Quick Shots Session V

Quick Shot Paper #45
January 12, 2018
9:15 am

EARLY VITAL CAPACITY PREDICTS THE NEED FOR TRACHEOSTOMY IN CERVICAL SPINAL CORD INJURIES

Kaitlin Ritter, MD, John J. Como, MD, MPH*, Michael Kavanagh,
Gregory Nemunaitis, Jeffrey A. Claridge, MD, MS*
MetroHealth Medical Center

Presenter: Kaitlin Ritter, MD

Objectives: The utility of formally using early PFT's to assist in determining the need of tracheostomy in patients with acute cervical spinal cord injuries (AC-SCI) has yet to be evaluated. This study evaluates the predictive nature of early vital capacity (VC) and need for tracheostomy in patients with AC-SCI.

Methods: An analysis of all patients with AC-SCI admitted to a level 1 trauma center during the period April 2013-April 2016 was performed. Need for tracheostomy was the primary outcome evaluated. Information including patient demographics, mechanism of injury, neurologic level of injury (NLOI) and completeness of cord injury, VC, co-existing chest injuries, and other clinical data was obtained via electronic medical records, the trauma registry, and a prospectively maintained rehabilitation database.

Results: A total of 85 patients with AC-SCI had a mean age of 55 years (SD±17) and 67 patients were male (80%). Median ISS was 17 (IQ 16-21) and blunt mechanism accounted for 97% of injuries. VC was obtained on average 3.8 days post-injury. Of the 85 total patients, 16 (19%) underwent tracheostomy. Those who underwent tracheostomy were younger, more injured, and demonstrated a significantly lower percent of predicted VC (Table 1). A logistic regression analysis of key variables showed younger age (OR, CI 0.85-0.99, p = 0.019), median ISS (OR 1.32, CI 1.08-1.62, p = 0.007), and lower percent predicted VC (OR 0.88, CI 0.81-0.97, p= 0.008) as significant factors predictive of needing a tracheostomy (C statistic = 0.98).

Conclusions: Decreased percent of predicted VC, measured early in the course of hospitalization, is a strong predictor of need for tracheostomy in individuals who have sustained an AC-SCI. Early assessment of pulmonary function can be utilized to help accurately and expediently identify those in need of tracheostomy within this patient population.

Risk Factors for Tracheostomy, n=85			
	No Tracheostomy (n=69)	Tracheostomy (n=16)	p-value
Mean Age (years)	58.0 ± 14.8	42.6 ± 18.5	0.001
Male	52 (77.6%)	13 (81.3%)	1.00
Blunt Mechanism of Injury	64 (95.5%)	16 (100.0%)	1.00
Median ISS (IQR)	16.0 (16.0-20.3)	25.5 (17.8-33.8)	≤0.001
History and Comorbidities			
Current Smoker	20 (29.0%)	4 (25.0%)	1.00
COPD	3 (4.3%)	1 (6.3%)	0.57
Neurologic Injury			
NLOI (C1-C3)	41 (59.4%)	7 (43.8%)	0.28
ASIA A	9 (13.0%)	10 (62.5%)	≤0.001
Concurrent Chest Injuries			
Rib Fracture	13 (18.8%)	3 (18.8%)	1.00
Hemothorax/Pneumothorax	3 (4.3%)	4 (25.0%)	0.02
Pulmonary Contusion	1 (1.4%)	5 (31.3%)	0.001
Pneumonia (prior to tracheostomy)	1 (1.4%)	5 (31.1%)	0.001
Ventilatory Function Testing			
Mean % Predicted Vital Capacity	47.7 ± 21.5	20.7 ±11.4	≤0.001

Table 1.

Quick Shots Session V

Quick Shot Paper #46
January 12, 2018
9:21 am

USE OF "SEPSIS ADVISOR TOOL" IMPROVES MORTALITY IN HIGH-ACUITY SEPTIC PATIENTS

Theophilus Pham, MBA, MS2, Yana Puckett, MD, MPH, MS, MBA, Steven Brooks, MD
Texas Tech University Health Sciences Center at Lubbock

Presenter: Yana Puckett, MD, MPH, MS, MBA

Objectives: Surviving Sepsis Campaign Guidelines was created in an effort to reduce mortality in septic patients worldwide. Texas Tech University Medical Center, a Level 1 Trauma and Regional Burn Center, has implemented a "Sepsis Advisor Tool" (SAT) into our EMR software that allows the physician to place orders quickly based on Surviving Sepsis Campaign Bundle. We hypothesize that SAT use has helped lower the mortality rate in higher-acuity septic patients.

