

# VERTEBRAL ARTERY INJURIES

## Epidemiology/Pathophysiology.

- Often associated w/ trauma.
  - May follow mild events such as sudden rotation or hyperextension of neck.  
Can occur from yoga, coughing or vomiting.
- ~0.1% of trauma patients (includes carotid & vertebral vessel injury).
  - >70% of vertebral artery injuries are associated w/ cervical spine fractures.
  - Majority are diagnosed after the development of secondary CNS ischaemia.
  - ~1% of asymptomatic patients of blunt trauma
  - up to 2.7% of patients w/ Injury Severity Score  $\geq 16$ .
- The vertebral arteries are susceptible to mechanical injury due to relationship to neighbouring bony structures & ligaments.
  - Most susceptible to injury at the entrance into the transverse foramen (C6) & at C1-2.
  - Occurs due to shearing forces at junctions between fixed & mobile segments.
  - Intimal disruption may lead to complete thrombotic occlusion, subintimal haematoma, dissection and pseudoaneurysm formation.
- Seen more frequently in people with underlying pathology of vessel wall.
  - eg. connective tissue disorders.
- Mortality 8-18%.

Diagnosis is often delayed [17-35% of patients do not develop neurological signs for > 24 hours].  
Concomitant head injury & intoxication can further delay diagnosis.

## Clinical Features.

- Headache
  - Frequently unilateral
  - Can occur days prior to neurological symptoms.
- Neck pain
- Vertigo & dizziness
- Nausea & vomiting
- Ataxia
- Cranial nerve palsies [esp. CN V, IX, X & XI]
- Horner's or Lateral medullary syndromes.
- Posterior circulation insufficiency
- Subarachnoid haemorrhage
- Ischaemic stroke (focal to global symptoms).

**Table 257-5 Conditions Associated with Blunt Cervical Vascular Injury**

Focal neurologic deficit or neurologic examination unexplained by head CT
Cerebral infarction visible on head CT
Cervical hematoma
Transient ischemic attack or stroke after blunt neck trauma
Horner and Wallenberg syndrome
Cervical bruit or thrill (particularly in young patients)
Massive epistaxis
Ecchymosis or abrasion (seat belt, near hanging or unexplained mechanism) with significant cervical edema or altered mental status
Basilar skull fracture
Le Fort II or III and complex mandible fractures from high energy mechanism
Diffuse axonal injury with Glasgow Coma Scale score $\leq 6$
Cervical spine fractures:
C1-C3
Fracture extending into the transverse foramen
Cervical subluxation

## **Investigations.**

The diagnosis of vertebral (or carotid artery) injury should be considered in any patient with focal neurological signs, especially after a normal CT-head.

- *Formal angiography*
  - Remains '*gold standard*'.
  - Risks include embolism, bleeding & reaction to contrast.
- *CT-angiography*
  - Multislice (8 or greater) just as good as formal angio.
  - Sn 97.7%, Sp 100% - compared to catheter angiography.
- *MRI*
  - Accurately diagnoses dissection, without risks associated with conventional angiography.
  - Provides other information also [eg. cerebral ischaemia, cord contusion, spinal ligamentous injury, size of thrombus].
- *Ultrasound*
  - Not adequate for screening. Poor sensitivity.

## **Who to screen ??**

Asymptomatic patients of significant blunt head trauma with;

- GCS  $\leq 8$
- Basilar skull fracture
- Diffuse axonal injury
- C-spine fracture:
  - C1-C3
  - Extension into foramen transversarium
  - Subluxation or rotational component
- Le Fort II or III facial fractures.
- Hanging w/ anoxic injury
- Facial haemorrhage
- Expanding neck haematoma.

## **How are they graded ??**

- *Grade I* - intimal irregularity w/ < 25% narrowing.
- *Grade II* - dissection or intramural haematoma (>25% narrowing).
- *Grade III* - pseudoaneurysm.
- *Grade IV* - vessel occlusion.
- *Grade V* - vessel transection with extravasation.

## **Treatment.**

Treatment modalities include surgery, anticoagulation & observation. Anticoagulation, antithrombotic therapy, and endovascular stenting have all been successful treatments in long-term treatment.

Treatment is often based on the above grading system.

- Grade I & II injuries should be treated w/ antithrombotic agents such as *heparin or aspirin*.
  - Heparin & antiplatelet therapy can be used with equivalent results.
  - Heparin started *w/out a bolus*.
  - Warfarin therapy should follow w/ target INR of 2-3 (for 3-6 months).
- Grade III injuries rarely resolve with observation or heparinisation.
  - Invasive therapy should be considered.
- Repeat imaging (CT-A) should be performed for grades I-III injuries at 7-10 days post-injury.

## **References.**

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