VOLUME-7, ISSUE-9, SEPTEMBER-2018 • PRINT ISSN No 2277 - 8160

Original Research Paper

ENT

A PROSPECTIVE STUDY OF LARYNGOTRACHEAL TRAUMA AND IT'S MANAGEMENT

Dr Praveena Varasala — Assistant Professor, Department Of ENT&HNS, Rangaraya Medical College & Govt. General Hospital, Kakinada

Dr Padavala Koteswararao* — Assistant Professor, Department Of ENT&HNS, Rangaraya Medical College & Govt. General Hospital, Kakinada *Corresponding Author

Dr Abhinav Kumar Reddy — Junior Resident, Department Of ENT&HNS, Rangaraya Medical College & Govt. General Hospital, Kakinada

ABSTRACT

BACKGROUND: Traumatic injuries of the larynx are diverse, uncommon, and potentially life threatening. Laryngotracheal trauma can be broadly divided into External trauma , which can be blunt or penetrating trauma , and internal trauma , which can be iatrogenic , thermal , caustic and foreign body injuries .external trauma which can be blunt trauma caused by motor vehicle accidents , suicidal or homicidal strangulation and penetrating trauma caused by suicidal or homicidal cut throat injuries . Iatrogenic injuries are most common cause of internal trauma . If not adequately treated these injuries lead to significant morbidity such as dysphonia , airway stenosis , aspiration and sometimes may lead to death . Laryngotracheal trauma is often associated with concomitant cervical or intracranial trauma or with multisystem poly trauma .

External laryngeal trauma is rare. It has a population incidence of 1 in 137,000 in adults and accounts for 0.5% of trauma admissions in children. Incidence of postintubation laryngotracheal stenosis requiring surgical correction is 1 in 204,000 in adults and 4.9 in 100,000 in children.Laryngeal webs , intubation granulomas , laryngeal injuries while intubation , inhalational and ingestion injuries are very rare in incidence[1].

MATERIALS AND METHODS: 20 patients who presented with external and internal laryngotracheal trauma to casualty department in Government general hospital, Kakinada, Andhra Pradesh state , during the period between June 2015 to September 2017. A detailed history was taken with emphasis on trauma.Clinical features were noted and patients were appropriately investigated .

RESULTS: The age of patients in present study varied from 12-70 years . Majority of patients are present in 26-40 years age group (55%) . Among the 20 cases in our study 13 cases were males (65%) and 7 cases were females (35%). In our study of 20 patients 14 patients sustained injuries due to external trauma(70%) and 6 patients presented with internal trauma of larynx(30%) due to prolonged intubation . In our study 6 of the 20 patients presented with laryngeal stenosis due to prolonged intubation among them 3 patients presented with subglottic stenosis 2 with glottic stenosis and 1 tracheal stenosis. Amongst them 9 of 14 patients were due to penetrating neck injuries(64.3%) and 5 of 14 are due to blunt neck trauma (35.7%) . 7 of 9 patients knife infected wounds and 2 due to motor vehicle accident. 2 of 5 patients in blunt trauma are due to hanging 2 are due to strangulation and one is due to bullgore injury. Most commonly presented with pain (70%) , dyspnoea (50%) , hoarseness (45%) . stridor was present mostly in laryngeal stenosis patients. The present study 15 of 20 patients airway was initially managed with the help of tracheostomy in 3 of 20 patients with intubation and 2 patients were under observation. There was a recurrence in one case of subglottic stenosis and endoscopic laser exicision was done again .In further followup there was no recurrence.

CONCLUSION: In conclusion, we believe that the management of injuries to the larynx and trachea can be individualized based on the clinical presentation and mechanism of injury. Early diagnosis and stratification of treatment based on the initial history, physical findings has improved outcomes. Our goal remains preservation of life with restoration of a normal airway and voice. Patients with blunt injuries can often be managed conservatively with close monitoring in the intensive care unit. Penetrating injuries will often have associated injuries or airway compromise that will mandate operative exploration.