Methods: Electronic medical records were analyzed from January 2016 to March 2017 for cases of sepsis defined by postoperative ICD-10 code A41, J18.9, N39.0 in patients with an age range of 18-89. The cases were divided into two groups: advisor used (SAT) and not used (no SAT). Demographical data as well as data on mortality, LOS, and treatment promptness were compared between the two groups. Independent t-test was used to compare means between continuous variables and Chi-Square test was used to compare categorical variables. Binary logistic regression analysis was used to adjust for severity of illness and outcome of mortality.

Results: A total of 2,461 patients were diagnosed with sepsis between January 2016 and Marc 2017. Of these, sepsis advisor was used on 10.81% (266). Length of stay, age, and BMI comparable between the two groups. Antibiotics were administered within the first 3 hours for 62.78% (167) of SAT patients and 44.46% (976) noSAT patients (p=0.0001). After adjusting for age, BMI, admission lactate level, mortality risk, and illness severity, SAT patients were 79% less likely to die if their severity of illness was Grade III or IV OR=0.219; 95% CI (0.164-0.487), (P=0.005); and 87.5% less likely to die if their risk of mortality was either Grade III or IV OR= 0.125; 95% CI (0.07-0.222), (P=0.02).

Conclusions: The "Sepsis Advisor Tool" was used more frequently in higher-acuity patients, resulting in improved mortality in these patients.

	SAT (n=266)	NoSAT (n=2195)	P-Value
Age	60.89 (17.745)	58.29 (17.68)	0.993
BMI	27.89 (12.97)	27.92 (15.68)	0.656
Payer Status			0.008
Medicare	62.41% (166)	50.30% (1104)	
Medicaid	10.15% (27)	13.17% (289)	
Private Insurance	15.79% (42)	22.19% (487)	
Self-Pay	11.65% (31)	14.35% (315)	
Risk of Mortality Score			0.0001
Grade I	1.13% (2)	1.42% (22)	
Grade II	5.08% (9)	16.89% (262)	
Grade III	18.08% (32)	26.69% (414)	
Grade IV	75.71% (134)	55.00% (853)	
Severity of Illness Grade			0.0001
Grade I	0.0% (0)	1.00% (22)	
Grade II	7.89% (21)	18.27% (401)	
Grade III	42.85% (114)	35.62% (782)	
Grade IV	48.49% (129)	42.73% (938)	

Description of the study population (mean (SD) for continuous variables or n (%) for categorical variables (n=2,461).

	SAT (n=266)	NoSAT (n=2195)	P-Value
Mortality	14.66% (39)	14.67% (322)	0.997
Total Charges (U.S. Dollars)	126,421.25 (202,399.26)	101,658.35 (173,340)	0.002
Total Payments (U.S. Dollars)	19,850.2 (32,389.01)	15,824.44 (29,681.07)	0.016
Total Cost (U.S. Dollars)	30,474.24 (56174.02)	24096.30 (50,534.76)	0.008
LOS (Days)	11.14 (13.05)	9.9 (10.8)	0.025
1st Lactate Level	2.56 (1.8)	2.4 (2.1)	0.8
2nd Lactate Level	1.73 (1.72)	1.36 (2.2)	0.25
Fluid Volume Given	1722.11 (1373.36)	1542.53 (1429.14)	0.922
Fluid Volume Given ml/kg	22.31 (16.43)	19.82 (18.44)	0.362
Fluids Administered Within 1 Hour	69.92% (186)	62.59% (1374)	0.05
Fluids Administered 30 mg/kg	43.23% (115)	31.11% (683)	0.0001
Antibiotics Administered Within 3 Hours of Presentation	62.78% (167)	44.46% (976)	0.0001
Antibiotics Administered Within 1 Hour of Presentation	8.3% (22)	7.6% (167)	0.328
Length of Stay Less than 1 Day	3.4% (9)	1.0% (56)	0.912

Comparison of outcomes between patients that had “Sepsis Advisor Tool” utilized and those that did not (mean (SD) for continuous variables or n (%) for categorical variables (n=2,461).

Quick Shots Session V

Quick Shot Paper #47
January 12, 2018
9:27 am

UNSEEN BURDEN OF INJURY: POST HOSPITALIZATION MORTALITY IN GERIATRIC TRAUMA PATIENTS

Ciara R. Huntington, MD, Ronald F. Sing, DO*, Kevin Kasten, Tanushree Prasad, Amy Lincourt, Vedra Augenstein, B. Todd Heniford
Carolinas Medical Center

Presenter: Ciara R. Huntington, MD

Objectives: This study utilizes Level I Trauma Center data and the US Social Security Death Database (SSDD) to capture long term, out-of-hospital mortality in geriatric trauma patients.

