Resection of a giant mycotic left subclavian pseudoaneurysm

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ABSTRACT
Subclavian artery pseudoaneurysm due to intravenous drug use is a rare pathologic entity. A 6.6-cm left subclavian artery pseudoaneurysm immediately distal to the origin of the vertebral artery was discovered in a 39-year-old man with neck swelling, bacteremia, and a history of intravenous drug use. The pseudoaneurysm was resected through a median sternotomy and left supraclavicular incision, without reconstruction. This operative approach was opted for given the presence of infection and the ongoing intravenous drug use. (J Vasc Surg Cases Innov Tech 2022;8:85-8.)

Keywords: Intravenous drug use; Pseudoaneurysm; Sternotomy; Subclavian artery

Subclavian pseudoaneurysms are uncommon, and the most common etiology is trauma. Intravenous drug use (IVDU) is a rare etiology leading to pseudoaneurysms in this location.1 The ideal treatment must consider the urgency of the intervention, causative organism (if mycotic), and location of the pseudoaneurysm relative to the aortic arch and vertebral artery.

In the present case report, we have described a giant left subclavian pseudoaneurysm resulting from to IVDU that was surgically managed with sternotomy and primary resection. The patient provided written informed consent for the report of his case and associated imaging studies.

CASE REPORT
A 39-year-old man with a history of opioid use disorder, IVDU, and chronic kidney disease had initially presented to the hospital with cellulitis of the right foot. He reported IVDU into his left neck the day before admission. The initial evaluation up demonstrated leukocytosis of 16,900 cells/mm3 with 86.8% neutrophils, creatinine 6.1 mg/dL, and blood cultures that grew methicillin-resistant Staphylococcus aureus (MRSA). A chest computed tomography (CT) scan demonstrated cavitary pulmonary nodules concerning for septic emboli. An ultrasound of his neck demonstrated two well-defined collections measuring 1.4 and 2.2 cm that were lateral to the left common carotid artery and were suspected to be hematomas. He was treated with vancomycin, and his hospital course was otherwise notable for acute kidney injury requiring initiation of hemodialysis. He left against medical advice on hospital day 16 before returning the next day.

On hospital day 23, he was noted to have left neck swelling. Duplex ultrasound demonstrated a pseudoaneurysm measuring 5.4 cm in the greatest diameter, with the “yin-yang” sign, which indicates bidirectional flow due to swirling within the false and true lumens of the pseudoaneurysm.

Fig 1. Ultrasound of the left neck demonstrating a pseudoaneurysm measuring 5.4 cm in the greatest diameter, with the “yin-yang” sign, which indicates bidirectional flow due to swirling within the false and true lumens of the pseudoaneurysm.
with exposure through a median sternotomy with left supraclavicular extension. The median sternotomy was performed first and, after division of the thymus and left brachiocephalic vein and systemic heparinization, proximal control of the left subclavian artery was obtained at the level of the aortic arch with a Henley clamp. The sternotomy was then extended above the left clavicle, dividing the strap muscles and sternocleidomastoid. Because the pseudoaneurysm was friable and anterior to the distal subclavian artery, it was entered during manipulation. Hemorrhage was initially controlled with digital manual pressure inside the pseudoaneurysm neck. Subsequently, distal control of the subclavian artery and vertebral artery were obtained, taking care to identify and protect the phrenic nerve. The pseudoaneurysm sac and ~2 cm of friable left subclavian artery were resected to healthy tissue, leaving a 2-mm stump distal to the origin of the left vertebral artery (Fig 3). The ends were closed with running two-layer 5-0 polypropylene suture. Mediastinal and left neck drains were left in place, and the incisions were closed. He had monophasic left radial and ulnar Doppler ultrasound signals at the end of the case. The estimated blood loss was 1 L. Although an infected field is a relative contraindication to a cell saver procedure, he had had negative blood culture findings before surgery, and, owing to a system-wide blood shortage, the cell saver was used.

Postoperatively, he had a 20 mm Hg blood pressure gradient between his two arms but he remained asymptomatic. He had no symptoms of limb ischemia or stroke and was discharged with outpatient follow-up visits scheduled. Cultures taken from the pseudoaneurysm wall grew coagulase-negative Staphylococci, and he completed a 2-week course of vancomycin with negative blood cultures after completion of therapy. He has since had >1 year of follow-up with no reports of stroke, claudication, or ischemia. No additional follow-up imaging studies were obtained, because the artery had been ligated and not reconstructed.

**DISCUSSION**

Although the true incidence is unknown, a subclavian pseudoaneurysm is an uncommon pathologic entity, with most of the described cases related to trauma or iatrogenic related to central catheter placement.² A search of the reported data revealed only seven cases of subclavian pseudoaneurysm related to IVDU.³⁻⁸ Subclavian pseudoaneurysms can present as a pulsatile neck mass, chest or shoulder pain, hoarseness, hemoptysis, brachial plexus palsy (Pancoast syndrome), or venous stasis and have been associated with limb ischemia, stroke, and rupture. The clinical suspicion for a subclavian pseudoaneurysm should prompt a CT angiogram, which can confirm the diagnosis and provide anatomic information to guide surgery.
have avoided sternotomy.4 However, we opted for ster-
cular placement of a balloon catheter could potentially
eral thoracotomy are well-described exposures. Endovas-
surrounding anatomic structures. A median sternotomy
owing to its retroclavicular and posterior location and the
of the proximal left subclavian artery can be challenging
the involved portion of the vessel. However, open surgery
s of subclavian pseudoaneurysm due to
IVDU had been treated with ligation and excision of
the involved portion of the vessel. However, open surgery of the
proximal left subclavian artery can be challenging owing to its retroclavicular and posterior location and the
surrounding anatomic structures. A median sternotomy
with supraclavicular extension,15 trap door, and anterolat-
eral thoracotomy are well-described exposures. Endovas-
cular placement of a balloon catheter could potentially have avoided sternotomy.6 However, we opted for ster-
otomy, given the distorted, infected field, lack of avail-
ability of a hybrid room, and the proximity of the
pseudoaneurysm to the aortic arch. Stenting across the
pseudoaneurysm was also considered. However, given
the presence of infection, explantation of the stent and,
therefore, sternotomy would likely have been necessary.
The performance of a median sternotomy achieved wide proximal exposure of the left subclavian artery, and the supraclavicular extension allowed for distal control.

The decision to revascularize during the index opera-
tion must balance operative morbidity, anatomic consid-
erations, and the availability of an autogenous conduit. The reconstruction options included end-to-end anasto-
mosis, direct graft replacement, and bypass (carotid–
subclavian or carotid–axillary), preferably with a native
vein, autograft, or xenograft in the setting of infection.16
In the case of our patient, we did not consider perform-
ing reconstruction owing to the patient's ongoing intra-
venous drug use and concerns for graft compromise
from MRSA. He had no baseline atherosclerotic disease,
and we believed his risk of limb ischemia to be low with this approach. We were also confident that we
could preserve the vertebral artery flow. However, in
cases of subclavian pseudoaneurysm involving the verte-
bral artery, the posterior cerebral circulation can be pre-
served via transposition of the proximal vertebral artery
to the common carotid.17,18

At present, no evidence-based recommendations have been reported regarding the management of a subcla-
vian pseudoaneurysm in the setting of possible infection,
because this clinical entity has only been described in case reports and small case series. Our literature search
found no comparative studies or definitive evidence that favored a specific surgical approach. For the reasons
described, we have preferred open surgical ligation and excision without reconstruction using the broad ex-
sure afforded by median sternotomy with supraclavicu-
lar extension.

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