Poster #63

RISK FACTORS FOR HYPONATREMIA IN ISOLATED GERIATRIC TBI AND THE IMPACT OF DDAVP

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Introduction: Early hyponatremia (HN) is common in hospitalized geriatric patient. In isolated traumatic brain injury (iTBI), both the injury itself and therapies such as desmopressin (DDAVP) augments the inherent risk of HN. Recent guidelines have recommended against DDAVP to counter antiplatelet (AP) effect due to risk of HN but the true impact of a single dose in iTBI is not known. Our primary objective was to determine incidence of early HN and secondarily to identify risk factors for early HN in geriatric iTBI.
Methods: After IRB exemption, a sub-analysis of an existing multicenter geriatric iTBI dataset (2021-2023) was performed. Patients admitted with normal serum sodium (135-145) were designated as either remaining eunatremic (EN) or HN (drop in serum sodium of 5 or a new serum sodium <135 within 2 days of admission). Cohorts were compared for demographics, injury characteristics including AIS head and type of intercranial hemorrhage (ICH), anticoagulant (AC) or antiplatelet (AP) status and reversal agents given, thiazide use or any history of previous or chronic hyponatremia. Length of stay (LOS), upgrade in level of care or neuro-intervention were also compared. Univariate, followed by multivariate, logistic regression was used to identify predictors of HN.
Results: 601 patients >/= 65 years old were admitted with iTBI and normal serum sodium across the study period. Median age was 77 years (IQR (64-85)) with a median AIS head of 3 (IQR 2-3). Incidence of AP or AC usage was 57% (n=340) with 35% receiving DDAVP (n=216) and 10% receiving PCC (n=62). History of hyponatremia was observed in 13% (n=77) and 18.5% used thiazides at home (n=77). 15.6% of patients developed early HN (n=94). Patient sex, AIS head, admission Glasgow coma score (GCS) and ICH type were similar between groups. On multivariate analysis the strongest predictors of HN were exposure to DDAVP (OR 2.16 (1.22 – 3.82), $p<0.01$) and history of hyponatremia (OR 3.39 (1.96 – 5.87), $p<0.01$). Median LOS was significantly different between HN and EN (3.5d IQR 2-6 vs. 3.0d IQR 2-5, $p<0.01$).
Conclusion: Early HN is a relatively common finding in geriatric patients with iTBI. Despite admission with normal serum sodium, the strongest predictors of early HN appears to be exposure to DDAVP and a history of hyponatremia prior to admission. A small but significant increase in LOS is observed in HN patients as well.

Poster #64

TRAUMATIC BRAIN INJURY IS THE STRONGEST PREDICTOR OF MORTALITY IN TRAUMA-ASSOCIATED ASPIRATION PNEUMONIA

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Introduction: Aspiration can be a devastating complication in trauma pts, yet national-scale data on incidence, outcomes, and risk factors remain limited. We sought to characterize the epidemiology of trauma-associated aspiration pneumonia, identify injury-specific predictors of mortality, and develop a temporally validated prediction model.
Methods: Retrospective cohort study using 2020-2022 NIS for model development and 2023 NIS for temporal validation. Aspiration pneumonia (ICD-10-CM J69.x) and trauma diagnoses were identified. ISS was calculated using ICDPIC. Case-control analysis compared trauma patients with/without aspiration (3:1 matching). Propensity score matching (1:1) assessed aspiration's independent mortality effect. Gradient boosting models predicted mortality.
Results: In 351,335 aspiration hospitalizations, 53,874 (15.3%) had trauma with 17.3% mortality. Aspiration increased mortality 5.9-fold vs controls (17.6% vs 3.0%; $p<0.001$). Propensity-matched analysis (9,976 pairs) confirmed aspiration's independent effect (OR 7.47; 95% CI 6.57-8.50). Traumatic brain injury (TBI) had highest mortality among major trauma types (20.3%) despite mid-range ISS (18.9). TBI mortality increased from 18.5% (2020) to 22.2% (2022). At ISS ≥25, TBI mortality was 29.1% vs 14.3% in non-TBI. The mortality model (AUC 0.720, 95% CI 0.715-0.724) was validated on 2023 data (n=28,534), demonstrating maintained discrimination (AUC 0.724, 95% CI 0.716-0.732) with sensitivity 75.3%, specificity 58.4%, NPV 92.7%. TBI mortality exceeding non-TBI was confirmed.
Conclusion: Aspiration pneumonia increased mortality > 7-fold. TBI emerged as the strongest predictor. The model demonstrated robust temporal stability (AUC 0.724) with high NPV (92.7%). These findings support prioritizing targeted aspiration prevention in TBI patients independent of injury severity.

