

A Study on Laryngotracheal Trauma and Its Management

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Abstract:

Background: Laryngotracheal wounds are rare; however, they have a significant mortality rate. Laryngeal injury forms less than 1% of all traumatic injuries. Despite being rare, they may be quite severe.

Aim and Objective: To study laryngeal trauma and its management in our hospital settings.

Material and Method: This was a prospective study conducted in Department of ENT, CAIMS Karimnagar, included 50 patients reported to OPD due to various aetiologies of Laryngeal trauma for the period of one year, after getting informed consent from patients, approved by institutional ethical committee and following inclusion and exclusion criteria.

Results: Among all 50 participants who were included in the study, 64% of them were male and 36% were female and majority of the patients were from the age group of 21 – 40 years followed by < 20 Years. majority of the patients were reported due to the Blunt Injury (Road traffic accidents, Cut Throat and Hanging) followed by intubation injury (Post Intubation) and penetrating Injury. But after management of the patients with above treatment procedures there was significant difference observed in outcomes of the patients, after treatment out of 50 patients 41 patients were able to speak and 43 patients were able to swallow.

Conclusion: The role of the CT scan is crucial in decision making in blunt trauma cases. A multidisciplinary approach is required in trauma patients to identify other co-existing injuries.

Keywords: Laryngotracheal Trauma, Road traffic accidents, Cut Throat etc.

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Introduction

Laryngeal trauma refers to any injury or damage to the larynx, which is the voice box located in the throat. The larynx plays a crucial role in breathing speaking and protecting the airway during swallowing. Trauma to the larynx can occur due to various causes, such as accidents, sports injuries, falls, physical assaults, or medical procedure. Laryngotracheal wounds are rare; however, they have a significant mortality rate. These wounds can be blunt or penetrating. Usually, the larynx is

protected from blunt trauma by the sternum and jaw. A "clothesline" injury happens when the exposed neck is struck by a hard object, such as a wall wire or tree branch, or when an attack is intended to damage the larynx. Additionally, injuries may occur when the neck is stressed due to damage, such as in a rear-end accident that causes a whiplash-like injury or when the larynx is intentionally targeted for harm. Penetrating neck trauma may result in injury to the larynx.

Laryngeal injury forms less than 1% of all traumatic injuries. Despite being rare, they may be quite severe. After intracranial injuries, laryngeal injury is the second most common reason for death in patients with head and neck injuries. Laryngeal trauma is medical emergency, and immediate evaluation and treatment are essential. If you suspect laryngeal trauma, it is important to seek prompt medical attention. A healthcare professional, such as an otolaryngologist (ear, nose and throat specialist) will evaluate the extent of the injury through a physical examination and may order imaging tests, such as X-rays or CT scans to assess the damage. The management of laryngeal trauma depends on the severity of the injury and the specific structures involved. General principles and interventions that may be used in the management of laryngeal trauma are Airway management, Evaluation and imaging, Non-surgical management, surgical intervention, voice and speech therapy. The initial step in treating laryngeal injuries is recognizing and establishing an airway. "Does the patient have a stable airway?" is the initial decision-making criterion. If the patient is talking normally, the airway is at least patent; but may not be steady [1]. There have been reports of hoarseness, dysphagia, odynophagia, anterior neck discomfort, dyspnea, stridor, coughing, and hemoptysis as laryngeal fracture symptoms. Clinical signs include cracking on palpation, ecchymosis, hematoma, neck wound, pain, and surgical emphysema [2-5].

Current study we have undertaken to study laryngeal trauma and its management in our hospital settings.

Material and Method

This was a prospective study conducted in Department of ENT, CAIMS Karimnagar, included 50 patients reported to OPD due to various aetiologies of Laryngeal trauma for the period of one year, after getting informed consent from patients, approved

by institutional ethical committee and following inclusion and exclusion criteria given below.

Inclusion Criteria

- Age between 15 and 70 years
- Both sexes (male and female)
- Neck Trauma (Cut throat, gunshot, hanging, Strangulation, RTA, Post Intubation)

Exclusion Criteria

- Age below 15 years and above 80 years
- Congenital stenosis or laryngeal stenosis caused by malignant tumours or systemic diseases.
- Patients who were not willing to participate in the study.

Method

Informed and written consent for inclusion in the study as included in the pro forma in the patient's own language was obtained prior to the start of the study. Detailed history about the nature of injury, manner of occurrence, and examination of injury was noted as per the items in the proforma. Based on the clinical presentation, patients were managed conservatively, tracheostomy, Neck exploration without tracheostomy Penetrating trauma, CO₂ laser excision of severely avulsed cord with tracheostomy.

The intraoperative findings were documented. The patients were followed up throughout the stay in hospital until decannulated or discharged. Postoperative video direct laryngoscopy was done and findings were recorded. After discharge, patients were followed up in the outpatient department and outcomes were recorded in terms of decannulation, phonatory outcome, and able to swallow or not.

