



Spinal Vascular Malformations

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Spinal Cord



Vascular Malformation

- Heterogeneous group of blood vessel (arterial and venous) disorders that affect the spinal cord parenchyma either directly or indirectly
 - Spinal AVMs
 - Dural AVF
 - Spinal Hemangiomas
 - Cavernous angiomas
 - Aneurysms

Etiology



- Not clear
- Spinal dural fistulas (AVF)
 - Elderly patients
 - Believed to be due to a traumatic occurrence
- Intradural parenchymal malformations (AVM,AVF)
 - Younger patients
 - Believed to be congenital



- **Spinal dural AVF**

- An abnormal connection between the spinal radicular artery and the medullary vein
- A slow-flow vascular malformation
- The high-pressure arterial flow from the radicular artery dilates the perimedullary venous system, causing venous stasis and hypertension
- The end result is venous outflow obstruction, hypoperfusion, and hypoxia of the spinal cord.



- **Spinal intradural AVMs/AVFs**

- Congenital lesions
- Consist of abnormal vasculature
- These lesions have recruit arterial blood vessels and thin-walled venous vessels
- Hemorrhage occurs when the high-flow arterial system overcomes the capacity of the abnormal venous vessels.

Spinal AVMs

Classification



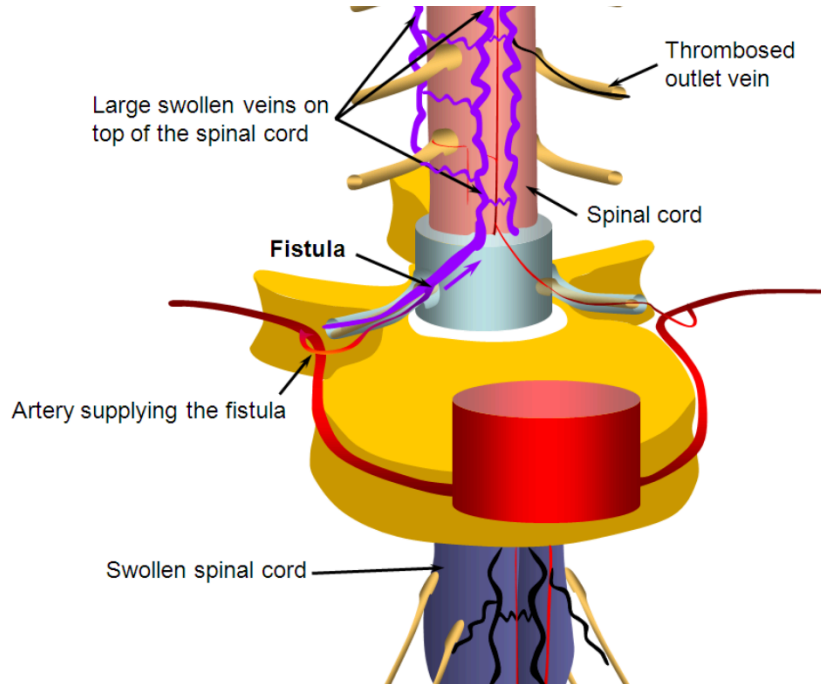
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- Type 1: Dural AVFs
- Type 2: Glomus or intramedullary AVM
- Type 3: Juvenile or metameric AVM
- Type 4: Perimedullary fistula

Anson & Spetzler, 1992

IBNC, March 14-18, 2014

Type 1 Dural AVFs



- 70%
- Radiculomeningeal artery feeds directly into a radicular vein
- Most common thoracolumbar region
- Venous congestion and hypertension, resulting in hypoperfusion, hypoxia, and edema of the spinal cord.

Type 2



Glomus or intramedullary AVM

– 20%

Consist of a nidus inside a short segment of spinal cord.

