A CLINICORADIOLOGICAL STUDY OF NECK INJURIES AND THEIR MANAGEMENTAvinash Kumar¹, R. Sangma²**HOW TO CITE THIS ARTICLE:**

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ABSTRACT: AIMS AND OBJECTIVES: 1. To study the incidence of various neck injuries in patients attending ENT OPD/admitted in ENT ward. 2. To evaluate the distribution in age, sex, modes of presentation and nature of injury (suicidal, homicidal or accidental) 3. To categorize neck injuries according to zones of involvement. 4. To study cases of neck injuries where tracheostomy was needed/blood transfusion was required. **TYPE OF STUDY:** A prospective clinical study. **MATERIALS AND METHODS:** Patients admitted in ENT WARD/attending ENT OPD, GMCH, Guwahati with neck injuries are selected for the present study. A prospective study is conducted over the selected group for their age, sex, modes of presentation and their investigations. Patients requiring tracheostomy in neck injuries are also included. Study on various treatment modalities either conservative or surgical is done. **OBSERVATION AND RESULTS:** The neck injuries were more common in males and in most of the cases belonged to lower socioeconomic status. Homicidal intent was most common with edged weapon as the choice. Penetrating wound was seen to be most common type. Commonest mode of presentation was bleeding. The most common investigation done was blood grouping and hemoglobin. In maximum cases, repair of soft tissue was done. Morbidity with left vocal cord paresis in 1 case and facial palsy in 1 case were observed. Mortality in our study was 1.31%. **CONCLUSION:** The increase in incidence of neck injuries is due to urban violence, psychological stress or illness and accidents. Open neck injury was more common than close injury. While managing the cases we found that clinical examination is more important than any other investigation. Management of neck injuries requires multidisciplinary approach. Consultations were taken from the department of CTVS, Psychiatry, Neurology and other departments as per requirement.

KEYWORDS: Zones, neck injury, tracheostomy, hemorrhage.

INTRODUCTION: Few emergencies pose as great a challenge as neck trauma. Because a multitude of organ systems (eg, airway, vascular, neurological, gastrointestinal) are compressed into a compact conduit, a single penetrating wound is capable of considerable harm. Furthermore, seemingly innocuous wounds may not manifest clear signs or symptoms, and potentially lethal injuries could be easily overlooked or discounted.

Airway occlusion leading to respiratory distress and exsanguinating hemorrhage leading to hypovolemic shock and aspiration pose the most immediate risks to life. Awareness of the various presentations of neck injuries and the establishment of a well-conceived multidisciplinary plan prior to the traumatic event is critical for improving patient outcome.

The purpose of this study is to evaluate and analyze the age, sex and habitat distribution, modes of presentation, investigations and the various modalities of management and their results.

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ANATOMY: A mastery over surgical anatomy of the neck is required before embarking on any neck dissection, since vital structures are present in the neck regions.

BOUNDARIES OF NECK: The upper border of the neck is the floor of the mouth anteriorly and skull base posteriorly. The lower border is the upper border of the first rib anteriorly and body of first thoracic vertebra posteriorly.

It is difficult to readily compartmentalize anatomically all of the structures in the neck. To make this easier the neck has been classically divided into triangles.

Dividing the neck into anatomic zones or regions assists in the evaluation of injury. Serving as the line of demarcation, the sternocleidomastoid separates the neck into anterior and posterior triangles. Most of the important vascular and visceral organs lie within the anterior triangle bounded by the sternocleidomastoid posteriorly, the midline anteriorly and the mandible superiorly. Except for individual nerves to specific muscles, few vital structures cross the posterior triangle, which is delineated by the sternocleidomastoid, the trapezius, and the clavicle (with the exception of the region just superior to the clavicle).

The submental, submandibular, carotid and muscular triangles form the ANTERIOR TRIANGLE. The occipital and the subclavian triangles form the POSTERIOR TRIANGLE.

ROON and CHRISTENSEN'S classified neck into three principal anatomic zones.

Zone 1 – vascular (carotid, vertebral, and subclavian arteries; jugular and subclavian veins)

Zone 2 –digestive (pharynx and esophagus)

Zone 3 –respiratory (larynx and trachea).

All three zones contain major vascular and aerodigestive structures and their management is both diagnostically and surgically very challenging.

RESULTS AND OBSERVATIONS IN MY STUDY: The present study was done in the department of E. N. T for duration of year from 1st May' 11 – 30th April' 12. During this period 76 cases of neck injuries were admitted in the department/attended ENT OPD. The results and observations are made according to the following tables & charts.

