Session I: Plenary Papers 1-8
Paper 1: 8:45 AM - 9:05 AM

CHILLING THE NERVE, EASING THE PAIN: A RANDOMIZED CLINICAL TRIAL EVALUATING SURGEON-ADMINISTERED BEDSIDE PERCUTANEOUS CRYONEUROLYSIS FOR RIB FRACTURE PAIN

Introduction: A cornerstone of rib fracture management is multimodal pain control, which includes scheduled non-opioid analgesics, as-needed opioids, regional or neuraxial blockade, and surgical stabilization of rib fractures (SSRF). Yet, these modalities have limitations and side effects, limiting use in all patients. Surgeon-administered, ultrasound-guided percutaneous cryoneurolysis performed at the patient bedside is a promising analgesic adjunct.
Methods: We performed a prospective, randomized clinical trial assessing additive benefit of surgeon-administered percutaneous cryoneurolysis to our existing multimodal rib fracture pain control bundle (Standard of Care [SoC]) for injured adults aged 18-64y. Patients with fractured ribs 3-9 were randomized within 72 hours of admission to receive either surgeon-administered, ultrasound-guided percutaneous cryoneurolysis at the bedside and our multimodal pain control bundle, or SoC alone. Patients undergoing SSRF were excluded. The primary outcome was pain score at discharge. Secondary outcomes included hospital length of stay, intervention-associated adverse events, morphine milligram equivalent (MME) use, Glasgow Outcome Score, SF-12, and McGill Pain Score (PROs) which were assessed at discharge and 1-, 3-, and 12-month intervals after discharge.
Results: Thirty-nine patients were randomized; 20 in the intervention arm and 19 in the SoC arm. Median age was 53 (interquartile [IQR] range 44,60), 9 (23%) patients were female, median injury severity score was 14 (IQR 10,17), and median number of rib fractures was 6 (IQR 4,8). Patients were well matched with no differences between groups. No intervention-associated adverse events were identified. Pain scores and MME use at discharge were not statistically different between groups, nor were pain scores, MME use, and PROs at 1-month. Among intervention patients, pain scores and MME use significantly decreased between discharge and 1-month follow-up (median (IQR) pain intensity: 7 (6, 7) to 3 (1, 6), $p < 0.001$; median (IQR) MME: 50 (15, 50) to 0 (0, 15), $p = 0.001$).
Conclusion: Application of surgeon-administered, ultrasound-guided percutaneous cryoneurolysis is safe and was associated with a significant decrease in both pain and daily narcotic usage.

Session I: Plenary Papers 1-8
Paper 2: 9:05 AM - 9:25 AM

SPLENIC ARTERY EMBOLIZATION IS ASSOCIATED WITH SPLENIC SALVAGE EVEN WHEN ANGIOGRAPHY IS NEGATIVE: AN AAST MULTI-INSTITUTIONAL STUDY

Introduction: While positive findings on splenic angiography (SA) require splenic artery embolization (EMB) after blunt trauma, whether EMB is indicated when SA is negative remains controversial. We hypothesize that prophylactic EMB is associated with splenic salvage in patients with negative SA.
Methods: 19 level 1 and 2 trauma centers participated in this retrospective trial. Blunt trauma patients who presented within 48 hours of injury and who underwent both computed tomography (CT) and SA from 2018 to 2023 were included. The primary endpoint was splenectomy within 30 days from admission. SA was categorized as positive/negative based on prespecified criteria. Patients with negative SA who underwent EMB were compared to those with negative SA who did not have EMB. A p value < 0.05 was considered significant.
Results: 686 patients were included of which 316 (46.1%) had a negative SA. 274 (86.7%) with a negative SA had AAST Organ Injury Scale (OIS) grades 3-5 injuries. 257 (81.3%) had EMB and 59 did not. Of the EMB patients, 199 (77.4%) had proximal or proximal and distal (segmental) EMB, and 58 had distal (segmental) EMB only. Compared to EMB patients, patients without EMB had lower OIS grades (median, 3 vs 4, $p<0.001$), similar Injury Severity Scores (ISS), age, time to SA and arrival systolic blood pressure (SBP). Crude 30-day splenectomy rates for EMB vs no EMB were 5.8% vs 18.6% ($p=0.003$). Adjusted for arrival SBP, age, OIS grade and ISS, EMB was associated with a reduced risk of splenectomy (hazard ratio [HR] 0.28, 95% confidence interval [CI] 0.12-0.67, $p=0.004$). Repeat SA rates (EMB vs no EMB: 1.2% vs 1.7%, $p=0.57$) and rates of complications requiring surgical or radiologic interventions (EMB vs no EMB: 1.5% vs 0%, $p= 0.41$) were similar.
Conclusion: EMB is associated with increased splenic salvage after negative angiography. Prophylactic EMB should be considered even when SA is negative.

Session I: Plenary Papers 1-8
Paper 3: 9:25 AM - 9:45 AM

WHAT'S A TRAUMA SURGEON WORTH? A 2025 RE-EXAMINATION OF THE QUESTION POSED IN 2000

Introduction: We compare valuation of trauma subspecialties including Critical Care Intensivist (CC), Orthopedic Trauma Surgery (OT), General Surgery (GS), and Trauma Surgery (TS).

Methods: Total Clinical Compensation (TCC), wRVU, and TCC/wRVU data were obtained from MGMA (2010, 2014, 2018, and 2022) for CC, OT, GS, and TS in academic (Ac) and non-Ac settings. Ac:non-AC ratio for TCC/wRVU and wRVU was calculated to assess trends in compensation. Z-test compared mean TCC and TCC/wRVU between Ac vs. non-Ac each year for all specialties.

Results: In 2022, Ac:non-AC TCC/wRVU <1 and Ac:non-Ac wRVU >1 for all specialties. Average TCC was greater in non-Ac GC and non-Ac TS across all years ($p<0.01$). (Table 1) Average TCC/wRVU was greater in non-AC TS for all years except 2018, although not statistically significant. (Table 2)

Conclusion: Compared to other specialties in the trauma field, Ac TS consistently generated more wRVU, earned less per wRVU, and received less TCC than non-Ac TS. The worth of an Ac TS is not adequately reflected in their compensation.

Table 1: Mean TCC Ac vs Non-Ac

Specialty	Year	Ac	Ac TCC	Non-Ac	Non-Ac TCC	Mean Difference	Confidence Interval	p-value
CC	2010	n=72	$316,458 (111,854)	n=99	$326,070 (140,383)	$9,612.00	[(28,233.40) - (47457.4)]	0.62
	2014	n=36	$304,331 (106,451)	n=251	$407,349 (128,069)	$103,018.00	[(64804.64) - (141231.36)]	<0.01
	2018	n=247	$351,839 (129,248)	n=559	$432,163 (163,160)	$80,324.00	[(59282.09) - (101365.91)]	<0.01
	2022	n=257	$380,173 (138,470)	n=876	$488,739 (171,416)	$108,566.00	[(88182.98) - (128949.02)]	<0.01
OS	2010	n=62	$429,924 (151,732)	n=43	$609,614 (168,308)	$179,690.00	[(72031.36) - (133594.64)]	<0.01
	2014	n=49	$551,747 (150,552)	n=83	$644,164 (251,916)	$92,417.00	[(52187.77) - (116910.23)]	<0.05
	2018	n=57	$642,907 (216,872)	n=102	$700,899 (194,347)	$57,992.00	[(75313.71) - (127354.29)]	0.09
	2022	n=68	$719,205 (286,373)	n=166	$751,768 (279,658)	$32,563.00	[(48396.43) - (97005.57)]	0.42
GS	2010	n=312	$308,125 (145,741)	n=1008	$368,108 (141,724)	$59,983.00	[(116783.06) - (242596.94)]	<0.01
	2014	n=230	$352,184 (182,528)	n=1413	$429,923 (179,908)	$77,739.00	[(23756.32) - (161077.67)]	<0.01
	2018	n=356	$356,261 (142,376)	n=1800	$459,435 (171,624)	$103,174.00	[(9,775.55) - (125759.55)]	<0.01
	2022	n=251	$423,720 (137,834)	n=2182	$501,940 (207,462)	$78,220.00	[(47,705.12) - (112831.12)]	<0.01
TS	2010	n=139	$329,342 (112,909)	n=134	$432,155 (144,085)	$102,813.00	[(41596.09) - (78369.91)]	<0.01
	2014	n=137	$381,452 (133,932)	n=156	$466,001 (148,665)	$84,549.00	[(52352.59) - (103125.41)]	<0.01
	2018	n=167	$401,532 (137,528)	n=348	$502,866 (148,051)	$101,334.00	[(86392.85) - (119555.15)]	<0.01
	2022	n=183	$468,308 (131,120)	n=555	$541,009 (182,208)	$72,701.00	[(59074.57) - (97365.43)]	<0.01

Data presented as mean (standard deviation).

Table 2: Mean TCC/wRVU Ac vs. Non-Ac

Specialty	Year	Ac	Ac TCC/wRVU	Non-Ac	Non-Ac TCC/wRVU	Mean Difference	Confidence Interval	p-value
CC	2010	n=23	$72.33 (55.04)	n=77	$73.67 (34.88)	$1.34	[(40.96) - (38.28)]	0.95
	2014	n=6	*	n=180	$99.61 (35.44)	*	*	*
	2018	n=75	$88.07 (47.33)	n=199	$52.51 (21.18)	$35.56	[(24.45) - (46.67)]	<0.01
	2022	n=67	$119.61 (57.47)	n=544	$126.44 (94.59)	$6.83	[(22.72) - (9.06)]	0.40
OS	2010	n=20	$52.36 (14.43)	n=35	$77.50 (22.30)	$25.14	[(34.87) - (15.41)]	<0.01
	2014	n=32	$64.25 (12.18)	n=53	$75.32 (21.19)	$11.07	[(18.17) - (3.97)]	<0.01
	2018	n=33	$75.87 (26.93)	n=31	$76.32 (27.60)	$0.45	[(13.82) - (12.92)]	0.95
	2022	n=42	$80.80 (30.11)	n=116	$86.86 (30.80)	$6.06	[(16.75) - (4.63)]	0.27
GS	2010	n=95	$75.61 (136.07)	n=766	$57.06 (29.86)	$18.55	[(8.89) - (45.99)]	0.19
	2014	n=74	$56.55 (23.82)	n=987	$68.62 (32.97)	$12.07	[(17.87) - (6.27)]	<0.01
	2014	n=164	$68.39 (34.16)	n=470	$71.54 (25.10)	$3.15	[(8.85) - (2.55)]	0.28
	2014	n=99	$76.02 (34.09)	n=1444	$82.56 (51.73)	$6.54	[(13.77) - (0.69)]	0.08
TS	2014	n=36	$44.89 (20.47)	n=87	$89.54 (61.61)	$44.65	[(59.22) - (30.08)]	<0.01
	2014	n=57	$51.51 (23.43)	n=73	$78.56 (32.35)	$27.05	[(36.65) - (17.45)]	<0.01
	2014	n=80	$58.52 (22.38)	n=86	$52.11 (21.75)	$6.41	[(0.31) - (13.13)]	0.05
	2014	n=102	$68.59 (28.22)	n=399	$104.48 (55.66)	$35.89	[(43.62) - (28.16)]	<0.01

Data presented as mean (standard deviation). *Indicates unknown values.

Session I: Plenary Papers 1-8
Paper 4: 9:45 AM - 10:05 AM

ANTI-IMPULSE THERAPY FOR BLUNT THORACIC AORTIC INJURY: DOES IT AFFECT OUTCOMES IN PATIENTS WITH CONCOMITANT TRAUMATIC BRAIN INJURY?

Introduction: Traumatic brain injury (TBI) and blunt thoracic aortic injury (BTAI) are leading causes of death in trauma patients. Mortality for patients with concomitant TBI and BTAI approaches 25%. Conflicting blood pressure (BP) management goals for TBI (higher BP) and BTAI (lower BP) create a therapeutic conundrum when treated concomitantly. Anti-impulse therapy (AIT) with antihypertensive medications has been shown to safely and effectively reduce the risk of injury extension in low-grade BTAI. However, there is limited information on its affect on outcomes in patients with concomitant TBI/BTAI.

Methods: An international prospective multicenter registry was used to identify adult blunt trauma patients 2006 – 2022. Primary outcomes included in-hospital mortality, 30-day mortality, aortic related mortality (ARM), operative intervention rates and complications. Outcomes were compared between patients with BTAI alone to those with TBI/BTAI, relative to receiving AIT.

Results: 1,276 BTAI patients were identified. Overall, compared to patients not treated with AIT, those treated with AIT had a lower rate of in-hospital mortality (8.1% versus 24.7%, $p<0.001$) and a lower rate of aortic related in-hospital mortality (16.7% versus 53.0%, $p<0.001$). A lower rate of laparotomy (16.2% versus 21.1%, $p=0.025$) and median ventilator days (1 versus 2, $p<0.001$) was also identified in AIT patients. 315 patients (24.7%) had concomitant TBI and BTAI, of which 36 (23.8%) were treated with AIT. Patients with concomitant TBI/BTAI treated with AIT were 0.46 times less likely to have in-hospital mortality than those who were not treated with AIT [OR 0.46(0.28,0.75)]. Patients undergoing AIT with concomitant TBI/BTAI had a higher rate of in-hospital mortality ($p<0.001$) and a lower rate of postoperative vasopressors utilized ($p<0.001$) compared to patients with BTAI alone. Patients with concomitant TBI/BTAI treated with AIT had a lower likelihood aortic related in-hospital mortality [OR 0.16(0.06,0.43)] and of undergoing laparotomy [OR 0.49(0.06,0.43)] compared to those not treated with AIT. There was no significant difference in likelihood of 30-day mortality, craniotomy or ischemic stroke.

Conclusion: TBI occurre in approximately 25% of patients with a BTAI; 23.8% were treated with AIT. AIT significantly reduced mortality in BTAI alone as well as in concomitant TBI/BTAI patients. AIT was also associated with lower likelihood of aortic related in-hospital mortality, postoperative vasopressor usage, and laparotomy. These findings suggest that AIT is beneficial compared to no AIT in BTAI patients, even when they present with TBI.

Session I: Plenary Papers 1-8
Paper 5: 10:05 AM - 10:25 AM

ACUTE TRAUMATIC PAIN TREATMENT WITH KETAMINE DECREASED PTSD AND ANXIETY SYMPTOMS 6 MONTHS POST HOSPITAL DISCHARGE

Introduction: Chronic pain, anxiety, depression, and posttraumatic stress disorder (PTSD) are frequently seen after traumatic injury. Ketamine infusions used to treat acute pain may decrease the risk of chronic pain and improve psychological outcomes of injured patients. We hypothesized patients receiving ketamine would have a lower incidence of chronic pain, anxiety, depression, and PTSD.

Methods: A prospective, randomized, double-blind placebo-controlled trial of severely injured (ISS ≥15) adult patients (age 18-64) admitted to a Level 1 trauma center was conducted. Exclusion criteria also included pregnancy, and chronic opiate use. All patients were prescribed a patient-controlled analgesia in addition to being randomized to either adjustable dose ketamine (ADK) starting at 3 mcg/kg/min or an equivalent rate of 0.9% normal saline. Quality of life (QoL) outcomes were measured using the Depression and Anxiety (DASS-21), PTSD (PCL-5), Trauma quality of life (TQOL), and pain (BPI-SF) questionnaires, which were performed at hospitalization, and 1-, 3-, and 6-months post discharge. Linear regression was used to evaluate the relationship between groups and baseline pain and mental health outcomes at each follow-up.

Results: Forty-four of 82 patients (54%) were randomized to ADK. Both groups were similar in demographics, injury mechanisms/severity, and baseline QOL measures. Patients in the ketamine group had significantly less anxiety symptom severity ($p < .05$) and PTSD ($p < .05$), with significantly less re-experiencing symptoms (subscale of PTSD) at 3 and 6 months ($p<.05$).

Conclusion: Ketamine infusion for acute pain treatment in severe traumatic injury may significantly reduce anxiety and PTSD 6 months after injury. This effect may be specific to the memory processes responsible for re-experiencing symptoms, such as nightmares and flashbacks. Further research is needed to explore the effects of acute ketamine administration on the neurobiological mechanisms implicated in the development of PTSD, as this could be a novel preventative intervention to improve QoL for injured patients.

Session I: Plenary Papers 1-8
Paper 6: 10:25 AM - 10:45 AM

ENDOTHELIAL PROTEIN C RECEPTOR RS867186 VARIANT ALLELE IS ASSOCIATED WITH PULMONARY EMBOLISM IN BLEEDING TRAUMA PATIENTS

Introduction: Pulmonary embolism (PE) remains a leading cause of potentially preventable death following traumatic injury. The endothelial protein C receptor (PROCR) missense single nucleotide polymorphism (SNP) rs867186 has been associated with elevated circulating soluble PROCR and a hypercoagulable state. Our study evaluates the influence of rs867186 on PE development in a cohort of bleeding trauma patients.
Methods: Trauma subjects requiring the highest level of activation, blood transfusion and with base excess <-4 were eligible for the study. Real-time PCR was used to genotype subjects for PROCR rs867186 and other common heritable risk factors for PE including factor V Leiden, prothrombin G20210A mutation and sickle cell disease.
Results: 623 trauma subjects had adequate DNA for rs867186 genotyping. 33 subjects developed PE of whom 9 (27%) carried a variant PROCR rs867186 allele and 3 (9%) carried a common heritable PE risk factor. rs867186 variant subjects were more likely to develop PE (10%) compared to wild type (5%; P=0.04) and this association persists in time to PE analysis (P=0.03) and when controlling for demographics and injury characteristics (P=0.04). Further, variant rs867186 was associated with shorter thromboelastography reaction-time (P=0.04) and activated clotting time (P=0.04).
Conclusion: We identify an endothelial protein SNP associated with a hypercoagulable profile and PE within a bleeding trauma cohort. These findings suggest that genetic predisposition is a significant driver of PE development following trauma and that the SNPs primarily responsible for this prothrombotic phenotype are specific to the pathophysiology of hemorrhage, shock and endotheliopathy rather than the common heritable thrombophilias.