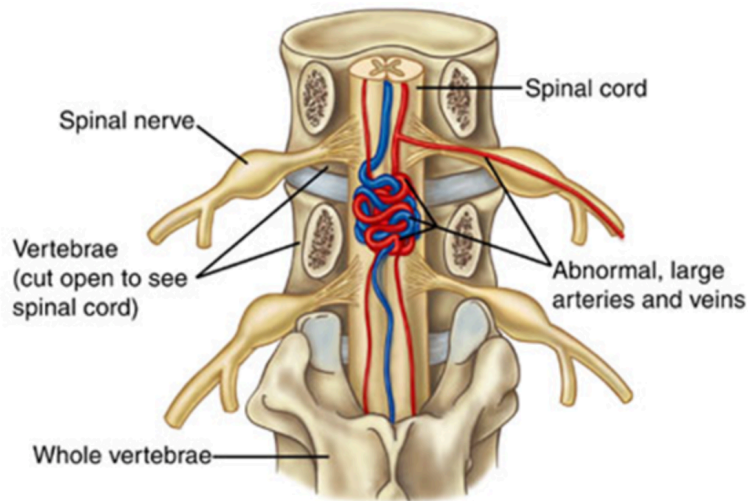
Multiple feeding vessels from the anterior and/or the posterior spinal circulation

Young age group

Dorsal cervicomedullary region

– Acute neurologic deterioration

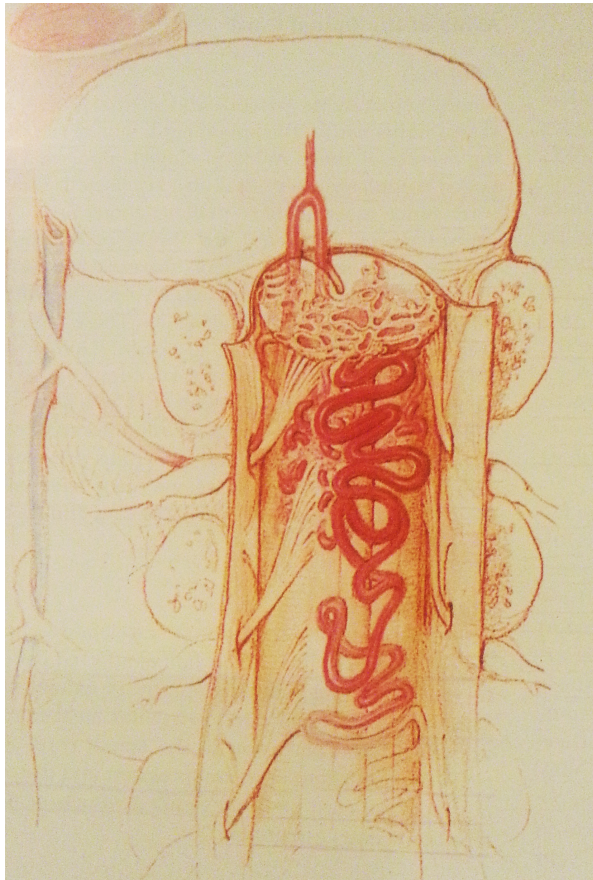
– Mortality rate is 17.6%, the rebleed rate is 10% within the first month and 40% within the first year



