

# Giant pseudoaneurysm of subclavian artery after blunt chest trauma

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## ABSTRACT

Subclavian artery (SCA) pseudoaneurysm after blunt chest trauma is rare and its delayed presentation months after the SCA injury is even rarer. Herein we discuss a case of SCA pseudoaneurysm in a 74-year-old man who presented to us 5 months after blunt chest trauma. He had been managed conservatively for the fracture of first rib and clavicle until presentation to our hospital. He had uncontrolled hypertension and a rapidly increasing large painful swelling (10 by 8 cm) in left clavicular region along with purplish discoloration of the overlying skin. The diagnosis was confirmed after computed tomography angiography and the patient was successfully treated with surgical evacuation of clots, primary repair of the rent in the SCA, and plating of clavicular fracture. (*J Vasc Surg Cases and Innovative Techniques* 2018;4:220-2.)

**Keywords:** Blunt chest trauma; Pseudoaneurysm; Subclavian artery

Subclavian artery (SCA) pseudoaneurysm is a rare consequence of first rib and clavicular fracture after a blunt chest trauma. SCA injury commonly occurs owing to penetrating injury. Less than 5% of all SCA injuries are due to blunt trauma.<sup>1-4</sup> Most of these injuries present in the acute setting and are associated with a very high mortality owing to concomitant injury to other organs. However, rarely, they can present in delayed fashion with pseudoaneurysm or thrombosis of SCA.<sup>5,6</sup> Herein we describe an elderly male who developed a giant pseudoaneurysm of left SCA after blunt chest trauma and presented to us after 5 months of conservative management for fracture first rib and clavicle. The patient gave his consent to use case information and images for educational and publication purposes.

## CASE REPORT

A 74-year-old man presented to us with a 2-week history of pain and a progressively enlarging swelling in the left clavicular region. He had a history of hitting a rock after a fall from a moving tractor that was about 8 feet high, approximately 5 months earlier. He was found to have a fracture of left clavicle and first rib without any hemothorax or pneumothorax that was

managed conservatively with a figure-of-eight bandage. His blood pressure at presentation in this episode was 160/100 mm Hg with a pulse rate of 100/min. Local examination revealed a large swelling of 10 × 8 cm occupying the left mid clavicular region. Although there was no visible pulsation, palpation showed the presence of thrill. There was no neurologic deficit and the distal pulses were palpable. His hemoglobin level was 8 g/dL. Computed tomography angiogram (CTA) revealed a large pseudoaneurysm of size 8 × 6 cm arising from the left SCA (*Fig 1*) with a displaced fracture of the left clavicle and the first rib. Operative intervention was planned owing to large and tense hematoma along with the need for repair of displaced and fractured clavicle. An endovascular procedure could not be planned owing to the unavailability of a covered stent graft and refusal of any form of intervention from the patient.

A week later, the patient returned to the hospital with rapidly enlarging swelling, severe pain, and purplish discoloration of the overlying skin (*Fig 2*). He had a very high blood pressure of 188/110 mm Hg owing to nonadherence to the prescribed antihypertensive medication. Further laboratory investigation also revealed a decrease in hemoglobin to 5 g/dL with normal biochemistry. He was started on intravenous nitroglycerine and scheduled to undergo urgent surgical intervention after consenting to the procedure.

The pseudoaneurysm occupied the entire supraclavicular and infraclavicular region with palpable thrill to the heads of sternocleidomastoid muscle. The contained hematoma had displaced the fractured clavicle, distorting its anatomy, making proximal exposure of the SCA difficult via the infraclavicular and supraclavicular approaches. Thus, a median sternotomy was chosen for proximal control of the SCA. After this maneuver, the thymus was removed and the left SCA was dissected near the arch of the aorta. After heparinization, the proximal SCA was clamped and distal control was taken by inflating the pressure cuff around the proximal arm. The pseudoaneurysm was approached via an infraclavicular incision and the hematoma was evacuated. After this step, a 5-mm tear in the SCA was repaired primarily.

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Author conflict of interest: none.

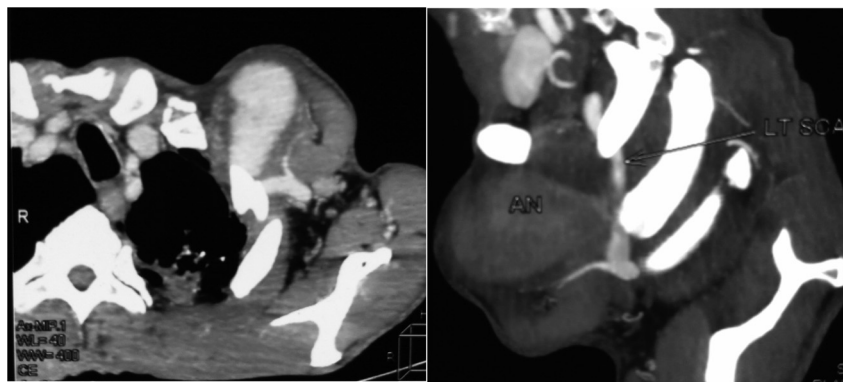
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2468-4287

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<https://doi.org/10.1016/j.jvscit.2018.03.009>



**Fig 1.** Computed tomography angiogram (CTA) showing large pseudoaneurysm arising from the left subclavian artery (SCA).



