Traumatic Carotid Cavernous Fistula

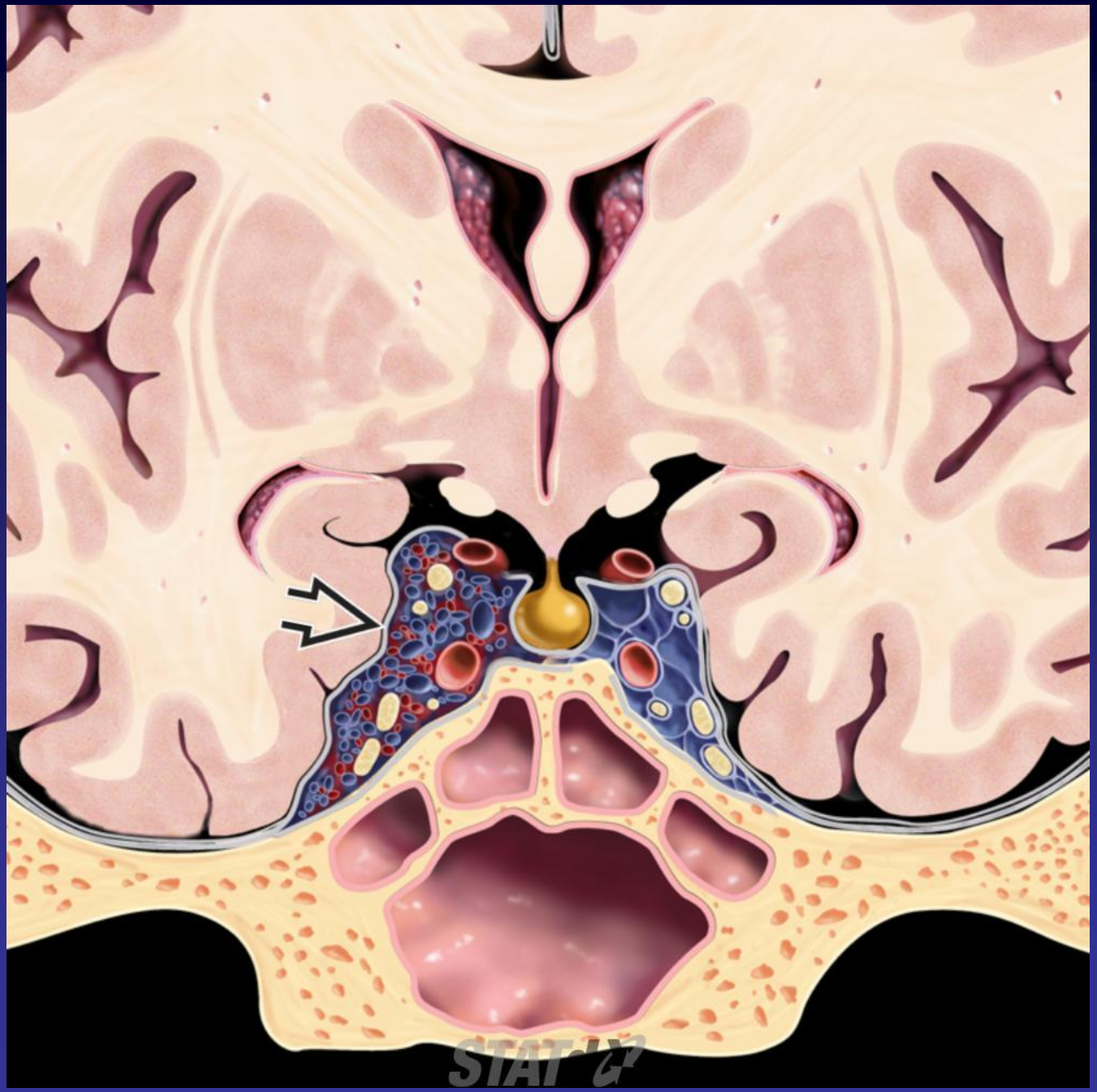
- Direct carotid cavernous fistula (CCF), high-flow CCF
- Single-hole tear/transection of cavernous internal carotid artery (ICA) with arteriovenous shunt into cavernous sinus (CS)
- **Image Interpretation Pearls**
  - Enlarged SOV and CS, proptosis, intraorbital edema
- **Reporting Tips**
  - CT/MR may be suggestive, but DSA is required for definitive diagnosis and treatment