Statistical Analysis

Collected data were entered in the Microsoft excel 2016 for, further statistical analysis. Categorical data were expressed

in terms of frequency and percentages. Proportion difference postoperatively was assessed by using chi-square test. P-value < 0.05 were considered as statistically significant. SPSS version 25 was used to perform statistical analysis.

Among all 50 participants who were included in the study, 64% of them were male and 36% were female and majority of the patients were from the age group of 21 – 40 years followed by < 20 Years and so on shown in bellow table 1.

Observation and Results:

Table 1: Demographic distribution of study population

Parameter	Frequency	Percentage
Age		
< 20 Years	12	24
21 - 40 Years	24	48
40 - 60 Years	9	18
> 60 Years	5	10
Gender		
Male	32	64
Female	18	36

Among all patients we have observed that, majority of the patients were reported due to the Blunt Injury (Road traffic accidents, Cut Throat and Hanging) followed by intubation injury (Post Intubation) and penetrating Injury shown in bellow graph.

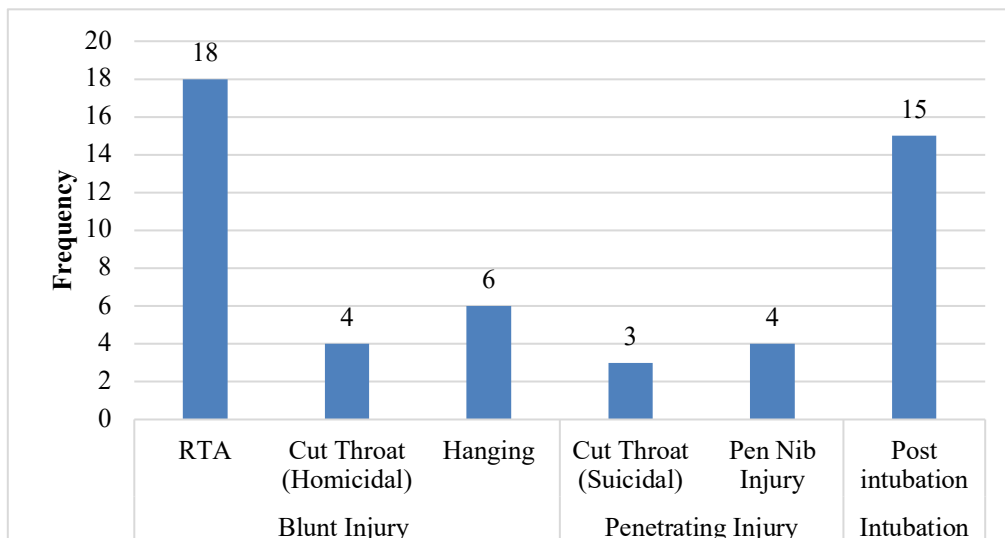


Figure 1: Distribution of Etiologies and type of modes of Injury

Table 2: Distribution of Clinical presentation and Laryngeal findings

Parameter	Frequency	Percentage
Size of tube (mm)		
7 mm	8	16
7.5 mm	25	50
8 mm	17	34
Days of Intubation		
< 5 Days	15	30
5 -10 Days	15	30

> 10 Days	20	40
Clinical Presentation		
Respiratory distress	30	60
Surgical emphysema	27	54
Dysphonia	13	26
Bleeding from the site	10	20
Dysphagia	7	14
Hemoptysis	7	14
Aphonia	5	10
Endotracheal tube in situ	5	10
Laryngeal findings		
Congestion and edematous vocal cord	40	80
Hematoma of the vocal cord	23	46
Restricted vocal cord mobility	7	14
Unilateral vocal cord palsy	3	6
Avulsed left cord	2	4
Hematoma of aryepiglottic fold & avulsed epiglottis	2	4
Avulsed anterior commissure	2	4

Table 3: Distribution of Clinical presentation and Laryngeal findings

Parameter	Frequency	Percentage
Treatment		
Conservative management (Blunt Injury)	20	40
Tracheostomy and primary LT repair (Penetrating Trauma)	4	8
Tracheostomy followed by close observation (Blunt Injury, Intubation)	21	42
Neck exploration without tracheostomy Penetrating trauma (Penetrating Trauma)	3	6
CO2 laser excision of severely avulsed cord with tracheostomy (Blunt Injury)	2	4
Complication		
Mild dysphonia	8	16
Aspiration	5	10
Wound infection	5	10
Granulation tissue	2	4
Residual vocal cord palsy	2	4
Grade 1 subglottic stenosis	2	4
Poor (breathy) voice	2	4

Table 3: Distribution of Clinical presentation and Laryngeal findings

Modes	Etiology	Yes	No	P-value
Able to Speak				
Blunt Injury	RTA	17(34%)	1(2%)	0.043*
	Cut Throat (Homicidal)	2(4%)	2(4%)	
	Hanging	5(10%)	1(2%)	
Penetrating Injury	Cut Throat (Suicidal)	2(4%)	1(2%)	
	Pen Nib Injury	2(4%)	2(4%)	

Intubation	Post intubation	13(36%)	2(4%)	
Able to Swallow				
Blunt Injury	RTA	18(36%)	0(0%)	0.0036**
	Cut Throat (Homicidal)	2(4%)	2(4%)	
	Hanging	6(12%)	0(0%)	
Penetrating Injury	Cut Throat (Suicidal)	2(4%)	1(2%)	
	Pen Nib Injury	1(2%)	3(6%)	
Intubation	Post intubation	14(28%)	1(2%)	

**P-value<0.05, statistically highly significant at 5% level of significance.

We have observed that after proper management of laryngeal injuries there was significant difference observed post operatively shown in above table.

