

# Blunt cerebrovascular injury epidemiology

The main objective of a study was to determine the incidence of BCVI after severe TBI. **METHODS** The authors conducted a prospective, observational, single-center study including all patients with severe TBI admitted in the trauma center. Diagnosis of BCVI was performed using a 64-channel multidetector CT. Characteristics of the patients, CT scan results, and outcomes were collected. A multivariate logistic regression model was developed to determine the risk factors of BCVI. Patients in whom BCVI was diagnosed were treated with systemic anticoagulation. **RESULTS** In total, 228 patients with severe TBI who were treated over a period of 7 years were included. The incidence of BCVI was 9.2%. The main risk factors were as follows: motorcycle crash (OR 8.2, 95% CI 1.9-34.8), fracture involving the carotid canal (OR 11.7, 95% CI 1.7-80.9), cervical spine injury (OR 13.5, 95% CI 3.1-59.4), thoracic trauma (OR 7.3, 95% CI 1.1-51.2), and hepatic lesion (OR 13.3, 95% CI 2.1-84.5). Among survivors, 82% of patients with BCVI received systemic anticoagulation therapy, beginning at a median of Day 1.5. The overall stroke rate was 19%. One patient had an intracranial hemorrhagic complication.

Blunt cerebrovascular injuries are frequent after severe TBI (incidence 9.2%). The main risk factors are high-velocity lesions and injuries near cervical arteries <sup>1)</sup>.

**Blunt cerebrovascular injury** (BCVIs) affect approximately 1% of patients with **blunt trauma**.

The incidence of blunt cerebrovascular injury (BCVI) has not been well characterized in the pediatric population. The goal of this study was to describe the incidence, patient characteristics, and risk factors for pediatric patients with cerebrovascular injuries.

Harris et al. collected data from the Kids' Inpatient Database (KID), a nationally representative database of pediatric admissions, for years 2000, 2003, 2006, 2009, and 2012.

Among an estimated 646,549 admissions for blunt trauma, 2150 were associated with BCVI, an overall incidence of 0.33%. The incidence of BCVI nearly doubled from 0.24% in 2000 to 0.49% in 2012. Patients 4 to 13 years of age were less likely to have BCVI than those in the youngest (0-3 years) and oldest age groups comprising adolescents (14-17 years) and young adults (18-20 years). BCVIs were associated with cervical (adjusted OR [aOR] 4.6, 95% CI 3.8-5.5), skull base (aOR 3.0, 95% CI 2.5-3.6), clavicular (aOR 1.4, 95% CI 1.1-1.8), and facial (aOR 1.2, 95% CI 1.0-1.5) fractures, as well as intracranial hemorrhage (aOR 2.7, 95% CI 2.2-3.2) and traumatic brain injury (aOR 2.0, 95% CI 1.7-2.3). Mechanism of injury was also independently associated with BCVI: motor vehicle collision (aOR 1.7, 95% CI 1.3-2.2) and struck pedestrian (aOR 1.4, 95% CI 1.0-1.9). Among pediatric patients with BCVI, 37.4% had cerebral ischemic infarction with an in-Hospital mortality of 12.7%, and patients with stroke had 20% mortality.

The incidence of pediatric BCVI is increasing, likely due to increased use of **screening**, but remains lower than that in the **adult** population. **Risk factors** include the presence of cervical, facial, clavicular, and **skull base fractures**, similar to that of the adult population. Diagnosed BCVI is associated with a relatively high incidence of **stroke** with increased **morbidity** and **mortality**. The use of adult screening criteria is likely reasonable given the similarity in the risk factors identified in this study. Further studies are needed to investigate the role of treatment with antiplatelet agents or anticoagulation <sup>2)</sup>.

<sup>1)</sup>

Esnault P, Cardinale M, Boret H, D'Aranda E, Montcriol A, Bordes J, Prunet B, Joubert C, Dagain A, Goutorbe P, Kaiser E, Meaudre E. Blunt cerebrovascular injuries in severe traumatic brain injury: incidence, risk factors, and evolution. J Neurosurg. 2016 Jul 29:1-7. [Epub ahead of print] PubMed

PMID: 27471889.

2)

Harris DA, Sorte DE, Lam SK, Carlson AP. Blunt cerebrovascular injury in pediatric trauma: a national database study. J Neurosurg Pediatr. 2019 Jul 19:1-10. doi: 10.3171/2019.5.PEDS18765. [Epub ahead of print] PubMed PMID: 31323625.

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