

Podium Presentation 3

Analyzing Computed Tomography Modalities for Screening Pediatric Patients for Traumatic Blunt Cerebrovascular Injury

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Background: Blunt cerebrovascular injuries (BCVIs) are a rare, but potentially devastating consequence of trauma in the pediatric patient secondary to their risk of stroke. Different institutions utilize a variety of screening approaches for BCVIs, but these have not been well-documented in the pediatric population. Timely and accurate screening is critical in order to optimize patient outcomes. Our institutional screening protocol changed in May 2022 to include a Computed Tomography Angiography (CTA) of the neck. We hypothesize that screening with a CTA neck will decrease the number of duplicate CT scans that patients undergo and increase the detection rate of BCVIs.

Methods: We performed a retrospective review of all pediatric patients presenting with traumatic injury at our high-volume Level 1 trauma center between 2019 and 2023. Demographics, clinical data, and injury characteristics were collected for all pediatric patients presenting with blunt trauma. Patients with penetrating trauma mechanisms, those transferred from other institutions, and patients older than 18 years of age were excluded from the study. Radiologic data collected included the modality of study utilized (CT head, CT C-spine, CTA neck, and combined), as well as clinical data of BCVI grade and presence of symptoms such as stroke or transient ischemic attack. Patients before and after implementation of our screening protocol were compared.

Results: A total number of 608 patients met inclusion criteria for the study, 368 pre-protocol change (60.5%) and 240 post-protocol change (39.5%). There were no significant differences in sex, age and ethnicity. Motor vehicle collisions were the most common mechanism of injury in both cohorts. The number of patients with duplicate neck imaging (CT C-spine and CTA neck) decreased significantly after the protocol change (5.7% versus 2.1%, $p=0.03$). There were seven patients diagnosed with a BCVI: one prior to the protocol change (0.27%) and six after (2.5%, $p=0.01$). All the BCVIs were carotid and Grade I, except for one patient after the protocol change that had a Grade 2 carotid BCVI. Of the seven patients diagnosed with a BCVI between 2019 and 2023, no patients suffered any stroke-related symptoms.

Conclusion: Screening for BCVIs in pediatric patients sustaining high-mechanism blunt injuries with a CTA neck, results in patients receiving fewer imaging studies overall with an increased detection rate of BCVIs. This approach demonstrates a reduction in radiation exposure and procedure-related risks, while expediting diagnosis and treatment. We recommend that clinicians utilize a CTA neck as the first screening test for BCVIs in the pediatric population.