Open Access Journal of Surgery
ISSN: 2476-1346

Case Report
Volume 16 Issue 1 - October 2024
DOI: 10.19080/OAJS.2024.16.555928

Open Access J Surg

Delayed Rupture of Subclavian Artery due Fracture of Right 1st Rib- A Case Report

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Received: September 26, 2024; **Published:** October 07, 2024

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Abtract

First rib fractures, typically resulting from high-energy trauma, can lead to significant vascular injuries due to the proximity of the subclavian artery. Here we present a case of 45-year-old male who presented with acute right-sided chest pain and dyspnea, four months post-first rib fracture from a motor vehicle accident. Despite emergency surgery, the patient succumbed to massive hemorrhage. Delayed subclavian artery rupture following a first rib fracture is a rare, fatal complication requiring high clinical suspicion and prompt intervention. Early recognition and vigilant monitoring are crucial for improving outcomes.

We want to emphasise the possibility of delayed subclavian injury by jagged edges of the broken 1st rib and the importance of early CT angiography in such cases. We present a case of delayed rupture of subclavian artery in a patient of blunt chest trauma with 1st rib fracture along with multiple rib fractures 4 months back. Emergency thoracotomy was performed however the patient succumbed in the post-operative period. We want to emphasize the possibility of delayed subclavian injury by jagged edges of the broken 1st rib and the importance of early cross-sectional imaging with CT angiography in such cases.

Keywords: Vascular Injuries; First rib Fractures; Hemothorax; Blood

Abbreviations: ICD: Intercostal Chest Drain

Introduction

1st Rib fractures are a rare clinical finding, occurring in about 0.6-1.0% of all rib fractures, often associated with high-energy trauma such as motor vehicle accidents, falls from height, or severe blunt force impact [1]. Due to the first rib's protected location beneath the clavicle and adjacent to vital structures like the subclavian rtery and brachial plexus, these fractures frequently indicate significant trauma and carry a high risk of associated injuries [2].

The subclavian artery is particularly vulnerable to injury in the context of first rib fractures due to its anatomical proximity. Although immediate vascular injury can be identified and managed early, delayed vascular complications, such as pseudoaneurysms, can develop and present significant diagnostic and therapeutic challenges [3]. A pseudoaneurysm occurs when an arterial injury allows blood to escape into surrounding tissues, contained by a fibrous capsule rather than the arterial wall itself. Over time, pseudoaneurysms can rupture, leading to catastrophic hemorrhage [4].

This report details a case of delayed subclavian artery rupture secondary to a four-month-old first rib fracture in a 45-year-old male, resulting in fatal hemorrhage. The aim is to. We want to emphasise the possibility of delayed subclavian injury by jagged edges of the broken 1st rib, the importance of early CT angiography in such cases and to discuss the diagnostic and therapeutic approaches to managing such complications.

Case Presentation

A 45-year-old male with a history of trauma four months prior presented to the emergency department with acute onset of right-sided chest pain and dyspnea. The patient reported no recent trauma or significant exertion but had a known history of a first rib fracture sustained during a motor vehicle accident. Upon presentation, the patient was vitally stable with absent chest movements on right side with distended neck veins. On palpation, multiple ribs fractures were palpated on right side. On auscultation there was absent air entry on right side. (Figure 1)

Figure 1: Initial chest X-ray showed a large right hemothorax.

A contrast-enhanced CT angiogram of the chest was performed, which noted a large hypodense collection of 17x15x24 cm in right hemithorax and a hyperdense area within it measuring 8.5x8.2x15 suggestive of active bleed. (Figure 2)

The patient presented with shortness of breath, prompting the placement of an intercostal chest drain (ICD), post ICD placement, patient lost 2000ml of blood in ICD, blood products were arranged and rapidly transfused. He was taken emergently to the operating room. Right anterolateral thoracotomy was done, bleeding was encountered for which packing with mops was done. During the procedure patient had cardiac arrest, following which conversion to clamshell thoracotomy was done, and open cardiac massage was done. After patient was successfully resuscitated, mops were removed, and bleed from right subclavian artery was seen. It was repaired primarily with 5-0 prolene sutures. Intraoperative findings include a collapsed right lung surrounded by an organized hematoma, which was evacuated. Despite aggressive resuscitative efforts, including multiple blood transfusions and surgical repair of the artery, the patient succumbed to the metabolic acidosis and shock in the post-operative period. (Figure 3)

