



## Otorhinolaryngological Trauma in Some Private Health Facilities in Benin City

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### Authors' contributions

This work was carried out in collaboration among all authors. Author IOA designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors IOA and ROM managed the analyses of the study. Authors IOA and FOO managed the literature searches. All authors read and approved the final manuscript.

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### ABSTRACT

**Background:** Otorhinolaryngological trauma is common in clinical practice. The disaster caused by otorhinolaryngological trauma arises from its morbidity and mortality. This is due to increased cost of care and varying degree of physical, cosmetic and functional disfigurements.

**Aim:** This study was conducted to determine the causes, mechanisms of trauma and outcomes of these injuries in private setting; and to profer possible preventive measures.

**Methods:** This study was a one-year descriptive prospective study on patients with otorhinolaryngological trauma managed at three private health settings in Benin City, Nigeria. All consecutive trauma patients seen from May 2016 to April 2017 constituted the sample size. Total population sampling technique was used. Statistical analysis was performed using SPSS version 20.0.

**Results:** A total of 31 patients were studied. Age ranged from 1 to 80 years. Median age was 35 years. Male to female ratio was 1.1:1. The commonest cause of trauma was use of cotton buds to clean the ears in 48.4% patients. This was followed by foreign bodies in the ear in 12.9% of the patients. This was not statistically significant as  $p > 0.05$ . The commonest mechanism of trauma

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was from Tympanic membrane perforation, canal laceration and ear canal inflammation in 48.4% of patients. The ear was the most affected region in 80.6% of the patients. The greatest complain at presentation was ear discharge in 38.7% of the patients, followed by hearing loss in 35.5% patients. The commonest complication was tympanic membrane perforation noted in 48.4% of the study population followed by chronic suppurative otitis media in 35.5% of them. Majority of the subjects (87.1%) were treated as outpatients. Only 12.9% of the subjects required admission to the ward. The most common treatment modalities used were 'keeping the ear dry' protocol, ear toileting and daily ear dressing in 80.6%, 41.9% and 38.7% of the patients respectively. The median length of hospital stay for in-patients was 7 days (range 3 to 11 days). There was no mortality. Majority of the patients (77.4%) had full recovery. Tympanic membrane perforation was persistent in 22.6% of the patients.

**Conclusion:** Otorhinolaryngological trauma constitutes a significant cause of morbidity in private hospital setting. Majority of these trauma are both preventable and treatable through public enlightenment programmes and early presentation to Otorhinolaryngologists respectively.

*Keywords: Otorhinolaryngology; trauma; private; health facility.*

## 1. INTRODUCTION

Otorhinolaryngological trauma is injury to the ear, nose and throat [1]. They are common in clinical practice [1]. These Ear, Nose and Throat (E.N.T.) injuries have various mechanisms of occurrence. There could be blunt traumas such as blows and slaps to the ears which represent a different spectrum of injuries [2, 3]. Previous literatures showed that domestic violence between couples and physical abuse from law enforcement agents are causes of tympanic membrane perforation [3,4,5].

In Nigeria, the incidence rate of otorhinolaryngological trauma is 5.3 – 14.5%. Otologic injuries were seen in 53.9 – 60.9% of the subjects in a similar study [2]. In another study in Benin City, Nigeria, the prevalence of ear diseases was 58.7% [5]. Injuries to the ear can be from trauma due to foreign bodies in the auditory canal or injury inflicted during its removal, which could also affect both the middle and inner ears. Some studies recorded fractures of the petrotympanic bone with consequent loss of inner ear structures and / or facial nerve palsy [4,6]. Although ear injuries occur in all age groups, causes and mechanisms of injuries vary with age and geographic distribution [7]. In developing countries, road traffic crashes are reported to be the leading cause of ear injuries among the adult while interpersonal violence is the leading cause in developed countries [1,8]. Despite its operational impact, ear injuries can be overlooked, especially in multi-organ trauma patients due to its obscurity by nature or because patient is unable to complain [9,10]. Management of otologic injuries depends on the aetiology and their mechanisms. While foreign bodies in the ear can be easily removed under vision in the

clinic, trauma to the ear with laceration/avulsion of the pinna, tympanic membrane perforation, dislocation of the ossicles and fractures of the petrous temporal bone may need surgical intervention [1–5,11]. Although patient's stabilization according to trauma protocols is important for the patient's life, care of an ear injury is equally important for this patient's quality of life post trauma and if addressed properly could save guard him from more complicated surgery and morbidity [11, 12].

