

An Audit of Otologic Injuries in a Nigerian Tertiary Health Facility.

T.O. Adedeji, A.O. Olaosun, J.E. Tobih.

Departments of Otorhinolaryngology Head and Neck Surgery, LAUTECH Teaching Hospital, Osogbo, Osun state, Nigeria.

Correspondence to: Adedeji T.O, E-mail: adedejitaiwo2003@yahoo.com

Background: The dearth of information despite its common occurrence stimulated our interest to audit cases of otologic injuries in a Nigerian tertiary hospital

Methods: This was a retrospective study of patients with otologic injuries that were managed at Otorhinolaryngology department of Ladoko Akintola University of Technology Teaching Hospital, Osogbo, Osun State, Nigeria between July 2006 and June 2012.

Results: A total of 149 cases with M: F ratio 1.2: 1. The right ear was affected in 55% of patients. Most of the injuries due to foreign bodies (58.2%) occurred in children aged 1-10years while the majority of ear injuries from Road Traffic Crashes (78.3%) occurred among age group 21 – 40 years. Most of the penetrating injuries (81.3%) occurred during habitual practice of ear cleaning. There was a significant association between age and the cause of injury ($X^2 = 38.977, p < 0.0001$). More than a quarter of patients with foreign bodies had complications from mismanagement by inexperienced medical personnel.

Conclusion: Otologic injuries are common in our environment. General practitioners should have adequate exposure to ENT training and provide prompt referral to the Otorhinolaryngologist to avoid unnecessary complications. Public enlightenment to persuade people to desist from the acts of cleaning the ear will prevent much accidental penetrating injuries

Key words: Otologic injuries, foreign bodies, conservative management, iatrogenic complications

Introduction

Otologic injury is one of the most common clinical conditions that present to the Otorhinolaryngologist¹⁻⁴. Trauma to the ear could range from simple trauma from foreign bodies to fractures of the petrous temporal bone with associated loss of inner ear or facial nerve function⁴⁻⁸. The incidence of ear, nose and throat injuries had been reported to range between 5.3 – 14.5% in Nigeria and otologic injuries account for 53.9 – 60.9% of the cases^{1,2}. Although ear injuries occur in all age groups, causes and mechanisms of injuries vary with age and geographic distribution^{1,9-14}. In developing countries while road traffic crashes are reported to be the leading cause of ear injuries among the adult, interpersonal violence is the leading cause in developed countries^{1,13}. . 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 depend on the aetiology and mechanism of injuries, while foreign bodies in the ear can be easily removed under vision in the clinic¹⁻⁵ trauma to the ear with laceration/avulsion of the pinna, tympanic membrane perforation; dislocation of the ossicles; fractures of the petrous temporal bone may need surgical intervention¹⁵. Although patient stabilization according to trauma protocols is important for the patients' life, care of an ear injury is important for the patient's quality of life post trauma and if addressed properly could save the patient more complicated surgery and morbidity^{14,15}.

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

patients and the otolaryngologist. It is necessary for physicians to be conversant with the spectrum of otologic injuries common in their communities of practice, and be prepared to render adequate and effective management, prevent complications and reduce morbidities^{16, 17}. Unfortunately, little information is available on otologic injuries in Nigeria. It is on this background that this study, seeks to audit the cases of ear injuries and determine the spectrum based on aetiology, pattern and outcome of injuries to the ear as seen in a tertiary health institution.

Patients and Methods

This was a retrospective study of patients with injuries to the ear that were managed at Otorhinolaryngology department of Ladoké Akintola University of Technology Teaching Hospital, Osogbo, Osun State, Nigeria between July 2006 and June 2012. Patients' records were obtained from the clinics, the wards and theatre registers. The data extracted for analysis were age, sex, clinical presentations, and causes of injuries, treatment, complications and outcome. Excluded were patients whose records could not be located and records with incomplete information. The data was entered into a spread sheet and presented in simple descriptive forms as proportions using tables and charts. A statistical analysis was done using statistical package for social sciences SPSS version 14 (Chicago, IL) with means, frequencies calculated.

Results

A total of 247 cases were managed for ear, nose and throat injuries out of which 149 were otologic injuries. There were 80 (53.7%) males with M: F ratio 1.2: 1. The age of the patients ranged from 6 months to 62 years with mean age of 18.5 ± 15.4 . The modal age group was 1 – 10 years accounting for (45%). Figure 1 shows age and sex distribution among the patients. Majority 91 (61.1%) of the injuries were due to foreign bodies, followed by road traffic accidents 23 (15.4%), figure 2 shows the various aetiological factors. Right ear was affected in 55%, left 43% and both ears in 2.0% of patients.

