



Isolated Complete Cervical Tracheal Transection in Penetrating Neck Injury: A Unique Case

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Authors' contributions

This work was carried out in collaboration among all authors. Author MM wrote the draft of the manuscript. Author PT managed the critical analyses of the draft. Author UTA did the proof reading. Author MM finalized the draft. Author TA approve the final draft. Authors MM, UTA, AA and NS managed the literature searches. All authors read and approved the final manuscript.

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Case Report

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ABSTRACT

Isolated penetrating neck injuries involving cervical trachea are rare. Cervical tracheal transection is life-threatening and may result in immediate death due to asphyxiation. Early recognition and maintenance of the airway followed by definitive repair are essential for survival. We report a 28-year-old male who presented to the emergency department with a penetrating neck injury. He was dyspneic and cyanosed with neck swelling. Air was gushing from the wound. He was immediately shifted to the operating room. Neck wound exploration revealed complete tracheal transection. The distal trachea was identified and controlled with stay sutures. The endotracheal tube was advanced into the distal trachea through an oral route across the 3 cm gap at the level of the suprasternal notch. Crossfield ventilation was achieved to first repair the posterior layer and then the anterior layer after establishing the airway through the oral cavity. End to end anastomosis was achieved with interrupted 3/0 vicryl. The postoperative course was uneventful and the patient was discharged on the 10th day after bronchoscopy.

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1. INTRODUCTION

Isolated penetrating neck injuries are not frequently encountered [1]. Up to 10% of patients presenting in the emergency department have penetrating neck injuries (PNI) along with other injuries [1]. The cervical trachea is involved in up to 6% of PNI possessing a high mortality rate [2]. Up to two-third of these patients die before reaching the hospital attributable to asphyxiation and bleeding from major vessels [2,3]. Immediate control of airway and hemostasis is the cornerstone for favorable prognosis in these injuries [2].

To the best of our knowledge and after doing a literature search of published reports in the English language, we did not find any reported case of isolated complete transection of cervical trachea due to PNI. We report here a successfully managed case of isolated complete cervical tracheal transection due to PNI.

2. PRESENTATION OF CASE

A 28-year-old laborer by profession was brought to the emergency department with penetrating injury to the neck. According to the patient he was hit in the neck by a sharp piece of glass mirror when his vehicle met an accident. On his arrival, advanced trauma life support (ATLS) protocol was initiated.

The patient had dysphonia, dyspnea, cyanosis, and swelling in the neck with subcutaneous air. His heart rate was 110 beats per minute, blood pressure 100/70 mmHg and respiratory rate of 30 breaths per minute. His oxygen saturation was 94% with a face mask over the neck. The neck wound was 4 x 2 cm extending from below the thyroid cartilage from midline cutting towards the left side 3 cm above the sternal notch. The gush of air during inspiration was seen with localized subcutaneous emphysema. There was no hemorrhage. A chest radiograph did earlier revealed subcutaneous emphysema and widened mediastinum (Fig. 1A), post-procedure radiograph with the resolution of emphysema and normal tracheal diameter (Fig. 1B).

On neck exploration, complete tracheal transection was revealed with the distal trachea retracted into thoracic inlet below the sternal notch. All blood and clots were suctioned out and immediate airway control was achieved by passing an endotracheal tube (ETT) through oral route into the distal trachea. The wound was converted into collar incision. The distal trachea which had retracted below the sternal notch was carefully brought out in the wound and secured with stay sutures. Thyroid isthmus was divided and stay sutures were taken at the proximal cut end of the trachea. Crossfield ventilation was established after removing the ETT.