Type 3

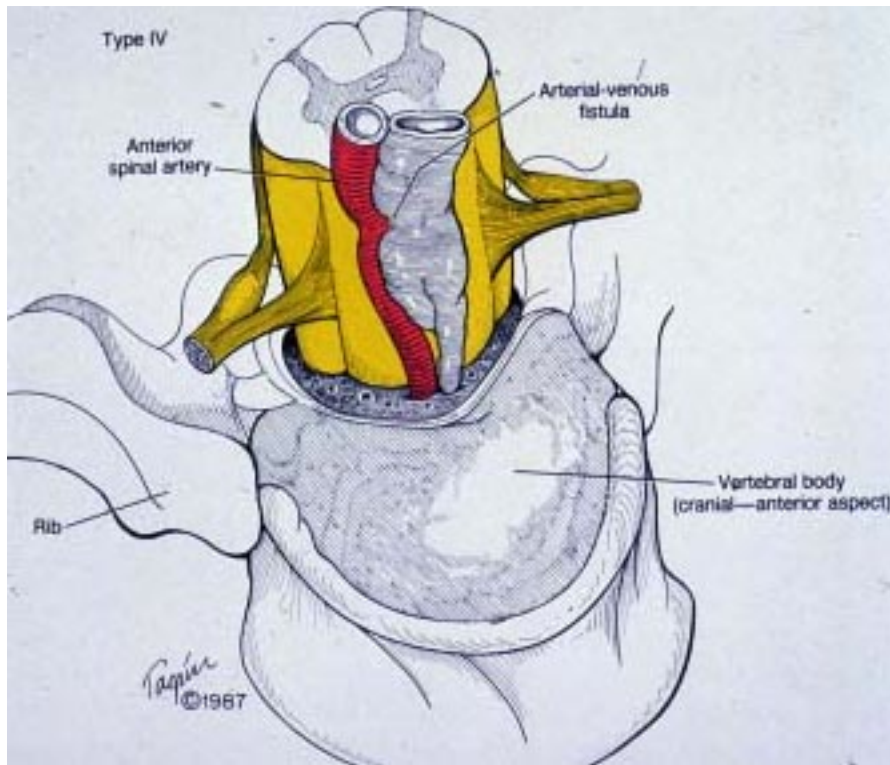


Juvenil or metameric AVM



- The spinal cord parenchyma feed by multiple vessels
- It can be both intramedullary and extramedullary in location
- Young adults and children

Type 4 Perimedullary fistula



- =Pial AVF
- Intradural extramedullary AVFs on the surface of the cord
- Direct communication between a spinal artery and a spinal vein
- Between 3rd and 6th decade

Spinal AVMs and AVFs



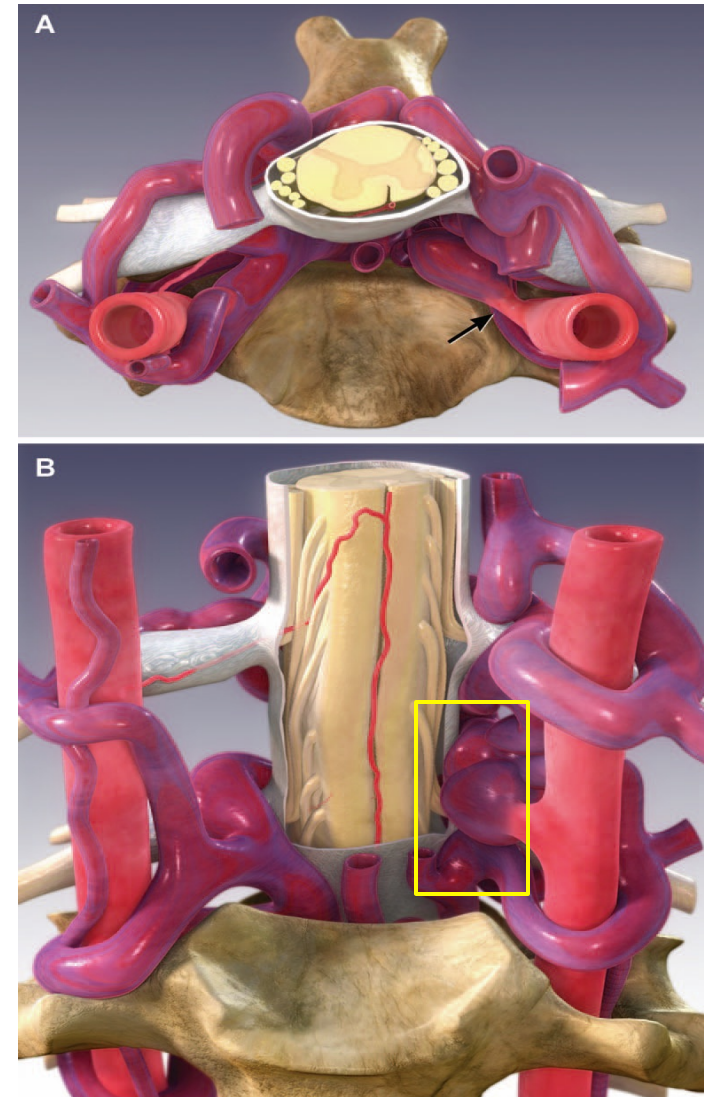
1. Extradural AVF
2. Intradural Dorsal AVF
3. Intradural Ventral AVF
4. Extradural-Intradural AVM
5. Intramedullary AVM
6. Conus medullaris AVM

