Case Report

From Crisis to Control: Successful Management of Cricotracheal Separation

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ABSTRACT

Introduction

Cutthroat injuries causing trauma to the laryngeal framework are one of the most challenging airway emergencies managed by otorhinolaryngologists, and a complete cricotracheal separation is the most severe type of laryngeal injuries. Prioritizing emergency airway establishment is the most crucial in the management of this scenario and a preliminary tracheostomy is the preferred, rather than intubation which may actually worsen the situation. The management should also include neck exploration and securing the laryngeal continuity will ensure a good quality of voice as well as life. Here, we report a case of cricotracheal separation that was managed successfully in our hospital underscoring the critical role of timely intervention and meticulous surgical techniques in achieving favorable outcomes in cutthroat injuries and the literature review of the same.

Case Report

We report the case of a 34-year-old male with a self-inflicted cutthroat injury resulting in a partial cricotracheal separation. On arrival, the patient was conscious, with stable vital signs but aphonic, and had a deep neck wound exposing the trachea. Emergency tracheostomy was performed through the distal end of the transected trachea, followed by neck exploration and primary repair of the cricotracheal junction using interrupted 3-0 polygalactin sutures. Comminuted thyroid and cricoid cartilage fractures were reconstructed, and postoperative care included antibiotics, corticosteroids, and enteral feeding via Ryle's tube. The patient was successfully decannulated on postoperative day 9. At 10 months of follow-up, the patient demonstrated normal voice quality, fully mobile vocal cords, no evidence of airway stenosis, and no requirement for further airway support. Psychiatric evaluation led to initiation of treatment for depression, and the patient remains stable both physically and mentally.

Discussion

Cricotracheal separation is a rare but critical component of cutthroat injuries. Immediate airway control, appropriate surgical repair, and multidisciplinary care are crucial for favourable outcomes. Our case highlights the potential for full functional recovery with timely intervention, even in resource-constrained settings.

Keywords

Cut Throat Injury; Laryngeal Framework Injuries; Cricotracheal Separation; Laryngeal Repair

Cutthroat injuries worldwide account for 5 to 10% of all traumatic injuries.[1] These injuries can involve the soft tissue of the neck, great vessels, and the nerves in the neck, laryngeal framework, esophagus, and cervical vertebrae.[2] Managing cutthroat injuries requires a multidisciplinary team capable of stabilizing the patient's condition before definitive management is planned.[3] Laryngeal framework injuries are to be addressed as emergency because they involve the airway and have long-term effects on voice and quality of life as well. According to the Schaefer-Fuhrman classification of laryngeal trauma, the most severe type is the complete cricotracheal separation, which poses an imminent danger of loss of airway.[4] These injuries must be promptly and appropriately managed, necessitating a well-trained otolaryngologist and a multidisciplinary team for the best outcome.

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We are presenting a case report of partial cricotracheal separation that was successfully managed in our institute and the literature review of the same.

Case Report

A 34-year-old male patient was brought to the emergency room by his colleague after finding the patient covered in blood, lying next to a kitchen knife with an open neck injury that was actively bleeding.

Upon initial assessment, the patient was conscious with a Glasgow Coma Scale score of E4V1M5, and his vitals were stable. However, the open neck injury revealed a partially exposed trachea, prompting an immediate call to the ENT duty team for emergency airway management.

The patient did not present with stridor and was unable to phonate. Upon inspection of the neck, there were three cut injuries involving Roon and Christensen's Zone 2. The upper two cut injuries measured about 5 x 2 x 1 cm and involved the anterolateral aspect of the neck. We observed a single cut injury measuring 10 x 2 x 4 cm over the middle part of the neck, extending from the posterior border of the right sternocleidomastoid to the anterior border of the left sternocleidomastoid, at the level of the thyroid cartilage. Upon reflecting the skin flap, a partially transected trachea at the level of cricoid cartilage and the 1st tracheal ring with an intact posterior tracheal wall was exposed (Fig.1).

We also noted that there were no injuries to the major neck vessels; however, there were multiple soft tissue injuries with excessive bleeding. No delay was made for radiological assessment as the severity of the injury and the need for immediate airway management were obvious.