In the developing countries like Nigeria, the morbidity and mortality associated with ear injuries remain a significant but neglected problem. Also late presentation after failed attempted removal of foreign body in the ear, by an unskilled health worker with its attendant complications poses more challenges to both the patient and the doctor.

The adversity caused by otorhinolaryngological trauma arises from its morbidity and mortality [1,2]. They usually increase the cost of care and lead to varying degree of physical, cosmetic and functional disfigurement. Mortality arises from the complications of the otological injuries [1,2]. These E.N.T. traumas are both preventable and treatable.

The aim of this study is to determine the causes, mechanism of trauma and outcome of these injuries in private setting and proffer possible preventive measures.

## 2. METHODS

This study was a one- year descriptive prospective study of patients with otorhinolaryngological trauma managed at three

private health settings in Benin City, Nigeria. The study centres were Hope hospital, Echos hospital and Juno medical centre. These hospitals are all in Benin City and were selected randomly. All consecutive trauma patients seen from May 2016 to April 2017 constituted the sample size. Informed consent was duly obtained from the patient and patient's relative in the cases of individuals less than 18 years of age, who have not attained accepted age of maturity in Nigeria. Total population sampling technique was used. All patients who had different types of otorhinolaryngological injuries were included while those from non trauma causes were excluded. History was taken from each patient, describing the cause, mechanism of injury, associated complications and type of care given to the injury prior to presentation. Physical examination, as well as Ear, Nose, Throat, Head and Neck examinations, was done. The injury in each patient was evaluated and managed accordingly. Findings were documented and statistically analyzed using SPSS version 20.0.

Data derived were presented in Tables and figures. P value of < 0.05 was considered statistically significant.

### 3. RESULTS

During the period of study, 85 otorhinolaryngological patients were seen. A total of 31 patients with otorhinolaryngological trauma were studied. All non trauma cases (in 54 patients) were excluded.

The age range of the patients studied was 1 to 80 years. The mean age was 35 years +/- 11.319 years (p = 0.813). There were 16 males and 15 females. Males predominated. The male to female ratio was 1.1:1. The commonest cause of otorhinolaryngological trauma in this study was use of cotton buds in cleaning the ears noted in 48.4% of the patients. This was followed by foreign bodies in the ears in 12.9% patients. The most common mechanism of trauma was tympanic membrane perforation, canal laceration

**Table 1. Socio demographics**

Sex	Hope hospital (N/%)	Echos hospital (N/%)	Juno medical centre (N/%)	Total (N/%)
Male	12 (75.0)	4 (25.0)	-	16 (100.0)
Female	13 (86.8)	1 (6.6)	1 (6.6)	15 (100.0)
<b>Age (yrs)</b>				
1 -10	3 (100.0)	-	-	3 (100.0)
11 – 20	4 (80.0)	1 (20.0)	-	5 (100.0)
21 – 30	3 (50.0)	2 (33.3)	1 (16.7)	6 (100.0)
31 – 40	7 (77.8)	2 (22.2)	-	9 (100.0)
41 - 50	3 (100.0)	-	-	3 (100.0)
51 – 60	-	-	-	-
61 – 70	1(100.0)	-	-	1 (100.0)
71 – 80	4 (100.0)	-	-	4 (100.0)

Sex: Fisher's exact = 2.599; df = 2; p = 0.333; Age: Fisher's exact = 11.319; df = 12; p = 0.813

**Table 2. Association of socio demographics and site of trauma**

Sex	Ear* (N/%)	Nose* (N/%)	Larynx (N/%)	Neck (N/%)
Male	14	2	-	-
Female	11	2	1	1
<b>Age (yrs)</b>				
1 -10	2	1	-	-
11 – 20	5	-	-	-
21 – 30	4	1	-	1
31 – 40	9	-	-	-
41 - 50	2	-	1	-
51 – 60	-	-	-	-
61 – 70	1	-	-	-
71 – 80	2	2	-	-

Age: Fisher's exact = 21.804; df = 18; p = 0.338; Sex: Fisher's exact = 2.508; df = 2; p = 0.378

