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Laryngotracheal trauma: its management and sequelae

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Abstract

Objective: Laryngotracheal trauma is a rare but clinically important injury. Complications are frequent. Early recognition, accurate evaluation and proper treatment is vital. In order to learn from our past experience and refine our management, we reviewed our cases

Methods: Fifteen patients with external laryngotracheal injuries were analyzed retrospectively. The outcome was assessed both in terms of voice and airway, on short term and long term basis.

Results: Commonest cause of injury was cut throat injuries followed by road traffic accidents. The main presenting symptoms and signs were hoarseness, haemoptysis, odynophagia and stridor. Major laryngeal injuries (10 cases) outnumbered minor injuries (5 cases). A good association exists between the symptoms of haemoptysis and stridor at presentation and severity of the injury. Sites of laryngeal injury included; thyroid cartilage, mixed soft tissue and cartilaginous injuries, thyrohyoid membrane, aryepiglottic fold and cricothyroid membrane. Ten patients presented within 24 hours of the injury. Out come (airway and voice) was good in 12 patients whereas it was poor in 3 patients. Poor results were seen in patients who had delayed surgical intervention.

Conclusion: The presence of stridor and haemoptysis are suggestive of major injury. Early surgical intervention is recommended for all major injuries to ensure a good outcome (JPMA 58:241;2008).

Introduction

External laryngeal trauma, which is often a part of head and neck trauma, per se is a relatively uncommon injury estimated at approximately 1 in every 22,900 emergency room visits.¹ This is fortunate because injury to the larynx can result in serious airway problems and impaired voice production if not diagnosed promptly. Laryngeal trauma may go unrecognized because patients may appear deceptively normal for several hours after the injury has occurred.² The most common associated injuries with laryngeal fractures, observed in United States were intracranial injuries (13%), open neck injuries (9%), cervical spine fractures (8%), and esophageal injuries (3%).³ The initial concern with acute laryngeal trauma is securing the airway. Vocal function which has secondary importance is often determined by the effectiveness of the initial management. Complications have been estimated to be as high as 13% to 17% with regard to chronic airway obstruction⁴ and 21% to 25% with regard to voice compromise in studies involving both penetrating and blunt laryngeal injury.⁵ Controversy exists with respect to the establishment of the airway at presentation with some favouring intubation⁶ and others preferring tracheostomy.^{7,8}

In those who require surgical treatment, the timing of surgery is also controversial. While some recommend early surgical intervention⁸⁻¹⁰, others have waited for about four to five days before attempting surgical repair.¹¹ Nonetheless, laryngeal trauma remains a clinically

important injury requiring early recognition, accurate evaluation, and proper treatment. Through this article we wish to audit our approach to this relatively infrequent injury and to share our experience with our peers. This study was conducted at Aga Khan University hospital, which is a tertiary care hospital receiving cases from all over Pakistan.

Methods

The present report analyses our experience with fifteen cases of external laryngeal trauma seen over a period of five years. The charts of patients with external laryngeal trauma from 2001 to 2005 were reviewed retrospectively. Patients were called in the clinic for evaluation of their airway and voice quality.

All patients initially presented to the emergency service of Aga Khan University Hospital, Karachi and were referred to the ENT department for management.

The following features were noted:

Underlying cause of the injury, airway management, symptoms, severity of injury, site of injury, treatment and outcome.

The results obtained were statistically analyzed, using Fisher's exact probability test, to note whether there was any association between: symptoms at presentation and severity of injury; outcome and timing of treatment; and outcome and severity of injury.

Results

A total of fifteen patients with ages ranging from 18 to 60 years (median 32.6) formed the basis of this study. There were twelve male and three female patients. Nine patients suffered penetrating injury and 6 patients sustained blunt trauma.

The commonest cause of laryngeal trauma was cut-throat injury seen in six patients (40%). Four cases of cut-throat injury were suicidal and two patients sustained injury following assault.

All five cases of vehicular accident (33%) suffered blunt trauma. Three patients (20%) had gunshot injury following assault. Accidental strangulation in one patient was due to a loose cloth (muffler) tied around the neck being caught in machinery causing strangulation.

Emergency tracheostomy was performed in 10 patients. In 5 cases with minor injury, airway was adequate and no intervention was required.

Hoarseness was found in 12 patients. Other symptoms suggesting laryngotracheal injury included haemoptysis (10 patients) and odynophagia (8 patients).

Based on the extent of injury, patients were classified as having either major or minor injury. Major laryngeal injuries (10 cases) outnumbered minor injuries (5 cases). Seven out of the 10 patients with major injury and none of the 5 patients with minor injury had stridor. Haemoptysis occurred in 9 out of 10 patients with major injury and 1 out of 5 with minor injury. However, hoarseness was not a symptom that was associated with the severity of injury.

