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CASE REPORT

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Lifesaving surgical approaches for severe penetrating knife injury to the neck

Anand Shankar Soundararajan[1*] and Kesava Phani Krishna[1]

Abstract

Background Penetrating neck injuries are rare and require urgent surgical intervention to prevent life-threatening complications. This report highlights a unique case involving complex surgical repair of tracheal, esophageal, and vascular injuries following a homicidal assault, emphasizing the challenges and techniques used in managing such severe trauma.

Case presentation A 45-year-old female presented with a severe penetrating neck injury after an alleged homicidal assault with a knife. The patient was in hypovolemic shock and required immediate resuscitation. Endotracheal intubation was performed through the transected tracheal segment, followed by surgical exploration in the operating room. Findings included partial transection of the carotid sheath, complete transection of the trachea, and oesophagus. Surgical repair involved using lateral polypropylene 5-O sutures for the carotid sheath, end-to-end oesophageal repair with absorbable 3 – 0 polygalactin sutures. As tracheal repair was not possible posterior wall was approximated with 3 – 0 polypropylene and size 7 tracheostomy tube was inserted and secured. The patient was managed post-operatively in the ICU and was discharged in stable condition on the 25th day adviced regular follow-up. This case underscores the importance of prompt airway management and surgical intervention in penetrating neck injuries. The meticulous repair of all injured structures and diligent post-operative care are crucial to a successful outcome. This report contributes to the limited literature on managing complex penetrating stab injuries to the neck and highlights the importance of a multidisciplinary approach in such cases.

Keywords Penetrating neck wounds injury, Tracheal transection, Oesophageal repair, Carotid sheath, Tracheostomy, Hypovolemic shock

Background

Penetrating neck injuries, though infrequent, present a critical surgical emergency demanding rapid intervention to prevent catastrophic outcomes. These injuries often result from self-inflicted, intentional, or accidental trauma [1], leading to significant morbidity and mortality if not promptly addressed. The case under discussion involves a complex surgical challenge resulting from a homicidal knife attack, resulting in the complete transection of the trachea and esophagus and partial injury to the carotid sheath. This report delineates the comprehensive surgical approach undertaken, highlighting its novelty and relevance in contemporary surgical practice. Such cases are scarcely documented, and our contribution aims to fill this void by elucidating a systematic approach to managing severe penetrating neck wounds injuries.

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Case presentation

The patient is a 45-year-old female with no prior significant medical history, presenting to the emergency department after sustaining a homicidal assault (Fig. 1). The injury was inflicted with a knife, resulting in a deep penetrating neck injury. Upon arrival, the patient exhibited signs of severe hypovolemic shock, with a rapid heart rate and significantly low blood pressure, necessitating immediate fluid resuscitation and airway management according to ATLS protocol. Aggressive fluid resuscitation, TXA administration, and PRBC transfusion were initiated to control bleeding and restore hemodynamic stability.

Emergency intervention

Due to the complete transection of the trachea, standard airway management techniques were ineffective. An endotracheal tube was strategically inserted through the transected tracheal segment to secure the airway (Fig. 2). This manoeuvre provided temporary stabilization, allowing for safe transport to the operating theatre.