Most of the foreign bodies (FBs) (58.2%) and trauma from syringing 9/15 (60%) occurred in children (1-10years) while preponderance of RTA 18/23 (78.3%) occurred in age group 21 – 40 years.

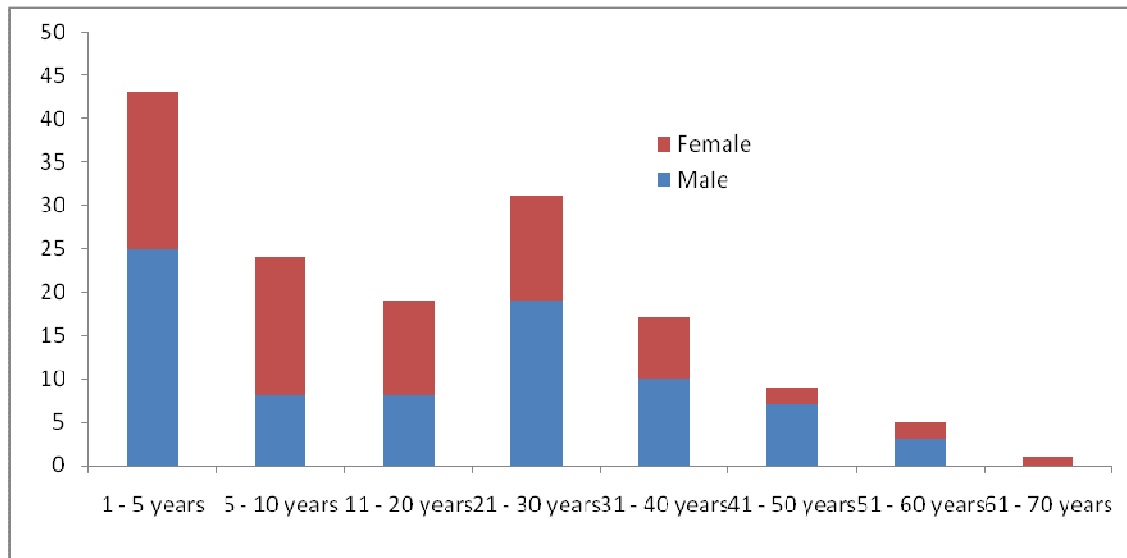


Figure 1. Age and Sex Distributions of the Patients with Ear Injuries.

