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## **Spontaneous Resolution of Delayed Onset Large Subclavian Artery Pseudoaneurysm**

### **—Case Report—**

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#### **Abstract**

**A 70-year-old woman with a history of end-stage renal disease secondary to anti-neutrophil cytoplasmic autoantibody-associated vasculitis had been receiving hemodialysis for 5 years. The patient underwent attempted right internal jugular vein cannulation for temporary hemodialysis catheter placement. Pulsating mass developed in the neck and angiography revealed a subclavian artery pseudoaneurysm 4 days later. The pseudoaneurysm disappeared spontaneously during the interval between the diagnosis and the planned surgical procedure. Such delayed onset and spontaneous resolution of subclavian artery pseudoaneurysm is uncommon. Close observation may be optimal if delayed onset of pseudoaneurysm occurs after small needle puncture with cessation of antiplatelet/anticoagulant administration.**

Key words: subclavian artery pseudoaneurysm, spontaneous resolution, antiplatelet, angiography, renal failure

#### **Introduction**

Subclavian artery pseudoaneurysm is a rare but severe

complication of internal jugular puncture, usually occurring with sudden onset, progressive nature, and high risk of death.<sup>2,8,14)</sup> Here, we describe a case of subclavian artery pseudoaneurysm with delayed onset and spontaneous resolution.

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## Case Report

A 70-year-old woman with a history of end-stage renal disease secondary to anti-neutrophil cytoplasmic autoantibody-associated vasculitis had been receiving hemodialysis for 5 years. The arteriovenous (AV) shunt in her left forearm had become stenotic twice, and was treated both times with percutaneous transluminal angioplasty (PTA). Aspirin 100 mg was administered for the prevention of restenosis. She was admitted to our hospital for third revision of the AV shunt.

Catheterization of the right internal jugular vein for temporary hemodialysis catheter placement was attempted several times but was unsuccessful (Day 0). Manual compression of the right side of her neck was continued for 40 minutes because of arterial puncture with a 19 gauge needle. No apparent active bleeding persisted. Another catheter was placed in the femoral vein.

Four days later, she noticed a pulsating mass developing in the right side of her neck. Color Doppler ultrasonography showed a pulsating mass of  $25.6 \times 33.3 \times 29.6$  mm, and turbulent flow lateral to the right common carotid artery and just above the subclavian artery. Angiography using nonionic iodinated contrast medium (iomeprol) on Day 5 revealed a pseudoaneurysm around the right subclavian artery with poor clearance of iomeprol. Based on the delayed expansion, pseudoaneurysm of some branch of the subclavian artery was suspected. The patient and her family first requested conservative treatment. Hemodialysis was performed with nafamostat mesilate from Day 1. Aspirin administration was stopped on Day 4. She complained of gradual exacerbating pain over her neck and dysesthesia in her right shoulder, although the mass remained the same size.

Coil embolization of the feeding artery was attempted on Day 11. Superselective angiography from the thyrocervical trunk detected no connection with the pseudoaneurysm. Three-dimensional rotational angiography using an Allura Xper FD20/10 and processed by Integris 3D-RA (Philips Medical Systems Nederland B.V., Best, The Netherlands) revealed a small opening on the dorso-superior side of the subclavian artery (Fig. 1). The mass shape had changed from spherical to ellipsoid and the out-flow had become slower. Coil embolization was abandoned because of the direct origin of the pseudoaneurysm from the subclavian artery. Cerebral angiography was performed to ascertain the feasibility of covered stenting over the opening, and revealed hypoplastic left vertebral artery and no cross flow from the left anterior communicating artery, even with compression of the right common carotid artery. Covered stenting might cause occlusion of the right vertebral artery, because of the short distance between the opening of the pseudoaneurysm and the origin of the right vertebral artery (less than 3 mm), which would surely result in massive infarction in the posterior fossa. Therefore, open surgery was planned.

She reported alleviation of the pain on Day 12. The mass had apparently decreased in size and no pulsation was felt on Day 14. Ultrasonography did not show the pseudoaneurysm or mass. Her complaints had completely disap-



**Fig. 1** Three-dimensional rotational angiograms seen from in front clearly depicting the orifice (arrows), configuration, and shape of the pseudoaneurysm and the adjacent branches. These stereographic images should be viewed by the cross fusion method.

peared. PTA for the existing AV shunt was performed and she was discharged without further intervention or sequelae.

## Discussion

Serious complications associated with central venous access occur in 0.4–9.9% of patients undergoing attempted central venopuncture,<sup>11)</sup> but inadvertent arterial puncture with a small needle is usually benign, and occurs in 0% to 11% of cases.<sup>6)</sup> Delayed development of pulsating mass in the supraclavicular region is often associated with pseudoaneurysm of the thyrocervical trunk<sup>16)</sup> or transverse cervical artery.<sup>4)</sup>

Arterial trauma caused by a large-bore dilator or catheter is usually associated with serious complications and requires prompt surgical or endovascular treatment.<sup>6)</sup> Coil placement into a pseudoaneurysm in the acute phase can be dangerous because of the absence of a true aneurysm wall. Therefore, endovascular occlusion of the parent vessel is often the most effective treatment if possible.<sup>7)</sup> Endovascular treatment of a pseudoaneurysm of the subclavian artery with stented graft was reported,<sup>14)</sup> but occlusion of the parent artery was as high as 16.6% with placement of covered stent-grafts in peripheral non-atherosclerotic arterial lesions.<sup>17)</sup> In the present patient, occlusion or even stenosis of the right subclavian artery will exert an unfavorable influence on creation of the right forearm AV shunt in the future. The collateral flows through the circle of Willis and the contralateral vertebral artery must also be first estimated.

Spontaneous resolution of pseudoaneurysm sometimes occurs in the femoral artery,<sup>10)</sup> pulmonary artery,<sup>19)</sup> middle meningeal artery,<sup>18)</sup> and other arteries.<sup>9)</sup> Pseudoaneurysm often occurs in the arteries with a superficial course, with rather small calibers, and/or injury with a small needle. Stopping of aspirin administration,<sup>1,13,15)</sup> change from unfractionated heparin to nafamostat mesilate,<sup>12)</sup> and/or thrombogenicity of nonionic iodinated contrast medium<sup>3)</sup> might promote aneurysmal thrombosis, but spontaneous resolution of unknown etiology is most likely. A period of

observation is often recommended with the hope that thrombosis and resolution of the pseudoaneurysm might occur.<sup>10)</sup>

Only two-dimensional ultrasonography is necessary to confirm the diagnosis of pseudoaneurysm, but angiography is essential for evaluation of the aneurysm origin and the neighboring cerebral vasculature to plan the treatment. Selective injection is often necessary to determine the feeder branches.<sup>5)</sup> In the present case, conventional angiography was inadequate to define the true opening, and three-dimensional rotational angiography was superior for depicting the stereoscopic configuration of the pseudoaneurysm and the adjacent branches. Computed tomography angiography may be a valuable tool for follow-up examination.<sup>17)</sup>

Even delayed development of a pulsating mass after attempted internal jugular vein catheterization might be due to subclavian artery pseudoaneurysm. Aggressive treatment such as covered stent or surgical ligation is the treatment of choice, but spontaneous resolution might happen. Three-dimensional rotational angiography is useful for depicting the details of the pseudoaneurysm and the adjacent branches.

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