Cervical Arterial Dissection

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Presentation
• 70-86% of patients with ICAD
• 90-96% of patients with VAD
  – present with stroke or TIA
  – mechanism is usually embolic rather than hemodynamic

Cervical artery dissection (CAD)
• Cervical artery dissection (CAD) annual incidence of 2.6–3.0 per 100,000
  – 2 % of all ischemic strokes
  – 10 to 25 % in young and middle-aged patients
Dissection

• 3 types
  – Spontaneous
  – After trivial trauma
  – Obvious trauma
• Most common age: early 5th decade; think of this dx in young and middle aged adults and kids
  – (Proenzale et al, Emergency Radiology 2009)

Hereditary Arteriopathy

Arteriopathy causing arterial dissection has been reported in:
• Ehlers-Danlos syndrome type IV
• Marfan’s syndrome
• Osteogenesis Imperfecta type I
• ADPKD
• Pseudoxanthoma Elasticum
• These are identified in 1 to 4% of patients with spontaneous CAD

Nonspecific underlying arteriopathy

• Fibromuscular dysplasia (FMD) is a non-atherosclerotic, non-inflammatory disease that mainly involves the renal, carotid and vertebral arteries.
  – Uncertain etiology
  – Prevalence of FMD in patients with CAD:
    >12-18% in ICAD
    >2-8% in VAD
**Fibromuscular Dysplasia**

**sICAD vs sVAD**

- Differences and Similarities Between Spontaneous Dissections of the Internal Carotid Artery and the Vertebral Artery
  - Von Babo, M et al., Stroke 2013;44:1537-1542

  - N.B.: Approx 1000 pts, of which 57 excluded b/c of co-existing sICAD and sVAD

**sICAD – More often:**

- Pulsatile Tinnitus (11% vs 3%)
- More severe ischemic strokes (NIHSS 10 vs 5)
- Cranial Nerve Palsy (9% vs 0%)
- Horner’s Syndrome (47% vs 0%)
  - N.B. Horner’s can be seen in up to 27% sVAD (central in origin from brainstem ischemia)

**sVAD – More often:**

- Bilateral (15% vs 7.6%)
- Thunderclap (9.2 vs 3.6%)
- SAH (6.0% vs 0.6%)
- Neck Pain (66% vs 34%)
- Recurrent TIA/Ischemic Stroke (4.8% vs 1.1%/2.8% vs 0.7%)
- Favorable outcome (mRS 0-2) at 3 months after ischemic stroke (89% vs 58%)
Dissection

• Spontaneous/Trivial Trauma (Carotid)
  – 60% extracranial only
    • Usually few cm above bifurcation (spares bulb)
  – 20% intra & extracranial
  – 20% intracranial only
    • When intracranial, may present as SAH

• Increase external diameter of vessel is a frequent finding in dissection, but this will be missed on catheter angiography
• ICA’s usu. symmetric in size. If asymmetric, check intracranial for hypoplasia/aplasia of A1 segment ACA.

DUS read as no stenosis but decreased caliber distal LICA
Dissection- Pitfalls

- MR Pitfalls
  - Intramural hematoma may not be hyperintense on T1 in first couple of days
  - If fat-sat is not used, can miss T1 bright hematoma
  - Turbulent flow may simulate dissection
  - Intraluminal clot/ hemorrhagic plaque

MR Sequences useful for Dissection

- Ax T1 FS (with sup and inf presat pulses)
- 2D/3D TOF MRA
- CE MRA
- FLAIR
- T2
- DWI
- GRE

At Skull Base  Near  Bifurcation
Dissection- Pitfalls

- CTA
  - Relies on correct timing of bolus
  - Intramural hematoma may easily be missed as it appears as non-specific wall thickening
  - Easily missed if there is absent or little luminal narrowing

4 vessel dissection
Dissection

- Spontaneous/Trivial Trauma (Vertebral)
  - 80% extracranial only
    - V3 segment most common but NOT exclusive site
  - 10% intra and extracranial
  - 10% intracranial only
    - With any intracranial component, may present as SAH

Vertebral arteries may be quite asymmetric in caliber normally- transverse foramen diameter NOT helpful- may occupy 8-85% of foramen

However, vert art diameter should be relatively constant level to level (Sanelli et al, JCAT 2002 462-470)
Dissection

- Left vert. art. dominance > co-dominance > right vert. dominance
- Basilar artery usu. deviates away from dominant vert
Other Pitfalls in sVAD

- Vertebral venous plexus surrounding vertebral arteries may be somewhat hyperintense on T1 (esp at 3T imaging)
Vert dissection seen on spine
CTA vs MRA/ MRI for Spontaneous Dissection

- *Comparison of Test Performance Characteristics of MRI, MRA, CTA in the Diagnosis of Carotid and Vertebral Artery Dissection: A Review of the Medical Literature*; Provenzale, JM and Sarikaya, B
  - AJR October 2009

CTA vs MRA/ MRI for Spontaneous Dissection

- Conclusion: “Test characteristics for MR techniques such as MRI and MRA were relatively similar to those for CTA in diagnosis of carotid and vertebral artery dissection.”

Management- Medical

- Antithrombotic Rx-based on:
  - Most ischemic events are thromboembolic
  - Most dissections will heal
  - Significant # of dissection related occlusions will re-canalize while on antithrombotic Rx
Prognosis for Cervical Artery Dissections

- Neurologic outcome good to excellent 70-80%
- Mortality 3-7%
- Subsequent ischemic stroke 0.3%/yr
- Recurrent dissection 0.3%/yr
- Rare for localized cervical dissecting aneurysms to cause subsequent problems
  - Approx 2/3 will stay same; 1/3 will decrease or resolve

Collet Sicard Syndrome Cr N IX-XII
Management- Endovascular

- Consider when:
  - Acute ischemic stroke caused by occlusive dissection
  - Continued ischemic sx’s despite antithrombotic Rx
  - Mass effect from dissecting aneurysm
  - Significant enlargement of dissecting aneurysm
  - Rupture of a dissecting aneurysm

Dissection-Catheter Angiography

- Findings
  - Luminal stenosis or occlusion- not specific
  - Pseudoaneurysm
  - Pearl and string
  - Dual lumen (seen in only 10%)

Dissection with endovase rx

DS
Intracranial Dissections

- Intradural arteries:
  - Thinner media and adventitia
  - Lack external elastic lamina
  - Thicker internal elastic lamina
  - Diminished vasa vasorum
  - >Increase risk of dissecting aneurysm and SAH
Conclusions

- MRI/ MRA preferred for suspected sCAD, particularly ICA (no radiation, ability to diagnose stroke on DWI)
  - CTA complimentary in equivocal cases, especially sVAD
- CTA preferred for suspected traumatic vascular injury/ dissection or those presenting as acute stroke protocols