Methods: Blunt trauma patients age =65 were identified from 2009-2015 in an ACS-verified Level 1 Trauma Center registry database. With IRB approval, dates of death were queried from the SSDD using social security number and unique patient identifiers. Patients without identifiers were excluded. Demographics, injury, diagnoses, treatment, and outcomes were collected and compared with descriptive and univariate analysis; $p<0.05$ was significant.

Results: 6289 geriatric trauma patients were identified, age 65-105 years. Data included: average age 78.5±8.4 years, 3625 (57.0%) female, 3217 (51.8%) transferred from another medical center, and median length of stay 4 days, mean 5.8±11.0. Median time to death was 225 days, mean 483±575 days. 2632 patients (41.9%) died within 8 years of injury; 505 (8.0%) died as an inpatient. Overall 24.1% of patients died within 1 year after injury: 757 (12.0%) died <1 month, 488 (7.8%) between 1-6 months, and 274 (4.4%) between 6-12 months. Of those who died, 80.8% were outpatient. Of 488 patients who died within 1-6 months of trauma, only 8 were inpatient at time of death. Patients who died at 1 month after trauma had significant differences compared to survivors: older age ($p<0.001$) lower mean Glascow coma scale at presentation (10.8±5.0 vs 14.5±1.8, $p<0.001$), and higher Injury Severity Score (18.1±11.5vs 9.7±7.0, $p<0.001$). Fall was the most common mechanism of injury (76%, n=4757), and only 53.5% of patients were alive at long term follow-up. Motor vehicle crash accounted for 19% of geriatric traumas, with 72.4% (n=1212) alive at long term follow-up.

Conclusions: Short term mortality rates fail to fully capture the burden of trauma on the elderly. Though 92% of geriatric trauma patients survive to discharge, almost one-quarter were dead at one year following their injury.

Quick Shots Session V

Quick Shot Paper #48
January 12, 2018
9:33 am

A SELECTIVE PLACEMENT STRATEGY FOR SURGICAL FEEDING TUBES BENEFITS TRAUMA PATIENTS

Joseph H. Marcotte, MD, Joshua P. Hazelton, DO, FACS*, Michael K. Dalton, MPH, Amber Batool, DO*, John Gaughan, Linh Nguyen, John Porter, MD*, Nicole Fox, MD, MPH, FACS*
Cooper University Hospital

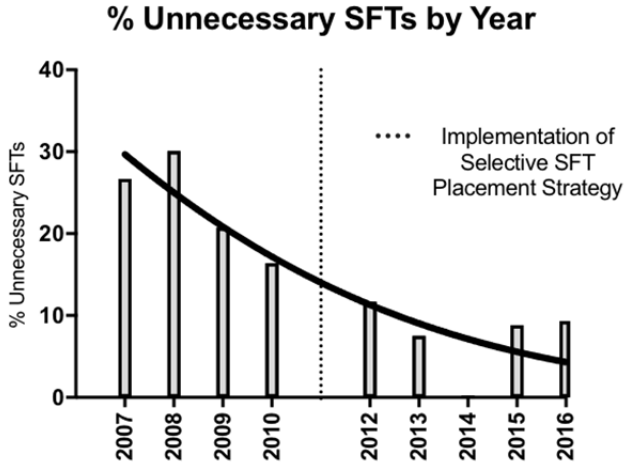
Presenter: Joseph H. Marcotte, MD

Objectives: The indications for surgical feeding tube (SFT) placement in trauma patients are poorly defined. Patient selection is critical as complications from SFTs have been reported in up to 20% of patients. A previous analysis by our group determined that nearly 25% of the SFTs we placed were unnecessary and that older patients, patients with head and spinal cord injuries, and patients who needed a tracheostomy were more likely to require long term SFTs. Following this study, we modified our institutional guidelines for SFT placement. We hypothesized that a more selective placement strategy would result in fewer unnecessary SFTs.

Methods: A retrospective review of all adult patients from 2012-2016 with an ICU LOS ≥4 days and a SFT placed during admission was conducted. This group was compared to our data collected prior to our change in practice (2007-2010). Data from 2011 was excluded as a washout period. "Necessary" SFT was defined per established guidelines as either daily use of the SFT through discharge or for ≥28 days and "unnecessary" SFT as all others. A $p<0.05$ was considered significant.

