Neck Trauma: ENT Prospects

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Abstract Neck trauma is a very important surgical emergency faced by ENT surgeons in day to day practice. They are potentially life threatening conditions due to the presence of many vital structures in this area. Timely presentation to the referral centre and proper multidisciplinary approach towards management plays a pivotal role in the healing pattern of the wound and prevention of serious complication like shock, sepsis, laryngeal stenosis or fistula formation. A retrospective study was done in ENT Department, NSCB Medical College, Jabalpur, Madhya Pradesh, India during the period of 2014–2016. 17 patients were included in the study. All the records regarding symptoms at presentation, type and mode of injury, level of injury were analyzed. Management plan undertaken were thoroughly studied and post operative complications like hoarseness, stenosis or fistula formation were noted carefully. 14 out of 17 patients were male, all 17 patients belonged to lower socioeconomic status. Most common age group presenting with neck trauma was between 22 and 40 years. 7 case were homicidal, 5 cases were suicidal and 4 were of accidental injury. Most cases reached hospital within 2–6 h of injury except 3 cases which took more than 8 h. Bleeding from wound site was most common symptom at presentation. Most injuries in 13 out of 17 cases were at thyroid cartilage level. Penetrating neck trauma was most common followed by blunt neck trauma. Most cases required emergency tracheostomy along with primary laryngotracheal repair. Most common post operative complication seen was wound dehiscence, subglottic

stenosis and fistula formation. Neck trauma and cut throat injuries are potentially life threatening emergency that require multidisciplinary approach. Timely intervention can be crucial in preventing fatal complications and reducing morbidity period of the patient.

Keywords Cut throat · Penetrating neck trauma · Tracheostomy · Subglottic stenosis

Introduction

Laryngotracheal injuries are very rare but potentially life threatening injuries. They have great clinical interest because if not handled timely and properly, they may lead to acute sequelae like shock, sepsis, death or if patient survives then there is a risk of fistula formation or voice dysfunction.

The structures within the laryngotracheal region provide vital function in terms of ventilation, swallowing and voice. Because of the complex anatomy within this region, traumatic injuries can produce significant acute dysfunction, create a life-threatening condition. Meticulous assessment and accurate surgical management are essential to minimize the likelihood of perioperative complications and long-term morbidity of dysphagia and dysphonia [1].

Materials and Methods

A retrospective study was carried out with 17 patients with neck trauma who presented to emergency department in NSCB Medical College, Jabalpur, India during 2014–2016. Patients with isolated cervical spine trauma and those superficial to the platysma were not included in the study.

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The medical histories of all the patients were reviewed. The cause of trauma, symptoms at presentation and treatment undertaken were analyzed and post operative complications were reviewed.

Observations

41.1% patients presented in age group of 20–30 years and 35.3% patients presented in 31–40 years age group. Young adult age group thus appeared to have more neck trauma than elderly age group (Table 1).

14 out of 17 patients (82.3%) were male and only 3 (17.6%) were female indicating a male preponderance in neck trauma cases. 13 out of 17 (76.4%) patients were from rural areas while only 4 (23.5%) were from urban areas. All the patients belonged to lower socioeconomic status. 8 cases (47%) were brought by police and rest 9 (52.9%) were brought by patient's relatives. 9 (52.9%) patients had horizontal wound, 2 (11.7%) had oblique cut extending to either side of sternocleidomastoid muscle being partially damaged.

Most of the patients were able to reach tertiary referral centre within 8 h of injury. Only 3 patients presented late after 8 h (Table 2).

7 cases (41.1%) were homicidal. 5 were suicidal (29.4%) and 4 were accidental (23.5%). Males had an equal incidence in homicidal and suicidal cases, while two females had homicidal attacks both by their husbands (Table 3).

Most common symptom at presentation was bleeding from the wound site (76.4%) followed by loss of voice (64.7%) (Table 4).

Most injuries were found to be at thyroid cartilage level (76.4%), and only 2 cases had injury at cricoids cartilage level (5.8%) (Table 5, Fig. 1).