Session I: Plenary Papers 1-8

Paper 7: 10:45 AM - 11:05 AM

EFFECTIVENESS OF PRE-EMPTIVE TARGETED MUSCLE REINNERVATION IN DECREASING THE POSTAMPUTATION PAIN IN AN ACUTELY INJURED PATIENTS UNDERGOING ABOVE KNEE AMPUTATION

Introduction: Post-amputation pain in amputees is a major cause of morbidity. Recent studies have highlighted the impact of pre-emptive surgical intervention of the amputated nerves for the prevention and treatment of post-amputation pain. In this study, we aimed to analyze the role of Targeted muscle reinnervation (TMR) at the time of limb loss in addressing both residual limb pain (RLP) and phantom limb pain (PLP).
Methods: In this open RCT, an acutely injured patients with lower extremity trauma undergoing above-knee amputation were randomized into two groups ie group A with TMR (Intervention) and group B with conventional stump formation (Control) at the time of amputation using simple mixed block randomization. The primary outcome analysis for the assessment of postoperative residual limb pain (RLP) and phantom limb pain (PLP) at five-time points postoperatively viz. 48 hours, 2nd , 4th , 8th , and 12th weeks were done using the Numerical Rating Scale (NRS) for RLP and PLP. To assess the psychological status with respect to post-amputation pain the Hospital Anxiety and Depression Scale (HADS) and McGill pain questionnaire and PROMIS scores were used.
Results: The majority of the patients were males (n=92, 94.8%) with median age of 30 years with IQR of 24-43. The mean MESS score was comparable (p=0.98) between the groups. The mean NRS of the residual limb pain (1.8 vs 3.3) and phantom limb pain (1.2 vs 2.6) were statistically different between the two groups (p-value of 0.001). The psychological scores HADS, McGill pain questionnaire and PROMIS scores were found to be statistically significant.
Conclusion: The pre-emptive surgical intervention of amputated nerve at the time of amputation by TMR techniques significantly reduces the postoperative residual limb pain and phantom limb pain.

Session I: Plenary Papers 1-8
Paper 8: 11:05 AM - 11:25 AM

THE COST OF DELAY: EVALUATING THE EFFECTIVENESS OF TIERED OPERATING ROOM POSTINGS ON PATIENT OUTCOMES

Introduction: Most centers utilize a tiered operating room (OR) posting system. This system is based on patient physiology and the potential for deterioration of their condition due to the pathology that requires operative intervention. If those criteria are respected, then meeting those time goals should result in better patient outcomes. We sought to determine the effect of patients meeting the time goals within the tiered posting systems on patient outcomes.
Methods: A retrospective review at a single academic center was performed on all patients posted for the OR by the acute care surgery (ACS) service over a 9-year period. Elective cases were excluded. The posting system was E48, E24, E12, E4, E2, E1 which designated Emergent and the number of hours they were to go to the OR after posting. Only the index surgery each admission was considered.
Results: There were 7520 patients. The 30-day mortality was significantly higher in the patients who did not meet the posting goal (8.7% versus 6.4%, $p < .001$). In a regression analysis controlling for age and Charlson Comorbidity Index, failure to reach the OR in a timely fashion remained an independent predictor of death (OR=1.3, 95% CI [1.1, 1.7], p=.005)
Conclusion: ACS care is predicated on timely intervention. Tiered OR posting systems are intended to get patients to the OR to achieve early source control and prevent further deterioration. There is a price to pay when those goals are not reached with an increased risk of death.

Session IIIA: Papers 9-18
Paper 9: 2:10 PM - 2:30 PM

A 2-GRAM BOLUS OF TXA IN PATIENTS WITH MODERATE OR SEVERE TBI MAY BE PROTECTIVE IN MALES BUT NOT IN FEMALES

Introduction: A cornerstone of rib fracture management is multimodal pain control, which includes scheduled non-opioid analgesics, as-needed opioids, regional or neuraxial blockade, and surgical stabilization of rib fractures (SSRF). Yet, these modalities have limitations and side effects, limiting use in all patients. Surgeon-administered, ultrasound-guided percutaneous cryoneurolysis performed at the patient bedside is a promising analgesic adjunct.
Methods: We performed a prospective, randomized clinical trial assessing additive benefit of surgeon-administered percutaneous cryoneurolysis to our existing multimodal rib fracture pain control bundle (Standard of Care [SoC]) for injured adults aged 18-64y. Patients with fractured ribs 3-9 were randomized within 72 hours of admission to receive either surgeon-administered, ultrasound-guided percutaneous cryoneurolysis at the bedside and our multimodal pain control bundle, or SoC alone. Patients undergoing SSRF were excluded. The primary outcome was pain score at discharge. Secondary outcomes included hospital length of stay, intervention-associated adverse events, morphine milligram equivalent (MME) use, Glasgow Outcome Score, SF-12, and McGill Pain Score (PROs) which were assessed at discharge and 1-, 3-, and 12-month intervals after discharge.
Results: Thirty-nine patients were randomized; 20 in the intervention arm and 19 in the SoC arm. Median age was 53 (interquartile [IQR] range 44,60), 9 (23%) patients were female, median injury severity score was 14 (IQR 10,17), and median number of rib fractures was 6 (IQR 4,8). Patients were well matched with no differences between groups. No intervention-associated adverse events were identified. Pain scores and MME use at discharge were not statistically different between groups, nor were pain scores, MME use, and PROs at 1-month. Among intervention patients, pain scores and MME use significantly decreased between discharge and 1-month follow-up (median (IQR) pain intensity: 7 (6, 7) to 3 (1, 6), $p < 0.001$; median (IQR) MME: 50 (15, 50) to 0 (0, 15), $p = 0.001$).
Conclusion: Application of surgeon-administered, ultrasound-guided percutaneous cryoneurolysis is safe and was associated with a significant decrease in both pain and daily narcotic usage.

Session IIIA: Papers 9-18
Paper 10: 2:30 PM - 2:50 PM

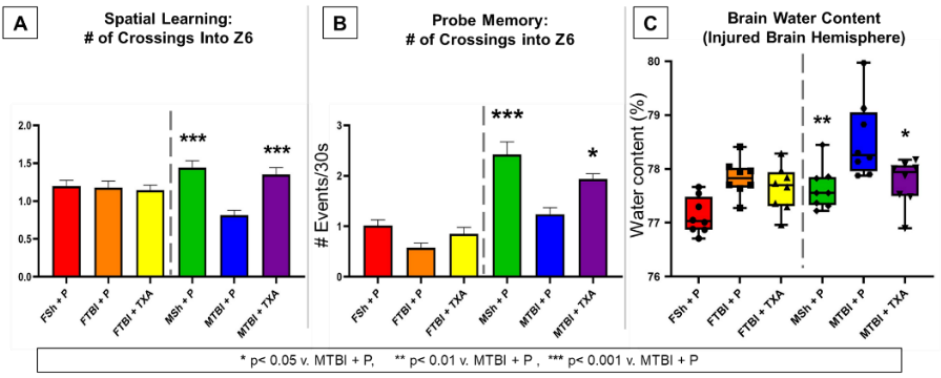
TXA AFTER SEVERE TBI: BENEFITS IN LEARNING AND MEMORY PROMINENT IN MALES, LESS PERVASIVE IN FEMALES

Introduction: Despite common use, post-TBI tranexamic acid (TXA) may only benefit males. TXA appears to preserve blood brain barrier integrity after TBI, but this solely occurs in male animals. We hypothesized that TXA unequally affects male and female learning and memory post-TBI.

Methods: CD1 male (M, n=24) and female (F, n=24) mice underwent controlled cortical impact (TBI) or sham craniotomy (Sh), receiving either TXA (60mg/kg) or saline (placebo, P) i.v., 1-hour later. For 14 days, mice underwent Morris water maze testing where improved learning/memory was indicated by traveling a shorter distance / reach or cross into target zones with greater frequency (Z1 - platform quadrant, Z5 - platform, Z6, Z7 -concentric peri-platform zones). Brains were collected for tissue water content.

Results: Post-TBI TXA improved male spatial **learning** (crossing frequency into Z6 (Fig A) & Z7 ($p<0.01$); latency to Z1 ($p<0.01$), Z5 ($p<0.01$), Z6 ($p<0.01$) & Z7 ($p<0.01$)). TXA improved female **learning** solely in one parameter (Z7 latency; $p<0.01$). TXA improved male **memory** (frequency into Z5 ($p=0.02$) & Z6 (Fig B); duration in Z1 ($p=0.01$) & Z7 ($p=0.04$); swimming velocity ($p<0.01$)). In females, TXA improved **memory** solely in one parameter (Z1 duration; $p=0.02$). TXA reduced only male cerebral edema (Fig C).

Conclusion: Post-TBI TXA benefits males more than females. TBI should be studied separately in males and females to identify sex-specific mechanisms of injury & recovery.



Session IIIA: Papers 9-18
Paper 11: 2:50 PM - 3:10 PM

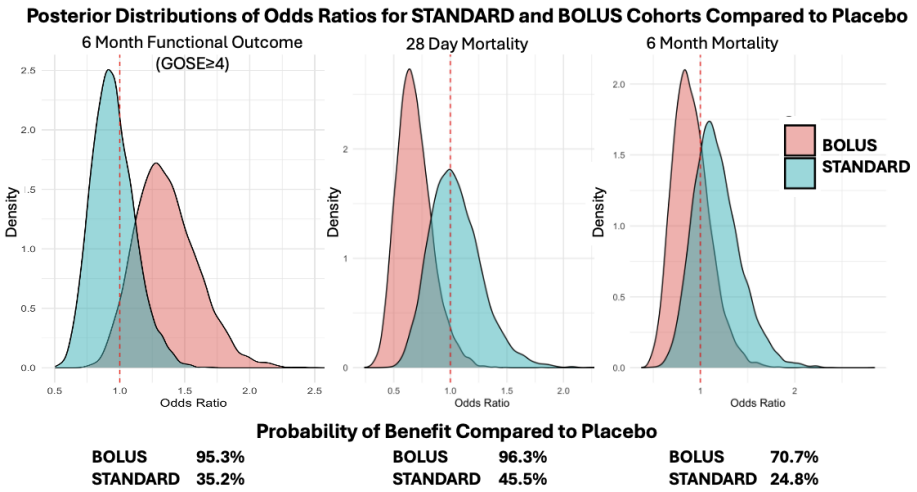
PREHOSPITAL TRANEXAMIC ACID BOLUS IMPROVES OUTCOMES IN TRAUMATIC BRAIN INJURY: A BAYESIAN REANALYSIS OF THE PREHOSPITAL TXA FOR TBI TRIAL

Introduction: Despite two large randomized controlled trials evaluating the effectiveness of prehospital tranexamic acid (TXA) in patients with traumatic brain injuries (TBI), the optimal dosing strategy remains uncertain. We sought to assess the impact of infusion and bolus administration on functional and mortality outcomes, using Bayesian techniques.

Methods: We performed a post hoc analysis of the Prehospital TXA for TBI RCT where TBI patients received TXA as a 1-gram bolus followed by a 1-gram infusion (STANDARD), 2-gram bolus (BOLUS), or placebo. Bayesian regression models were created to assess the association of early TXA administration in TBI patients using posterior probabilities for 6-month functional outcomes, as well as 28 day and 6-month mortality.

Results: Patients receiving TXA (STANDARD or BOLUS) displayed a 78.1% probability of having improved functional outcomes at 6 months compared to placebo. When comparing STANDARD and BOLUS dosing strategies versus placebo, the BOLUS cohort demonstrated posterior probabilities consistent with improved benefit for 6-month functional outcomes, 28day mortality, and 6-month mortality (Figure).

Conclusion: The 2gm TXA bolus dosing strategy demonstrated a high probability of benefit compared to both placebo and STANDARD cohorts for functional and mortality outcomes in TBI patients.



Session IIIA: Papers 9-18

Paper 12: 3:10 PM - 3:30 PM

TRANEXAMIC ACID BOLUS PLUS DRIP PARADOXICALLY INCREASES COMPLEMENT ACTIVATION: A PATCH TRIAL SECONDARY STUDY

Introduction: Multiple trials have found a survival benefit from early tranexamic acid (TXA) administration after polytrauma, but the early discrimination of the survival benefit observed (~10 minutes) has questioned if bleeding reduction is the primary mechanism. Plasmin is known to directly cleave and activate complement proteins, which generate marked inflammation, and TXA can inhibit plasmin generation. We hypothesized that polytrauma patients who received TXA would demonstrate less complement activation compared to placebo controls.
Methods: Patient plasma was obtained from N=56 polytrauma patients in the Emergency Department, at 8 hours and again at 24 hours after admission, who were enrolled in the PATCH randomized placebo-controlled trial of pre-hospital TXA (1g bolus + 1g drip over 8 hours) versus placebo. Complement multiplex was performed on plasma samples for activation and regulatory markers, and plasmin-antiplasmin (PAP) was measured via ELISA. Pairwise comparisons of analytes between TXA and placebo at each timepoint were performed. Significance was set at $p<0.05$.
Results: Median age was 40.5 (IQR 28-56), 71.4% were male, median ISS was 36 (24.5-50), and 94.6% were blunt mechanism. At early time points (ED and 8hrs) patients who received TXA did not demonstrate a reduction in C3a, C5a, sC5b-9 or PAP relative to placebo. At 24 hours, there was a significant increase in both C3a (274.0 vs 416.6ng/mL, $p=0.0024$) and C5a (9.4 vs 11.6ng/mL, $p=0.0462$) in the TXA group.
Conclusion: A 1g bolus + 1g drip of TXA does not reduce complement activation in trauma patients. Paradoxically, there was a significant increase in complement activation at 24-hours in the TXA group. Further studies are required to understand if previously hypothesized mechanisms, such as delayed urokinase release, and dosing regimen are responsible for this observation and may drive further discussion on optimal TXA dosing.

Session IIIA: Papers 9-18
Paper 13: 3:30 PM - 3:50 PM

A SMALL MOLECULE THERAPEUTIC TARGETING THE CHOLINERGIC ANTI-INFLAMMATORY PATHWAY ATTENUATES TRAUMA-INDUCED ACUTE LUNG INJURY

Introduction: Acute lung injury (ALI) after trauma is associated with alveolar dysfunction that causes significant morbidity with limited treatment options. We have shown that AR-R17779 (AR), a small molecule agonist of the a7 nicotinic acetylcholine receptor highly expressed on macrophages, prevents lung edema in preclinical models of injury. The mechanism by which AR attenuates trauma-induced ALI is unknown. We hypothesized that AR decreases trauma-induced ALI by limiting macrophage activation and preventing lung epithelial glycocalyx breakdown.

Methods: C57BL/6 mice underwent a polytrauma model consisting of lung contusion and liver crush injury with cohorts treated with an intraperitoneal dose of AR (25 mg/kg) vs. vehicle after polytrauma. Lungs were harvested 24 hours post-injury for evaluation of ALI using histology and immunofluorescence of heparan sulfate (HS), a key component of the glycocalyx. In vitro co-culture studies were performed to assess the impact of AR on the activation of macrophages by LPS and its effects on the lung epithelial glycocalyx by immunoblotting, ELISA, and HS expression.

Results: AR attenuated polytrauma-induced histological ALI ($p<0.01$) and loss of HS from the lung epithelial glycocalyx ($p=0.04$). In vitro, AR dose-dependently suppressed STAT3 phosphorylation ($p<0.01$) and TNFa release ($p=0.04$) from LPS-treated macrophages. In co-culture studies, treating LPS-stimulated macrophages with AR decreased epithelial glycocalyx degradation compared to macrophages treated with LPS alone ($p=0.02$).

Conclusion: AR attenuated ALI by decreasing macrophage STAT3 signaling that prevented macrophage-induced lung epithelial glycocalyx breakdown. Future research should test AR as an adjunct to resuscitation aimed at limiting dysregulated macrophage activation and ALI after trauma.

Session IIIA: Papers 9-18
Paper 14: 3:50 PM - 4:10 PM

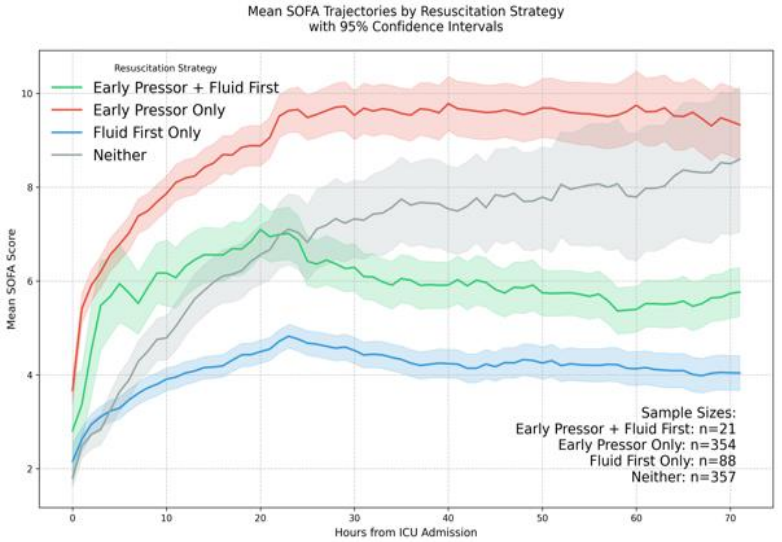
FLUID-FOCUSED RESUSCITATION ENHANCES ORGAN RECOVERY IN SEPTIC EGS PATIENTS: A TIME-VARYING ANALYSIS

Introduction: Septic patients undergoing emergency general surgery (EGS) procedures have unique physiology due to acute tissue injury and infection yet are underrepresented in large sepsis trials of early vasopressor initiation. Thus, optimal management of septic shock in EGS remains uncertain.

Methods: We retrospectively analyzed 820 EGS patients from the MIMIC-IV database using a time-varying marginal structural model to address hourly confounding in the ICU. Two strategies—early vasopressor initiation ("Early Pressor, EP") and a fluid-prioritizing approach ("Fluid First, FF")—were compared. Primary outcomes were 72-hour SOFA (Sequential Organ Failure Assessment) and ΔSOFA from baseline. Stabilized inverse-probability weights balanced baseline severity and evolving clinical parameters.

