

ABSTRACT

Background: Penetrating neck injuries are common problem in our country due to increasing violence, terrorist bombing and military operations.

These injuries are potentially life threatening and need great attention and proper management.

Objective: The aim of this study is to focus on the importance of anatomical zonal classification of the neck in the management of penetrating injuries of the visceral compartment of the Neck.

Methods :70 patients with various injuries who were managed at causality unit and Otolaryngology department in Al-Kindy Teaching Hospital during aperiod from January 1st 2015 to October 31st 2015.

The study carried on those patient depending on proper clinical examination and their urgent management.

Results : Both civilian and military patients were admitted to the hospital, 34 patients (47.2%) in their 20s age group, while only 2 (2.8%) in 60s.

High percentage of penetrating neck injuries in zone II, 48 patient (68.6%) and lowest in zone I, 6 patients (8.5%).

40 patients (57.1%) presented with tracheal and laryngeal injuries and 12 patients (17.5%) were with pharyngeal injuries, 4 patients (5.7) were with recurrent laryngeal nerve injury and 13 patients (18.5%) presented with vascular injuries.

Radiological examination done for 53 patients (75%) and we found foreign bodies in 30 patients (56.6%), tracheal deviation in 4 patients (7.5%) and emphysema in 19 patients (35.8%).

Tracheostomy done in 51 patients (72.8%) neck, exploration in 20 patients (28.5%) and a 9 patients (12.8%) treated conservatively.

Conclusion: Zonal classification of penetrating neck injuries was helpful in the management. Our study explains demographics and location of the injuries. Young men involved in violence and bombing was at high risk.

Zone II with involvement of trachea, larynx and pharynx were most common areas of injuries.

Recommendations

Anatomical zone classification should be used as a guideline in management of penetrating neck injuries. (Trauma lifesaving guideline).Tracheostomy should be practiced by every doctor in casualty unit. Team of surgeons and anaesthiologist should be always ready for any intervention with patient present to the casualty unite with a penetrating neck injury. Emergency medicine medical practice must be presents in every casualty unit to deal with insults.

Aim of the study

- 1.To recognize penetrating injuries of the neck according to the anatomic neck zones.
- 2.Identify the outcome of their treatment.

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INTRODUCTION

As the incidence of violent trauma rises due to sectorial violence and terrorist bombing in our society, the penetrating neck injuries also rise. Penetrating neck wounds are potentially dangerous and require urgent treatment.

In the neck multiple vital structures are vulnerable to injury in a small anatomic area and are not protected by bone⁽¹⁾.

A successful management of penetrating neck injuries depend on a clear understanding of the anatomy of the neck⁽²⁾.

- Surgical anatomy of the neck:-

There are 6 systems with important organs in the neck⁽³⁾:-

1.The vascular system: - includes the innominate, subclavian, axillary, carotid, jugular and vertebral vessels.

2.The respiratory system: - includes the larynx and trachea.

3.The diigestive system: - includes the pharynx and esophagus.

4.The nurological system: - includes spinal cord, brachial plexus, cranial nerves and sympathetic trunk.

5.The endocrine system:- includes the thyroid and parathyroids.

6.The skeletal system:- includes the cervical spines.

The most common classification of neck anatomy in term of penetrating trauma is to divide the neck in to 3 anatomic zones, anterior to the sternomastoid muscles⁽⁴⁾.

Zone I :- Is from the level of clavicles and sternal notch to the cricoid cartilage. The structures contained in this zone include proximal carotid arteries, subclavian vessels, major vessels in the chest, lungs, esophagus, trachea and thoracic duct

Zone II : - Extend from the level of the cricoid cartilage to angles of the mandible; included in this zone the carotid arteries, jugular veins, larynx and hypopharynx.

Zone III : - Extend from angles of mandibles to the base of the skull; included here are the distal carotid arteries, jugular veins and hypopharynx. The zone II in comparison to zone I and III has the easiest surgical exposure and therefore the easiest to evaluate intraoperatively without the aid of preoperative diagnostic testing⁽⁵⁾.

METHODS

This study had done on 70 patients seen at casualty unit and otolaryngology department in Al-Kindy Teaching Hospital from January 1st 2015 to October 31st 2015.

Those patients were subjected to full clinical examination of neck circulatory, respiratory and nervous system. 53 of patients have radiological examination of the neck. 4 patients underwent endoscopic (fiber-optic) examination of the larynx used to assess the vocal cords condition.

RESULTS

All patients were admitted to the hospital either to the casualty unite or otolaryngology department.

Total number of patient 70 distributed according to age as shown in table (1) and we found that in 20s age group (34) of patients (47.2%) which is high, while low percentage in 60s (2) patients (2.8%) and in teens (4) patients (5.5%).

Distribution according to the anatomical zones, table (2):-

Zone I, 6 patients (8.5%).

Zone II, 48 patients (68.6%).

Zone III, 16 patients (22.9%).

40 of patients (57.1%) present with tracheal and laryngeal injuries, 12 patients (17.2%) presented with pharyngeal injuries including esophageal injuries.