**Table 3. Mechanism of trauma**

<b>Cause of Trauma</b>	<b>Mechanism of trauma</b>	<b>Ear (N/%)</b>	<b>Nose (N/%)</b>	<b>Throat (Larynx, Neck) (N/%)</b>	<b>Total (N/%)</b>
Cotton bud	TM* perforation,	15(48.4)	-	-	15(48.4)
Foreign bodies	Canal laceration, inflammation,	3(9.7)	1(3.2)	-	4 (12.9)
	Canal / cavity laceration, Nasal blockage				
Iatrogenic (Foreign body removal, Total thyroidectomy, Dental extraction)	Inflammation	1(3.2)	-	2(6.5)	3(9.7)
Gun shot	Shearing force, laceration	1(3.2)	1(3.2)	-	2 (6.5)
Slap	Blunt trauma	2(6.5)	-	-	2 (6.5)
Assault (Blow)	Blunt trauma	2(6.5)	-	-	2 (6.5)
Nose picking	Laceration,	-	2(6.5)		2(6.5)
	vascular rupture				
Domestic accident	Sharp pointed object perforating the TM*	1(0.7)	-	-	1(3.2)
<b>Total</b>	-	<b>25 (80.6)</b>	<b>4(12.9)</b>	<b>2 (6.5)</b>	<b>31(100)</b>

\*TM → Tympanic membrane; \*Multiple responses; fisher's exact = 22.405; df = 12; p = 0.367

and inflammation (48.4%). The ear was the most affected region in 80.6% of the subjects. The greatest complain at presentation was ear discharge in 38.7%, followed by hearing loss in 35.5% of the patients. The commonest complication was tympanic membrane perforation in 48.4% of the ears followed by chronic suppurative otitis media in 35.5% of the ears. The most common treatment modalities used were 'keeping the ear dry' protocol, ear toileting and daily ear dressing in 80.6%, 41.9% and 38.7% of the patients respectively. Majority of the patients (87.1%), especially those who had minor trauma were treated as outpatients. Only 12.9% subjects required admission into the in-patients' ward. They were patients that had moderate to severe injury, impending and life threatening complications. The median length of the hospital stays for these in-patients was 7 days (range 3 to 11 days). There was no mortality recorded in this study. Most of the patients (77.4%) had full recovery. Hearing disability was recorded in the ears that had persistent tympanic membrane perforation in 22.6% of the patients. Three of which had chronic suppurative otitis media. Two cases of Facial palsy were seen.

#### 4. DISCUSSION

##### 4.1 Prevalence of Otorhinolaryngological Trauma

In this study, the prevalence of otorhinolaryngological trauma was 36.5%. This is high when compared to the study by Sogebi et al

in 2006 which recorded 5.3% [1]. The rise in the prevalence could be due to increased individuals' awareness of otorhinolaryngological services through high technology and social media in the present times.

##### 4.2 The Commonest Site of Trauma

The ear being the commonest site of trauma (80.6%) in this study agreed with previous researches by Aremu et al in 2011 where 48.7% was recorded [2]. Otologic site was also noted as most common site of injury in the work by Gilyoma et al in 2013 [3]. A recent study by Akpalaba et al in Benin City recorded similar results in 2015 [8]. However earlier researchers such as Arif Raza Khan et al found more injury in the nose in 50% of the subjects. [13] This may be due to the position of the nose which projects in front of the face and is thus exposed to trauma. The reason for shift in trauma site to the ear in this index study could be attributed to the natural tendency of dodging the face away from oncoming missiles or slap. The ears inadvertently absorbed the injury with its resultant complications.

##### 4.3 Commonest Cause of Trauma

Cotton buds used in cleaning the ears accounted for most of the trauma found in this study in 48.4% of the injuries. They caused ear canal lacerations with its antecedent infection of the external ear (Otitis externa). Tympanic membrane perforation and the resultant recurrent suppuration were documented in this study.

**Table 4. Clinical presentation**

Anatomical site	Clinical presentation	Frequency	Percentage (%)
Ear	Foreign body insertion	3	4.8
	Hearing loss	11	17.7
	Otalgia	10	16.1
	Mucopurulent discharge	11	17.7
	Tinnitus	4	6.5
	Vertigo	1	1.6
	Lacerations	6	9.7
	Bleeding	4	6.5
	Aural fullness	5	8.1
Nose	Foreign body insertion	1	1.6
	Epistaxis	2	3.2
	Foul smelling nasal discharge	1	1.6
Throat (Larynx / Neck)	Stridor (Post thyroidectomy)	1	1.6
	Low pitched voice	1	1.6
	Swollen neck	1	1.6
Total		62	100.0

