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Case report

Anterior retropharyngeal approach for ventral perimedullary arteriovenous fistula (PMAVF) in upper cervical spine: Preliminary report

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1. Introduction

The anterior retropharyngeal approach provides direct access to the upper cervical spine (C1–C3) and it has been applied in a variety of conditions since 1987. We presented a very rare case of perimedullary arteriovenous fistula (PMAVF) in the ventral upper cervical spine that was successfully treated through the anterior retropharyngeal approach.

2. Case report

A 60-year-old woman presented with progressive motor weakness in the left lower extremity for 10 months. Neurological examinations revealed decreased muscle strength in the left lower extremity (grades 3–4), brisk deep tendon reflexes, and positive Hoffman and Babinski signs. Cranial nerves, muscle tone and sensation were normal. There was no family history of neurological disorders. Routine laboratory tests were all normal. Cervical spine MRI (3 T) showed flow void signal intensity on the ventral surface of the upper cervical spine on T2-weighted images (Fig. 1A and B).

Diagnostic angiography defined the vascular anatomy as a perimedullary arteriovenous fistula (PMAVF) (Fig. 1C–E). Two anterior radicular arteries arose from left vertebral artery (VA) as feeders. The fistula point was located at the level of C2–C3 vertebral bodies. Draining vein coursed up along the anterior midline of the cervical spine.

The fistula was mainly fed by two anterior radicular arteries (Fig. 1D and E). We chose the larger one as treatment route. Superselective angiography demonstrated sharp turns and great tortuosity of this feeder. It was very hard to navigate the microcatheter (Flow-Directed Marathon, eV3) to the fistula point exactly. So we just placed the tip of Marathon to the fistula point as close as possible, and one small coil (1.5 mm × 2 cm, *Helix*, *Microplex*, *eV3*) was deployed there (Fig. 1H–L). Left VA angiography suggested decreased steal flow despite incomplete obliteration. Additional embolic coils or agents may not warrant appropriate obliteration, and carry the risk of the occlusion of the normal spinal vessels. The procedure was then stopped, and intensive follow-up was suggested for the patient.

The patient was re-admitted 4 months later because her symptoms got worse. Neurological examinations demonstrated decreased muscle strength in both lower extremities (grade 3 for the left side; grade 4+ for the right side), brisk deep tendon reflex, and positive Hoffman and Babinski signs. Repeated angiography suggested residual fistula (Fig. 1M–P), and another attempt for the fistula closure was planned. Since a coil was deployed previously in the larger feeder, we chose the other anterior radicular artery (the smaller one, Fig. 1D and E) as an approach for the fistula occlusion. Unfortunately, this attempt failed due to poor approach for the microcatheter. Therefore, open surgery through anterior retropharyngeal approach was chosen as the salvage treatment strategy.

