

Blunt Cerebral Vascular Injury

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Disclosures

- None



Learning Objectives

Discuss	Discuss Blunt Cerebrovascular injuries
Discuss	Discuss management
Discuss	Discuss diagnosis
Discuss	Discuss treatment options



Background

- **Incidence:** BCVI affects approximately 1 in 1000 hospitalized trauma patients, with an increased detection rate due to advances in non-invasive imaging (Biffi et al., 2020).
- **Morbidity & Mortality:** Neurologic morbidity can reach 80%, with mortality approaching 40% (Kim et al., 2020). The annual risk of stroke is 20%, but this can be reduced to 1% with appropriate antiplatelet and anticoagulation therapies (Murphy et al., 2021).
- **Risk Factors:** Common mechanisms include high-energy trauma, such as motorcycle accidents, and specific injuries like cervical spine fractures and severe blunt force trauma to the neck (Brommeland et al., 2019).



Initial Evaluation

- All patients with suspected BCVI should undergo a CT Angiogram (CTA) of the neck (Biffl et al., 2020).

Indications for Imaging

- **Trauma Mechanisms:**
 - High-energy transfers (e.g., motorcycle accidents)
 - Seat belt marks or soft tissue neck injuries
 - GCS < 8 (not explained by head CT)
 - LeFort II or III facial fractures
 - Mandibular or skull base fractures (e.g., petrous)
 - C-spine fractures (C1-C7) and related injuries
 - Significant thoracic blunt force trauma
 - Blunt cardiac injuries



- **Signs/Symptoms:**

- Arterial bleeding from head, nose, mouth, or neck
- Audible neck bruits
- Neck hematoma
- Focal neurological deficits (e.g., TIAs, Horner's syndrome)
- Neurological findings inconsistent with head CT
- Stroke evident on CT or MRI



Imaging Protocol

- Obtain CTA of the neck.
- If CTA results are equivocal, consider a diagnostic angiogram if suspicion remains high (Kim et al., 2020).

Grading

- Use the Biffi classification system to categorize BCVI severity.

