)).

Scientific Posters Group IV - Emergency General Surgery

Poster #20
January 12, 2017
1:45 pm-3:00 pm

PREDICTORS OF POST-OPERATIVE COMPLICATIONS AFTER SURGICAL ADHESIOLYSIS

David T. Asuzu, PhD, MPH, Kevin Pei, MD*, Kimberly A. Davis, MD, MBA, FACS, FCCM*
Yale-New Haven Hospital

Presenter: David T. Asuzu, PhD, MPH

Objectives: Small bowel obstruction often requires surgical management. This study develops a model to predict post-operative complications after surgical adhesiolysis. We compare this model to one previously reported based on Veterans Affairs Surgical Quality Improvement Program (VASQIP).

Methods: We analyzed data from the American College of Surgeons (ACS) National Surgical Quality Improvement Program (NSQIP) from 2005 to 2013. Predictors of post-operative complications were identified using univariable logistic regression and combined by step-forward selection into multivariable logistic regression models reporting beta coefficients. Goodness of fit was assessed using Pearson $\chi 2$ statistics, or Hosmer-Lemeshow $\chi 2$ statistics when the ratio of observations to covariate patterns approached unity. $P< 0.05$ was considered significant. Predictive models were compared using areas under the receiver operating characteristic curves (AUROC). This model was compared to an existing model based on VASQIP data by Margenthaler. Four and three parameters models were constructed.

Results: The four-parameter model, termed FAST: Functional status, ASA classification, Sepsis, and operative Time, predicts complications with odds ratio 2.72, (95% CI 2.50, 2.96), vs. Margenthaler odds ratio 1.10 (95% CI 1.09, 1.12), $P < 0.001$ FAST predicts any complication with a higher AUROC than Margenthaler (0.70 versus 0.67, $P = 0.01$). FAST predicts the 6 most common complications with a higher AUROC (0.70 versus 0.67, $P = 0.01$). The three-parameter FAS (removal of operative time) generated an OR of 1.10, 95% CI (1.09, 1.10), $P < 0.001$ and AUROC 0.68.

Conclusions: FAST and FAS predicts subsequent post-operative complications after surgical adhesiolysis and is more accurate than an existing predictive model.

Scientific Posters Group IV - Emergency General Surgery

Poster #21
January 12, 2017
1:45 pm-3:00 pm

CT PSOAS DENSITY PREDICTS ENTEROCUTANEOUS FISTULA TAKEDOWN OUTCOMES

Wilson D. Lo, BS, David Evans, MD*, Taehwan Yoo
The Ohio State University

Presenter: Wilson D. Lo, BS

Objectives: We hypothesized that preoperative CT-based psoas density as a marker of sarcopenia can used to predict fistula recurrence, morbidity and mortality.

Methods: This retrospective cohort study examined patients admitted to Wexner Medical Center Surgery service between January 2003 and May 2016 that underwent ECF repair with abdominal CT study. L3 level psoas muscle cross-section CT studies were captured with EasyViz® software [Fig.1] Psoas density was measured as mean psoas Hounsfeld unit density (MPHU). Clinically relevant outcomes measured were fistula recurrence/leak, mortality, complication, 30 day readmission rate and dependent discharge. Variables were compared using Fischer's exact, Student's T and chi-square tests. Significance was defined $\alpha = 0.05$.

Results: 58 patients were identified that met our criteria. Patient characteristics included mean age 54.9 years and 51.7% female. Average length of stay was 17.9 days. 90 day mortality was 3.4%. Overall complication rate was 70.7%. Discharge destination was: home 24.1% and dependent to skilled nursing facility/long term acute care hospital 75.9%. 30 day readmission rate was 41.3%. Muscle density cutoff for sarcopenia was defined as the lowest 25th percentile value of MPHU (sarcopenia by MPHU $\leq$ 32.9 HU). Sarcopenia did not predict fistula leak/repair failure, length of stay and did not increase complication risk. Patients with lower MPHU had increased risk of 90-day mortality(RR=4.24,p=0.01), 1-year mortality(RR=1.42,p=0.004), 30-day readmission(RR=2.92,p=0.03) and discharge to dependent-care facilities(RR=3.11,p=0.02).

Conclusions: Psoas muscle density appears to be a significant predictor of mortality, dependent discharge and 30-day readmission. It does not predict likelihood of postoperative fistula recurrence/leak. This objective measure of sarcopenia may aid identifying patients at highest risk of significant morbidity and mortality when assessing for elective repair.

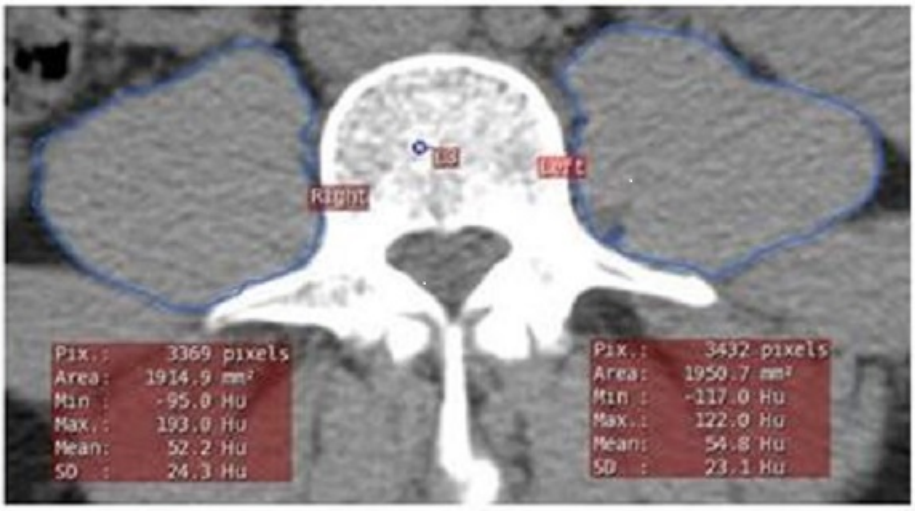


Figure 1. CT image analysis. Tracings of right and left psoas muscles at the third lumbar vertebrae level (L3)

Figure 1. CT image analysis. Tracings of right and left psoas muscles at the third lumbar vertebrae level (L3)

Scientific Posters Group IV - Emergency General Surgery

Poster #22
January 12, 2017
1:45 pm-3:00 pm

THE PARKLAND GRADING SCALE FOR CHOLECYSTITIS

David Leshikar, MD, Christian T. Minshall, MD, PhD*, M. Chance Spalding, DO, PhD,
Paul Nakonezny, Alexander L. Eastman, MD, MPH, FACS*,
Joseph P. Minei, MD, FACS*, Herb A. Phelan III, MD, FACS*, Michael W. Cripps, MD*
University of Texas Southwestern Medical Center

Presenter: David Leshikar, MD

Objectives: Laparoscopic cholecystectomy is one of the most frequent operations performed by general surgeons. However, gallbladders (GB) with more severe inflammation have longer operative times, increased risk for complications or conversion to open. Further, no simple grading system exists which allows the surgeon to stratify the severity of inflammatory disease. We propose a novel grading system using intra-operative images to better stratify GB inflammation.