Kim & Spetzler, 2006

1. Extradural AVFs



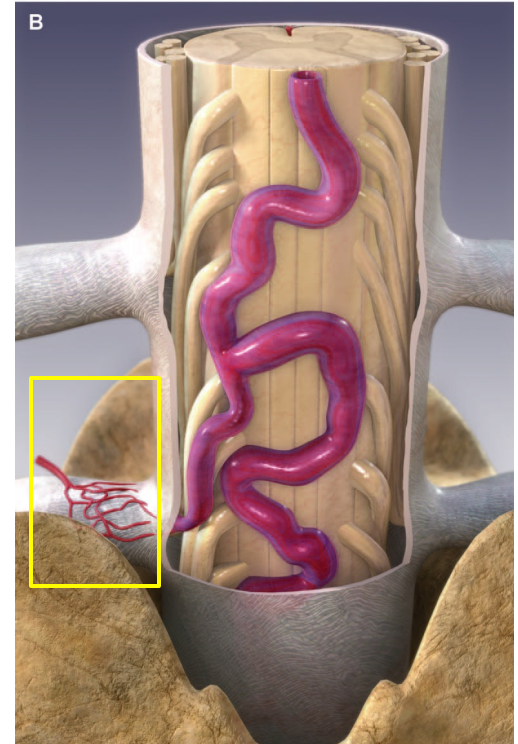
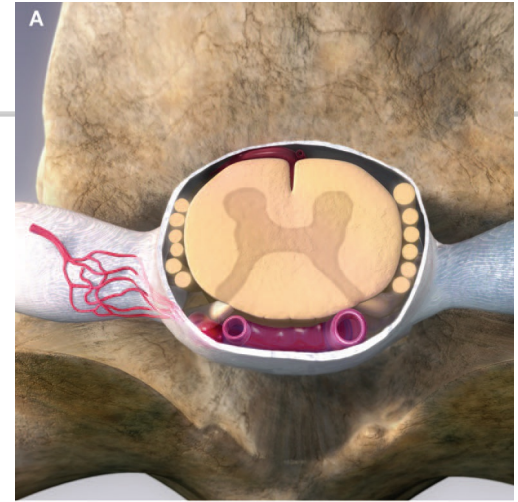
- =Epidural fistula
- Extradural arterial branch of radicular artery



2. Intradural Dorsal AVFs



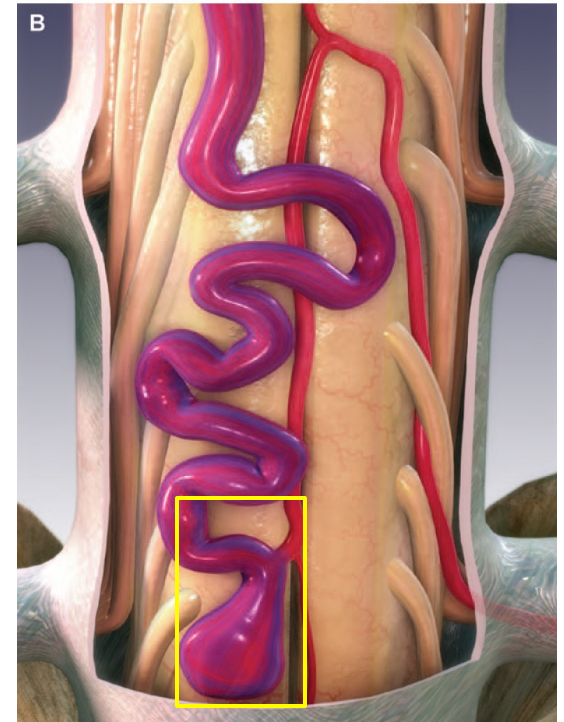
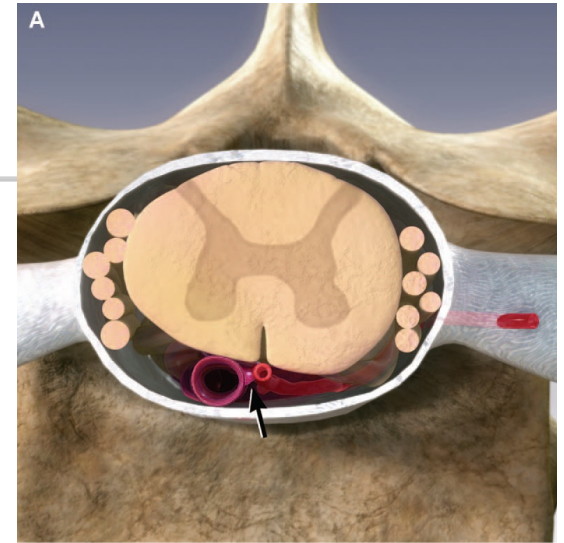
- =Type 1 dural AVFs



