R Adams Shock Trauma Center Blunt Cerebrovascular Injury (BCVI) Management Protocol

Blunt Cerebrovascular Injury (BCVI)

These injuries can present with or lead to a devastating stroke and largely arise from flexion-extension injuries. Some injuries are time dependent and STC has a dedicated vascular trauma service to support the trauma service with management of these patients. This protocol presents the management of BCVI and when to consult with vascular trauma.

Vascular Trauma Service Consults

Tiger: STC Trauma Vascular/Endovascular Consults OR
Call the TRU (8-8869) and ask to contact the on-call vascular trauma surgeon.
Place Epic order Consult to Trauma Vascular
Emergent - any time of day or night (fellow or attending only)
Urgent - 0800 – 1700 any day

Criteria for Screening[1]

"Shan scan"
If no Shan scan done: Denver Criteria

Imaging and Imaging Schedule

Follow-up imaging should consist of a CTA Head and CTA Neck
Imaging schedule: 48-72 hrs; 2-4 weeks; 3 months; 12 months

Anti-Platelet

Low ASA – Aspirin 81 mg qD
ASA – Aspirin 325 mg qD
Plavix – Clopidogrel 75 mg qD

Carotid or Vertebral Artery Injury

Grade	Description	High Risk Features*	Management[2.3]	Follow-Up[2]
I	Luminal irregularity or dissection with <25% luminal stenosis	Progression of lesion grade on rpt CTA	**Initial therapy**: Start low ASA **Resolved**: Stop ASA when resolved on imaging **Stable**: Stop ASA after 3 months **High risk features only**: **urgent** vascular trauma consult	Follow imaging schedule for 3 months unless resolved sooner. Stop therapy if stable/resolved at 3 months.
IIa	Dissection with 25-50% stenosis			
IIb	Dissection with >50% stenosis	Progression of lesion grade on rpt CTA Multiple injured arteries (grade IIb or higher)	**Initial therapy:** Start ASA **Resolved**: stop ASA when resolved on imaging **Stable**: switch to low ASA at 3 months **High risk features only: urgent** vascular trauma consult	Follow imaging schedule for 12 months unless resolved sooner. Continue low ASA for life
III	Pseudoaneurysm	Progression of lesion on rpt CTA Multiple injured arteries (grade IIb or higher); pseudoaneurysm >5 mm size; associated stenosis >50%	**Initial therapy**: Start ASA and Plavix **Resolved**: stop all therapy when resolved on imaging **Stable:** switch to low ASA at 3 months **High risk features only**: **urgent** vascular trauma consult.	Follow up in Trauma Vascular Clinic Follow imaging schedule for 12 months unless resolved sooner. Continue low ASA for life
IV	Vessel occlusion	Progression of lesion on rpt CTA Multiple injured arteries (grade IIb or higher)	**Initial therapy**: Start ASA and Plavix; **urgent** endovascular trauma consult **Resolved**: stop all therapy when resolved on imaging **Stable**: switch to low ASA at 3 months **High risk features only**: **emergent** vascular trauma service consult	Follow up in Trauma Vascular Clinic Follow imaging schedule for 12 months unless resolved sooner. Continue low ASA for life
V	Vessel transection	All transections are high risk	**Emergent vascular trauma service consult**	Lesion specific, per vascular trauma service.

All symptomatic lesions are considered high risk and Trauma Vascular should be consulted emergently.
[2] If a patient undergoes stent placement, treatment will be dictated by Trauma Vascular.
[3]If recommended therapy cannot be initiated, Trauma Vascular should be consulted.

Intervention

Intervention for BCVI is infrequent and consists of a wide range of treatment modalities designed to balance the need for cerebral perfusion, reduction of thromboembolic stroke risk, and minimize bleeding complications. Moreover, the patient's larger injury profile must be taken into account. Intervention can therefore only occur as a result of close collaboration between multiple services.

Tailored Management

A single pathway of medical management that applies to all trauma patients is impractical. Although the above provides indications for antiplatelet/anticoagulation therapy, other injuries may make such treatment contraindicated. Discussion with the vascular trauma service regarding other pathways for diagnosis, management and surveillance of these patients is welcomed.

[1]Denver Criteria for Screening

For patients who do not undergo Shan scan (i.e. transfers from outside hospitals who come with imaging already complete), please use the following list of criteria when considering the need for dedicated CTA Head/Neck to rule out BCVI:

- Arterial hemorrhage
- Cervical bruit
- Expanding cervical hematoma
- Focal neurologic deficit
- Neurologic examination incongruous with head CT scan findings
- Stroke on secondary CT scan
- High energy transfer mechanism with:
    - Le-Fort II or III fracture
    - Cervical spine fracture patterns: subluxation, fractures extending into the transverse foramen, and fractures of C1-3
    - Basilar skull fracture with carotid canal involvement
    - Petrous bone fracture
    - Diffuse axonal injury
    - Near hanging with anoxic brain injury
    - Suspected cervical spine fracture any level
    - All head-on MVC

[1]This is based on:

Bensch FV, Varjonen EA, Pyhältö TT, Koskinen SK. Augmenting Denver criteria yields increased BCVI detection, with screening showing markedly increased risk for subsequent ischemic stroke. Emerg Radiol. 2019 Aug;26(4):365-372. doi: 10.1007/s10140-019-01677-0. Epub 2019 Feb 12. PMID: 30756247; PMCID: PMC6647420.

Farhat-Sabet A, Lauerman M, Chavez A, Lloyd J, Scalea T, Stein D. Blunt Cerebrovascular Injury Screening Criteria Should Include Motor Vehicle Crash Characteristics. Am Surg. 2021 Mar;87(3):390-395. doi: 10.1177/0003134820951475. Epub 2020 Sep 29. PMID: 32993322.