Results: Weighted regression showed that FF was associated with lower final SOFA and a smaller ΔSOFA (–2.17, $p<0.001$). EP had a significant positive effect on final SOFA (+1.30, $p<0.001$). Group-level analyses confirmed less organ dysfunction in FF.

Conclusion: In septic EGS patients, a fluid-first approach was linked to improved organ function recovery, suggesting that EGS sepsis may require a different resuscitation strategy than medical sepsis.

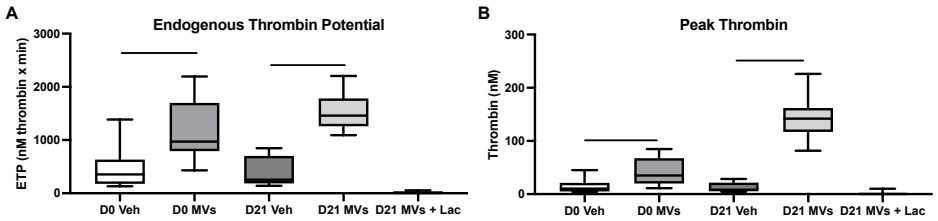


Session IIIA: Papers 9-18

Paper 15: 4:10 PM - 4:30 PM

MICROVESICLES IN STORED HUMAN WHOLE BLOOD INCREASE THROMBIN GENERATION VIA PHOSPHATIDYLSERINE

Introduction: Whole blood storage leads to microvesicle (MV) release. The effect of these shed MVs on coagulation is poorly understood. We hypothesized that MVs produced during whole blood storage express phosphatidylserine (PS) and cause increased thrombin generation.
Methods: Whole blood was collected from 14 healthy donors (6 male, 8 female; 20-30 years old) and stored for 21 days. On day 0 and 21, MVs were quantified by cell origin and PS expression. Platelet poor plasma (PPP) was sampled during storage and thrombin generation determined via calibrated automated thrombogram. To determine the MV effect on thrombin generation, MVs from day 21 blood were added to PPP with and without lactadherin and assayed for changes in thrombin generation.
Results: There was a significant increase in PS expressing, platelet-derived MVs after 21 days of storage. Thrombin generation increased with storage duration. When MVs were added to plasma, thrombin generation was increased as evidence by increased endogenous thrombin potential (ETP; Figure A) and peak thrombin (Figure B). This effect was mitigated by blocking phosphatidylserine on MVs with lactadherin (lac; Figure).
Conclusion: Whole blood storage results in time-dependent increased thrombin generation. Our data suggest that changes in thrombin generation are due, in part, to PS expression on MVs shed during storage. These data highlight the need for clinical studies on the coagulability of stored versus fresh whole blood, particularly in the setting of massive transfusion.



Session IIIA: Papers 9-18
Paper 16: 4:30 PM - 4:50 PM

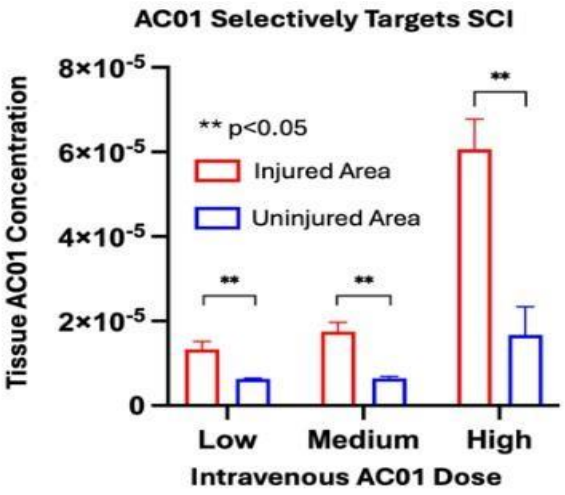
ROLE OF PEPTIDYLARGININE DEAMINASE 2 IN A MURINE MODEL OF TRAUMATIC BRAIN INJURY

Introduction: Traumatic brain injury (TBI) is among the leading causes of death and disability worldwide. Studies have linked Peptidylarginine deiminases (PADs) with TBI outcomes. However, nonspecific PAD inhibition makes it difficult to decipher the exact role of specific PAD enzymes in neurotrauma. Since both PAD2 and PAD4 have been linked with neurodegeneration, we sought to clearly establish their roles in TBI.
Methods: Male mice (11-14 weeks) were subjected to controlled cortical impact TBI (n=5/group). Experimental groups included wildtype (WT), PAD2 knockout (PAD2-KO), PAD4 knockout (PAD4-KO), and PAD2/4 double knockout (PAD2/4-DKO). 24 hours post-TBI, frozen brain-sections were stained (Nissl and immunofluorescence) to determine lesion size and expression of PAD2 and PAD4. We also assessed the impact of PAD2-KO on neurologic severity scores (NSS, 1-8 days post TBI) and visuospatial learning using the Morris water maze test (MWM, 21-30 days post TBI).
Results: Overall, PAD2-KO and PAD2/4-DKO displayed significantly smaller brain lesion sizes than WT ($p= 0.005$ and 0.005 respectively) and PAD4-KO ($p= 0.005$ and 0.004 respectively). However, there was no significant difference in lesion size between PAD4-KO and WT ($p= 0.880$). Analysis of archived snRNA-seq data and immunofluorescence staining 24 hours post-TBI showed upregulation of PAD2 (primarily in astrocytes) in WT compared with sham ($P=0.048$), whereas PAD4 was undetectable. Guided by these results, we compared the neurological outcomes of WT with PAD2-KO TBI mice. Overall, PAD2-KO had a significantly lower NSS on post-injury days 1, 5 and 6 compared with WT TBI mice (all $P<0.05$). Moreover, MWM demonstrated that the cumulative noncued spatial learning was worse in WT compared with PAD2-KO ($p < 0.05$).
Conclusion: Our results suggest that PAD2, but not PAD4, blockade can improve outcomes following TBI, which justifies its exploration as a potential therapeutic target.

Session IIIA: Papers 9-18
Paper 17: 4:50 PM - 5:10 PM

INTRAVENOUS AC01 SELECTIVELY TARGETS INJURED SPINAL NEURONS AND DISPLAYS NEUROPROTECTIVE ACTION

Introduction: AC01 is a homing protein that ferries nanotherapeutics to neuronal injury sites and has intrinsic neuroprotective effects in brain injury. This study evaluates AC01's biodistribution and therapeutic properties in spinal cord injury (SCI).
Methods: Neuroprotection was tested in vitro using human spinal neurons treated with increasing doses of AC01 or saline and exposed to staurosporine. Then, 24 rats with cervical SCI were injected with CY5-labeled AC01 at low (n=3), medium (n=3), or high doses (n=6) or CY5 saline (n=12) as controls. Biodistribution was tracked with LAGOS live imaging. Eighteen rodents were sacrificed after 24 hours, and six animals (3 high-dose and three controls) were sacrificed after 7 days. Organ imaging and histological analyses were performed; a dose-response curve was established. Neuronal degeneration was assessed via Fluoro-Jade C staining.
Results: In vitro, AC01 treatment led to a dose-dependent increase in neuron branching and length compared to controls. In vivo, immediate post-injection showed a broad distribution of CY5 and CY5-AC01, with CY5-AC01 accumulating at the SCI site one hour post-injury and remaining bound for up to 7 days. Higher doses resulted in greater accumulation and reduced cellular apoptosis and neuronal degeneration compared to controls.
Conclusion: Intravenously injected AC01 specifically binds to injured spinal neurons and provides dose-dependent neuroprotection, suggesting potential for use as an injectable treatment for SCI.



Session IIIA: Papers 9-18
Paper 18: 5:10 PM - 5:30 PM

DAILY STRESS FOLLOWING TRAUMATIC BRAIN INJURY INDUCES UNIQUE DIFFERENTIAL NEUROINFLAMMATORY GENE TRANSCRIPTION COMPARED TO INJURY ALONE

Introduction: Traumatic brain injury (TBI) is a significant health burden often with long stays in the intensive care unit (ICU). We hypothesize that extended stress exposure, such as that seen during an ICU stay, leads to differential expression of genes related to neuronal death and astrocyte activation.
Methods: Male Sprague-Dawley rats (n=6/group) were divided into four groups: 1) TBI 1d underwent controlled cortical impact brain injury (CCI) with sacrifice 3hs later, 2) TBI 7d underwent CCI followed by 7 days of daily handling, 3) TBI/CRS 7d underwent CCI followed by daily chronic stress or 4) naïve underwent daily handling only. At sacrifice the brains were flash frozen, and later, RNA was isolated from the injured frontal lobe. The gene expression in the isolated RNA was evaluated using the 770 gene NanoString Neuroinflammation panel. The data was imported to ROSALIND (San Diego, CA) and analyzed using normalization, fold changes, and significance using criteria defined by NanoString. Significant differential expressed genes (sDEG) was defined if the fold change was ≥ 1.5 or ≤ -1.5 and p-value ≤ 0.05. These sDEG were selected for functional analysis using Qiagen Ingenuity Pathway Analysis.
Results: Following brain injury, we observed a number of unique sDEG. for example, 3hs following CCI (TBI 1d), 74 sDEG were identified compared to naïve animals. On day seven (TBI 7d), 115 sDEG genes are altered compared to the TBI 1d group. The addition of stress following TBI results in distinct gene expression within the brain involving astrocyte and microglial function as well as inflammation and cell death, many of which have their expression altered to increase cell death.
Conclusions: Daily stress following TBI results in gene expression changes associated with neuronal death and astrogliosis. Reducing this effect of stress may improve long term recovery outcomes following TBI.

Session IIIB: Papers 19-28
Paper 19: 2:10 PM - 2:30 PM

SCHEDULING THE ACS SURGEON: MINIMIZING ERROR RISK

Introduction: Fatigue contributes to suboptimal human performance and increases risk of error. Military experiments on sleep deprivation led to the validated Sleep, Activity, Fatigue and Task Effectiveness (SAFTE) algorithm, which uses sleep data to predict risk of error and has been calibrated against blood alcohol level. We used the Fatigue Avoidance Scheduling Tool (FAST), which applies the SAFTE algorithm, to predict error risk in surgeons during in-house night call.
Methods: Two common night shift schedules were analyzed using the FAST application: a 24-hour call and 12-hour night shift under idealized pre-shift rest conditions (8 hours of sleep before the 24 hour and a 6-hour pre-call sleep period before the 12 hour shift), but without sleep during the shift. Time with performance predicted under 77% (equivalent to a blood alcohol level [BAL] of 0.05) and below 70% (BAL 0.08) was recorded.
Results: During a 24-hour call, predicted performance drops below 77% (BAL 0.05) at midnight and 70% (BAL 0.08) at 01:30; performance improves above 70% at 07:00, but not above 77%. Conversely, for a 12 hour night shift, predicted performance drops to but not below 77% (BAL 0.05) between 02:30 and 0:500.
Conclusion: Our analysis using the SAFTE model and FAST application shows that 24h shifts, a common practice in surgeon scheduling, likely include periods of significant performance impairment due to fatigue equivalent to alcohol intoxication. During a 24-hour shift without sleep, performance impairment is more severe and of longer duration than during a 12-hour night shift. However, this model assumes that the surgeon sleeps during the day before the night shift, a practice which may not be common.

Session IIIB: Papers 19-28
Paper 20: 2:30 PM - 2:50 PM

THE UNWRITTEN COST OF TRANSFER: SMALL BOWEL OBSTRUCTION TRANSFERS TO HIGHER LEVEL OF CARE LARGELY AFFECT SOCIOECONOMICALLY DISADVANTAGED PATIENTS

Introduction: Small bowel obstruction (SBO) represents over 250,000 admissions annually with a 70% success rate of non-operative management (NOM). Patients are frequently transferred to tertiary care centers; yet many do not require advanced surgical interventions or resources. We evaluated factors associated with need for transfer for SBO at a tertiary care center, patient socioeconomic status, and success of NOM. We hypothesized that transfer to a tertiary care center is often unnecessary for SBO management and places additional financial and social stress on disadvantaged patients.
Methods: Adult patients transferred for SBO and evaluated by the EGS service from 1/1/2018 to 12/31/2022 were identified via ICD-10 codes and included. Patient demographics, comorbidities, socioeconomic status, referring center information and SBO management were collected. Referring institution's trauma center level was utilized as a proxy for available surgical services. The cohort was divided based on SBO management (NOM vs. operative) and further characterized to assess whether NOM was successful. Multivariate analysis was performed to identify variables associated with NOM failure. The Census Bureau Social Vulnerability Index (SVI) data were obtained and transformed into quartiles. Patients' home zip codes were geocoded and spatially merged at the census tract level with the SVI data. $P < 0.05$ was considered significant.
Results: Referring hospitals transferred 288 SBO cases: 43 (14.9%) operative and 245 (85.1%) NOM cases. Most patients (65.6%) were referred from hospitals categorized as level 4 trauma centers; 57.3% resided in high vulnerability areas based on SVI. NOM was successful in 203 patients (82.9%); of which 60% resided in high vulnerability areas. NOM failed for 42 patients (17.1%). Factors associated with NOM failure included older age (OR=1.04[1.01-1.07], p=0.005), female sex (OR=2.53[1.15-5.55], p=0.021), systolic blood pressure (OR=0.98[0.97-0.99], p=0.04), and presence of ascites prior to admission (OR=6.96[2.08-23.26], p=0.002).
Conclusion: NOM was effective for most SBO patients (70.5%), suggesting that NOM should be attempted prior to transfer to tertiary care centers. Tertiary centers should collaborate with referring facilities and develop SBO care pathways to minimize unnecessary transfers and healthcare costs in this socioeconomically vulnerable population.

Session IIIB: Papers 19-28
Paper 21: 2:50 PM - 3:10 PM

BEYOND THE BLUSH: IS ANGIOEMBOLIZATION NECESSARY FOR STABLE GRADE III LIVER INJURIES?

Introduction: In 2018, contrast extravasation was incorporated into AAST grade III liver injury criteria, yet the role of immediate angioembolization (AE) for these injuries remains nuanced. While AE has been associated with increased liver-related complications in AAST IV-V injuries, its impact on grade III injuries is unclear. This study evaluates outcomes of AE in stable grade III liver injuries following the 2018 OIS revisions.

Methods: The 2020-2022 TQIP database was queried for adults with blunt grade III liver injury and stable vital signs on arrival. Patients with other major abdominal injuries (OIS $\geq$3), early laparotomy (<4 hours), and delayed AE (>24hrs) were excluded. Patients were matched 1:1 (AE vs. non-AE) controlling for age and ISS using propensity score matching. Primary outcomes were mortality, failure of non-op management, transfusions, and liver-related complications.

Results: 6,503 patients were included, with 186 (2.9%) receiving AE. After propensity matching, there were 180 patients in each cohort. The median time to AE was 3.6 hours.

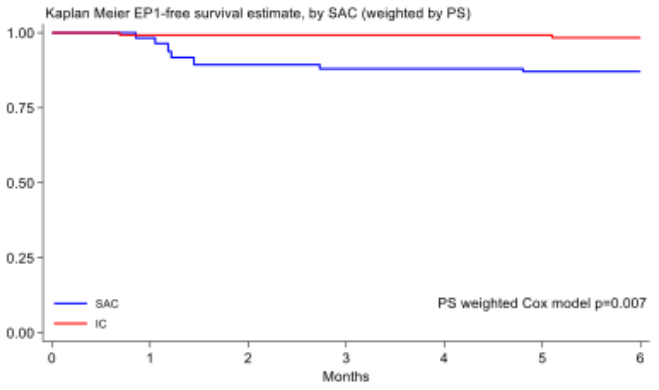
Conclusion: For stable Grade III liver injuries, AE offers no survival benefit and is associated with increased liver-related complications and hospital length of stay. Our findings suggest that in the absence of hemodynamic instability, observation without AE should be strongly considered.

	Non-AE (n=180)	AE (n=180)	p Value
Mortality, *n (%)*	12 (7.0)	6 (3.3)	0.147
Late laparotomy (>4h)	3 (1.7)	6 (3.3)	0.311
Late RBC transfusion (>4h)	5 (2.8)	23 (13.0)	**<0.001**
Liver Complication	0 (0)	6 (3.3)	**0.03**
AKI	0 (0)	5 (2.8)	**0.024**
Unplanned Intubation	0 (0)	8 (4.4)	**0.004**
Unplanned ICU Admission	2 (1.1)	9 (5.0)	**0.032**
Hospital Days, *median (IQR)*	4 (3-9)	7 (5-14)	**<0.001**
ICU Days	3 (2-5)	3 (2-6)	**0.023**

Session IIIB: Papers 19-28
Paper 22: 3:10 PM - 3:30 PM

CLOSING THE GAP BETWEEN EVIDENCE AND PRACTICE: UNDERUTILIZATION OF SAME-ADMISSION CHOLECYSTECTOMY IN MILD ACUTE BILIARY PANCREATITIS - A MULTICENTER PROSPECTIVE STUDY

Introduction: Mild acute biliary pancreatitis (MABP) is a common condition requiring timely cholecystectomy to prevent recurrent gallstone-related events (GRE). Nevertheless, data from the literature indicate that same admission cholecystectomy (SAC) remains underutilized in clinical practice despite its demonstrated efficacy in reducing GRE. Our study aimed to provide additional evidence supporting SAC while highlighting its suboptimal adoption in real-world settings.
Methods: A prospective observational study with propensity score analysis was conducted across multiple centers. Patients with MABP were categorized into SAC and interval cholecystectomy (IC) groups. Primary endpoint was 6-month readmission due to GRE. Secondary outcomes included postoperative complications, operative times, and length of hospital stay.
Results: A total of 445 patients were enrolled. Only slightly more than half (57%) of the enrolled patients who underwent cholecystectomy had the procedure performed during the same hospital admission, and 26% of all enrolled patients did not undergo cholecystectomy even within six months of the episode of pancreatitis. SAC significantly reduced GRE readmissions compared to IC (HR 0.11; 95% CI: 0.02–0.55; p = 0.007, figure 1). Postoperative complications were comparable between groups.
Conclusion: Our findings reaffirm the evidence supporting SAC as the preferred approach for patients with MABP. Despite this, our study highlights the persistent gap between evidence and clinical practice. Efforts to address logistical challenges and improve guideline adherence are essential to optimize patient outcomes and reduce healthcare resource utilization.