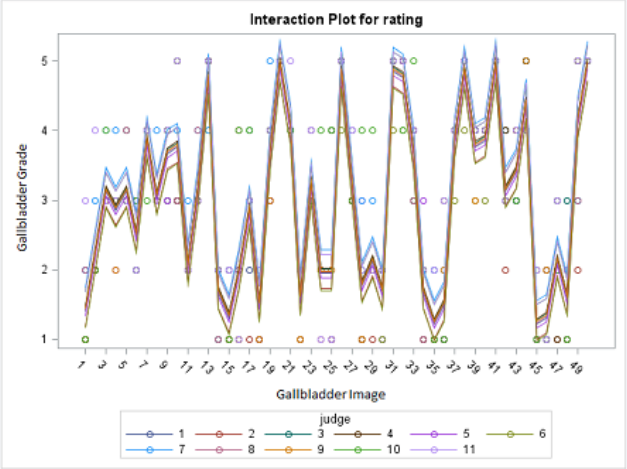
Methods: After reviewing the intraoperative images of the initial view of the GB obtained during several hundred consecutive laparoscopic cholecystectomies, we developed a five-tiered grading system based on anatomy and inflammatory changes **(Table 1)**. A priori power analysis determined 11 raters grading 45 GB images achieves 81% power to detect an intraclass correlation as small as 0.20 with a significance level of 0.05. Therefore, 50 intra-operative photographs were taken after elevation of the GB fundus and prior to dissection at a single institution and distributed to 11 Acute Care Surgeons who, in turn, rated each GB severity according to the grading system. The two-way random effects Intraclass Correlation Coefficient (ICC) was used to assess the reliability (or magnitude of absolute agreement) among the 11 raters based upon the 50 GB images.

Results: Each rater graded all 50 images, for a total of 550 observations. The ICC among the 11 raters of GB severity was 0.804 (95% CI: 0.733 to 0.867; p=.0001) **(Figure 1)**. Nineteen GB images had greater than 82% agreement and 16 were clustered around those with severe inflammation (Grades 3-5). Only 3 images had less than 50% agreement with ranges of 1-4.

Conclusions: This study proposes a simple, reliable grading system that characterizes GB complexity based on inflammation and anatomy. This classification can now be used to predict case complexity, patient outcomes and changes in surgeon reimbursement.

Gallbladder Severity Grade	Description of Severity
1	Normal appearing gallbladder ("robin's egg blue") a. No adhesions present b. Completely normal gallbladder
2	Minor adhesions at neck, otherwise normal gallbladder a. Adhesions restricted to the neck or lower of the gallbladder
3	Presence of ANY of the following: a. Hyperemia, pericholecystic fluid, adhesions to the body, distended gallbladder
4	Presence of ANY of the following: a. Adhesions obscuring majority of gallbladder b. Grade I-III with abnormal liver anatomy, intrahepatic gallbladder, or impacted stone (Mirrizi)
5	Presence of ANY of the following: a. Perforation, necrosis, inability to visualize the gallbladder due to adhesions

Table 1. Parkland Grading Scale for Cholecystitis



Intra-operative images of 50 gallbladders were arranged randomly. Each rater graded every image. The high reliability of the grading system is demonstrated by the near identical trend for all 11 raters.

Scientific Posters Group IV - Emergency General Surgery

Poster #23
January 12, 2017
1:45 pm-3:00 pm

MORNING REPORT DECREASES LENGTH OF STAY IN EMERGENCY GENERAL SURGERY PATIENTS

JD Wolfe, BS, Britney Beumeler, Michael J. Sutherland, MD*, Katie Whitlock Kimbrough, MD*, Joseph C. Jensen, MD, MHA, FACS*, Audra Choate, Ronald Robertson, Kevin Sexton, MD*
University of Arkansas for Medical Sciences

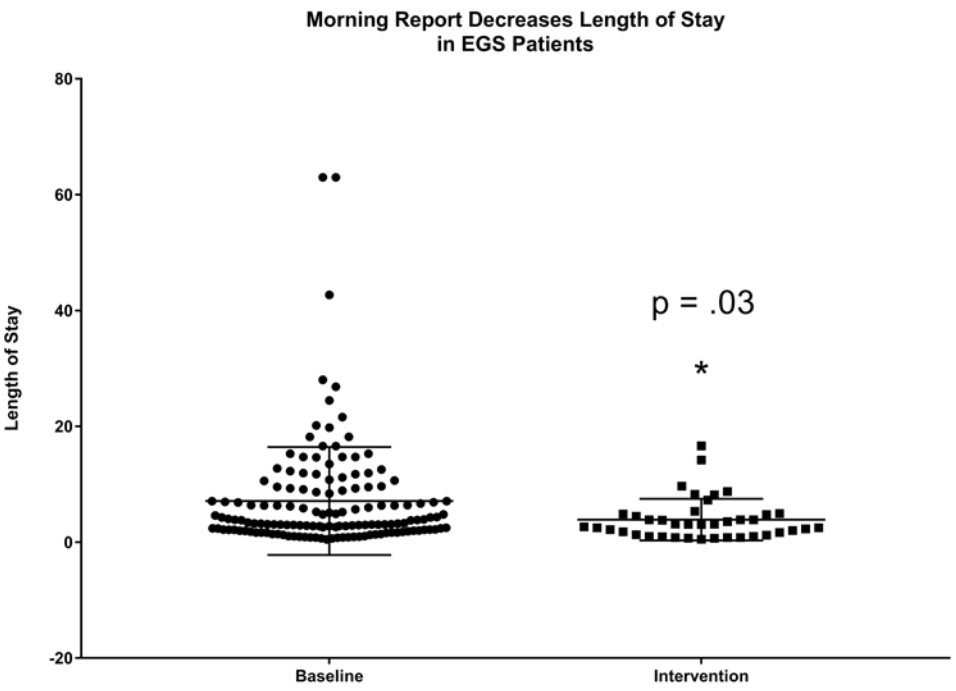
Presenter: JD Wolfe, BS

Objectives: To improve the care of our Emergency General Surgery (EGS) patients, we implemented a structured morning report. We hypothesized this intervention would decrease length of stay (LOS) and we aimed to prospectively collect changes to the plan of care to identify why LOS would decrease.

Methods: Prior to the intervention hand-offs were communicated between resident teams without attending provider supervision and post intervention hand-offs were completed between resident teams with oversight from 3 attending surgeons (night call, trauma day call, and emergency general surgery day call). Changes to the plan of care were collected prospectively by an advanced practice nurse and retrospectively classified into the following categories: medication changes, addition of a procedure, avoidance of a procedure, protocol deviations, and other.

Results: During the study period 101 daily surveys were completed (60% response rate) detailing 158 EGS admissions (134 Floor (85%) and 24 ICU (15%). Changes to the plan of care occurred in 45 patients (28.5%). The most common change (n=18, 40%) was the addition of a procedure the same day, followed by medication changes (n=10, 22%). The mean LOS for the study period was 3.9 + 0.6 days and was significantly decreased compared to the intervention period (7.1 + 0.8 days (p=.03)).

Conclusions: Implementation of an attending supervised EGS morning report is associated with a decreased length of stay and changes to the plan of care in 29% of patients. The most common changes that occurred during this hand-off were the addition of procedures and changes in medications. Further work needs to be done in this area to determine how changes to the plan of care impact length of stay.


Morning Report Decreases Length of Stay
in EGS Patients
Length of Stay
80
60
40
20
0
-20
p = .03
*
Baseline
Intervention

Scientific Posters Group V - ICU

Poster #24
January 12, 2017
1:45 pm-3:00 pm

EVALUATION OF INTERMITTENT EXTUBATION BETWEEN STAGED PROCEDURES IN PATIENTS MANAGED WITH AN OPEN ABDOMEN

Noran Barry, MD*, Cindy Hlavacek, MD, Sean P. Montgomery, MD*,
Michelle Brownstein, MD*, Thersia Knapik
University of North Carolina

Presenter: Cindy Hlavacek, MD

Objectives: Patients managed with an open abdomen (OA) often remain ventilated between their staged returns to the operating room (OR). We hypothesized that appropriately selected OA patients may be safely managed with intermittent extubation between staged procedures, offering them the potential benefits known to be associated with shorter durations of mechanical ventilation.

