

A Rare Injury Due to Blunt Trauma: Rupture of Subclavian Artery Branch

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Abstract

Subclavian artery injury is an extremely rare and life-threatening condition. In this case, we discussed the diagnosis and treatment of the subclavian artery branch injury due to chronic blunt trauma caused by inappropriate traditional physical therapy. A 72-year-old male patient was admitted to the emergency department with sudden onset of pain and swelling in the left chest wall after inappropriate traditional physical therapy. He had a medical history of hemorrhagic stroke causing paralysis in his right arm and right leg. Muscle tension exercises were given to the patient by his relatives with the mechanism they built. Pulses were normal in the left upper extremity, and there was no difference in temperature and diameter between both upper extremities. The patient diagnosed with left subclavian artery branch rupture with computed tomography angiography was followed up with compression therapy without any surgical intervention and discharged with full recovery.

Keywords: Subclavian artery, branch, rupture, physical therapy, blunt injuries

Introduction

The subclavian artery that lies in a groove on the first rib is well protected by the clavicle, first rib, and scapula. Subclavian artery injuries are extremely rare among artery injuries due to their location on the chest wall. Clavicle, scapula, first rib fractures, hemothorax, pneumothorax, and brachial plexus injuries may see in the injuries of the chest wall and 90-95% of injuries are due to penetrating trauma and 5% of injuries are due to blunt trauma. Most penetrating injuries are due to gunshot wounds^{1,2}. In the mechanism of blunt trauma, the subclavian arteries are injured after the first rib is broken after the force from the top to the bottom and the artery is squeezed between the clavicle and the rib. The other mechanism is deceleration type injury³⁻⁸. In some cases, the trigger factors are sneezing, severe cough. Surgical repair of the subclavian artery is very difficult due to the anatomical location of the artery. Although open surgery is the classical method of treatment, it is associated with high morbidity and includes clavicular resection, thoracotomy, and median sternotomy⁵.

Case Report

A 72-year-old male patient was admitted to our emergency department with sudden swelling and pain in the left chest. In his history, he had right hemiplegia due to hemorrhagic stroke and diabetes mellitus and there were no triggering factors such as sudden sneezing and severe cough. The patient was exercised suspended from the armpits with a mechanism set up by the patient's relatives without any physician's recommendation. (Figure 1) They have been doing this exercise 2 or/and 3 times a week for the last 2 months. The patient is not under follow-up and does not use any medication. In physical examination, her vital signs were stable: blood pressure was 120/80 mm/Hg, heart rate was 80 beats per minute, oxygen saturation was 98%, and body temperature was 36.5 degrees Celsius. There was extensive subcutaneous edema in the left hemithorax extending from the top first rib to the bottom 6th rib, the sternum on the right, and the posterior axillary line on the left. (Figure 2) Left upper extremity pulses and capillary refill time was normal. There was no difference in pulse, temperature, and diameter between both upper extremities. Computed tomography (CT) angiography examination was performed because of



Figure 1: Demonstration of the mechanism set up by the patient's relatives for physical therapy



Figure 2: Ecchymotic area in the posterior axillary line on the left. B) Extensive subcutaneous edema in the left hemithorax

the localization of the hematoma caused by the rupture of the subclavian artery branch. (Figure 3) The Patient was not taken to surgical treatment during his hospitalization. He was discharged with uncomplicated recovery after conservative treatment.

Discussion

Rupture of the subclavian artery is a rare injury that can be life-threatening. The mechanism of injury to the artery is through strain and penetrating injury. Penetrating injuries are most commonly caused by fractures of the first rib and clavicle, which occur after a gunshot, sharp piercing device. Subclavian artery rupture caused by blunt trauma is rarely seen. Subclavian artery injuries are seen in thoracic and neck traumas. Patients present to the emergency department with complaints of weakness in the arm due to brachial plexus

damage, pain due to fracture of the first rib and clavicle, and shortness of breath due to lung damage. Most of the cases die at the scene. Rulliat et al. (7) conducted a retrospective study involving 1181 heavy traffic victims in France. Only 0.4% (5 patients) were diagnosed with subclavian artery rupture. Four of them died before reaching the hospital. In the present case, there was a chronic blunt trauma in the history given by the patient and his relatives.

In the physical examination findings of subclavian artery rupture, there may be findings such as the presence of an enlarged and fixed hematoma in the subclavian artery localization, the presence of a murmur in the hematoma region, and the absence of a pulse in the distal part. However, it should be noted that there might not be any clink signs¹⁻⁴. In the present case, there was ecchymosis in the posterior axillary line on the left and, extensive subcutaneous edema and hematoma without a murmur that does not cause an absence in pulse.

