

A cervical spinal extradural arteriovenous fistula presenting with compression of nerve roots and erosion of spinal bodies

Published on 19.09.2018

DOI: 10.1594/EURORAD/CASE.15181

ISSN: 1563-4086

Section: Neuroradiology

Area of Interest: Neuroradiology spine Interventional vascular

Procedure: Diagnostic procedure

Imaging Technique: CT

Imaging Technique: MR

Imaging Technique: Catheter arteriography

Special Focus: Arteriovenous malformations Case Type: Clinical Cases

Authors: Eliza Stavride, Katerina Manavi, Antonios Theodorakopoulos, Marianna Theodorou, Ioannis Tsitouridis

Patient: 51 years, male

Clinical History:

A 51-year-old man presented complaining of neck and right arm pain. Neurological examination revealed paresis of the right upper extremity with power of 2/5. His workup next included magnetic resonance imaging (MRI), computed tomography scan (CT) and finally digital subtraction angiography (DSA).

Imaging Findings:

Computed tomography and CTA revealed an enlarged epidural venous plexus destroying the right lamina and part of the body of C3 and C4, nearly occluding the foramina and compressing the right nerve roots. The dilated vessels were seen as hypointense mass on T1 and T2-weighted images, consistent with flow voids. Cord oedema and dilated perimedullary vessels were not observed. Gadolinium-enhanced T1-weighted images did not reveal enhancement within the cord. Digital subtraction angiography (DSA) showed the two main feeding arteries and the draining veins of the plexus.

Discussion:

Spinal arteriovenous lesions are predominantly classified in AVMs and AVFs. AVFs are further divided into intradural and extradural lesions, which constitute a direct connection between an extradural artery and vein and formation of a high-flow fistula [1]. Extradural AVFs develop in the ventral epidural space and are closely associated with the adjacent osseous structures. They are fed by multiple epidural branches and drain into the ventral epidural venous pouch [2, 3]. The increase in spinal venous pressure may lead to decreased drainage of normal spinal veins

and secondary venous congestion, but less frequently than in dural AVFs, because the shunting vessels are related to structures developed from the notochord. If stenosis or thrombosis of the venous outflow occurs, the epidural venous system is engorged and this results in compression of the spinal cord or the spinal roots, and deteriorating myelopathy, due to the secondary increase in the pressure of perimedullary venous plexus.

Non-contrast CT is sensitive for the detection of subarachnoid haemorrhage and remodelling of the cortical bone in long-standing vascular enlargement. The pathological arteries and veins are opacified after intravenous infusion of contrast. On MR imaging, the engorgement of perimedullary vessels, cord oedema and enhancement are important diagnostic features of AVF [2, 4]. The dilated vessels can be seen as flow-voids on T2-weighted images, while the cord oedema is depicted as ill-defined, flame-shaped central hyperintensity often surrounded by hypointense rim, corresponding to deoxygenated blood. The cord oedema may be missing in the early stage. On T1-weighted images the cord appears slightly hypointense and enlarged. The administration of gadolinium reveals diffuse enhancement within the cord, especially in delayed images, as sign of chronic venous congestion and breakdown of the blood-spinal cord barrier. Haemorrhage may be observed if venous hypertension persists untreated. T2*-weighted imaging demonstrates low signal "blooming", depending on the amount of haemorrhage.

Spinal angiography is necessary to find the exact level of the fistula and to visualise the feeding artery and the draining veins [1, 5, 6]. An extensive network of perimedullary veins may also be visualised.

Extradural AVFs can be treated with both endovascular and microsurgical approaches. The fistula is identified and disconnected using a small clip or electrocautery-assisted ligation. Following the occlusion of the shunt, progression of the disease can be stopped and improvement of symptoms is typically observed [5, 6].

Written informed patient consent for publication has been obtained.