KEYWORDS : Laryngeal Stenosis, Glottic Stenosis, Tracheostomy, Blunt Injury, Penetrating Injury

BACKGROUND:

Traumatic injuries of the larynx are diverse, uncommon, and potentially life threatening. Laryngotracheal trauma can be broadly divided into external trauma , which can be blunt or penetrating trauma , and internal trauma , which can be iatrogenic , thermal , caustic and foreign body injuries .External trauma which can be blunt trauma caused by motor vehicle accidents , suicidal or homicidal strangulation and penetrating trauma caused by suicidal or homicidal cut throat injuries . Iatrogenic injuries are most common cause of internal trauma .If not adequately treated these injuries lead to significant morbidity such as dysphonia , airway stenosis, aspiration and sometimes may lead to death. Laryngotracheal trauma is often associated with concomitant cervical or intracranial trauma or with multisystem poly trauma .

An increase in stress and road traffic accidents are cause of proportionately increase in laryngotracheal trauma. Immediate management towards laryngotracheal trauma patients leads to decrease in morbidity and mortality of anatomical and functional outcome. Our aim of study is to establish an organized management algorithm for various types of laryngotracheal trauma which can lead to better long-term functional outcome.

We evaluated 20 patients who presented with external and internal laryngotracheal trauma to casualty& ENT departments in Government general hospital, Kakinada, Andhra Pradesh state, during the period between June 2015 to September 2017. A detailed history was taken with emphasis on type of trauma , followed by clinical examination and stabilization of airway. later, followed by direct laryngoscopic examination and radiological investigations with plain x-ray neck AP and lateral view , CT-Scan neck to asses laryngotracheal frame work and surrounding soft tissues. These patients are managed by stabilizing the airway and definitive treatment like laryngotracheal repair in external trauma and laryngoplasty in internal trauma. Overall success rate as assessed based on the procedure.

AIM:

1. To evaluate clinical features and its management of patients with laryngo-tracheal trauma .
2. To establish an organized management algorithm for various types of laryngotracheal trauma.

MATERIALS AND METHODS:

Method of Collection of Data

20 patients who presented with external and internal laryngotracheal trauma to casualty ENT departments in Government general hospital, Kakinada, Andhra Pradesh state , during the period between June 2015 to September 2017. A detailed history was taken with emphasis on trauma. Clinical features were noted and patients were appropriately investigated .

INCLUSION CRITERIA

Study subjects were limited to patients of any age group with neck trauma and laryngotracheal stenosis. Neck trauma includes cut throat injuries, gunshot injuries, Hanging, Strangulation, RTA, and injuries during and after prolonged intubation.

EXCLUSION CRITERIA

Congenital stenosis or laryngeal stenosis cases caused by malignant tumors or systemic diseases, such as collagen disease or Wegener's granulomatosis were excluded from the study.

RESULTS:

The present study titled "A PROSPECTIVE STUDY OF LARYNGOTRACHEAL TRAUMA AND ITS MANAGEMENT" is evaluated in 20 patients who presented with external and internal laryngotracheal trauma to casualty& ENT departments in Government general hospital, Kakinada, Andhra pradesh state during the period between June 2015 to September 2017. Here are the details of the following data

TABLE 1: AGE DISTRIBUTION

Age (YRS)	No of CASES	Percentage
11-25 years	4	20 %
26-40 years	11	55 %
41-55 years	3	15 %
56-70 years	2	10 %