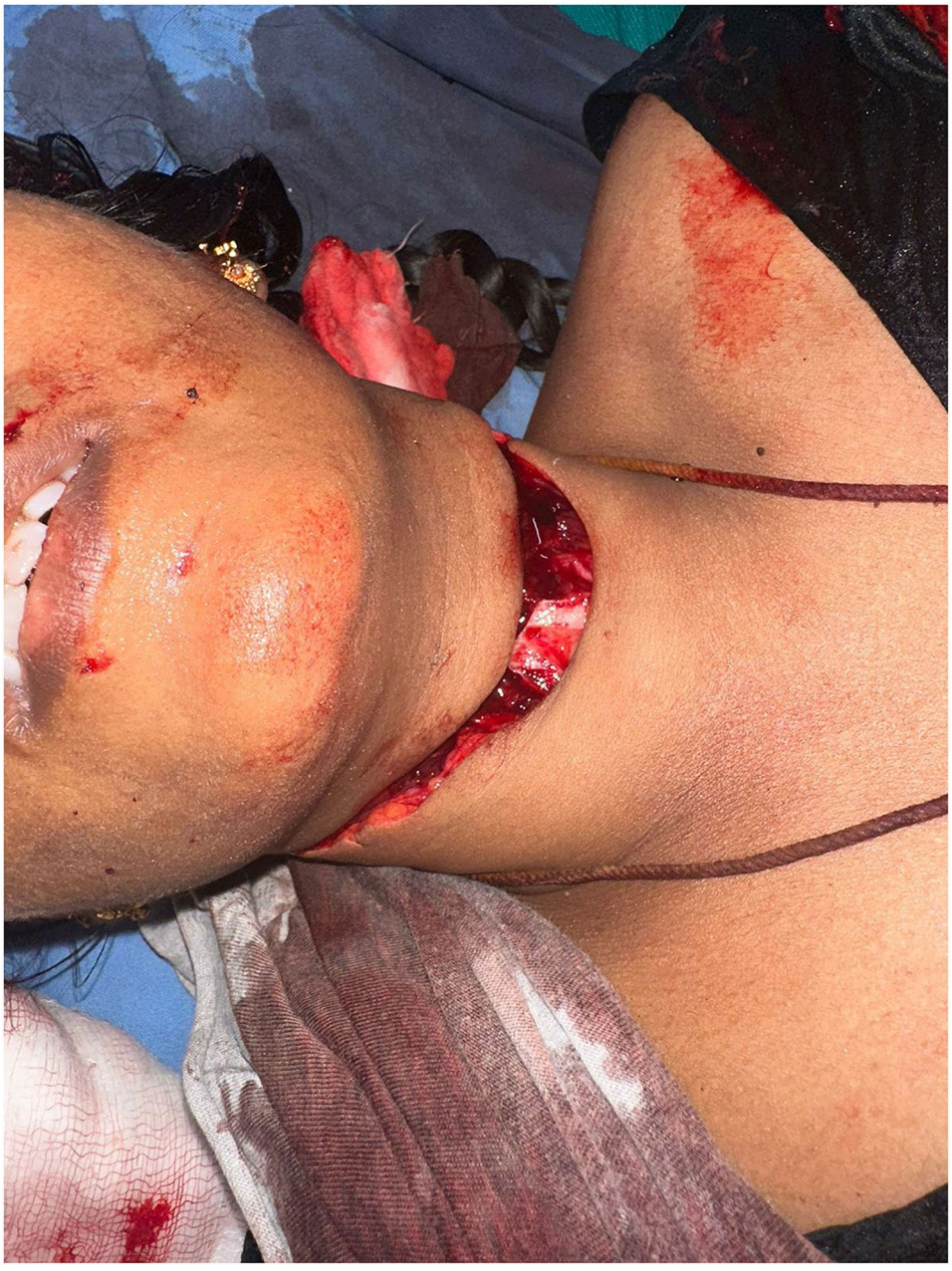

Fig. 1 Penetrating neck injury following a knife assault, highlighting its severity on presentation

Fig. 2 Endotracheal intubation through the transected trachea for emergency airway management

Surgical exploration

In the operating room, a detailed examination of the neck injury was conducted under anaesthesia. The intra op findings were Carotid Sheath had Partial transection, with potential risk to the underlying vascular structures. Meticulous dissection was performed to assess the integrity of the carotid artery and internal jugular vein. Trachea was Completely transected was at the mid-tracheal level. The distal and proximal ends were identified, and care was taken to preserve surrounding tissues to facilitate reconstruction (Fig. 3). Esophagus had a clean transection, necessitating precise approximation to restore the continuity of the gastrointestinal tract.

Surgical Procedures included Carotid Sheath Repair: Given the partial injury, the carotid sheath was carefully sutured using 5 – 0 polypropylene sutures, ensuring the protection of the carotid artery and jugular vein. Followed by Esophageal Repair: An end-to-end anastomosis was performed using absorbable 3 – 0 polygalactin sutures over a nasogastric tube to maintain patency. Adequate care was taken to achieve tension-free closure and prevent postoperative leaks. Finally Tracheal Reconstruction: Initial attempts to approximate the transected