Results: 257 SFTs were placed from 2007-2010 and 244 from 2012-2016. Following implementation of our selective SFT placement strategy, unnecessary SFT placement decreased from 25% in 2007-2010 to 8% in 2012-2016 ($p<0.0001$) (Fig.1) Significant predictors of necessary SFT placement by univariate regression were: increasing age (OR 1.03/yr CI 1.01-1.04), head injury (OR 2.80 CI 1.71-4.60), cervical spinal cord injury (OR 4.42 CI 1.34-14.50), and need for tracheostomy (OR 1.41 CI 2.21-7.67). The rate of complications related to SFT placement after implementation of a selective strategy was 9%, and was highest following open jejunostomy placement (43%)

Conclusions: A selective placement strategy for surgical feeding tubes in our trauma population resulted in fewer unnecessary SFTs and a complication rate lower than most reported series.



Percentage of unnecessary SFTs by year, with Gaussian line of best fit.

Quick Shots Session V

Quick Shot Paper #49
January 12, 2018
9:39 am

PROGNOSIS OF DIFFUSE AXONAL INJURY (DAI) WITH TRAUMATIC BRAIN INJURY (TBI)

Stephen Humble, BS, MD(c), Laura Wilson, Li Wang, Drew Long, Miya Smith, Jonathan Siktberg, Aashim Bhatia, Sumit Pruthi, Matthew Day, Mina F. Mirhoseini, MD, Susanne Muehlschlegel, Mayur B. Patel, MD, MPH, FACS*
Vanderbilt University Medical Center

Presenter: Stephen Humble, BS, MD(c)

Objectives: To determine the prognostic impact of MRI-defined DAI after TBI on functional outcomes, quality of life, and 3-year mortality.

Methods: This retrospective single center cohort included adult trauma patients (age>17y) admitted from 2006-2012 with TBI. Inclusion criteria were positive head CT with brain MRI within 2 weeks of admission. Exclusion criteria included penetrating TBI or prior neurologic condition.

Separate ordinal logistic models assessed DAI's prognostic value for following scores: 1)hospital-discharge Functional Independence Measure (FIM); 2)long-term Glasgow Outcome Scale-Extended (GOSE); and 3)long-term Quality of Life after Brain Injury-Overall Scale (QOLIBRI-OS). Cox proportional hazards modeling assessed DAI's prognostic value for 3-year survival. Covariates included age, sex, race, insurance status, Injury Severity Score (ISS), admission Glasgow Coma Scale Score, Marshall Head CT Class, clinical DAI on MRI (Y/N), research-level anatomic DAI Grades I-III (I:cortical, II:corpus callosum, III:brainstem), ventilator days, time to follow commands, and time to long-term follow up (for logistic models).

Results: Eligibility criteria was met by 311 patients, who had a median age=40y (IQR:23-57), ISS=29 (IQR:22-38), ICU stay=6d (IQR:2-11), and follow-up=5y (IQR:3-6y). MRIs had DAI 47% clinically. Among 300 readable MRIs, 56% of MRIs had anatomic DAI (25% Grade I, 18% Grade II, 13% Grade III). On regression, only clinical (not anatomic) DAI was predictive of a lower FIM score (OR=2.7 [95% CI:1.39-5.26], P=0.003). Neither clinical nor anatomic DAI were related to survival, GOSE, or QOLIBRI scores.

Conclusions: In this longitudinal cohort, clinical evidence of DAI on MRI may only be useful for predicting short-term in-hospital functional outcome. Given no association of DAI and long-term TBI outcomes, providers should be cautious in attributing DAI to future neurologic function, quality of life, and/or survival.

Quick Shots Session V

Quick Shot Paper #50
January 12, 2018
9:45 am

EMERGENT TRANSFUSION IN LEVEL 1 TRAUMA PATIENTS: ARE WE PULLING THE TRIGGER TOO SOON?

Adrian A. Coleoglou Centeno, MD, Kelly Bochicchio, Qiao Zhang, ROHIT K Rasane, MBBS, MS,
Jarot Guerra, MD, Marlon Torres, Chris Horn,
Douglas J.E. Schuerer, MD, FACS*, Grant V. Bochicchio, MD,MPH*
Washington University in St. Louis

Presenter: Adrian A. Coleoglou Centeno, MD

Objectives: Recent studies suggest that early transfusion (TX) of packed red blood cells (PRBCs) saves lives and improves outcome in severely injured trauma patients. However, as with any strategy that aims to improve outcome, there may be a tendency to "pull the trigger" too soon. Our objective was to determine the incidence of unnecessary TXs of PRBCs in high risk trauma patients.