The patient was immediately shifted to the operating room and a 8 Fr cuffed tracheostomy tube was inserted into the distal end of the transected trachea and secured with the lower skin flap. Emergency neck exploration was done under general anesthesia administered through the tracheostomy tube. A distal tracheostomy was created, and an 8 Fr cuffed tracheostomy tube was inserted at

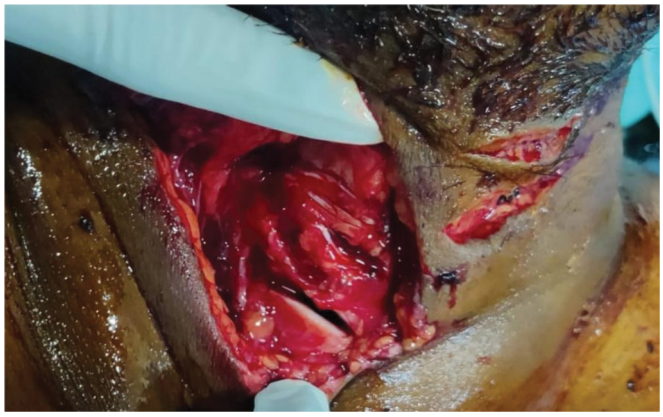

Fig. 1. Lacerated wound exposing cricotracheal separation with tentative cuts in the anterolateral aspect of the neck

the 2nd tracheal ring. The initial tracheostomy tube was removed, and cricotracheal repair was performed by interrupted sutures using 3-0 polygalactin, with an end-to-end anastomosis without including the endoluminal mucosa and we avoided unnecessary lateral exploration to prevent recurrent laryngeal nerve injury.

There were multiple comminuted fractures of the thyroid and cricoid cartilage with intact inner perichondrium, which were repaired with 3-0 polygalactin on the atraumatic needle by interrupted sutures over the outer perichondrium (Fig.2).

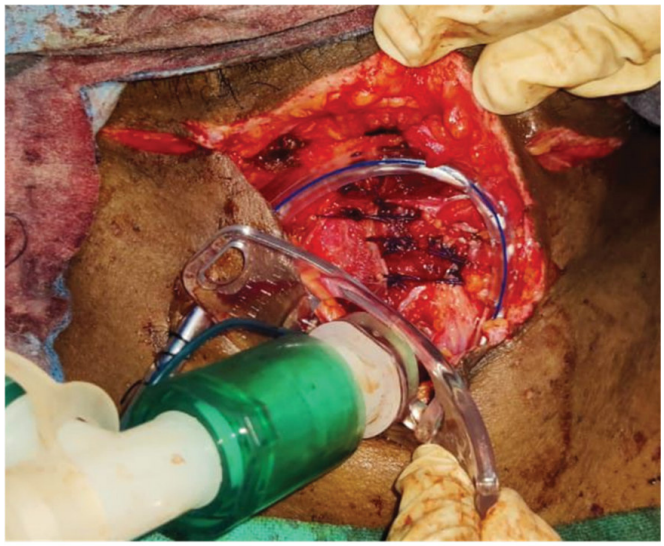

Fig. 2. Anastomosis and repair of laryngeal framework with distal tracheostomy in situ

Tracheal continuity was ensured, and the soft tissue was closed in layers using 3-0 polygalactin on the atraumatic needle and 3-0 nylon. A 14 Fr size suction drain was placed in the subplatysmal plane.

The vocal cords were examined using video laryngoscopy, revealing bilateral oedematous vocal cords; however, the mobility could not be assessed. A Ryle's tube was inserted to ensure postoperative nutritional care.

Postoperatively, the patient was treated with parenteral antibiotics, intravenous dexamethasone, Ryle's tube feeds, regular tracheostomy tube care, and neck wound dressings. The Ryles tube was removed on the 5th postoperative day, and the patient could tolerate a soft solid diet.

A non-contrast computed tomography neck was performed on the 6th postoperative day, revealing subcutaneous emphysematous air pockets in the deep subcutaneous plane and right visceral space involving the right cricothyroid muscle. There were no endo-laryngeal injuries. Tracheostomy downgrading was gradually initiated, and the patient was decannulated on the 9th postoperative day.

Psychiatric consultation was sought for the cause of his suicidal tendencies and depressive symptoms for which the patient was started on antipsychotics, antidepressants, and psychotherapy. He was discharged on the 10th postoperative day in stable physical and mental condition.

