



Predictors for Pediatric Blunt Cerebrovascular Injury (BCVI): An International Multicenter Analysis

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Abstract

Introduction Practice guidelines for adult BCVI patients have been implemented recently, but data for this devastating injury pattern in children are still limited. An international multicenter analysis was performed to characterize BCVI in the pediatric population.

Methods The TraumaRegister DGU[®], a prospectively maintained database, was analyzed (01/2002–12/2015). Pediatric patients (0–17 years) with major injuries [Injury Severity Score (ISS) \geq 9 points] were included. BCVI was divided into carotid artery injury and vertebral artery injury (VAI). Data of demographics, injury, imaging, therapy, and outcome characteristics were analyzed with SPSS (Version 25, IBM Inc., Armonk, NY).

Results The study cohort included 8128 pediatric trauma patients. We identified 48 BCVIs in 42 children, resulting in an overall prevalence of 0.5%. Carotid injuries were diagnosed more frequently ($n = 30$; 0.4%) when compared to VAIs ($n = 12$; 0.1%). The coincidence of head ($p = 0.028$), facial ($p \leq 0.001$), chest ($p \leq 0.001$), and spinal injuries ($p \leq 0.001$) was higher in BCVI patients. The risk for thromboembolic complications (8.3% vs. 1%, $p = 0.026$) and in-hospital mortality (38.1% vs. 7.7%, $p \leq 0.001$) was excessive in children with BCVI. We identified various predictors for pediatric BCVI and quantified the cumulative impact of these risk factors.

Conclusion BCVI is more uncommon in pediatric than in adult trauma patients. Due to the considerable relevance of this injury for both children and adults, special attention should be paid to this entity and associated complications in the early treatment phase after severe pediatric trauma, especially in high-risk children.

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Abbreviations

ACCP	American College of Chest Physicians
AIS	Abbreviated Injury Scale
BCVI	Blunt cerebrovascular injury
BSF	Basilar skull fracture
CAI	Carotid artery injury
CI	Confidence interval
CTA	Computed tomography angiogram
DGU	Deutsche Gesellschaft für Unfallchirurgie/ German Trauma Society
ER	Emergency room
GCS	Glasgow Coma Scale
ICU	Intensive Care Unit
ISS	Injury Severity Score