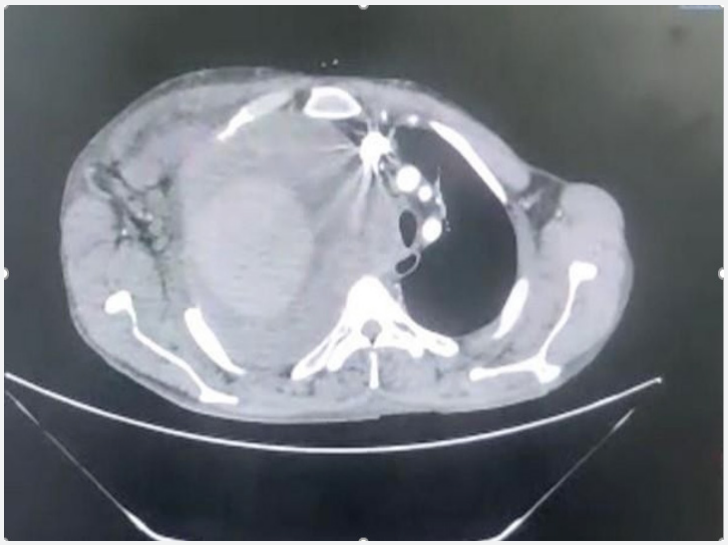

Figure 2

How to cite this article: Madhur U, Rupesh P, Mohd Ozair K. Delayed Rupture of Subclavian Artery due Fracture of Right 1st Rib- A Case Report. Open Access J Surg. 2024; 16(1): 555928. DOI: 10.19080/OAJS.2024.16.555928

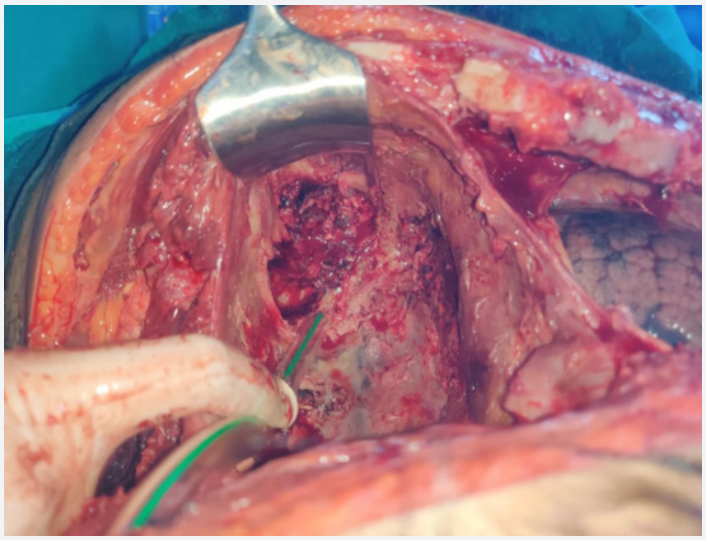

Figure 3

Discussion

The subclavian artery is anatomically vulnerable to injuries due to its proximity to the first rib and clavicle [5]. When a first rib fracture occurs, sharp bone fragments can injure the arterial wall, potentially leading to a pseudoaneurysm formation. This pseudoaneurysm may remain asymptomatic for weeks to months before eventual rupture, causing life-threatening hemorrhage. [6]

Delayed rupture of the subclavian artery often presents with acute symptoms of hemorrhagic shock, including hypotension, tachycardia, and chest pain [7]. In this case, the patient's sudden presentation of right-sided chest pain and dyspnea, combined with signs of hypovolemic shock, prompted urgent imaging and surgical intervention. A detailed trauma history, including previous rib fractures, is essential in raising suspicion for potential vascular injuries.

Prompt and accurate diagnosis is critical in managing vascular injuries associated with rib fractures. While initial chest X-ray may identify hemothorax, CT angiography is the gold standard for visualizing vascular injuries and determining the extent of damage [8]. In this case, CT angiography successfully identified the site of active extravasation from the subclavian artery, facilitating surgical planning. Emergent surgical intervention is often required to control hemorrhage and repair the injured vessel. Surgical options include direct vessel repair, graft placement, and endovascular techniques such as stenting [9]. Despite timely surgical intervention in this case, the extent of hemorrhage and the patient's unstable condition contributed to a fatal outcome. This highlights the critical nature of early diagnosis and rapid intervention.

The prognosis for patients with delayed subclavian artery rupture is generally poor, with high mortality rates due to the potential for rapid exsanguination [10]. Preventative strategies involve careful monitoring of patients with first rib fractures, especially those at high risk for vascular injuries. Prophylactic vascular imaging in such cases may aid in early detection and management of pseudoaneurysms [11].

