



CASE REPORT

¹Department of Neurosurgery, University Hospital Center Sestre Milosrdnice, Zagreb, Croatia
²University of Applied Health Sciences, Zagreb, Croatia
³J.J. Strossmayer University of Osijek Faculty of Medicine, Osijek, Croatia
⁴Department of Radiology, University Hospital Center Sestre Milosrdnice, Zagreb, Croatia

CORRESPONDING AUTHOR:

Bilandzic Josko

Department of Neurosurgery, University Hospital Center Sestre Milosrdnice, Vinogradska cesta 29, Zagreb, Croatia, E-mail:

josko.bilandzic@hotmail.com

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In Order to Arrive from A to B You Need to Use Access Roads – Accessing Posterior Cerebral Circulation Through Thyrocervical Trunk

Bilandzic Josko^{1,2}, Rotim Kresimir^{2,3}, Rotim Ante¹, Culo Branimir⁴, and Kalousek Vladimir⁴

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ABSTRACT

A female patient, aged 69, was admitted because of a sudden headache followed by loss of consciousness. On emergent brain multislice computed tomography scan, subarachnoid hemorrhage with intraventricular extension was observed due to a ruptured basilar artery aneurysm. On digital subtraction angiography (DSA) scan, a dilated thyrocervical trunk and its anastomosis to the V3 segment of the vertebral artery were observed on the right side. A right transradial approach was used to enter the thyrocervical ostium. A distal access catheter was placed in the ostium, through which a microcatheter was introduced. Finally, the V3 segment of the vertebral artery was reached. The ruptured basilar aneurysm was occluded using a simple coiling technique with careful selection of coils due to its wide neck. Follow-up DSA showed enlargement of an anterior communicating artery aneurysm. Aneurysm was occluded using an intrasaccular device. Vertebral artery stenosis (VAS) can pose significant difficulties when approaching the posterior cerebral circulation by endovascular means. Fluoroscopy-guided direct percutaneous vertebral arteries puncture distal to the occlusion point and hybrid approaches have been used so far in cases of VAS. A technique similar to ours was used only once as reported in the literature, but without neuroradiological follow-up. In patients with sufficiently developed collateral circulation, collaterals could be used as an endovascular route for the treatment of distally located lesions.

KEYWORDS

vertebral artery stenosis, thyrocervical trunk, basilar artery aneurysm

INTRODUCTION

A female patient, age 69, was transferred to our hospital from outside facility. She was initially admitted because of a sudden intense headache followed by loss of consciousness. Her past medical history was notable for atrial fibrillation, arterial

hypertension and stroke 11 years before our admission, which caused permanent left-sided hemiparesis. She was taking anticoagulant medications and antihypertensive therapy.

CASE PRESENTATION

Emergent brain multislice computed tomography (MSCT) scan showed diffuse subarachnoid hemorrhage (SAH) with intraventricular extension which was graded as Fisher 4. MSCT cerebral angiography showed two aneurysms—a larger (6 × 4 mm), ruptured one on the ventral wall of the basilar artery (BA) and a smaller (3 × 2 mm), unruptured one on the anterior communicating artery (ACoA). The patient was comatose, graded 5 on Hunt-Hess scale, with miotic and unreactive pupils. Due to the patient's clinical condition and the localization of the aneurysm on the posterior circulation, endovascular treatment was indicated. However, the patient had previously been diagnosed with stenosis of the proximal two-thirds of both vertebral arteries (VAs). On DSA, both vertebral arteries were occluded up to the end of V2 segments (Figure 1). The posterior communicating arteries on both sides were not suitable for posterior cerebral circulation access from the anterior circulation. A dilated thyrocervical trunk and its anastomosis to the V3 segment of the vertebral artery were seen on the right side (Figure 2). Entering the thyrocervical ostium from the transfemoral route was difficult; therefore, a right transradial approach was used to place an 8 F Ballast™ sheath into the subclavian artery. The thyrocervical trunk was dilated but also very tortuous so the length of distal access and microcatheter needed to be as long as possible (Figure 3). Using only a microcatheter was not successful due to a lack of stability. Stiffer and wider distal access guiding catheters could not follow the tortuosity of the trunk. Therefore, a decision was made to place a SOFIA™ 5 F distal access catheter in the ostium of the thyrocervical trunk and



FIGURE 1. Occluded vertebral arteries up to V3 segment is visible on the right side.