Methods: We prospectively enrolled all Level 1 trauma patients admitted over 1 year who received at least 1 unit of PRBCs and/or were taken emergently to the OR for bleeding control within 2 hours of injury. Patients were stratified into 3 TX categories: 1) Clinically necessary 2) Unnecessary 3) No TX. Unnecessary TX was defined on a case by case basis which included whether there was truly a clinical need for blood TX based on injury and pre/post TX hemoglobin. Outcomes evaluated included infection, hospital, ICU and ventilator days and mortality.

Results: 140 patients were enrolled. 97 (69%) patients received a clinically necessary TX compared to 25 patients (18%) who received no TX. The remaining 18 patients (13%) were evaluated and considered to have been unnecessarily transfused and received a mean number of 2.9 Units of PRBCs. We compared outcome in patients in the unnecessary TX group to the no TX group. There was no significant difference in age (mean =28.5 years), gender (91% male), mechanism (penetrating =95%) or ISS (mean = 18) between the 2 groups. Unnecessarily TX patients were more likely to be admitted to the ICU [72% vs. 40% ($p<0.03$)] and had more ICU days [2.7 days vs. 0.88 ($p<0.03$)]. There was no significant difference in hospital days, infection rate and sepsis.

Conclusions: 13% of high risk level 1 trauma patients received an immediate unnecessary blood TX which has a potential to have a significant impact on outcome and resource utilization. Further research is needed to determine more appropriate TX triggers.

Quick Shots Session V

Quick Shot Paper #51
January 12, 2018
9:51 am

EXAMINATION OF HEMODYNAMICS IN PATIENTS UNDERGOING RESUSCITATIVE ENDOVASCULAR BALLOON OCCLUSION OF THE AORTA (REBOA)

Philip J Wasicek, MD, Yao Li, Shiming Yang, PhD, William Teeter, MD, MS,
Deborah M. Stein, MD, MPH, FACS, FCCM*, Thomas M. Scalea, MD, FACS, FCCM*,
Peter Hu, PhD, Megan Brenner, MD*
R Adams Cowley Shock Trauma Center, University of Maryland School of Medicine

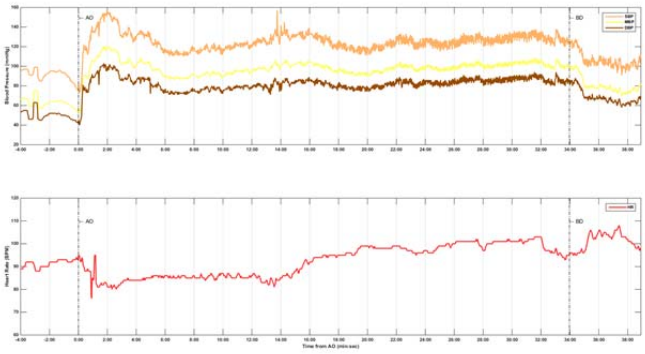
Presenter: Philip J Wasicek, MD

Objectives: The objective of this study was to investigate the hemodynamic effects of aortic occlusion (AO) during REBOA using a sophisticated continuous vital sign (CVS) monitoring tool.

Methods: Patients admitted between February 2013 and May 2017 at a tertiary center that received REBOA were included. Patients in cardiac arrest before or at the time of REBOA were excluded. Time of AO was documented by time-stamped videography and correlated with CVS data.

Results: 28 patients were included, mean ISS was 39?12 and in-hospital mortality was 36%. 71% suffered blunt injury and 29% suffered penetrating trauma. 18 received Zone 1 (distal thoracic aorta) AO and 10 received Zone 3 (distal abdominal aorta) AO. Among Zone 1 patients the pre-AO systolic blood pressure (SBP) nadir was 64?19mmHg (mean?SD), which increased to a mean of 116?35mmHg within 5 minutes after AO ($p<0.001$). Among Zone 3 patients the pre-AO SBP nadir was 75?19mmHg, which increased to a mean of 98?14mmHg within 5 minutes after AO ($p=0.01$). 72% of Zone 1 patients had episodes during AO where SBP was less than 90mmHg as compared to 80% of Zone 3 patients ($p=0.66$). 100% of Zone 1 patients had periods during AO where SBP was greater than 140mmHg as compared to 70% Zone 3 patients ($p=0.01$). The mean decrease in SBP after balloon deflation was 14?21mmHg for Zone 1 ($p=0.06$) and 12?18mmHg for Zone 3 patients ($p=0.10$). Patients undergoing Zone 1 AO were more likely to have an acute change (increase or decrease) in their heart rate immediately after AO as compared to Zone 3 AO ($p=0.04$).