Most commonly penetrating neck trauma was seen (64.7%), followed by blunt neck trauma (17.6%) (Table 6). Only 2 cases had clothesline injury caused by a dupatta.

Most wounds had depth of 2–3 cm (Table 7) only 2 cases had depth of wound more than 4 cm that took more time in repair and healing.

Table 1 Age group distribution

Age group	Incidence of neck trauma
20–30 years	7 (41.1%)
31–40 years	6 (35.3%)
41–50 years	3 (17.6%)
>50 years	1 (5.8%)

Table 2 Time to reach tertiary referral centre

Time taken to reach tertiary centre*	
1–2 h	3 (17.6%)
2–4 h	4 (23.5%)
5–7 h	2 (11.7%)
>8 h	3 (17.6%)
Already repaired at primary centre	3 (17.6%)

* 2 patients were of old history of previous trauma (these are not included in this table)

Table 3 Mode of injury

Mode of injury	Total	Male	Female
Homicidal	7	5	2
Suicidal	5	5	–
Accidental	4	3	1
RTA	1	1	–

Table 4 Symptoms at presentation

Symptoms	Cases
Bleeding from site	13 (76.4%)
Aphonia	11 (64.7%)
Dysphonia	2 (11.7%)
Respiratory distress	8 (47%)
Unconsciousness	1 (past history)

Table 5 Levels of injury

Levels	
Thyroid cartilage	13 (76.4%)
Cricoid cartilage	2 (11.7%)
Cricothyroid level	1 (5.8%)
Cricotracheal	1 (5.8%)

Table 6 Type of injury

Type of injury	
Penetrating neck trauma	11 (64.7%)
Blunt neck trauma	3 (17.6%)
Gunshot	1 (5.8%)
Clothesline injury (thrasher)	2 (11.7%)

Fig. 1 Cut throat injury at upper border of thyroid cartilage level

Table 7 Depth of the injury

Depth	
1 cm	3
2–3 cm	7
4 cm or more	2

Fig. 2 Layer wise primary repair of the wound

Involvement of vessel was seen in only one case which had superior thyroid artery injury leading to massive blood loss. Rest all the 16 cases had all the major vessels intact. 5 out of 17 (29.4%) had reduced laryngeal crepitus. 10 out of 17 (58.8%) had subcutaneous emphysema. The emphysema was a major indicator of airway leak in cases with intact overlying skin with no apparent cut wound.

Depending on the nature and extent of injury, management plan was decided (Table 8). 58.8% patients had first tracheostomy done followed by primary laryngotracheal repair with vicryl 3-0 and prolene 2-0 suture (Fig. 2). 2 cases needed only tracheostomy to relieve the respiratory distress and then close observation was done. No surgical exploration was required. In 2 cases only repair of the wound was done, with orotracheal intubation. 2 cases who had presented with previous history of clothesline injury required serial dilatations with stenting.

3 cases (17.6%) underwent CECT Neck and were reported to have breach in thyroid lamina with residual framework to be intact.

The patient with superior thyroid had massive blood loss with hemoglobin level dropped to 5.8 gm/dl. He was transfused 4 units of blood. 5 patients were transfused 1 unit of blood each. Rest 11 patients were hemodynamically stable and didn't require any blood transfusion.

Post operative complications observed were wound dehiscence (23.5%), residual vocal cord palsy (41.1%), fistula formation (11.7%) and subglottic stenosis (11.7%) (Table 9, Fig. 3).

Discussion

13 patients (76.4%) were from rural areas and 4 were from urban areas (23.5%).

All the patients belonged to lower socioeconomic status. 4 patients were labourer and 2 were unemployed. 14 patients (82.3%) were male and 3 were females (17.6%). In a study by Aich et al. [2] majority of the patient's belonged to young age between 21 to 30 years.

Onotai et al. [3] found male preponderance in CTIs in their study and concluded that it may be due to their risk taking behavior, active participation and frequent involvement in interpersonal violence.