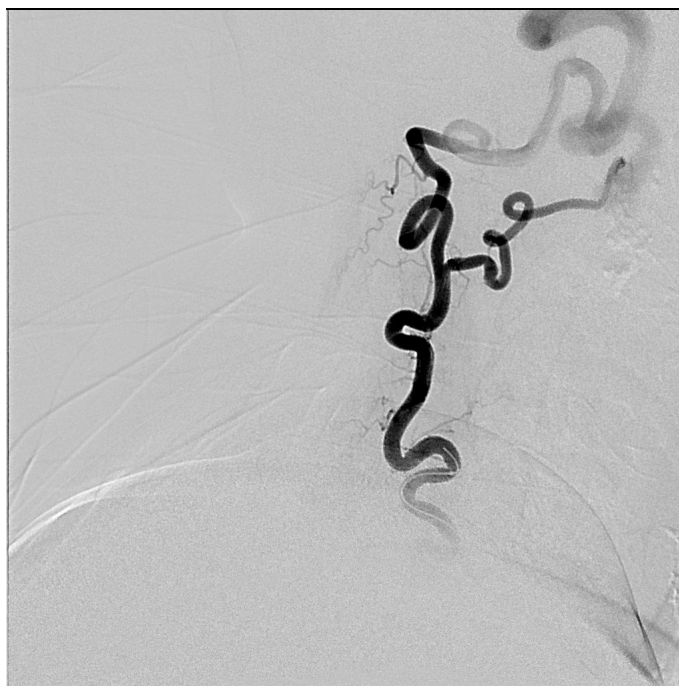


FIGURE 2. Anastomoses between dilated thyrocervical trunk and V3 segment are shown.

insert a Headway™ DUO (167 cm). This limited us to use only a microcatheter for coiling. A combination of stiffer and softer wires was used (Synchro2®, Traxcess™14, and HYBRID008) to straighten loops and to move distally with the microcatheter and subsequently with the SOFIA™ 5 F. Compression on the outside of the rotating hemostasis valve (RHV) portion was needed to maintain stability. Finally, the V3 segment of the vertebral artery

was reached (Figures 4 and 5), and then using a simple coiling technique (Figure 6), the ruptured basilar aneurysm was occluded with careful selection of coils due to its wide neck (Figure 7). There was no balloon on the market that was long enough to reach and cover the aneurysm neck in our case, except for the Scepter Mini™. Unfortunately, Scepter Mini™ was too wide to fit into our distal access catheter. Hence, we coiled aneurysm

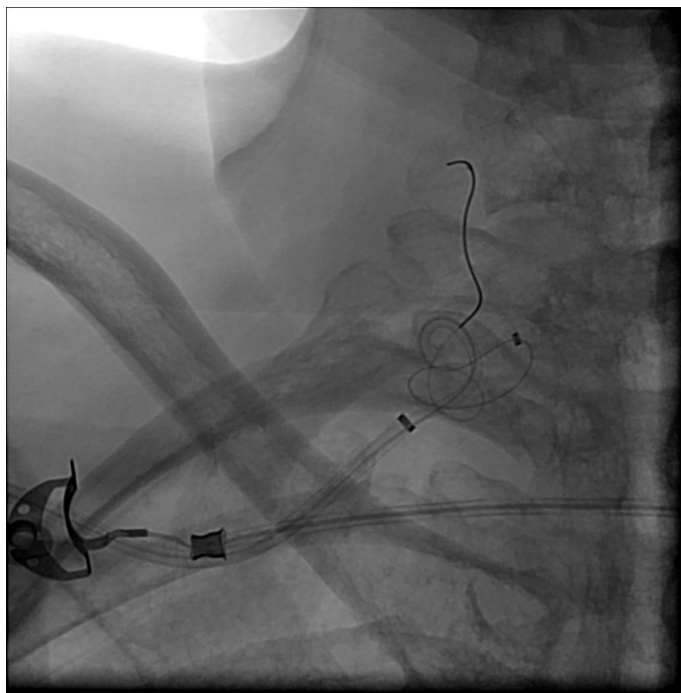


FIGURE 3. Guidewire navigation through dilated and tortuous thyrocervical trunk.



