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Case Report

Non-operative management in tracheal injuries: a feasible approach

Monique Alexander*, Estelle Laney, Maeyane S. Moeng

Charlotte Maxeke Academic Hospital, Trauma Unit, University of the Witwatersrand, Johannesburg, South Africa

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***Correspondence:**
Dr. Monique Alexander,
E-mail: mona.2292@gmail.com

ABSTRACT

Tracheal injuries secondary to penetrating chest trauma are rare, and the non-operative management of isolated injuries, few successful cases of non-operative management are recorded. A 20-year-old male patient presented after sustaining a penetrating injury to his chest. On clinical evaluation and diagnostic imaging, he had an isolated perforated tracheal injury. Extensive surgical emphysema, bilateral pneumothoraces and a positive finding of tracheal injury on bronchoscopy clinically evidenced it. The patient was managed conservatively in the intensive care unit, endotracheal intubation was placed below the injury and subsequently, associated clinical signs improved; he was extubated and discharged home with no further complications noted. Isolated tracheal injury secondary to trauma is a rare finding. The treatment depends on the size, location and resolution of surgical emphysema and pneumothorax. In the absence of these, surgical management is preferred. Non-operative management for tracheal injuries is favoured in iatrogenic injuries. Isolated tracheal injuries secondary to trauma can be managed non-operatively. With close monitoring in high-care settings and a good understanding of the disease process make successful management of tracheal injuries possible. Conservative management saves both the patient and the health system the burden of undergoing surgical repair.

Keywords: Perforating tracheal injury, Non-operative management, Chest trauma

INTRODUCTION

Tracheal injuries are infrequently seen in isolation in a trauma setting and are commonly associated with vascular or oesophageal injuries.[1] Tracheal injury can be classified as iatrogenic, typically due to bronchoscopy or intubation, or traumatic, divided into penetrating and blunt.[2,3] These injuries can be managed conservatively or surgically and carry a morbidity and mortality of 11% and 9%, respectively.[4] In the local South African setting, the most common injury site is zone II of the neck, where close to 20% were noted in the cervical region.[5,6] Tracheal injuries are rare (1 to 2%) in penetrating chest trauma.[4] This case report identifies the non-operative management (NOM) of an isolated tracheal injury secondary to penetrating chest trauma. We present a case of a patient with a perforating tracheal injury who was successfully treated with conservative management.

CASE REPORT

A 20-year-old male patient presented to Charlotte Maxeke Academic Hospital Trauma unit after sustaining a stab wound to the first parasternal intercostal space on the left. He was found to have a sucking chest wound with surrounding surgical emphysema. He was treated according to ATLS® principles; an ICD was placed on the left, and the wound was closed in layers. On further chest examination, he was found to have a right-sided pneumothorax for which he had bilateral ICDs placed.

He was assessed as hemodynamically normal with no hard vascular signs and was booked for a computed tomography (CT) angiogram. The findings on the CT scan were bilateral traumatic pneumothoraces and associated pneumomediastinum. Due to significant pneumomediastinum and concern for potential

oesophageal injury, a hexabrix swallow was booked, which excluded the injury.

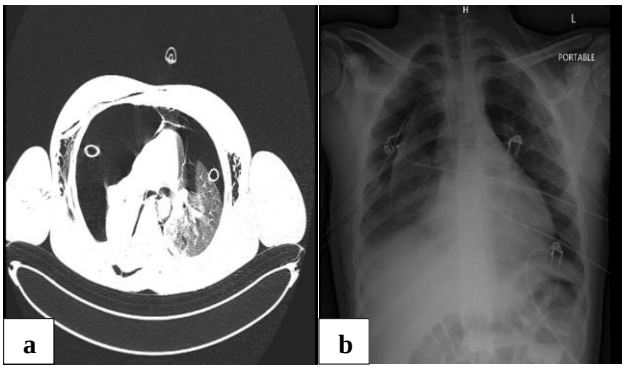

Figure 1: (a) CT chest and (b) CXR post-ICD insertion showing persistent pneumothorax with surrounding surgical emphysema.

On follow-up, the right ICD was noted to have excessive bubbling with a non-expanding lung on chest X-ray (CXR). At this point, there was a high index of suspicion for a possible tracheobronchial fistula.

Going forward, the plan was to place a second ICD on the right with negative suction and a planned bronchoscopy. The bronchoscopy revealed a through-and-through tracheal defect (Figure 2) located approximately 1.5-2 cm above the carina (34 cm from incisors).

