

A novel approach for the repair of left subclavian artery aneurysm



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JTCVS Techniques 2023;22:147-9

2666-2507

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<https://doi.org/10.1016/j.xjtc.2023.09.012>



Preoperative computed tomographic 3D reconstruction showing LSCA aneurysm.

CENTRAL MESSAGE

Elective repair of an LSCA aneurysm through left posterolateral thoracotomy and first rib excision provides optimal access to the entire length of the SCA through a single incision.

▶ Video clip is available online.

Subclavian artery (SCA) aneurysms, particularly left SCA (LSCA) aneurysms, are exceptionally rare, with fewer than 400 cases reported worldwide.¹ Conventional approaches involve left thoracotomy or sternotomy, occasionally with infraclavicular access. We present a novel approach—a single high left thoracotomy and excision of the first rib—for accessing LSCA aneurysms. We highlight its advantages over traditional methods. Patient consent was obtained for publication of study data, and institutional review board approval was waived for this case report.

CASE REPORT

A 36-year-old woman with Takayasu arteritis presented with a right-sided lower motor neurone facial palsy. She also had claudication of the left upper limb for 4 months, for which she did not seek treatment earlier. On physical examination, arterial pulses in the left upper limb were not palpable; however, the limb was not ischemic. Arterial Doppler of the left upper limb showed monophasic flow, suggestive of proximal obstruction. Computed tomography (CT) angiogram demonstrated a saccular aneurysm arising from the LSCA that measured 4.2×3.4 cm (Transverse \times Anteroposterior) near the origin of the LSCA with an eccentric thrombus (Figure 1). Another small aneurysm (0.6×0.5 cm) was also present in the distal right common iliac artery. All other branches of the aorta were normal. CT and magnetic resonance imaging of the brain were also normal.

Elective repair of the LSCA aneurysm was done by entering the thorax through the third intercostal space utilizing a left posterolateral thoracotomy. The aneurysm was

4×4 cm in size and positioned 3 cm from the origin of the LSCA (Figure 1). The apex of the left lung adhered to the aneurysm, hindering retraction. We stapled and divided this portion to improve exposure to the aneurysm. After opening the mediastinal pleura, proximal control of the LSCA was obtained. The course of the LSC vein entering the thorax and joining the brachiocephalic vein was traced. The left phrenic nerve and vagus nerve were identified and preserved. The first rib was exposed by incising the parietal pleura and went around the rib on either side of the aneurysm without injuring it. The first rib was divided, taking care not to injure the vessels/nerve/aneurysm by staying close to the rib. After resecting the first rib, the distal portion of the LSCA and the proximal axillary artery were well visualized for looping. Branches of the LSCA arising from the aneurysm were identified and ligated (Video 1). This new approach provided proximal and distal vascular control and the aneurysm was excised (Figure 2). The LSCA aneurysm was repaired with a 7-mm polyethylene terephthalate interposition graft. Postoperatively, the patient had no neurological deficits or ischemic symptoms in her left arm and had palpable radial and ulnar pulses at 2 weeks' follow-up.

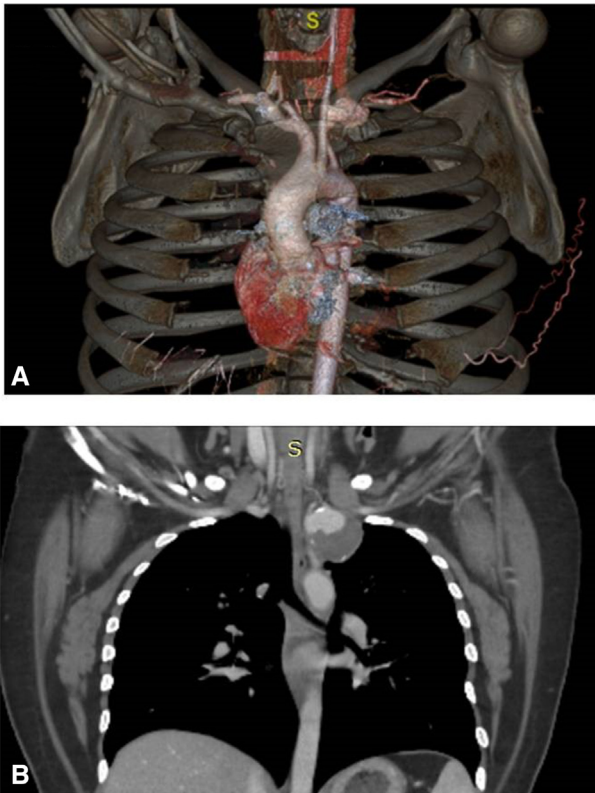
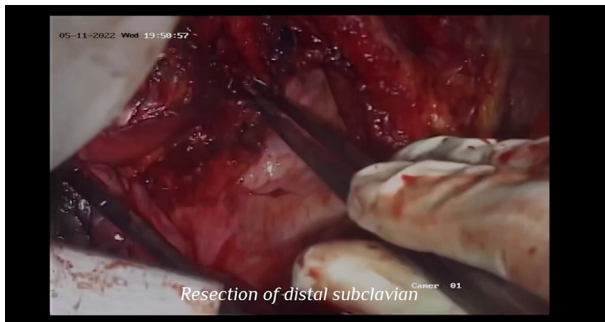


FIGURE 1. A, Three-dimensional reconstruction from computed tomography images to show left subclavian artery (LSCA) aneurysm. B, Computed tomography image depicting the LSCA aneurysm.