Conclusions: Significant hemodynamic alterations occur before, during, and after AO. The effects of Zone 1 AO on blood pressure and heart rate appear different than Zone 3 AO. This may have important implications for cardiac or cerebral function and perfusion goals, particularly with concomitant injuries such as cardiac contusion or traumatic brain injury.



Vital sign data recorded continuously every 2 seconds from a patient in hemorrhagic shock undergoing REBOA. A dramatic increase in blood pressure (BP) and decrease in heart rate is identified after AO. The timing of AO is confirmed with videography in the resuscitation area and operating room. Upon balloon deflation, the patient experienced a small decrease in BP and increase in heart rate.

Quick Shots Session V

Quick Shot Paper #52
January 12, 2018
9:57 am

BLUNT CEREBRAL VASCULAR INJURY IN ELDER FALL PATIENTS: ARE WE SCREENING ENOUGH AND IS IT WORTH THE RISK

Vince Anto, BS, Andrew B. Peitzman, MD*, Brian Zuckerbraun, Matthew Neal, Gregory A Watson, MD*, Timothy Billiar, MD, Jason L. Sperry, MD, MPH*
University of Pittsburgh Medical Center

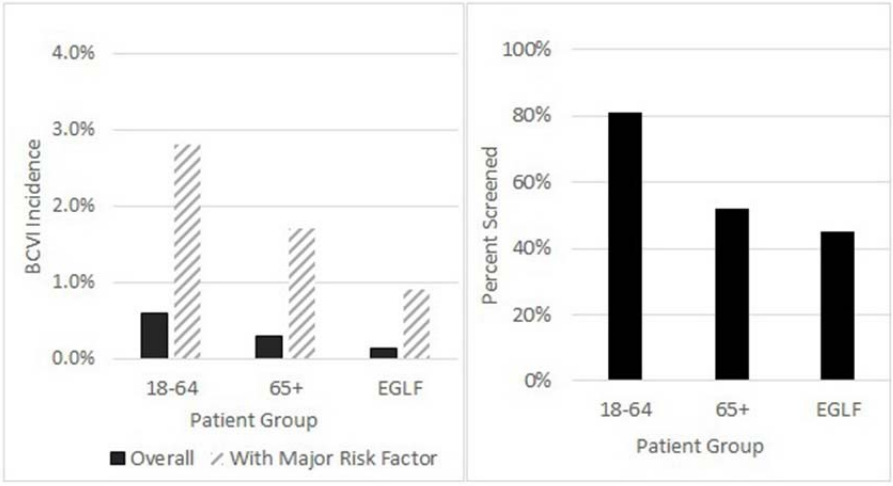
Presenter: Vince Anto, BS

Objectives: Blunt cerebrovascular injuries (BCVI) are generally associated with high-energy injuries. Less is known regarding lower-energy injuries and the risks attributable to screening with intravenous contrast in the elderly. We sought to characterize current BCVI screening practices and associated complications in elderly ground level fall patients (EGFL, =65 years). We hypothesized that BCVI in EGLF patients would be frequent and screened less commonly due to anticipated risks.

Methods: A retrospective study was performed utilizing the National Trauma Data Bank (NTDB, 2007-2014) and single institution data. BCVI risk factors and diagnosis were determined by ICD9 codes and chart review. Presenting creatinine and eGFR, incidence of kidney injury (AKI), and clinical course were obtained by chart review. The NTDB dataset was used to determine the incidence of BCVI and outcomes in the EGLF cohort, local chart review focused on screening complications.

Results: The incidence of BCVI in EGLF patients was 0.14% overall and 0.9% in those with at least one BCVI risk factor. These rates were comparable to those =65 years and age 18-64 years (figure). In EGLF patients, the diagnosis of BCVI was an independent risk factor for mortality (OR-2.1,95% C.I. 1.6-2.6). Over the same period the institutional data had a BCVI incidence of 0.3% (n=4,603) and 2.7% in those with at least one risk factor (n=451). EGLF patients had a significantly lower rate of BCVI screening (45%, figure). Only 8% of EGLF patient not screened had documented contraindications. The incidence of AKI was 9% irrespective of BCVI screening.

Conclusions: The incidence of BCVI is common in EGLF patients and an independent predictor of mortality. Screening is less common in EGLF patients despite few contraindications. This data suggests that using age and injury mechanism to omit BCVI screening in EGLF patients may exclude an at-risk population.