**Table 5. Clinical findings**

Anatomical site	Clinical finding	Frequency	Percentage
Ear	Cotton bud tip (Foreign body)	2	4.5
	*TM perforation	15	34.0
	Wax, Scaly desquamated epithelial debris, ulcer, granulomas	1	2.3
	Purulent discharge	11	25.0
	Bloody discharge	2	4.5
	Canal laceration	1	2.3
	Hyperemic *TM	1	2.3
	Hyperemic , edematous canal	1	2.3
	Associated facial paresis	2	4.5
	Nose	Foul smelling Mucopurulent discharge	1
Bead in the nasal cavity		1	2.3
Bleeding from the nasal cavity		2	4.5
Throat (Larynx / Neck)	Stridor (iatrogenic)	1	2.3
	Low pitched voice (iatrogenic)	1	2.3
	Edematous vocal cords in paramedian position (iatrogenic)	1	2.3
	Swollen neck, fetor oris, severe trismus	1	2.3
Total		44	100.0

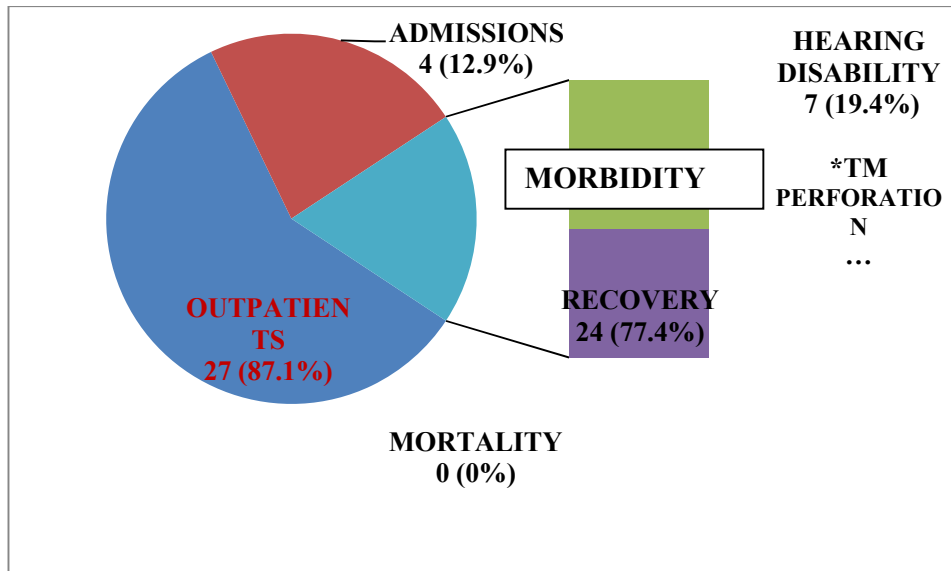
\*TM → Tympanic membrane

**Table 6. Complications**

Anatomical site	Complications	Frequency	Percentage
Ear	Otitis externa	2	5.0
	Chronic suppurative otitis media	11	27.5
	Sensorineural hearing loss	3	7.5
	Labyrinthitis	1	2.5
	Furunculosis	1	2.5
	Perforated tympanic membrane	15	37.5
	Keratitis obturans	1	2.5
	Facial palsy	2	5.0
Nose	-	-	-
Throat	Trismus	1	2.5
	Low-pitched voice	1	2.5
	Recurrent laryngeal nerve palsy	1	2.5
	Ludwig's Angina	1	2.5
Total		40	100.0

**Table 7. Treatment modality**

Treatment modality	Frequency	Percentage
Foreign body removal	4	5.7
Surgical wound debridement/wound dressing	1	1.4
Nasal packing	2	2.9
Ear toileting	13	18.6
Daily Ear dressing	11	15.7
Ear Syringing	1	1.4
Keep ear dry	25	35.7
Facial physiotherapy	2	2.9
Voice rest and rehabilitation	1	1.4
Antibiotics	6	8.6
Vestibular decongestants	1	1.4
Anti-inflammatory	3	4.3
Total	70	100.0



**Fig. 1. Treatment outcome**

► \*TM => Tympanic membrane; +CSOM => Chronic suppurative otitis media

Of note in this study is the novel finding of left sided facial palsy in a 32 year old female patient though there was male preponderance. This is caused most likely from inflammations of recurrent acute exacerbation of chronic suppurative otitis media which has been discharging for 2 years duration. The left facial palsy was a grade 1V facial palsy. This patient habitually cleans her ears with cotton buds. The facial palsy caused an obvious facial disfigurement in this patient. It is of great concern because this facial disfigurement could have been prevented by avoidance of ear cleaning.