3. Intradural Ventral AVF



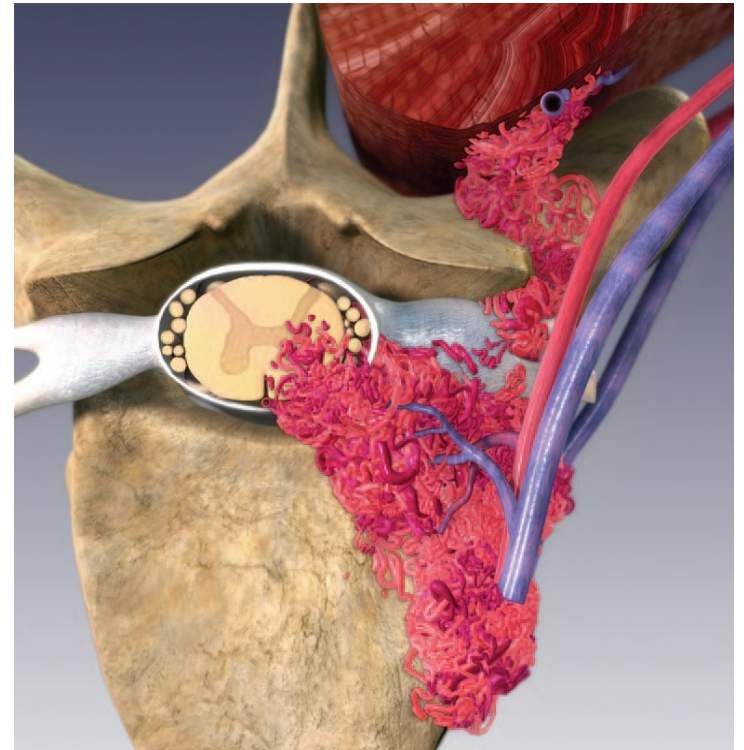
- Feed by anterior spinal artery



4. Extradural -Intradural AVMs



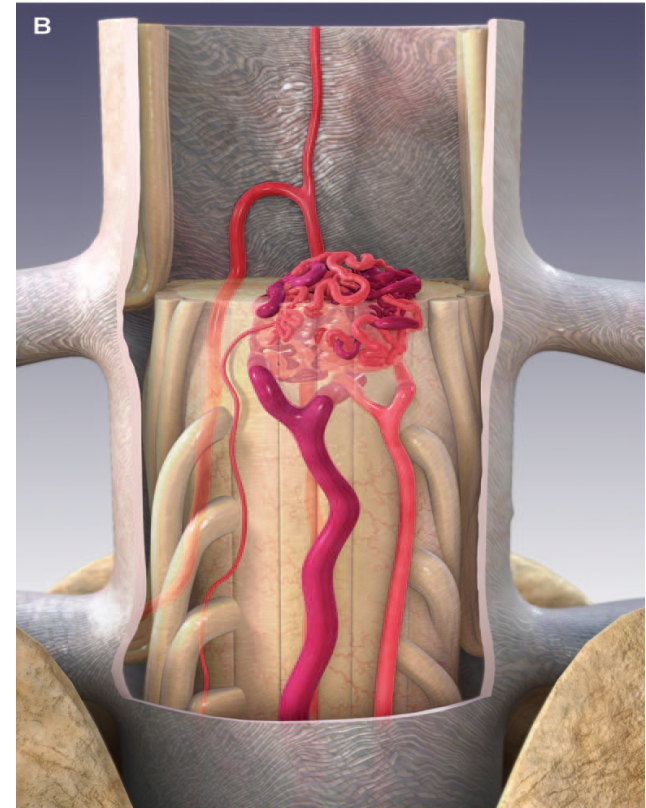
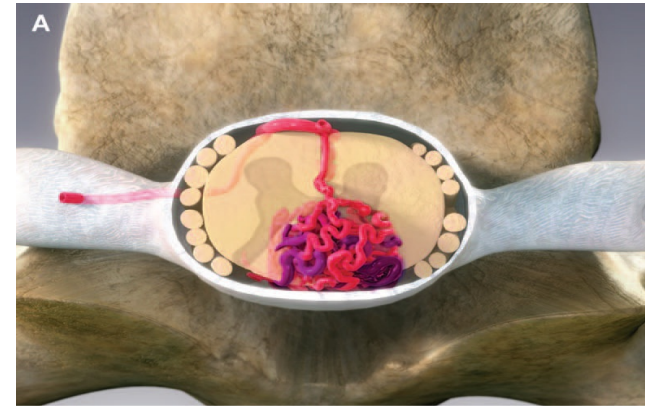