Session IIIB: Papers 19-28
Paper 23: 3:30 PM - 3:50 PM

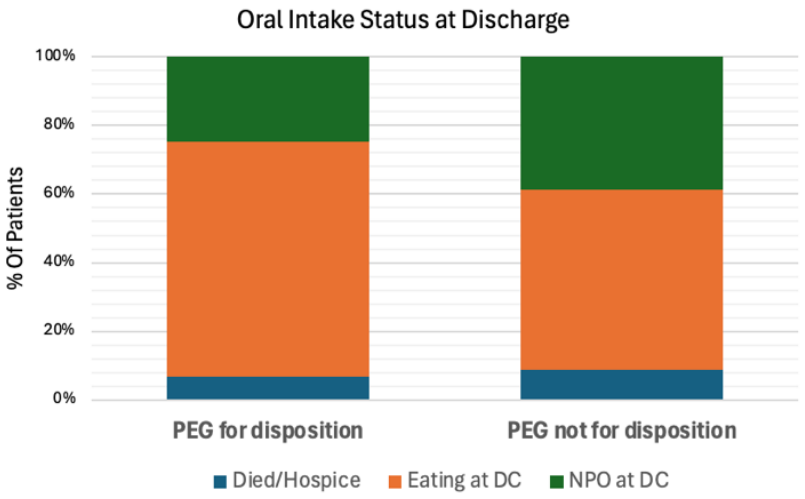
IS IT TIME TO UNBUNDLE THE 'TRACH-PEG' DURING TBI RECOVERY?

Introduction: Dysphagia is a significant concern for patients following traumatic brain injury (TBI). The true need for gastrostomy tube (GT) placement is not well described for patients with moderate to severe TBI. Defining patients that will regain swallow function will help to decrease unnecessary GT procedures and their complications. We hypothesized that there is a subgroup of patients with moderate to severe TBI who may not need early GT placement.
Methods: Retrospective chart review from a Level 1 Trauma Center, 2019-2024. Inclusion criteria: Age≥18, admission GCS≤13. Exclusion criteria: Died ≤9 days post injury or GCS=15 on post injury day 1. Variables collected: Demographics, injury characteristics, neurosurgical interventions, tracheostomy, ventilator days and swallowing function data including timing of first swallow evaluation (SE), number of failed SEs, initiation of oral diet and full oral intake achieved.
Results: There were 335 patients identified, the average age was 51.6±20.9 years and 61.2% were male. 54.0% had severe TBI (GCS≤8), 76.1% had an ICP monitor, and 25.7% underwent craniotomy/ectomy. GTs were placed in 51 patients (15.2%); 82.4% had Severe TBI, and 92.2% had a tracheostomy. Of all GT patients, 45.1% passed a SE, with a median days from first SE to initial diet of 13(2-31), and 29.4% achieved full PO intake after a mean of 7.1 SEs. Compared to patients with ongoing dysphagia GT patients achieving full PO intake had less time to first SE (7±12 vs 14±18 days, p=0.614) and better GCS at 2 weeks post-injury (11±2 vs 9±3, p=0.007).
Conclusion: Patients with severe TBI who can participate in a SE within the first 7 to 10 days after ventilator liberation may not need a GT and should not have it bundled with early tracheostomy.

Session IIIB: Papers 19-28
Paper 24: 3:50 PM - 4:10 PM

REASSESSING THE TIMING OF PEG TUBE PLACEMENT: TOO MANY TOO SOON

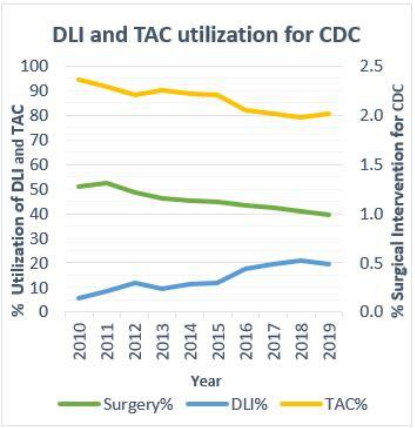
Introduction: Percutaneous endoscopic gastrostomy (PEG) tubes are frequently placed for durable feeding, and often for facility disposition. We investigated PEG timing, indications, and outcomes to better elucidate the balance of procedural risk/benefit for PEG placement.
Methods: A retrospective review of all patients who underwent non-elective PEG placement at our Level 1 trauma center from 1/1/23 to 3/1/24 was performed. Patient demographics, procedure details, time to resumption of oral feeding, and outcome data was collected. Descriptive statistics were used to compare outcomes by indication.
Results: 236 patients were identified, 50 of which were trauma/acute care surgery patients. The overall complication rate was 25% (45% Clavien-Dindo 3 [requiring intervention]). The median time to discharge from PEG placement was 11 days and 60% had resumed an oral diet at time of discharge. 38% of PEGs were performed for disposition. This group resumed an oral diet at a median of 5.5 days vs. 17.5 days in those not placed for disposition ($p<0.01$).
Conclusion: Most patients who received a non-elective PEG resumed an oral diet prior to discharge. Deferring PEG placement until near discharge may reduce unnecessary procedures and their associated morbidity.



Session IIIB: Papers 19-28
Paper 25: 4:10 PM - 4:30 PM

DIVERTING LOOP ILEOSTOMY WITH ANTEGRADE COLONIC LAVAGE V.S. COLECTOMY IN FULMINANT C. DIFFICILE COLITIS: A DECADE-LONG PROPENSITY SCORE-MATCHED ANALYSIS OF SURGICAL OUTCOMES

Introduction: The use of a more conservative approach involving diverting loop ileostomy with antegrade colonic lavage (DLI) compared to total abdominal colectomy (TAC) offers a less invasive option while still providing colonic decompression and reducing systemic toxicity in patients with fulminant clostridium difficile colitis (CDC). This study aims to assess DLI as an alternative to TAC in the management of CDC.
Methods: Retrospective analysis of National Inpatient Sample (NIS))(10-19) was done to isolate patients with primary diagnosis of CDC. Patients who underwent TAC or DLI were included. Patients who had IBD, volvulus, colon cancer, ischemic colitis, colon trauma and diverticulitis in addition to TAC or DLI were excluded. Patients with failed trial of DLI requiring TAC were included in the DLI group. Propensity score matching was performed in 1:1 ratio to adjust for age, sex, race, Charlson comorbidity index, APR-DRG severity of illness, vasopressor use, presence of ileus and immunosuppression. Outcomes were mortality, in-hospital complications, length of stay, discharge disposition, costs and utilization rates.



Results: Out of 693,784 CDC patients, 7,935 (1.14%) patients were included. There were 6, 913 (87.1%) patients in TAC group vs 1,022 (12.9%) patients in DLI group. The utilization of DLI in CDC went up from 5.6% in 2010 to 19.4% in 2019 ($p<0.001$). Failed DLI trial requiring TAC constituted 18.8% of the DLI group. After matching there were 194 patients in each. There was no significant difference in mortality and complications including wound infection, wound dehiscence, post-op shock, post-op bleeding, sepsis, need for mechanical ventilation, post-op GI and renal complications. There was no significant difference in length of stay, discharge to home or costs.
Conclusion: Comparable outcomes and relatively low failure rate of DLI offer promising insights into its potential as a viable alternative to TAC in CDC.

Session IIIB: Papers 19-28
Paper 26: 4:30 PM - 4:50 PM

TO IMAGE OR NOT TO IMAGE: THE ROLE OF PRE-OPERATIVE IMAGING IN OSTOMY REVERSAL AFTER TRAUMA

Introduction: The value of pre-operative imaging studies for ostomy reversal has been understudied in the trauma population. We hypothesized that pre-operative evaluation would not detect meaningful lesions requiring intervention prior to reversal.
Methods: Trauma patients with ostomies were identified from our Level 1 trauma center (2017–2024). Univariable and multivariable associations between injury patterns, pre-operative evaluation (colonoscopy, rectal contrast studies), intraoperative factors, and surgical outcomes were analyzed. A decision-analytic model to evaluate the cost-effectiveness of routine pre-operative evaluation prior to reversal was performed. Cost, probability estimates, and utilities in Quality-Adjusted Life Years (QALYs) were accessed from published literature.
Results: Of 280 patients with colorectal injuries, 70 required ostomies and 55 underwent reversal (median time to reversal 305 days$\pm$220). Pre-operative evaluation was performed in 36(65%) patients, with abnormal findings in 2(3.6%), without impact on operative plan. Patients with anastomotic leak after reversal were more likely to have had surgical complications at the index operation (63% vs. 19%, p=0.02) and an end ileostomy reversal (63% vs. 23%, p=0.03). Regression analysis showed presence of small bowel injury at index operation (OR 5.4, p=0.04) and loop ostomy (OR 4.8, p=0.04) were more likely to undergo pre-operative rectal contrast studies. Increasing age (OR 1.4, p=0.03) was associated with colonoscopy. Cost-effective analysis revealed no pre-operative evaluation as the most cost-effective option with a QALY of 0.83.
Conclusion: Pre-operative evaluation did not impact operative course or surgical management outcomes. Outside of standard colorectal cancer screening, we recommend avoidance of routine pre-operative evaluation for ostomy reversal.

Session IIIB: Papers 19-28
Paper 27: 4:50 PM - 5:10 PM

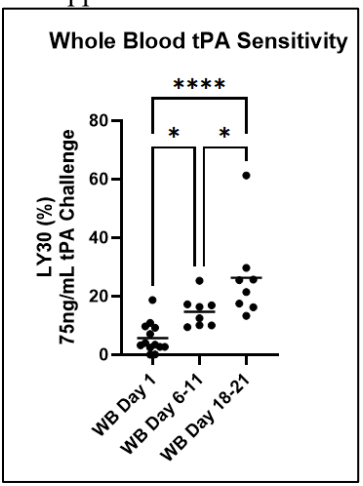
WHOLE BLOOD LOSES ABILITY TO CORRECT TPA-MEDIATED HYPERFIBRINOLYSIS DURING STORAGE

Introduction: Whole blood (WB) transfusion is beneficial in trauma for hemostatic resuscitation. Emerging data suggests the functional integrity of WB components, particularly fibrinogen, may deteriorate during WB storage. Excess breakdown of fibrin(ogen) during trauma, termed hyperfibrinolysis, is driven by tPA release in shock and is implicated in traumatic hemorrhage. This study examines the impact of WB storage duration on tissue plasminogen activator (tPA) sensitivity/fibrinolysis and fibrinogen function.

Methods: Whole blood tails were obtained (n=13) and stored at 4C. Thromboelastography with 75ng/mL tPA (tPA-TEG) was performed on days 1, 6-11, and 18-21 to assess WB resistance to tPA-mediated hyperfibrinolysis. Fibrinogen function was evaluated using k-time and alpha angle. Significance was set at $p<0.05$.

Results: Aging WB units demonstrated a significant, progressive increase in fibrinolysis (LY30) in response to tPA (Figure 1), with a positive correlation between storage duration and tPA-TEG LY30 (Spearman $r=0.56$, $p=0.01$). Additionally, fibrinogen function declined during storage, with a positive correlation between k-time and storage duration ($r=0.44$, $p=0.02$), although α-angle correlation with time did not reach significance ($r=-0.37$, $p=0.06$). The native inhibitor of tPA, PAI-1, did not demonstrate reduced activity over time.

Conclusion: WB storage results in time-dependent increased susceptibility to tPA-mediated hyperfibrinolysis and diminished fibrinogen function. These findings may highlight the need to supplement older whole blood units with fibrinogen or other hemostatic adjuncts in trauma resuscitations.



Session IIIB: Papers 19-28
Paper 28: 5:10 PM - 5:30 PM

TO PACK OR PLUG: AAST MULTICENTER EVALUATION OF HEMORRHAGE CONTROL STRATEGIES IN PELVIC FRACTURE MANAGEMENT

Introduction: Mortality in pelvic ring fractures (PRF) with hemorrhagic shock remains high, with limited high-quality data to guide care. Our primary aim was to compare two main hemorrhage control interventions (HCI): pelvic angioembolization (PAE) and preperitoneal pelvic packing (PPP), hypothesizing similar risk of death.
Methods: A prospective, observational study was conducted across 47 trauma centers between 2022-24. We included patients with blunt trauma-associated PRF with hypotension (SBP<90 mmHg) and either transfusion > 4 units pRBCs within 24 hours and/or use of an HCI. Bivariate comparisons and a multivariable analysis controlling for age, sex, lactate level, injury severity score (ISS), Glasgow Coma Scale score, lowest SBP, abdominal Abbreviated Injury Scale score and REBOA use were performed. Primary outcomes were in-hospital and early (3 hour) mortality.
Results: 948 patients were included. The average age was 48 years, 68% were male, the lowest SBP was 73 mmHg, and the median ISS was 34. Overall and 3-hour mortality were 21% and 5%, respectively. A total of 549 patients (58%) received an HCI; 441 (80%) had 1 HCI, 95 (17%) had 2 HCIs, and 13 (2%) had 3. The most common HCIs were PAE alone (66%), PPP alone (10%) and PAE+PPP (9.8%). When compared to PAE, PPP was used in patients with a higher ISS (41 vs 34, p=0.005) and worse physiology (lowest SBP 62 vs 74 mmHg, lactate 6.4 vs 4.3, p<0.001), and who more often underwent laparotomy (68% vs 24%, p<0.001). Mortality was higher in PPP versus PAE patients (47% vs 18%, p<0.001), with 29% of deaths occurring within 3 hours in the PPP group vs. 1% in the PAE group (p<0.001). On multivariable analysis, PAE had lower odds of death overall (OR 0.4, CI 0.19, 0.88) and lower odds of death within 3 hours (OR 0.04, CI 0.01,0.17).
Conclusion: This is the largest observational study on hypotensive patients with PRF. Compared to PAE, PPP is being used in less stable patients, which may account for higher mortality. In allcomers, PAE is associated with better survival than PPP.

Session IV: Papers 29-34

Paper 29: 7:30 AM - 7:50 AM

REBOA COE DESIGNATION AND PARTIAL OCCLUSION IS ASSOCIATED WITH REDUCED MORTALITY, RESUSCITATION VOLUME, AND END-ORGAN DAMAGE

Introduction: REBOA provides mechanical support for hemorrhagic shock(HS). pREBOA-PRO (PRO) was designed for partial occlusion and piloted in Centers of Excellence(COE) with continuous peer-to-peer educational support. This study hypothesizes that COE and partial occlusion (PRO vs ER-REBOA) reduce mortality through rapid HS control and reduced resuscitation volume (RV), mitigating end-organ damage.

Methods: All complete AAST AORTA registry cases were grouped by COE-PRO(224), COE-ER(233), and NCOE-ER(262). Kruskal-Wallis, chi-square, and Spearman's rho were used for statistical analysis.

Results: COE had shorter time to hemorrhage control (COE-PRO 70 min, COE-ER 67 min, NCOE-ER 104 min, $p<0.001$). COE-PRO group had the most Zone 1 placements ($p<0.001$), most improvement in hemodynamics ($p<0.001$), and lowest RV ([8 U PRBC vs. 13 COE-ER and 12 NCOE-ER, $p<0.001$], [2 L crystalloid COEs vs. 4 NCOE-ER, $p<0.001$]). RV was associated with ALI/ARDS (crystalloid) and MSOF(crystalloid and PRBC, $p<0.001$). ALI/ARDS was lowest in COE-PRO(4.9% vs. 10.7% COE-ER and 12.0% NCOE-ER, $p<0.02$) and MSOF was lower in COEs (5.8% COE-PRO and 4.3% COE-ER vs 14.7% NCOE-ER, $p<0.001$). COEs had a significantly lower mortality (49.1% COE-PRO and 43.8% COE-ER vs 61.7% NCOE-ER, $p<0.001$).

Conclusion: COE model designation coupled with a purpose-built partial aortic occlusion catheter (pREBOA-PRO) is associated with improved outcomes: reduced resuscitation volume, ALI/ARDS and MSOF, and mortality. Improved end-organ perfusion during resuscitation and hemorrhage control may be the reason for improved results.

Session IV: Papers 29-34

Paper 30: 7:50 AM - 8:10 AM

NO INJURY LEFT BEHIND: EFFECTS OF IMPLEMENTING A UNIVERSAL SCREENING PROTOCOL FOR BLUNT CEREBROVASCULAR INJURY AT A LEVEL 1 TRAUMA CENTER

Introduction: Evolution in blunt cerebrovascular injury (BCVI) screening has been driven by the increased utilization of computed tomography angiography (CTA), recognition of risk factors, and concern that BCVI incidence is underreported. We sought to determine the effect of implementing a universal screening protocol (UNIV) for BCVI at our Level 1 Trauma Center where approximately 1,600 blunt trauma cases present each year.

Methods: We retrospectively compared our patients screened before and after switching from the Western Trauma Association (WTA) BCVI screening protocol (January 2021 - July 2024) to UNIV (August - October 2024). Patient demographics, injuries, and screening outcomes were recorded. The primary outcome was detection rate of BCVI.

Results: The groups had comparable demographics, mechanisms of injury, and injury severity scores ($p=1.0$). BCVI was detected in 26 of the 5,609 patients with blunt injury screened with WTA (0.46%) vs 19 of the 457 (4.2%) UNIV patients ($p< 0.00001$). Fifteen of the 19 UNIV patients with BCVI (78.9%) would not have been screened under WTA. Among these 15, the Biffl Grade was I in nine patients, II in five patients, III in one patient, and IV in one patient. All BCVI patients were managed with anticoagulation, and the patient with Grade IV injury required operative intervention. Applying published stroke rates to our Biffl distribution, we found that without treatment these patients had a cumulative 19% risk of progression to stroke. 27 CTAs were required to diagnose one BCVI and 142 CTAs to potentially prevent one stroke.

Conclusion: UNIV increases detection of severe as well as low grade BCVI. With a one in five risk of progression to stroke, timely diagnosis and treatment of BCVI is paramount. UNIV is resource intensive but may prevent devastating and expensive outcomes.