Two patients had undisplaced fractures of thyroid cartilage only. Four patients had soft tissue injuries alone (thyrohyoid membrane, cricothyroid membrane). Nine patients had combined soft tissue and cartilaginous injuries. Of four patients who had suicidal cut throat injuries, the cricothyroid membrane was damaged in two and the thyrohyoid membrane in two others.

Patients underwent either medical or surgical treatment or both, depending on the type or severity of the injury. Medical treatment consisted of observation, voice rest, oral steroids, antibiotics and saline nebulizations. Five patients with minor injury were managed conservatively.

Surgical treatment consisted of tracheostomy and/or laryngeal exploration and repair. Only tracheostomy was required in six patients with severe laryngeal oedema or large haematoma. Four patients required laryngeal repair. This included repairs of mucosal tears and reduction of displaced fractures. In two cases of major injuries with an unstable laryngeal framework, stenting was required. We

used finger cot stents for 3 weeks duration. A Prolene suture was passed through the stent and larynx at the level of ventricle and tied over buttons outside the skin.

Three patients who had major injury presented late (>1 month). (Table)

Table. Outcome related to time of presentation.

Time of presentation	Outcome			
	Major injury (n = 10)		Minor injury (n = 5)	
	Good	Poor	Good	Poor
<24 hours	6	0	4	0
1 to 7 days	1	0	1	0
>7 days	0	3	0	0

One patient with major and one with minor injury presented within one week of the trauma. Majority of patients (67 %) presented within 24 hours of the injury. This included four patients with minor injury and 6 with major injuries.

The follow- up period ranged from one month to four years. There was no mortality in our study. Outcome was assessed in terms of airway and voice. A good outcome was defined as that in which the patient had a normal airway or could be decannulated along with a good or fair voice. Patients were asked to evaluate their voice. The following definitions for airway and voice quality were used:

Good airway: normal airway or patient could be decannulated

Poor airway: patient needed a tracheostomy for maintenance of airway

Good voice: no hoarseness or close to preinjury voice

Fair voice: mild to moderate hoarseness

Poor voice: patient cannot raise voice above a whisper.

Seven patients with major injury who had early surgical intervention (within seven days of injury) did well while three patients managed by delayed surgery had poor outcome. Thus early surgical intervention was associated with a significantly better outcome ($p = 0.01$). All 5 patients with minor injury had a good outcome.

However there was no statistically significant difference in outcome between major and minor injuries.

Discussion

Cut throat injuries were the commonest cause of laryngeal trauma. Homicidal injury, an important cause of laryngeal trauma in Western patients⁷ was infrequently seen in our patients. Road traffic accidents were the second commonest cause of trauma. With the increasing use of seat belts and air bags, the number of laryngotracheal injuries is

decreasing in the West. But in Pakistan education in the general population is lacking.

Females tend to have slimmer, longer necks, predisposing them to a higher susceptibility to laryngeal injury, in particular supraglottic injury. However, males (77% vs. 33%) tend to present with the highest percentage of traumatic laryngeal injuries³, secondary to greater participation in violent sports and other activities as fighting.¹² In our study also males were predominantly involved.

The first priority in any trauma patient is to secure an adequate airway. However, when dealing with laryngotracheal trauma, the initial airway securing method is controversial. Schaefer⁷ has stated that intubation following laryngotracheal trauma is hazardous. However, American College of Surgeons recommends an attempt at intubation and if it fails only then tracheostomy should be performed.⁶ If the airway is determined to be unstable, we prefer an awake tracheostomy over intubation to avoid further injury to larynx and its supporting structures.

Various classifications have been proposed to describe the extent of laryngeal injury. The classification used in the present study is similar to that used in other studies.^{13,14} Patients with minor laryngeal injuries did well with medical management alone. On the other hand patients with major injuries invariably needed tracheostomy and/or laryngeal repair.

Symptoms of stridor and haemoptysis appear to be cardinal features of major laryngeal injuries. Timing of surgery showed significant correlation with the outcome in terms of voice and airway. The importance of early operative management has been stressed by several authors recently.⁸⁻¹⁰ However, others in the past have recommended delay following injury to enable any oedema to resolve.¹¹

There are chances that laryngeal injuries can be missed in the early evaluation because when such patients arrive in casualty they are often initially managed by trauma

team and not by otolaryngologists. Secondly when such an injury occurs, it is frequently associated with multiple life threatening injuries. It is therefore important to have a high level of suspicion for early detection and intervention to reduce morbidity from the injury. The main functions of larynx are airway and speech. Outcome of different treatment modalities should be compared in terms of adequacy of airway and quality of speech. The distinction between major and minor trauma categories should be affected within the first 24 hours after trauma. Early surgical intervention is recommended for all major injury to ensure a good outcome.

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