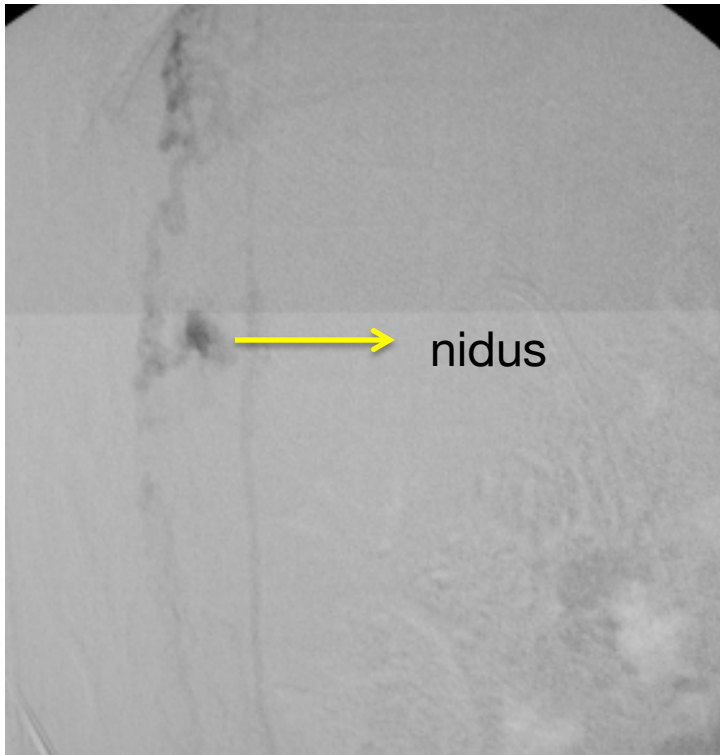
- =Juvenile or metameric AVMs



5. Intramedullary AVMs



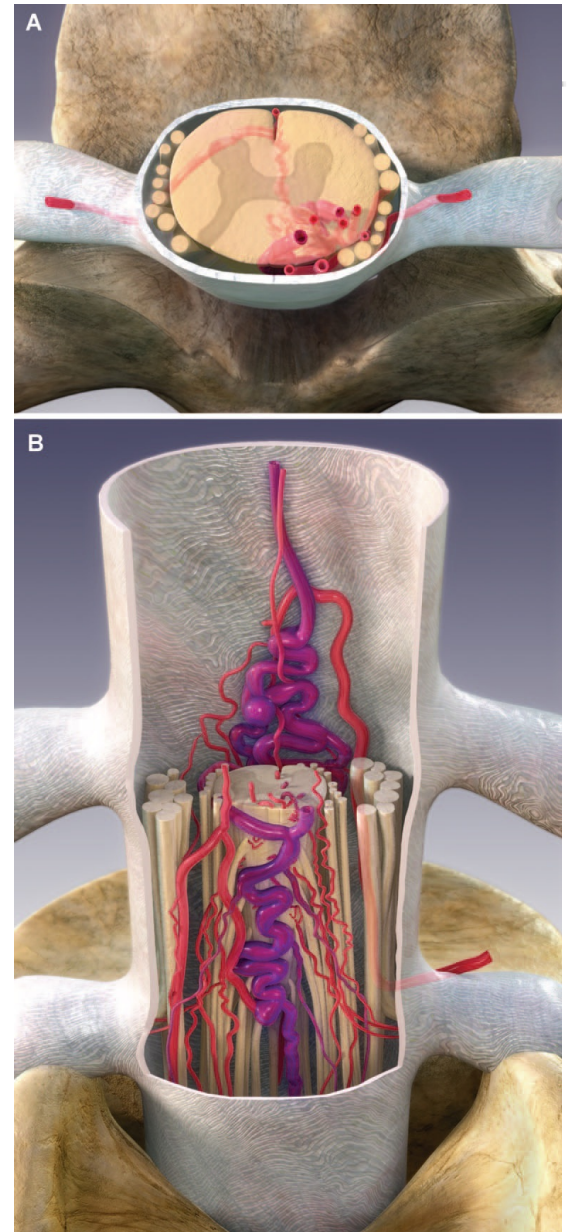
- Analogous to intracranial AVMs
- Single or multiple feeders (ASA, PSA)



