

Traumatic Vertebro-vertebral Arterio Venous Fistula Treated by Coil Embolisation: A Case Report

ABSTRACT

Cervical vertebral arteriovenous (AV) fistulae are uncommon vascular lesions involving abnormal communication between the extradural vertebral artery and surrounding venous structures. We examine the case of a male with a post-traumatic vertebral AV fistulae and later successfully treated with standard endovascular techniques. A discussion on the etiology, pathophysiology, and management of vertebral AV fistulae follows.

Key words: Vertebral artery, Vertebral vein, Fistula

INTRODUCTION

Cervical vertebral arteriovenous (AV) fistulae are uncommon vascular lesions involving abnormal communication between the extradural vertebral artery (VA) and surrounding venous structures – the vertebral vein, epidural venous plexus, and jugular venous system. Vertebral AFVs are often traumatic in origin due to penetrating neck wounds, blunt trauma with vertebral fracture, and iatrogenic injuries of the neck.^[1,2] Infrequently, they arise either congenitally or occur spontaneously in patients with underlying genetic disorders like Neurofibromatosis Type 1 or connective tissue disorders like Ehler–Danlos syndrome.^[3]

CASE REPORT

A 27-year-old male was brought by relatives with complaints of difficulty in raising the right upper limb. The patient had a history of assault with a sharp knife near the right shoulder by an unknown person, the patient received conservative treatment and was discharged. The patient still had significant pain in the right upper arm and shoulder.

Imaging findings [Figures 1-6]

- In this case, the patient initially underwent MRI brachial plexus which revealed a C7–C8 posterior transection. The patient was taken up for surgery and on OT table incidentally, pseudoaneurysm of the right VA was noted, and the surgery had to be abandoned
- The patient underwent a CT angiogram which was suggestive of a fistula between a VA and vertebral vein at C7–T1 levels
ON DSA
- Right subclavian artery angiogram showed proximal VA to vertebral vein AV fistula draining into the right

Saraswathi¹, Sharad Balasaheb Ghatge², Shivraj Ingole²

¹Department of Radiodiagnosis, JJ Group of Hospitals, Mumbai, Maharashtra, India, ²Department of Radiodiagnosis and Interventional Radiology, JJ Group of Hospitals, Mumbai, Maharashtra, India

Corresponding Author: Dr. Saraswathi, Department of Radiodiagnosis, JJ Group of Hospitals, Mumbai, Maharashtra, India

brachiocephalic vein. There was no antegrade flow distally into intracranial circulation

- Left subclavian artery angiogram showed the normal origin of the left VA, the left VA is dominant. The left VA showed normal vertebrobasilar circulation. There was reflux into the right VA up to the C5–C6 level; however, there was no opacification of the fistula on this angiogram.

Differential diagnosis

1. VA and internal jugular vein fistula
2. Spinal AV malformation.

DISCUSSION

Vertebral AFVs commonly present as pulsatile bruits and tinnitus as a result of turbulent blood flow within the aberrant AV connection.^[3,4] They can present as vertigo, neurological deficits, and neck pain, though up to 30% of vertebral AFVs may be asymptomatic at diagnosis. Brain stem signs (vertigo and vertebrobasilar insufficiency) are likely due to arterial steal. Spinal cord dysfunction is the result of direct cord compression by dilated veins, ischemia due to arterial steal or venous hypertension. The dilated epidural veins of vertebral AFV can cause radiculopathy by compressing the exiting cervical nerve roots.^[5-8]

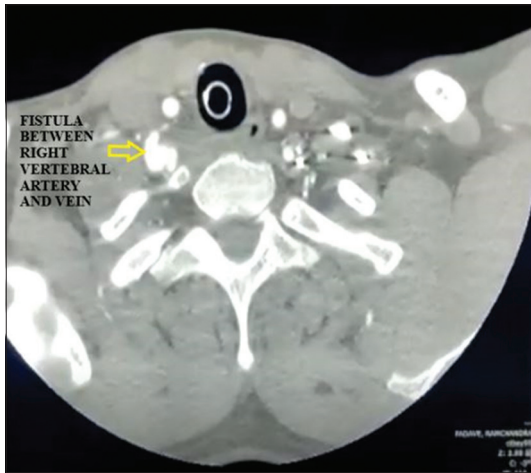


Figure 1: CT vertebral angiogram showed a fistulous communication between the right vertebral artery and vein at C7–T1 level