Session IV: Papers 29-34
Paper 31: 8:10 AM - 8:30 AM

OPTIMIZATION OF PLATELET-DERIVED EXTRACELLULAR VESICLE PREPARATION FOR HEMOSTATIC EFFICACY DURING MAJOR HEMORRHAGE

Introduction: Storage limitations make early administration of platelets (PLTs) in austere settings a challenge. Platelet-derived extracellular vesicles (PEVs) are a PLT-derived product that may solve this problem. We aimed to determine if different PEV preparation methods result in differential hemostatic potential and determine if there is a superior procoagulant PEV fraction within PLT units.

Methods: Expired apheresis PLTs were obtained from 6 healthy donors. Platelet additive solution (PAS) supernatant and washed PLT PEV solutions were prepared through tangential flow filtration. PEVs were sized and quantified by Nanosight tracking assay. Rats were infused with phosphate-buffered saline (PBS), PAS prepared PEVs, or PEVs from washed PLTs 60 seconds after liver laceration. Blood was collected from the abdominal cavity in 15-minute intervals. Combined automated thrombography (CAT) was used to measure thrombin generation of differently prepared PEV solutions and post hemorrhage rat plasma.

Results: Rats infused with PAS-derived PEVs showed the least cumulative blood loss at all time points (Figure 1A). CAT analysis demonstrated an increased rate of thrombin generation (p=0.0317), higher peak thrombin concentration (p=0.0317), and higher total thrombin generation (p=0.025) in plasma from rats infused with PAS-derived PEVs compared to washed PLT PEVs (Figure 1B). PAS-derived PEV solutions demonstrated higher peak thrombin generation (p=0.045) and following a paired analysis of PAS & washed PEV solutions prepared from the same donor, an increased peak thrombin generation (p=0.0384) and increased rate of thrombin generation (p=0.0488) in PAS derived PEVs were observed.

Conclusion: PAS-derived PEVs exhibit superior hemostatic potential compared to washed PLT PEVs, providing valuable insights for optimizing PEV production from donor platelets in future approaches.

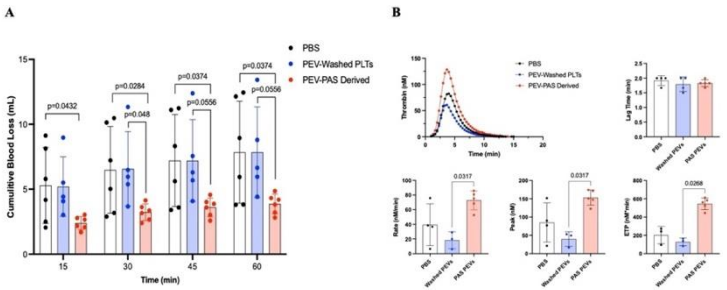


Figure 1. Procoagulant and superior hemostatic properties of PAS-derived PEVs. (A) Comparison of cumulative blood loss of rats over a 60-minute uncontrolled abdominal hemorrhage by PEV infusion type. (B) Thrombin generation results of post hemorrhage rat plasma (1:2 dilution with normal rat fresh frozen plasma). P-value<0.05 considered significant.

Session IV: Papers 29-34

Paper 32: 8:30 AM - 8:50 AM

REPEAT IMAGING OF HIGH-GRADE BLUNT SPLEEN AND LIVER INJURIES IN PEDIATRIC TRAUMA PATIENTS ALLOWS FOR EARLIER IDENTIFICATION OF COMPLICATIONS: RESULTS OF THE RADIOGRAPHIC EVALUATION OF DELAYED SOLID ORGAN COMPLICATIONS (REDSOC) EAST MULTICENTER TRIAL

Introduction: A non-operative, low-radiation approach is favored in stable pediatric trauma patients with blunt spleen (BSI) and liver (BLI) injuries. We hypothesized that scheduled repeat imaging in pediatric high-grade BSI & BLI allows for early identification of complications (abscess, pseudoaneurysm, necrosis, increased hemorrhage, etc.).
Methods: We performed a four-year (Nov 2020-Oct 2024) prospective observational study across 43 trauma centers evaluating pediatric (0-17y) trauma patients with BLI and/or BSI. Patients were grouped based on AAST injury grade and reason for repeat imaging being performed: scheduled imaging (SI) or patient experiencing a clinical change (CC).
Results: A total of 509 patients were included (BSI:311, BLI:257, combined BSI & BLI:59). Mean age for all patients was 11.9y ± 4.7y. Repeat imaging was performed in 68 (21.9%) BSI patients [SI:47 (69.1%), CC:21 (30.9%)] and 66 (25.7%) BLI patients [SI:40 (60.6%), CC:26 (39.4%)]. Complications were identified in 15 (22.1%) re-imaged BSI patients [SI:9 (60%), CC:6 (40%)] and in 11 (16.7%) re-imaged BLI patients [SI:6 (54.5%), CC:5 (45.5%)]. While the rate of identified complications in all patients was less than 5%, grade 4 & 5 BSI and BLI had identified complication rates of >20%. Of patients with BSI complications, 10 (66.7%) [SI:6 (60%), CC:4 (40%)] underwent an intervention. Of patients with BLI complications, 5 (45.5%) [SI:2 (40%), CC:3 (60%)] underwent intervention. Most complications were identified within 36-72 hours from initial imaging.
Conclusion: Pediatric patients with grade 4 and 5 BSI and/or BLI being managed non-operatively should have scheduled repeat imaging performed between 36 to 72 hours from index imaging, allowing for identification of complications.

Session IV: Papers 29-34
Paper 33: 8:50 AM - 9:10 AM

PARTIAL AORTIC OCCLUSION DURING HEMORRHAGIC SHOCK PRESERVES THE INTESTINAL PERFUSION

Introduction: Partial aortic occlusion with balloon (pREBOA) offers extended occlusion times compared to complete REBOA. The effect on splanchnic circulation and metabolism has been studied partially.
We investigated the macro and microcirculatory effects of pREBOA in a porcine model of controlled hemorrhage.
Methods: Eighteen Landrace pigs underwent controlled hemorrhage and were randomized to three groups (n=6 each): total REBOA, pREBOA, or control, with 30-minute interventions. Blood was reinfused after 25 minutes post-hemorrhage. In REBOA groups, balloon deflation occurred after 30 minutes of ischemia. The animals were followed 4 hours. Descending aorta (DAO) and superior mesenteric artery (SMA) flow were measured; microcirculatory flow was monitored with laser-doppler probes in the jejunal mucosa and serosa. The intestinal microcirculation was studied by the Sidestream dark-field (SDF) technique.
Results: During the occlusion period, the tREBOA animals had drastic effects: arrest of the DAO flow, a marked reduction of the MA flow, and a parallel reduction of the microcirculatory flow. The SDF revealed a reduction to zero in the percentage of small vessels perfused (PPV) in the intestinal mucosa. Lactic acid peaked at the end of the occlusion period and remained elevated for the following three hours. pREBOA subjects demonstrated changes like controls, with 30% reductions in MA and microcirculatory flow. Intestinal mucosal PPV decreased 60% during hemorrhage and remained stable during balloon inflation. Lactate peaked post-occlusion and normalized within two hours.
Conclusion: Partial aortic occlusion preserved mesenteric flow and intestinal microcirculation, reducing ischemia and its metabolic consequences.

Session IV: Papers 29-34

Paper 34: 9:10 AM - 9:30 AM

DIRECT PERITONEAL RESUSCITATION VS OPEN ABDOMEN ALONE IN TRAUMA AND EMERGENCY GENERAL SURGERY: EARLY RESULTS OF A SINGLE-CENTER RANDOMIZED TRIAL

Introduction: Splanchnic vasoconstriction from the sympathetic response to acute blood loss and shock can lead to significant mesenteric hypoperfusion and associated inflammatory response, which is not easily detectable through conventional hemodynamics. Direct peritoneal resuscitation (DPR) using a glucose-supplemented balanced salt solution infused intraperitoneally has been shown in animal studies to induce visceral vasodilation, maintain hepatic blood flow and function, reduce organ edema and tissue necrosis, and reduce proinflammatory cytokine response and damage-associated molecular pathogen concentrations. Little high-quality evidence exists on the efficacy of DPR in trauma and acute care surgery in human populations.

Methods: This single-center trial randomized all patients undergoing damage control laparotomy with delayed closure into two arms: negative pressure temporary abdominal closure (TAC) alone, or TAC + DPR, reporting intention to treat. For DPR, a 19F Jackson-Pratt drain at the mesenteric root instilled 37˚C hypertonic peritoneal dialysate with initial 800mL/h bolus over 1h, then 400mL/h until re-exploration. Primary outcome was time to fascial closure. Secondary outcomes included intensive care unit (ICU) length of stay (LOS), hospital LOS, ventilator days, mortality, fluid and blood requirements, and complications including abscess, enterocutaneous fistula, & evisceration.

Results: In the first 30 patients, 12 had DPR, 18 TAC alone. Average time to closure was 4.0 days in DPR, 3.5 days in TAC alone ($p=0.78$). Complications were fewer in the DPR group (67% vs 100%, $p=0.018$). DPR patients had fewer superficial surgical site infections (SSI) (8% vs 67%, $p=0.002$), deep SSI (0% vs 67%, $p<0.001$), and intra-abdominal abscess (25% vs 78%, $p=0.004$). Mortality was lower in DPR but not significantly (8% vs 22%, $p=0.622$). Hospital LOS, ICU LOS, and ventilator time were all shorter for DPR compared to TAC alone, though not significantly different.

Conclusion: Although randomization yielded a more acidotic DPR group, patients who received DPR had lower overall complication rates, primarily in infectious complications, compared to patients undergoing TAC alone, albeit with similar closure rates and time to closure. The data support continuation of this trial, and DPR should be considered for critical patients requiring TAC.

Session X: Papers 35-42
Paper 35: 7:30 AM – 7:50 AM

TIMING THE FEED: THE IMPACT OF EARLY ENTERAL NUTRITION ON ABDOMINAL TRAUMA OUTCOMES AFTER ANASTOMOSIS

Introduction: This study assesses the relationship between time to initiation of enteral nutrition (EN) and outcomes in abdominal trauma patients undergoing single exploration and anastomosis.
Methods: Retrospective analysis of TQIP (2017-2022) was done to isolate adult (≥18 years) abdominal trauma patients who were taken to OR for exploratory laparotomy/diagnostic laparoscopy and were administered enteral feeds. Patients with Abdominal AIS of 6, AIS≥ 3 in other regions, death on arrival, patients who underwent multiple explorations and did not get primary anastomosis were excluded. Patients were dichotomized into: early EN (≤24 hours=EEN) and delayed EN (>24 hours=DEN). Propensity score matching was performed in 1:1 ratio to adjust for demographics, vitals and injury characteristics. In-hospital outcomes were assessed.
Results: Out of 3,975 patients, 1,082 (27.2%) were in EEN compared to 2,893 (72.8%) in DEN. Mean time to initiation of EN was 34.39 ± 9.50 hours. Median age was 48 and 89.6% had blunt trauma. After matching, there was no significant difference in mortality. EEN had lower complications, higher routine discharge, lower need for inpatient rehab and SNF ($p< 0.05$). With each additional day delay in initiation of EN, hospital stay increased by 1.08 days ($p< 0.001$).
Conclusion: Initiation of EN within 24 hours in abdominal trauma patients undergoing single exploration and primary anastomosis appears safe with lesser complications and resource utilization.

	Early EN (n= 448)	**Delayed EN** (n= 448)	***p*-value**
Hospital LOS	25.31 ± 17.85	30.90 ± 20.05	<0.001
ICU-LOS	14.58 ± 11.04	18.60 ± 13.14	<0.001
Ventilator days	11.41 ± 9.74	14.42 ± 11.26	<0.001
VAP	37 (8.3%)	62 (13.8%)	0.008
Sepsis	10 (2.2%)	25 (5.6%)	0.035

VAP: Ventilator Associated Pneumonia, LOS: Length of Stay.
Using independent T-test and Chi-square test.

Session X: Papers 35-42
Paper 36: 7:50 AM – 8:10 AM

OUTCOMES AFTER SPLENIC INJURY IN GERIATRIC TRAUMA: IS SPLENIC EMBOLIZATION HELPFUL?

Introduction: A common adjunct to nonoperative management (NOM) of splenic injury is splenic artery embolization (SAE) which is not without controversy. Recent research has established SAE as protective against NOM failure in adult trauma patients (A), but studies focused on outcomes of SAE in Geriatric trauma patients (G) is sparse. We hypothesized SAE would confer no benefit in G undergoing NOM.

Methods: This study included patients in years 2019-2022 of the TQIP database with splenic trauma and placed patients into an A (18-64) or G (≥65) cohort. Multivariable logistic regression was used to estimate odds of mortality associated with age and management strategy adjusted for patient, injury, and hospital characteristics. Interaction terms allowed for evaluation of differential associations between management and likelihood of mortality. Secondary analysis focused on identification of predictors of NOM failure and potential differences between the age cohorts.

Results: G had nearly 5x greater odds of mortality after splenic trauma (OR 4.79 95%CI 3.02-7.47) and 45% higher odds of mortality after SAE (OR 1.43 95% CI 1.20-1.70) compared to A. Despite increasing overall odds of mortality, in A, SAE was protective against failure of NOM. This relationship was not seen in the G cohort, with SAE having no benefit to G in terms of preventing failure of NOM. G were more sensitive to failure of NOM than A.

Conclusion: In the G decompensating secondary to an active splenic bleed, operative intervention is the optimal management, and time should not be wasted with SAE as it increases mortality without a reduction in odds of NOM failure.

Session X: Papers 35-42
Paper 37: 8:10 AM – 8:30 AM

SEAL OF APPROVAL: CELOX GRANULES ARE AN EFFECTIVE TOOL FOR HEMORRHAGE CONTROL IN BLUNT AND PENETRATING CIVILIAN TRAUMA PATIENTS

Introduction: Hemorrhage remains the most common cause of avoidable mortality in trauma patients. Celox™ (MedTrade Products Ltd, Cheshire, UK) granules, a chitosan agent that promotes coagulation independent of classic coagulation pathways, is one of many products developed to aid in hemostasis. Prior animal studies and off label human case reports have demonstrated the safety and effectiveness of intracavitary use of Celox granules. Despite the abundance of experience and data supporting it's success as an adjunct to extra cavitary hemorrhage control, the intra operative use of Celox granules remains off label as published data is limited. Celox granules have been especially impactful for surgically inhospitable locations including the liver and pelvis. We hypothesized that intracavitary use of Celox granules is an effective adjunct to achieving hemorrhage control in both blunt and penetrating civilian trauma patients.
Methods: Cases were identified using a prospectively maintained registry from a single, large, urban, level 1 trauma center from 2016-2024. Trauma patients whose operative reports documented intracavitary Celox granule utilization were included. Subsequent operative reports and progress notes were reviewed retrospectively to determine Celox's effect at achieving hemostasis.
Results: Our study identified 110 trauma patients who received intracavitary Celox granules during surgical procedures following traumatic injury. The patient demographics and Celox treatment sites are listed in **Table 1**. Intracavitary Celox granules were effective at achieving hemostasis in a single application in 92% of patients. Including early and late mortality the effectiveness was 81% and 72%, respectively. In 8 patients who did not achieve hemostasis from the first application and received a second application of Celox granules, they were effective in 6 cases (75%). Celox granules were effective at resolving liver and presacral bleeding 89% and 92% of the time, respectively.
Conclusion: This large case series demonstrates intracavitary Celox granule use to be a highly effective adjunct to achieve hemorrhage control in both blunt and penetrating trauma patients. This effectiveness is especially valuable when considering penetrating injuries to the liver and pelvis where surgical control of hemorrhage is challenging.

Table 1. Patient Demographics and locations of Celox treatments

Demographics		Celox treamtnet Sites (n, % overall)			
Age (mean, SD)	29.8, 11.7	Abdomen	73, 66%	Pelvis	37, 34%
Gender (n, %)	-	Liver	44, 40%	Presacral	20, 18%
Male	100, 91%	Kidney	8, 7%	Iliac vessles	10, 9%
Female	11, 10%	IVC	6, 5%	Pelvic wall	7, 6%
ISS (median, IQR)	22, 16-32	Aorta	5, 5%	Chest	8, 7%
Mecahanism (n, %)	-	Pancreas	5, 5%	Chest wall	4, 4%
Penetrating	99, 90%	Spleen	4, 4%	Lung	3, 3%
Blunt	11, 10%	Other*	18, 16%	Aorta	1, 1%
Number of surgeries (median, IQR)	2, 2-4				

Session X: Papers 35-42
Paper 38: 8:30 AM – 8:50 AM

PLATELET FUNCTION ASSAYS FAIL TO DETECT DIFFERENCES BETWEEN TRANSFUSION OF COLD OR ROOM TEMPERATURE PLATELETS IN TRAUMATIC BRAIN INJURY PATIENTS

Introduction: Traumatic brain injury (TBI) patients on antiplatelet medications receive platelet (PLT) transfusions to reverse platelet inhibition. *In vitro*, cold-stored PLT (CS-PLT) exhibit superior hemostatic function to room-temperature PLT (RT-PLT). We conducted a post-hoc analysis of a pilot randomized clinical trial to test the hypothesis that improved platelet function after CS-PLT transfusion would be associated with superior clinical outcomes.
Methods: TBI patients on antiplatelet medications requiring PLT transfusion were randomized to receive 1–2 CS- or RT-PLT. Whole blood was collected pre- and post-transfusion for VerifyNow (VN) and thromboelastography with platelet mapping (TEG-PM). A mediation analysis evaluated the effects of PLT temperature on clinical outcomes via assay performance.
Results: Data from 94 patients ($N_{CS\text{-}PLT}$=49; $N_{RT\text{-}PLT}$=45) were analyzed. Baseline characteristics and pre-transfusion assay results were similar between groups. The change in assay value (post *minus* pre) of TEG-PM's kaolin maximal amplitude (MA) was significantly larger for RT-PLT (2.4 mm [0.5–4.4]) than CS-PLT (0.6 mm [-0.4–2.3]; p=0.004). Compared to RT-PLT, CS-PLT did not improve any other platelet assay value. Patients receiving CS-PLT had lower odds of neurosurgical intervention than patients receiving RT-PLT (OR 0.17; 95% CI 0.04–0.084; p=0.029). The only potential mediator, change in TEG-PM kaolin MA, was not associated with need for neurosurgical intervention (OR 1.06; 95% CI 0.96–1.18; p=0.24).
Conclusion: PLT storage temperature did not significantly affect *ex vivo* platelet hemostatic function despite improved clinical outcomes in the CS-PLT group. The relationship between platelet function testing and clinical outcomes requires further exploration in a definitive RCT

Session X: Papers 35-42
Paper 39: 8:50 AM – 9:10 AM

A NATIONWIDE COMPARISON OF ICP MONITORING DEVICES IN PEDIATRIC SEVERE TBI: IMPACT ON SURGICAL INTERVENTION AND MORTALITY

Introduction: The aim of this study is to analyze the differences in invasive monitors and their impact on outcomes.
Methods: This is a 5-year analysis of the ACS TQIP (2017-2021). We included all pediatric (< 18 years) trauma patients with severe TBI (Head-AIS ≥3) who received invasive ICP monitoring and were admitted for ≥24 hours. Patients were stratified based on type of ICP monitoring into extra ventricular drain (EVD) and intraparenchymal monitor (IPM). Patients who received both or other invasive monitoring devices were excluded. Primary outcomes included mortality and need for surgical intervention. Multivariable regression analysis was performed to identify the independent effect on outcomes.
Results: 4,250 met our inclusion criteria. The mean age was 10 years, with 67% being male. On arrival, the median ISS was 27. Majority of patients (64.6%) underwent IPM placement. EVD was more commonly placed in adult trauma centers (77.7% vs 70%, **p< 0.001**) and IPM was placed more frequently in pediatric centers (22.3% vs 26.8%, **p< 0.001**). The overall rate of mortality was 20% with no significant differences between the two groups (p=0.432). However, patients in the EVD group had a lower rate of surgical intervention (46% vs 56.9%, p< 0.001). On multivariable regression analysis, EVD was independently associated with decreased need for surgical intervention (aOR = 0.702, 95% CI = 0.590–0.835, **p< 0.001**).
Conclusion: Despite the lack of guidelines on choice of ICP monitoring for pediatric patients with severe TBI, undergoing EVD placement alone was associated with a 30% reduction in the need for surgical intervention.