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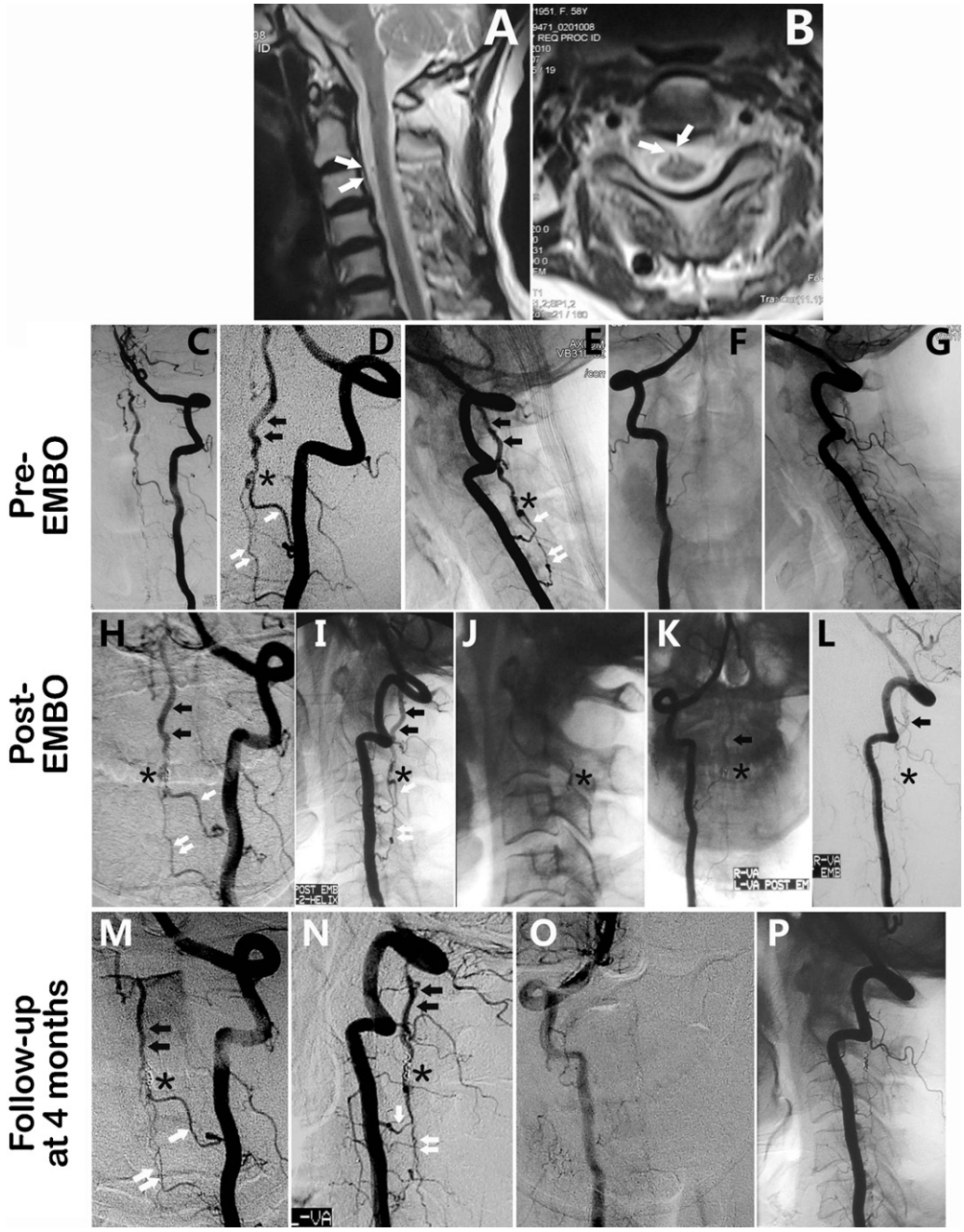

Fig. 1. Cervical spine MRI (A, sagittal T2; B, axial T2): abnormal flow void signals in the ventral surface of C2 (indicated by white arrows); (C–G) angiogram before the endovascular embolization; left VA (C–E) and right VA (F and G) angiogram showed the fistula point (noted by asterisk, D–E). Two anterior radicular arteries arose from left VA, and served as the feeding arteries. They were indicated by single (the larger one) and double (the smaller one) white arrows respectively (D and E). They contributed to the fistula at level of C2–C3 vertebral bodies. The arterialized vein coursed up anterior to the cervical spinal cord (black arrow, D and E). Minor contributing flow arose from right radicular arteries (F and G). (H–L) Angiogram after the embolization; a coil was deployed (asterisk, J). The feeding blood flow from left VA was decreased (H–J) and the fistula was not completely closed (K and L). (M–P) Angiogram 4 months after the embolization: left (M and N) and right VA (O and P) angiogram showed the fistula was not completely obliterated; feeding arteries and draining vein were noted by white and black arrows, respectively; a coil, deployed previously can be identified (asterisk). VA, vertebral artery.

The patient was under general anesthesia by transnasal intubation. She was placed in supine position, with head extended and rotated to the left side. Monitoring of the spinal cord with motor evoked potential (MEP) and somatosensory evoked potential (SEP) were used throughout the surgery.

A modified submandibular incision was used (Fig. 2A). The skin incision started one finger distance from the midline below the mandible, proceeded laterally, curved inferior to the angle of mandible, and ran down along the anterior edge of sternomastoid muscle. The platysma was dissected and retracted medially in order to expose the inferior edge of the submandibular gland. The tendon of the digastric muscle ran under the inferior edge of the submandibular gland. It was sectioned to reveal the external and internal carotid artery as well as the hypoglossal trunk. The hypoglossal nerve was gently dissected along its course and carefully retracted superiorly. The carotid sheath was then retracted laterally. The superior laryngeal nerve was identified. It coursed deep and paralleled to the superior thyroid artery. Retraction of fascia opened the retropharyngeal space, and exposed the precervical fascia and longus colli muscles. The longus colli muscles were