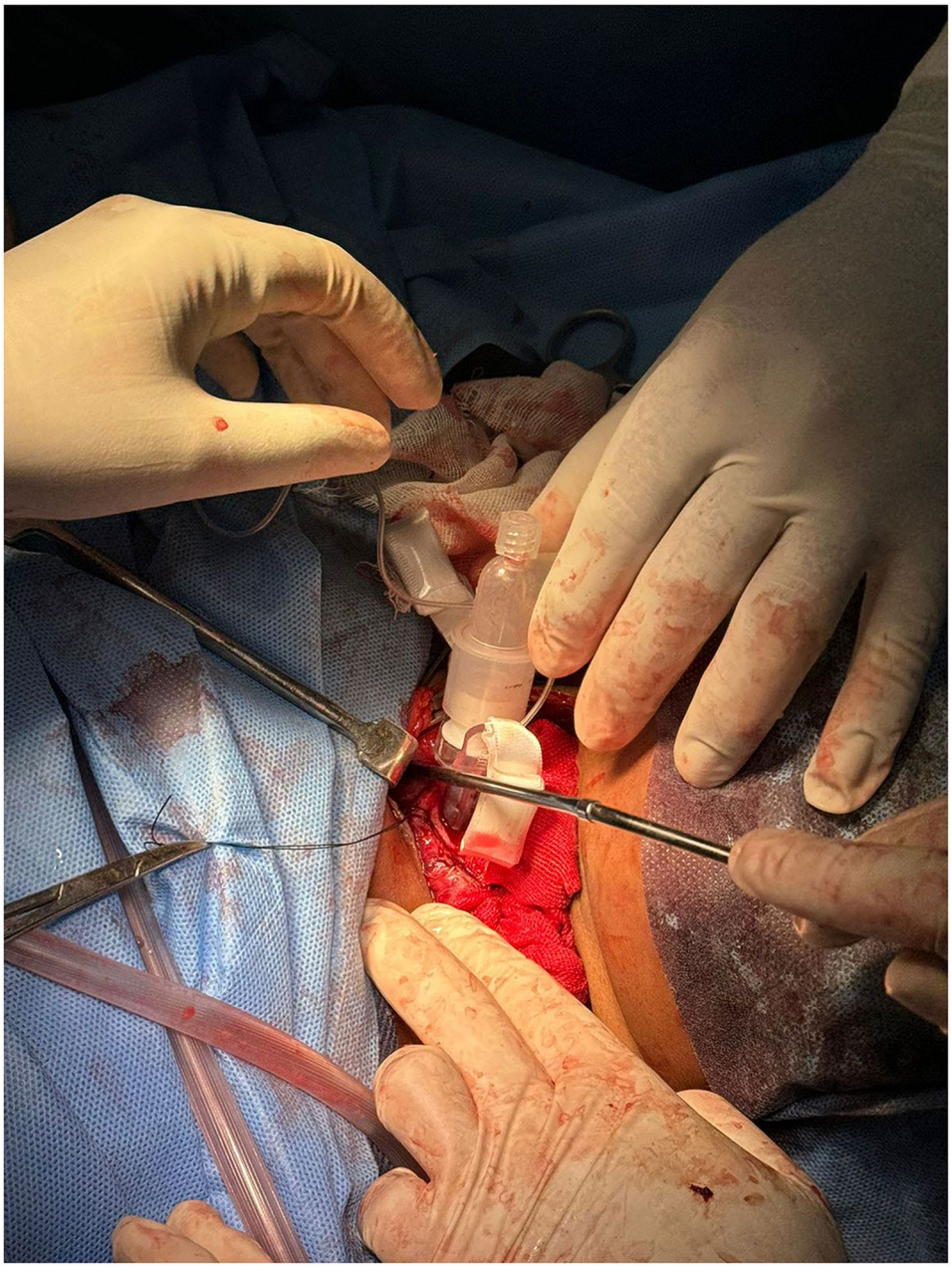

Fig. 3 Intraoperative view of tracheal and esophageal transections with carotid sheath injury

tracheal ends proved inadequate. Subsequently, a posterior tracheal wall repair was accomplished using 3 – 0 polypropylene sutures. Given the complexity of the injury, a size 7 tracheostomy tube was inserted and securely positioned to maintain airway stability. (Fig. 4). The platysma and overlying skin were meticulously approximated in layers. A suction drain was positioned to manage postoperative fluids, and the wound was closed in a tension-free manner.

Postoperative management

The patient was monitored in the intensive care unit (ICU) for potential complications, including airway obstruction, infection, and anastomotic dehiscence. A tracheostomy care regimen was instituted, with gradual downgrading and eventual removal of the tracheostomy tube by the 20th postoperative day. The patient received nutritional support via enteral feeding until esophageal healing was confirmed.