Session X: Papers 35-42
Paper 40: 9:10 AM – 9:30 AM

AORTIC CARDIOPULMONARY RESUSCITATION IN TRAUMA: CONTROLLED EXTRACORPOREAL CPR SIGNIFICANTLY OUTPERFORMS CONVENTIONAL RESUSCITATIVE THORACOTOMY IN A PORCINE MODEL OF EXSANGUINATION CARDIAC ARREST

Introduction: Exsanguination cardiac arrest (ECA) remains associated with extremely poor survival. We hypothesized that Aortic Cardiopulmonary Resuscitation in Trauma (ACT), a controlled extracorporeal cardiopulmonary resuscitation (eCPR) technique to reduce reperfusion injury after ECA, improves sustained return of spontaneous circulation (ROSC) compared to resuscitative thoracotomy (RT) in swine.
Methods: Twelve swine were bled to mean arterial pressure (MAP) < 20 mmHg and end-tidal CO_2 < 10 mmHg, defining ECA. After 10 minutes of ECA, animals were randomized to: (1) RT with aortic cross-clamp, open cardiac massage, whole blood transfusion, and 100% FiO_2 (n=6) or (2) ACT with venoarterial extracorporeal membrane oxygenation (ECMO) and graded FiO_2 advancement (n=6). Both groups underwent 30 minutes of resuscitation followed by 90 minutes of critical care. The primary endpoint was sustained ROSC with MAP >50mmHg at the end of critical care. Secondary outcomes included coronary and carotid flow rates.
Results: The primary endpoint was achieved in 100% of ACT animals vs 0% of controls ($p< 0.0001$). All subjects demonstrated pulseless electrical activity (PEA) during ECA; 100% of controls developed ventricular fibrillation during resuscitation compared with 33.3% in ACT ($p=0.06$). During resuscitation, mean left anterior descending (LAD) artery flow was 85.8±27.1 vs. 0.97±0.13 mL/min ($p=0.005$), and mean right carotid artery flow was 70.4±9.6 vs. 28.7±1.7 mL/min ($p< 0.0001$) for ACT vs. controls, respectively.
Conclusion: ACT achieved sustained ROSC at significantly higher rates than conventional RT after ECA, with marked improvements in coronary and carotid artery flow. This eCPR technique shows promise for improving survival from ECA.

Session X: Papers 35-42
Paper 41: 9:30 AM – 9:50 AM

EVERY HOUR COUNTS: VENOUS THROMBOEMBOLISM PROPHYLAXIS AFTER SPINAL TRAUMA

Introduction: Spinal trauma patients are at risk for venous thromboembolism (VTE) due to immobilization, endothelial injury, and hypercoagulability after acute injury. Current guidelines recommend initiating VTE prophylaxis (VTEp) 24-72 hours after spinal trauma, yet optimal timing remains unclear. We sought to investigate the optimal time to administer VTEp in patients with isolated, blunt spinal trauma (IBST) requiring operative management, hypothesizing that early VTEp initiation is effective in preventing VTE events.

Methods: The TQIP database (2018-22) was analyzed for patients ≥16 years old with IBST (Abbreviated Injury Scale Spine ≥3, ≤2 for other regions) requiring surgery. VTEp timing categories were early (< 24 hours), intermediate (24-72 hours), and late (>72 hours). Outcomes were VTE incidence and mortality.

Results: 49,854 IBST patients had surgery. On multivariate analyses, early VTEp was associated with decreased VTE events and mortality. Combined vertebral and spinal cord injury was associated with increased VTE (Table 1). When examined as a continuous variable, each passing hour without VTEp was associated with VTE events (OR: 1.004, 95%CI: 1.003-1.004, p< 0.001) and mortality (OR: 1.002, 95%CI: 1.001-1.002, p< 0.001).

Conclusion: Early VTEp is associated with lower thrombotic events and mortality. IBST patients undergoing surgery may benefit from early VTEp.

Table 1: Multivariate Regression Summarizing Significant Variables Associated with VTE and Mortality

VTE[1]				**Mortality**			
Time to VTEp	*OR*[2]	*95% CI*[3]	*p-value*	*Time to VTEp*	*OR*	*95% CI*	*p-value*
Early VTEp	Ref	Ref	Ref	Early VTEp	0.73	0.60-0.89	0.002
Intermediate VTEp	1.62	1.35-2.03	<0.001	Intermediate VTEp	0.99	0.84-1.16	0.90
Late VTEp	2.28	1.86-2.81	<0.001	Late VTEp	0.97	0.82-1.15	0.70
Spinal Injury Type				*Spinal Injury Type*			
Vertebral Injury	Ref	Ref	Ref	Vertebral Injury	Ref	Ref	Ref
Spinal Cord Injury (SCI)	1.88	1.54-2.29	<0.001	Spinal Cord Injury (SCI)	1.80	1.48-2.20	<0.001
Vertebral + SCI	2.37	2.01-2.81	<0.001	Vertebral + SCI	3.31	2.66-3.66	<0.001

[1]Deep Vein Thrombosis and Pulmonary Embolism, [2]Odds Ratio, [3]Confidence Interval

Session X: Papers 35-42
Paper 42: 9:50 AM – 10:10 AM

A NOVEL FILTRATION DEVICE TO INCREASE THE EFFICACY OF PLASMA IN HEMORRHAGIC EVENTS

Introduction: Upper gastrointestinal bleeding (UGIB) is one of the most common acute care emergencies with a significant utilization of resources, morbidity and mortality. Blood products, including plasma, are commonly used in this population for resuscitation and reversal/correction of anticoagulation therapies and abnormal coagulation parameters. ClearPlasm is a single-use extracorporeal filtration device that removes plasminogen from plasma donors resulting in infusion of plasminogen-depleted plasma (PDP). This is expected to reduce bleeding and a decreased need for blood products by preventing fibrinolysis and enhancing the stabilization of newly formed clots. Here we examine the safety and efficacy of using ClearPlasm in UGIB patients requiring plasma transfusion.
Methods: An international multi-centered randomized, double-blind, controlled trial was conducted evaluating the safety and efficacy of transfusion PDP in patients presenting with an acute UGIB. This was compared to a match cohort transfused with standard fresh frozen plasma (FFP).
Results: No significant differences were observed in the rate of major adverse events (defined as death, transfusion-related serious adverse events, or re-bleeding requiring hospitalization within 30 days of follow-up). Two deaths were reported in the standard FFP group during the 30-day follow-up compared to none in the ClearPlasma group. There were no adverse events during transfusion in the ClearPlasma group, while 2 adverse events were reported in the FFP group. In the first 8 hours the PDP group had a smaller increase in D-dimer levels ($p=0.04$). There was also a trend for a shorter time from intervention to discharge (4.7d vs. 6d, $p= 0.21$), and a trend for shorter overall length of hospitalization (5.2d vs. 6.4d, $p= 0.22$). There were also no platelets given in the ClearPlasma group (0% vs. 7.7%, $p= 0.032$).
Conclusion: Use of the ClearPlasma filter was safe, with findings suggesting a lower systemic fibrinolytic activity represented by the decreased D-dimer. There was also no need for platelet transfusion in the PDP group, and a trend towards a decrease in length of hospitalization. ClearPlasma has a potential beneficial both clinically and regarding resource utilization in the care of unstable trauma and acutely bleeding patients who receive FFP transfusion. Larger studies are needed to examine the benefit of the ClearPlasma filter to improve the outcome of trauma patients.

Session XIIIA: Papers 43-51
Paper 43: 2:00 PM – 2:20 PM

ASSESSING EQUITY WITHIN TRAUMA CENTERS: A CALL TO INTEGRATE EQUITY MEASURES INTO QUALITY IMPROVEMENT PROGRAMS

Introduction: Equity is the "sixth domain" of health care quality but is not explicitly assessed by the ACS TQIP Program. We sought to assess equitable outcomes within hospitals using stratified analyses for populations that experience health disparities.
Methods: Analysis of 2018-20 TQIP data from Level 1/2 trauma centers (TCs) and adult patients with ISS ≥9. Following TQIP methodology, we applied multivariable regression to calculate hospital-level risk-adjusted mortality and observed vs expected (O/E) ratios to identify low-, average and high-mortality TCs. Using stratified analysis, we evaluated within-TC equity by race (Black vs White) and insurance (Medicaid, uninsured vs commercial) by assessing 1) concordance with reference group, 2) presence of narrow mortality gap (< 5% difference) and 3) meeting criteria 1 and 2.
Results: We analyzed 892,583 patients at 380 TCs, of which 194 (50.5%) were classified as "low-mortality" (median O/E 0.85 [0.76-0.93]), 18 (4.7%) as average and 172 (44.8%) "high-mortality" (O/E 1.13 [1.06-1.22]). Compared to average TCs, low-mortality TCs treated higher proportions of White (79% vs 72%), lower Medicaid (10% vs 14%) and similar ISS. Among low-mortality TCs, 93(50%) had concordant low-mortality O/E for both Black and White populations, 11(6%) had a narrow gap and 10(5%) met both criteria. By payor, concordance was achieved by 120(62%) of TCs for Medicaid and 42(22%) for uninsured patients; narrow gap for 14(7.2%) and 13(6.7%), and both criteria for 14(7%) and 8(4%) of TCs.
Conclusions: A minority of low-mortality TCs achieve equitable outcomes, with both minoritized and socioeconomically vulnerable populations affected. Such inequities are masked in typical QI reports of total populations. Equity measures including stratified analyses should be incorporated into TQIP reports to inform hospital-level QI initiatives and purposefully improve care for populations that experience health disparities.

Session XIIIA: Papers 43-51
Paper 44: 2:20 PM – 2:40 PM

THE IMPACT OF VIOLENCE INTERVENTION PROGRAMS ON POST-DISCHARGE SERVICES AMONG PATIENTS INJURED BY GUNFIRE: REVIEW OF A MULTICENTER DATABASE

Introduction: Post-discharge services, such as outpatient rehabilitation and home health care, are critical to trauma patient recovery; however, disparities exist in the allocation of these resources. We hypothesized that patients seen by Hospital/Community-Based Violence Intervention Programs (VIPs) would have more equitable access to post-discharge services.

Methods: The ACS COT Firearm Study Dataset was queried for adult patients and divided into those who did and did not receive VIP services. Multivariate logistic regression was used to identify differences in post-discharge service access based on VIP participation.

Results: Among 12,134 patients, 1,413 (12%) received VIP services. The VIP group was younger, more often Black, and more likely unemployed with a higher ISS compared to non-VIP patients ($p < 0.001$). Outpatient rehabilitation and home health care were significantly more often recommended for VIP patients than non-VIP patients (19% vs. 13% and 14% vs. 8%, respectively, $p < 0.001$). VIP status was independently associated with a 40% increase in outpatient rehabilitation (odds ratio [OR]: 1.4, 95% confidence interval [CI] = [1.1 – 1.6], $p < 0.001$) and a 70% increased chance of home health care (OR = 1.7, CI = [1.4 – 2], $p < 0.001$). Importantly, Black patients had a lower chance of outpatient rehabilitation compared to White patients (OR: 0.7, CI: 0.6 - 0.9, $p < 0.001$).

Conclusions: Violence Intervention Programs significantly improve access to post-discharge services for patients injured by gunshot wounds, effectively reducing disparities. However, important racial inequities persist, highlighting the need for additional efforts to eliminate these gaps.

Session XIIIA: Papers 43-51
Paper 45: 2:40 PM – 3:00 PM

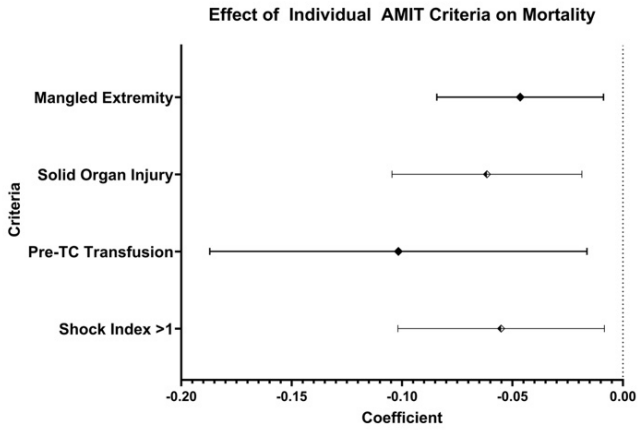
DEVELOPMENT AND VALIDATION OF THE AIR MEDICAL INTERFACILITY TRIAGE SCORE: PREDICTING THE BENEFIT OF INTERFACILITY HELICOPTER TRANSPORT FOR TRAUMA PATIENTS

Introduction: Air medical transport (AMT) improves survival in selected trauma patients. Little guidance exists for interfacility (IF) transport mode triage where additional evaluation and therapy may be undertaken compared to scene transport. Our objective was to develop a transport mode triage tool for IF transfer of trauma patients.

Methods: Retrospective cohort study of injured adult patients undergoing IF transfer in PTOS 2000-2020. The data were divided into training and validation sets. In the training set, patients were grouped by potential criteria and propensity score matching identified criteria in which AMT was associated with a survival benefit using cross-validation. Criteria evaluated included SBP< 90mmHg, shock index >1, non-extremity firearm injury, mangled extremity, severe TBI, solid organ injury, hollow viscus injury, major vascular injury, unstable pelvic fracture, paralysis, and pre-trauma center blood transfusion or intubation. Each criterion with a survival benefit for AMT was assigned a point value and summed to create the Air Medical Interfacility Triage (AMIT) score. The score threshold that predicted AMT risk-adjusted survival benefit was evaluated in the validation set.

Results: 226,115 subjects were included. Criteria associated with AMT survival benefit were solid organ injury, pre-trauma center blood transfusion, shock index >1, and mangled extremity (Fig), each assigned 1 point. An AMIT score ≥2 showed a survival benefit for AMT (ARR -0.07; 95% CI -0.13, -0.01, p=0.02). Among patients with a score < 2, transport mode was not associated with survival (p=0.21).

Conclusion: The AMIT score identifies patients with a survival after AMT IF transport compared to ground. These data may inform triage protocols for IF transport mode selection in trauma patients.



Session XIIIA: Papers 43-51
Paper 46: 3:00 PM – 3:20 PM

STATE-LEVEL VARIABILITY IN DISCHARGE TO INPATIENT REHABILITATION AFTER SEVERE TRAUMATIC INJURIES

Introduction: Rehabilitation care at an inpatient rehabilitation facility (IRF) has been shown to improve seriously injured patients' long-term functional independence. However, not all eligible injured patients are discharged to IRF. We examined differences in the proportion of severely injured patients discharged to IRF across US states.
Methods: We analyzed the 2021 Healthcare Cost and Utilization Project State Inpatient Databases for 13 states. We included all severely injured (ISS >15) adult patients who survived to hospital discharge. We calculated the marginal probability of discharge to IRF, skilled nursing facility (SNF), or home across different states using a logistic regression model to control for patient demographics, insurance, injury severity, comorbidities, and trauma center level. We also performed a mixed effects logistic regression to evaluate the association between the supply of IRFs (defined as the number of IRFs per 1,000,000 population) and the likelihood of discharge to IRF.
Results: We identified 104,017 severely injured patients. Across all states, 13% of patients were discharged to IRF, 19% to SNF, and 42% to home. The adjusted probability of discharge to IRF varied between states, ranging from 6.3% in Oregon (95% CI: 5.6-7.1%) to 21.1% in Arkansas (95% CI: 19.9-22.4%). The state-level supply of IRFs ranged from 0.49 to 8.63 per 1,000,000 in Maryland and Arkansas, respectively. Each additional IRF per 1,000,000 population was associated with 11% increased odds of discharge to IRF (95% CI: 1.03-1.21, P=0.009).
Conclusion: Severely injured patients face substantial variation in accessing high-level rehabilitation care at an IRF depending on their state of residence. Increasing the availability of IRFs within underserved states may improve access to specialized rehabilitation care for injured patients.