Incidence of BCVI in NTDB dataset and screening rates from local institution data

Quick Shots Session V

Quick Shot Paper #53
January 12, 2018
10:03 am

LIMITED PRE-HOSPITAL CRYSTALLOID ADMINISTRATION IS ASSOCIATED WITH A DECREASED INCIDENCE OF ARDS: A SECONDARY ANALYSIS OF THE PROPPR TRIAL

Aravind K. Bommiasamy, MD, Elizabeth Dewey, Todd Graham, James Murphy, John B. Holcomb, MD*, Eileen M. Bulger, MD, Charles E. Wade, PhD, Kenji Inaba, MD, Martin A. Schreiber, MD, FACS*
Oregon Health and Science University

Presenter: Aravind K. Bommiasamy, MD

Objectives: Crystalloid administration is relied heavily upon to treat hemorrhagic shock in the pre-hospital setting. Current evidence suggests that aggressive fluid administration is detrimental and leads to worse outcomes. We hypothesize that patients who receive limited fluid resuscitation in the pre-hospital setting would have improved outcomes.

Methods: Trauma patients admitted to 12 Level I North American trauma centers were studied. Patients were divided into 3 groups, no pre-hospital crystalloid fluid, low pre-hospital fluid (1-250mL), and high pre-hospital fluid (>250mL). Propensity scores were created and added to subsequent analysis to balance for potentially confounding variables between patients in different fluid groups. Cox proportional hazards clustering on site compared 30-day survival between groups. Logistic regression evaluated 3, 6 and 24 hour mortality and complications.

Results: 392 (58%) patients met inclusion criteria for analysis. Patients who received high amounts of fluid (n=231) had longer transport times, lower Glasgow Coma Scale, and higher incidence of traumatic brain injury (Table 1). Patients who received low fluids (n=65) were less likely to develop Acute Respiratory Distress Syndrome (ARDS) compared to patients who received no fluids (n=96) or high fluids (Table 2).This did not translate to improved mortality when comparing low fluid administration to no fluid or high fluid administration. There were no differences in rates of acute kidney injury, multiple organ failure or sepsis between the 3 groups.

Conclusions: Crystalloid resuscitation has been shown to lead to worse outcomes in trauma patients. Low fluid administration was found to be associated with decreased risk of developing ARDS when compared to no fluid and high fluid. However, in patients predicted to receive a massive transfusion, fluid administration did not impact mortality.

Table 1	High Fluid (>250mL) (n=231)	Low Fluid (1-250mL) (n=65)	No Fluid (0 mL) (n=96)	p*
Age, Mean(Standard Deviation)	39.37(18.14)	37.32(16.66)	38.93(16.43)	0.71
Transport Time, Mean(Standard Deviation)	39.06(22.87)	24.77(12.23)	26.04(13.65)	<0.01
Injury Severity Score, Mean(Standard Deviation)	33.23(12.51)	34.45(12.27)	32.7(12.05)	0.67
Glasgow Coma Scale ,Mean(Standard Deviation)	8.95(5.61)	10.57(5.24)	10.57(5.00)	0.01
TBI (%)	54.55	38.46	43.75	0.03
1:1:1 Treatment Group	46.32	50.77	56.25	0.25
Geriatric Patient (%)	8.66	7.69	9.38	0.93
Blunt Injury (%)	58.44	52.31	56.25	0.31
Hypotension on Admission (%)	48.48	43.08	46.88	0.74
Tachycardia on Admission (%)	73.59	69.23	68.75	0.60
ARDS (%)	22.08	9.23	15.63	0.03
Ground Transport (%)	69.26	86.15	84.38	<0.01
Total Fluids (L),median (IQR)	0.00(0.00)	0.20(0.10)	1.00(1.00)	<0.01

*p value calculated using F-test, Kruskal-Wallis H test, or $\chi 2$

Table 1. Baseline characteristics. Hypotension was defined as a SBP < 100. Tachycardia was defined as a Pulse > 100. TBI was based on AIS head ≥3 or GCS ≤8.