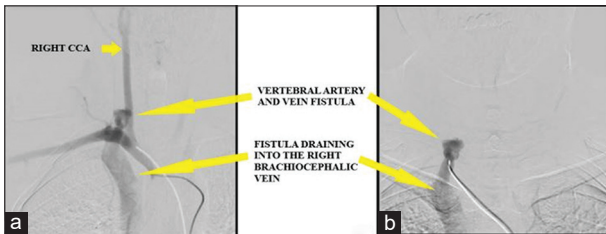


Figure 2: (a and b) Envoy 6F guiding catheter was parked into the right proximal vertebral artery. The AV fistula of the right vertebral artery to the right vertebral vein was demonstrated. There was no antegrade flow of the right vertebral artery distally into the intracranial circulation

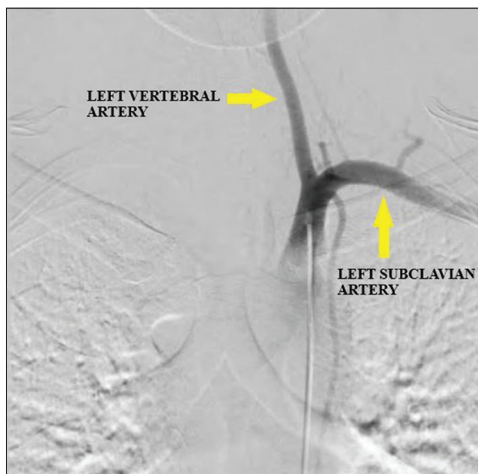


Figure 3: Left subclavian artery angiogram showed the normal origin of the left VA, left VA was dominant

Although conventional angiography is the definitive radiologic examination for vertebral AFV, the diagnosis can usually be made with CT and MR angiography. Imaging

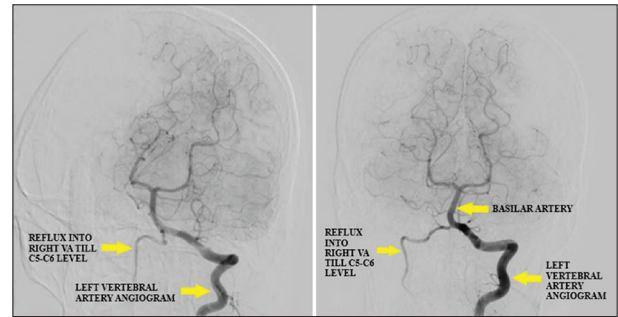


Figure 4: Left VA angiogram showed reflux filling of the right vertebral artery until C5–C6 level

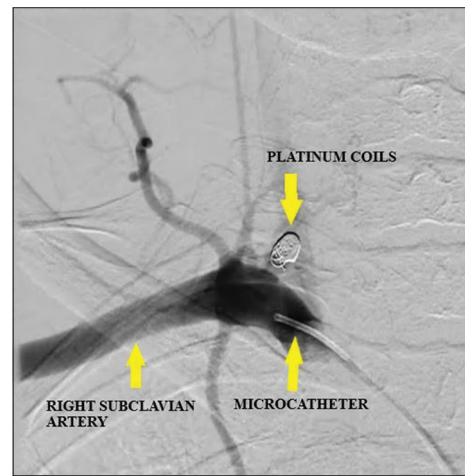


Figure 5: Progreat microcatheter was navigated near the site of fistula and coiled with 3 detachable platinum coils (nylon fiber 7 × 300 mm, penumbra complex 5 × 90 mm, and 3 × 30 mm). Post-coiling angiogram showed endovascular sacrifice of the right vertebral artery and complete obliteration of AV fistula

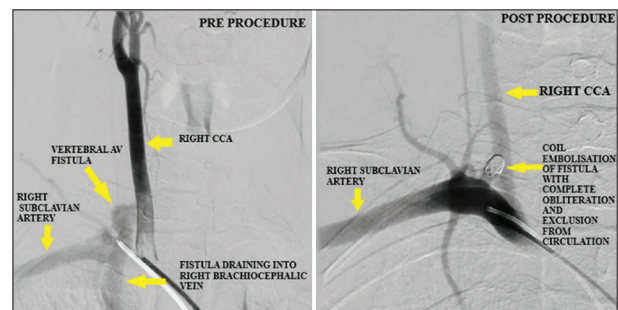


Figure 6: Coil embolization of the right vertebral to vertebral AV fistula with complete obliteration and exclusion from circulation

findings include markedly enlarged epidural or paraspinal veins, enlarged extraspinal or vertebral arteries proximal to the fistula, and spinal cord or nerve root compression.^[9] Digital subtraction angiography can help confirm the presence of a fistula.

