

# 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

# Presentation

- 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, Ehrlor Danlos Type IV, FMD, ADPCKD, OI Type I, Cystic medial necrosis
- Chiropractic Manipulation

# Pathophysiology

- 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

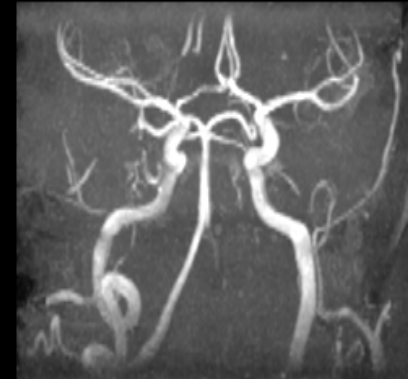
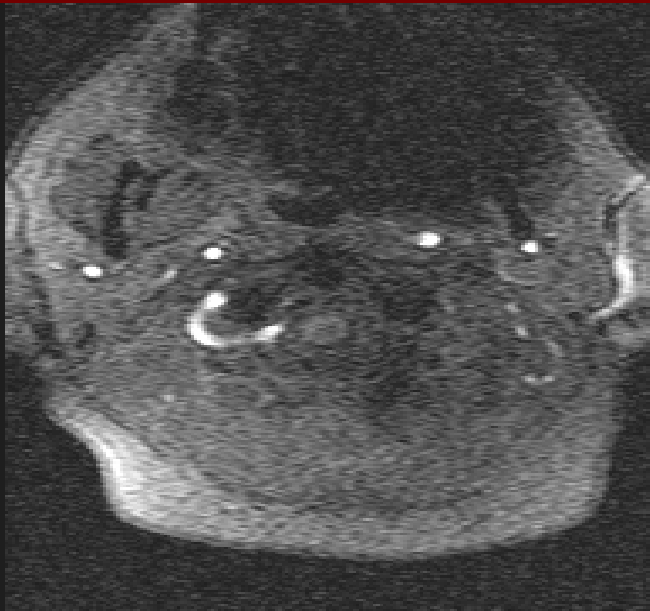
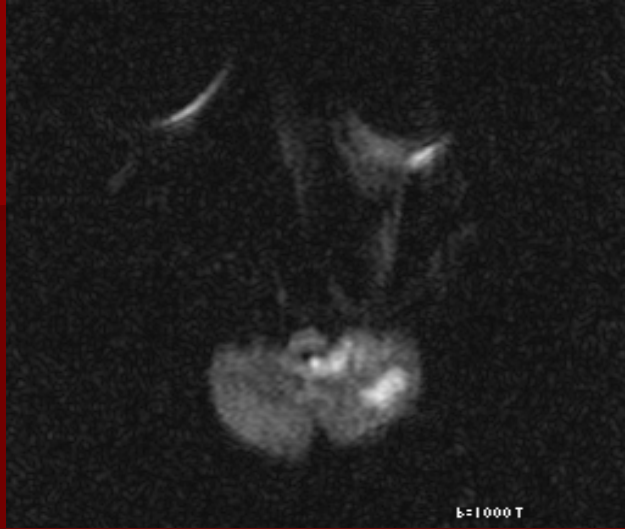
- Stenosis – irregular, seen in areas not prone to stenosis from atherosclerosis, e.g. distal to carotid bifurcation
- String sign
- Occlusion
- Pseudoaneurysm - fusiform
- Crescent/Egg yolk – narrowed, eccentric flow void surrounded by hyperintense, crescentic signal
- Double lumen
- Intimal flap
-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

