Subclavian Artery Pseudoaneurysm with Arteriovenous Fistula Following Trauma: A Case Report

Anfal Alsayed, BSc, MD* Dhafer Kamal MD, MSc, FRCSC** Amr Ashour MSc**

ABSTRACT

Pseudoaneurysms of the subclavian artery are infrequent but potentially life-threatening complications that may arise after penetrating or blunt injuries. Prompt diagnosis and intervention are essential to prevent further complications and ensure favorable outcomes. We describe the clinical presentation, diagnostic workup, and successful management of this challenging case.

Keywords: Pseudoaneurysm, aneurysm, subclavian artery, arterio-venous fistula AVF

INTRODUCTION

Subclavian artery psudoaneurysm are an uncommon vascular complication that can occur following traumatic injuries to the chest or neck region. They pose a significant risk of rupture and potential life-threatening bleeding. Early identification and appropriate management are crucial for favorable outcomes. We present a case of subclavian pseudoaneurysm following a penetrating trauma and discuss the diagnostic approach and treatment.

CASE REPORT

A 53 years of age Asian male, who is otherwise healthy, presented to the emergency department after an assault with sharp object on his left axilla. On presentation, the patient was complaining of left sided chest pain. Trauma code was activated. As per ATLS protocol, primary survey examination: Airway intact, Breathing equal bilaterally and maintains saturation on room air, Circulation heart rate was 110, Blood pressure 125/80 mmHg. Disability GCS 15/15, bilateral pupil reactivity, no signs of lateralization. On examination, a 3cm long stab wound was present in the left axilla with no active bleeding. Left radial pulse volume was reduced. On auscultation, a bruit was present over the supraclavicular and infraclavicular fossae, other findings on examination are a small forehead wound with no active bleeding, and a cut wound in the right ear involving the whole cartilage with partial amputation. FAST was negative, Chest x-ray was normal with no pneumothorax, hemothorax, lung contusion, Or rib fracture. The patient was shifted to the Computed tomography (CT) in stable condition.

Computed tomography (CT) with intravenous contrast showed evidence of a left sided axillary and chest wall hematoma with surgical emphysema. A well-defined pouch of contained contrast was seen arising from the left subclavian artery suggestive of a pseudoaneurysm as in figure 1. The rest of the body CT was normal. ECG showed sinus tachycardia, Echocardiography was also deemed normal.

Vascular service consultation was obtained. The patient had hard signs of arterial injury as described above, and the pseudoaneurysm was 2x3cm in maximum diameter with a wide mouth. Therefore, the decision for intervention was made. An endovascular intervention was favored over open repair as it significantly less morbid, and it can usually be performed under local anesthesia and sedation. The patient was consented and shifted to the operator room on an urgent basis. Under local anesthesia, procedure was initiated by left brachial artery retrograde access with an 8Fr sheath. Angiography showed pseudoaneurysm of subclavian artery with an arterio-venous fistula into the subclavian vein. The lesion was crossed with an 0.035-inch wire, and a covered stent was accurately deployed at the site of the pseudoaneurysm. Completion angiography showed excellent sealing-off of the aneurysm and disappearance of the fistula with normal uninterrupted blood flow in the subclavian and axillary arteries. The ipsilateral radial artery pulse was now of normal volume.

Postoperatively, the chest pain immediately disappeared, and the patient was doing well. He was discharged on the first postoperative day in good condition. On the follow-up after 2 weeks from the operation, patient had no complaints, radial artery pulse felt, no bruit on the left subclavian artery, and patient returned to his normal activity of daily living. He has been followed up in vascular clinic on regular basis and remains well and asymptomatic at 2 years follow up.

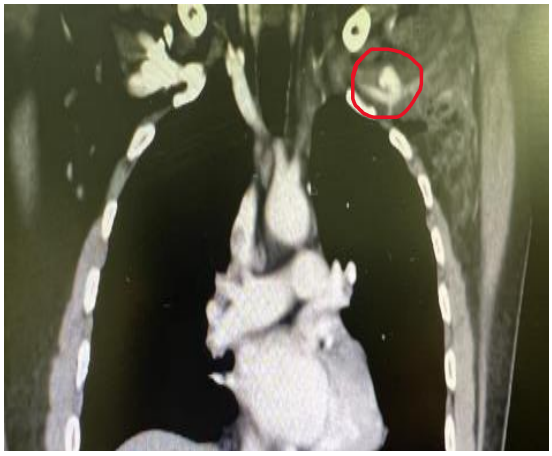

Figure.1 Computed tomography (CT) with intravenous contrast, a well-defined pouch of contained contrast was seen arising from the left subclavian artery

* Surgical Resident
Department of Surgery, Bahrain Defense Forces Hospital
Royal Medical Services, PO Box 28743, West Riffa, Kingdom of Bahrain.
E-mail: Anfal.alhashem@hotmail.com
** Senior Consultant Vascular and Endovascular Surgeon
Department of Surgery, Vascular Surgery Service, Bahrain Defense Forces Hospital, Royal Medical Services, Riffa, Bahrain.