AGE DISTRIBUTION	NO. OF CASES	PERCENTAGE
1 -10 YRS	0	0
11 – 20 YRS	11	14.47%
21 -30 YRS	37	48.68%
31 – 40 YRS	14	18.42%
41 – 50 YRS	7	9.2%
51 – 60 YRS	5	6.5%
61 – 70 YRS	2	2.63%

The present study shows commonest age group up to the third decade followed by fourth decade. The youngest victim 11 years of age and the oldest was 70 years of age.

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SEX DISTRIBUTION:

SEX	NO. OF CASES	PERCENTAGE
MALE	52	68.42%
FEMALE	24	31.57%

The injuries were more common in males in 52 (68.42%) cases.

INTENT:

INTENT	NO. OF CASES	PERCENTAGE
HOMICIDAL	27	35.52%
ACCIDENTAL	26	34.21%
SUICIDAL	23	30.26%

Homicidal injuries were most common in 27 (35.52%) cases. The accidental injuries were either road or household. Household injuries were common in children. Suicidal intent was found in 23 cases.

TYPE OF WOUND:

TYPE OF WOUND	NO. OF CASES	PERCENTAGE
INCISED	14	18.42%
PENETRATING	28	36.84%%
LACERATED	12	15.78%
LIGATURE MARK	9	11.84%
CLOSED WOUND	10	13.15%
BURNS	3	3.94%

The penetrating wounds were most common in 36.84% cases.

ZONES: Out of 28 penetrating neck injury cases,

ANATOMICAL ZONES	NO. OF CASES	PERCENTAGE
ZONE 1 (vascular)	10	35.71%
ZONE 2 (digestive)	10	35.71%
ZONE 3 (respiratory)	8	28.57%

MODE OF PRESENTATION:

CLINICAL PRESENTATION:

MODE OF PRESENTATION	NO. OF CASES	PERCENTAGE
BLEEDING	55	72.36%
NECK SWELLING	28	36.84%
DYSPHONIA	25	32.89%
RESPIRATORY DISTRESS	18	23.68%
DYSPHAGIA/ODYNOPHAGIA	12	15.78%%
EXPOSED/INJURY CARTILAGE	21	27.63%%

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OPEN PHARYNX	14	18.42%%
EXPOSED /INJURED BONE	12	15.78%%
STRIDOR	18	23.68%%
MENTAL IMBALANCE	23	30.26%%
EXPOSED NERVE	1	1.31%

The commonest presentation was bleeding (55 cases), followed by neck swelling (28 cases). In exposed nerves, only 1 patient presented with facial nerve paralysis.

RADIOLOGICAL PRESENTATION:

MODE OF PRESENTATION	NO. OF CASES	PERCENTAGE
SURGICAL EMPHYSEMA	21	27.63%
REDUCTION OF NORMAL LORDOSIS	12	15.78%
INTRAMUSCULAR FOREIGN BODY	6	7.89%
PRETRACHEAL SOFT TISSUE SWELLING	4	5.26%
SUBGLOTTIC STENOSIS	2	2.63%
COLLAPSE OF C5 VERTEBRA	2	2.63%
RETROPHARYNGEAL ABSCESS FOLLOWING INJURY	1	1.31%
NORMAL FINDING	28	36.84%

INVESTIGATIONS:

TYPE OF INVESTIGATION	NO. OF CASES	PERCENTAGE
BLOOD GROUP & HAEMOGLOBIN	65	85.52%
SOFT TISSUE NECK	61	80.26%
PA VIEW CHEST	18	23.68%
CT SCAN NECK	32	42.10%
USG NECK	3	3.94%
CT BRAIN	31	40.78%
CT SCAN THORAX	4	5.26%
ENDOSCOPY/FLEXIBLE LARYNGOSCOPY	24	31.57%
BARIUM SWALLOW X- RAY	10	13.15%

In the present study among the laboratory investigations, determination of blood grouping & hemoglobin percentage were important especially in open injury cases for proper management. Soft tissue neck was the second most common investigation done in 61 cases.