Session XIIIA: Papers 43-51
Paper 47: 3:20 PM – 3:40 PM

RADIOGRAPHIC PROGRESSION GUIDELINES FOR WORSENING TRAUMATIC BRAIN INJURY ON HEAD CT SCANS

Introduction: Traumatic Brain Injury (TBI) often necessitates serial CT scans, as up to 30% of patients show radiographic worsening. Traditional binary classifications "YES" or "NO" lack nuance, leading to unnecessary imaging and increased costs. The Radiographic Progression Guidelines introduce a three-tiered system; NOT CONCERNING, CONCERNING, and ALARMING to improve decision-making and optimize resources.
Methods: A 14-month prospective cohort study of 281 patients applied RPG classifications to serial CT scans while tracking changes in management. Non-invasive interventions included adjustments in fluids, medications, nursing care, and ventilator settings, while invasive interventions encompassed craniotomy, craniectomy, or ICP monitoring. Statistical analyses assessed associations between RPG classifications and intervention likelihood. Criteria for RPG are illustrated in Table 1.
Results: Among 129 patients receiving serial CTs, worsening was observed in 32% at the second scan, 34% at the third, and 59% at the fourth. Of 99 worsening cases, 69 were NOT CONCERNING or CONCERNING, while 30 were ALARMING. No patients in the lower tiers required intervention, whereas four ALARMING cases required invasive procedures. RPG effectively identified all patients needing intervention while preventing unnecessary escalation
Conclusion: RPG enhances TBI classification, improving communication and targeted management. By distinguishing lesion severity, it helps optimize resource use and reduce unnecessary imaging for lower-risk patients. Further multi-center studies are needed to refine classification criteria and validate RPG across diverse clinical settings.

RADIOGRAPHIC PROGRESSION GUIDELINES – (RPG)

Classification	Size	MAX size	Midline Shift	Additional Findings
NOT CONCERNING	Less than double the size of the original	<10 mm	None	None
CONCERNING	More than double the initial size	<10 mm	<5mm	None
ALARMING	Any size	>10 mm	>5mm	Effacement of sulci or gyri

Table 1: Radiographic Progression Guidelines (RPG) Classification and corresponding criteria

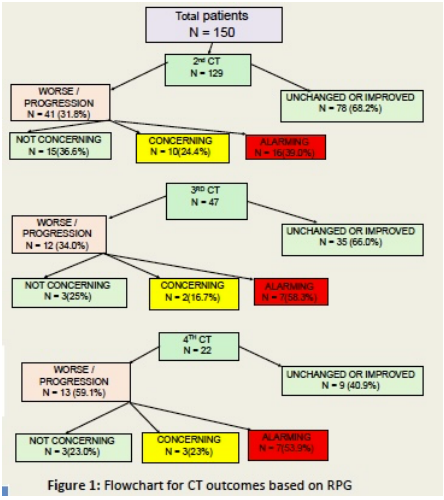


Figure 1: Flowchart for CT outcomes based on RPG

Session XIIIA: Plenary Papers 43-51
Paper 48: 3:40 PM – 4:00 PM

INTRACRANIAL HEMORRHAGE IN ISOLATION: IS THE SUM BETTER THAN ITS PARTS? AN ANALYSIS OF THE MODIFIED BRAIN INJURY GUIDELINES

Introduction: Traumatic brain injury (TBI) with small volume intracranial hemorrhage (ICH) can be managed in a streamlined fashion. The modified Brain Injury Guidelines (mBIG) stratify TBI severity and provide management protocols. Unlike other TBI triage protocols, mBIG does not differentiate between isolated and combined ICH. Combined ICH, defined as ≥2 ICH types may have distinct clinical trajectories, but current guidelines are discordant on this subgroup's optimal management. This study aims to characterize outcomes of combined ICH.
Methods: This is a retrospective analysis of prospectively collected data of trauma patients with ICH at two level 1 trauma centers between 2017-22. All mBIG 3 injuries including displaced skull fractures, epidural hematomas, or intraventricular hematomas were excluded. ICH were classified as isolated (iICH) or combined (cICH). Primary outcome was clinical deterioration, defined as worsening neurological exam. Secondary outcomes were radiographic progression, neurosurgical (NSG) intervention, & readmission.
Results: 633 patients were included. 189 (29.9%) had cICH. There were no significant differences in age or arrival GCS between groups. cICH patients had higher ISS (13.3 vs 11.5, $p< 0.001$), longer ICU length of stay (1 vs 0 days, $p< 0.001$), and more frequent CTH (2 vs 2, $p< 0.001$) compared to iICH. Both radiographic progression (20.3 vs 10.6%, $p=0.004$) and NSG consultation were more frequent in cICH (83.1 vs 74.1%, $p=0.015$), though only 2 patients (0.5%) with cICH had clinical deterioration or NSG intervention. There were no significant differences in clinical deterioration, NSG intervention, or readmission between cICH and iICH.
Conclusion: While cICH patients are more likely to have radiographic progression, this does not translate to additional clinical progression or NSG intervention compared to iICH. Current mBIG protocols can be safely applied to cICH without routine escalation of care.

Session XIIIA: Papers 43-51
Paper 49: 4:00 PM – 4:20 PM

REMOTE TELEMENTORING LEADS TO ORTHO TRAUMA AND ORTHOPLASTIC SURGICAL INDEPENDENCE IN A HUMANITARIAN CRISIS

Introduction: To determine whether remote digital platform telementoring enables surgical independence for complex care during a humanitarian crisis.

Methods: A senior mentoring team (Orthoplastic Surgery, Ortho Trauma, Trauma/Surgical Critical Care, ID Administration) partnered with an Orthopedic team and a NGO at a Ukraine civilian hospital treating complex war-injured patients. Weekly teleconsultation evaluated patients, imaging, and labs to address patient care including OR management, antibiotics, organ failure, nutrition, and rehabilitation. Prospective data included injuries, recommendations, and the presence of a plan generated by Ukraine surgeons prior to consultation. Data were explored using descriptive statistics or Chi-square; significance for $p < 0.05$.

Results: Telementoring (135 events) occurred (4/2022 – 11/2024) for 222 patients (85% military, 15% civilian). Most were male 89% (mean age = 37.8$\pm$14.8 yr). Injured regions included: thigh (24.8%), ankle (24.8%), wrist (21.2%) hand (21.2%). Injuries mainly involved: bone (93.4%), joint (76.6%), and soft tissue (70.1%); infection present in 36.5%. Recommendations principally addressed: surgical decision-making (97.8%), OR plans (98.5%), implants (31.3%), rehabilitation (32.1%), antibiotics (21.9%) and culture data (18.2%). Procedural recommendations were for: re-debridement (48.1%), ORIF (27%), NPWT (22.6%), local flap (22.6%), IM nail (20.4%), ex-fix removal (18.9%), free flap (15.3%), and bone grafting (13.8%); amputation was rare (10.9%) The Ukraine team transited from needing a plan to articulating one by patient 136 (61.2% of consult patients; 6/2023). Free flap plans vastly increased after surgical independence through direct experiential and mentored training (3 before vs. 18 after, $p < 0.01$).

Conclusions: Remote platform telementoring during a humanitarian crisis can develop local expertise regarding surgical decision-making, OR planning, and complication management of complex injured patients. The capability of successful complex operative management is supported by a stable and experienced consultant group that fosters durable relationships.

Session XIIIA: Papers 43-51

Paper 50: 4:20 PM – 4:40 PM

IMPLEMENTATION OF A SMARTPHONE BASED ULTRASOUND PROGRAM TO IMPROVE TIMELY DIAGNOSIS OF LIFE-THREATENING INJURIES IN CAMEROON: RESULTS FROM A PROSPECTIVE, MULTISITE FEASIBILITY STUDY

Introduction: Undiagnosed hemorrhage is the leading cause of preventable trauma death in Cameroon, yet only 4% of injured patients receive imaging to diagnose hemorrhage. A smartphone-based ultrasonography (SBU) curriculum was developed to rapidly train Cameroonian providers to perform and interpret eFAST. SBU has demonstrated promising educational efficacy, but its clinical feasibility in this technology-constrained setting is unknown. We evaluate the feasibility and acceptability of a SBU pilot at three trauma centers in Cameroon.

Methods: We implemented a six-month feasibility pilot at three Cameroonian hospitals participating in the Cameroon Trauma Registry (CTR). Trauma providers were trained to perform SBU eFAST using a novel 5-hour curriculum, then asked to perform SBU on all injured patients as part of the trauma evaluation. Feasibility was assessed as the proportion of CTR patients with completed eFAST. Acceptability was assessed as the proportion of users rating SBU ≥68 on the previously validated System Usability Scale (SUS).

Results: Trauma care providers completed SBU eFAST on 609 (87%) of 702 eligible patients, compared to a diagnostic imaging rate of 5.5% in the pre-study period. Completion was highest at low-volume referring centers (100%, n= 42) and lower at tertiary referral centers (84%, n=492 $p<0.01$). Overall, 89% of providers rated the program as highly acceptable (SUS scores ≥68).

Conclusions: Implementation of a SBU program is highly feasible and acceptable in Cameroon, with an associated 81% increase in diagnostic imaging completion among trauma registry patients. A multisite prospective clinical trial is planned to assess the impact of SBU on patients' outcomes, including preventable trauma deaths.

Session XIIIA: Papers 43-51
Paper 51: 4:40 PM – 5:00 PM

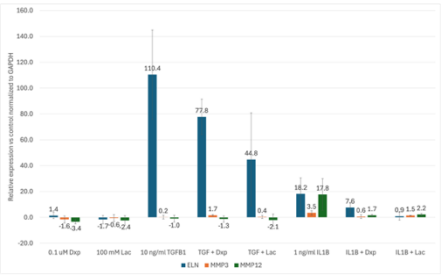
DISCHARGE FUNCTIONAL STATUS AND PREDICTORS OF ALL-CAUSE GERIATRIC TRAUMA READMISSION ACROSS A MATURE TRAUMA NETWORK

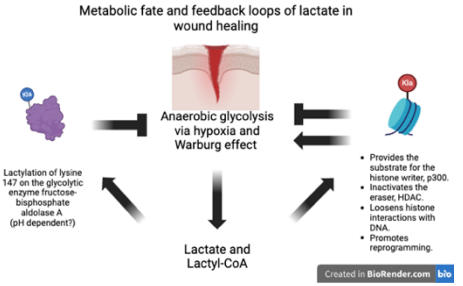
Introduction: Readmission after trauma remains a significant challenge in the geriatric population. Few studies have looked at geriatric all cause re-admission (RA) across a mature trauma network including at level IV centers. Our objective was to determine if discharge functional status predicts RA across all levels of trauma centers. Secondary objective was to determine incidence and reason for RA.
Methods: Institutional trauma registries were queried for all geriatric trauma admissions across our network (2018-2023). This data was merged with all cause network RA data. Demographics, injury characteristics, trauma center level, frailty, discharge functional status (FIM), disposition, and payor status were compared between non-RA and RA patients. Univariate, followed by multivariate, logistic regression was used to identify predictors of readmission. Reason for RA and time to RA were examined.
Results: 11,270 patients were admitted across the network with median age 81 (IQR 74-88) and median ISS of 5 (4-9) while 6.6% (n=741) had ISS >16. All-cause RA rate was 6.2% (n=700). On multivariate analysis, FIM score (OR 0.99 (0.95-1.02), p=0.60), treatment at a level IV center and disposition were not predictors of RA. The results were similar after adjusting for frailty, with >3 comorbidities (OR 1.708 (1.16-2.51), p< 0.01) and HLOS (OR 1.05 (1.01-1.09), p< 0.01) representing the highest predictors of RA. 14% (n=101/700) of RA patients were readmitted for a trauma complication, 11% (n=75) for new injury, 63% (n=439) for a medical condition and 12% (n=84) due to prior refusal for rehab. Median time to RA was 14 days (IQR 6-21). 57% (n=396) had incomplete follow-up prior to RA. \
Conclusion: HLOS and >3 comorbidities but not FIM score predict all cause RA with most RA for a new or pre-existing medical condition. These variables represent suitable targets for RA reduction.

Session XIIIB: Papers 52-60
Paper 52: 2:00 PM – 2:20 PM

LACTATE MODULATES TGF-B1- AND IL-1B-INDUCED TRANSCRIPTIONAL PROGRAMS IN HUMAN DERMAL FIBROBLASTS: POTENTIAL IMPLICATIONS FOR WOUND MANAGEMENT.

Introduction: Cutaneous wounds are susceptible to metabolic imbalances, which can lead to excessive lactate accumulation that delays healing. It is also accepted that lactylation of histone and other proteins is important in the epigenetic regulation of cells. Thus, a greater understanding of how lactate affects fibroblasts could lead to new therapeutic approaches. This study aimed to investigate how lactate impacts TGFb1- and IL-1b-induced transcriptional programs in normal human dermal fibroblasts (NHDF).
Methods: qRT-PCR was used to evaluate transcriptional changes in key remodeling markers in NHDF treated with 100 mM sodium lactate (Lac) or 0.1 mM dexamethasone-21-phosphate (Dxp) and then activated with 10 ng/ml TGFb1 or 0.1 ng/ml IL-1b for 24 hours. Total mRNA was isolated and DDCp relative expression was calculated versus untreated medium controls, normalized to the housekeeping gene, *GAPDH*.
Results: We observed that 100 mM lactate treatment inhibited the increased relative expression (fold changes) of *elastin*(*ELN)* following activation with TGFb1 or IL-1b (TGFb1=110 $\pm$ 35, TGFb1 + Lac = 45 $\pm$ 36, IL-1b = 18 $\pm$ 12, IL-1b + Lac = 0.86 $\pm$ 3; n=3). Dxp also reduced cytokine-induced *ELN* expression (TGFb1 + Dxp = 78 $\pm$ 14, IL-1b + Dxp = 7.8 $\pm$ 4). Additionally, both Lac and Dxp exhibited an ability to reduce IL-1b-induced increases (fold changes) in *matrix metalloproteinase 3* (*MMP3*) (IL-1b= 3.5 $\pm$ 1.7, IL-1b + Lac = 1.5 $\pm$ 0.8, IL-1b $\pm$ Dxp = 0.6 $\pm$ 1.5) and *MMP12* (IL-1b = 17.8 $\pm$ 12.3, IL-1b + Lac = 2.2 $\pm$ 0.8, IL-1b + Dxp = 1.7 $\pm$ 0.6).
Conclusions: These findings indicate that lactate treatment of NHDF exhibits anti-inflammatory effects, suggesting that metabolic regulation may help reduce tissue damage. Additionally, histone lactylation may serve as a potential target for pharmacological interventions in wound healing disorders.





Session XIIIB: Papers 52-60
Paper 53: 2:20 PM – 2:40 PM

PLATELET RECEPTOR SHEDDING: AN IN VITRO STUDY IN SHOCK RELATED PLATELET FUNCTIONAL IMPAIRMENT

Introduction: Early platelet dysfunction has been recognized as an important component of the acute coagulopathy of trauma. The exact mechanism(s) remain unclear; a current hypothesis suggests that functional platelet exhaustion results from exposure to trauma/shock related catecholamine plasma concentrations. Platelet receptor proteolysis (shedding) is important in normal physiologic as well as pathophysiologic conditions. Catecholamines play an important role in controlling platelet responses *in vivo.* Excess catecholamine concentrations in plasma following shock conditions may increase platelet receptor cleavage and result in decreasing platelet reactivity. We therefore studied the effect of catecholamine exposure on platelet receptor shedding and platelet aggregation and adhesion *in vivo*.

Methods: Blood samples were obtained from healthy volunteers in sodium citrate tubes. Whole blood was treated with epinephrine (10 and 50 ng/ml) for 5-30 minutes. Platelet receptor shedding (P-selectin, CD40L and GpIIb/IIIa) was quantitated using ELISA(s) specific for each receptor. In other experiments, collagen coated microfluidic channels or microfluidic channels perfused with Human umbilical vein endothelial cell (HUVEC) monolayers were established in microfluidic flow devices. Epinephrine (epi) containing media or media alone was perfused for 5 -30 minutes. Whole blood was subsequently labelled with a fluorescently labeled antibody specific for platelets (PE-Anti CD41/CD61) and perfused through the microfluidic device. Platelet aggregation was determined by fluorescent microscopy in the microfluidic channels coated with collagen. Platelet adhesion to the HUVEC coated microfluidic channels was determined by dual fluorescent staining of the endothelial monolayer (FITC-wheat germ agglutinin) and platelets (PE-anti CD41/CD61).

Results: (Please see attached Table)

Conclusion: Epinephrine exposure increased platelet receptor shedding in a time and concentration dependent manner. Enhanced platelet receptor shedding was associated with impaired platelet adherence and aggregation in microfluidic flow devices. “Early” platelet functional impairment following catecholamine excess may be a therapeutic window to investigate in future studies.

Results: Mean ± SD, N = 4 for each group.

	P-selectin (ng/ml)	CD40L (ng/ml	GpIIb/IIIa (ng/ml)	Platelet Adhesion (fluorescent intensity)	Platelet aggregation (fluorescent intensity)
Control (no epi)	4.3 ± 0.4	2.9 ± 0.1	4.9 ± 0.4	290 ± 14	475 ± 26
10ng/ml epi 5min	7.6 ± 0.6*	4.4 ± 0.5*	11.2 ± 1.2*	170 ± 16*	310 ± 15*
10ng/ml epi 30 min	10.4 ± 0.7*	7.3 ± 1.0*	20.1 ± 1.7*	159 ± 17*	246 ± 10*
50ng/ml epi 5 min	16.8 ± 1.2*#	9.0 ± 1.3*#	24.5 ± 2.4*#	139 ± 12*#	235 ± 13*#
50ng/ml epi 30 min	28.2 ± 2.3*$	17.1 ± 1.7*$	50.6 ± 3.0*$	54 ± 5*$	86 ± 7*$

*p<0.05 vs. Control, #p<0.05 vs. 10ng/ml epi (5 and 30), $p<0.05 vs. All groups.