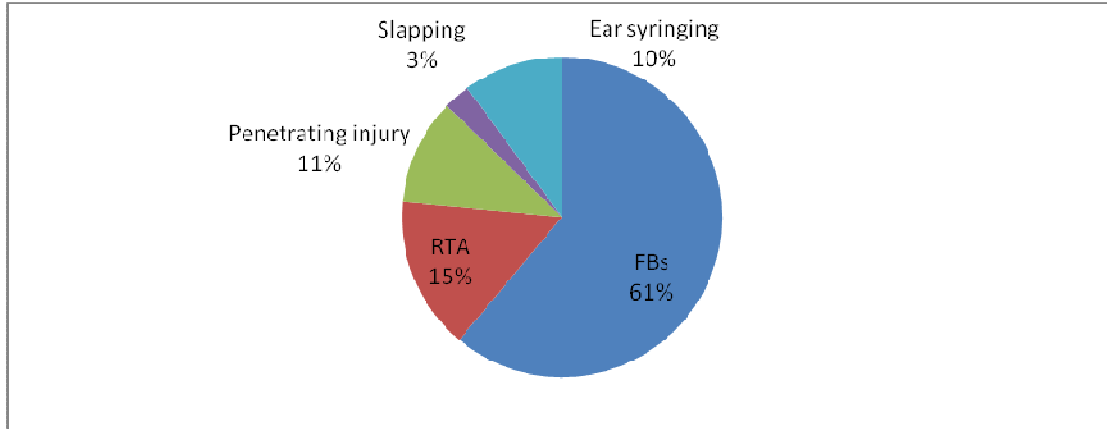


Figure 2. Aetiology of Otologic Injuries

Most of the foreign bodies (FBs) (58.2%) and trauma from syringing 9/15 (60%) occurred in children (1-10years) while preponderance of RTA 18/23 (78.3%) occurred in age group 21 – 40 years. There was a significant association between age and the cause of injury ($X^2 = 38.977$ $p < 0.0001$) as noted in Tables 1 and 2. Most (81.3%) of the penetrating injuries occurred during habitual practice of ear cleaning with cotton swab/pen/stick. Clinical evaluation showed that 18.8% had external auditory canal laceration. The main clinical findings are shown in Table 3. More than a quarter of patients with FBs had been mismanaged by quacks and inexperienced medical personnel and were only referred following various complications. Figure 3 shows various complications secondary to mismanagement of FBs by inexperienced medical personnel.

Most of the FBs were successfully removed in the clinic under proper illumination while those that had been pushed into the middle ear prior to presentation were removed under General Anaesthesia. One patient with a permanent TM perforation had myringoplasty. Patients with temporal bone fracture with/without CSF otorrhoea were managed conservatively with antibiotics, analgesics and dietary regulation with good outcome and those with associated facial palsy had physiotherapy. Pinna lacerations were repaired after debridement under local anaesthesia and a case of External Auditory Canal atresia had canaloplasty.

Table 1. Frequency distribution of Aetiology of Otologic injuries by age

Age (years)	Aetiology					Total
	FBs	RTA	Penetrating injury	Slapping	Syringing	
1 – 10	53(35.6%)	1(0.7%)	4 (2.7%)	-	9(6.0%)	67(45%)
11 – 20	10(6.7%)	4(2.7%)	2(1.3%)	1(0.7%)	2(1.3%)	19(12.8%)
21 – 30	10(6.7%)	11(7.4%)	4(2.7)	2(1.3%)	4(2.7%)	31(20.8)
31 – 40	6(4.0%)	7(4.7%)	2(1.3%)	2(1.3%)	-	17(11.4%)
41 – 50	6(4.0%)	-	2(1.3%)	-	1(0.7%)	9(6.0%)
51 – 60	3(2.0%)	-	2(1.3%)	-	-	5(3.4%)
61 – 70	-	-	1(0.7%)	-	-	1(0.7%)
Total	91(61.1%)	23(15.4%)	16(10.7%)	4(2.7%)	15(10.1%)	149(100%)

Table 3. Relationship between age and aetiology of Otolgic injuries

Age (years)	Aetiology			Total
	FBs	RTA	Others	
1 – 10	53 (79.1%)	1 (1.5%)	13 (19.4%)	67 (100%)
11 – 20	12 (63.2%)	4 (21.1%)	3 (15.8%)	19 (100%)
21 – 30	11 (35.5%)	11(35.5%)	9 (29.0%)	31 (100%)
31 – 40	6 (35.3%)	7 (41.2%)	4 (23.5%)	17 (100%)
≥ 41	9 (60.0%)	0 (0.0%)	6 (40.0%)	15 (100%)
Total	91 (61.1%)	23 (15.4%)	35 (23.5%)	149 (100%)

$X^2 = 38.977$ $P < 0.001$ (Fishers exact test)

Table 3. Clinical findings among the Patients with Otic Injuries

Clinical findings	Frequencies	Percentage
EAC laceration	28	28.8
TM perforation	18	12.1
Temporal bone # + CSF otorrhoea		
± facial nerve paresis	9	6.0
Temporal bone # ± facial nerve paresis	8	5.4
Hearing loss	8	5.4
Ear infection (Otitis media)	8	5.4
Pinna laceration/ Avulsion	7	4.7
Otalgia + tinnitus	3	2.0
EAC atresia	1	0.7
FBs (nil other associated injury)	59	39.6
Total	149	100.0

NB: Sudden hearing loss was associated with the findings in patients with TM perforation, Temporal bone #, Otitis media and external auditory canal atresia.

