Successful Treatment of Iatrogenic Subclavian Artery Pseudoaneurysm by Ultrasound-Guided Thrombin Injection

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Ultrasound-guided thrombin injection has been well described as a safe and effective treatment for pseudoaneurysms of the femoral artery. However, cases for subclavian artery pseudoaneurysms are rare. An 82-year-old man developed an iatrogenic right subclavian artery pseudoaneurysm. The pseudoaneurysm, which was partially thrombosed, was successfully treated by ultrasound-guided percutaneous thrombin injection. A trial injection with saline under color Doppler ultrasonography was helpful for confirming that the tip of the needle was in the sac with blood flow in the partially thrombosed pseudoaneurysm. Ultrasound-guided thrombin injection can be the first treatment of choice to treat subclavian artery pseudoaneurysm.

Keywords: subclavian artery pseudoaneurysm, thrombin injection

Case Report

An 82-year-old man had a history of graft replacement for abdominal arterial aneurysm via a midline abdominal incision and total aortic arch replacement for thoracic arterial aneurysm via median sternotomy. He was diagnosed with postoperative abdominal aortic pseudoaneurysm at the anastomosis site of graft replacement, and it was treated by endovascular aortic aneurysm repair. In the operation, a central venous catheter was inserted into the right jugular vein. At this time, the adjacent artery was inadvertently punctured and local pressure was applied to the puncture site to achieve hemostasis. The patient complained of worsening right neck pain from postoperative day 9, but we initially thought that the pain was orthopedic, and simply observed. On postoperative day 11, a computed tomography was performed to evaluate the site of the treated abdominal aneurysm. This showed a 39-mm-diameter pseudoaneurysm superior to the right subclavian artery in the neck. On physical examination, a pulsatile hematoma was noted in the patient’s right neck just superior to the clavicle. Therefore, the patient’s pain was considered to be due to the mass effect of the pseudoaneurysm. An ultrason sound examination showed an aneurysm arising from the subclavian artery. Color Doppler ultrasonography revealed that the neck of the aneurysm originated from the subclavian artery and was approximately 3 mm wide. Additionally, part of the aneurysm was thrombosed and blood flow had entered part of the aneurysm (Fig. 1). Magnetic resonance angiography showed that the pseudoaneurysm originated from the right subclavian artery and was approximately 3 mm wide. Additionally, part of the aneurysm was thrombosed and blood flow had entered part of the aneurysm (Fig. 1). Magnetic resonance angiography showed that the pseudoaneurysm originated from the right subclavian artery and was approximately 3 mm wide. Additionally, part of the aneurysm was thrombosed and blood flow had entered part of the aneurysm (Fig. 1). Magnetic resonance angiography showed that the pseudoaneurysm originated from the right subclavian artery and was approximately 3 mm wide. Additionally, part of the aneurysm was thrombosed and blood flow had entered part of the aneurysm (Fig. 1). Magnetic resonance angiography showed that the pseudoaneurysm originated from the right subclavian artery and was approximately 3 mm wide. Additionally, part of the aneurysm was thrombosed and blood flow had entered part of the aneurysm (Fig. 1).
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In the present case, non-color Doppler ultrasound guidance, a 22-gauge needle tip was passed into the pseudoaneurysm away from its neck. A trial injection with saline under color Doppler ultrasound was then performed. This confirmed that the saline was going to be injected into the non-thrombosed site of the pseudoaneurysm because injected saline caused swirling flow in the aneurysm as observed by ultrasound. Subsequently, thrombin was injected into the sac at the speed of 0.1 ml/s or slower until complete thrombosis in the pseudoaneurysm was confirmed with color Doppler ultrasonography (Fig. 2). As a result, 400 units of thrombin were injected. Ultrasonography also showed a patent subclavian artery and vertebral artery. The patient's symptom of neck pain improved immediately, and ultrasonography 6 months after thrombin injection showed no evidence of pseudoaneurysm in the subclavian artery (Fig. 3).

Discussion

A rare, but potentially serious, complication of central line catheter insertion is development of a pseudoaneurysm of the subclavian artery after inadvertent puncture of the artery. Treatment options include ultrasound-guided compression repair, ultrasound-guided thrombin injection, endovascular repair, and open surgical repair. Ultrasound-guided compression is usually unsuitable for subclavian artery pseudoaneurysms, such as in the present case, because of the close proximity of the clavicle, which makes it difficult to compress the subclavian artery. Surgical repair of subclavian artery pseudoaneurysm can be associated with significant morbidity because it often requires thoracotomy to obtain proximal control of the artery. Our patient had a history of median sternotomy and this was expected to be more challenging to examine the proximal artery because of adhesion. Endovascular repair might be effective in this situation. However, attempts at stenting the subclavian artery could occlude the close right vertebral artery or even lead to cerebral ischemia, especially because our patient's vertebral artery was right-dominant. Therefore, we selected ultrasound-guided thrombin injection, which is less invasive, to treat the subclavian artery pseudoaneurysm. Ultrasound-guided thrombin injection is a safe and effective treatment for pseudoaneurysms of the femoral artery. However, reports of thrombin injection that involve the subclavian artery are rare. A potential complication of thrombin injection includes thromboembolic complications, but this is infrequent. Krueger et al. reported only...
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All authors have no conflict of interest.

Authors’ Contributions
Study conception: YY
Data collection: YY, SK
Investigation: YY, KK, YU
Writing: YY
Critical review and revision: all authors
Final approval of the article: all authors
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