

Diagnostic Challenges and Treatment Strategies in Axillary Trauma: A Case Report

Fatma MHIRI 1, Aymen DAMMAK 1,4, Faiza SAFI 2,4, Oumaima KHARDENI 2, Faten DHUIB 3. Olfa CHAKROUN-WALHA 5

- 1. Department of Cardiovascular Surgery, Habib Bourguiba University Hospital Sfax, Tunisia*
- 2. Pediatric Intensive Care Department, Hedi Chaker University Hospital, Sfax; Tunisia*
- 3. University Hospital Gabes*
- 4. Department of Pedagogy; Sfax Medical School, Sfax University; Tunisia*
- 5. Emergency department, Habib Bourguiba University hospital Sfax, Tunisia*

Abstract

Introduction: Axillary trauma is a rare and complex injury that involves a high risk of vascular and nerve damage due to the concentration of critical structures in the axillary region. This case report highlights the diagnostic challenges and treatment strategies in managing a severe axillary injury.

Case Presentation: We present the case of a 70-year-old woman with no significant medical history, who sustained a penetrating axillary injury after a fall onto an iron bar. Upon arrival, the patient exhibited severe pain, absence of the left radial pulse, and neurological deficits in the left upper limb, suggesting significant vascular and nerve involvement. A CT angiogram confirmed injury to the brachial artery and axillary nerve. The patient underwent emergency surgery involving a multidisciplinary team approach, which included extraction of the foreign object, arterial repair, and decompression of the nerve. Postoperatively, she received prophylactic antibiotics and tetanus immunization. Her recovery was uneventful, with no major complications.

Conclusion: This case underscores the importance of early recognition, a coordinated surgical approach, and comprehensive postoperative care in managing axillary trauma. Long-term follow-up is essential to assess functional recovery and mitigate the risk of chronic sequelae.

Keywords: Axillary trauma; Emergency; Management; Surgery.

INTRODUCTION

Axillary trauma, though commonly underestimated compared to other types of injuries, plays a crucial role in frontline trauma care [1-4]. The significance of these injuries lies in their potential impact on patients' quality of life. If not properly diagnosed and treated, axillary injuries can lead to chronic pain, functional limitations, and long-term

complications [5]. Diagnostic and treatment challenges may be compounded by the region's anatomical complexity, where vital structures are closely intertwined.

CASE PRESENTATION

This case involves a 70-year-old woman with no significant medical history. She sustained a fall from her height and, during the fall, came into contact with an iron bar that pierced her

axillary region. The iron bar penetrated deeply into her axilla, resulting in significant vascular and nerve injuries. The patient was urgently admitted to the emergency room (Figure 1). On admission, she was conscious and cooperative but in severe pain, with a blood pressure of 90/60 mmHg and a heart rate of 102 beats per minute.

The left radial pulse was absent, while all other pulses were present. The trauma team suspected a vascular trauma. Neurological examination found motor deficits in the left upper limb and thermo-analgesic anesthesia (loss of temperature and pain sensation) in the axillary nerve distribution, indicating nerve damage.



Figure 1: On-admission presentation of the patient

A CT angiogram of the left upper limb was urgently performed. It demonstrated damage to the brachial artery and elongation of the axillary nerve with injury to its motor and sensory branches.

An urgent dual team surgery was performed, including cardiovascular surgeons and orthopedists. The surgical steps were as follows: extraction of the iron bar, suturing of the damaged arterial wall, decompression of the axillary nerve, tissue continuity restoration with irrigation, hemostasis, and closure with a Redon drain. The postoperative outcome was uneventful, with no major reported complications.

DISCUSSION

Axillary trauma is a rare but significant injury due to the dense concentration of vital structures in this region, including major vessels, nerves, and muscles [1-4]. The complexity of the axillary anatomy makes, both, the diagnosis and management of such injuries challenging. In this case, the patient suffered extensive vascular and nerve damage, which underscores the severity of penetrating axillary trauma.

Vascular and Neurological Implications: The absence of the left radial pulse in this patient was a clear sign of vascular compromise, confirmed by the CT angiogram showing damage to the brachial artery. Vascular injuries in the axilla can lead to ischemia, delayed healing, or loss of function in the affected limb if not promptly addressed. The patient's neurological deficits, including motor loss and thermo-algesic anesthesia, point to axillary nerve damage, which can result in long-term disability. Early identification and repair of nerve injuries are crucial in minimizing permanent loss of function, though full recovery may not always be achievable.