4 patients (5.7%) have recurrent laryngeal nerve injury presented with hoarseness of voice and supported by fiber-optic endoscopic examination table (3).

53 patients have radiological (75.7%) examination and foreign bodies were found in 30 patients (56.61), tracheal deviation in 4 patients (7.5%) and emphysema in 19 patients (35.8%) table (4).

Tracheostomy done in 51 patients (72.8%), neck explorations in 20 patients (28.5%) and 9 patients (12.8%) treaded conservatively table (5).

Table (1), Number of patients by age

Age	No.	%
Teens	4	5.5
20s	34	47.2
30s	11	15.2
40s	14	19.4
50s	7	9.7
60s	2	2.8

Table (2), sites of injuries according to zones

Zones	No.	%
<i>I</i>	6	8.5
<i>II</i>	48	68.6
<i>III</i>	16	22.9

Table (3), visceral structures injury

Organ	No.	%
Trachea	31	44.3
Pharynx	12	17.2
Larynx	9	12.8
R L N	4	5.7
Vascular	1	18.5
Vertebra	3	1.4
	1	

Table (4), X-Ray findings

X-Ray	No.	%
Foreign body	30	56.6
Tracheal deviation	4	7.5
Emphysema	19	35.8

Table (5), Neck management

Procedure	No.	%
Tracheostomy	51	72.8
Exploration	20	28.5
Observation	9	12.8

DISCUSSION

Penetrating neck injuries are potentially life threatening and warrant prompt evaluation and treatment⁽⁶⁾, patient involved in this study has serious injuries and some of them developed complications.

Patient demographics were consistent with general trauma patients in that most were young men (civilian and militaries).

The average age of the patients was (34.3%) years and it is consistent to that found by Jeffery's⁽⁶⁾ (36.4%) and Agnood⁽⁷⁾ (29.6%).

Our mortality rate is (15.2 %) which is higher than other studies; while (13%) in Jeffery⁽⁶⁾, other studies varies from (0 %-20 %) Vogelman M J et al⁽⁸⁾; (Minard, Kudsek K A)⁽⁹⁾.

This high mortality rate reflects the serious nature of the bombs and other materials that is used with it to made more injuries at time of explosions (nails, metal and glass shells, small iron balls and others) and also because of using more explosive materials such as (C4) for example and because of poor logistic facilities and difficulties in transferring patients to the hospitals.

The common zone II location of penetrating neck wounds (68.6 %) which is near to other studies, 68 % in Jeffery⁽⁶⁾, 71 % in Shearers⁽¹⁰⁾, 50 % in Apiffelstadt J P, Muller⁽¹¹⁾ it varies from (60 – 70%) in Obied⁽¹²⁾.

Our study shows tracheal injuries were (44.3 %) and laryngeal injuries (12.8 %), in Mc Connel D B⁽¹³⁾ showed (10 %) tracheal and laryngeal injuries, while in Jeffery⁽⁶⁾ (69 %). Pharyngeal injuries in our's were (17.2 %) and in Fogelman M J⁽⁸⁾ (12 %) and in Jeffery⁽⁶⁾ was (38 %).

Recurrent laryngeal nerve injuries were (5.7 %), in Jeffery⁽⁶⁾ (13 %). Vascular injuries in our study was (18.5 %) and in Jeffery⁽⁶⁾ was (17.5 %) and in Mc Connel D B⁽¹³⁾ (23.7 %). Neck exploration done in (28 %) of patients, Jeffery⁽⁶⁾ (81 %), others range (37–100 %)

Shelly⁽¹⁴⁾, Apiffelstadt J P⁽¹¹⁾, Mc Connel⁽¹³⁾, Roon A J, Christensan⁽¹⁵⁾. The difference in the rate which might occurred between our study and others in different data's might be due to different factors like, nature of the bombs and weapons, number of patients that reach casualty units at the same time which make it difficult to select patients with clinical evidence of vascular and visceral injuries especially in the presence of unwell-trained staff in the casualty units which have to deal with these massive injuries in professional way.

In other hand most of our patients were civilian (students, workers, employee and others) who are not protected by military equipment's like (bullet-proof vests, solders helmet, and other protective equipments).

Conclusions

Our study focusing on: -

1. The importance of zonal classification of penetrating neck injuries and it support previous reports and literatures regarding age distribution.
2. Zone II of the anterior neck with involvement of trachea, larynx and pharynx is the most common area of injury.
3. Patients with vascular injuries show high mortality.
4. Multiple sites of injuries in the upper chest greatly increase the risk of mortality.
5. Most of patients receive appropriate priority of care, airway, breathing and circulatory problems must be resolved before neck exploration and other associated injuries management.

Recommendations

1. Anatomical zone classification should be used as a guideline in management of penetrating neck injuries. (Trauma lifesaving guideline).

2.Tracheostomy should be practiced by every doctor in casualty unit.

3.Team of vascular, general, otolaryngology surgeons and anesthesiologist should be always ready for any intervention with patient present to the casualty unit with a penetrating neck injury.

4.Emergency medicine as subspecialty must be delivered as an important branch in the medical practice and must be present in every casualty unit to deal with such insults.

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