63 y/o woman presenting with headache and sudden onset of aphasia

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Acute ICH Secondary to Dural Arteriovenous Fistula
Acute parenchymal hematoma

Subarachnoid blood products
Hyperacute Blood Products

T1: isointense
T2: iso to hyper-intense

Abnormal Flow Voids
Time of Flight MRA shows arterialized veins.

Arterialized transverse sinus.
Left external carotid artery angiogram

- Enlarged middle meningeal and occipital artery branches
- Arteriovenous shunting into transverse sinus
- Cortical venous drainage due to transverse sinus stenosis
- Enlarged middle meningeal and occipital artery branches
Dural Arteriovenous Fistula

- Dural AVFs are acquired, pathological connections between dura supplying arteries and a dural venous sinus or cortical vein. Arteriovenous shunting through the fistula results in arterialized flow into the normally low pressure venous system, which may lead to hemorrhage.
- Usually seen in adults, middle age or older. Rare in children.
- Common symptoms for transverse sinus dAVF include:
  - Hemorrhage, including subarachnoid, subdural, or parenchymal
  - Pulsatile Tinnitus
  - Neurological deficits from venous hypertension
    - Focal deficit, seizures, encephalopathy, progressive dementia
Dural Arteriovenous Fistula

• MR imaging findings include:
  – T2/FLAIR: Enlarged flow voids; vasogenic edema
  – GRE: Microhemorrhages within brain parenchyma
  – Post contrast T1: dilated leptomeningeal and medullary vessels, venous ectasia, and parenchymal enhancement. Dural sinus occlusion or stenosis may also be seen.
  – MRA: Enlarged dural arteries; arterialized flow related signal in dural sinuses and cortical veins
Dural Arteriovenous Fistula

• Catheter-based cerebral angiography
  – Assess arterial supply (full 6-vessel study)
    • Predominantly ECA branches (MMA, ascending pharyngeal, occipital)
    • May also be supplied by meningeal branches from ICA, vertebral, PCA and SCA
  – Assess venous drainage pathway and flow direction
    • Which sinuses are involved
    • Anterograde or retrograde flow
    • Stenotic? Occluded?
  – Identify cortical venous drainage and ectasias
Dural Arteriovenous Fistula

- Classification based on location of shunt (dural or direct cortical vein) and presence or absence of cortical venous drainage (CVD)
  - Low grade fistulas, no CVD (Borden type I, Cognard type I or IIa)
    - Usually benign, low risk of ICH
    - Treated only if bothersome symptoms
  - High Grade Fistulas, +CVD (Borden type II and III, Cognard type IIb, III, IV, V)
    - Higher risk of ICH, usually treated
References

- Ollenschleger M. Acute left temporal lobe ICH secondary to dural arteriovenous fistula. Radiology Online (2021)