Methods: This retrospective study was approved by the IRB. A central surgical database was queried to identify consecutive post-laparotomy patients managed with the OA technique during a 16-month period (4/14-8/15). Intermittently extubated OA patients were compared to those who remained intubated for the duration of OA. Data are presented as mean +/- standard deviation. Two-tailed Student's T-tests were applied to continuous variables, and the Chi-Squared to ordinal variables. Statistical significance was defined as $p<0.05$.

Results: During the study period, 61 patients were managed with OA. 10 were extubated (EXT) between staged procedures; all others (n=51) remained intubated throughout the OA period (NON). Mean hospital LOS (EXT=24.4+/-16.2, NON=21.5+/-22.8 days; p= 0.42), ICU LOS (EXT=9.0+/- 9.8 days, NON=13.2+/-15.6 days; p=0.712), and cumulative ventilator days (EXT=5.9+/-7.9, NON=10.2+/-12.5 days; p=0.297) did not statistically differ between the two groups. There were no deaths in the EXT group, versus 24 in the NON group (p=0.004).

Conclusions: Our results suggest that the practice of extubation between staged operative procedures in properly selected patients managed with the OA technique can be performed safely. Patient selection bias for extubation candidates during OA may be associated with less illness severity, likely resulting in the mortality difference we observed. A larger study will be required to define selection criteria that appropriately identify candidates for intermittent extubation during OA.

Notes

Scientific Posters Group V - ICU

Poster #25
January 12, 2017
1:45 pm-3:00 pm

DON'T GET BURNED: PREHOSPITAL INTUBATION IMPROVES OUTCOMES IN PATIENTS WITH SUSPECTED INHALATION INJURY

Eric H. Bradburn, DO, MS, FACS*, Brian Gross, Caitlin A. Lynch,
Cole D. Rinehart, EMT-B, Frederick Rogers, MD, MS, FACS*
Penn Medicine Lancaster General Health

Presenter: Eric H. Bradburn, DO, MS, FACS

Objectives: Early aggressive airway management has long been the mantra for pre-burn center care of inhalation injuries. Despite this accepted approach, a paucity of data exists on outcomes associated with these methods. We sought to compare outcomes between prehospital and hospital intubated patients, hypothesizing that prehospital intubation would decrease mortality and increase functional status at discharge (FSD) in patients with suspected inhalation injury.

Methods: All inhalation injuries presenting to accredited Pennsylvania trauma centers from 2003-2015 who underwent intubation were analyzed. Penetrating trauma patients were excluded from analysis. A multilevel mixed-effects logistic regression model assessed the adjusted impact of prehospital intubation on mortality while controlling for injury severity score (ISS), total burn surface area (TBSA), and admission Glasgow Coma Scale (GCS) score. A generalized linear mixed model characterized FSD for non-fatal patients while controlling for the same variables.

Results: A total of 444 patients met inclusion criteria, of which 328 were intubated prehospital and 116 were intubated in hospital. No difference in unadjusted ISS (prehospital: 11.49±8.67; hospital: 11.3±8.1; p=0.26) or TBSA (prehospital: 1.49±6.0; hospital: 1.75±5.2; p=0.73) was observed between subgroups, although higher GCS arrival scores (prehospital: 5.49±3.4; hospital: 4.48±3.0; p=0.004) were found in prehospital-intubated patients. A significant decrease in adjusted mortality (AOR: 0.15, 95% CI 0.07-0.32; p<0.001) and increase in FSD (AOR: 6.33 95% CI 1.20-33.1; p=0.029) were observed for patients receiving prehospital intubation (Figure 1).

Conclusions: Objective analysis of mortality and functional measures provides support for prehospital intubation in patients presenting with inhalation injuries.

	Mortality Model (n=444)		Functional Status at Discharge Model (n=369: non-fatal patients)	
Variable	Adjusted Odds Ratio (95% CI)	p-value	Adjusted Odds Ratio (95% CI)	p-value
Prehospital Intubation	0.15 (0.07-0.32)	<0.001	6.33 (1.20-33.1)	0.029
ISS	1.08 (1.04-1.13)	<0.001	0.82 (0.76-0.89)	<0.001
TBSA	0.95 (0.89-1.02)	0.213	0.93 (0.86-1.02)	0.126
GCS	0.66 (0.49-0.88)	0.005	1.14 (0.97-1.34)	0.100
		AUROC: 0.87		

Figure 1: Adjusted trends in mortality and functional status at discharge between prehospital and hospital-intubated patients.

Scientific Posters Group V - ICU

Poster #26
January 12, 2017
1:45 pm-3:00 pm

EXTUBATING THE TRAUMA PATIENT WITH AN OPEN ABDOMEN

Joseph Sujka, MD, Karen Safcsak, RN, Joseph Ibrahim, MD*
Orlando Regional Medical Center

Presenter: Joseph Sujka, MD

Objectives: The open abdomen (OA) is commonly utilized in trauma as a technique for damage control laparotomy (DCL). We proposed these patients could be extubated prior to abdominal closure to decrease ventilator days and the risk of pneumonia.

Methods: A retrospective chart review was performed at a Level 1 trauma center on all adult trauma patients requiring an OA following DCL. Patients were stratified into 2 groups: extubated prior to (PRE) and extubated after (POST) abdominal closure. Successful extubation in the PRE group was measured by the need for re-intubation and/or the development of pneumonia during or within 72 hours of closure. Data were analyzed using Mann-Whitney U and Fisher's exact test and reported as median with interquartile range (IQR) and percentage. Univariate regression analysis was performed to identify successful extubation prior to abdominal closure. Statistical significance was defined at $p < 0.05$.

Results: 113 adult trauma patients in 2014-2015 required an OA for DCL. 23 patients were excluded for GCS < 8 or expired/care withdrawn within 72 hours. 48 patients whose abdomen was closed in < 48 hours were also excluded. Therefore, 20 patients remained in the PRE group and 22 in the POST group. There was no statistical difference between the groups in age, mechanism of injury, penetrating vs. blunt or AIS-abdomen. Days from OA to extubation was significantly lower in the PRE group [0.5 (0.2-1.2) vs. 7 (5-19); $p < 0.001$]. The PRE group had a significant decrease in pneumonia rate [1 (5%) vs. 7 (32%); $p = 0.047$]. There was 1 re-intubation in the PRE group. Univariate analysis demonstrated ISS, GCS and AIS-chest to be predictive of successful extubation ($p < 0.05$). Median hospital LOS, ICU LOS, and hospital charges were significantly higher in the POST group.

Conclusions: Presence of an OA does not necessitate the need for mechanical ventilation. Extubation of appropriate patients may lead to decreased pneumonia, LOS and hospital expenditures.

Notes

Scientific Posters Group V - ICU

Poster #27
January 12, 2017
1:45 pm-3:00 pm

SHOULD PATIENTS MANAGED WITH OPEN ABDOMEN BE EXTUBATED?

Roberto Taarea, DO*, Allison Tompeck, MD , Michael W. Cripps, MD*,
Alexander L. Eastman, MD, MPH, FACS*, Natalie Provenzale, Christian T. Minshall, MD, PhD*
University of Texas Southwestern Medical Center

Presenter: Roberto Taarea, DO

Objectives: Temporary abdominal closure (TAC) is a common tool used to manage surgery patients with aberrant physiology. Most of these patients require ventilator support during their initial resuscitation but may meet extubation criteria prior to definitive fascial closure. We routinely extubate our patients with TAC and have retrospectively reviewed this practice to establish the feasibility and safety of extubation in patients managed with an open abdomen.

Methods: We reviewed the records of all patients managed with an open abdomen via negative pressure wound therapy in a tertiary university hospital from January 2014 to February 2016. Patients that died within 24 hours of index operation were excluded. Data collected included: demographics, ICU length of stay, ventilator days, Injury Severity Scores (ISS) in trauma patients and Sequential Organ Failure Assessment (SOFA) scores SOFA scores in general surgery patients. We compared results using Welch's t-test.