TABLE 2: SEX DISTRIBUTION

SEX	NO OF CASES	PERCENTAGE
MALE	13	65%
FEMALE	7	35%

TABLE 3: TYPE OF TRAUMA

TYPE OF TRAUMA	NO OF CASES	PERCENTAGE
INTERNAL	6	30%
EXTERNAL	14	70%

TABLE 4 : TYPE OF INTERNAL TRAUMA

TYPES	NO OF CASES	PERCENTAGE
SUB GLOTTIC STENOSIS	3	50%
GLOTTIC STENOSIS	2	33.33%
TRACHEAL STENOSIS	1	16.67%

TABLE 5 : TYPE OF EXTERNAL TRAUMA

TYPE	NO OF CASES	PERCENTAGE
PENETRATING	9	64.3%
BLUNT	5	35.7%

TABLE 6 : CAUSES OF INJURY

CAUSE	NO OF CASES	PERCENTAGE
RTA	2	14
KNIFE INFLICTED	9	50
HANGING	2	14
STRANGULATION	2	14
BULL GORE INJURY	1	8

TABLE 7: MOST COMMON SYMPTOMS PATIENTS PRESENTED WITH

SYMPTOM	NO OF CASES	PERCENTAGE
Hoarseness	9	45%
Loss of voice	8	40%
Pain	14	70%
Dysphagia	5	25%
Stridor	5	25%
Dyspnoea	10	50%

TABLE 8 : MAINTENANCE OF AIRWAY

AIRWAY	NO OF CASES	PERCENTAGE
TRACHEOSTOMY	15	75%
INTUBATION	3	15%
NEITHER	2	10%

TABLE 9 : Management of external trauma

Method	No of cases
Cricothyroid membrane repair	4
Thyrohyoid membrane repair	1
Aerodigestive tract repair with stent placement	1
Tracheostomy and observation	3
Only observation	5

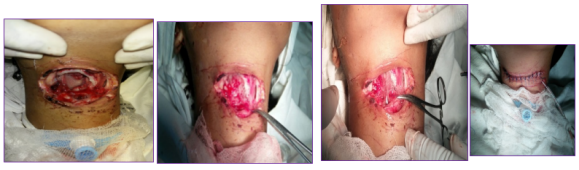
TABLE 10 : MANAGEMENT OF LARYNGEAL STENOSIS

Stenosed segment	Method
Glottic stenosis	Endoscopic laser excision with keel application
Tracheal stenosis	Resection and Montgomery silastic T tube placement
Subglottic stenosis	Endoscopic laser excision was done in 2 cases and Montgomery silastic T tube in one case.

INDIVIDUAL CASE REPORTS:

CASE 1:

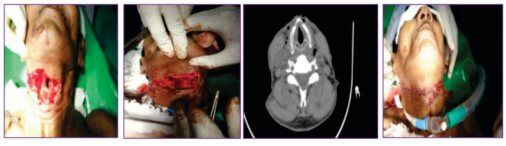
A 30 year old female patient presented to our casualty with an open wound in the neck, loss of voice and dysphagia. On examination aerodigestive tract injury was present. Emergency tracheostomy was done. Later VLS, CT scan and MRI were done showing aerodigestive tract injury, then primary membrane repair along with stent placement was done. Decannulation was not done. Patient is on follow up [for 1 year].



Complete Aerodigestive tract injury | Primary Mucosal repairof Digestive tract with a Stent insitu | Primary closure of Airway | Suturing done in layers

CASE 2

A 70 year old male patient presented to our casualty with neck trauma, the patient has loss of voice, dysphagia and open wound on the neck .On examination there was rupture of thyrohyoid membrane. VLS, MRI and CT scan were done for this patient, fracture of the thyroid cartilage was present in the CT scan. Tracheostomy with primary membrane repair was done for this patient. The patient is on follow up [for 1 year,]Decannulation was done in later stage and his voice is near normal.



Rupture of Thyrohyoid Membrane | Primary mucosal repair | Thyroid cartilage in CT scan | # Closure done in layers

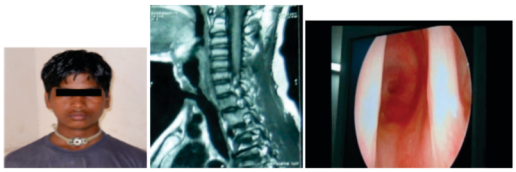
CASE 3

A 41 year old male presented to our OPD with complaint of hoarseness of voice, on VLS there was a laryngeal web. Tracheostomy followed by laser excision of the glottic web was done. The patient was on follow up[for 1 year,]Decannulation was done later, the patient is stable and has near normal voice.

