

# Excision of Delayed Presented Giant Pseudo Aneurysm of Left Subclavian Artery Post Stab Injury

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## Abstract

Penetrating injuries to the subclavian arteries as well as post traumatic pseudo aneurysm involving subclavian artery (SCA) are uncommon and it should be repaired early whenever diagnosed because of the risk of complications such as thrombosis, gangrene, limb loss, rupture may be resulting to the death if not reach to the hospital early. Presenting a case report of a 20-year-old male who presented with a left subclavian artery pseudo aneurysm following a stab injury to the left axilla. He was referred to our institute, 20 days after the alleged assault. The presentation, diagnostic procedures and approach for management of this injury are discussed.

**Keywords:** Subclavian Artery; Pseudo Aneurysm; Stab Injury

## Introduction

Penetrating SCA injuries constitute less than 2% of all civilian vascular traumas [1,2]. Complex local anatomy combined with the difficult surgical exposure of proximal injuries makes these injuries challenging even for experienced surgeons. Post-traumatic pseudo aneurysm of subclavian artery (SCA) is rare because trauma to it is rare [3]. Most common site of pseudo aneurysm is common femoral artery, followed by radial and brachial artery [3]. We present a case of the patient in whom pseudo aneurysm of left subclavian artery developed after 20 days of stab injury and was successfully treated by surgical excision of pseudo aneurysm and removal of blood clots with interposition grafting with PTFE graft of injured left subclavian artery.

## Case Summary

A 20-year-old male patient presented to us with an alleged history of stab injury to left axillary region 20 days back that was treated primarily at a local hospital with skin sutures [Figure 1]. He had mentioned in the history that there was no swelling when he had visited the local hospital at the time of suturing. After 10 days, patient noticed a pulsatile swelling in left arm pit which initially was small in size but increased rapidly within 10 days. Patient presented to our hospital after 20 days of stab injury with swelling of 12 cm × 9 cm over left deltopectoral region extending into the left axilla with complaints of severe pain in left upper limb. Left axillary, brachial, radial, and ulnar artery pulsations were palpable.

Upper limb computed tomography angiography revealed pseudo aneurysm from third part of left Subclavian artery with maximum anteroposterior and transverse length of pseudo aneurysm 78 mm and 57 mm respectively. The neck of pseudo aneurysm is 3.4 mm. Subclavian artery 1.3 cm proximal to neck of pseudo aneurysm and first part of axillary artery shows faint contrast opacification due to external pressure effect of pseudo aneurysm.

After short preoperative preparation, the patient underwent surgical intervention under general anaesthesia. Initially for distal vascular control left axillary artery exposed and loop in upper arm with separate incision. Considering the CT angiography findings and huge size of aneurysm, decision of mini sternotomy upto 4th intercostals space with left lateral extension (reverse J) taken for proximal control of subclavian artery. Thus, a better exposure and the control of the proximal subclavian artery was done. After proximal and distal vascular control was secured, the pseudoaneurysm was dissected with horizontal incision of 6 cm approximately extending over left deltopectoral groove and left anterior axillary fold. Dissection deepened, pectoralis major divided partially and complete division of pectoralis minor done to reach the pseudoaneurysm. Intravenous heparin (100 IU/kg) was administered and after 3 minutes, the Proximally subclavian and distal axillary arteries were clamped. Pseudoaneurysm opened and large amount of clots, equivalent to 300-400ml removed. Dissection and separation of pseudoaneurysm followed by excision of the pseudoaneurysm sac [figure 3] done. A Rent of about 3 mm was noted at the 3rd part of the subclavian artery. Subclavian arterial wall proximal and distal to the rent was unhealthy and friable, most likely due to the delayed presentation of the pseudoaneurysm. Left sided supraclavicular incision taken at the sternoclavicular junction, extending over the medial half of the clavicle, then with careful dissection was done and left distal subclavian artery control taken. Fogarty catheter of 4 French passed proximal and distal through the rent and there was no evidence of thrombus. After confirming adequate flow from both side, an interposition grafting was done with 6 mm ring PTFE graft between the first part of subclavian artery and proximal axillary artery in an end to side fashion [Figure 3a and 3b]. After achieving hemostasis two 14Fr Romovac drains were placed in the pseudoaneurysm cavity and a 28Fr chest drain tube in the pericardial cavity. Divided ends of the Pectoralis major muscle approximated. Sternum closed with steel wires, subcutaneous tissue and skin closed in layers.