Results: A total of 53 patients (21 trauma, 32 general surgery) were managed with TAC. A total of 18 (34%) patients with TAC (4 trauma, 14 general surgery) were extubated while they had an open abdomen. Thirty-four extubation events occurred in these 18 patients, saving an average of 31.5 ± 10.4 ventilator-free hours per extubation event, as opposed to leaving the patient intubated the entire time their abdomen was open. The patients with TAC that were successfully extubated had lower median ISS [11.5 (5,22) vs. 19 (10,50); $p = 0.038$] and SOFA [3 (0,6) vs. 7.5 (3,11); $p < 0.0001$] scores as compared to those that required ongoing ventilator support. None of the extubation events in the patients managed with TAC required reintubation for respiratory dysfunction.

Conclusions: Our results demonstrate patients managed with TAC that meet criteria for liberation from the ventilator may be successfully extubated without increased risk of reintubation.

Notes

Scientific Posters Group V - ICU

Poster #28
January 12, 2017
1:45 pm-3:00 pm

THE INTERMOUNTAIN RISK SCORE'S ASSOCIATION WITH MORTALITY PREDICTION IN TRAUMA PATIENTS: A PROSPECTIVE, RANDOMIZED STUDY

Sarah Majercik, MD, MBA, FACS*, Joseph Bledsoe, Brad Morris, Benjamin Horne
Intermountain Medical Center

Presenter: Sarah Majercik, MD, MBA, FACS

Objectives: The Intermountain Risk Score (IMRS) is a validated tool to evaluate individual mortality risk. IMRS is calculated using components of the complete blood count (CBC), basic metabolic profile (BMP), patient age, and gender. The aims of this study are to: 1. prospectively determine the IMRS' ability to predict 30-day and 1-year mortality in trauma patients and 2. compare experienced trauma surgeons' (ETS) ability to predict 30-day and 1-year mortality to that of of the IMRS.

Methods: Prospective, randomized analysis of adult trauma activation patients from 10/2013 to 5/2014. Patients were randomized to have admission IMRS provided to clinicians in the Emergency Department vs. not. ETS estimated mortality risk using all available clinical information including the IMRS if calculated. Gender-specific IMRS were calculated using multivariable modeling. Three mortality risk thresholds were established. Actual mortality was determined using the medical record and Social Security Administration death data. Net reclassification improvement (NRI) index was used to compare IMRS calculation of mortality risk to ETS judgment.

Results: 437 patients were enrolled. IMRS was calculated and available to physicians in 221. IMRS was highly predictive of death at 30 days (c=0.77 females, c=0.88 males) and 1 year (c=0.77 females, c=0.90 males). ETS assessment of mortality risk correlated well with IMRS risk thresholds at 30 days and one year in males and females ($p<0.001$). NRI index showed that ETS were better than the IMRS at predicting 30-day mortality. At one year, ETS and IMRS were not different in mortality risk prediction. Knowledge of IMRS vs not knowing did not change ETS predictive accuracy nor outcomes.

Conclusions: IMRS prospectively predicts mortality in trauma patients at a single Level I trauma center. IMRS is similar in predictive ability to ETS judgment. IMRS may be a useful component of a future comprehensive mortality prediction score for trauma patients.

Notes

Scientific Posters Group VI - Systems

Poster #29
January 12, 2017
1:45 pm-3:00 pm

ARE TRAUMA SURGEONS READY TO RESPOND TO TODAY'S DISASTERS?

Daniel J. Grabo, MD, FACS*, Kyle N. Remick, MD*, Susan M. Briggs, MD*
LAC+USC Medical Center

Presenter: Daniel J. Grabo, MD, FACS

Objectives: A well-defined means of organizing trauma surgeons based on capabilities in disaster response has been lacking. We sought to create a registry of trauma surgeons available to respond to disasters in conjunction with the American College of Surgeons (ACS) Operation Giving Back and define functional capabilities of trauma surgeons appropriate to meet the diverse medical response needs of today's disasters.

Methods: The authors conducted a survey of members of the American Association for the Surgery of Trauma and the Eastern Association for the Surgery of Trauma aimed at establishing a registry of qualified trauma surgeons available to respond to disasters. Data was obtained for surgical and specialty training, board certification, disaster response training, and military or civilian disaster experience.

Results: Of 211 respondents, 96% identified as trauma surgeons, and nearly 90% also reported practicing acute care surgery and/or critical care (Fig. 1). While 97% were current in Advanced Trauma Life Support, only 40% had taken Advanced Trauma Operative Management and/or Advanced Surgical Skills for Exposure in Trauma. Only 30% of those surveyed received disaster specific training in the Federal Emergency Management Agency courses and the Disaster Management and Emergency Preparedness course. Even fewer had military service (26%) or had civilian experience (19%) in disaster response.

Conclusions: This initiative complements efforts by the ACS to organize a registry of trauma surgeons who are qualified and willing to respond in all aspects of disaster response: search and rescue, triage, definitive care and evacuation. While trauma surgeons are optimally positioned to provide a wide range of surgical expertise in a disaster, this study identified the lack of a universally accepted training program for surgeons willing to respond to mass casualty incidents. Standardized disaster response training for surgeons remains a challenge for the future.

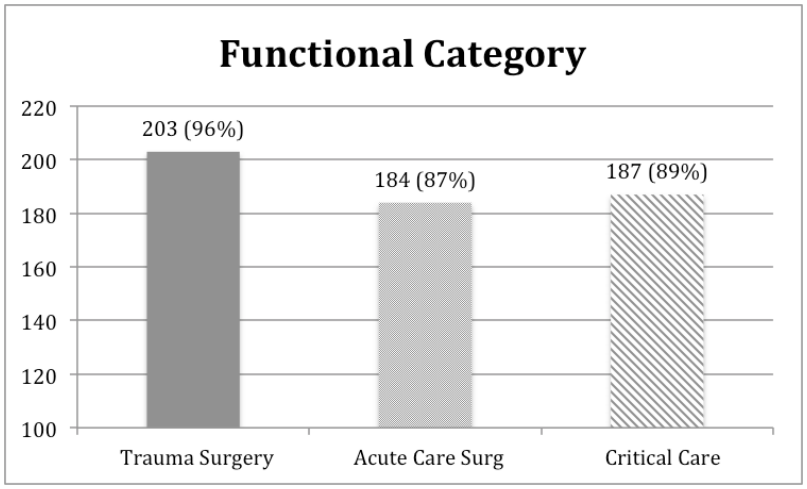


Figure 1: Functional Category as reported by respondents to the survey.

Scientific Posters Group VI - Systems

Poster #30
January 12, 2017
1:45 pm-3:00 pm

EARLY UNPLANNED TRAUMA READMISSIONS IN A SAFETY NET HOSPITAL ARE RESOURCE INTENSIVE BUT NOT DUE TO RESOURCE LIMITATIONS

Martin Rosenthal, MD, Marie L. Crandall, MD, MPH*,
Joseph J. Tepas III, MD*, Andrew J. Kerwin, MD*
University of Florida College of Medicine - Jacksonville

Presenter: Martin Rosenthal, MD

Objectives: It has been suggested that trauma readmissions are an indicator of poor hospital care or fragmented discharge. With readmission rates around 5% within 30 days of injury, readmissions may add significant cost and are associated with worse outcomes, including mortality. Despite multiple well-done studies in the literature, there has been little uniformity with respect to predictors of readmission.