Poster #65

EFFECTIVENESS AND SAFETY OF DOAC COMPARED TO LMWH FOR THROMBOPROPHYLAXIS IN TRAUMA PATIENTS WITH TBI

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Introduction: Low-molecular weight heparin (LMWH) is currently the standard of care for venous thromboembolism (VTE) prophylaxis in trauma patients who have no contraindication to the medication. Recently, direct oral anticoagulants (DOACs) started to become an option for VTE chemoprophylaxis of hospitalized patients. The use of DOAC for prophylaxis has been studied in hospitalized medical patients, hip fracture patients as well as patients with lower extremity fractures, showing DOACs to be noninferior in prevention of VTE compared to LMWH. To date, there have been no studies that evaluate the effectiveness and safety of LMWH and DOACs for traumatic brain injuries (TBI) patients. This study aims to evaluate the clinical outcomes of TBI patients who receive DOAC compared to LMWH as thromboprophylaxis while inpatient. We hypothesize that DOAC will be associated with similar VTE outcome with no increase in bleeding complication.

Methods: We queried the ACS-TQIP database from 2017 to 2023 for adult patients who suffered TBI and were started on either DOAC or LMWH for VTE prophylaxis. Given the large discrepancy between patients receiving DOACs compared to LMWH, propensity score matching was utilized to compare the effectiveness (symptomatic VTE) and safety (bleeding complications) between the two medications.

Results: 277,450 patients met criteria to be included in the study, with 270,260 patients receiving LMWH and 7,190 receiving DOAC. Following propensity score matching, 6,562 patients were included in the analysis. DOAC was given 44.6 (56.8) hours after admission while LMWH was given 47.6 (44.5) hours after admission ($p<0.01$). The DOAC cohort had 1.52% of patients diagnosed with a symptomatic VTE. This was significantly higher compared to the 0.84% of LMWH cohort with symptomatic VTE ($p<0.01$). There was no difference in bleeding control surgery or angioembolization between those who received DOACs and LMWH.

Conclusions: This study demonstrates a higher rate of symptomatic VTE when TBI patients were on DOACs for VTE chemoprophylaxis compared to LMWH. These results differ to previous medical and trauma literature showing DOACs to be superior or noninferior to LMWH in preventing VTEs. Bleeding complications were similar between the two groups, which is consistent with previous TQIP studies comparing DOACs and LMWH. Given these results, LMWH, rather than DOACs, should be utilized for VTE chemoprophylaxis in patients with TBI.

Poster #66

TIME TO INITIATION OF VENOUS THROMBOEMBOLISM PROPHYLAXIS IN TRAUMATIC SPINE INJURED PATIENTS - HOW EARLY IS EARLY?