Table 2	OR(95%CI)	p*
3-hour mortality (high vs none)	0.68(0.20,2.26)	0.51
3-hour mortality (low vs none)	1.33(0.49,3.64)	0.56
3-hour mortality (high vs low)	0.51(0.19,1.39)	0.18
6-hour mortality (high vs none)	0.68(0.40,1.17)	0.16
6-hour mortality (low vs none)	0.76(0.36,1.57)	0.44
6-hour mortality (high vs low)	0.91(0.52,1.59)	0.72
24-hour mortality (high vs none)	0.87(0.44,1.69)	0.66
24-hour mortality (low vs none)	1.53(0.83,2.81)	0.16
24-hour mortality (high vs low)	0.57(0.31,1.03)	0.06
ARDS (high vs none)	0.95(0.54,1.69)	0.85
ARDS (low vs none)	0.45(0.20,0.99)	<0.05
ARDS (high vs low)	2.13(1.11,4.09)	0.02
AKI (high vs none)	1.31(0.66,2.60)	0.42
AKI (low vs none)	1.07(0.34,3.34)	0.91
AKI (high vs low)	1.23(0.58,2.61)	0.57
MOF (high vs none)	1.14(0.33,3.96)	0.83
MOF (low vs none)	0.77(0.18,3.24)	0.71
MOF (high vs low)	1.49(0.43,5.14)	0.51
Sepsis (high vs none)	1.13(0.64,2.01)	0.65
Sepsis (low vs none)	0.74(0.41,1.35)	0.31
Sepsis (high vs low)	1.53(0.86,2.72)	0.14

*p calculated using multivariate logistic regression or Cox proportional hazard model

Table 2. Multivariate logistic regression model for complications.

Quick Shots Session V

Quick Shot Paper #54
January 12, 2018
10:09 am

MULTICENTER STUDY OF CRYSTALLOID BOLUSES AND TRANSFUSION IN PEDIATRIC TRAUMA - WHEN TO GO TO BLOOD?

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Objectives: The 9th edition of ATLS recommends up to three crystalloid boluses in pediatric trauma patients with consideration of transfusion after the second bolus however this approach is debated. We aimed to determine if nonresponse to incremental crystalloid boluses is associated with transfusion in injured children.

Methods: 2010-2016 highest tier activation patients <15 years of age from two ACS Level I pediatric trauma centers were identified from prospectively maintained trauma databases. Those with a shock index (heart rate/systolic blood pressure) >0.9 were included. Crystalloid boluses (20±10 cc/kg) and transfusions administered prehospital and within 12 hours of hospital arrival were determined. Univariate and multivariable analyses were conducted to determine association between crystalloid volume and transfusion.

Results: Among 208 patients, the mean age was 5±4 years (60% male), 91% sustained blunt injuries, and median (IQR) ISS was 11 (6,25). 29% received one bolus, 17% received two, and 10% received at least three. Transfusion of any blood product occurred in 69 (18%) patients; mean (range) RBC was 23 (0-89) cc/kg, plasma 8 (0-69), and platelets 1 (0,18). The likelihood of transfusion increased logarithmically from 11% to 43% for those requiring ≥2 boluses (Figure 1). This relationship persisted on multivariable analysis that adjusted for institution, age, and shock index with good discrimination (AUROC 0.84). Shock index was also strongly associated with transfusion (Table 1).

Conclusions: Almost half of pediatric trauma patients with elevated shock index require transfusion following two crystalloid boluses and the odds of requiring a transfusion plateau at this point in resuscitation. This supports consideration of blood after the second bolus in conjunction with shock index though prospective studies are needed to confirm this and evaluate the impact on outcomes.

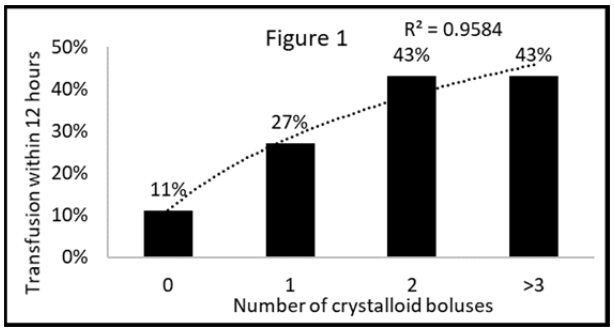

Table 1: Multivariable analysis of characteristics associated with transfusion

	Patient Factor	Odds Ratio	Confidence Interval	p value
Number of crystalloid boluses (vs <1)	1	2.28	0.91-5.86	0.08
	2	6.07	2.31-16.68	<.001
	3	4.28	1.30-14.08	0.017
Shock Index Quartile (vs 0.9-1.0)	>1.0-1.2	8.43	2.04-34.85	.003
	>1.2-1.5	25.00	7.10-87.91	<.001
	>1.5	18.15	4.92-67.02	<.001
*Also adjusted for institution and age				