Radial and ulnar artery pulsations were well felt and confirmed with a hand held Doppler. His postoperative recovery period was uneventful. Pericardial drain and romovac drains removed on 2nd and 3rd postoperative day (POD) respectively and on the 5th POD the patient was discharged. On 14th POD in his first follow-up visit skin staplers were removed, wound was healthy and all the arterial pulsations of the left upper limb were palpable and there was no sign of any neurological impairment.

## Discussion

The most common cause for a post-traumatic pseudoaneurysm is iatrogenic such as post AV fistula dialysis needle puncture or invasive procedures such as percutaneous coronary interventions. Accidental arterial puncture occurs in around 1% and 2.7% of jugular and subclavian approaches, respectively [4,5]. Penetrating stab injuries involving Subclavian arteries are particularly devastating because mortality prior to hospitalisation is about 75% and longterm morbidity is due to brachial plexus injuries [6,7]. Symptoms of Subclavian artery aneurysm are determined by the aneurysm site and size. Extrathoracic aneurysm usually presents with pulsatile swelling over deltopectoral groove with pulsation and vascular murmurs, whereas intrathoracic aneurysm or post-stenotic dilated aneurysm may compress the brachial plexus or upper extremity vessels leading to the ischemia of the limb. Tumor body eroding the apex of lung might cause hemoptysis, compress recurrent laryngeal nerve resulting in hoarse voice. Besides, there are reports about dysphagia and Horner's syndrome as well. However, dyspnea caused by trachea compression is seldom reported.

Angiogram is extremely helpful to determine the site of injury, whether patients get benefit from endovascular intervention and most importantly for planning the surgical approach. In our case we use CT angiogram to confirm the extent of the injury and surgical approach for the operative procedure. In the management of penetrating subclavian artery aneurysm, recent studies showed that use of subclavian artery stent to close the opening between subclavian artery and pseudoaneurysm is not superior to surgical correction because there may remain at a higher risk for infection in an already formed pseudoaneurysm sac. A more delayed presentation may necessitate repair with subclavian artery excision with interposition grafting. Excision of that pseudoaneurysm is mandatory [9].

Various types of surgical approaches have been described in different literature for the management of penetrating Subclavian artery injuries like midline sternotomy, anterolateral thoracotomy (trap door incision) [8,9]. In our case, we used the combination of mini sternotomy and a left sided clavicular incision, left deltopectoral groove, left arm incision was used with excellent exposure to take adequate vascular control and to deal with injuries. With this approach we found minimal risk of preoperative bleeding as we took proximal and distal vascular control and complete excision of pseudoaneurysmal sac with repair of vascular injury with interposition ring PTFE graft went uneventful. When necessary, innominate artery and carotid artery are supposed to be occluded, or the operation should be performed in a profound hypothermic circulatory arrest under extracorporeal circulation. It is highly recommended not to open the aneurysm sac if the aneurysm sac is adherent to the surrounding tissues with rich collateral circulation, as ligation of bilateral ends is effective as well. Exposure of aneurysm body, aneurysm inflow, and aneurysm tract control along with intracapsular bleeding control after aneurysm dissection are crucial for the success of the operation.

There were no major postoperative vascular complications in our case and no associated or residual brachial plexus injury. Regarding brachial plexus injuries studies mentioned earlier, were encountered in 12% of cases and neurological deficit remains the leading cause of morbidity of those case. Neurological deficit on presentation of some cases were results from compression of the nerves by a haematoma or an aneurysm and resolves after surgical intervention [8].

## Conclusion

Proximal and distal control of artery is must for safe excision of any pseudoaneurysm. By proper anatomical dissection, pseudoaneurysm can be excised without damaging the surrounding vital structure such as brachial plexus and axillary vein. Timely management is important to prevent complications such as infection, rupture, and gangrene. Although recently published meta-analysis showed no superiority of subclavian artery stenting in such pseudoaneurysm because even after closing the opening which connect subclavian artery with the pseudoaneurysm, the already formed pseudoaneurysm is at a high risk of infection [10]. So excision of that pseudoaneurysm is a must.

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**Ethical Approval:** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Informed consent:** Informed consent has been obtained.

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