General Features

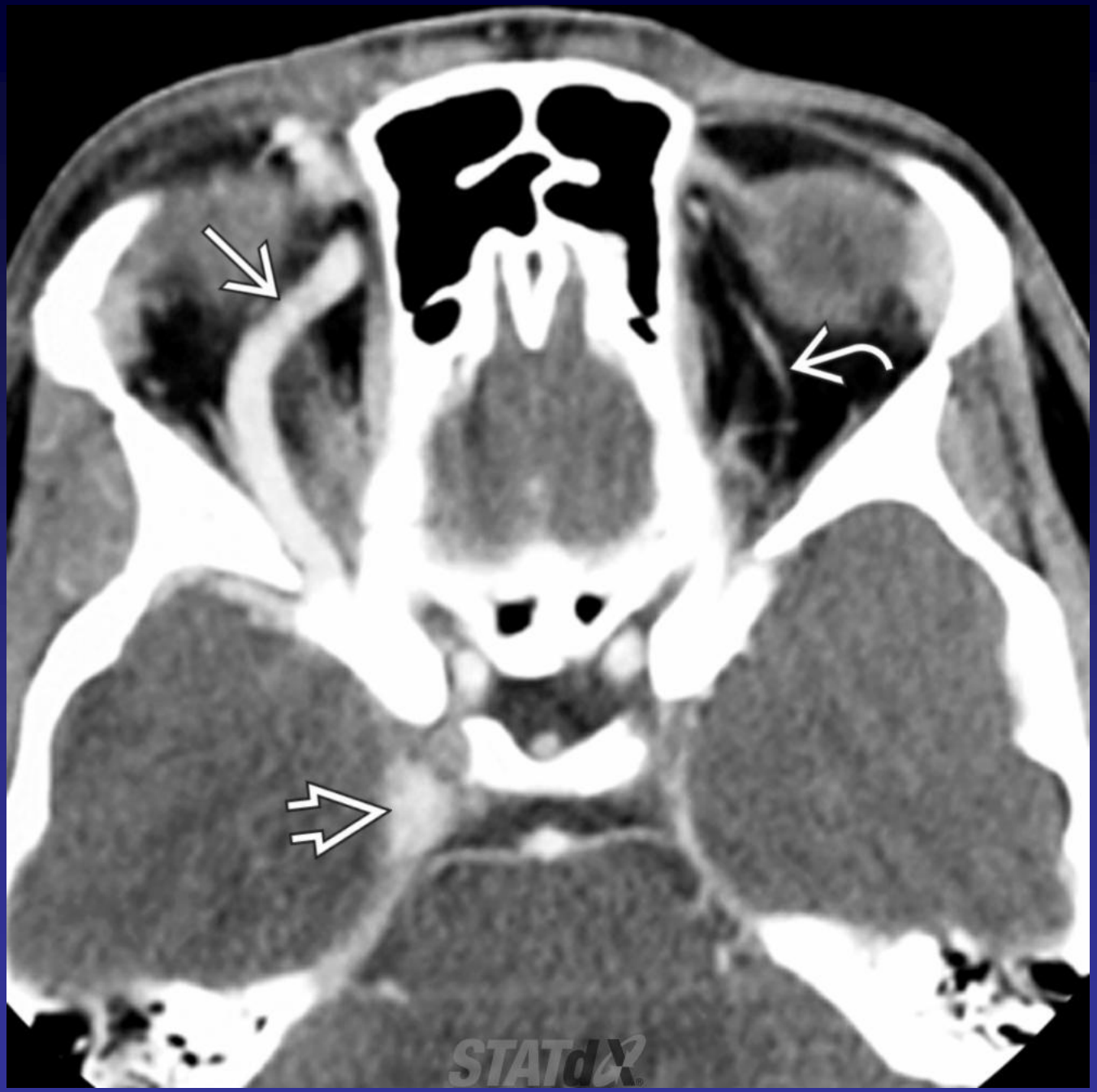
- **Etiology**
  - Skull base fracture with bony fragment injuring ICA
  - Stretch injury of vessel wall between fixed points at foramen lacerum and anterior clinoid process
- **Associated abnormalities**
  - Arterialized flow in CS with retrograde venous reflux
    - Superior/inferior ophthalmic veins → proptosis, chemosis, ↑ intraocular pressure → ↓ retinal perfusion pressure → blindness
    - Cortical veins → increased SAH risk
  - Reduced antegrade flow in ICA beyond fistula → hemispheric ischemia

Clinical Issues

- Bruit, pulsating exophthalmos, orbital edema/erythema, ↓ vision, glaucoma, headache
- Hemispheric ischemia if ↓ flow in ICA beyond CCF
- Focal deficits → cranial nerves 3-6
- Endovascular treatment options include
  - Transarterial-transfistula balloon embolization
  - Transvenous embolization
  - Pipeline/covered stent placement
  - ICA sacrifice



Coronal graphic depicts a carotid cavernous fistula (CCF). The right cavernous sinus (black open arrow) is enlarged by numerous dilated arterial and venous channels.



CECT scan shows classic findings of CCF. The right cavernous sinus (white open arrow) is enlarged and the ipsilateral superior ophthalmic vein (white solid arrow) is more than 4x the size of the left superior ophthalmic vein (white curved arrow).