FIGURE 4. Microcatheter entering the V3 segment from the dilated thyrocervical trunk.

without balloon assistance. After the endovascular procedure, an external ventricular drain (EVD) was put in due to intraventricular hemorrhage (IVH) accompanied by hydrocephalus. The clinical course was further complicated by meningitis and ventriculitis, which were treated with intrathecal antibiotic therapy. After antibiotic treatment, the patient became shunt-dependent, so a

permanent ventriculoperitoneal shunt was inserted. A multidisciplinary meeting was held, and it was decided to follow ACoA aneurysm. Finally, the patient was released to the rehabilitation facility. At discharge, the patient was opening her eyes, had symmetric and reactive pupils, followed some commands, and had minimal spontaneous movements in all four extremities.



FIGURE 5. Distal navigation through vertebral arteries.

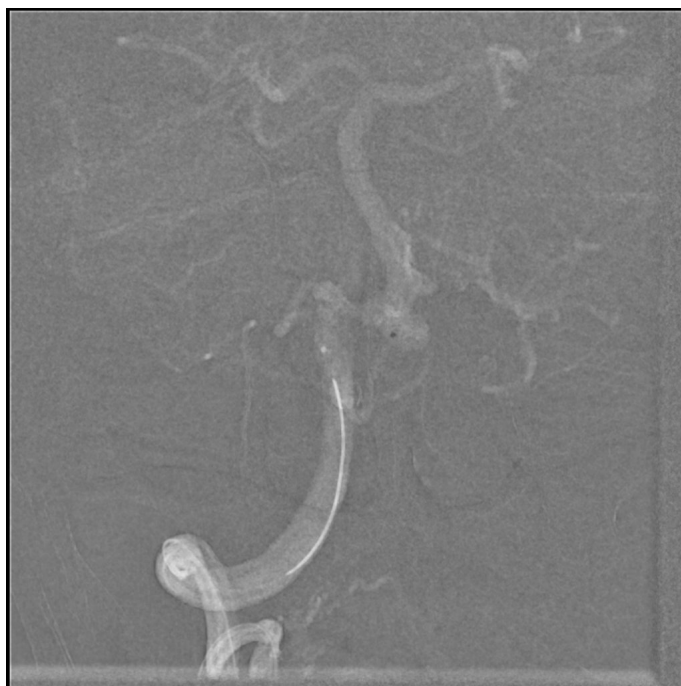


FIGURE 6. Microcatheter positioned in the aneurysm lumen.

The rehabilitation process was complicated by shunt meningitis. Subsequently, the VP shunt was removed. Ten months after discharge, follow-up DSA was performed. DSA showed enlargement of ACoA aneurysm (Figure 8), which measured 6×6 mm in size and was projecting anteriorly. Due to its location and morphology, the aneurysm was deemed suitable for

endovascular treatment. It was occluded using WEB™ Aneurysm Embolization System (MicroVention™) device (Figures 9 and 10). After the procedure, the patient experienced an epileptic seizure. Emergent brain MSCT and cerebral DSA were performed, which did not show any signs of aneurysm rupture or ischemia. Eventually, she recovered almost completely. Finally, she