There is therefore, extreme need for frequent public education on the self cleansing nature of the ears and for individuals to stop cleaning their ears with cotton buds. Furthermore, individuals should avert themselves the opportunity of getting well informed by participating in ear screening and enlightenment programmes.

#### 4.4 Tympanic Membrane Perforations

Apart from cotton buds, foreign body in the ear was seen as a cause of tympanic membrane perforation in 12.9% of the cases. Higher results, 61.8% and 29.5%, were found by Gilyoma and Aremu in 2013 and 2011 respectively. In the documented mechanism in this study, a bead which a child accidentally inserted into her right ear was found pushed into the middle ear by her parents and concerned persons in attempt to

bring out the bead. The patient was presented to the hospital on account of right facial deviation and micro-ophthalmia after being managed by a general practitioner in their suburban area. The perforated tympanic membrane (due to unskilled removal of foreign body) was also complicated with chronic suppurative otitis media which can progressively cause life threatening meningitis and brain abscess. She eventually had a surgical removal of the foreign body under general anaesthesia.

Use of beads in decorating young girls' hair especially under 3 age, should be discouraged. This is because children of this age group are highly explorative and as such, could insert foreign bodies in any orifice in the face.

#### 4.5 Iatrogenic Causes and Morbidity

Iatrogenic cause was seen in the neck in this study. This contrasts earlier study by Gilyoma where it was noted in the nose and throat. Two patients presented with stridor and low pitched voice post thyroidectomy by general surgeons. The stridor necessitated an emergency tracheostomy leading to increased morbidity, prolonged hospital stay and more expenses for the patient. These complications would have been prevented if promptly presented and managed by Otorhinolaryngologists.

Among the least cause of trauma in this study was a sharp pointed object. A sharp pointed

comb accidentally ruptured the left tympanic membrane of a 16 year old girl. She was holding the comb when wind storm forcefully slammed an entrance door against her, accidentally pushing the sharp end of the comb into her left ear. There was resultant hearing disability. This buttresses the need to avoid carrying sharp objects about. All pointed objects whether sharp or blunt, should be kept off the way and out of reach.

#### **4.6 Disability, Outcome and Mortality**

The highest disability encountered in this study was hearing loss in 7 (19.4%) patients who had tympanic membrane perforation. The ruptured tympanic membrane caused chronic suppurative otitis media (CSOM) in 3 (9.7%) patients. This disability progressively caused physical, cosmetic (facial) and functional disfigurement in two (5.0%) patients who had facial nerve palsy.

Due to aggressive treatment with standard treatment protocols, no mortality was encountered in this study.

#### **4.7 The Study Sample Size**

The sample size of 31 patients in this study is similar to a previous study in Oshogbo where 47 patients were studied. However, the study was a retrospective study with longer study duration of 4 years compared to this one year prospective index study. [1]

This study's sample size contrasts a similar prospective study size of 270 patients in Ilorin. The difference could be probably due to the longer duration of study of 5 years in a tertiary study centre compared to the private setting of the index study [2].

### **5. CONCLUSION**

Otorhinolaryngological trauma abounds in clinical practice. Complications of this trauma increase hospital stay and cost of medical care, hence, causing significant morbidities and disabilities. The greatest cause of otorhinolaryngological trauma is use of cotton buds in cleaning the ears while commonest mechanism of trauma is tympanic membrane perforation, canal laceration and inflammation.

### **6. RECOMMENDATION**

We therefore, recommend that individuals should avoid using cotton buds to clean their ears since the ears are self cleansing.

The key to the prevention of otorhinolaryngological trauma and its complications is high standard of self discipline and prompt referral to trained specialists respectively.

Individuals are therefore encouraged to participate in otorhinolaryngological public enlightenment programmes which are avenues to improve and enrich one's knowledge.

Knowledge is power.

### **CONSENT**

As per international standard or university standard, patient's written consent has been collected and preserved by the author(s).

### **ETHICAL APPROVAL**

Ethical clearance and permission to conduct this study was sought from relevant authorities. This study commenced after ethical clearance was gotten from Ethics and Research Committee of Hope Hospital and permission from the study centres.

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### **COMPETING INTERESTS**

Authors have declared that no competing interests exist.

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