

Blunt Cerebrovascular Injury (BCVI) Practice management Guideline

All patients presenting with signs/symptoms of BCVI should be evaluated with CTA head+neck.¹

Signs / symptoms of BCVI:

- Arterial hemorrhage between thoracic inlet and angle of the mandible
- Expanding cervical hematoma
- Focal neurologic deficit
- Neurologic examination incongruous with head CT findings
- Stroke on secondary CT scan

Screening for BCVI with CTA neck+head should be considered in asymptomatic patients with the following high-risk features.¹⁻³

Risk Factors for BCVI:

- GCS $\leq$ 8 (not explained by head CT findings)
- Severe facial trauma including Lefort fracture types II or III
- Mandible fractures
- Basilar skull or occipital condyle fractures
- Cervical spine fracture, subluxation or ligamentous injury at ANY level (excluding TP or SP fractures)
- Diffuse axonal injury
- Near hanging with concern for hypoxic-ischemic brain injury
- Neck soft tissue injury (seatbelt sign, hanging, or hematoma)

BCVI Injury Grading Scale

Grade	Scale
I	Luminal irregularity, intimal dissection or intramural hematoma with <25% luminal stenosis
II	Intraluminal thrombus, intimal dissection or intramural hematoma >25% luminal stenosis
III	Pseudoaneurysm
IV	Vessel Occlusion
V	Vessel Transection

Management of BCVI

ALL Symptomatic BCVI (any vessel, any grade), as evidenced by ischemic stroke on imaging and/or focal neurologic deficits attributable to the specific vascular distribution, mandates a consult to Cerebrovascular service.

-Depressed GCS alone does not represent symptomatic BCVI

Asymptomatic BCVI

Vertebral Artery

- Asymptomatic Vertebral Artery BCVI of any grade does not require cerebrovascular consultation.
- Treatment for any grade vertebral BCVI will be ASPIRIN 81mg daily^{4,7} as early as safely possible after injury identification, to be initiated by the trauma surgery team.
 - For patients with concomitant traumatic brain injury, ASA treatment will be started on:
 - BIG 1 TBI: Post-injury day 7
 - BIG 2 or 3 TBI: Multidisciplinary decision with Trauma and Neurosurgery Attending Surgeons
- Treatment duration = 3 months
- No follow up imaging is required.⁶

Carotid Artery

- Grade 1 carotid BCVI does not require cerebrovascular consultation
- Grade 2-5 carotid BCVI is a mandatory cerebrovascular consultation
- Treatment for all grades of carotid BCVI will be Antithrombotic therapy (ATT) with either Aspirin (Antiplatelet agent) OR therapeutic anticoagulation. ATT will be initiated as early as safely possible after injury identification.^{4,5,8,9}
 - Preference for ASA treatment given decreased bleeding complications with equivalent stroke rates compared to anticoagulation.
- Follow up imaging⁸
 - Grade 1 carotid BCVI = Repeat CT neck+head Angio in 48-72 hours
 - Grade 2-5 carotid BCVI = imaging per cerebrovascular recommendations OR repeat CT neck+head Angio in 72 hours.

Authors:

Jill Streams, MD

Brad Dennis, MD

Rohan Chitale, MD

Patrick Kelly, MD

Revision Dates:

3/2020, 3/2022, 6/2024, 7/2026

References:

1. Burlew CC, Biffl WL, Moore EE, et al. Blunt cerebrovascular injuries: Redefining screening criteria in the era of non-invasive diagnosis. *J Trauma Acute Care Surg*. 2012 Feb; 72(2):330-5.
2. Ciapetti M, Circelli A, Zagli G, et al. Diagnosis of carotid arterial injury in major trauma using a modification of Memphis criteria. *Scand J Trauma Resusc Emerg Med*. 2010; 18 (1): 61.
3. Hundesmarck D, Slooff WM, Homans JF, van der Vliet QMJ, Moayeri N, Hietbrink F, de Borst GJ, Öner FC, Muijs SPJ, Leenen LPH. Blunt cerebrovascular injury: incidence and long-term follow-up. *Eur J Trauma Emerg Surg*. 2021 Feb;47(1):161-170. doi: 10.1007/s00068-019-01171-9. Epub 2019 Jun 13. PMID: 31197394; PMCID: PMC7851103.
4. Russo RM, Davidson AJ, Alam HB, DuBose JJ, Galante JM, Fabian TC, Savage S, Holcomb JB, Scalea TM, Rasmussen TE; AAST PROOVIT Study Group. Blunt cerebrovascular injuries: Outcomes from the American Association for the Surgery of Trauma PROspective Observational Vascular Injury Treatment (PROOVIT) multicenter registry. *J Trauma Acute Care Surg*. 2021 Jun 1;90(6):987-995. doi: 10.1097/TA.0000000000003127. PMID: 34016922.
5. Kim DY, Biffl W, Bokhari F, Brakenridge S, Chao E, Claridge JA, Fraser D, Jawa R, Kasotakis G, Kerwin A, Khan U, Kurek S, Plurad D, Robinson BRH, Stassen N, Tesoriero R, Yorkgitis B, Como JJ. Evaluation and management of blunt cerebrovascular injury: A practice management guideline from the Eastern Association for the Surgery of Trauma. *J Trauma Acute Care Surg*. 2020 Jun;88(6):875-887. doi: 10.1097/TA.0000000000002668. Erratum in: *J Trauma Acute Care Surg*. 2020 Aug;89(2):420. PMID: 32176167.
6. Nally MC, Kling C, Hocking KM, Lillemoe H, Boll JM, Curci JA, Garrard CL, Naslund TC, Valentine RJ. Follow-up imaging of traumatic vertebral artery dissections is unnecessary in asymptomatic patients. *J Vasc Surg*. 2019 Jun;69(6):1704-1709. doi: 10.1016/j.jvs.2018.09.051. Epub 2019 Feb 18. PMID: 30792055.
7. Pujari A, Ramos CR, Nguyen J, Rajani RR, Benarroch-Gampel J. Pharmacologic Therapy is Not Associated with Stroke Prevention in Patients with Isolated Blunt Vertebral Artery Injury. *Ann Vasc Surg*. 2021 Jan;70:137-142. doi: 10.1016/j.avsg.2020.05.029. Epub 2020 May 29. PMID: 32479882.
8. Esposito EC, Kufera JA, Wolff TW, Spalding MC, Simpson J, Dunn JA, Zier L, Burruss S, Kim P, Jacobson LE, Williams J, Nahmias J, Grigorian A, Harmon L, Gergen A, Chatoor M, Rattan R, Young AJ, Pascual JL, Murry J, Ong AW, Muller A, Sandhu RS, Appelbaum R, Bugaev N, Tatar A, Zreik K, Hustad L, Lieser MJ, Stein DM, Scalea TM, Lauerman MH. Factors associated with stroke formation in blunt cerebrovascular injury: An EAST multicenter study. *J Trauma Acute Care Surg*. 2022 Feb 1;92(2):347-354. doi: 10.1097/TA.0000000000003455. PMID: 34739003.
9. Momic J, Yassin N, Kim MY, Walser E, Smith S, Ball I, Moffat B, Parry N, Vogt K. Antiplatelets versus anticoagulants in the treatment of blunt cerebrovascular injury (BCVI) - A systematic review and meta-analysis. *Injury*. 2024 Apr;55(4):111485. doi: 10.1016/j.injury.2024.111485. Epub 2024 Feb 27. PMID: 38452701.