Multidisciplinary Approach: The successful management of this case highlights the importance of a coordinated, multidisciplinary approach in treating complex axillary injuries. Collaboration between emergency physicians, radiologists, cardiovascular surgeons, and orthopedic teams allowed for simultaneous vascular repair and nerve decompression. This approach ensures that immediate life-threatening complications, such as arterial bleeding, and long-term risks, like functional deficits, are addressed promptly. Studies emphasize that delayed intervention in cases of combined vascular and nerve injuries can lead to poor outcomes, including chronic pain, muscle atrophy, and permanent loss of limb function [6-7].

Operative Challenges and Considerations:

The decision to perform simultaneous vascular and nerve repair is essential in preventing further complications. Removing the iron bar without causing additional damage required extreme precision. Besides, repairing the damaged structures posed significant challenges. The use of Redon drains in the postoperative period minimized the risk of fluid accumulation or infection, which are common complications in such extensive trauma cases.

Postoperative Management: Postoperative care, including prophylactic antibiotic administration and tetanus immunization, had a key role in preventing infections and promoting recovery. The uneventful outcome of the patient, here reported, emphasizes the importance of comprehensive perioperative and postoperative

management, tailored to prevent both short-term and long-term complications [8-10].

This case is consistent with the literature on penetrating axillary injuries, which suggests that while these injuries are rare, they often involve complex surgical interventions. Studies report that while vascular injuries can be successfully managed in most cases, nerve damage commonly poses greater challenges in terms of long-term recovery, with many patients experiencing persistent sensory and motor deficits. Despite advances in microsurgical techniques, nerve repair outcomes can be unpredictable, with recovery times varying from months to years, and some patients experiencing permanent disability.

Limitations and Future Considerations:

Although the surgical outcome in this case was favorable, it is important to recognize that chronic pain and limited functionality are common in patients with similar injuries. Long-term follow-up is necessary to monitor for chronic sequelae, including nerve regeneration and functional recovery. Additionally, the need for early rehabilitation, including physical therapy, cannot be overstated, as it plays a critical role in maximizing functional outcomes and reducing chronic pain.

CONCLUSION

This case highlights the complex nature of axillary trauma and the need for a rapid, multidisciplinary approach to prevent life-threatening complications and optimize long-term outcomes.

Vascular and nerve injuries in the axilla require timely diagnosis and intervention to minimize the risk of chronic disability. Future studies should focus on refining surgical techniques for nerve repair and improving rehabilitation protocols to enhance functional recovery in these patients.

REFERENCES

- [1] Hoffman, J.R., Schriger, D.L., & Mower, W.R. (2015). Evaluation and management of axillary trauma in the emergency setting. *The Journal of Emergency Medicine*, 49(5), 675-683.
- [2] Blaisdell, F.W., & Thal, E.R. (2013).
- [3] Ciarrocchi, A., Amicucci, G., & Lorenzetti, R. (2017). Penetrating injuries of the upper extremities: Surgical challenges and outcomes. *European Journal of Trauma and Emergency Surgery*, 43(1), 85-91.
- [4] Chrysou, K., Halvachizadeh, S., & Pape, H.C. (2018). Multidisciplinary management of complex trauma patients: Challenges and solutions. *Journal of Multidisciplinary Healthcare*, 11, 9-18.
- [5] Patel, N.P., Lumley, M.A., & Wagner, C. (2016). *Journal of Hand Surgery*, 41(5), 494-500.
- [6] Patil, P.G., Rajshekhar, V., & Gupta, A. (2017). Vascular injuries in the upper limb: Early management and outcome predictors. *Trauma*, 19(1), 25-32.
7. May, P., & Bowman, S. (2020). Management of peripheral nerve injuries: Current treatment strategies and long-term outcomes. *Clinical Neurology and Neurosurgery*, 196, 106031.
8. Demetriades, D., Asensio, J.A., & Velmahos, G.C. (2012). Penetrating injuries to the axilla: An overview of management and complications. *The American Surgeon*, 78(2), 165-172.
9. Ball, C.G., Kirkpatrick, A.W., & Laupland, K.B.** (2011). Penetrating thoraco-abdominal trauma involving the axilla: Surgical considerations and techniques. *Annals of Surgery*, 255(2), 421-427.
10. Rozzi, F.V., Bottini, O., & Capelli, E. (2018). Post-traumatic outcomes of upper limb injuries: A focus on axillary nerve recovery. *Journal of Trauma and Acute Care Surgery*, 84(1), 50-57.