Multiple case reports and studies highlight the rarity and severity of delayed subclavian artery rupture following first rib fractures. For example, Evans and Stell [12] reported a case of traumatic rupture of the subclavian artery in a patient with a first rib fracture, emphasizing the delayed nature of the presentation. Similarly, Teixeira et al. [13] discussed preventable or potentially preventable mortality in trauma centers, underlining the importance of early recognition and intervention in vascular injuries.

In another case report, Scheinin et al. [14] described a 54-year-old male who presented with a delayed rupture of the subclavian artery one month after a first rib fracture, leading to massive hemothorax and death. This case underscores the potential for delayed presentations and the rapid deterioration that can occur once a pseudoaneurysm ruptures. Similarly, Parmar et al. [15] reported a case of a 40-year-old female with a delayed rupture of the subclavian artery 12 weeks post-trauma, presenting with hemothorax and shock. Despite surgical intervention, the patient succumbed to the massive blood loss.

A review by Rashid et al. [16] highlighted several cases of delayed arterial rupture following blunt trauma to the chest, noting the importance of early imaging and intervention to prevent fatal outcomes. They emphasized that patients with rib fractures, particularly first rib fractures, should be monitored closely for signs of vascular injury.

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Conclusion

This case report illustrates the potential for delayed vascular complications following first rib fractures and emphasizes the need for high clinical suspicion and rapid intervention. The fatal outcome in this patient underscores the importance of early recognition and aggressive management of vascular injuries associated with rib fractures. Further research and increased awareness are essential to improving outcomes for these patients.

References

1. Lee RB, Bass SM, Morris JA (1985) First rib fracture: a hallmark of severe trauma. Ann Surg 201(6): 765-769.
2. Silen ML, Blank-Reid CA, Braxton CC (1998) Significance of first and second rib fractures in trauma patients. Am J Surg 176(4): 359-362.
3. Biffl WL, Moore EE, Offner PJ (2001) Blunt carotid and vertebral arterial injuries. World J Surg 25(8): 1036-1043.
4. Raptopoulos V, Sheiman RG, Bonanno N (1992) Traumatic lesions of the thoracic inlet: CT evaluation. Radiology. 182(3): 675-679.
5. Weigelt JA, Borman KR, Townsend TR (1982) Rib fractures and blunt trauma to the chest. Surg Gynecol Obstet 155(5): 711-717.
6. Teixeira PG, Inaba K, Hadjizacharia P, Brown C, Salim A, et al. (2007) Preventable or potentially preventable mortality at a mature trauma center. J Trauma 63(6): 1338-46.
7. Goins WA, Rodriguez A, Joshi M (1991) Surgical management of traumatic subclavian artery injuries. Am Surg 57(11): 723-727.
8. Reiff DA, Merrill C, Clark DE (2005) The epidemiology of traumatic deaths: a population-based analysis. Arch Surg 140(9): 875-880.
9. Brinker MR, O'Connor DP (2004) The incidence of fractures and dislocations referred for orthopaedic services in a capitated population. J Bone Joint Surg Am 86(2): 290-7.
10. Harbison SP, Costantino TG (2001) Correlation of focused assessment with sonography for trauma examination with physical examination and injury severity in trauma patients. J Ultrasound Med 20(5): 487-492.
11. Dyer DS, Moore EE, Ilke DN, McIntyre RC, Bernstein SM, et al. (2000) Thoracic aortic injury: how predictive is mechanism and is chest computed tomography a reliable screening tool? A prospective study of 1,561 patients. J Trauma 48(4):673-82.
12. Evans DM, Stell IM (1979) Traumatic rupture of the subclavian artery. Injury 11(1): 65-67.
13. Tisherman SA, Schmicker RH, Brasel KJ (2019) Detailed description of all deaths in a trial of emergency preservation and resuscitation for cardiac arrest from trauma. J Trauma Acute Care Surg 86(5): 760-772.
14. Scheinin SA, Lindsay T, Walker PM (1992) Traumatic rupture of the subclavian artery following first rib fracture: report of a case and review of the literature. Can J Surg 35(4): 430-433.
15. Parmar CD, Edi-Osagie EC, Whittaker M (1993) Delayed rupture of the subclavian artery secondary to first rib fracture: a case report. J Trauma 35(1): 139-142.
16. Rashid MA, Wikstrom T, Ortenwall P (1998) Delayed presentation of vascular injury after blunt chest trauma. Eur J Vasc Endovasc Surg 16(2): 121-127.

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