Session XIIIB: Papers 52-60
Paper 54: 2:40 PM – 3:00 PM

THE PYRUVATE KINASE ACTIVATOR TEPP-46 SUPPRESSES VESSEL LEAKAGE INDUCED BY SEVERE BURN

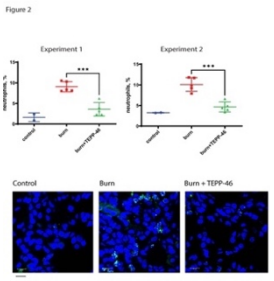
Introduction: Burn injury results in lung edema and infiltration of neutrophils in lung tissue. The search for novel approaches to suppress burn-induced edema is an endeavor of high medical importance. We have previously found that tranexamic acid (TXA), a widely used anti-fibrinolytic agent, efficiently suppresses lung edema after severe burn. This finding prompted us to screen for novel molecular targets of TXA in endothelial cells and then use the results of this screening to identify other chemical compounds able to suppress edema caused by burn injury.

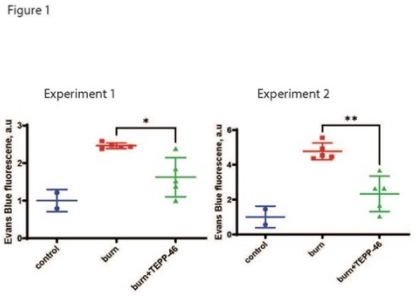
Methods: *Mass spectrometry search for TXA targets.* Human umbilical endothelial cell (HUVEC) culture was used in these studies. To determine the molecular targets(s) of TXA, we applied the Drug Affinity Responsive Target Stability (DARTS) method which involved the incubation of HUVEC lysates with TXA followed by pronase treatment. Then proteins were precipitated, denatured, reduced, alkylated and digested with trypsin. Tryptic peptides were separated by reverse phase chromatography on a handmade C18 column on a Dionex U_3000 RSLC in line with a Sciex TripleTOF 5600 mass spectrometer. Data were acquired operating in MS (library construction) and MS/MS (SWATH quantitation workflow) and were analyzed using Protein Pilot v.5.0 and Marker View (Sciex) software. *Burn injury studies.* Age- and weight-matched male Sprague-Dawley rats were used in burn injury studies. A 30% TBSA full thickness burn was created by using heated metal columns on the dorsum of each animal. TEPP-46 at 30 mg/kg body weight, dissolved in corn oil, or TEPP-46-free corn oil were administered intraperitoneally immediately after the burn injury.

Assessment of capillary leak in lung tissue. Six hours after burn injury, the animals were injected intravenously with Evans blue and its leakage to lung tissue was determined. Fragments of rat lungs were collected from sacrificed animals and formalin fixed, paraffin sections were prepared, immunostained for neutrophil marker myeloperoxidase and analyzed by fluorescence microscopy.

Results: DARTS analysis detected pyruvate kinase 2 (PKM2) as a major binding partner of TXA. Based on this result, we assessed the effects of TEPP-46, a specific activator of PKM2 on burn-induced vascular leakage. The intraperitoneal injection of TEPP-46 immediately after burn resulted in a significant suppression of burn-induced leakage of Evans blue to lung tissue (Figure 1). In addition, TEPP-46 strongly decreased the burn-induced infiltration of neutrophils to lungs (Figure 2).

Conclusion: The results of DARTS study indicating PKM2 as a binding partner of TXA, lead us to the suggestion that the suppression of burn-induced edema by TXA could be a result of PKM2 activation. Based on this finding, we assessed the effects of TEPP-46, a specific activator of PKM2 upon burn-induced edema. Our results indicate that active PKM2 protects the integrity of endothelial monolayers and thus suppresses the burn-induced vascular leakage. Interestingly, TEPP-46 has been shown to suppress the doxorubicin-induced cardiomyocyte apoptosis, to alleviate traumatic brain injury and to suppress the infiltration of inflammatory cells in diabetic nephropathy. Moreover, it contributes to endotoxin tolerance by stimulating mitochondrial biogenesis. It remains to understand the exact mechanism of the protective effect of TEPP-46 on endothelial integrity after severe burn: enhancement of mitochondrial respiration or suppression of inflammation, or both. The results of our study support the development of approaches to burn trauma treatment based on pharmacological activation of PKM2.





Session XIIIB: Papers 52-60
Paper 55: 3:00 PM – 3:20 PM

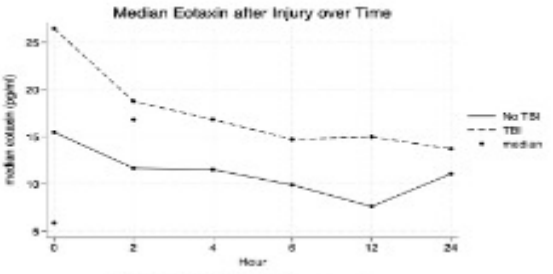
EOTAXIN & MCP-1 DOMINATE TIME-DEPENDENT CHEMOKINE SIGNATURES IN TRAUMATIC BRAIN INJURY

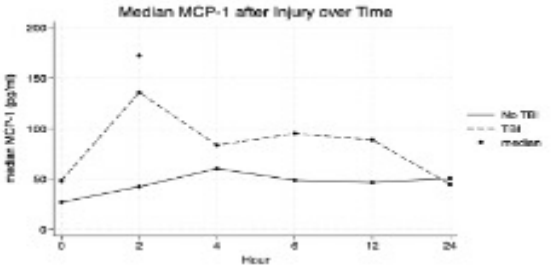
Introduction: Inflammation after traumatic brain injury (TBI) is known to impact outcomes, possibly through immune dysregulation. Cytokines and chemokines are key inflammatory mediators whose levels are highly dynamic in the hours after TBI. We sought to characterize the initial levels and temporal profiles of critical plasma inflammatory mediators after TBI.

Methods: Adult trauma patients were prospectively enrolled at a level 1 trauma center (2021-2024). Venous blood was collected within 30 mins of ED arrival (prior to transfusion) and at 2, 4, 6, 12, and 24h. Biomarkers were measured with a 27-plex Luminex panel; individual timepoints and temporal patterns were compared between patients with and without TBI.

Results: 375 patients were enrolled; 16% with TBI. Patients with TBI were older (median 55 vs. 41y, p=0.005), more likely to have blunt injury (95% vs. 65%, p< 0.001), more severely injured (median ISS 25 vs. 5, p< 0.001), and had higher 28-day mortality (34% vs. 2%, p< 0.001). On bivariate analysis, TBI patients had significantly higher median eotaxin, FGF-2, IL-1β, IL-6, IL-7, IL-9, IL-10, IL-12, IP-10, and MCP-1 with lower GM-CSF and IL-2 at the time of injury (p< 0.05). Controlling for ISS, pro-inflammatory chemokines eotaxin (p=0.026) and MCP-1 (p=0.018) were significantly higher in TBI patients. Over time, eotaxin was significantly higher in TBI patients at 0, 2, 6, and 12h, with MCP-1 also higher at 0 and 2h after injury (all p< 0.05).

Conclusion: Initial absolute values of inflammatory chemokines eotaxin and MCP-1 were higher in TBI patients vs. non-TBI patients, and those elevations in eotaxin persist in the TBI cohort over 24 hours. The role of these cytokines in secondary brain injury are not well known and may provide clues for future diagnostic and therapeutic targets.

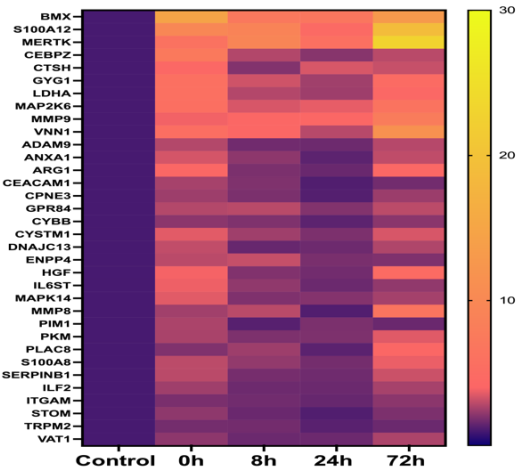




Session XIIIB: Papers 52-60
Paper 56: 3:20 PM – 3:40 PM

BLUNT TRAUMA INDUCES A PRO-INVASIVE TRANSCRIPTIONAL PROGRAM IN ISOLATED CIRCULATING HUMAN NEUTROPHILS

Introduction: Trauma induces a "genomic storm" of gene expression in circulating leukocytes. We hypothesized that the neutrophil contribution to this response after blunt trauma varies with the magnitude of physiologic insult and with exposure to additional and subsequent inflammatory stimuli.
Methods: Blunt trauma patients had blood samples taken at 0, 8, 24, and 72h post-injury. Clinical data on injury pattern, treatment, and outcomes were collected. Circulating neutrophils were isolated for whole transcriptome RNAseq. Genes with ^{3}2-fold increased or decreased expression compared to healthy control neutrophils with $p< 0.0005$ were considered for further analysis and correlation to clinical outcomes.
Results: Nineteen patients were enrolled (median ISS 25, IQR 14-36) with 16377 genes analyzed. 3153 genes were differentially expressed compared to controls and clustered by dynamic expression. Top biological processes implicated were neutrophil degranulation, lysosomal regulation, and cellular migration. Exposure to major surgery and/or blood transfusion between timepoints was associated with deflections in transcriptome dynamics on principle component analysis. Expression of a pro-invasive transcriptional program common to septic shock was identified following injury (**Figure**) and was more pronounced in patients with elevated serum lactate and organ failure.
Conclusions: Cell type-specific analysis teases out the time- and insult-dependent neutrophil signal from the circulating leukocyte "storm". Neutrophil activation by severe trauma induces a pro-invasive transcriptome signal, a potential link between the circulating and tissue phenotypes associated with poor clinical outcomes.



Session XIIIB: Papers 52-60
Paper 57: 3:40 PM – 4:00 PM

TRAUMA-INDUCED ALTERATIONS IN BONE MARROW EXOMSOME MIRNA PROFILES

Introduction: Severe trauma disrupts bone marrow function, triggering physiological changes that impair hematopoiesis, immune cell production, and the bone marrow microenvironment. Bone marrow-derived exosomes play a critical role in intercellular communication, but their contribution to the cellular response to injury remains poorly understood. This study investigates bone marrow exosome miRNA expression in rodents subjected to polytrauma (PT) with and without chronic stress exposure, a model simulating chronic critical illness following injury.
Methods: Bone marrow was collected from rats (N=6/group) subjected to PT, including lung contusion, hemorrhagic shock, cecal ligation, and pseudo fracture. A second group underwent PT with daily restraint stress (PTRS) to model chronic critical illness. Bone marrow-derived exosomes were isolated seven days post-injury, and miRNA expression was quantified using ROSALIND Bioinformatics Software (Healthcare Technology Systems, San Diego, CA) with significance defined as $p < 0.05$.
Results: Nine miRNAs were differentially expressed in the PTRS group compared to PT alone ($p < 0.05$). Significant upregulation was observed in miR-433 (2.89 log2 fold change), miR-689 (2.28), miR-496 (2.24), miR-1395 (2.11), and miR-875 (2.11). Additional upregulated miRNAs included miR-M1-7, miR-466, and miR-3471. In contrast, miR-216B was downregulated (-1.58) in the PTRS group. Notably, miR-433 and miR-3471 have been linked to impaired erythropoiesis and maladaptive stress responses.
Conclusion: Chronic critical illness following severe trauma alters bone marrow exosome miRNA profiles, modulating gene regulatory mechanisms involved in injury response, inflammation, and recovery. Upregulated miRNAs, such as miR-433 and miR-3471, may contribute to maladaptive stress responses and impaired erythropoiesis, while downregulation of miR-216B suggests disruption of stress resilience pathways. These findings identify potential molecular targets for therapeutic intervention to mitigate trauma-related complications and improve recovery outcomes.

Session XIIIB: Papers 52-60
Paper 58: 4:00 PM – 4:20 PM

GERIATRIC TRAUMA COAGULATION PROFILES: IMPACT OF GENDER ON CLOT FORMATION

Introduction: There is a paucity of data on the role of gender on coagulation characteristics among geriatric trauma patients. We aimed to assess the gender-based differences in TEG and conventional coagulation profiles among geriatric trauma patients.
Methods: We performed a 5-year (2018-2023) retrospective review at a Level I trauma center and included geriatric (≥65 years) trauma patients with the highest activation level and for whom a rapid TEG was obtained on arrival. Patients with bleeding disorders, taking anticoagulation or antiplatelets medications, or who received whole blood, frozen fresh plasma, platelets, and antifibrinolytic medications prior to TEG were excluded. Patients were stratified based on gender. Rapid TEG results included activation time (ACT), α-angle, maximum amplitude (MA), and percent fibrinolysis 30 minutes after MA (LY30). TEG values and conventional coagulation profiles (prothrombin time [PT] and international normalized ratio [INR]) were compared.
Results: 349 geriatric trauma patients met our inclusion criteria and 36.7% were Female. Median time to TEG was 21 minutes. Females had shorter median TEG ACT (seconds, 105 vs 113, p=0.037), and higher α-angle (degrees, 77 vs 75, p< 0.001), MA (mm, 68 vs 65, p< 0.001). There was no difference in LY30. After controlling for confounding factors, male gender was independently associated with lower TEG α-angle (β= -2.081, 95%CI [-3.972 to -0.189], p=0.031) and MA (β= -3.282, 95%CI [-5.412 -1.152], p=0.003). Gender was not identified as an independent predictor of TEG ACT and LY30, PT and INR. **Conclusion**: Geriatric female trauma patients are more likely to have faster clot formation and higher clot propagation and strength, indicating a hypercoagulable profile following traumatic injuries.

Session XIIIB: Papers 52-60
Paper 59: 4:20 PM – 4:40 PM

DOES CORRECTING PLATELET INHIBITION DESPITE NORMAL TEG MA IMPROVE OUTCOMES IN ISOLATED NEUROSURGICAL TRAUMA?

Introduction: Thromboelastogram (TEG) with platelet mapping (PM) assesses coagulopathy in traumatic brain and spinal injuries. Platelet function correction based on PM values is common before neurosurgery, but its impact remains unclear. This study evaluates whether correcting abnormal PM values in patients with normal maximal amplitude (MA) improves outcomes after adjusting for injury type, mechanism, demographics, and comorbidities.
Methods: A retrospective cohort study of adult patients (16–89 years) with isolated traumatic brain (head AIS ≥ 3) or spinal injuries who underwent TEG with PM upon admission across 53 ACS-verified Level 1 and 2 trauma centers. Patients were stratified by injury type (TBI vs. spinal), platelet function correction, and surgical intervention. Primary outcomes included hospital length of stay (LOS), time to surgery, and discharge disposition. Multivariable regression adjusted for age, gender, race, insurance, injury mechanism, and comorbidities.
Results: Among 21,851 patients, those undergoing cranial surgery with platelet correction had worse disposition outcomes (59.4% vs. 38.4%, aOR: 2.30, 95% CI: 1.72–3.08). Spinal surgery patients with platelet reversal had longer LOS (18.1 ± 19.5 vs. 14.1 ± 14.5 days, $p = 0.0019$) and worse disposition (29.4% vs. 10.6%, aOR: 2.47, 95% CI: 1.66–3.68). Non-surgical patients receiving platelet reversal also had higher odds of poor disposition (Cranial: aOR: 2.28; Spinal: aOR: 5.96; Both: aOR: 2.72, all $p < 0.001$). No significant difference in time to surgery was found.
Conclusion: After adjusting for confounders, platelet correction in cases with normal MA but abnormal PM showed no benefit and was associated with worse outcomes, particularly in neurosurgical patients. These findings challenge routine platelet function reversal in isolated brain and spinal injuries and highlight the need for refined transfusion strategies.

Session XIIIB: Papers 52-60
Paper 60: 4:40 PM – 5:00 PM

WHOLE BLOOD RESUSCITATION IS ASSOCIATED WITH DECREASED END-ORGAN DYSFUNCTION IN PEDIATRIC TRAUMA PATIENTS

Introduction: Low Titer O Whole Blood (WB) has emerged as a safe and effective therapeutic agent for hemostatic resuscitation in traumatically injured children. The relationship between type of blood product transfused and incidence of end-organ dysfunction is not well elucidated. We hypothesize that WB transfusion is associated with decreased end-organ dysfunction compared to patients receiving Component Therapy (CT).
Methods: This is a multicenter, observational study of injured children ages 0-17 utilizing a national trauma database (2020-2022). Inclusion criteria were receipt of any blood product within 4 hours of ED arrival and survival to 72 hours. Subjects were categorized by receipt of WB. Primary outcome was a composite variable of multi-organ dysfunction (MODS) and respiratory failure, defined as presence of any of the following: mechanical ventilation greater than 6 days, sepsis, acute respiratory distress syndrome, pneumonia, acute kidney injury, urinary tract infection, or myocardial infarction. Data were analyzed using logistic regression, adjusting for age, sex, trauma mechanism, injury severity score (ISS), head abbreviated injury score (AIS), GCS, shock, interfacility transfer, site, total transfusion volume of all blood products (mL/kg), and WB transfusion volume (mL/kg).
Results: 408/2308 (18%) subjects receiving transfusion were given WB. Median (IQR) age was 16 years (15-17), 56% penetrating mechanism, median (IQR) injury severity score 24 (13-44), median (IQR) total transfusion volume 20 mL/kg (12-52), and median (IQR) WB transfusion volume 13 mL/kg (8-20). The incidence of respiratory failure, either isolated or in combination with additional parameters, was 61% (1487/2308), and incidence of MODS was 7% (165/2308). In the adjusted model, WB transfusion was associated with decreased odds of respiratory failure and MODS (Odds Ratio 0.71 (Confidence Interval 0.52-0.97, p=0.03)). On sensitivity analysis, inclusion of additional subjects with 72-hour mortality minimally impacted the predicted outcome of respiratory failure and MODS (OR 0.70, CI 0.55-0.92, p=< 0.01)), suggesting minimal influence of survival bias in the model.
Conclusion: WB resuscitation was associated with reduced end-organ dysfunction, including MODS and respiratory failure, in pediatric trauma patients. Further large, prospective, and mechanistic studies are needed.