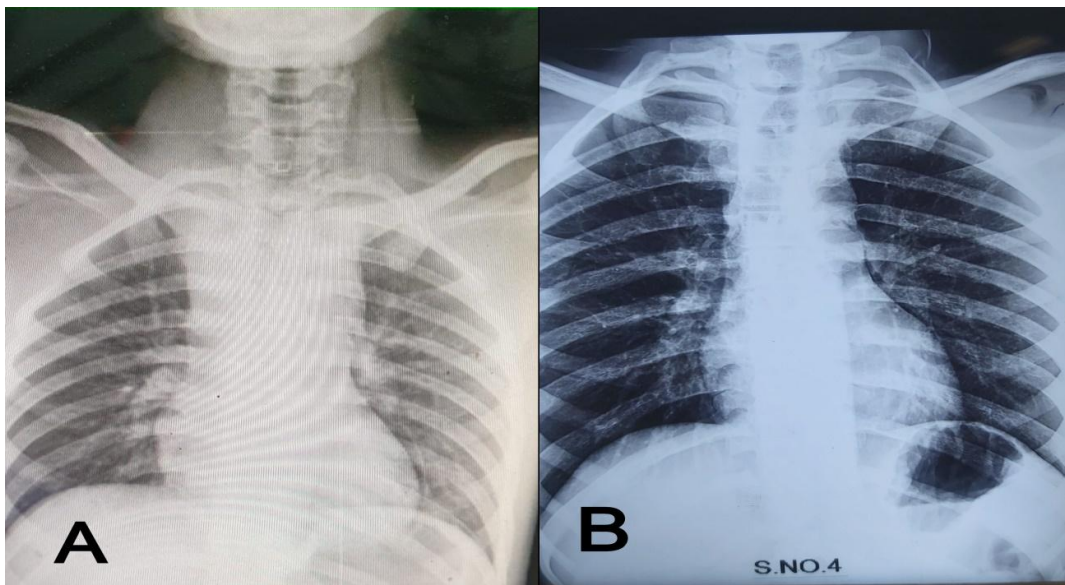


Fig. 1. Radiograph of the patient, A: Chest X ray with subcutaneous emphysema and widened mediastinum, B: Seventh postoperative day with resolved emphysema

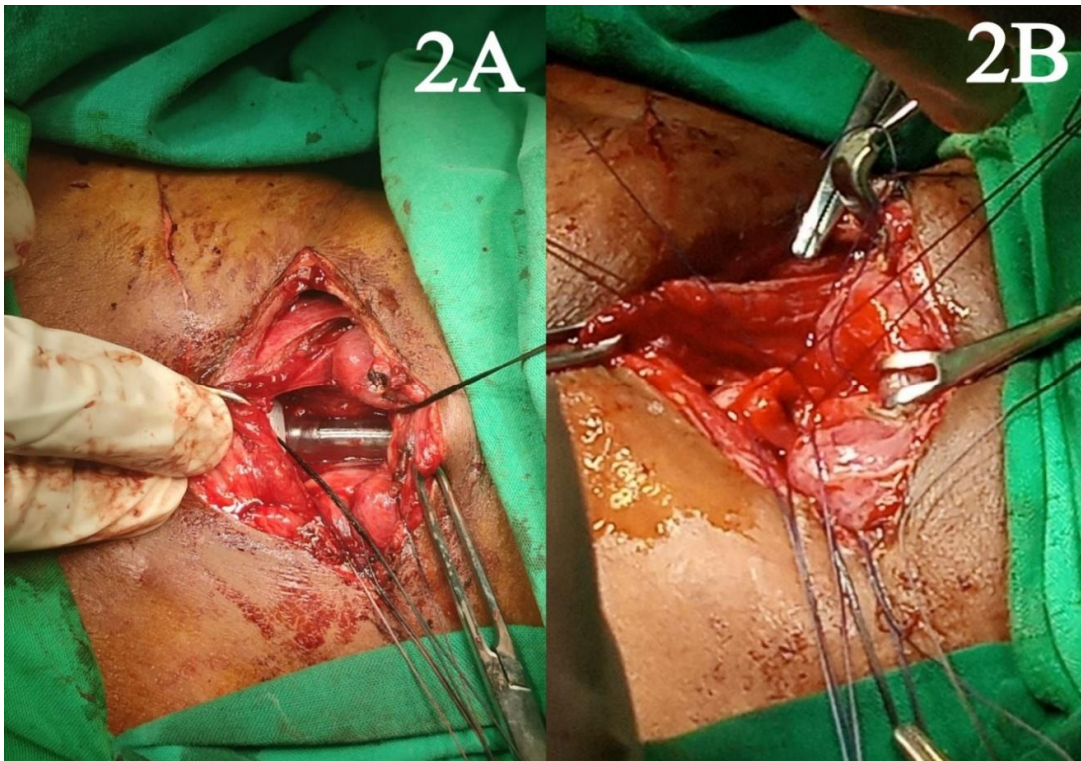


Fig. 2. 2A: Endotracheal tube has been seen across the tracheal defect, 2B: The distal trachea retracted from the mediastinum

