



Acute Laryngeal Trauma: A Case Series of 30 Cases

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Gauri Patil.**Abstract**

Although rare, anterior blunt or penetrating neck trauma demand a high grade of suspicion for laryngeal injury, since the spectrum of presentation can vary and early management is imperative for good patient outcomes.

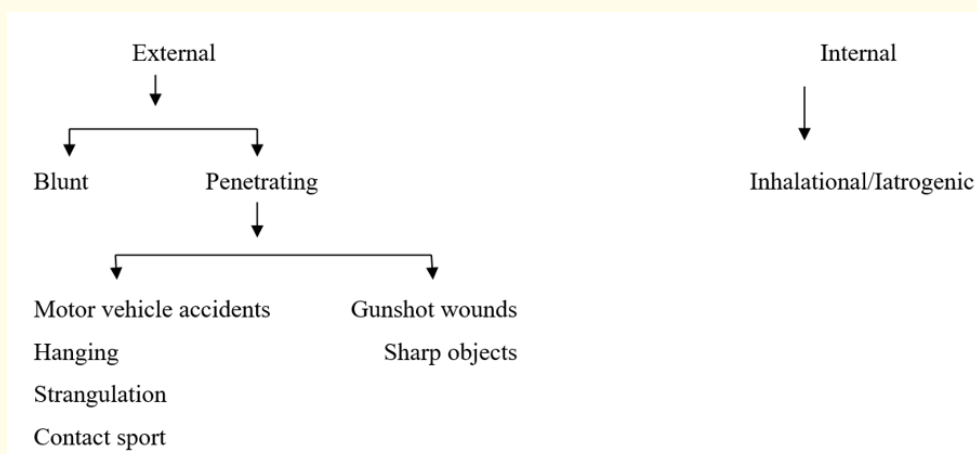
Aim: To study various clinical presentations of acute laryngeal injuries. At a tertiary care hospital, a retrospective review was performed of 30 cases. Classification was done on basis of history, type of injury, structures involved and protocol for the treatment that was followed. Few of the interesting cases are hereby discussed with novel interventions.

Keywords: Acute Laryngeal Trauma; Blunt Laryngeal Trauma

Introduction

Acute laryngeal trauma though rare is yet a life-threatening scenario affects both quality and maintenance of life. It is estimated that the incidence of acute laryngeal trauma is approximately 1 per 14,583 to 42,528 emergency room visits [1,2]. Blunt trauma is more common than penetrating trauma, although the incidence of penetrating trauma has increased over the past 30 years [3]. The most common cause of blunt laryngeal trauma is motor vehicle accidents. After the invention of the shoulder harness and airbag technology and laws for lower speed limits and compulsory usage of seat belt, injury rates have reduced [4]. Other causes include

pugilistic insults and sports-related trauma. Clothesline type and strangulation injuries are rare. These injuries can lead to laryngo-tracheal separation with injury of the laryngeal lumen and often are associated with asphyxiation and death [5]. Gunshot or stab injury cause majority of penetrating trauma. Evaluation of results for voice, airway and swallowing needs to be done [6]. Also a CT scan is a reliable tool for defining the extent of soft tissue trauma and for diagnosing the presence arytenoid dislocation or any fracture [7]. External laryngeal trauma is a rare injury but most of the time requires surgical intervention [8]. If surgical treatment is not required, the results for airway and voice are generally excellent [9].

Mechanism of injury**Figure a**

Aim of the study was to revisit various clinical presentations of acute laryngeal injuries.

The objectives were, 1) To study mechanism of injury. 2) To classify types of injuries. 3) To plan various treatment strategies.

Methodology

Analysis on retrospective basis was carried out in tertiary care hospital of patients coming to emergency department. Videolaryngoscopy was performed in all patients on day 2. The patients were divided based on the severity of injury according to the four-group classification system proposed by Schaefer and Close with the addition of a fifth group proposed by Fuhrman., *et al.* to include laryngotracheal separation into five cohorts. The various injury groups in this classification system are depicted in Table 1.

Group	Description
1	Minor injury-hematoma or laceration
2	Odema, hematoma, minor mucosal disruption without exposed cartilage
3	Massive edema, mucosal tear, exposed cartilage, cord immobility, displaced fracture
4	Same as group 3, but with more than 2 fracture lines or massive trauma to laryngeal mucosa
5	Severe injury-Complete laryngotracheal separation

Table 1

Case Series

Case 1

A thirty -five year old male presented to casualty with history of suicidal attempt with sharp object presenting with severed strap muscles and exposed trachea (Figure 1). A low tracheostomy was performed with primary closure of wound in layers. On day 2, a video laryngoscopy was performed showing diffuse oedema over cords visualised. On day 6, patient experienced hoarse voice and on video laryngoscopy an anterior glottis web was visualised. Therefore web release was done with cold steel instrumentation with ML scopy. A silicon sheet was placed as a keel and sutured transtracheal with prolene 2-0 along with Fullers tube insertion postoperatively (Figure 2). This sheet was removed after 4 weeks and satisfactory healing was noted (Figure 3). Though no new web formation was seen at 6 months, yet voice did not recover to normal as there was granulation tissue at the site planned to be cauterised (Figure 4). Patient is undergoing extensive speech therapy has experienced improvement in his voice quality.



