

Blunt Cerebral Vascular Injury (BCVI) Guideline

Purpose: To establish guidelines for the screening selected adult trauma patients. This document is a guide to help determine which patients would benefit from the screening for BCVI.

Scope: BCVI is a known, but rare complication in blunt trauma, possibly occurring in just over 1% of all blunt traumatic injuries admitted to the hospital. Injuries to the cerebral circulation can be minimal, but can have significant, devastating consequences to the patient if undiagnosed and untreated.

Four broad mechanisms:

- Type I: Direct blow (seat belt sign, strangulation, assault)
- Type II: Hyperextension and contralateral rotation (most common mechanism)
- Type III: Intraoral trauma (e.g. child falling with toothbrush in mouth)
- Type IV: Associated with basilar skull fractures, involving sphenoid or petrous bones

Injury patterns:

- Cervical spine fractures, especially those involving C1-C3, subluxation, or extension into foramen transversarium
- Lefort II or III facial fractures
- Basilar skull fractures, as described above
- Horner's Syndrome
- Seat belt sign or other direct neck soft tissue injury including hangings
- Neurological deficits not explained by intracranial injuries e.g. DAI
- Any unexplained bleeding from the nose, ear, or oropharynx which may suggest damage to the carotid artery

Protocol: Screening for injury should proceed once one of the mechanisms above is noted or there is a high enough physician concern for injury.

Screening Methods:

1. CT angiography: least invasive and there may be as low as 75% sensitivity in detecting significant injury.
 - Order with initial screening CT scans to limit contrast load and rapid diagnosis
2. Four vessel cerebral angiography: most invasive reserved for those cases in which there is:
 - High index of suspicion
 - Need for intravascular intervention
 - Still suspicion after CT angiography
3. Duplex ultrasound of cerebral vessels for a type II mechanism or the patient has a high suspicion of injury but is too unstable for CT scan.
 - Never utilize as sole radiographic imaging modality to clear the carotid or vertebral vessel of injury.

MR angiography should not be considered due to low sensitivity and specificity to identify injury to the cerebral vessels.

CT angiography grading:

- Grade I: intimal injury with < 25% narrowing of diameter
- Grade II: dissection or narrowing of > 25% intraluminal diameter
- Grade III: pseudoaneurysm
- Grade IV: occlusion
- Grade V: transection with extravasation

Treatment: Directed by the vascular surgeon upon consultation.

Post discharge follow up:

- Follow up CTA on all BCVI patients in 2 weeks with follow up in vascular surgeons clinic.

References:

- 1) EAST practice guidelines <http://www.east.org/tpg/archive/html/BluntCVInjury.html>
- 2) Miller PS, Fabian TC, et al. Prospective Screening for Blunt Cerebrovascular Injuries. *Annals of Surgery*, 2002; 236 (3): 386-395.
- 3) Biffi WL, Moore EE, et al. Blunt Carotid and Vertebral Injuries. *World Journal of Surgery*, 2001; 25: 1036-1043.
- 4) Cothren CC, Moore EE, et al. Cervical Spine Fracture Patterns Mandating Screening to Rule Out Blunt Cerebrovascular Injury. *Surgery*, 2007; 141: 76-82.
- 5) Biffi WL, Moore EE, et al. Blunt Carotid Arterial Injuries: Implications of a New Grading Scale. *The Journal of Trauma*, 1999; 47 (5): 845-853.

REVIEW/REVISION HISTORY

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