

A life-saving approach utilizing simple recourses in penetrating neck injuries: a case report

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Received 16 April 2018

Accepted 23 May 2018

The Egyptian Journal of Surgery
2018, 37:616–619

Penetrating neck injuries are a crucial area of trauma care and represent nearly 5–10% of all trauma cases in the emergency department. Injuries in the zones 1 and 3 of the neck are more difficult to investigate than zone 2 and require extensive effort and knowledge. We report the case of a 35-year-old male patient with penetrating neck injury in zone 1 of the neck, causing left-sided hemothorax. Effective patient management was challenging as the patient was unstable and could not be transferred to any nearby tertiary hospital. Therefore, he was immediately transferred to the operative table. A longitudinal neck incision was made on the left side of the neck to control the bleeding, and median sternotomy in addition to anterior thoracotomy was performed. Two injuries were observed at junction of the jugular, subclavian, and brachiocephalic veins, and one injury was seen in a side branch of the subclavian artery. The patient was treated successfully through this treatment approach, thereby overcoming the challenges of a complicated case and limited facilities in the hospital.

Keywords:

median sternotomy, neck injuries, trauma care

Egyptian J Surgery 37:616–619
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1110-1121

Introduction

Penetrating neck injuries (PNIs) comprise all the injuries that penetrate the platysma muscle [1]. PNIs are a crucial area of trauma care and represent nearly 5–10% of all trauma cases of the emergency department [2]. As the neck is the hub of several vital functions such as neural, digestive, vascular and respiratory systems, the injury can result in significant morbidity and mortality [1]. Fundamental knowledge of the anatomy of the neck is essential to understand the nature of the injury and its management. The extent of any damage depends on the anatomic level, that is, the zone in which the injury has occurred. Zone 1 is below the cricoids to the thoracic inlet, zone 2 is between the cricoids and angle of the mandible, and zone 3 is above the angle of mandible. Injuries in the neck most commonly occur in the zone 2, yet mortality is reportedly higher in zone 1 [1]. In comparison with zones 1 and 3, zone 2 injuries are easier to investigate and to expose during operation; therefore, the management of injuries in zones 1 and 3 requires extensive effort and knowledge. Furthermore, timely access to diagnosis and treatment for PNIs is critical for saving the patient's life. Neck injuries involving the innominate artery have been reported to be life-threatening [3]. Injury-associated exsanguination is usually the cause of death. Nearly 25% of structural injuries are vascular, mainly involving the carotid and internal jugular. Studies have reported that respiratory

tract is affected in 10% cases, thus highlighting the importance of proper airway management [1]. Thus, the initial diagnosis should be prompt and in line with the general trauma principles [4] and examining the airway, breathing, and circulation should be the first step. However, management of PNIs is difficult as no specific international guidelines exist and the recent advances in imaging modalities have resulted in a changed approach for the treatment of such cases. Nevertheless, operative management is suggested if the diagnosis reveals symptoms of significant injury such as active hemorrhage, respiratory distress, or expanding hematoma. In this study, we report the case of a patient with PNI located in zone 1 of the neck, causing left-sided hemothorax, which was treated successfully. However, the suspected vascular injuries compromised the hemodynamic stability of the patient.

Case presentation

A 35-year-old male patient presented to the emergency room of Buraidah Central Hospital with a stab wound at zone 1 in the suprasternal notch of the neck (Fig. 1). The patient was in shock and agitated and was immediately intubated. Chest radiography revealed a