Figure 1: Wound with exposed trachea.

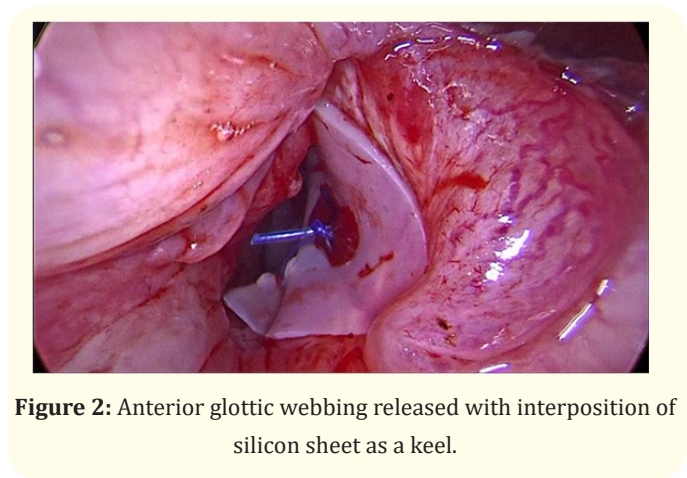


Figure 2: Anterior glottic webbing released with interposition of silicon sheet as a keel.



Figure 3: Post operatively status.

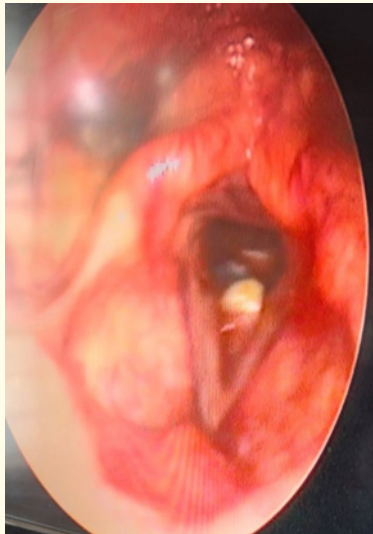


Figure 4: Scopy at the end of 6 months showing granulation at the web site.



Figure 6: Low Tracheostomy performed with closure of wound in layers.

Case 2

A fifty year old male patient presented to casualty with an open wound in anterior aspect of neck with exposed trachea with diffuse oozing (Figure 5). As tracheostomy tube was not handy in casualty, an endotracheal tube was inserted immediately to secure the airway and hemostasis was achieved. After stabilization, the patient was shifted to operation theatre and a low tracheostomy was done. This was followed by suturing of laryngeal framework with 4-0 PDS and ETHILON sutures (Figure 6). A Ryle’s tube was inserted and patient shifted to intensive care unit for observation and further started on steroids and antibiotics. The video-laryngoscopy and Upper GI scopy performed on the next day appeared normal.



Figure 5: Penetrating injury damaging laryngeal framework.

Case 3

A forty year old male presented to casualty with penetrating trauma and open wound with defect at upper level of thyroid cartilage sparing the vocal cords, with loss of tissue, with active bleeding. The superior thyroid artery being the bleeder was identified and ligated as shown in figure 7 and hemostasis was achieved. A low tracheostomy was performed, followed by primary repair of framework using two pieces of costal cartilage sutured as jigsaw with 4-0 PDS suture tension free and covered by strap muscles as seen in figure 8. The perichondrium on costal cartilage was kept intact. Decannulation was done at 3 weeks. Patients voice at the end of a month was normal.



Figure 7: Defect and loss of thyroid cartilage.

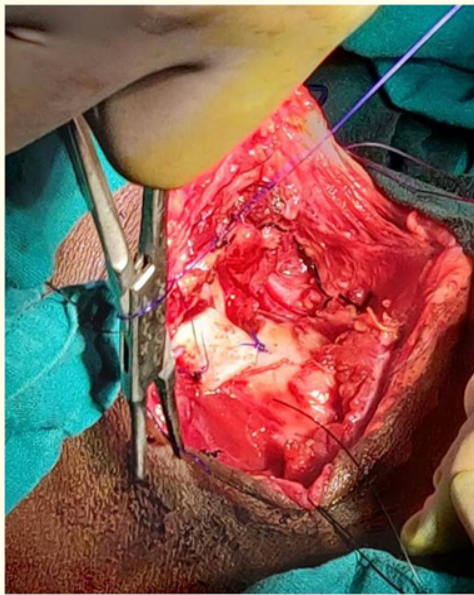


Figure 8: Wound closed and suturing done in layers with PDS.

defect closure with septal cartilage was performed. The septal cartilage was sutured around the defect and closed with a flap of strap muscles and skin, separately (Figure 10,11,12).