After 10 months of postoperative follow-up, the patient remains stable physically and mentally, with a normal voice, and can perform regular activities and strenuous physical work comfortably. Follow-up video laryngoscopy showed normal and equally mobile vocal cords, with no subglottic stenosis (Fig.3).

X-ray of the soft tissue neck showed a normal airway and no airway narrowing (Fig.4).

Fig. 3. 10 months follow-up videolaryngoscopy showing normal-looking vocal cords with no post-traumatic sequelae

Fig. 4. 10 months follow-up x-ray showing no airway narrowing.

Discussion

Laryngeal traumas are very rare, amounting to less than 1% of all trauma cases[5] and can result from blunt or penetrating trauma to the neck. Penetrating neck injuries commonly occur due to road traffic accidents, homicides, suicides, bull gore incidents, and gunshot wounds. Cut-

throat injuries are a known method of homicide and are observed in suicides as well, as in our case. In South India, the majority of patients with such injuries are male, from rural populations, and fall within the age bracket of 20 to 40 years.[3, 6]

Our patient was brought to the emergency department and had multiple self-inflicted cuts in the neck, causing soft tissue injuries at the level of the thyroid cartilage and an open airway exposing the cricotracheal separation. Psychiatry consultation revealed an underlying depressive cause for his suicide attempt, resulting in cutthroat injury.

Neck injuries are classified into three anatomical zones according to Roon and Christensen's classification, with zone II injuries being predominant. This is due to the lack of protection by bony structures, making it highly vulnerable, especially in cut-throat injuries, as in our case.

In a retrospective study conducted by Panchappa et al. in South India, 51 cases of cutthroat injuries were analysed. Among these cases, 12 had laryngeal injuries, and only 1 patient sustained a tracheal injury, highlighting the rarity of isolated tracheal injuries.[6]

In an effort to investigate the outcomes of neck injuries, a case series by Chakraborty et al. from West Bengal described 22 patients with cutthroat injuries. Among them, 3 out of 22 patients required permanent tracheostomy, 4 experienced permanent voice changes, 2 developed laryngeal stenosis, and 1 developed tracheal stenosis.[7]

The literature recommends that neck imaging should be performed only after stabilizing the airway, and computed tomography of the neck is particularly helpful in cases where the continuity of the larynx and trachea cannot be assessed due to extensive neck edema or hematoma formation.[8] In our case, we did not have time for radiological investigation, and a partial cricotracheal separation was evident.

The recommended management approach for laryngeal framework injuries, especially cricotracheal separation, involves emergency tracheostomy followed by neck exploration and prompt repair, preferably with interrupted absorbable 3-0 sutures, which have the lowest chance of granuloma formation. [2, 7, 9, 10] We followed this approach, achieved a successful anastomotic outcome, and restored laryngeal function without secondary healing sequelae, which are the ultimate goals of emergency surgical management. Early decannulation, if vocal cords are mobile, and regular follow-up of the patient, will ensure that postoperative healing sequelae are minimized.[11]

The long-term sequelae that can cause significant morbidity in such cases include recurrent wound infection, granuloma formation, poor voice quality, tracheal stenosis, chronic aspiration, and the need for permanent tracheostomy.[5, 7] However, none of these were observed in our patient during the 10-month follow-up.

The following measures contributed to our effective management of the airway in an emergency, resulting in a favorable anastomotic and functional outcome:

1. Time management - There was no delay in triage and promptly shifting the patient to the operating room.
2. Airway management - Immediate control of the airway was achieved by cannulating the distal trachea.
3. Correct surgical technique - Utilization of a distal tracheostomy approach, repair of the anterior and lateral tracheal wall through careful end-to-end anastomosis while excluding the mucosa from sutures, and avoidance of unnecessary lateral exploration to prevent recurrent laryngeal nerve injury.
4. Good post-operative care - Early decannulation of the tracheostomy was implemented.

Conclusion

Cutthroat injuries represent critical surgical emergencies, demanding the expertise of a multidisciplinary team for successful management. Laryngeal framework injuries should be handled by an otorhinolaryngologist for immediate airway management and to ensure laryngeal continuity for good clinical outcomes.

Our experience underscores the importance of swift and precise intervention in addressing cutthroat injuries. Despite their severity, our case demonstrates that with prompt airway management and careful repair techniques, favourable outcomes are attainable, even in resource-limited settings.

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