MODE OF TREATMENT:

MODE OF TREATMENT	NO. OF CASES	PERCENTAGE
CONSERVATIVE	20	26.31%
INTUBATION/TRACHEOSTOMY	18	23.68%
LIGATION OF VESSELS	50	65.78%

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LARYNGOTRACHEAL REPAIR	16	21.05%
REPAIR OF PHARYNX	14	18.42%
REPAIR OF SOFT TISSUE	54	71.05%
SPLINTER/FOREIGN BODY BULLET REMOVAL	6	7.89%
PSYCHIATRY CONSULTATION	23	30.26%
BLOOD TRANSFUSION	16	21.05%

Cases explored under GA were lacerated neck injury with bleeding and aero digestive tract violation in 2 cases, 1 penetrating injury neck with hematoma (reexploration) was done, 6 cases of foreign body removal, another 1 with bleeding and exposed bone. Airway was managed by tracheostomy in 18 cases of open neck injury. In maximum cases soft repair was done (71.05%), followed by ligation of vessels (65.78%). Drainage was provided by negative suction drain or corrugated rubber drain in some cases. In patients presenting with mental imbalance, psychiatric consultation was taken.

COMPLICATIONS:

TYPE OF COMPLICATION	NO.OFCASES	PERCENTAGE
INFECTION	2	2.63%
RETROPHARYNGEAL ABSCESS	1	1.31%
TRACHEAL STENOSIS	2	2.63%

In the present study we have encountered a few complications also. All the complications were treated conservatively.

MORBIDITY:

TYPE OF MORBIDITY	NO. OF CASES	PERCENTAGE
FACIAL NERVE DAMAGE	1	1.31%
LEFT VOCAL CORD PARESIS	1	1.31%

We had residual deformity in 2 cases.

FOLLOW UP: Our cases were followed up after 2 weeks and 1 month of discharge from hospital.

MORTALITY:

CAUSE	NO. OF CASES	PERCENTAGE
HANGING	1	1.31%

Mortality in our study was 1.31%

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HOMICIDAL CUT NECK (BEFORE) HOMICIDAL CUT NECK (AFTER)

FOREIGN BODY (BULLET) IN NECK

CASE OF BURN INJURY NECK CASE OF HANGING (ligature marks)

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SUICIDAL CUT NECK (BEFORE)

AFTER [HESITATION MARKS SEEN]

DISCUSSION: The present study of 76 cases of neck injuries are discussed in light of the similar available literature. The study is compared with relevant literature to find out the differences or similarities of evaluated results; although we did not get exactly similar study in the review of literature. The discussion is done according to the sequence of results & observations.

In our study commonest age group was 21-30 years (37 cases) followed by 31-40 years (14 cases).

Edwards WH Jr (1987) reviewed 20 patients for 12 years for airway injuries and found average age as 29.6 years, Bhattacharjee Net al (1997) in their study of cut throat injury found that commonest presentation was in third decade (11 cases) which coincides with our study. Borah SR et al (2004), who did a prospective study of open neck injury and the retrospective study of strangulation deaths done by Verma SK et al (2006) also found commonest incidence to be in third decade.

In our study the most common intent was homicidal i.e. in 27 cases (35.52%) followed by accidental in 26 cases (34.21%) & suicidal in 23 cases (30.26%). Bhattacharjee et al (1997) found equal number of cases (11) in suicidal and homicidal category and 4 cases of accidental intent. Walsh MS (1994) et al reported 43 % cases were due to motor vehicle accident, homicidal in 57%cases. Borah S R et.al (2004) also found maximum cases with homicidal intent that is 46.15%, followed by suicidal in 30.77%, accidental in 23%.

In the present study penetrating wound was most common in 28 cases (29.54%) followed by incised wounds in 14 cases (18.42%).

Kelly JP et al (1987) also found penetrating trauma as the most common type of wound in 87.4% cases. Penetrating trauma was also found as the most common wound in the studies done by Edwards wh et al (1987), Cicala rs et al (1991), Vassiliu P et al (2001).

In the present study the most common presentation was bleeding in 55 cases (72.36%) followed by neck swelling in 28 cases (36.84%).

Colombo F et al (2003) while reviewing 16 penetrating lesions found that in 56% cases vascular structures were involved. Borah SR et al (2004) also reported bleeding as the commonest mode of presentation in 73.08% cases.

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We found a total of 21 cases of surgical emphysema of neck. Edwards WH Jr. (1987) et al reported surgical emphysema in 11 cases out of 20 cases. Reece GP et al (1988) reported surgical emphysema in 84% cases.

In study of penetrating trauma of neck Nason RW et al (2001) found Zone 2 involvement was the commonest in 81% cases. Earlier Obeid et al (1985) also found Zone 2 to be most frequently involved in 60%-70% cases. In our study also penetrating injury was most common in Zone 2; among 28 cases of penetrating injury 5 cases (38.46%) found in Zone 2, 4 cases (30.76%) in zone I, 3 cases (23.07%) in Zone 3, 1 case (7.69%) in both Zone II&I.