# Radiographic findings – stenosis, string sign



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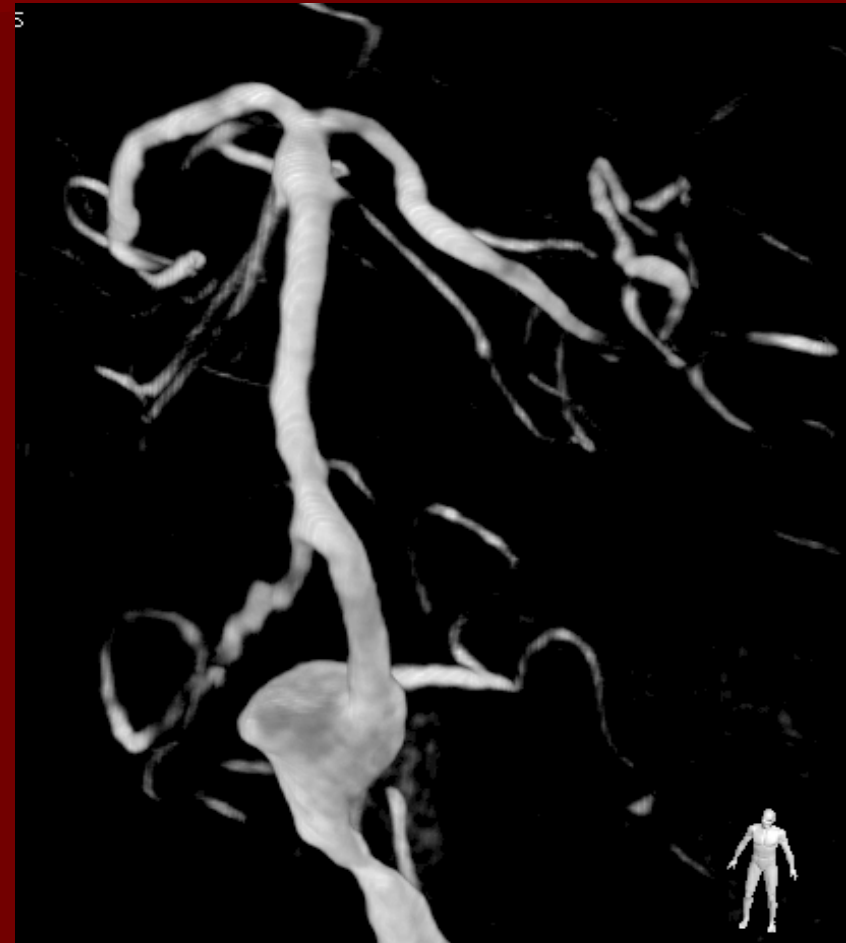
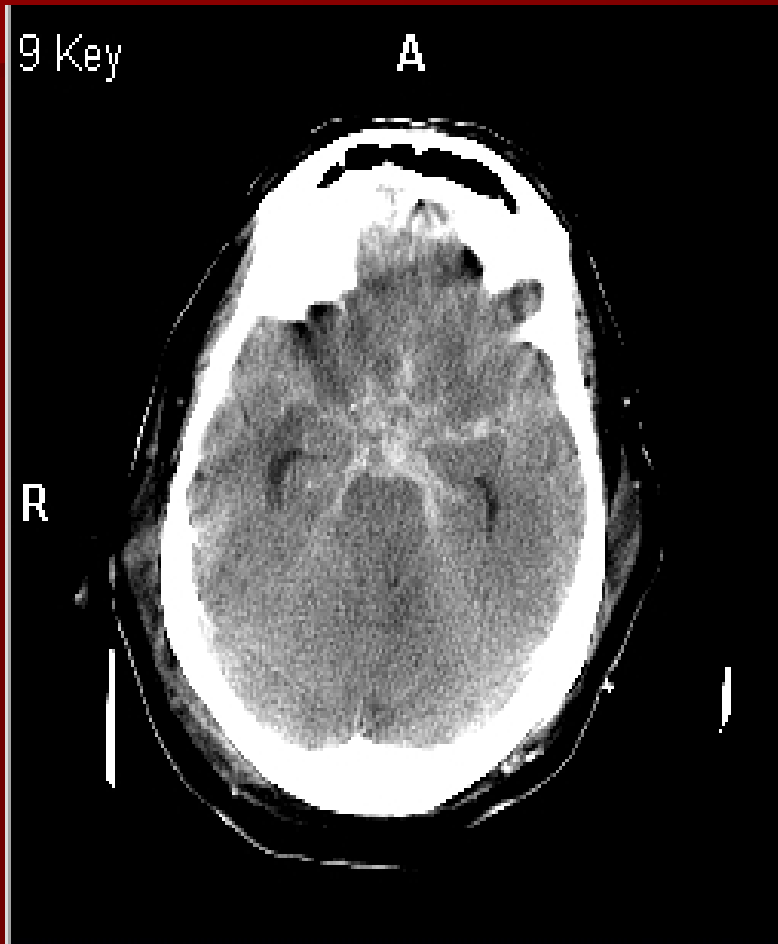
# Radiographic findings – CVA, occlusion



# 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