Differential Diagnosis List: A cervical spinal epidural arteriovenous fistula, Arteriovenous malformation (AVM), Dural arteriovenous fistula, Spinal cord tumour

Final Diagnosis: A cervical spinal epidural arteriovenous fistula

References:

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Figure 1

a



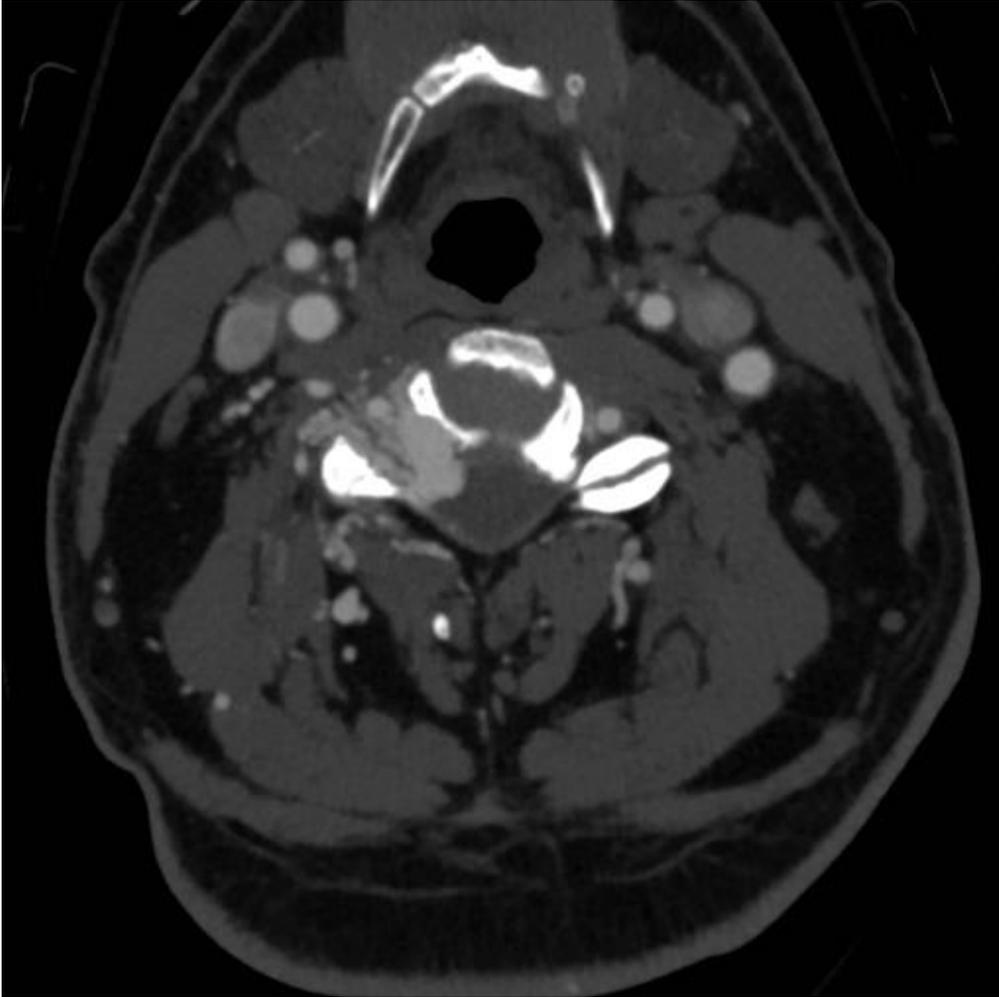
Description: Coronal contrast-enhanced CT image showing a dilated venous plexus eroding the right lamina and part of the bodies of C3 and C4. **Origin:** Department of Radiology, Papageorgiou General Hospital, Thessaloniki, Greece

b



Description: Sagittal contrast-enhanced CT image showing a dilated venous plexus eroding the right lamina and part of the bodies of two cervical vertebrae. **Origin:** Department of Radiology, Papageorgiou General Hospital, Thessaloniki, Greece

c



Description: Axial contrast-enhanced CT image showing an engorged epidural venous plexus eroding the right lamina of the cervical vertebra and nearly occluding the foramen. **Origin:** Department of Radiology, Papageorgiou General Hospital, Thessaloniki, Greece