DISCUSSION

The preferred treatment for SCA aneurysms involves resection and reconstruction using a prosthetic vascular graft. Optimal exposure of the SCA is crucial for effective aneurysm management. Surgical access to the SCA



VIDEO 1. Operative steps for the repair of left subclavian artery (LSCA) aneurysm. Initially, the first rib was exposed by incising the parietal pleura and went around the rib on either side of the aneurysm without injuring it. Then, the first rib was divided and the distal portion of the left subclavian artery and the proximal axillary artery was well visualized for looping. Branches of LSCA arising from the aneurysm were identified and ligated. The aneurysm was excised, and LSCA was repaired with a 7-mm polyethylene terephthalate interposition graft. Video available at: [https://www.jtcvs.org/article/S2666-2507\(23\)00355-3/fulltext](https://www.jtcvs.org/article/S2666-2507(23)00355-3/fulltext).

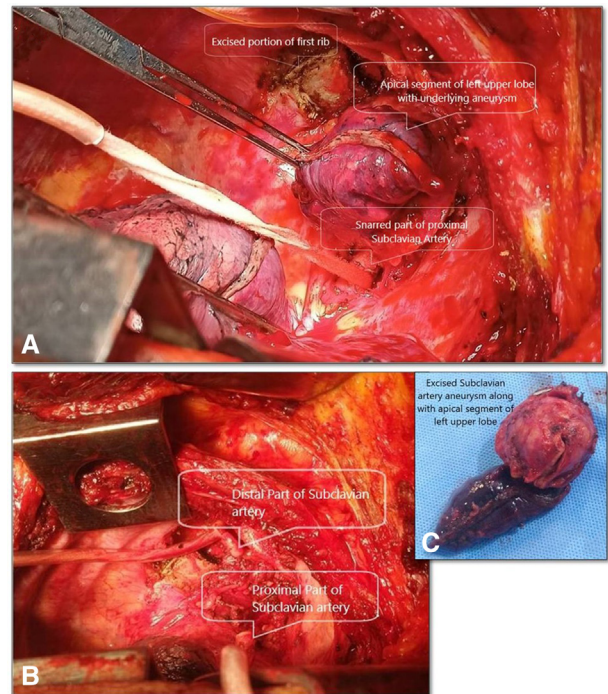


FIGURE 2. A, Intraoperative view of the aneurysm with left subclavian artery looped proximally and distally. B, Proximal and distal left subclavian artery stumps after removal of the aneurysm. C, Excised subclavian artery aneurysm with part of lung apex adherent to it.

depends on aneurysm location and extent as revealed by CT scans. In this case, the large aneurysm was situated near the LSCA origin. Due to the intact first rib, distal SCA control was challenging. With the conventional approach, the problem here needs a large incision, like an open book incision or a staged procedure. The commonly used conventional approaches for proximal SCA corrections are median sternotomy,¹ median sternotomy plus left supraclavicular extension (aneurysm in intrathoracic space and close to the common carotid and vertebral arteries),² modified supraclavicular approach (extrathoracic location),³ infraclavicular approach (for carotid to subclavian bypass of aneurysm),⁴ left thoracotomy plus supraclavicular approach (intrathoracic subclavian artery aneurysms),⁵ 2-staged approach (multiple supra-aortic artery aneurysms),⁶ modified trapdoor plus thoracotomy (intrathoracic subclavian artery aneurysms),¹ and left posterolateral thoracotomy (left hemithorax).⁷ But none of these techniques provides access to the entire length of the LSCA through a single incision.

We introduced a novel technique in our case: A single high left thoracotomy incision with first left rib division that provided extensive LSCA exposure. This innovative approach enhances aneurysm visualization and facilitates proximal and distal SCA clamping for effective repair. This technique also minimizes technical mishaps, reducing blood loss, morbidity, and mortality risks. Traditional

methods display greater complexity, resulting in inadvertent aneurysm entry in 50% of cases and subsequent severe complications.¹ Our approach, a single high left thoracotomy with first rib division, not only grants complete access to the subclavian artery but also eliminates the need for infraclavicular incisions seen in conventional procedures. Its feasibility diminishes if the aneurysm extends to the axillary artery's initial or distal segments.

Conflict of Interest Statement

The authors reported no conflicts of interest.

The *Journal* policy requires that editors and reviewers disclose conflicts of interest and to decline handling manuscripts for which they may have a conflict of interest. The editors and reviewers of this article have no conflicts of interest.

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