These all social factors play a major role in discontent leading to disputes and violence leading to neck trauma. 7 cases were homicidal injury, 5 were suicidal, 4 had accidental cause and 2 were due to clothesline injury. Also two females had homicidal cause owing to assault by their husbands and no female had any suicidal cause. Males had equal incidence in homicidal and suicidal causes. This was in contrast to study by Modi and Pandey [4] who observed that in India, suicidal wounds of the throat are rare.

Mohanty et al. [5] studied 588 suicide victims, financial burden (37%) and marital disharmony (35%) were the principal reasons for suicide attempts. Jayanth et al. [6] had assessed cut throat injuries in homicidal and suicidal cases. In our study, the causes of suicide were psychiatric illness,

Table 8 Line of management followed

Treatment followed	
Tracheostomy followed by close observation	2 (11.7%)
Wound exploration without tracheostomy	1 (5.8%)
laryngotracheal repair without tracheostomy	2 (11.7%)
Tracheostomy and primary laryngotracheal repair	10 (58.8%)
Stent placement	2 (11.7%)

Table 9 Post operative complications

Complications observed	
Wound dehiscence	4 (23.5%)
Residual vocal cord palsy	7 (41.1%)
Fistula formation	2 (11.7%)
Subglottic stenosis	2 (11.7%)

Fig. 3 Tracheoesophageal fistula formation

unemployment, and family troubles, which was in agreement with the above study.

2 out of 17 patients had major psychiatric illness of schizophrenia (third person hallucinations). These patients were treated by psychiatrist from the very start and proper counseling was done. Nock et al. [7] also suggested about psychiatric illness playing a major role in etiology of neck trauma injuries.

Most cases reported to the tertiary centre within 2–4 h. Beigh and Ahmad [8] also quoted that all patients should

be referred to the referral centre as early as possible. But 3 cases reported after 8 h and these 3 cases were observed to later have delayed healing of the wound with post operative complications namely wound dehiscence and fistula formation.

8 cases were brought in by the police, this included prisoner patient with gunshot injury. 9 cases were brought by the relatives.

Herzog et al. in their study divided the Injuries of the neck into three anatomic zones for the purpose of ease of assessment; (1) Zone I injuries occur at the zone extending from the level of the cricoid cartilage to the clavicles. (2) Zone II injuries are those occurring in the region between the cricoid cartilage and the angle of the mandible. Injuries in this zone are the easiest to expose and evaluate. (3) Zone III injuries occur between the angle of the mandible and the base of the skull [9]. In this study all the injuries were in zone II.

5 cases (29.4%) had reduced laryngeal crepitus. Remaining had normal laryngeal crepitus since they had partial and neat tear of part of thyroid lamina with rest of laryngeal framework intact.

4 out of 17 patients (23.5%) came with no apparent wound over skin, but with prominent neck subcutaneous emphysema, respiratory distress and recent history of trauma over neck. They were immediately tracheostomised, but no exploration was required at that time. Close observation was done followed by direct laryngoscopic examination to rule out any vocal cord injury or subglottic stenosis.

In 12 cases (70.5%) tracheostomy was done to secure the airway and general anaesthesia was given through the tracheostomy stoma during the surgical exploration and primary repair of the wound.

13 patients (76.4%) had presented in emergency department with heavy bleeding from the wound site and loss of voice. 4 patients were transfused blood with only one patient requiring 4 units of blood. This patient had unilateral superior thyroid artery injury which caused major blood loss. In this patient, wound exploration was done with ligation of the injured vessel. Laryngeal framework was intact.

None of the patients presented with loss of consciousness, suggesting that airway injury is not related with consciousness levels. Also the patients were able to breathe from the wound site.

76.4% of the injuries primarily were at the thyroid cartilage level. Thyroid cartilage was most commonly damaged with neat cut of the lamina, 2 cases had loss of cartilage in the lamina.