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Introduction: Trauma patients, especially those with spine injuries, have a high venous thromboembolism (VTE) risk (up to 58%). Delays in VTE prophylaxis increase this risk. While guidelines advise initiating prophylaxis early, the optimal timing is unclear. Our goal was to determine the optimal time for prophylaxis to minimize VTE without increasing bleeding.
Methods: Adults aged ≥18 years admitted to a level 1 trauma center between 2022-2024 with any spine fracture or spinal cord injury who received VTE prophylaxis were included. Patients were grouped based on time to initiation of VTE prophylaxis; very early (0-24hours), early (25-48hours), late (49-72 hours), or delayed (> 72 hours). An adjusted logistic regression model was used to predict the primary endpoint of VTE. Predictors were time to prophylaxis and associated covariates.
Results: 650 patients were included (66.5% male, average age 54.7 ± 21.2 years, 47% with injury severity score ≥ 16, 15% with Glasgow Coma Scale < 13, 8.9% with spinal cord injury, 24.0% with traumatic brain injury). The distribution of VTE was very early (2.5%), early (3.5%), late (6.0%), delayed (5.4%) and was dichotomized into less than 48 hours (n=389, 59.8%) vs after 48 hours (n=261, 40.2%). VTE prophylaxis initiation > 48 hours predicted VTE occurrence, (OR = 2.3 [1.0 - 5.3], AUC 0.79[0.71-0.87]) when adjusted for ISS, TBI, creatinine clearance, penetrating injury, and missed prophylaxis doses. 43(6.6%) patients required ≥ 1 blood transfusion and 1 required unplanned neurosurgery.
Conclusion: The odds of VTE occurrence more than doubled when prophylaxis was initiated after 48 hours from admission. Clinically relevant bleeding events were rare, highlighting an acceptable bleeding risk profile supporting earlier initiation of VTE prophylaxis.

Poster #67

WHEN DO BEST PRACTICES STOP BEING BEST? DISPARITIES IN MANAGEMENT OF ADULTS WITH SEVERE TBI AND THE RELATIONSHIP BETWEEN INTERVENTIONS AND MORTALITY

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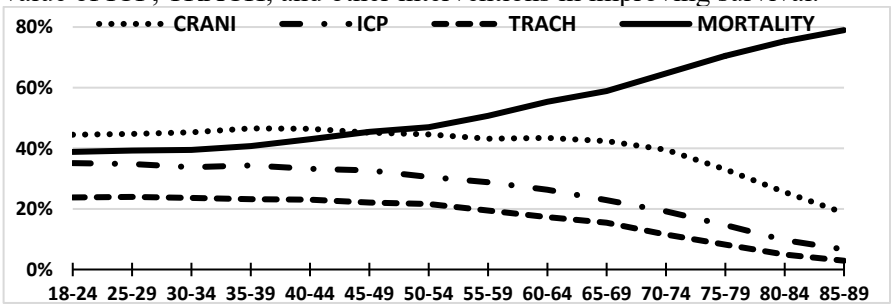
Introduction: There are known disparities in care- e.g., intracranial pressure monitoring (ICP), craniotomy (CRANI), and tracheostomy (TRACH)- between older (age 65+; OLD) and younger adults (YOUNG) with severe TBI. This is presumably due in part to a patient-centered approach based on goals of care. However, while 65 is used as a definition for "older," the age at which intervention rates change is not clear. Further, the relationship between interventions and mortality is unknown. We hypothesized that interventions decrease and mortality increases at age >65.
Methods: Retrospective review of Trauma Quality Improvement Program (TQIP) data (2016-2021) on patients age ≥18 with severe TBI, defined as Glasgow Coma Score <8, head Abbreviated Injury Scale ≥4, and requiring mechanical ventilation. Primary outcomes were mortality, ICP, CRANI, and TRACH. Age groups were compared with various appropriate statistical tests. "Change point" was defined as the point at which a group had a different outcome than the next younger group ($p<0.05$).
Results: 98,606 patients were studied; 24,998 (25%) were OLD. Mortality was 50% overall, with change point at age 55-59. Intervention change points were: CRANI, age 70-74; ICP, age 50-54; TRACH, age 55-59 (see Figure).
Conclusion: In this population of severe TBI patients, interventions decrease and mortality increases well before age 65. While there may be a palliative approach in the oldest age groups, these findings raise questions about factors driving care in the 50s-70s. Although CRANI did not decrease significantly until age >70, the data indicate that it is not sufficient by itself to result in improved survival. Further study is necessary to determine the value of ICP, TRACH, and other interventions in improving survival.