Methods: We performed a retrospective review of all admissions to our urban level 1 trauma center from 7/1/2012 to 6/30/2015. Patients 16 and older discharged alive were studied. We identified all unplanned readmissions that occurred within 30 days of discharge and performed a chart review to identify reasons and risk factors for readmission. We performed univariable and multivariable analyses to determine independent predictors of readmission.

Results: We identified 6,026 trauma admissions and 158 (2.6%) unplanned readmissions within 30 days of discharge. Approximately 1/3 of readmissions required some type of procedure, such as wound debridement. On multivariate analysis only Injury Severity Score (ISS; OR 1.02, 95% CI 1.00-1.05, p=0.016), penetrating injuries (OR 1.9, 95% CI 1.12-3.24, p=0.018) and smoking (OR 1.73, 95% CI 1.05-2.86, p=0.031) were significant predictors of readmission. Hospital length of stay, insurance status, and race were not significant.

Conclusions: Despite our resource-limited environment, our trauma readmission rate was consistent with previously published studies. Since our trauma readmissions were resource intensive, we hoped to find modifiable risk factors for quality improvement. Our results shared some risk factors with previous research, but not all. With little consensus in the literature, individual trauma centers should evaluate their specific risk factors for readmission to improve patient outcomes and decrease hospital costs.

Notes

Scientific Posters Group VI - Systems

Poster #31
January 12, 2017
1:45 pm-3:00 pm

REVACCINATION COMPLIANCE AFTER TRAUMA SPLENECTOMY: A CALL FOR IMPROVEMENT

Jason Weinberger, DO*, Marilynn Bartley, MSN*
Christiana Care Health System

Presenter: Jason Weinberger, DO

Objectives: This study's aim was to assess patients' personal understanding of the risk for future infections and compliance with subsequent revaccinations after splenectomy for trauma.

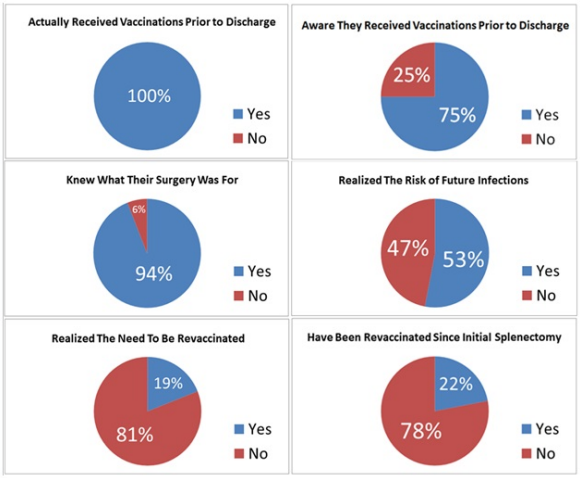
Methods: A 10-year, single-institution, retrospective chart review was performed for patients who underwent splenectomy for trauma from 2004 to 2013 at a tertiary care level 1 trauma center. During this period, 267 patients underwent splenectomy secondary to trauma, 49 expired prior to discharge, and 23 patients expired since their time of discharge. A follow-up telephone survey was undertaken and 52 of the surviving 196 splenectomy patients agreed to participate (27% response rate). Average time from discharge to date of survey was 5.4 years. Survey questions were used to determine patients' recollection of their injuries, knowledge of splenectomy implications on risk of future infections, and their current vaccination status (Figure 1).

Results: Of the 52 patients contacted, 100% of them received vaccinations prior to discharge but just 25% of patients were aware that they had received these vaccinations. Only 53% of patients were aware that they were at an increased risk for severe infection due to their splenectomy, and a mere 19% understood they would require revaccinations to continue prevention of infections. The revaccination rate in this group of patients was only 22% since their trauma splenectomy (Figure 2).

Conclusions: Vaccination rates post-splenectomy from our tertiary care level 1 trauma center are high but the ensuing patient education and stress on need for revaccination is poor. Only 53% of patients are aware of their lifelong risk of infection due to asplenia, and 81% of respondents failed to recognize the need for revaccinations. More specific patient education and surveillance policies need to be initiated for trauma patients who have undergone splenectomy to ensure compliance with revaccination.

Figure 1 – Telephone Survey Questionnaire Post-Splenectomy		
Question	Patient Response	
1.) Did you have an operation?	YES [100%]	NO [0%]
2.) Do you know what the operation was for?	YES [94%]	NO [6%]
3.) Are you aware that you are at increased risk for infection because you have had your spleen removed?	YES [53%]	NO [47%]
4.) Are you aware that you were given vaccinations after your surgery to prevent infections in the future?	YES [75%]	NO [25%]
5.) Were you given any verbal information about your risk for infection after having your spleen removed?	YES [55%]	NO [45%]
6.) Were you given any written information about your risk for infection after having your spleen removed?	YES [23%]	NO [77%]
7.) Did you notify your family doctor of your injury?	YES [58%]	NO [42%]
8.) Are you aware that you will need to be vaccinated?	YES [19%]	NO [81%]
9.) Have you been revaccinated?	YES [22%]	NO [78%]
10.) Have you been hospitalized since your splenectomy for a serious infection?	YES [11%]	NO [89%]

Telephone Survey Questionnaire Post-Splenectomy



Survey Results of Post-Splenectomy Patients

Scientific Posters Group VI - Systems

Poster #32
January 12, 2017
1:45 pm-3:00 pm

RISK FACTORS AND COSTS ASSOCIATED WITH NATIONWIDE NONELECTIVE READMISSION AFTER TRAUMA

Joshua Parreco, MD, Nicholas Cortolillo, Rishi Rattan, MD*, Nicholas Namias, MD*
University of Miami Miller School of Medicine

Presenter: Joshua Parreco, MD

Objectives: Readmission after trauma represents a major burden. Prior studies are limited by inability to track readmission across hospitals nationwide, the inability to distinguish elective from nonelective readmission, and the availability of cost data. The purpose of this study was to use the Nationwide Readmission Database (NRD) to compare the risk factors and costs associated with nonelective readmission after trauma across different hospitals in the US.

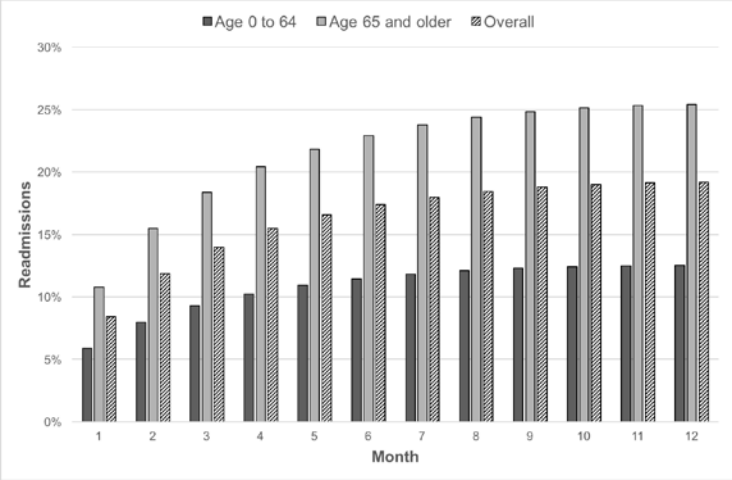
Methods: The NRD was queried for all patients with nonelective admissions in 2013 with primary or secondary diagnoses of trauma who survived the initial admission. Multivariate logistic regression identified risk factors for nonelective readmission, reported as odds ratios. The diagnosis-related groups (DRGs) on readmission were evaluated and the total cost of readmissions was calculated.

Results: There were 568,849 patients admitted for trauma with a total initial admission cost of $9.2 billion. Of these, 109,128 (19.2%) were readmitted with a total readmission cost of $2.1 billion. The 30-day readmission rate was 8.4% and 32.6% of readmissions occurred at a different hospital. The top readmission DRGs and their related cost were: septicemia and disseminated infections (29,407 [7.7%], $447 million [9.7%]), heart failure (17,563 [4.6%], $163 million [3.5%]) and pneumonia (13,306 [3.5%], $132 million [2.9%]). The strongest predictors of readmission were Charlson comorbidity index, length of stay and payer status of Medicare or Medicaid.