The nasogastric tube was passed and the esophagus was assessed for injuries. After any associated injuries were ruled out end tracheal anastomosis was done. Posterior wall of the trachea was repaired with interrupted Vicryl 3/0 sutures (Fig. 3A). After repairing posterolateral wall with knots placed inside, cross-field ventilation was stopped and oral ETT was guided over the repair distally. The anterior wall was repaired similarly but knots were placed outside (Fig. 3B).

Post repair air leaks were checked and none were found. The neck wound was repaired layer by layer and a drain was kept. A Guardian suture was applied to keep the neck in slight flexion. The patient was extubated on the table and managed in HDU without oxygen support. He was allowed orally on the 3rd postoperative day and Guardian suture was removed on the 6th day. Recovery was uneventful and the patient was discharged on the 10th postoperative day after neck sutures were removed.

3. DISCUSSION

Neck has three anatomical zones: Zones I, II and III with zone I injury-causing the highest mortality

owing to their relationship with major structures [1]. PNIs alone due to firearm and stab injuries are rare [1,2]. Tracheal injuries are classified according to the mechanism and location of injury [4].

More than three-quarters of the patient with tracheal injuries present with difficulty in breathing, subcutaneous emphysema and respiratory distress [2,4,5,6,7,8]. Change in voice is encountered among 46% of cases [2,5,8]. Poor gas exchange leading to cyanosis is evident in 30% [4,5] and hemoptysis in one quarter [5,8]. The most eminent sign of PNI is leakage of air from the wound [2,4].

Immediate and prompt management are hallmarks for a favorable outcome in tracheal transection [9]. Radiology is helpful in 90% of cases, [10] for identification of pneumomediastinum 60% [5], pneumothorax 20% [5] or subcutaneous emphysema.

The first and most important step of management is the maintenance of the airway [2,4,5,6,9], which can be achieved through an endotracheal tube or tracheostomy through the same track

[11]. Sedation before maintenance of the airway should be discouraged as the airway may collapse [11]. Various techniques are present for ETT placement. For complete tracheal transection (CTT) it can be through the oral cavity guided by a surgeon under vision or cross-field ventilation into the distal trachea once it has been delivered into the cervical wound after dissection [2,12]. In CTT both ends of the trachea retract [9]. In such a scenario, a finger is placed in front of the esophagus at the level of the inlet, blunt dissection is carried out and the distal trachea is palpated. A stay suture is placed into the distal trachea and delivered into the wound and cross-field ETT placed into distal trachea to establish ventilation [2,12]. In the present case the latter technique was utilized. For incomplete tracheal injury, ETT can be passed with the help of flexible bronchoscopy [11] which is not well tolerated in conscious or desaturating patients and a rigid bronchoscope may be used in these cases [11].

For CTT primary repair after debridement of traumatized tissue is recommended [2,3,5,10,11,12]. End to end tension-free

anastomosis with absorbable 3/0 or 4/0 suture in interrupted manner is recommended with a distance of 3-4 mm between each suture [2,7,8,11,12]. Blunt dissection to free the ends of the trachea should be kept in the anterior and posterior planes only as lateral dissection can disrupt its blood supply. The neck is kept flexed for a week with the help of Guard suture [2,4,12]. Postoperatively broad-spectrum antibiotics, pulmonary toilet, bronchodilation, clearance of secretion and pulmonary rehabilitation augment the healing process [2,11]. Post trachea repair, it is important to extubate the patient on the table as ETT balloon may disrupt the anastomosis and lead to suture dehiscence [13]. Bronchoscopy should be performed after 1st week of repair [2, 7,13].