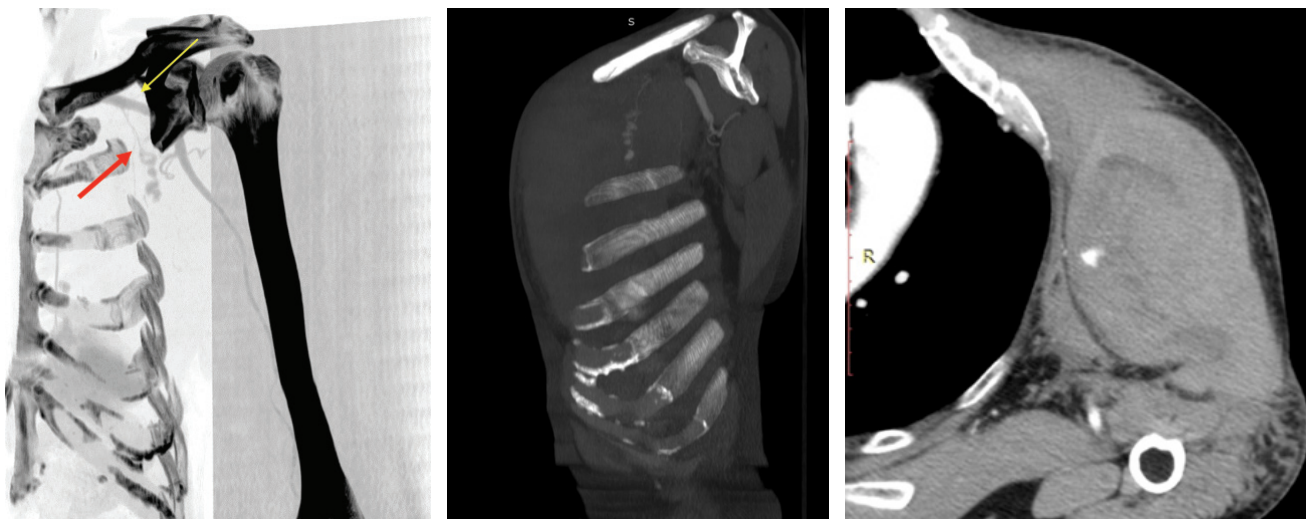


Figure 3: CT angiogram showing rupture of subclavian artery branch. 3A. Contrast leakage due to rupture of the branch (red arrow) originating from the subclavian artery (yellow arrow). 3B and 3C. Bleeding area of the left subclavian artery branch. Hypodense heterogeneous appearance with dimensions of 12x8 cm is observed at the widest point. There are necrotic areas in the center of the lesion in the left axillary area.

Ultrasound (US), CT angiography, and MR angiography can be used in the diagnosis of subclavian artery injury. The US can show indirect signs of subclavian artery injury. It is difficult to view the entire subclavian artery in the US due to its anatomical location. CT angiography is the most commonly used method in emergency conditions. MR angiography can be diagnosed in patients with stable vital signs. The gold standard method in diagnosis is CTA^{1,2}. In the present case, upon the presence of extrapleural hematoma in the anterior chest wall, we performed a CT angiography upon suspicion of injury to the subclavian artery and its branches and diagnosed an injury to one of the subclavian artery branches. The hematoma was the extrapleural area did not expand. The main subclavian artery was not injured.

Endovascular and open surgery options are available for treatment⁶. In recent years, endovascular surgery with stenting has become widespread and successful results have been obtained. Its morbidity is lower than open surgery.^{5,6,8} Barao et al.⁵ conducted a retrospective study involving 15 patients from a single center. They repaired the traumatic subclavian artery rupture with endovascular surgery. In a case report, a patient with a traumatic subclavian artery injury that cause large extrapleural hematoma was conservatively followed and was discharged with full recovery. Authors recommended conservative treatment in hematoma with stable vital signs and non-extrapleural expansion in selected cases⁶. Baikoussis et al.⁸ achieved survival by endovascular

surgery in the management of hemothorax after traumatic subclavian artery rupture. We achieved uncomplicated survival with conservative treatment because the patient's vital signs were stable in the present case.

Conclusion

This case is interesting because of the scarce of a similar case in the literature, and its occurrence with blunt trauma after the application of inappropriate physical therapy. Subclavian artery branch injury should be kept in mind in patients with clinical neurovascular anomalies in the ipsilateral extremity and edema in the ipsilateral chest wall in blunt traumas. The conservative approach without surgery can be preferred as an alternative option for such patients.

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References

1. Muhip K, Şadan Y, Salih T, Ersan Ö, Turan B. Delayed Presentation of A Penetrating Subclavian Arterial Injury: Case Report. ADU Tıp Fakültesi Dergisi 2006;7(2):43- 45
2. Cox CS, Allen GS, Fischer RP, Conklin LD, Duke JH, Cocanour CS, et al. Blunt versus penetrating subclavian artery injury: presentation, injury pattern, and outcome. J Trauma 1999;46:445-9
3. Demetriades D, Rabinowitz B, Pezikis A, et al. Subclavian vascular injuries. Br J Surg 1987;74:1001
4. Demetriades D, Chahwan S, Gomez H, et al . Penetrating injuries to the subclavian and axillary vessels. J Am Coll Surg 1999;188:290-5
5. Barão, T., Queiroz, A. B., Apoloni, R., Ricardo, A., & Nelson, D. L. (2015). Endovascular repair of traumatic subclavian artery injuries: a single-center experience. Journal of Vascular Medicine & Surgery, 1-4.
6. Kumar M. Babu A, Ranjan P et al. Traumatic Subclavian Artery Injury Causing Large Extrapleural Haematoma Managed Nonoperatively-A Case Report. Medical Science;2015: 4 (2)
7. Rulliat, E., Ndiaye, A., David, J. S., Voiglio, E. J., Lieutaud, T. (2011). Subclavian artery rupture after road crash: many similitaries. In Annales francaises d'anesthesie et de reanimation 30;(12): 909-913.
8. Baikoussis, N. G., Siminelakis, S. N., Matsagas, M., & Michalis, L. K. (2010). Massive haemothorax due to subclavian artery rupture: Emergency thoracotomy or primary stent-grafting?. Heart, Lung, and Circulation 19(7), 431.

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