Conclusions: A significant portion of US readmissions occur at different hospitals with implications for continuity of care, cost, and resource allocation. Additionally, most readmissions are for infections with ramifications for outcomes research and quality improvement. Patients with Medicaid are readmitted at a higher rate than private insurance. Further research is required to better elucidate this disparity.

Characteristic		n	%	OR	p-value	95% CI	
Age (years)	65 or older	74,697	68.4	1.20	<0.001	1.18	1.23
Gender	Female	61,439	56.3	0.99	0.22	0.98	1.01
Charlson comorbidity index	0 or 1	69,204	63.4				
	2 or 3	27,758	25.4	1.76	<0.001	1.73	1.79
	4 or more	12,166	11.1	2.42	<0.001	2.36	2.48
Length of stay (days)	0 to 7	80,638	73.9				
	8 to 30	25,809	23.7	1.48	<0.001	1.46	1.51
	31 or more	2,681	2.5	1.95	<0.001	1.86	2.04
Injury severity score	1 to 5	42,427	38.9				
	6 to 10	41,550	38.1	0.80	<0.001	0.78	0.81
	11 to 15	8,003	7.3	0.74	<0.001	0.72	0.76
	16 or more	17,148	15.7	0.83		0.81	0.85
Mechanism of injury	Penetrating	3,160	2.9	0.89	<0.001	0.86	0.93
Primary expected payer	Private ins./Self-pay/Other	22,221	20.4				
	Medicare	77,166	70.7	2.34	<0.001	2.28	2.40
	Medicaid	9,741	8.9	1.79	<0.001	1.74	1.84
Median household income national quartile for patient ZIP Code	$1 to $37,999	29,059	27.0				
	$38,000 to $47,999	27,919	26.0	0.95	<0.001	0.93	0.97
	$48,000 to $63,999	26,285	24.5	0.93	<0.001	0.91	0.94
	$64,000 or more	24,234	22.5	0.93	<0.001	0.91	0.95

Risk factors for nonelective readmission after trauma.



Cumulative readmissions by month and age group.

Scientific Posters Group VI - Systems

Poster #33
January 12, 2017
1:45 pm-3:00 pm

THE TRAUMA SEVERITY MODEL: A NOVEL STATISTICAL SYSTEM FOR TRAUMA PROGRAM OUTCOMES EVALUATION

Michael Gorczyca, BS, Nicole Toscano, Ryan Vogan, Keelan Cosgrove, Jared Frank, Kanchan Yawalkar, Ewa Przybylko, Tavish McDonald, Dilip ThiaGarajan, Julius D. Cheng, MD, MPH*
University of Rochester School of Medicine and Dentistry

Presenter: Michael Gorczyca, BS

Objectives: The Injury Severity Score (ISS) was the first injury score that had value. Other metrics for assessing trauma severity were later developed; the Trauma Mortality Prediction Model for ICD-9 codes (TMPM-ICD9) is now the most accurate for evaluating injury severity. The authors developed a novel program that seeks to improve the accuracy and quality of trauma system outcomes evaluation.

Methods: Retrospective data review of 2008-2012 National Trauma Data Bank was used to develop the Trauma Severity Model (TSM). A computer program was written to develop the TSM utilizing an ICD-9 based injury classification. Patients admitted to a Trauma Center (defined as > 500 admissions per year) were included in the model. Patients with non-trauma injuries were excluded. Weaker prediction models were developed using ICD-9 codes, grouped by injury type. A computer-based ensemble learner selected the best models, resulting in the TSM. To assess the performance of the TSM and TMPM-ICD9, the receiver operating characteristic (ROC), mean cross entropy (MXE), and Squared-error Accuracy ROC (SAR) were compared.

Results: The TSM included 801,898 patients admitted to 269 hospitals during those years. The TSM exhibits better discrimination (ROC=.922), precision (MXE=.095), and accuracy (SAR=.955) than the TMPM-ICD9 (ROC=.887, MXE =.100, SAR=.945). Augmenting TSM with mechanism of injury, Glasgow Coma sub-scores, age, gender, and comorbidities further improved TSM performance (ROC=.968, MXE=.070, SAR=.973).

Conclusions: The TSM has improved prognostic value for trauma program evaluation and should improve risk-adjustment models. The algorithm used to develop the TSM can be applied to ICD10 data in the future. To provide for easy accessibility and use of the model, a software application has been implemented and will be made freely available.

Notes

Scientific Posters Group VI - Systems

Poster #34
January 12, 2017
1:45 pm-3:00 pm

"TIER 3": LONG TERM EXPERIENCE WITH A NOVEL ADDITION TO A TWO-TIERED TRIAGE SYSTEM TO EXPEDITE CARE OF GERIATRIC TRAUMA PATIENTS

Forrest Fernandez, MD*, Adrian W. Ong, MD*, Christopher Butts, Kristen Sandel, Charles Barbera, Amanda McNicholas, RN, MSN, CRNP*, Anthony Martin, C. William Schwab, MD*
Reading Hospital

Presenter: Forrest Fernandez, MD

Objectives: We aimed to study our outcomes with "Tier 3" (T3), an emergency medicine (EM) physician-driven protocol based on predefined triage criteria, designed to identify at risk geriatric patients with occult blunt head and torso trauma who otherwise did not meet conventional trauma team activation (TTA) criteria.

Methods: Patients ≥ 65 years prior to (Pre-T3: January 2006-October 2009) and after (Post-T3: January 2012-October 2015) implementation of T3 were retrospectively analyzed. Variables studied included age, Glasgow Coma Scale (GCS) score, systolic blood pressure (SBP), heart rate (HR) and Injury Severity Score (ISS). Outcomes included time to CT imaging, ED length of stay (LOS) and mortality. Logistic regression analysis was used to determine association with mortality. Those with Head-Abbreviated Injury Score (H-AIS) of ≥3 were separately analyzed. A p value of 0.05 was deemed significant.

Results: Compared to the Pre-T3 period, geriatric volume increased (3688 vs 1715) with a greater proportion of patients (74% vs 52.3%, $p<0.001$) receiving expedited workups (TTA or T3) in the Post-T3 period. For non-TTA encounters, median time to CT (102 vs 128 min, $p <0.001$) and EDLOS (361 vs 432 min, $p<0.001$) were shorter in the Post-T3 period. Mortality rates for the study sample (4.5% vs 8.4%, $p<0.001$) and those with H-AIS≥3 (10.9% vs 19.3%, $p<0.001$) were lower. Controlled for age, ISS, SBP, HR and GCS, the Post-T3 period was independently associated with lower mortality both for the study sample (odds ratio [OR] 0.61, 95% confidence interval [CI] 0.44-0.84) and the subset with H-AIS≥3 (OR 0.60, 95% CI 0.38-0.97).

Conclusions: The addition of an EM physician-driven protocol for evaluation of geriatric patients who did not meet trauma activation criteria provided efficient identification of serious injuries, lowered mortality and improved utilization of EM and trauma team resources.

Notes

Scientific Posters Group VII - Transfusion/Hemorrhage

Poster #35
January 12, 2017
1:45 pm-3:00 pm

THE FEASIBILITY OF A WARM FRESH WHOLE BLOOD DONATION PROGRAM IN A CIVILIAN HEALTH SYSTEM

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Mayo Clinic

Presenter: Joy D. Hughes, MD

Objectives: War time data demonstrated that warm fresh whole blood (WFWB) improved mortality, but myriad logistic and infectious concerns prevent its widespread use, particularly during civilian massive transfusion (MT). Developments in pathogen reduction are bringing civilian WFWB transfusion ever closer to reality by mitigating concerns regarding disease transmission. We aimed to determine the barriers to an emergent civilian WFWB donation program.