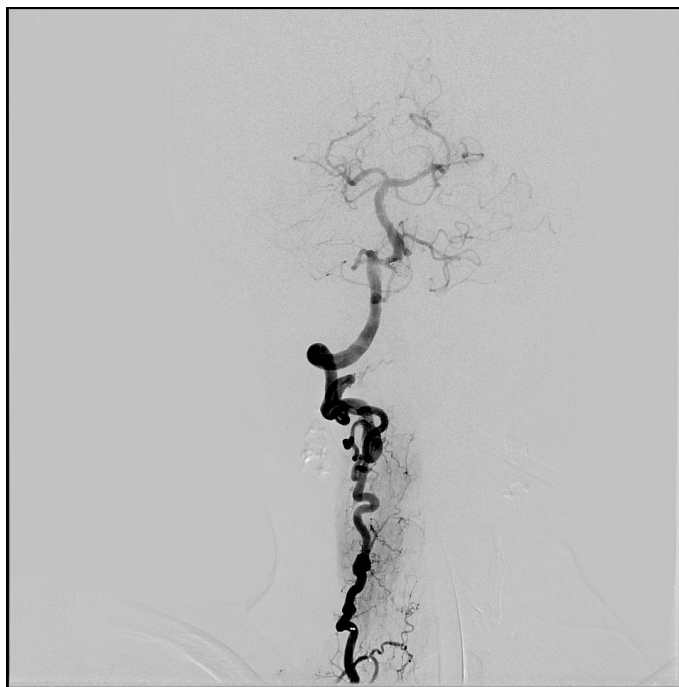


FIGURE 7. Final digital subtraction angiography run with occluded ventral basilar artery aneurysm.

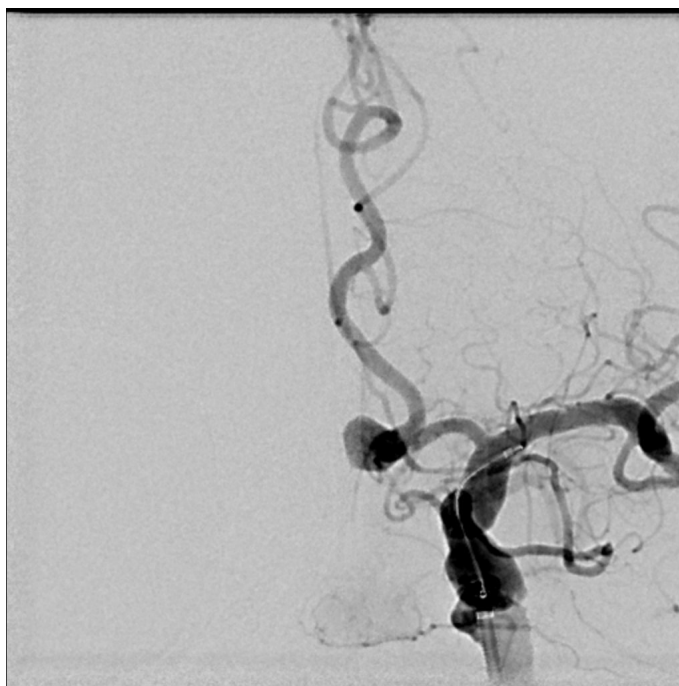


FIGURE 8. Left carotid angiogram showing anterior communicating artery aneurysm.

was discharged with only mild right-sided facioparesis (House-Brackmann 2/6).

DISCUSSION

The vertebral artery origin from the thyrocervical trunk has been reported as a rare anatomical variation.¹ In our case, the patient had been previously diagnosed with bilateral atherosclerotic

VA stenosis. Hence, the anastomosis between the VA and the thyrocervical trunk was established as a consequence of collateral artery development and was not an anatomical variant. Vertebral artery stenosis (VAS) most commonly occurs in the proximal part of the vessel due to arterial calcification, atherosclerotic lesions, dissection lesions, fibromuscular dysplasia, giant cell arteritis, or abnormal bony compression.² VAS can pose significant