6. Conus medullaris AVMs



- Multiple feeders (ASA, PSA)
- Direct AV shunts
- Large dilated veins



Clinical presentation



- For dural type 1 slowly progressing sensory and / or motor deficits
- For the rest rapidly or sometimes progressively motor and / or sensory deficits

Diagnosis



- MRI
- Angiography

Diagnosis



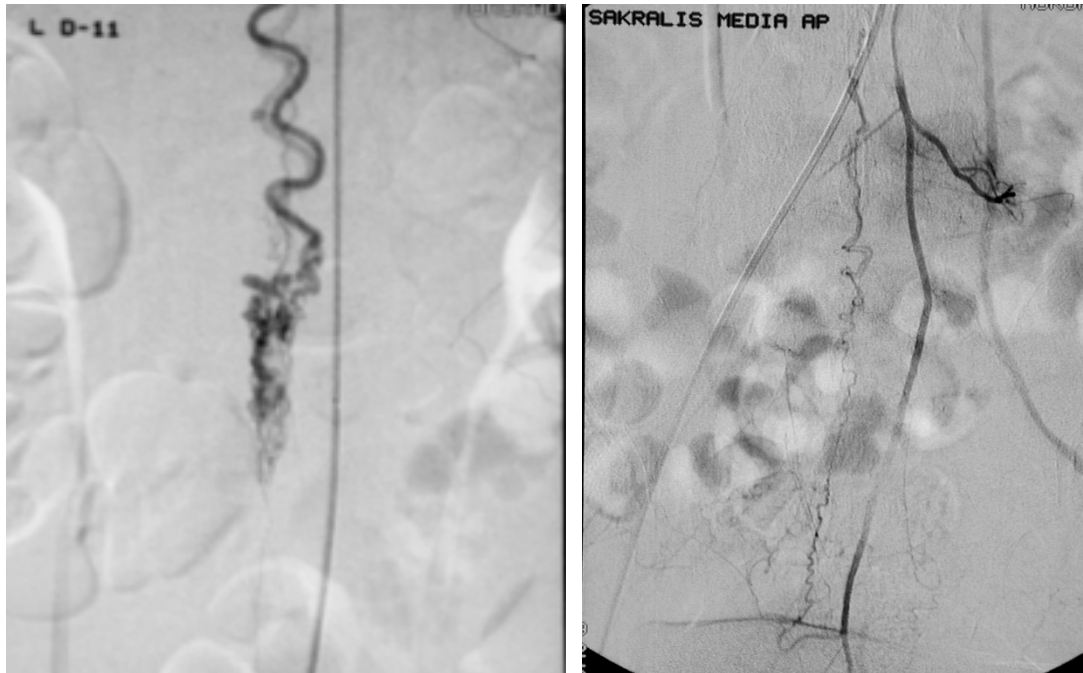
- Haemorrhage
- Venous congestion
- Elements of malformations



Angiographic work-up



- All possible feeders should be studied even after disclosing a lesion



Angiographic work-up



- Avoid global injections

Selective angiography



Treatment



- Endovascular
- Microsurgical
- Combined

TREATMENT IS A TEAM JOB

Thank You



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Slides of the presentation

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