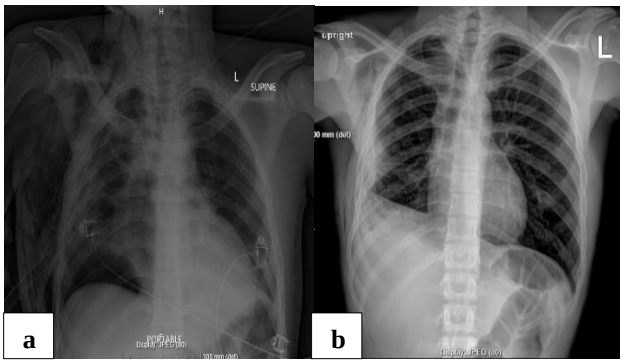

Figure 2: (a) Progressively worsening surgical emphysema, a collapsed right lung with two ICDs in in-situ, and (b) complete resolution of pneumothorax.

The ETT tube was carefully positioned below the injury and was ventilated with high PEEP pressures to recruit the collapsed lung. ICD output was closely monitored, and by the second day of admission, the left side ICD was removed. The right lung was expanding; however, bubbling was still noted in the ICD system.

Two days later, a repeat CXR was performed, which revealed improved lung expansion and surgical emphysema (Figure 3a). At this point, the patient was extubated and coping with facemask oxygen. The right lung continued to expand, and he was discharged from the hospital with good bilateral air entry (Figure 3b). He was well on the follow-up outpatient appointment, and no further issues were noted.

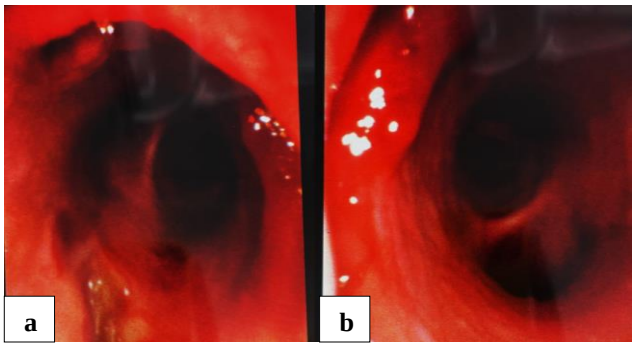

Figure 3 (a and b): Bronchoscopy images of the through-and-through tracheal injury.

DISCUSSION

The anatomy of the trachea is described as a tube-like structure that starts at the cricoid cartilage and terminates at the levels of the carina.[4] It is divided into cervical and thoracic regions, which guide surgical approaches and anatomical relations. The blood supply to the cervical and thoracic regions is the subclavian artery and aorta, respectively.

In penetrating trauma, the most commonly affected region is the cervical region of the trachea, measuring 2.5 to 3 cm from the carina.[4] The trachea can be injured anywhere along its course, but notably in penetrating trauma, injuries are found on the anterior surface of the trachea and approximately 2.5 cm from the carina and in the cervical portions.[3,4]

The clinical presentation of tracheobronchial injuries can range from surgical emphysema and pneumothorax to pneumomediastinum.[1,3,7] Diagnosis of tracheal injuries requires a high index of suspicion. Plain film chest radiographs and chest computed tomography are useful in diagnosing the complications of tracheal injuries such as persistent pneumothorax, pneumomediastinum and progressive surgical emphysema, but the gold standard of diagnosis remains bronchoscopy.[4,7,8] Bronchoscopy is useful in visualizing the location and size of the mucosal injury and whether there is associated lung collapse.[4,8] The clinical presentation of tracheobronchial injuries can range from surgical emphysema and pneumothorax to pneumomediastinum.[1,3,7] Penetrating injuries to the neck and chest are usually associated with vascular and aerodigestive injuries, making NOM a more complex pathway to follow.

Non-operative management in tracheal injuries is not unheard of.[7,8] The indications for NOM can be guided by: the size of the mucosal tear, lack of associated oesophageal injuries, absence of signs of infection, resolution of concomitant pneumothorax post-intercostal drain insertion and improvement of surgical

emphysema.[7,8] In this case, not all of the above guidelines for NOM were met; however, NOM was still successful.

Our case had the classic features mentioned in the literature: pneumothorax, surgical emphysema and a tracheal injury 2.5cm from the carina. Our management approach was bilateral intercostal drains and careful placement of the ETT tube below the mucosal injury. This allowed for adequate ventilation and for the mucosal injury to heal as the air was directed away from the injury.[7] Thus leading to the resolution of the persistent pneumothorax and progressive surgical emphysema as seen and described in this case.

Literature supporting NOM favours iatrogenic tracheal injuries rather than trauma-related injuries.[2,4] There are very few reports of NOM for traumatic tracheal injuries as most trauma cases present with concomitant vascular and digestive tract injuries which require operative management.[7]

CONCLUSION

This case report indicates that NOM beyond the guidelines is possible when closely monitored in an intensive care setting. Great emphasis should be placed on understanding the disease process and early identification of complications to promptly escalate the management process.

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