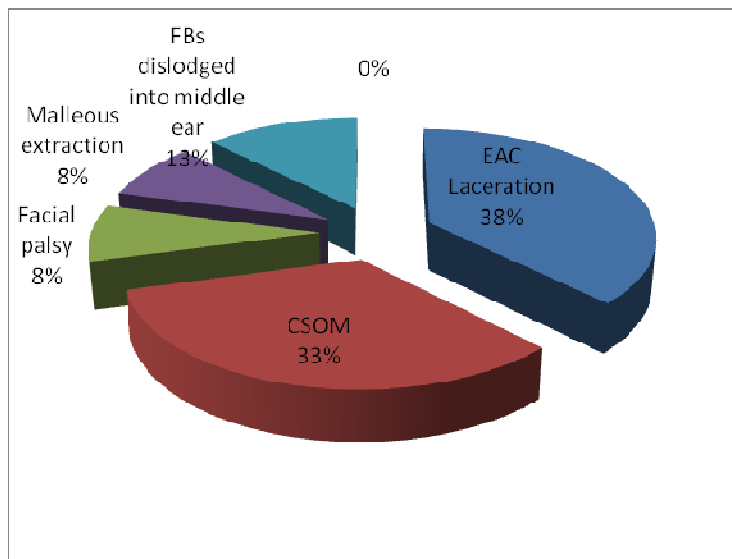


Figure 3. Complications from FBs Due to Mismanagement by Inexperienced Medical Personnel

Discussion

Otologic injuries represent a significant workload that Otolaryngologist attends despite the fact that the disease entity had been largely under-reported especially in the sub-Saharan Africa^{4,13}. Trauma to the ear may affect the external, middle, inner ear and associated structures with consequence in hearing, balance and facial nerve functions as well as cosmetic deformity^{4, 18}. Ear had been consistently reported to be the most predominantly affected in ear nose and throat injuries¹⁻⁶.

In the present study, ear injuries that accounted for 58% of all the cases of ear nose and throat injuries therefore agrees with the findings of the previous published studies^{1, 2, 4}. Gilyoma et al¹³ in Tanzania reported ear as the most common cranio-facial region affected in injuries in the body. Arif et al²⁰ however reported nasal trauma as the commonest type of cranio-facial injuries. Preponderance (80%) of male in the present study is similar to 72% reported by Afolabi et al⁴ in Ilorin, Nigeria and in agreement with other published reports^{12, 13, 19}. This is due to the fact that trauma is more common in male due to their over active nature compared to the female.

Though injury to the ear cut across all ages^{4, 13} it however predominates in children. In the present study there are two peaks; the first among the children 1 – 10 years and the second peak among the age group 21 – 30 years. A similar study in Port Harcourt Nigeria¹, also reported similar findings with 2 peaks among the children and the young adult. Afolabi et al⁴ in Ilorin however reported the contrary with preponderance among the middle age while the children were the least group affected. The reason for the pattern seen in the present study can be explained by the aetiological factors and mechanisms of otologic injuries. Children are hyperactive and assertive with tendency to explore their environment and associated involvement in high risk activities including foreign body insertion into the ear and hence highest prevalence (58.2%) of injuries from foreign bodies seen especially among the children in present study. The age group 21 – 30 years also represent the age of activity coupled with the role of males in African society as the bread winners, working outside home predisposing them to higher risk of various type of traffic injuries compared to women who predominantly stay at home⁴. This group also has the tendency to defend self and as such can be involved in fights with the security agents²¹. A similar finding was reported in Port Harcourt, Nigeria¹.

Aetiological profile of otologic injuries seen in Sub-Sahara Africa was similar though there had not been consistency about the leading cause. Foreign bodies followed by RTA seen in the present study was similar to the report from Tanzania¹³, while findings from Port Harcourt, Nigeria reported slaps/blows as the leading cause of otologic injury followed by FBs¹, a similar study in Ilorin, Nigeria reported slaps followed by RTA as the major cause of otologic injuries⁴. The reason responsible for fewer cases of injury from assault /slaps/blows in our study may be due to relatively low incidence of civil unrest from south western part of Nigeria. Slaps commonly occur between the security agents and the offender, among students/ secrete cult members and marital conflict between wife and husband predisposing to tympanic membrane perforation⁴. Syringing had been reported as one of the most common sources of iatrogenic Otorhinolaryngologist problems²². Majority of injuries seen in the present study occurred in children 10 years and below. This is expected as children may be restless and uncooperative unlike an adult during syringing. Syringing though may appear simple should not be taken for granted, proper training, patience and given attention to the technique of syringing to make the procedure safe and cost effective are advised²².