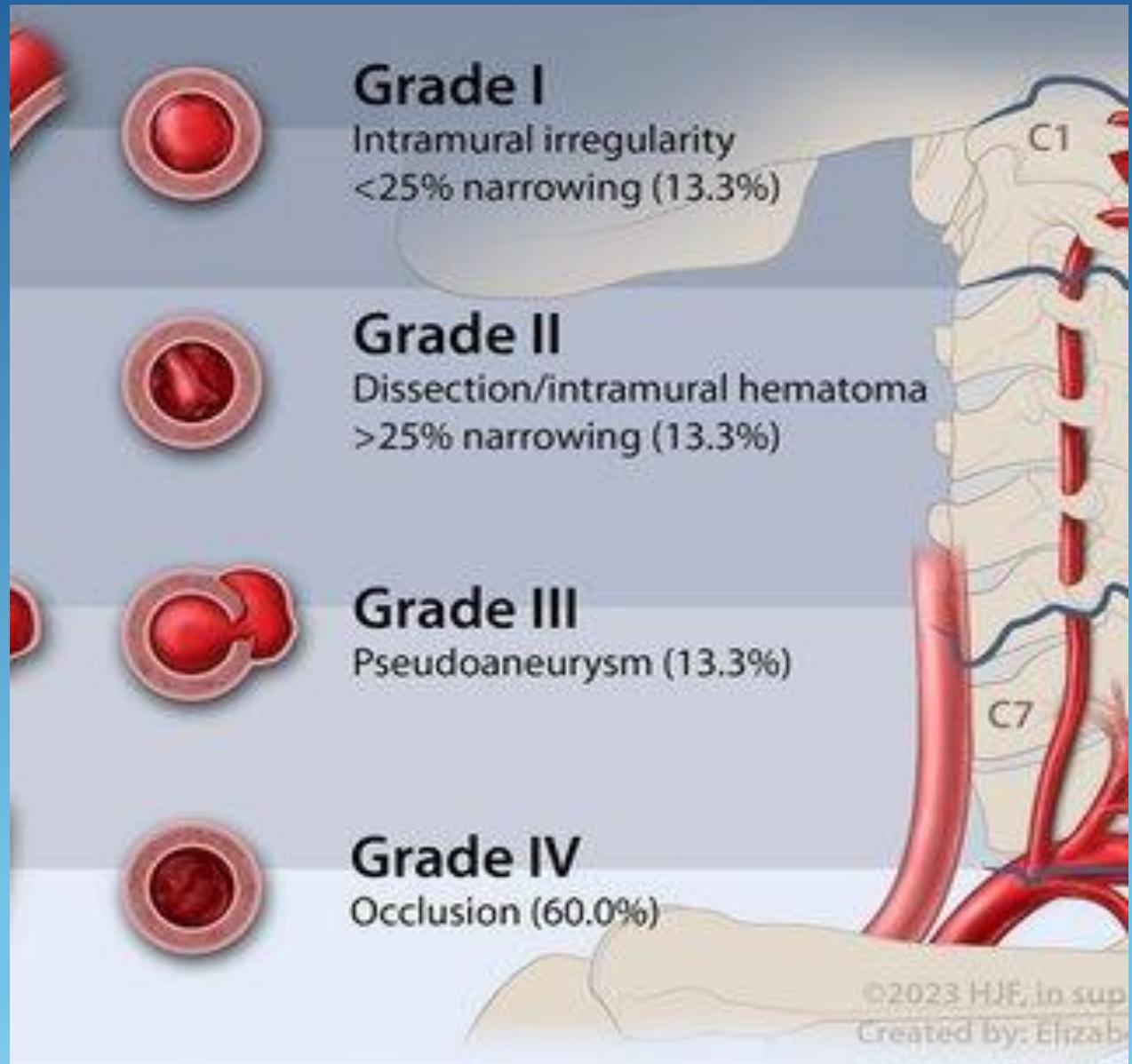
Consultations

- Refer to the Interventional Neurovascular Service as appropriate (Biffi et al., 2020).

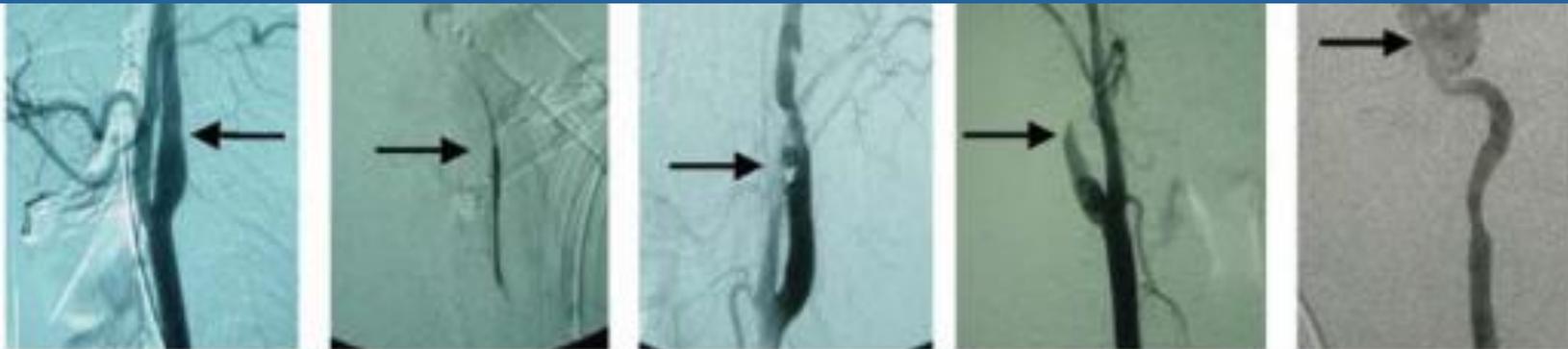


- **Biffl Classification System**
- The Biffl classification system is used to grade BCVI based on angiographic findings and clinical presentation. The classification is as follows:
- **Grade I:**
 - Minor intimal injury with no evidence of stenosis or occlusion.
 - Typically managed conservatively with antiplatelet therapy.
- **Grade II:**
 - Moderate intimal injury with <50% stenosis.
 - Antiplatelet therapy and close monitoring recommended.
- **Grade III:**
 - Severe intimal injury with >50% stenosis but no occlusion.
 - Antiplatelet therapy and potential interventional management required.
- **Grade IV:**
 - Complete occlusion of the vessel without collateral circulation.
 - May require interventional treatment, such as stenting.
- **Grade V:**
 - Transection of the vessel or major vascular injury.
 - Surgical intervention is typically necessary.