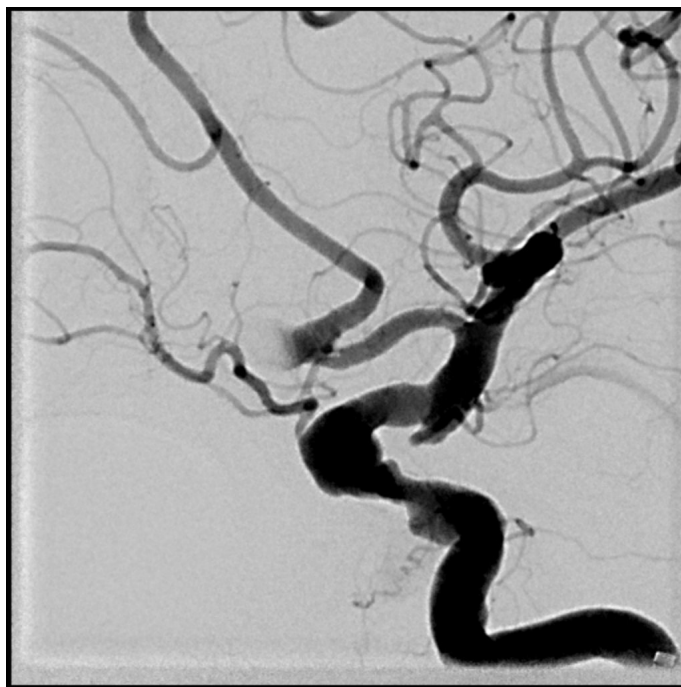


FIGURE 9. Left carotid angiogram showing occluded anterior communicating artery aneurysm.

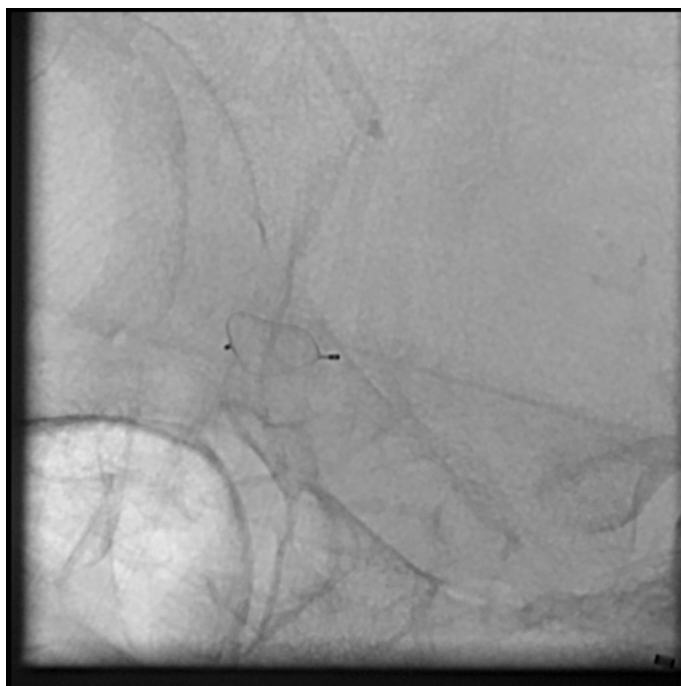


FIGURE 10. WEB device deployed within the anterior communicating artery aneurysm lumen.

difficulties when approaching the posterior cerebral circulation by endovascular means, especially during emergency settings. Some authors used fluoroscopy-guided direct percutaneous VA puncture distal to the occlusion point.³ Moreover, hybrid approaches for VAS cases have been previously reported, where

the vertebral artery is surgically exposed, and a guide catheter is introduced after arteriotomy is performed.⁴ A technique similar to ours was used only once as reported in the literature, but without a neuroradiological follow-up that we presented.⁵ The WEB™ Aneurysm Embolization System device has been previously

used to occlude wide-neck unruptured ACoA aneurysms with promising results.⁶

CONCLUSION

In patients with sufficiently developed collateral circulation due to atherosclerotic disease, collaterals could be used as an endovascular route for the treatment of distally located lesions. Knowing the properties and length of the material is crucial in such cases to achieve catheterization of the desired branch location without compromising the outcome.

Patient consent

Patient consent was obtained for this case report submission.

Contributors

JB: Investigation, Conceptualization, and Writing - Original Draft. KR: Supervision and Writing - Review & Editing. AR and BC: Writing - Review & Editing. VK: Conceptualization and Writing - Original Draft.

Conflict of interest

The authors report no conflict of interest.

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