Discussion

Cut throat injuries were the commonest cause of laryngeal trauma. Homicidal injury, an important cause of laryngeal trauma in Western patients [6] but in our study we have observed Road traffic accidents were the commonest cause of trauma. Also we have observed due to the poor knowledge of handling vehicles and no use of seat belts and air bags, the number of laryngotracheal injuries is increasing in the country.

In the present study we have observed that, mean age of the patients were 34 years with standard deviation of 4.49 Years, among all majority of the patients were males compare to female. In our study we have observed that, blunt Injury (Road traffic accidents, Cut Throat and Hanging) followed by intubation injury (Post Intubation) and penetrating Injury. Among 60% of the patients respiratory distress was observed, followed by Surgical emphysema, Dysphagia, Bleeding from the site, Dysphagia, Hemoptysis and others were common clinical presentation. 80% of the patients found with Congestion and edematous vocal cord followed by Hematoma of the vocal cord, Restricted vocal cord mobility for 7 patients. Almost among 21 patients were treated with Tracheostomy followed by close observation (Blunt Injury, Intubation) and for 20 patients who were with blunt injury

managed conservatively. 3 patients were managed with Neck exploration without tracheostomy Penetrating trauma (Penetrating Trauma). Among 16% of the patients had mild dysphonia was observed as complication and each of 5 patients had complication of aspiration and wound infection. Also 2 patients in our study observed complication with poor voice. But after management of the patients with above treatment procedures there was significant difference observed in outcomes of the patients, after treatment out of 50 patients 41 patients were able to speak and 43 patients were able to swallow.

Study conducted by Parida PK,[7] et al observed that blunt LT injuries were more common than penetrating injuries, which was consistent with our study but another study conducted by Sachdeva et al.[8], who observed penetrating neck injury more commonly than blunt trauma, which contradicts our study.

The type of injury depends on the mode of injury, nature of the object that cause the injury, location and velocity of the impact force, and patient-related factors (such as age and ossification of the laryngeal cartilages) which can result in minor injury to fracture of the laryngeal cartilage, cricothyroid or cricotracheal separation associated with recurrent laryngeal nerve damage. In the same study consistent with our study RTA neck injury was common mode of injury because of lack awareness among the general population regarding the use of seat belts. Another study by Sabbir et al. observed that cut-throat neck

injuries were more common than road traffic accidents in their study [9].

In present study, the majority of the neck injury patients presented with respiratory distress and subcutaneous emphysema. Studies by Schaefer et al., Yen et al., and Cherian et al. also found respiratory symptoms as the most common presentation of neck injury, followed by hoarseness of voice, neck tenderness, and subcutaneous emphysema [10-12].

Treatment should be individualized based on the type and severity of the injury. Direct laryngoscopy to assess the larynx and rigid esophagoscopy to assess for any pharyngeal and upper esophageal injury should precede the neck exploration [13]. In an intubated patient, direct laryngoscopy was performed after ruling out cervical spine injury. Endotracheal tube was retrieved to inspect the supraglottis, glottis, and subglottis for traumatic lesions using a Hopkins 0-degree long endoscope. In all patients with an open wound, the neck was explored through the neck wound itself, using the path already created by the cutting instrument to identify the depth and extent of the injury. In our study, the most common laryngeal injury found was a fracture of the thyroid cartilage. All displaced and comminuted fractures were reduced and fixed with nonabsorbable 2-0 PROLENE. Other authors used Mini-plates to fix the displaced fracture [14, 15].

After one year of follow-up, 2 patient (4%) had restriction of cord mobility. All patients had functional voice, with mild hoarseness in 3 patients, and all had near normal deglutition. Jalisi et al. found that all patients in their study had a good voice quality, and all tracheostomized patients were decannulated successfully [5]. The major limitation of this study was loss of patients for long-term follow up, meaning that late complications such as stenosis of the airway or quality of voice could not be studied.

Conclusion

From overall observation and discussion with other studies we can conclude that, the role of the CT scan is crucial in decision making in blunt trauma cases. A multidisciplinary approach is required in trauma patients to identify other co-existing injuries.

Timely intervention plays a vital role in providing the best functional outcome. Large-scale studies with a longer follow-up period are warranted to develop a management strategy.

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