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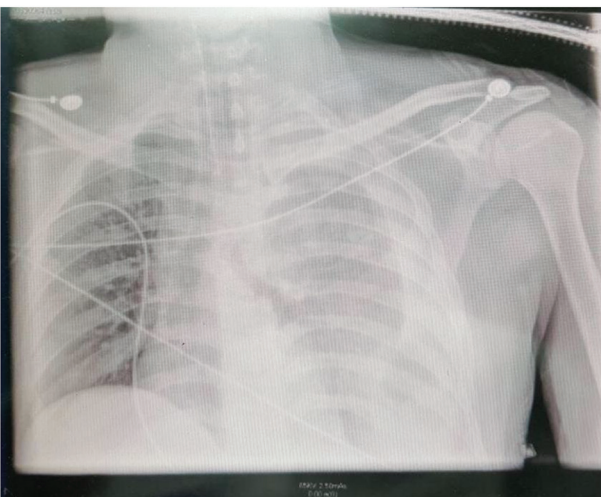
left-sided hemothorax (Fig. 2). This was followed by a tube thoracotomy. The stab wound did not show any sign of bleeding; however, the patient became severely unstable shortly and was urgently transferred to the operating table. First, a longitudinal neck incision was made on the left to control the bleeding. We decided to incise the clavicle urgently with a saw, but as the access was limited, we chose to perform median sternotomy by simple means of a bone cutter and then by Gigli saw. As a result, all great vessels and heart were accessible, and traction was maintained. The injury appeared at the left brachiocephalic vein with subclavian artery behind. Digital pressure was maintained throughout the procedure with packing, and anterior thoracotomy

Figure 1



Neck injury at zone 1.

Figure 2



Initial chest radiography showing massive hemothorax.

extension of the median thoracotomy was done at the third space for better access to repair (Fig. 3). One injury was observed at the junction of the jugular, subclavian, and brachiocephalic veins (Fig. 4a and b). A repair was done with 6/0 prolene for venous injury. As the chest radiography film of the patient displayed hemothorax, a large chest tube was employed to evacuate blood and decrease the probability of clot, as well as assist in continuous examination of blood loss [5]. Two chest tubes were inserted, one anterior and one posterior, connected to underwater seal. Closed suction drains have an important role in surgical wound healing, and another suction drain for neck wound was employed. The clavicle was repaired with plate and screw, and the wound was closed by wire and neck incision in the layer. Skin stapling was performed, and postoperative computed tomography (CT) angiography and pan CT were planned for the patient. The total operative time was ~180 min. The patient was kept in the intensive care unit and maintained in ventilation and antibiotic therapy.

Discussion

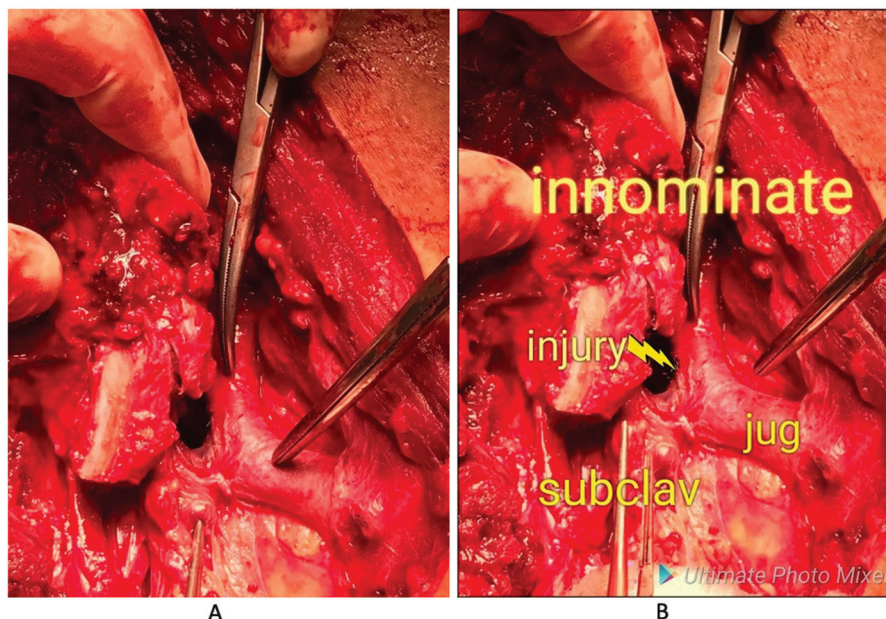
There lies an ambiguous definition of a trauma surgeon, and consequently, the objectives of a trauma surgery fellowship remain ill-defined. Trauma surgery is a

Figure 3



Incision.