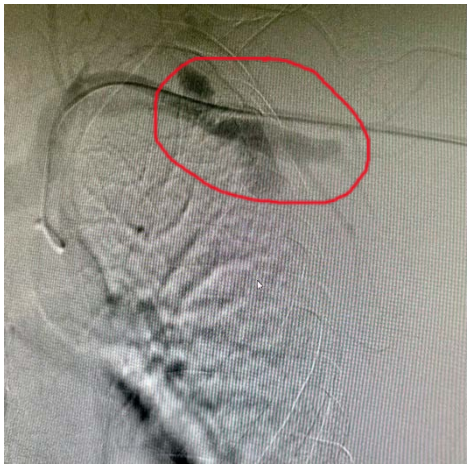

Figure 2. Initial angiogram is showing pseudoaneurysm of subclavian artery with AV fistula to subclavian vein

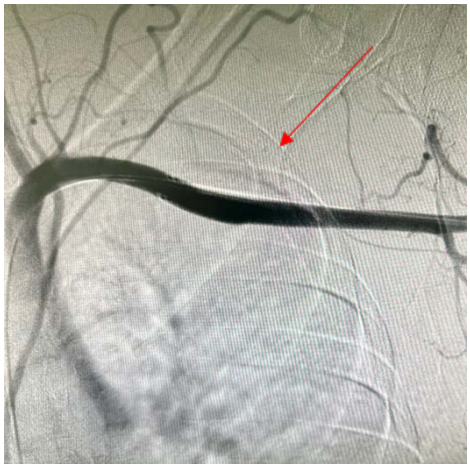

Figure 3. Completion angiogram is showing covered stent and complete disappear of the pseudoaneurysm and the AV fistula with normal flow

DISCUSSION

Penetrating trauma accounts for the increased incidence of major thoracic vascular injury. In one large review, truncal (including neck) vascular injuries predominated at 66 percent[1]. An arterial pseudoaneurysm is a contained rupture of the arterial wall, resulting in the presence of blood collection without proper vessel boundaries[2]. This results in a pulsating, enclosed collection of blood in direct connection with the interior of a torn blood vessel[3]. Traumatic subclavian artery pseudoaneurysm can be life threatening if ruptured causing hemorrhage, especially if it wasn't undiagnosed promptly or left untreated[3]. A complex pseudoaneurysm can cause arteriovenous fistulas, with incidence ranging from 2.3% to 3.9%[4,5].

A traumatic subclavian pseudoaneurysm may lead to various symptoms, including shortness of breath, swallowing difficulties. Clinical signs include reduced or absent pulse in the affected limb, expanding pulsatile neck hematoma, the presence of bruit on auscultating the supraclavicular or infraclavicular regions. Upper limb edema is present in case of a traumatic arterio-venous fistula. These pseudoaneurysms can also remain asymptomatic and may be diagnosed weeks to years after the initial trauma, with an average latency of approximately 5 years[6]. If a traumatic subclavian pseudoaneurysm is complicated by an arteriovenous fistula, high output heart failure may ensue[5].

Upon suspicion of a vascular injury, various diagnostic modalities are used to confirm and assess the extent of the injury and determine the appropriate management strategy. Initial diagnostic evaluation of subclavian artery pseudoaneurysms typically involves CT angiography. Conventional angiography also provides definitive localization of the site and size of arterial injury and help guiding definitive management decisions[3].

The management of subclavian artery pseudoaneurysms can be approached using either endovascular repair, or open (surgical) repair by direct suturing of the traumatic arteriotomy, vein patch angioplasty, or interposition graft placement. In the open repair technique, the subclavian artery is explored via a supraclavicular incision extended laterally. An infraclavicular approach is used to explore and control the axillary artery. If thoracotomy is performed, precautions should be made to protect the phrenic nerve and thoracic duct during this approach[8]. The open technique gives the Surgeons a direct visualization to the operative filed. However, it involves the need for general anesthesia, larger incisions, longer operative time, potentially surgical morbidities, and longer hospital stays compared to endovascular repair[8]. On the other hand, endovascular treatment of this injury can be done under local or regional anesthesia, with shorter operative time, and enhanced recovery time with shorter hospital stay, all of which results in lower procedure related morbidity and mortality. An endovascular approach has become the first line of treatment for subclavian artery injury[7].

The endovascular Skills for Trauma and Resuscitative Surgery group reported their experience with endovascular repair of subclavian and axillary arteries injury in 160 patients from 1996 to 2012; technical success was achieved in 97% of cases[5,7].

Our patient had a penetrating injury to the distal left subclavian artery resulting in a symptomatic large pseudoaneurysm and an arteriovenous fistula between subclavian artery and vein. Endovascular repair was performed promptly using a stent-graft with excellent results. The procedure was done under local anesthesia with sedation and lasted under an hour. The patient's symptoms immediately disappeared, he had an uneventful recovery, and was discharged home on first postoperative day in good condition. He was regularly followed up in vascular clinic and remains in good health at 2 years follow up. It is worth mentioning that this is the first endovascular repair of subclavian artery injury in the kingdom of Bahrain.

CONCLUSION

Subclavian artery psudoaneurysm following penetrating trauma require prompt recognition and intervention to prevent potential life-threatening complications. Endovascular stent placement has demonstrated its efficacy as a suitable treatment modality in such cases. This case report highlights the importance of a multidisciplinary approach involving emergency physicians, trauma surgeons, vascular surgeons, radiologists, and other supporting services for the successful management of this injury.

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