Vertebral Artery Injuries Associated with Cervical Spine Trauma

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Introduction
a. Incidence of vertebral artery injury (VAI)
   i. 0.5% of all trauma patients
   ii. 70% of VAI in blunt trauma has associated cervical fracture
   iii. 33%-39% of all cervical spine fractures
b. Impact of VAI difficult to predict
   i. Not all patients symptomatic
   ii. Variable symptomatology

II. Anatomy
a. 4 segments
   i. Most injuries from cervical trauma in V2 (foraminal segment)
b. Types of injury
   i. Intimal tear
   ii. Dissection
   iii. Pseudoaneurysm
   iv. Occlusion
   v. Transection

III. Injury Patterns
a. V2 segment (foraminal) most commonly injured
b. Mechanism
   i. Direct trauma (bone fragments)
   ii. Stretching (dislocation / subluxation)
c. Most common fracture / injury
   i. Transverse foramen
   ii. Subluxation or dislocation
   iii. Upper cervical injury (C1-C3)
d. Associated conditions
   i. Basilar skull fracture
   ii. Occipitocervical dissociation
   iii. Ankylosing Spondylitis / DISH
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<tbody>
<tr>
<td>TP / Foramen Transversarium</td>
<td>88%</td>
<td>25%</td>
<td>48%</td>
<td>8%</td>
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<td>-</td>
<td>17%</td>
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<tr>
<td>Facet Subluxation / Dislocation</td>
<td>-</td>
<td>40%</td>
<td>44%</td>
<td>21%</td>
<td>33%</td>
<td>-</td>
<td>63%</td>
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<td>Upper Cervical (C1-C3)</td>
<td>-</td>
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<td>/</td>
<td>18%</td>
<td>25%</td>
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I. Screening
   a. Modalities
      i. Digital subtraction angiography (gold standard)
      ii. CT Angiography
      iii. MR Angiography
   b. Criteria
      i. No definite established criteria
      ii. Varies by institution
      iii. East & West Trauma Assoc.’s criteria
         1. Includes evaluation for carotid, intracranial injuries
         2. Includes extraspinal indications
      iv. Screening all trauma patients not encouraged
         1. Cost
         2. Complications
         3. Low yield

   Criteria for Ordering CTA (Head & Neck)
   West Virginia University
   - Unexplained or incongruous central or lateralizing neurologic deficit
   - Evidence of acute cerebral infarct on Head CT
   - Glasgow Coma Scale score ≤ 8
   - Evidence of diffuse axonal injury
   - Facial fracture or Lefort type II or III fracture
     o Basilar skull fracture
     o Petrous fracture
     o Complex mandible fracture
   - Cervical spine injuries
     o Subluxation / dislocation
     o C1, C2, or C3 fracture
     o Extension through foramen transversarium
   - Cervical spinal cord injury
   - Hanging injuries
   - Major thoracic injury or 1st rib fracture
     o Thoracic aorta or major vessel injury
     o Sternal fracture
     o Scapula fracture

II. Treatment
   a. Symptomatic VAI
      i. Anticoagulation / antiplatelet Rx
      ii. Thrombolysis
      iii. Endovascular procedures
      iv. Open procedures
   b. Asymptomatic VAI
      i. Anticoagulation / antiplatelet Rx
         1. Low dose heparin, ASA 325mg, Clopidogrel
      ii. Observation
   c. Repeat imaging
      i. 7-10 days
      ii. 3 months
III. Outcomes

a. Highly variable
   i. Many clinically silent
   ii. Delayed presentation
   iii. Does not correlate with presenting symptoms or fracture

b. Vertebrobasilar insufficiency
   i. Bilateral VAI

c. Embolic stroke
   i. Posterior circulation (brainstem, cerebellum, posterior hemispheres, thalamus)
   ii. Nonocclusive injuries (dissection, pseudoaneurysm)

d. PICA stroke
   i. Lateral medullary syndrome (Wallenberg syndrome)

e. Spinal cord ischemia
   i. Anterior spinal artery
   ii. Intersegmental arteries

f. Mortality rates 0-33%

 g. Impact on surgical treatment of cervical injury
References