Figure 10: Defect in trachea- penetrating trauma.

Case 4

A fifty two year old male came to casualty with blunt laryngeal trauma and change of voice. Video laryngoscopy showed reduced movement on left side of vocal cord. Computed Tomography and Xray (Figure 9) showed fracture left thyroid cartilage. This patient was managed conservatively with steroids and antibiotics with monitoring of saturation and an eye on development of surgical emphysema.



Figure 9: X-ray Neck Lateral view.

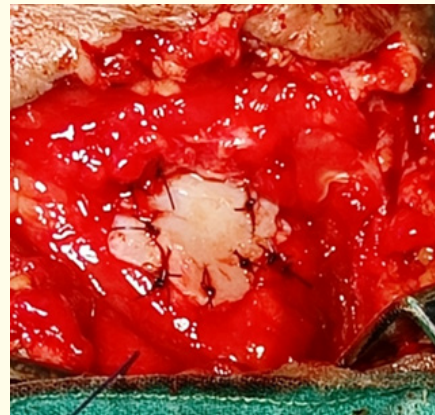


Figure 11: Septal Cartilage Tracheoplasty

Case 5

A thirty two year old male came to casualty with self inflicted penetrating injury to neck. The injury was at the level of trachea below thyroid cartilage with 1.5 cm diameter tissue loss. A tracheostomy tube was inserted through the defect and after stabilisation



Figure 12: Wound closed in layers.

Observations

In this case series, findings were as follows.

Discussion

The common presenting symptoms of Acute Laryngeal trauma are as hoarseness, dysphonia, difficulty in breathing, dysphagia, odynophagia. Stridor, hemoptysis, neck swelling, ecchymosis, laceration or penetrating neck wound with exposed cartilage,

Penetrating injuries	11
Blunt trauma	19
Deep wound (trachea exposed)	10
Superficial injuries	20
Suicidal injuries	9
Homicidal injuries	7
Total patients	30

Table 2: Classification of Injuries.

crepitus, subcutaneous emphysema and loss of thyroid cartilage prominence are signs representative of acute laryngeal trauma [1]. Gussack, *et al.* in 1986 had a publication a review of 12 major cases series that included a total of 392 cases of laryngeal trauma [2]. In this study blunt trauma was seen in 63.33% patients, while penetrating trauma in 36%.

- Generally, patients’ with blunt trauma are managed conservatively with steroids, voice rest and a watch on oxygen saturation. In cases of increasing subcutaneous emphysema or if patient is in distress, a tracheostomy is to be performed. A videolaryngoscopy is a must to evaluate damage to vocal cords, arytenoid dislocation or laryngeal haematoma. A USG or CT scan can pick up fracture of laryngeal framework. A thorough systemic evaluation for cervical spine injury, head injury and poly-trauma is a must.
- Patients’ presenting with penetrating injuries with open wound, airway should be secured with a low tracheostomy via a separate incision followed by suturing of severed structures in layers. Commonly anterior jugular vein, superior thyroid artery, muscle injury or diffuse thyroid tissue oozing is the cause of bleeding. For Internal Jugular vein injury, a bull dog clamp should be ready in operation theatre. In cases of laryngeal framework trauma, repair by prolene or PDS suture needs to be done, keeping a watch on inner perichondrium. Costal cartilage can be used for reconstruction as pri-

mary or secondary reconstruction. Titanium or stainless steel microplates can be used for stabilisation of fracture pieces. Web can be attended after patient stabilizes on Day 2-3 and a keel needs to be placed to prevent adhesions.

- RT should be inserted in case of suspected trachea esophageal fistula. In cases of hanging or strangulation a multidisciplinary team consisting of an intensivist, general physician, psychiatrist, orthopedician, radiologist and a Head and Neck Surgeon should be available. Acute laryngeal trauma can have various complications secondary to any intralaryngeal mucosal injury. This healing granulation can result into a thick cicatrix. If scarring is severe, a long-term tracheostomy dependence is expected.
- Other complications like esophageal injury, vocal fold paralysis or paresis or nerve injuries need to be kept in mind.

Conclusion

Acute laryngeal injury can occur due to a variety of causes namely motor vehicle accidents, gunshot, attempted hanging and assault. Such patients should be evaluated in the Emergency Department thoroughly. The priority is to secure the airway and identify the degree of the lesion. This allows us to decide between a primary repair or a conservative approach. Even if the person is asymptomatic, serious delayed complications like subcutaneous emphysema, laryngeal odema or laryngeal hematoma may occur needing a tracheostomy. Intubation should be postponed till assessment of upper airway obstruction is completed by an ENT Surgeon. All stable patients without significant trauma should undergo a videolaryngoscopy or an imaging like CT scan of Neck with X-ray of chest and upper esophagoscopy if required. Medical management or observation and surgical management depend on the site and severity of the injury, patient condition, and type of injury [10]. Following successful treatment, postoperative and rehabilitative care like speech therapy and swallowing therapy may be necessary.

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