**Fig 2.** Giant pseudoaneurysm in the left clavicular region with overlying skin discoloration.

There was established nonunion of fracture of the midshaft clavicle. The interposed soft tissue was removed, the fracture margins were refreshed, and the fracture was reduced and stably fixed using a precontoured clavicular plate. The fixation was augmented with autogenous cancellous bone graft harvested from the ipsilateral iliac crest. Hemostasis was achieved and the wound was closed in layers with a suction drain. Standard protocol of rehabilitation for a clavicle fracture was initiated gradually, which continued in the follow-up period. Postoperatively, the patient had an uneventful recovery. After 5 months of follow-up, the patient is doing well without any neurovascular deficit, with normal hemoglobin and well-controlled blood pressure with antihypertensives.

## DISCUSSION

Pseudoaneurysms are pulsatile hematomas that communicate with an artery through a localized arterial disruption. Common causes are trauma, intravenous

drug abuse, vascular interventions, and anastomotic disruptions. Characteristically, they present as a pulsatile mass with thrill and an audible to-and-fro murmur.

There is close anatomic relationship of the clavicle and the first rib to the neurovascular structures passing through the thoracic outlet. This proximity makes these neurovascular structures more prone to injury after blunt chest trauma, especially in cases of posteriorly displaced fracture of first rib and clavicle. The reported incidence of vascular injury associated with first rib fracture is around 7%.<sup>2,4</sup> Association of an SCA injury with isolated clavicular fracture is not common. In almost one-half of the cases, SCA injury and clavicular fracture is seen to have occurred with other organ injuries.<sup>3</sup> The possible mechanisms for SCA injury are elongation associated with blunt force applied to the anterior chest and laceration to the SCA owing to bony fragments produced by a fractured first rib or clavicle.<sup>7</sup> The possible cause of the SCA injury in our case could be contusion or laceration of SCA owing to bony fragments of the first rib or clavicle, which was aggravated because of uncontrolled hypertension.

Injury to the SCA owing to blunt trauma is mostly associated with injuries to other organs and presents in the acute setting with a high associated mortality. The reported hospital mortality after operative intervention is about 5% to 30% in the patients reaching hospital.<sup>8</sup> The initial investigation suggestive of possible vascular injury in the setting of traumatic chest injury includes a widened mediastinum, apical pleural hematomas, and first rib/clavicle fractures on a chest X-ray, and these patients should be further evaluated with CTA.<sup>1</sup> Patients with delayed presentation after a blunt chest trauma with unilateral absence of the radial pulse, brachial plexus palsy, and supraclavicular hematoma/swelling (although rare) should undergo CTA to rule out a possible SCA injury.

An untreated pseudoaneurysm of the SCA can be limb and life threatening. It can lead to limb and cerebral ischemia owing to thromboembolism or it can even rupture in 10% of cases, a threatening-life complication.<sup>9</sup>

Traditionally, pseudoaneurysms of the SCA were managed with operative intervention that involved primary repair, resection, or exclusion of the aneurysm by direct reconstruction or with interposition venous graft or by an extraanatomic bypass. Recent advances in endovascular surgery have made the management of small pseudoaneurysms less invasive with covered stent grafting, and can be life saving in acute setting. However, prolonged follow-up is needed because the stent can fracture or occlude over time owing to motion and proximity to the clavicle and first rib.<sup>10,11</sup> However, surgery still plays important role at places where this minimal access facility is still not available. In this case, we opted for surgical intervention owing to the need for the evacuation of a giant, painful hematoma and repair of fractured clavicle, coupled with the unavailability of a covered stent graft.

### CONCLUSIONS

Pseudoaneurysm of the SCA after blunt chest trauma is very rare. Any patient presenting with supraclavicular swelling and/or symptoms suggestive of neurovascular insufficiency with associated first rib and clavicle fracture should be evaluated with CTA for a possible vascular injury. Urgent surgical or endovascular intervention is required; pseudoaneurysm of the SCA is associated with limb- and life-threatening complications.

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Submitted Nov 11, 2017; accepted Mar 22, 2018.