Glottic web

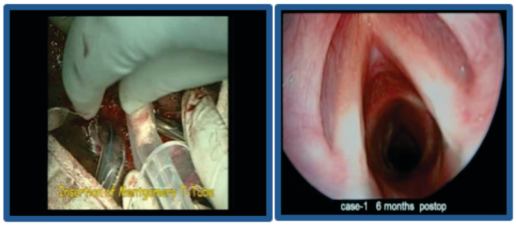
CASE 4

A 15 year old male patient presented to our casualty with stridor and hoarsness of voice for which emergency tracheostomy was done. Later Direct Laryngoscopy was done which revealed subglottic stenosis, both CT scan and MRI were done showing subglottic stenosis. Laser excision was done along with placement of Montgomery T Tube. The patient was on follow up[for 1 year,]Decannulation was done later, the patient is stable, airway is good and voice is near normal.



MRI showing sub glottic Stenosis

Circumferential narrowing of subglottic region



Montgomery tube insertion after 6 months follow up

DISCUSSION

The present study titled "A PROSPECTIVE STUDY OF LARYNGOTRACHEAL TRAUMA AND ITS MANAGEMENT" is evaluated in 20 patients who presented with external and internal laryngotracheal trauma to casualty&ENT department in Government general hospital, Kakinada, Andhra Pradesh state, during the period between June 2015 to September 2017.

In a study by jalisi et al consisted of 11 men and one woman with a mean age of 41.5 years[3].

In a case study by R A Bhojani et al identified 71 patients with a mean age of 32.8 +13.3 years (range, 15-71 years)[4].

In a case study by S A panchappa et al included 51 cases of cut throat injury. Age varied from 4 years to 80 years. Out of 51 cases, there were 43 males, 7 females and one male child. Male to female ratio was 6.2:1[5].

A total of 30 patients with cut throat injury were included in the study by Rautela et al , in which males were 27(89.9%), females were 3(11.1%). Male to female ratio was 9:1. Age ranged from 4 years to 50 years (mean age 29.9 years). The majority of the patients were young adults aged ranged between 20-40 years. 5(16.6%) patients were below 10 years[6].

In our study of 20 patients mean age is 34.15 years (range 10 to 70 years). In our study 4 patients were between 11 to 25 years, 11 patients between 26 to 40 years, 3 patients between 41 to 55 years and two patients between 56 to 70 years.

In our study of 20 cases there were 12 males, 7 females and 1 child .Male to female ratio is 1.86: 1

In R ABhojani case series penetrating trauma was the cause in 73.2% of patients; however, blunt trauma had a significantly higher mortality (63.2% vs 13.5%, respectively). Blunt mechanisms involved older patients (38.5 + 15.2 years vs 30.1 +11.9 years, P .017), and these patients were more likely to require emergency airways than those with penetrating trauma (78.9% vs 46.2%)[4].

In a study by Francis et al of 23 patients ,4 patients presented with blunt trauma and 19 patients with penetrating injuries of larynx. Among them 8 patients presented with tracheal injuries, 12 patients with laryngeal injuries and 3 patients with combined injuries[7].

According to Cicala et al mechanism of injury was knife stab wound in 9 cases, gunshot wound in 17 cases and blunt trauma in 20 cases. Location was larynx in 13 cases, trachea in 24 cases, cricoid cartilage in 5 cases and multiple sites in 4 cases[8].

In a study by Gussack et al over 21 patients, 9 patients were with blunt injuries and 12 patients presented with penetrating injuries of larynx.

In our study of 20 patients,14 patients sustained injuries due to external trauma and 6 patients presented with internal trauma of larynx[9].

Iirish et al Of the 66 penetrating injuries, knife wounds accounted for 43 (65%) of the injuries, whereas motor vehicle trauma and gunshot wounds each accounted for 5 (8%) .Of the 19 blunt injuries, motor vehicle trauma was the causative factor in 10 (53%), and hockey injuries accounted for 4 (21%) of the cases[10].

In a study of 51 patients by S A Panchappa et al 26 cases (50.98%) were due to homicidal attack; 13 cases (25.49%) due to suicidal attempt; 7 cases (13.72%) due to road traffic accident; 4 cases (7.84%) due to bull gore injury; 1 case (1.96%) due to accidental fall. Emergency tracheostomy was done in 16 cases (33.33%) [5].