Endovascular treatment of vertebral AFV is the simplest and most reliable method of occlusion, this is accomplished

with detachable balloons, although coils, particles, liquid adhesives, and autologous clots have also been used. In this case, the coil was used for occlusion over graft, as right distal VA was not seen. Complications of endovascular treatment include spasm, dissection, emboli, and reactions to contrast material. Neurologic complications may also arise after abrupt closure of a long-standing fistula; this is due to reestablishment of normal arterial flow to a region that is chronically ischemic and unable to regulate cerebral blood flow.^[5-9]

Due to the rarity of its presentation, disease mortality and morbidity are not well established, however, if the left untreated, it allows time for the fistula to recruit additional feeding vessels and produce symptoms of vertebrobasilar insufficiency through vascular steal phenomena, aneurysm formation with subsequent thromboembolism due to abnormal flow patterns, compressive myeloradiculopathy due to progressive engorgement of the cervical epidural veins, or catastrophic intramedullary hemorrhage due to intramedullary venous hypertension, thus making treatment more difficult.

CONCLUSION

In this case of traumatic VA and vertebral vein fistula, the fistula was occluded by vascular coils with resultant complete obliteration of AV fistula, thus reducing the morbidity due to vascular lesion.

REFERENCES

1. Ammirati M, Mirzai S, Samii M. Vertebral arteriovenous fistulae. Report of two cases and review of the literature. *Acta Neurochir* 1989;99:122-6.
2. Gonzalez A, Mayol A, Gil-Peralta A, Gonzalez-Marcos JR.

- Endovascular stent-graft treatment of an iatrogenic vertebral arteriovenous fistula. *Neuroradiology* 2001;43:784-6.
3. Nikolopoulos P, Krokidis M, Spiliopoulos S, Lioupis C, Gkoutzios P, Katsanos K, *et al.* Endovascular treatment of an iatrogenic vertebrojugular fistula with a balloon-expandable covered stent: Case report and review of the literature. *Perspect Vasc Surg Endovasc Ther* 2012;24:149-54.
4. Hofmann E, Behr R, Neumann-Haefelin T, Schwager K. Pulsatile tinnitus: Imaging and differential diagnosis. *Dtsch Arztebl Int* 2013;110:451.
5. Halbach VV, Higashida RT, Hieshima GB. Treatment of vertebral arteriovenous fistulas. *Am J Neuroradiol* 1987;8:1121-8.
6. Beaujeux RL, Reizine DC, Casasco A, Aymard A, Rüfenacht D, Khayata MH, *et al.* Endovascular treatment of vertebral arteriovenous fistula. *Radiology* 1992;183:361-7.
7. Nagashima C, Iwasaki T, Kawanuma S, Sakaguchi A, Kamisasa A, Suzuki K. Traumatic arteriovenous fistula of the vertebral artery with spinal cord symptoms: Case report. *J Neurosurg* 1977;46:681-7.
8. Russell EJ, Goldblatt D, Levy JM, Kim KS, Bergan JJ, Yao JS, *et al.* Percutaneous obliteration of a postoperatively persistent vertebral arteriovenous fistula. *AJNR Am J Neuroradiol* 1989;10:196.
9. Friedman DP, Flanders AE, Tartaglino LM. Vascular neoplasms and malformations, ischemia, and hemorrhage affecting the spinal cord: MR imaging findings. *AJR Am J Roentgenol* 1994;162:685-92.
10. Johnson CE, Russell EJ, Huckman MS. Resolution of spinal epidural vascular pseudotumor following balloon occlusion of a postoperative vertebral arteriovenous fistula. *Neuroradiology* 1990;31:529-32.

How to cite this article: Saraswathi, Ghatge SB, Ingole S. Traumatic Vertebro-vertebral Arterio Venous Fistula Treated by Coil Embolisation: A Case Report Bombay Hosp J 2022;64(2):13-15.

Source of support: Nil, **Conflicts of interest:** None

This work is licensed under a Creative Commons Attribution 4.0 International License. The images or other third party material in this article are included in the article's Creative Commons license, unless indicated otherwise in the credit line; if the material is not included under the Creative Commons license, users will need to obtain permission from the license holder to reproduce the material. To view a copy of this license, visit <http://creativecommons.org/licenses/by/4.0/> © Saraswathi, Ghatge SB, Ingole S. 2022.