Methods: An electronic survey was disseminated to a random sample of 3000 employees on our institution's trauma center campus. Survey content ascertained familiarity with the concept of WFWB, willingness to donate in an emergency, and the barriers which might prevent donation.

Results: Of 3000 surveys, 883 were returned (25%). 630 respondents (71%) were female. 43% (n=381) stated they were "Very" or "Somewhat familiar" with the concept of WFWB; 40% (n=356) stated they were "Somewhat unfamiliar," or "Not at all familiar." 41% (n=366) had donated blood more than ten times, but 53% (n=469) had donated 0 times in the previous 12 months; 16% (n=138) had never donated. 85% worked day-time shifts (n=754). Most respondents would be "Definitely" or "Somewhat" willing to emergently donate blood (n=660,75%), particularly during work-hours(n=652, 74%), and to drive from home to donate (n=460, 52%). 55% cited responsibilities that could prevent donating(n=486); childcare was the most frequently cited reason precluding as-needed WFWB donation (n=242; 27%).

Conclusions: Obtaining emergency WFWB donors in a civilian hospital is potentially feasible. Efforts to implement a WFWB program for hemorrhage resuscitation should consider on-duty hospital employees as the 1st-line of emergent donors, with perhaps a 2nd line of volunteers traveling to the donation center. The results of this study have allowed the creation of an emergency blood donor list for ongoing feasibility analysis.

Notes

Scientific Posters Group VII - Transfusion/Hemorrhage

Poster #36
January 12, 2017
1:45 pm-3:00 pm

INCREMENTAL BALLOON DEFLATION FOLLOWING COMPLETE REBOA RESULTS IN STEEP INFLECTION OF FLOW AND REPERFUSION IN LARGE ANIMAL MODEL OF SHOCK

Anders J. Davidson, MD, Sarah-Ashley Ferencz, MD, Rachel M. Russo, MD,
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Lucus P Neff, M. Austin Johnson, Timothy Williams
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Presenter: Anders J. Davidson, MD

Objectives: Current guidelines recommend slow and methodical balloon deflation over 5min to slowly reintroduce aortic flow after REBOA to mitigate reperfusion and to avoid potential cardiovascular collapse. However, anecdotal evidence suggests that this technique does not result in a predictable and smooth return of distal aortic flow. We sought to characterize aortic flow during the dynamic phase of balloon deflation following REBOA utilizing current practice guidelines.

Methods: Eight Yorkshire-cross swine were splenectomized, instrumented, and subjected to rapid 25% total blood volume hemorrhage. After 30min of shock, animals received zone 1 REBOA for 60min with a low-profile REBOA catheter. During subsequent resuscitation with shed blood, the catheter's balloon was gradually deflated in stepwise fashion at the rate of 0.5cc every 30sec until completely deflated. Aortic flow rate, proximal mean arterial pressure (MAP), and time to return of aortic flow were measured.

Results: Graded balloon deflation resulted in variable times to return of aortic flow (median 78 seconds, IQR 70-100sec). A rapid increase in aortic flow during a single balloon deflation step was observed in all animals (Median 820mL/min IQR 683-1242mL/min) and corresponded with an immediate decrease in proximal MAP (Median 28.7mmHg IQR 15.1-37.3mmHg). Figure 1 demonstrates aortic flow dynamics in a single representative animal.

Conclusions: This study is the first to characterize specific parameters of aortic flow in the dynamic phase of balloon deflation following REBOA. With existing catheter technology, a steep inflection point occurs during balloon deflation that results in abrupt increases in aortic flow, with a concomitant decrease in mean arterial pressure that limits controlled restoration of distal flow. Studies to define the hemodynamic intricacies of flow around balloon occlusion of the aorta are needed to promote targeted perfusion optimization and development of new balloon technologies for resuscitation from shock.

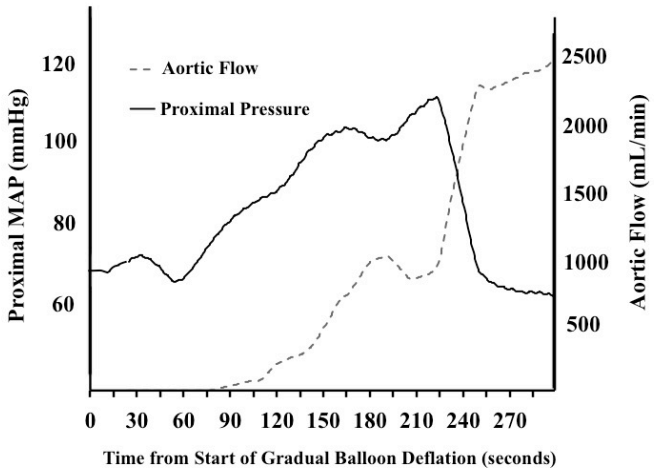

Figure 1: Proximal pressure and aortic flow during gradual REBOA deflation in a representative animal demonstrates improvement in pressure with blood resuscitation followed by abrupt increase in aortic flow and concomitant drop in proximal pressure.

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Poster #37
January 12, 2017
1:45 pm-3:00 pm

SEROTONIN MODULATING ANTI-DEPRESSANTS AND THE RISK OF BLEEDING AFTER TRAUMA

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Presenter: Lindsay B. Wilson, PharmD

Objectives: Serotonin-modulating antidepressants (SSRI/SNRI) have been associated with increased risk of bleeding. However, withdrawal syndromes have been described after abrupt discontinuation. This study sought to investigate the effect of pre-injury SSRI/SNRI use on transfusion requirements after solid organ injury and to evaluate whether resumption of home SSRI/SNRI after trauma may worsen bleeding risk.

Methods: This was a retrospective matched-cohort study at a level 1 trauma center. Patients who were admitted from 1/2010-7/2015 with solid organ injury of the kidney, liver, or spleen were evaluated. Exclusions included anticoagulant/antiplatelet use, coagulation disorders, and ER mortality. Pre-injury SSRI/SNRI users were matched to non-users based on age, aspirin use, injury severity score, and abdominal abbreviated injury severity score. Transfusion requirements, ICU length of stay, in-hospital mortality, and total length of hospital stay were examined.

Results: 1584 solid organ injuries were identified. After exclusions and matching, 161 SSRI/SNRI users were compared to 159 non-users. The need for transfusion was higher in SSRI/SNRI users throughout hospitalization (50.9% vs. 37.3%, p = 0.02). The median units of blood transfused did not differ between groups among patients requiring transfusions. There was no difference in ICU length of stay, total hospital length of stay, or mortality (HR (95% CI); 0.86 (0.27 - 2.96), p=0.14; 1.18 (0.46 - 3.07), p=0.61; respectively). Fewer patients restarted on home SSRI/SNRI therapy within 72 hours required blood transfusion compared to those who were restarted later or not at all (43.2% vs. 60.3%; p=0.04).

Conclusions: Pre-injury use of SSRI/SNRIs lead to an increased requirement of blood transfusions after solid organ injury. While clinicians should weigh bleeding risk prior to re-initiation of home therapy, results of this study indicate that reasonable efforts to restart home SSRI therapy after stabilization do not result in further risk for transfusion.