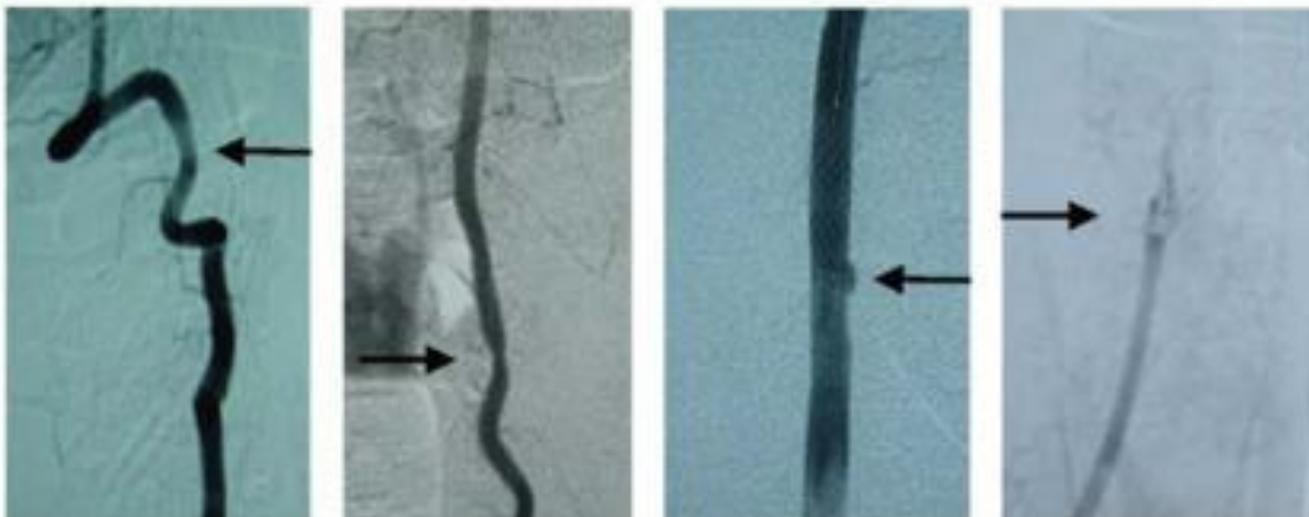




CAI



VAI



Grade I

Grade II

Grade III

Grade IV

Grade V



Management by Grade:

- **Grade I:**
 - Obtain MRI brain (stroke protocol).
 - Initiate antiplatelet therapy unless contraindicated.
 - Consider heparin infusion in high-risk bleeding patients.
 - Monitor via parenchymal imaging (MRI/CT) in 3 days.
 - Follow-up vascular imaging in 72 hours.
- **Grade II:**
 - Similar management as Grade I.
 - Consider Interventional Neurovascular consultation if symptoms persist or worsen.



01

Grade III:

- Antiplatelet therapy and Interventional Neurovascular consultation.
- Monitor closely; consider endovascular intervention if symptoms worsen.

02

Grade IV:

- Interventional treatment (e.g., stenting) is usually required.
- Consult with Interventional Neurovascular Service immediately.

03

Grade V:

- Surgical intervention required; refer to the appropriate surgical team.



Asymptomatic BCVI

- **Grade I:**
 - Initiate Aspirin 325 mg po/pr unless contraindicated.
 - Consider heparin if contraindicated; follow similar protocols for transition to Aspirin.
 - Follow-up imaging in 72 hours.
- **Grade II:**
 - Similar to Grade I.
- **Grade III - V:**
 - Consult Interventional Neurovascular Service and follow similar protocols for antiplatelet therapy and imaging.



Disposition

- Admit all BCVI patients to the ICU for neuro checks every hour for at least 24 hours.
- Antithrombotic therapy should be initiated when feasible, with follow-up imaging performed in 72 hours.
- Patients must not be discharged until follow-up imaging demonstrates stable or resolved lesions.

Long-Term Management

- **Vertebral Artery Injury:**
 - Aspirin 325 mg daily for 3 months.
 - Follow-up imaging in 3 months and outpatient follow-up with Neurovascular and Trauma services.
- **Carotid Artery Injury:**
 - Similar management as vertebral injuries.



References

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