In our study 9 of 14 patients are due to penetrating neck injuries and 5 of 14 are due to blunt neck trauma. 7 of 9 patients are knife inflicted wounds and 2 are due to motor vehicle accident. 2 of 5 patients in blunt trauma are due to hanging 2 are due to strangulation and one is due to bullgore injury.

Jautilainen et al found that in their review of 33 cases of external laryngeal trauma hoarseness was the presenting symptom in 85% of cases , dysphagia in 52% of cases , pain in 42% of cases , dyspnea in 21% of cases and hemoptysis in 18% of cases[11].

In a retrospective study of 30 patients by Yen PT et al 26 patients presented with hoarseness ,18 patients with dysphagia ,17 patients with subcutaneous emphysema ,11 patients with hemoptysis ,11 patients with dyspnea[12]

According to Goudy et al found that of 236 patients admitted with aerodigestive tract injury subcutaneous emphysema was seen in 19 patients only[13].

Jautilainen et al found that in their review of 33 cases of external laryngeal trauma hoarseness was the presenting symptom in 85% of cases , dysphagia in 52% of cases , pain in 42% of cases , dyspnea in 21% of cases and hemoptysis in 18% of cases[11].

In a retrospective study of 30 patients by Yen PT et al 26 patients presented with hoarseness ,18 patients with dysphagia ,17 patients with subcutaneous emphysema ,11 patients with hemoptysis ,11 patients with dyspnea[12].

In a study by Francis et al 7 patients presented with subcutaneous emphysema ,12 patients with lacerations, 6 patients with respiratory distress and 4 patients with dysphonia[7].

According to Goudy et al found that of 236 patients admitted with aerodigestive tract injury.Subcutaneous emphysema was seen in 19 patients only[13].

In a retrospective study by bent JP et al in 1993 including 77 patients over 18 years , 45 patients with blunt injuries and 32 patients with penetrating injuries involving larynx presented with minor hematomas and edema in 11 patients ,10 patients with Hematoma and minor lacerations , 36 patients with massive edema , mucosal lacerations and fractures , 14 patients with massive edema and

multiple fractures, 4 patients with complete laryngotracheal separation[14].

In our study among the 14 external trauma patients classified according to Schaefer's grading 3 patients presented with grade 1 injuries, 5 patients presented with grade 2 injuries, three patients with grade 3 injuries, two patients with grade 4 injuries and one patient with grade 5 injury[15].

In the literature of Luiz Alberto Alvesmota , Glauber Barbosa de Cavalho , Valeska Almeida Brito(1969) , Lindholm CE ;It is stated that prolonged intubation leads to LTS and increased complications . The risk of developing LTS also depends on the size of the ET tube, improper position of the tube, poor humidification of inspired air and presence of local infection[16].

According to Scott Brown in long term over 90% will be successfully decannulated in penetrating laryngeal trauma when compared to 68%in case of blunt trauma and 70% will have normal voice in penetrating trauma when compared to 40% in case of blunt trauma[2].

In our study 12 patients were decannulated of 15 tracheostomy patients, 3 of intubated patients were extubated as there was no problem in further follow up.

According to Scott Brown if surgical treatment is performed within 48 hours 91 to 94%of patients will have good airway and 69 to 74%will have good voice[2].

In our study after one and half year follow up 17 patients are with normal Airway and 3 patients with tracheostomy tube.

In our study 7 patients attained normal voice , 9 patients are with near normal voice , 3 patients could speak with Chevalier Jackson tracheostomy tube and one patient could not attain any voice.

CONCLUSION

The main objective of our study is to establish a protocol for different types of laryngo tracheal trauma is to secure a safe airway and to achieve a normal voice.

In conclusion, we believe that the management of injuries to the larynx and trachea can be individualized based on the clinical presentation and mechanism of injury.

Early diagnosis and stratification of treatment based on the initial history, physical findings have improved outcomes. Our goal remains preservation of life with restoration of a normal airway and voice.

Patients with blunt injuries can often be managed conservatively with close monitoring in the intensive care unit.