In our study, mode of treatment was conservative in 20 cases (26.31%), tracheostomy in 18 cases (23.68%), ligation of vessels in 50 cases (65.78%).

There is a lot of controversy regarding management of neck injuries, especially open neck injuries. Some authors advocate for mandatory exploration and some for selective exploration. Sriussadaporn et al (2001) said that mandatory exploration should be done in cases presenting with airway obstruction and unstable hemodynamics.

Lambert Jr. et al (1976) in their review of trauma to larynx and trachea, control of airway was achieved by emergency tracheostomy or intubation followed by tracheostomy, after that prompt operation and primary repair was done.

Cicala et al (1991) in their study of management of upper airway injuries stated that elective intubation should be attempted only with a surgical team present and prepared for emergency tracheostomy. We have also followed the same protocol; in our study tracheostomy done in 18 cases (23.68%) of open injury neck. Edwards JH et al (1987) did intubation/tracheostomy in 12 cases out of 20 cases of airway injuries. Bhattacharjee N et al (1997) also did tracheostomy in 15 cases (57.69%). Goudy SL et al (2002) did tracheostomy in 83% of the explored patients. Borah SR et al (2004) did tracheostomy in 8 cases (30.77%).

Goudy et al (2002) in their study of upper aero digestive tract injury did immediate surgical exploration in 55%, rest managed without surgery. Their findings showed that suspected upper aero digestive tract injury can be managed without surgery but a high index of suspicion for airway compromise and associated facial injuries must be considered. Only pharyngeal repair was done in 14 cases (18.42%). Laryngotracheal framework repaired in 16 cases (21.05%).

Borah SR et al (2004) performed laryngeal framework repair in 10 cases (38.46%). Stanley RB Jr (1997) while reviewing injuries to hypopharynx and cervical part of oesophagus found that injuries located in the upper portion of the hypopharynx can be routinely managed without surgical intervention; but injuries in lower part of hypopharynx and cervical oesophagus need exploration with drainage of deep neck spaces. In our study all open pharynx cases had injury to hypopharynx in the lower part. All were repaired surgically with Ryle's tube in situ.

In our study repair of soft tissue was done in 54 cases (71.05%). Borah SR et al (2004) has done soft tissue repair in 100% cases in their study of open neck injury. Though in our study there were 19 blunt trauma cases, none of them severe enough for surgical treatment. All recovered with conservative treatment. In addition in our study psychiatric consultation was taken in 23 cases, all were suicidal cases either with open or blunt injury.

Morbidity in our study was observed in 2 cases (2.62%). The patient who presented with the penetrating neck injury developed left vocal cord paresis postoperatively. Another case who had injury back & side of the neck (left) above the angle of mandible developed lower motor neuron facial

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palsy after operation. Borah SR et al (2004) also reported morbidity due to facial palsy and loss of voice in 2 cases (7.70%).

In our study there was no mortality due to laryngotracheal injury. Aufderheide TP et al (1994) while reviewing hanging victims stated that cerebral hypoxia rather than spinal cord injury is the probable cause of death and should be the primary concern in treatment. In the present study the hanging victim probably died of cerebral hypoxia as there was no sign of spinal cord injury.

CONCLUSION: The present study was done in lieu of increasing number of neck injury cases attending emergency department in recent years. The increase in incidence of neck injuries is due to urban violence, psychological stress or illness and accidents. The commonest victims were due to homicidal injuries, in third decade, belonging to lower socioeconomic status. Open neck injury was more common than close injury.

While managing the cases we found that clinical examination is more important than any other investigation. The investigations should be done according to the presenting symptoms and their need. If the symptoms are life threatening than after restoration of airway, breathing & circulation primary repair should be the aim. We have done exploration in all the open injury cases mostly under local anesthesia. During simple repair also we have tried to localize all the injuries of the vital structures.

In few cases injuries have been missed which resulted in complications, hence we stress that surgeons should be vigilant, for early recovery and uneventful post-operative period by proper assessment and repair of the wound. The blunt injuries encountered, were not severe enough to require surgical treatment.

We have also learnt in our study that management of neck injuries requires multidisciplinary approach. Consultations were taken from the department of CTVS, psychiatry, neurology and other departments as per requirement.

These kinds of studies should be done to devise a proper protocol for management of neck injuries, as it is evident in review of literature that there are no set protocols for management. However, to come to a definite conclusion a longer study is required; an observation of one year is not enough for the same.

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