Poster #68

SEX-SPECIFIC IMPACT OF VENOUS THROMBOEMBOLISM PROPHYLAXIS TIMING IN SEVERE TRAUMATIC BRAIN INJURY

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Introduction: Patients with severe traumatic brain injury (sTBI) face high venous thromboembolism (VTE) risk, yet optimal chemoprophylaxis (PPX) timing remains unclear. Literature also remains contradictory regarding the impact of biological sex on VTE incidence in this population. We sought to evaluate sex-based differences in the association between VTE PPX timing and VTE incidence in TBI patients. We hypothesized that early initiation of PPX would decrease VTE in both male and female sTBI populations.
Methods: A retrospective cohort study was conducted using the TriNetX United States collaborative research network to identify patients with sTBI, defined as Glasgow Coma Scale score of 3–8 in the presence of an acute intracranial injury (ICD-10 S02, S06, S09). This combined diagnosis was used as the index event. Early PPX initiation was investigated at 1 days and 2 days after injury. The primary outcome was VTE incidence within one month of sTBI. A 1:1 propensity score matching (PSM) was performed to adjust for neurologic injury, comorbidities, age and race. Patients were stratified by sex.
Results: The 2-day cohort included 6,772 patients (74.7% male); the 1-day cohort included 4,982 (74.3% male). In the combined male and female sTBI analysis, early PPX within 2 days (OR 0.78, p=0.006) showed significant VTE incidence reduction, while the 1-day definition showed no significant impact (OR 0.83, p=0.088). In the male cohort, early PPX was protective at both definitions (1 day: OR 0.74, p=0.017; 2 day: OR 0.72, p=0.002). No significant protection was observed in the female cohort at either definition (1 day: OR 1.207 p=0.36; 2 days: OR 0.94, p=0.73).
Conclusion: In male sTBI patients, VTE PPX initiation within 1 day of injury may significantly reduce VTE incidence. While the protective effect of early PPX in females is unclear. In the total sTBI population, early VTE PPX within 2 days of injury was associated with a lower VTE incidence. These findings suggest that sex-specific protocols may optimize VTE prevention strategies in sTBI.

Poster #69

IMPACT OF PROTOCOLIZED ANTI XA GUIDED ENOXAPARIN PROPHYLAXIS ON VENOUS THROMBOEMBOLISM AND INTRACRANIAL BLEEDING PROGRESSION IN PATIENTS WITH TRAUMATIC BRAIN INJURY: A PRE-POST ANALYSIS

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Introduction: Venous thromboembolism (VTE) remains a major preventable complication in traumatic brain injury (TBI) yet concerns regarding hemorrhagic progression often hinder pharmacologic prophylaxis (VTEp). We aimed to evaluate the effect of an anti-Xa guided VTE prophylaxis protocol in TBI patients.
Methods: Pre-post study compared TBI patients admitted to the Trauma ICU one year before (November 2022–November 2023) and one year after (November 2024–November 2025) implementation of a VTE prophylaxis protocol in a Level-1 trauma center. Pre-implementation cohort received fixed doses of dalteparin (5000IU/24h), while the post-implementation cohort received anti-Xa guided enoxaparin doses starting at 30 mg twice daily. Primary outcomes were VTE (deep venous thrombosis, pulmonary embolism, or both) and progression of intracranial bleeding. Secondary outcomes included ICU length of stay, ventilator days, and VTEp interruptions.
Results: 417 patients were analyzed (207 pre-implementation; 210 post-implementation). Demographics and injury severity were similar except for more initial hypotension and spinal cord injuries in the pre-implementation cohort. VTE incidence was significantly reduced following protocol implementation (3.4% vs 0.5%, p=0.03). Time to VTEp initiation was similar in both cohorts. Intracranial bleeding progression remained infrequent and did not differ significantly between the two groups (1.9% vs 0.5%, p=0.21). Post-implementation cohort demonstrated fewer VTEp interruptions, without increase in transfusion requirements or major systemic bleeding episodes. Days on mechanical ventilation were significantly reduced in the post-implementation group.
Conclusion: Implementation of an anti-Xa guided enoxaparin VTEp protocol was associated with a significant reduction in thromboembolic events with no increase in intracranial bleeding progression among critically injured TBI patients. These findings support the safety and clinical benefit of a protocolized anti-Xa guided enoxaparin prophylaxis in this high-risk population.