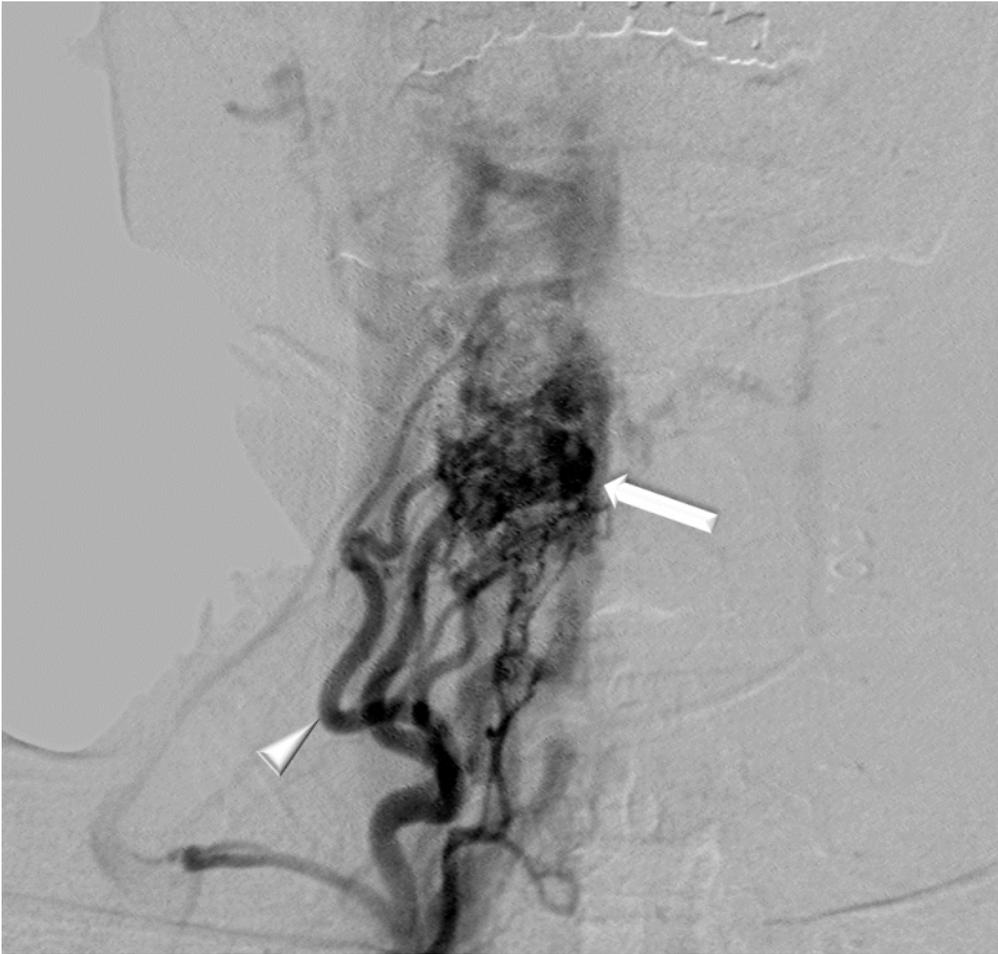
Figure 2

a



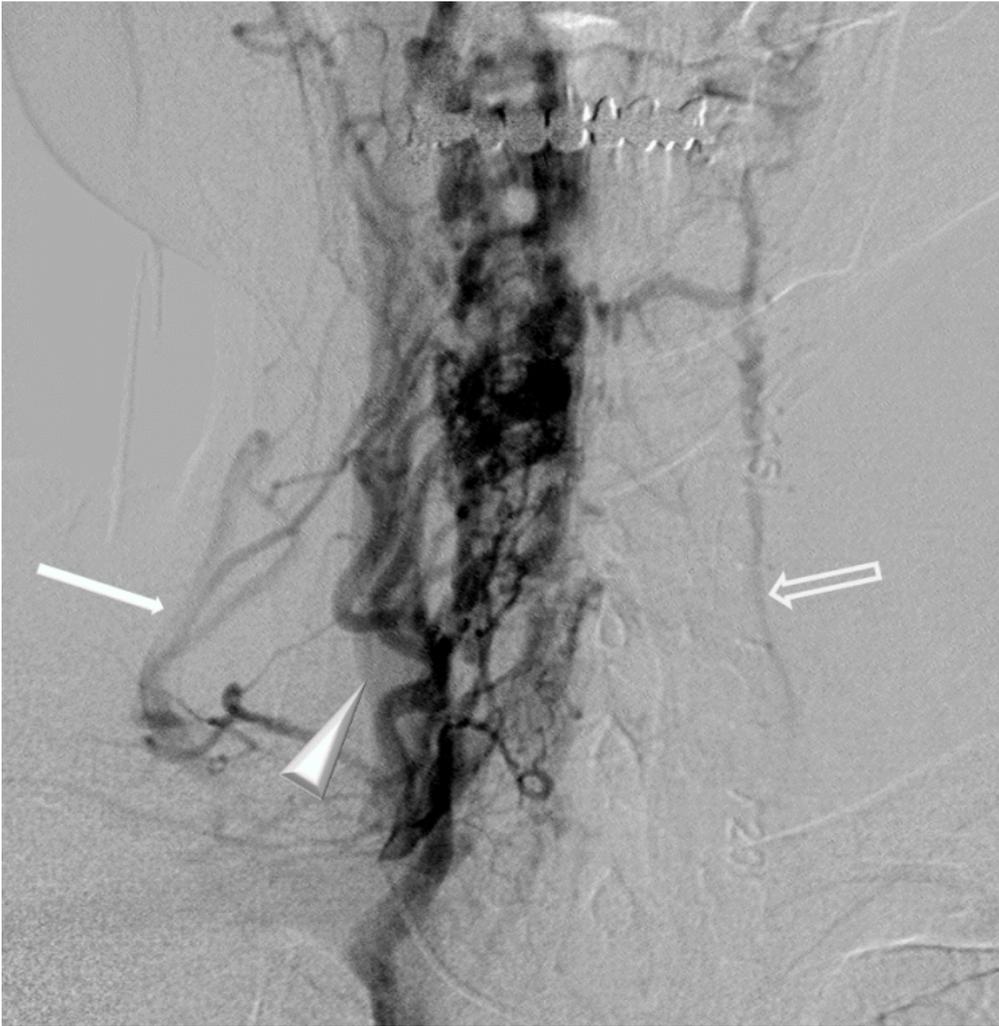
Description: Digital subtraction angiography showing the main feeding arteries (black arrow) arising from the thyrocervical trunk (white arrowhead). **Origin:** Department of Radiology, Papageorgiou General Hospital, Thessaloniki , Greece

b



Description: Early venous phase of DSA showing epidural venous plexus (arrow) and the feeding arteries (arrowhead). **Origin:** Department of Radiology, Papageorgiou General Hospital, Thessaloniki , Greece

c



Description: Venous phase of DSA showing draining veins to internal jugular vein (arrowhead), external jugular vein (white arrow) as well as the contralateral vertebral vein (empty arrow). **Origin:** Department of Radiology, Papageorgiou General Hospital, Thessaloniki , Greece

Figure 3

a



Description: Sagittal T2-weighted image showing dilated vessels as flow voids. **Origin:** Department of Radiology, Papageorgiou General Hospital, Thessaloniki, Greece

b



Description: Sagittal gadolinium-enhanced T1-weighted image showing no enhancement within the cord. **Origin:** Department of Radiology, Papageorgiou General Hospital, Thessaloniki, Greece