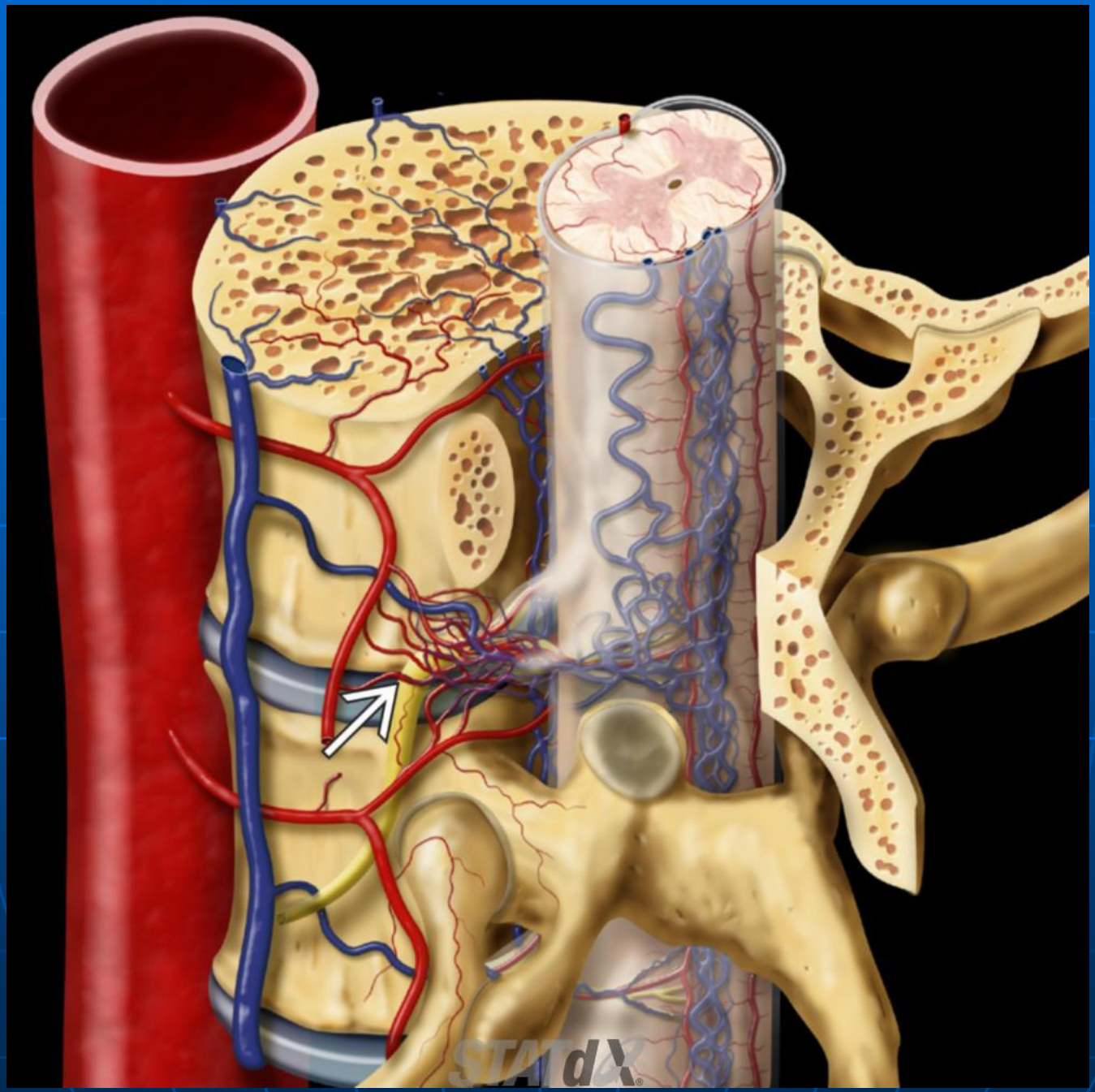
# Type 1 Vascular Malformation (dAVF)

- Synonyms:
  - Type 1 spinal AVF, dural AVF, dural fistula
- Venous hypertension from engorgement reduces intramedullary AV pressure gradient, causing reduced tissue perfusion and cord ischemia.
- Most common presentation is progressive lower extremity weakness with both upper + lower motor neuron involvement
- Very rarely presents with subarachnoid hemorrhage
- Middle-aged male with progressive lower extremity weakness exacerbated by exercise
- Persistent edema and enhancement of cord can occur even with successful clinical treatment of fistula



Sagittal oblique graphic of the thoracic cord shows site of a type 1 dural fistula at the dural root sleeve level (white solid arrow), with secondary dilatation of intradural venous plexus due to AV shunt.

Sagittal T2WI MR shows central cord T2 hyperintensity (edema) related to venous hypertension from the peripheral fistula shunting, which typically spares the cord periphery. There are multiple serpentine intradural flow voids from the arterialized and distended venous plexus (white solid arrow).

# MRI

- **T1WI**
  - Cord enlarged, hypointense
    - Abnormal small vessel flow voids on cord pial surface
- **T2WI**
  - Cord enlarged, hyperintense
    - Multiple small abnormal vessel flow voids (dilated pial veins) on cord pial surface
    - Edema spares cord periphery
    - Edema has flame-shaped margins superiorly and inferiorly
    - Low signal cord periphery on T2WI consistent with venous hypertensive myelopathy
- **STIR**
  - Cord enlarged, hyperintense signal from cord edema
- **T1WI C+**
  - Multiple enhancing serpentine veins on cord surface
  - May show patchy, ill-defined enhancement within cord
    - Enhancement can be pronounced
- **MRA**
  - Dynamic contrast-enhanced MRA capable of defining dilated intradural veins; may guide catheter angiography
  - Rarely MR imaging may be normal or demonstrate only cord hyperintensity with no flow voids in cases with catheter confirmed fistula

# Check List

- **Consider**
  - Dynamic enhanced MRA is first-line vascular imaging choice
  - Consider other types of spinal vascular malformation if evidence of intramedullary flow voids
  - Rarely, cervical type 1 dAVF may drain intracranially with high flow, varix formation, and SAH
  - Posterior fossa dural fistula may mimic cervical spinal type 1 fistula when intracranial fistula has caudal intraspinal venous drainage
- **Image Interpretation Pearls**
  - Imaging and clinical findings are frequently subtle or nonspecific; early diagnosis requires high level of suspicion