Figure 4



(a, b) Site of the injury.

surgical specialty that utilizes both operative and nonoperative management to treat traumatic injuries, typically in an acute setting. The broad scope of the surgical critical care training enables the trauma surgeon to address most injuries to the neck, chest, abdomen, and extremities. There is significant variation across hospitals in the degree to which other specialists, such as cardiothoracic surgeons, plastic surgeons, vascular surgeons, and interventional radiologists are involved in treating patients with trauma. PNIs are life-threatening, and their treatment is challenging as the neck harbors many vital systems, and injury to any of these can be detrimental. Over the years, the treatment of PNIs has undergone significant improvization as the surgeons have explored novel and better treatment strategies to improve patient outcome. As such, the surgeons must be well aware of the neck anatomy and exposure for patient safety in case when the transfer is dangerous. In the present case as well, an unusual surgical approach was adopted to save the life of the patient. Herein, the patient was treated successfully with the 'T-shaped incision' approach thereby overcoming the challenges of a complicated case and limited facilities in the hospital. However, it is noted that in the absence of specific international guidelines and several modifications in the treatment method, no specific protocol exists to treat these injuries. Previous studies have lately dismissed trap door incision as too mutilating for the occasional victim of a penetrating thoracic trauma with massive bleeding. This is a surgical procedure to treat deep thoracic injuries and is controversial owing to the pain, postoperative bleeding, and respiratory

complications; therefore, a supraclavicular and infraclavicular approach is suggested with optional addition of median sternotomy [6]. In our case, the patient presented with injuries in zone 1 of the neck and an unstable condition, which posed an immense challenge. Thus, we recommend the need to reconsider the applicability of an approach that ensures patient safety in the treatment of zone 1 PNIs in the light of this patient presentation and facility management [7].

Doppler ultrasonography, CT angiography, and laryngoscope are now essential tool for detecting laryngeal and major vascular system injuries, but if the hemodynamic stability permits, a routine radiological scoring system can help in the process of treatment and timely assessment of the health conditions before any sort of emergency.

Acknowledgements

The authors thank Professor Ibrahim Dawoud, Head of Trauma Unit, Mansoura University Hospitals, for providing insight and expertise that greatly assisted in swift management of the study and great results.

Amro El Hadidi, Amr M. Abdellatef, and Abdelmohsen Hammad performed the research; Amro El Hadidi and Abdelmohsen Hammad analyzed the data; Amro El Hadidi, Amr Mohamed Abdellatef; and Abdelmohsen Hammad designed the research; and Amro El Hadidi, Amr M. Abdellatef Abdelmohsen Hammad, and Taha Yaseen wrote the paper.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

- 1 Moeng S, Boffard K. Penetrating neck injuries. *Scand J Surg* 2002; 91:34–40.
- 2 Vishwanatha B, Sagayaraj A, Huddar SG, Kumar P, Datta RK. Penetrating neck injuries. *Indian J Otolaryngol Head Neck Surg* 2007; 59:221–224.
- 3 Akiyoshi R, Kanaya H, Konno W, Kashiwagi T, Hirabayashi H, Haruna SI. Case report: stab injuries in the neck involving the innominate artery. *J Otol Rhinol* 2015; 4:3.
- 4 Bain J, Bhargava M, Shukla P, Singh AK. Penetrating injury to the neck which was caused by a heavy knife: a case report. *J Clin Diagn Res* 2012; 6:1051–1053.
- 5 American College of Surgeons. Committee on Trauma. Advanced trauma life support course for physicians. Available at: <https://www.facs.org/quality-programs/trauma/atls>. [Accessed 10 February 2018].
- 6 Demetriades D, Chahwan S, Gomez H, Peng R, Velmahos G, Murray J, *et al.* Penetrating injuries to the subclavian and axillary vessels. *J Am Coll Surg* 1999; 188:290–295.
- 7 Dindo D, Demartines N, Clavien P. Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. *Ann Surg* 2004; 240:205–213.