Only 2 out of 17 cases had cricoid cartilage level injury and they developed subglottic stenosis. Only one case had damage to vocal cords as seen in intraoperative

examination and were again observed in follow up period to rule out any granuloma formation or residual paresis [8].

Intraoperative examination was always carried out before starting primary repair. 10 patients (58.8%) had significant subcutaneous emphysema in the neck region. This was subsequently resolved with strapping. One patient had extensive subcutaneous emphysema extending till mediastinum. He had difficulty with subsequent decannulation due to subglottic stenosis.

Only one case had esophageal injury along with crico-tracheal injury. The incised wound created a circumferential defect over the anterior tracheal wall extending to esophageal junction at cricopharyngeal level with exposed prevertebral fascia. This patient presented with heavy bleeding and respiratory distress with SpO_2 dropping up to 55%. This patient was immediately tracheostomised through the wound site and primary repair was done for stabilization of the patient. Ventilator support was needed for 3 days. A secondary stage surgery was planned for the anterior tracheal wall defect. She had later developed tracheoesophageal fistula in post operative period after day 7 for which she was advised pharyngocoloplasty by the gastrosurgeon after 2 months of conservative management.

Nasogastric tube was placed in both the patients with fistula formation on discharge. In rest of the patients nasogastric tube was taken out once the decannulation was done successfully and patient was able to take oral feeds.

Two patients one male and one female need special mention. They had clothesline thruster injury in recent past. They had presented with intact skin and significant respiratory distress and subcutaneous emphysema. Emergency tracheostomy was done to secure the airway and monitoring was done. The female patient had a 1 month old history of injury and had presented with stridor and subcutaneous emphysema. She had subsequently developed supraglottic stenosis for which serial dilatations and stenting was done and had to be discharged with fullers tracheostomy tube. She got partial improvement with stenting.

The male patient had cricotracheal level injury with intact overlying skin and he couldn't be intubated due to significant neck emphysema. Tracheostomy was done to relieve the distress. In later period, he could not tolerate decannulation. He was referred to higher centre for secondary surgery.

In post operative period two patients developed fistula after day 7, which prolonged their hospital stay to more than 50 days. Otherwise rest of the patients had an average of 12–28 days of hospital stay. The fistula formation in one patient with clothesline injury at cricotracheal level was esophagocutaneous and in other patient with esophageal breach, it was tracheoesophageal fistula with stricture just above cricopharynx as evident by upper GI endoscopy.

7 patients (41.1%) had residual vocal cord palsy. They were advised speech therapy and had gained partial recovery till the time of records for the study.

4 patients (23.5%) had infection from the wound site leading to wound dehiscence. Proper debridement and dressing was done and ultimate healing was achieved. Prevention of these complications depends upon immediate resuscitation by securing the airway by tracheostomy or intubation, prompt control of external hemorrhage and blood replacement, protection of the head and neck, accurate and rapid diagnosis, and prompt intervention or operative treatment when indicated.

There was no mortality in all 17 patients, it can be attributed to timely presentation to the hospital and successful multidisciplinary approach of ENT surgeon, anesthesiologist and psychiatrist.

The only drawback faced during the study period was loss of patient to long term follow up once they were discharged from the hospital. This caused a major hindrance in assessment of voice recovery and long term sequelae.

Conclusion

Neck trauma with laryngeal framework injury are uncommon yet very crucial and important surgical emergency. Timely arrival at the tertiary referral centre is very important for the patient outcome and avoidance of future complications. Cut throat injury involves a multidisciplinary approach. All patients who have attempted suicide should undergo a psychiatric evaluation. Meticulous repair of bleeding vessels, esophagus, hypopharynx and laryngeal framework should be done in proper layers otherwise there is a chance of subglottic stenosis, fistula formation and wound dehiscence. If proper protocol is timely followed, then major complications can be avoided.

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Compliance with Ethical Standards

Conflict of interest The authors hereby disclose that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

Human and Animal Rights This article does not contain any studies with animals performed by any of the authors.

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