### **Original Research Article**

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# Neck trauma: a profile of experience from otorhinolaryngology unit of a referral hospital in North West Nigeria

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#### **ABSTRACT**

**Background:** Neck trauma is a potentially life threatening clinical condition often presenting as a challenging surgical emergency to otolaryngologist due to high concentration of vital structures in the neck that are at risk. We aimed to study the clinical profile and management challenges of neck trauma in our environment.

**Methods:** This is a retrospective study in which case records of patients diagnosed with neck trauma over 6 years (January 2013 to December 2018) were reviewed. Data extracted included the demography, etiology, presenting symptoms, nature of trauma, surgical intervention and their complications.

**Results:** A total of 28 cases of neck trauma 15 (53.6%) males and 13 (46.4%) females with an M: F ratio of 1.2:1 was analyzed. Age range 8 years to 60 years with a mean age of 30.2 years. The highest incidence was 39.3% in patients within the age group 21-30years. Hoarseness and difficulty in breathing were the commonest presenting symptoms. The commonest etiology of neck trauma in this study is accidental 17 (60.7%) followed by homicidal 6 (21.4%) with zone II site of the neck being the commonest site of injury. Most cases presented to the hospital 2-8 hours of trauma except 5 patients that took more than 24 hours. Nineteen of the patient had emergency tracheostomy and Neck exploration. Most common complication was supraglottic stenosis 12 (42.8%). No mortality recorded in this study.

**Conclusions:** Neck trauma is a potentially life threatening surgical emergency requiring timely multi-disciplinary management thereby reducing complications and postoperative morbidity.

Keywords: Neck trauma, Hoarseness, Accidental, Tracheostomy, Emergency

#### INTRODUCTION

The neck is a region of the body that houses many vital organs packed in a small space relatively unprotected. Elements of the aero digestive tract, vascular system, and major nerves traverse the neck as they move from the head, to the remaining parts of the body and vice visa. <sup>1,2</sup> Though the neck constitutes a small percentage of the

human body, neck injuries accounts for a far greater percentage of cases of trauma, which comes with a significant degree of morbidity and mortality. 1,3 Neck trauma could be blunt or penetrating. Penetrating neck trauma (PNT) accounts for the majority of cases. In civilian practice, stab wounds, followed by firearm injuries are the commonest causes. 3-5 Others sustain it from road traffic accidents, deliberate self-harm,

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clothesline injuries, and other low velocity projectiles. In military practice and during wartime, high velocity projectiles from firearms are the most common cause. <sup>6-9</sup>

Roon and Christensen divided the neck into three zones. Zone 1 covers the area between the clavicles and the cricoid cartilage; zone 2 between the cricoid cartilage and the angle of the mandible, while zone 3 is from the angle of the mandible to the skull base. 1,10 This classification aids clinicians to make decisions on patient management. Zone 2 contains the common carotids, internal carotids, external carotids arteries, internal jugular vein, larynx, cervical trachea, pharynx, esophagus, and nerves.<sup>1</sup> Injuries to this zone are the commonest. This is because of the ease of access to this site by projectiles and other objects that can inflict trauma to the neck. It is however, the zone with the best prognosis. Zone 1 contains major blood vessels and distal parts of the aero digestive tracts. Injuries to these are almost always life threatening. Access to this zone is also difficult, patients often requiring a sternotomy or thoracotomy for access. Zone 3 injuries are also not so easy to access. 6,7,11,12

The management of patients with neck trauma has been debated for many years, and no consensus on when to surgically intervene. The various trends in management have evolved from our experience during war. 1,8,12-16 The practice during the First World War was that of conservative management for most patients and surgery for a few. However, high mortality among patients was reported with this practice. The practice of mandatory exploration for neck trauma during World War 2 saw a significant reduction in mortality. This was however associated with a high incidence of negative neck explorations. With the advent of cutting edge technology for medical diagnosis, the trend is changing more conservative towards a approach hemodynamically stable patients. 1,12,16

Traditionally patients with zone 2 injuries undergo mandatory neck explorations, while those with zone 1 and 3 injuries undergo investigations before surgery. Hemodynamically unstable patients however undergo surgery irrespective of zone. In an era where radiodiagnostic capabilities were low, this appeared to be the best decision at that time. The trend has now shifted to selective conservative management. Patients with zone 2 injuries that are hemodynamically stable and do not have hard signs (shock, pulsatile bleeding or expanding hematoma, audible bruit or palpable thrill, airway compromise, wound bubbling, subcutaneous emphysema, stridor, hoarseness, difficulty or painful swallowing, neurological deficits) are evaluated with diagnostic imaging studies. Multidetector helical computed tomography with angiography (MDCT-A) revolutionized the management of patients with neck trauma. 6,7,13-15 Initially used to evaluate vascular trauma, MDCT-A has proven itself useful for evaluating aerodigestive and other forms of trauma in these patients. Access to such cutting edge radio-diagnostic facilities in

resource constraint settings drives surgeons in those areas to adopt less conservative methods of treatment, and rather opts to explore the necks of patients, even when they appear to be hemodynamically stable with no hard signs.