Notes

Scientific Posters Group VII - Transfusion/Hemorrhage

Poster #38
January 12, 2017
1:45 pm-3:00 pm

EFFECTS OF A MORE RESTRICTIVE TRANSFUSION TRIGGER IN TRAUMA PATIENTS

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Presenter: Mary M. Garland, MD

Objectives: While blood transfusions can be lifesaving, they are associated with significant detrimental effects in some patients. Available data suggest that appropriately selected patients transfused to a hemoglobin (HGB) goal of 7 g/dL have decreased mortality compared to those transfused to a goal of 10 g/dL. Studies in Jehovah's witnesses, animal models, and healthy volunteers suggest that even lower levels may be safe in some patients. Preliminary work at our institution revealed no physiologic advantage to transfusions in stable trauma patients with HGB concentrations between 6.5 g/dL and 7 g/dL. Thus we lowered our transfusion trigger for selected stable trauma patients to 6.5 g/dL. Here we report our initial experience with this lower trigger. We hypothesize this will be associated with unchanged outcomes, but will improve quality by conserving resources and exposing fewer patents to the potential risks of transfusion.

Methods: This is a retrospective chart review at an urban Level I trauma center from 1/15 – 12/15. The change in transfusion trigger from 7 to 6.5 g/dL occurred on July 1. Adult trauma patients in our ICU with HGB $\leq$ 7 g/dL were included. Patients with hemorrhage, expected surgery, or unreconstructed coronary artery disease were excluded. Outcomes in patients before (TT7) and after (TT6.5) the change in threshold were then compared.

Results: 131 of 852 ICU admissions met inclusion criteria. 72/401 patients (17.9%) were transfused before the change in threshold and 59/451(13.0%) after (p=0.049). There was no change in outcomes with change of threshold (see table). After initiation of a more conservative threshold, transfusion rate in this cohort dropped by 27%. After the change in threshold, 72 units of blood were saved.

Conclusions: Decreased transfusion threshold was associated with similar outcomes and decreased resource utilization. These data suggest that prospective evaluation of 6.5 g/dL as a transfusion trigger is warranted.

	TT7	TT6.5	p-value	Confidence Interval (95%)
Total Vent Days	3.9±5.8	4.1±7.8	0.582	-2.561- 2.312
Organ Systems	0.9±1.0	0.7±0.8	0.805	-0.1839-0.4641
Total ICU Days	6.5±6.4	7.9±8.5	0.421	-4.656-1.767
Total Hospital Days	17.5±10.5	17.0±10.6	0.198	-3.166-4.236
Deceased	8.3%	8.5%	0.533	

Outcomes after change in transfusion trigger.

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Poster #39
January 12, 2017
1:45 pm-3:00 pm

TQIP SHOCK COHORT MAY NOT BE SHOCK AT ALL

James J. Hoth, MD, PhD, Preston R. Miller III, MD*, Michael C. Chang, MD*,
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Presenter: James J. Hoth, MD, PhD

Objectives: TQIP is a risk adjusted database that is utilized to evaluate trauma center performance on a national scale. Several subsets of patients are selected for focused analysis. One such cohort is "shock patients" which is defined as a single SBP less than 90mmHg in the emergency department. Our hypothesis is that a single SBP of less than 90mmHg does not adequately characterize shock and may lead to erroneous inclusion of patients for analysis.

Methods: We identified patients from our fall 2015 TQIP report that were in the shock cohort. Medical records were reviewed and patients were divided into those who had a single SBP of less than 90 (SBP90) and those who had 2 or more SBP less than 90 (SBP90x2). Data collected included demographics as well as ISS, HR, lactate, PRBC/FFP transfusion requirement in the first 4hrs, and mortality. Comparisons were made between SBP90, SBP90x2, and patients randomly picked from a blunt trauma cohort ("nonshock" comparison group).

Results: A total of 65 patients were identified in the shock cohort. 46 had more than one measure SBP of less than 90mmHg. SBP90x2 patients had greater ISS (30 v 25, $p<.05$), HR (102 v 87, $p<.01$), Lactate (5 v 3.4, $p<.05$), mortality (43% v 6%, $p<.01$) and blood product requirements ($p<.01$) when compared to SBP90 patients. When SBP90 patients were compared with the nonshock cohort, no significant differences were identified in ISS, LA, mortality, or blood product requirements.

Conclusions: SBP90x2 patients had features more indicative of shock when compared to those with a single SBP of 90 in the ED. Furthermore, SBP90 patients were indistinguishable from nonshock patients. These data indicate that a single SBP of less than 90 alone may not be adequate for inclusion in the TQIP shock cohort and that incorporating other characteristics may be required.

Notes

Scientific Posters Group VII - Transfusion/Hemorrhage

Poster #40
January 12, 2017
1:45 pm-3:00 pm

MANAGEMENT OF VENOUS INJURIES IN COMBINED ARTERIAL AND VENOUS POPLITEAL INJURIES: A REVIEW OF COMBAT DATA

Jordan L Guice, MD, MPH, Tyson E. Becker, MD, FACS*, Brandon Propper,
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Presenter: Jordan L Guice, MD, MPH

Objectives: Combined arterial and venous injuries pose choices for the surgeon that are life changing for those injured. Current literature supports restoration of arterial flow in a limb salvage effort. Management of the venous injury is less studied and requires the surgeon to make a choice between ligation and restoration of flow. This retrospective review of combat wounded in recent conflicts seeks to answer what benefit is associated with venous outflow repair in the setting of a combined popliteal arterial and venous injury.

Methods: Records included in the analysis were identified using the vascular injury database of all combat related vascular injuries from 2003 to 2016. Those with a combat-related ipsilateral popliteal artery and vein injury were included. Two groups were identified; venous outflow repair and venous ligation. The primary outcome was secondary amputation. Data analysis was performed.

Results: A total of 56 records were included. 27 (48.2%) were managed with vein ligation and 29 (51.8%) with venous outflow repair. Baseline and injury characteristics were not statistically significant. However Injury Severity Scores did tend to be higher in those who underwent vein ligation (14.5 vs 18.6; p=0.09). Secondary amputation rates did not significantly differ between those with venous outflow repair and venous ligation (44.8% vs 40.7%, respectively; p=0.79). Reasons for secondary amputations also were not significantly varied. Other complications did not vary either.

Conclusions: Combined popliteal arterial and venous injuries can be a highly morbid injury and presents to the surgeon various treatment options. Overall this type of combat-related injury carries a 40-45% risk of secondary amputation. When comparing outcomes between those with venous outflow repair and venous ligation the secondary amputation rates did not differ.

	Vein Repair		Vein Ligation		p-value
Age	25.24	SD 6.02	25.48	SD 7.88	0.899586
ISS	14.45	SD 6.33	18.56	SD 10.36	0.087654
AK Injury	15	51.7%	12	44.4%	0.605
BK Injury	14	48.3%	15	55.6%	0.605
Proximal Arterial Injured	1	3.4%	3	11.1%	0.3434
Distal Arterial Injury	2	6.9%	1	3.7%	1
Proximal Venous Injury	2	6.9%	3	11.1%	0.6642
Major Soft Tissue Injury	28	96.6%	27	100.0%	1
Fracture	20	69.0%	20	74.1%	0.7712
Nerve Injury	15	51.7%	19	70.4%	0.1804
Shunt Artery	10	34.5%	9	33.3%	1
Shunt Vein	6	20.7%	1	3.7%	0.1029
Fasciotomy	23	79.3%	22	81.5%	1
Pre-hospital Tourniquet	15	51.7%	14	51.9%	1
Mortality	0	0.0%	1	3.7%	0.4821

Table 1. Baseline and Injury Characteristics

	Vein Repair		Vein Ligation		p-value
Secondary Amputation. Total	13	44.8%	11	40.7%	0.7928
Failed Vascular Repair	2	6.9%	6	22.2%	0.137
Failed Limb Salvage	5	17.2%	3	11.1%	0.7066
Infection	2	6.9%	0	0.0%	0.4916
Chronic Pain	4	13.8%	2	7.4%	0.6708

Table 2. Secondary Amputation Rates