Management of cervicocephalic arterial dissection

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Definition

- Disruption of arterial wall, either at level of intima-media or media-adventitia, due to hemorrhage within wall
Classical triad for extracranial ICA dissection
1. Ipsilateral headache
2. Facial or neck pain
3. Partial Horner’s syndrome (Miosis and ptosis only because interrupt postganglionic sympathetic fibers)

CVA – especially in the young or after trauma; CVA can be seen in up to 40-60% of patients w/dissection

TIA

Local compressive syndromes, e.g. IX, X, XII

SAH – most commonly with intracranial vertebral artery dissection
Epidemiology

- Responsible for 0.4-2.5% of all stroke, particularly in patients <40 yrs old

- Average incidence of dissection
  - 2-3 per 100,000 population (ICA)
  - 1-1.5 per 100,000 population (vertebral)

- Stroke incidence due to dissection
  - Infarct 40-60 %
  - TIA 20-30 % (Schievink et al 1994)

- Recurrent stroke after dissection
  - ~1% per year, thought to decrease rapidly
Etiology

- Spontaneous
- Traumatic, e.g. blunt carotid injury, penetrating injury
- Connective Tissue Disorder, e.g. Marfan’s, Ehrlos Danlos Type IV, FMD, ADPCKD, OI Type I, Cystic medial necrosis
- Chiropractic Manipulation
Pathophysicsiology

- Intimal tear
- Mural hematoma
  - Stenosis – from formation of mural hematoma at level of intima-media
  - Pseudoaneurysm – from formation of mural hematoma at level media-adventitia
Pathophysiology of morbidities due to dissection

- **Horner’s syndrome**
  - Ptosis and miosis from interruption of postganglionic sympathetic fibers traveling on internal carotid artery

- **SAH**
  - Pseudoaneurysm rupture – intracranial dissection with bleeding and hematoma formation at media-adventitia interface leads to bleeding into subarachnoid space

- **CVA/TIA**
  - Hemodynamic compromise from stenosis vs. microemboli?
  - Implications for treatment!
Radiographic findings

- Stenosis – irregular, seen in areas not prone to stenosis from atherosclerosis, e.g. distal to carotid bifurcation
- String sign
- Occlusion
- Pseudoaneurysm - fusiform
- Crescent/Egg yolk – narrowed, eccentric flow void surrounded by hyperintense, crescentic signal
- Double lumen
- Intimal flap
- Mural hematoma
Radiographic findings – stenosis, string sign
Radiographic findings – CVA, occlusion
Radiographic findings - Crescent/Egg yolk
Radiographic findings – SAH, pseudoaneurysm
Treatment

- Do nothing
- Secondary stroke prevention with anticoagulation – debate as to choice of anticoagulant
- Thrombolysis for occlusion
- Arterial reconstruction/repair via open surgery, stenting and/or coiling of stenosis or flap or pseudoaneurysm
Argument in favor of anticoagulation

- Dissection responsible for significant amount of stroke, particularly in young population
- Stroke from dissection has been associated with death
- Dissection and stroke can recur after initial dissection
- Most dissections/occlusions recanalize
Arguments against anticoagulation

- Anticoagulation in acute stroke can increase the rate of symptomatic hemorrhagic transformation.
- Dissections can propagate/involve intracranial vessels which can lead to SAH which is a contraindication to anticoagulation.
- Anticoagulation can favor expansion of mural hematoma.
- Recurrence rate of stroke after dissection is low (<1% per year) and spontaneous recanalization rate is high.
Arguments in favor of heparinization and warfarin

- Transcranial doppler has shown increased frequency of high-intensity transient signals (HITS) in patients with recurrent strokes/TIAs
- Most strokes from dissection are cortical and subcortical as opposed to watershed
- Distal branch emboli have been found in dissection associated stroke
- Analogous to risk of embolus from Afib being reduced with warfarin > with antiplatelets, coumadin would be the preferred means of anticoagulation
Arguments in favor of antiplatelets

- Hyperacute anticoagulation in acute stroke can increase the rate of symptomatic hemorrhagic transformation
- Increased anticoagulant effect of heparin/warfarin may allow expansion of intramural hematoma
- CARESS trial showed reduced HITs with ASA and plavix
- Ease of administration, e.g. no blood testing required
- Lower risk for bleeding complications
Studies comparing anticoagulants in cervicocephalic dissection

There is NO level I evidence supporting the use of warfarin or antiplatelets in cervicocephalic dissection
Studies comparing anticoagulants in cervicocephalic dissection

- **Wahl, et al**
  - *Journal of Trauma, 2002*
  - Retrospective review of 22 cases of blunt carotid injury with dissection
  - No difference in neurological outcome observed between pts receiving warfarin vs. antiplatelets

- **Canadian Stroke Consortium**
  - *Stroke, 2003*
  - 105 patient series
  - Annual recurrence rate for CVA, TIA, or death was higher in ASA group than with warfarin group, but not statistically significant

- **Arauz, et al**
  - *Cerebrovasc Dis, 2006*
  - 130 patient series
  - No significant differences found in recurrent ischemic stroke in patients receiving aspirin vs. warfarin
Studies comparing anticoagulants in cervicocephalic dissection

- Edwards, et al
  - *Journal of the American College of Surgeons, 2007*
  - Retrospective review of 110 patients
  - No difference in functional outcome in patients receiving warfarin or antiplatelets

- Engelter, et al
  - *Stroke, 2007*; also published as Cochrane Review
  - “No reliable comparisons of antiplatelets or anticoagulants with control were available”
  - Meta-analysis of 26 studies with 327 patients
  - The likelihood of death did not differ between warfarin and antiplatelet groups
  - The likelihood of being dead or disabled did not differ between warfarin and antiplatelet groups
Conclusion

- Dissection remains a significant cause of morbidity and mortality in a young population.
- Strategies for stroke prevention in dissection remain empiric rather than evidence based.
- The exact pathophysiology of stroke after dissection remains unclear.
- A randomized, case-controlled study of anticoagulation with coumadin vs. antiplatelet agents is:
  1. Necessary
  2. Warranted, and
  3. Ethical.
Bibliography