Penetrating injuries will often have associated injuries or airway compromise that will mandate operative exploration.

Various modalities of treatment are available for laryngeal stenosis, for lesion <1cm laryngoscopic Laser excision is accepted treatment and for lesions >1cm external approach resection and grafting procedures are accepted treatment.

Laryngotracheal trauma is a rare diagnosis, with early treatment and regular follow up will lead us to a great functional outcome of larynx in terms of airway and voice.

Laryngotracheal trauma is a rare but life threatening diagnosis in casualty when compared to head injuries, as most blunt injuries of neck are concealed and may land in sudden respiratory obstruction. Emergency department faculty and Otorhinolaryngologists must be prepared and well versed to immediately respond to secure airway of these patients.

Decrease in vehicle speed, road safety measures and decrease in personal stress reduces the chance of **laryngotracheal** trauma.

Early the intervention, Better the restoration.

REFERENCES

1. Guri S. Sandhu S. A. Reza NouraeiLaryngeal and Esophageal Trauma. Cummings Otolaryngology Head & Neck Surgery.;70:951-960
2. Lisa pitkin ,laryngo tracheal trauma ,scott browns otorhinolaryngology 7th edition , vol 2 ; 2271-2286.
3. Jalisis S, Zoccoli M. Management of laryngeal fractures—a 10-year experience.J Voice 2011;25:473–479 .
4. Bhojani RA, Rosenbaum DH, Dikmen E, Paul M, Zane B, ZoniesD,Estrera AS, et al. Contemporary assessment of laryngotracheal trauma.JThorac Cardiovasc Surg 2005;130:426–432.
5. Panchappa, S.A., Natarajan, D., Karuppasamy, T., Jeyabalan, A., Ramamoorthy, R.K., Thirani, S. andSwamirao, R.K. (2014) Cut Throat Injuries—A Retrospective Study at a Tertiary Referral Hospital. International Journal ofOtolaryngology and Head & Neck Surgery, 3, 323-329 .
6. Neha Rautela, Veerendra Verma, Shahab aliUsmani, Anupam Mishra, H.P. Singh, Sunil Kumar .Cut Throat Injuries: The Socio-Demographic Pattern, Causes, and Outcome at Tertiary Care Hospital of North India .ijcmr.
7. Francis S, Gaspard DJ, Rodgers N, Stain SC. Diagnosis and management of laryngotracheal trauma. J Natl Med Assoc 2002;94:21–24.
8. Cicala RS, Kudsk KA, Butts A, Nguyen H, Fabian TC . Initial evaluation and management of upper airway injuries in trauma patients . Clin Anesth. 1991 Mar-Apr;3(2):91-8.
9. Gussack GS, Jurkovich J. Treatment dilemmas in laryngotracheal trauma.J Trauma 1988;28:1439–1444 .
10. Irish jc et al: penetrating and blunt neck trauma: 10-year review of a canadianexperience . J crit care 40:33 ,1997 .
11. Marko Juutilainen,JuhaVintturi,SorayaRobinson,LeifBäck,Hannu Lehtonen Dr Antii A Makitie . Laryngeal fractures: clinical findings and considerations on suboptimal outcome; journal Acta oto-laryngologica , volume 128 ,issue 2.
12. Yen PT, Lee HY, Tsai MH, et al. Clinical analysis of external laryngeal trauma. J LaryngolOtol1994;108:221–225.
13. Goudy SL, et al. Neck crepitance: evaluation and management of suspected upper aerodigestive tract injury. Laryngoscope. 2002.
14. Bent JP, Silver JR, Porubsky ES. Acute laryngeal trauma: a review of 77 patients. Otolaryngology Head& Neck Surg 1993;109:441–449.
15. Schaefer: Management of Acute Laryngeal Trauma. Laryngoscope 124: January 2014 ; 233-244.
16. Luiz Alberto Alves Mota,1 Glauber Barbosa de Cavalho,2 and Valeska Almeida Brito . Laryngeal complications by OroTracheaIntubation : literature review. Int.arch.Otorhinolarygol 2012;16:2.