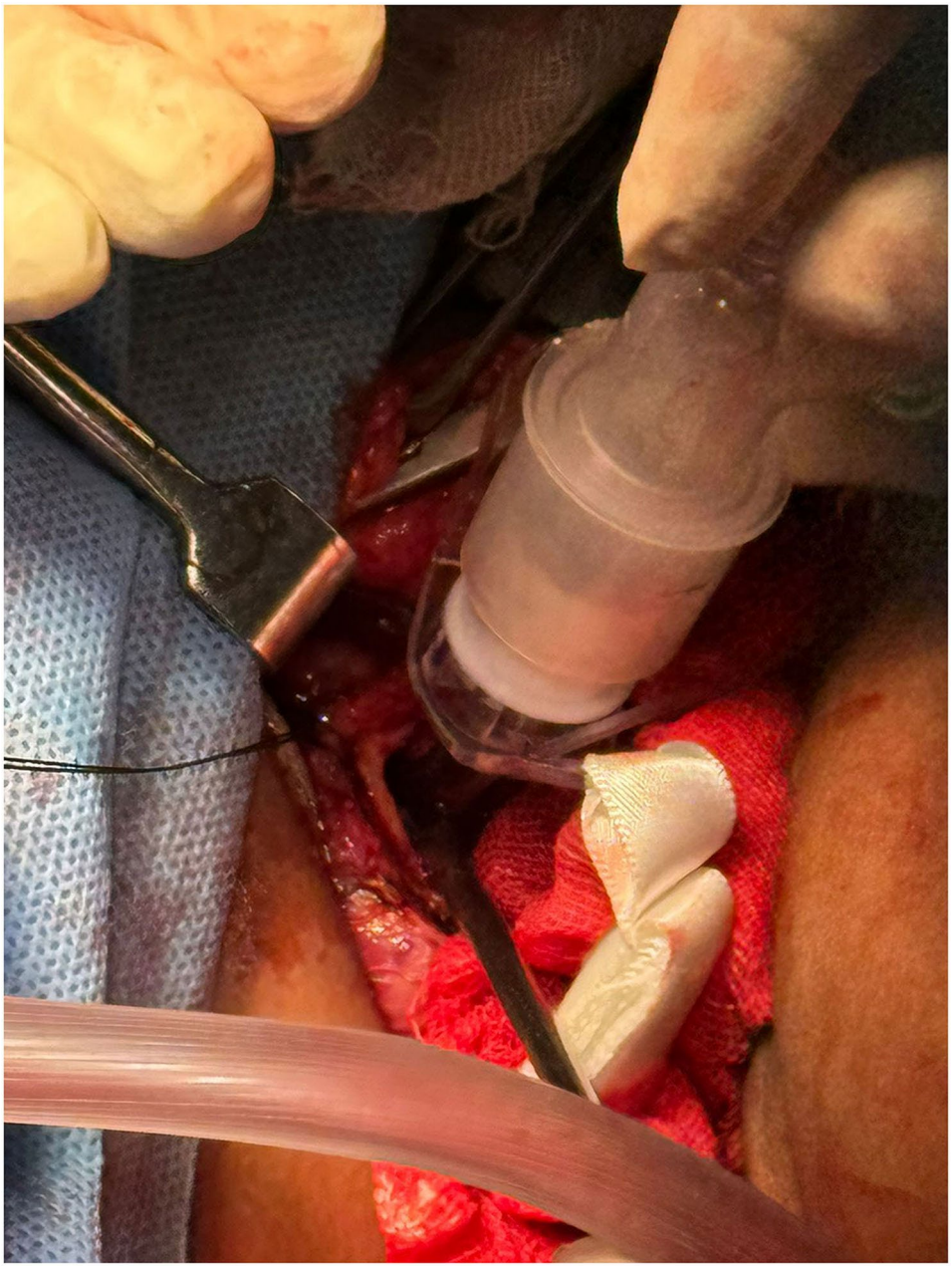

Fig. 4 Postoperative reconstruction with tracheostomy tube, esophageal repair, and carotid sheath repair

Discharge and follow-up

The patient showed remarkable recovery with no signs of infection or fistula formation. Psychiatric evaluation and therapy were integral to her holistic recovery, addressing the psychological aftermath of the traumatic event. She was discharged on the 25th day, with recommendations for outpatient follow-up and continued psychiatric care.

Discussion and conclusions

Penetrating neck wounds injuries present a multifaceted challenge requiring a coordinated surgical and medical response. The presented case emphasizes the critical role of prompt and effective airway management, as well as the surgical intricacies involved in repairing multiple cervical structures. A review of existing literature reveals that while penetrating neck wounds injuries are documented, cases involving complete transection of both trachea and esophagus [2], compounded by vascular injuries, are exceedingly rare.

In this case, the use of direct endotracheal intubation through the transected trachea underscores an innovative approach to emergency airway management, pivotal in stabilizing the patient [3]. Surgical repair necessitated a meticulous and methodical strategy to restore

anatomical integrity, with particular attention to minimizing tension on repaired structures to prevent postoperative complications.

The successful outcome in this case can be attributed to a multidisciplinary approach [4], involving expertise from surgical, anaesthetic, and psychiatric teams. This case not only contributes to the existing body of knowledge but also highlights the necessity for continued research and documentation of such rare and complex injuries.

Abbreviations

ICU Intensive Care Unit
ET Endotracheal

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Author contributions
AS and KP conceived and designed the study. KP performed the surgery and wrote the initial draft of the manuscript. AS contributed to data collection and manuscript revision. Both authors contributed to the interpretation of the data and approved the final manuscript.

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Data availability
No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate
Ethics approval was obtained from the ABC Hospital Ethics Committee (Ref: 2024-CTI-56). Written informed consent was obtained from the patient for participation in this case study.

Consent for publication
Written informed consent for publication of this case report and any accompanying images was obtained from the patient. A copy of the consent form is available for review by the Editor of this journal.

Competing interests
The authors declare no competing interests.

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