Esophageal injuries co-exist in 11-28% cases of cervical tracheal injury [2,3]. Primary repair of the esophagus along with a vascularized flap between the esophagus and trachea is recommended to prevent the development of esophagotracheal fistula [2,6,10,11,12]. Other injuries involving neck vessels and nerves may also coexist [2]. Anastomotic dehiscence, loss of

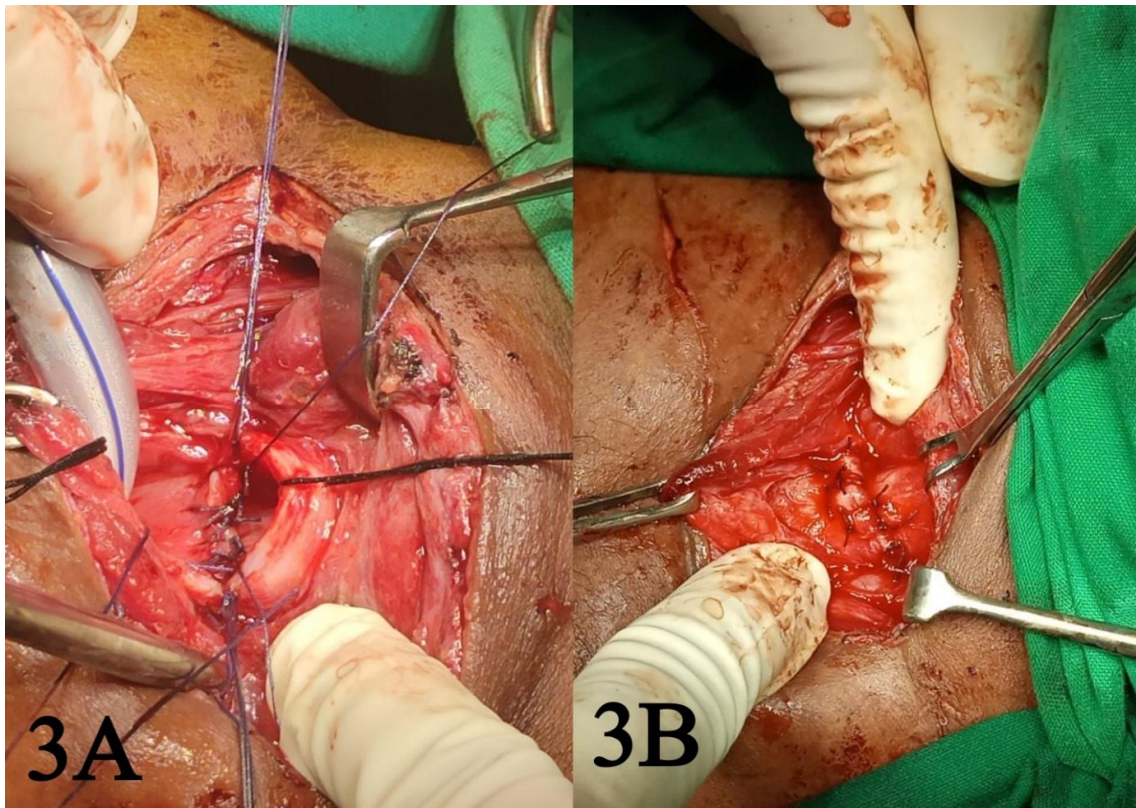


Fig. 3. 3A: Posterior wall repaired with cross-field ventilation, 3B: The anterior wall repaired

voice, fistula, stenosis are the reported complications [2,8,11]. Mortality reported for airway injuries ranges from 9-40% [3,5,8,10], which is attributed to immediate asphyxiation, bleeding from vessels, post-operative sepsis due to the long hospital stay and other postoperative complications [1,2,8].

4. CONCLUSION

Isolated complete cervical tracheal transections are rare in penetrating neck injuries. They may result in the immediate death of the patient due to asphyxiation. Aggressive management to establish the airway can change the outcome. All trauma centers should have a team educated with methods of airway maintenance in such cases as referral to other specialized centers may not be possible. Primary repair should be done in all cases of tracheal transection with post-operative neck flexion and pulmonary rehabilitation for a favorable outcome.

CONSENT

Informed and written consent was taken from the patient for publication of this case report and accompanying images.

ETHICAL APPROVAL

Case reports are exempted from ethical approval as per our institutional review board policy.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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