Vascular injuries are common in neck trauma, they account for 50% of mortalities. Extravasation from an injured blood vessel is life threatening if not promptly managed. This has led to a change in the traditional protocol of resuscitation, placing emphasis on circulation even before airway in those having life-threatening hemorrhage. <sup>17,18</sup> Anterior jugular vein injuries are the most common observed. Unilateral jugular vein and external carotid injuries can be ligated without significant consequences. Common carotid and internal carotid injuries are however best repaired in patients without neurological deficits. <sup>12-15</sup>

Laryngeal and tracheal injuries are more common than pharyngeal and esophageal injuries. Airway injuries may range from minor mucosal tears to distortions in the skeletal framework and airway obstruction. Endoscopic examination of the airway is necessary as part of the initial evaluation. The immediate priority in this case is to secure an airway. Where the skeletal framework of the airway is stable, endotracheal intubation may suffice. Where injury to the airway is significant, with distortions in the skeletal framework, or when there are associated facial injuries, a surgical airway in form of a tracheostomy is preferred. 2,6,11,13 Tracheal injuries, which are mostly linear cuts on the trachea, can be treated by primary repair. Minimal hematomas and mucosal tears of the larynx may require observation with humidified air and steroids, while progressively severe injuries with massive edema, exposed cartilage, vocal cord immobility may require extensive repair and stenting.<sup>5,15</sup> Esophageal injuries though rare need a high index of suspicion in asymptomatic patients to prevent life threatening mediastinitis. 6,12,19 In sub-Saharan African countries, the prevalence of Neck injuries is difficult to estimate due largely to paucity of trauma registries. There are few studies carried out on neck injuries in our country most of which are mainly case reports.<sup>13</sup> We present the clinical profile, and management challenges of patients with neck trauma seen in a tertiary hospital in a resource constrained setting.

#### **METHODS**

A retrospective study conducted in the Otorhinolaryngology (ENT) department of Usmanu Danfodiyo University Teaching Hospital Sokoto over six years (January 2013 to December 2018). All 28 patients diagnosed with neck trauma were included in the study. These patients' clinical records were retrieved from the health record department and data extracted included the demography, etiology, presenting symptoms, nature of trauma, surgical intervention and their complications. Data analysis was done using SPSS version 20.

#### **RESULTS**

#### **Demographics**

A total of 28 patients presented to the ENT department of the hospital during the period under review. Thirteen (46.4%) were females, while 15 (53.6%) were males, with a male: female ratio of 1.2:1. The mean age was 30.2 years, with ages ranging from 8-60 years (Table 1).

Table 1: Age group of patients.

S. no	Age group (years)	Males	Females	Total (%)
1	0 - 10	-	2	2 (7.2)
2	11 - 20	1	3	4 (14.2)
3	21 - 30	8	3	11 (39.3)
4	31 - 40	2	4	6 (21.4)
5	41 - 50	3	-	3 (10.7)
6	51 - 60	1	1	2 (7.2)

#### Etiology/mechanism of trauma

Penetrating injury accounted for 17 (60.7%) cases, while blunt trauma accounted for 11 (39.3%). Majority of the patient sustained neck trauma from road traffic accident (Table 2).

Table 2: Mechanism of trauma/etiology.

S. no	Mechanism of trauma/ etiology	Number of patients (%)
1	Road traffic accident	9 (32.1)
2	Clothesline	8 (28.6)
3	Assault (stab injury with knife)	6 (21.4)
4	Suicidal attempt	1 (3.6)
5	Gunshot	1 (3.6)
6	Carmel bite	3 (10.7)

#### Clinical features

Zone 2 injuries accounted for 25 (89.3%) cases, zone 3 accounted for 2 (7.1%), while zone 1 accounted for 1 (3.6%) cases. Patients presented with varying degrees of hoarseness, difficulty in breathing, dysphagia, subcutaneous emphysema, hemoptysis, neck swelling, bleeding, and dysphonia.

#### Treatment

All patients had initial evaluation with endoscopy. Nineteen patients had neck exploration and emergency tracheostomy, out of which 13 (46.4%) had repair at exploration. Nine (32.1%) were managed conservatively (Table 3).

#### Duration of hospital stay

Majority of patients stayed for 0-1 months in the hospital (Table 4).

**Table 3: Treatment offered to patients.** 

S. no	Treatment	Number of patients (%)
1	Endoscopy	28 (100)
2	Selective neck explorations	19 (67.9)
3	Emergency tracheostomy	19 (67.9)
4	Positive neck exploration and repair	13 (46.4)
5	Direct laryngoscopy + Stenting	10 (35.7)
6	Microlaryngoscopy + repair	2 (7.2)
7	Conservative management	9 (32.1)

Table 4: Duration of hospital stay.