Poster #70

BURRHOLE VERSUS CRANIOTOMY IN ISOLATED GERIATRIC TRAUMATIC SUBDURAL HEMATOMA: A PROPENSITY-MATCHED NATIONAL ANALYSIS

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Introduction: Traumatic SDH is a major cause of mortality in the older trauma population. Surgical evacuation is commonly performed, but the optimal operative strategy in geriatric patients is unclear. We aim to compare burrhole vs. craniotomy in isolated traumatic SDH in ≥ 65 years old.

Methods: We conducted a retrospective cohort study using data from the ACS TQIP (2017-2023). Adults (≥65 years) with isolated SDH receiving burrhole or craniotomy were included. We excluded patients with penetrating trauma, AIS ≥ 3 in non-head regions, ED deaths, and pre-hospital deaths. The primary outcome was in-hospital mortality. The secondary outcomes are discharge disposition, unplanned intubation, ICU admission, stroke, surgical site infections (SSI), and hospital and ICU LOS. A 1:1 propensity-score match was performed using patient characteristics, GCS, midline shift, pupillary status, ICP monitoring, AIS, mechanism of injury, mFI-11, and shock index.

Results: There were 4,597 isolated TBI cases selected, with a median age of 77. 43.2% of the cases received burrhole. After matching (n=1373 per group), Burrhole was associated with decreased mortality (OR 0.451, CI 0.32-0.64, p<0.001), unplanned intubation (OR=0.631, CI 0.43-0.92,p=0.015), return to the OR (OR=0.518, CI 0.36-0.74,p<0.001) and unplanned return to the ICU (OR=0.693, 0.52-0.93,p=0.013). Burrhole also had a higher routine discharge rate (OR 1.464, CI 1.21-1.77). The craniotomy group had prolonged hospital and ICU LOS (p<0.001). Stroke and ventilator days were similar between the groups.

Conclusion: In isolated SDH in geriatric patients, burrhole use was associated with decreased mortality, in-hospital complications, LOS, and better discharge disposition.

Poster #71

FUNCTIONAL COAGULOPATHY, NOT ANTICOAGULANT HISTORY, PREDICTS TRAUMATIC INTRACRANIAL PROGRESSION: A TEG R-TIME STUDY

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Introduction: Reversal of anticoagulants (AC) following traumatic intracranial hemorrhage (tICH) based on medication history rather than objective assessments may miss clinically relevant "physiologic" (non-AC-associated) coagulopathy. We hypothesized that R-time would identify patients at risk for hemorrhagic progression and improve outcomes via TEG-guided reversal.
Methods: We reviewed all adult (≥18 years) patients admitted to a Level I trauma center from 2019-2023 with computer tomography (CT)-confirmed tICH and TEG testing. AC use was confirmed by a pharmacist. Patients were stratified based on R-time ≥ 7 minutes ("highR") vs <7 ("lowR").
Results: Among 290 patients (mean age 67.0±1.0), 148 (51.0%) had severe tICH. HighR patients were more often on AC (25 (83.3%) vs 151 (58.1%), p=0.0073), but incidence of severe tICH was not different. HighR was associated with hemorrhage progression on follow-up CT (15 (50%) vs 78 (30.1%), p=0.0273) and higher in-hospital mortality (9 (30% vs 28 (10.8%), p=0.0028). Correction of coagulopathy (R<7) was associated with improved follow-up CT in 181 (92.4%) vs 77 (82.8%) patients, p=0.0142. After adjusting for age, gender, injury severity score and tICH severity, R≥7 predicted CT worsening (OR 2.6 [95%CI 1.2-5.9]). Correction of coagulopathy was independently associated with lower odds of CT worsening (OR 0.347, 95% CI ([0.155-0.774]), 18.2% absolute and 63% relative risk reduction. AC history was not associated with mortality.
Conclusion: TEG R-time identifies functional coagulopathy associated with tICH progression and mortality, independent of AC history. TEG-guided reversal with achievement of R<7 was associated with less hemorrhage progression and improved outcomes, supporting the need for physiologic, assay-driven reversal protocols over history-based reversal.