

# Vertebro-vertebral arteriovenous fistula

Vertebro-vertebral [arteriovenous fistula](#) (VV-AVF) is a rare vascular [disorder](#) with an abnormal [shunt](#) between the extracranial [vertebral artery](#) (VA), its muscular or radicular branches, and adjacent [veins](#) <sup>1)</sup>

[Trauma](#) is the most common cause, including [stab wounds](#), [gunshot wound](#), and [blunt trauma](#). Most VV-AVF patients have lesions that are spontaneous or caused by [neck trauma](#) <sup>2)</sup> Some patients with VV-AVF are asymptomatic. Others may have [tinnitus](#) or neurologic deficit because of high flow arteriovenous shunting, steal phenomenon, or compression mass effect from enlarged venous pouches <sup>3) 4) 5) 6)</sup>.

The location of VVAVF is also variable with most cases above the C2 vertebra or below the C5 vertebra <sup>7)</sup>.

Surgical ligation or endovascular closure of the high-flow arteriovenous fistula is the main goal of treatment for VV-AVF <sup>8) 9) 10) 11)</sup>.

## Case series

Chen et al. presented two female NF-1 patients with a diagnosis of VV-AVF treated with endovascular approach. The fistula was completely obliterated with balloon assisted embolization and covered stent separately and VA patency was preserved in both cases. Reviewing the literature with a focus on endovascular treatment, endovascular occlusion of VV-AVF in NF-1 patients is safe and effective. To preserve the parent VA patency and obliterate the fistula simultaneously is challenging generally, but feasible in some cases <sup>12)</sup>.

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Yeh et al. presented the experience of VV-AVF treatment with covered stents in three patients and detachable coils in two patients. One patient with a fistula at the V3 segment had rapid fistula recurrence one week after covered stent treatment. The possible causes of failed treatment in this patient are discussed. The currently available treatment modalities for VV-AVF are also summarized after a literature review. At the end of this article, we propose a new concept of anatomically based approach for endovascular treatment of VV-AVF. Fistula in the V1-2 segments of vertebral artery could be treated safely and effectively by covered stent with the benefit of preserving VA patency. Embolization with variable embolizers should be considered first for fistula in the V3 segment because of the tortuous course and flexibility of the VA in this segment <sup>13)</sup>.

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Briganti et al. describe endovascular approaches for occlusion of vertebro-vertebral arteriovenous fistula (VV-AVF) in a series of three cases and a review of the literature. Complete neuroimaging assessment, including CT, MR and DSA was performed in three patients (two female, one male) with VV-AVF. Based on DSA findings, the VV-AVF were occluded by endovascular positioning of detachable balloons (case 1), coils (case 2), or a combination of both (case 3) with parent artery patency in two out of three cases. In this small series, endovascular techniques for occlusion of VV-AVF were safe and effective methods of treatment. To date, there are no guidelines on the best treatment for VV-AVF. Detachable balloons, endovascular coiling, combined embolization procedures could all be considered well-tolerated treatments <sup>14)</sup>.

## Case reports

[Vertebro-vertebral arteriovenous fistula](#) involving the [vertebral artery segment V3](#) is a rare vascular pathology that is either spontaneous or traumatic in origin. Furtado et al. described a post-operative traumatic vertebro-vertebral fistula in a 47-year-old lady with NF-1. They reviewed reported cases of V3 segment vertebrovertebral fistula for their incidence, etiology, clinical presentation, treatment, and outcomes using an illustrative case. Traumatic V3 segment vertebrovertebral fistula is predominantly managed with parent vessel occlusion. Per the algorithm presented, we suggest endovascular management of non-traumatic fistula be based on the anatomical variance of the contralateral vertebral artery <sup>15)</sup>.

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A vertebral AVF was detected by carotid duplex ultrasonography, and endovascular treatment was successfully performed in a 72-year-old woman with 1-year history of hemodialysis <sup>16)</sup>

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A 72-year-old woman was admitted with a complaint of bilateral leg weakness. A cervical magnetic resonance image showed compression of the spinal cord by a large vascular lesion. Right vertebral angiogram showed a vertebro-vertebral fistula draining into ectatic epidural veins. From a transfemoral arterial approach, the fistula site was selected with a microcatheter, and embolization was performed by placement of several Guglielmi detachable coils until flow arrest was obtained. The patient made a full recovery, and a long-term angiographic follow-up demonstrated a complete cure <sup>17)</sup>.

<sup>1)</sup>  
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<sup>2)</sup>, <sup>3)</sup>, <sup>8)</sup>

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<sup>5)</sup>

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<sup>6)</sup>

Ito O, Nishimura A, Ishido K, et al. Spontaneous vertebral arteriovenous fistula manifesting as radiculopathy. *No Shinkei Geka.* 2011;39(8):775-781.

<sup>7)</sup>

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<sup>11)</sup>

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<sup>12)</sup>

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<sup>13)</sup>

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<sup>15)</sup>

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<sup>16)</sup>

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