S. no	Duration of hospital stay (Months)	Number of patients (%)
1	0 - 1	13 (46.4)
2	2 - 3	7 (25.0)
3	4 - 5	8 (28.6)

#### **Complications**

Twelve (42.9%) patients had supraglottic stenosis (Table 5).

**Table 5: Complications observed among patients.** 

S. no	Complications	Number of patients (%)
1	Supra-glottic stenosis	12 (42.9)
2	Wound dehiscence/Infections	4 (21.4)
3	Tracheo-esophageal fistula	4 (21.4)
4	Pharyngo-cutaneous fistula	2 (7.1)
5	Hypokalemia	1 (3.6)
6	Aspiration pneumonia	1 (3.6)



Figure 1: A 19 years old female with cutthroat injury from assault.



Figure 2: An 8 year old boy with cut throat injury from road traffic accident and partially exposed tracheal cartilage ring (arrow).



Figure 3: Healed cut throat wound (superior arrow) and successfully decanulated (inferior arrow).

#### **DISCUSSION**

The mean age of 30.2 years observed in this study is not too different from what has been reported in other studies. 4,5,20,21 We observed a male preponderance of 53.6% in this study. Sethi et al in an epidemiological survey of 5 million head and neck injuries observed a similar male preponderance of 56.8%. Other authors, though having male preponderance, reported wider margins between males and females in both military and civilian injuries. 3,8,9,20

The commonest cause of injury observed in this study was road traffic accidents, followed by Clothesline

injury, then stab wounds. All patients with clothesline injuries were females. The typically history is that of a female patient wearing a veil, which got caught up in the spokes of a grinding machine, strangulating the patient. This may have also attributed to the relatively higher percentage of females in this study. In a retrospective review of 25 cases over 18 months by Siau and colleagues, deliberate self-harm was the most common etiology, followed by stab wounds.<sup>20</sup> Many authors however report stab wounds and gunshot injuries as the two most common causes of neck trauma in civilian practice.3-5,16 Mahmoodie and colleagues did a retrospective review of 192 patients that presented with neck trauma in Alzahra hospital, Iran over 10 years, and observed that stab wounds accounted for 85.93% of all injuries.<sup>3</sup> Another retrospective study in an American College of Surgeons certified level I trauma center, observed that 97 (43%) of patients had neck injuries from gunshot injuries, while 89 (40%) of their patients sustained neck injuries from knife wounds.<sup>5</sup> Various factors influence the possible mechanisms of neck trauma. In military related injuries, Explosives are most common, followed by gunshot injuries.

Majority (89.3%) of patients in this study had zone 2 injuries. Zone 2 injuries are the most commonly reported of all the zones. <sup>3,4,9,14,20</sup> Fox and colleagues in a study on military associated penetrating cervical trauma of 63 patients over 2 years however observed an equal proportion of patients having zone 2 and 3 injuries.<sup>8</sup> The practice in our Centre is that of selective management of patients with neck injuries. Patients who are hemodynamically unstable or who presented with 'hard signs' had immediate neck exploration and repair where applicable. We had 19 of such patients who had neck explorations, and in 13 (68%) we observed positive findings that necessitated surgical repair (Figure 1 and 2). Successful decanulation was carried out in 67.9% of patient that had emergency tracheostomy (figure 3). For those that were hemodynamically stable and did not present with 'hard signs' were clinically evaluated and managed conservatively. We offered endoscopic evaluation to all patients that presented with neck trauma as part of initial evaluation. This was often done at little or no cost to the patients. We could not do CT scans for all patients that presented with neck trauma, due to the high cost of the investigation. Siau and colleagues reported a panendoscopy rate of 41.7% among their patients. They also did not request for CT Scan among all patients, as only 58.3% did CT scans.<sup>20</sup> Nineteen (67.9%) patients had selective neck exploration in this study. This finding is higher than that reported by other authors. 3,4,15,21-23 Ibraheem and colleagues in a retrospective review of neck trauma cases in a level I trauma center in Tucson USA, reported neck explorations in 82 (24%) patients.<sup>4</sup> while Bell and colleagues had only 5 (7.7%) patients with hard signs that necessitated surgical intervention. 16 The positive neck exploration rate observed in this study agrees with the findings by Brennan and colleagues. They report a positive neck exploration rate of 69%. We observed supraglottic stenosis in 12 (42.9%) patients, and wound dehiscence in 4 (21.4%). Similar findings were reported in a retrospective review of 46 patients in Kashmir, where they reported airway reduction, wound infection, and pharyngo-cutaneous fistula as complications among their patients. There was no mortality recorded in this study.

#### **CONCLUSION**

Neck trauma is a potentially life-threatening emergency with a male preponderance worldwide. We however observed a rising female population in our study due to some peculiarities in our environment. Careful evaluation, and appropriate investigation of these patients can prevent unnecessary neck explorations and morbidities. We offer selective neck explorations to patients that present to our Hospital. Modifications may be necessary in resource-constrained settings where CT scan is not readily available.

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