Most of the penetrating injuries resulted from cotton swab/pen/sticks used for cleaning the ear. This act is particularly common among the adults due to the almost universal practice of “cleansing” the ears. Mothers and caregivers were known to inadvertently traumatize and often times pierce their children’s ears ear drums with cotton buds^{1, 4, 8, 12, 19}. Smith et al²³ reported spectrum of cotton swab induced otologic complication to include; tympanic membrane perforation, facial nerve paralysis, vertigo and perilymphatic fistulae. Penetrating ear trauma though common especially in younger children but had been underreported²⁴. Afolabi in Ilorin, Nigeria reported about attitude of self ear cleaning in black Africans and that majority of people interviewed do self ear cleaning and believe ear should be cleaned to remove wax, because of itching and for cosmetic reason²⁵. Therefore the need for health education which should include persuasion of people to desist from cleaning the ear as the tip can accidentally traumatize the TM cannot be over emphasized.

Pattern of injury site in the present study indicated that the right ear is at a higher risk than the left ear. This could be due to the fact that most injuries were due to FBs and consistent with the right hand dominance in the majority of people. Lacks of domestic safety, parental carelessness, explorative and inquisitive nature of the children are some of the reasons that had been presented for this finding¹³. There was no single case of trauma from explosion in our study, similar to findings from previous report^{1,4}. Orji et al²¹ reported about non-explosive blast injury of the tympanic membrane in Umuahia, South Eastern Nigeria. Though there are cases of civil unrest associated with the use of explosive devices especially in the Northern and Southern part of Nigeria, Explosion is not a common phenomenon in South Western Nigeria⁴ and this may account for the pattern seen in the present study. These findings suggest that the predominant type of ear injuries may be affected by socio- political environment.

The pre-hospital care of trauma patients and time of presentation are the most important factor that determines the outcome after the injury^{13,26}. Most patients in our setting had received various treatments in private clinics or with unqualified health provider which led to various complications and delayed referral to specialists. Similar patterns of presentation have been reported in Tanzania and Nigeria^{1,13,19}. This scenario is one of the major challenges in providing care for ENT patients in the developing world. Attempts at removing foreign body by unqualified health providers in an unskilled manner was the most common cause of complications (TM perforation/ossicular extraction/ dislodgement into middle ear) in our study . This has been reported to be an important cause of hearing loss found mostly among children^{4,7, 8, 13,19}. General practitioners should have adequate exposure to ENT training to be able to render emergency care and to know their limitations especially as regards otologic FBs and promptly provide appropriate referral to the Otorhinolaryngologist for proper evaluation and treatment to avoid unnecessary complications.

Most cases of suppurative otitis media following injuries resulted from the common habit of instilling ear drops into the external auditory canals. Though traumatic TM perforation has an excellent prognosis, but the habit of instilling ear drops delays healing and predisposes the middle ear to infections^{1,13}. Only few of such tympanic membranes that have been tampered with healed after a long time of treatment¹. One of our patients had hydrogen peroxide instilled into his ear following traumatic perforation; he developed tinnitus and moderate degree of mixed hearing loss and permanent TM perforation that was later repaired by myringoplasty. Appropriate management of traumatic TM perforations had been reported to be associated with good prognosis^{4,13,27}. Grant in USA reported that conservative

management was effective for all forms of traumatic TM perforation and that surgical intervention for perforation or conductive hearing loss should be undertaken in the rare cases that fails to heal/ resolve²⁸.

All cases of temporal bone fracture with / without leakage of cerebrospinal fluid into the middle ear in this study were secondary to road traffic injury. The management protocol for skull base fracture with TM perforation/CSF leakage does not require any intervention to avoid contamination with an ascending infection. Afolabi⁴ in Ilorin reported successful outcome with conservative management of CSF leaks secondary to skull base fractures. Surgical intervention is only reserved for those cases of CSF leakage that fails to resolve after 2 weeks of conservative treatment, surgery is also indicated in cases of transverse fracture of temporal bone with complete facial nerve transection. Conservative management was effective in all our patients. This was similar to the findings from previous published studies^{4, 27}.

Conclusion

- Otolgic injuries are common in our environment and foreign bodies followed by road traffic injuries are the most common causes.
- Foreign bodies are commoner in children while trauma is predominant among young adults.
- General practitioners should have adequate exposure to ENT training to be able to appropriately render emergency care and prompt referral to the Otorhinolaryngologist to avoid unnecessary complications.
- Public enlightenment through health education to persuade people to desist from the acts of cleaning the ear will prevent much accidental penetrating injuries

Acknowledgement

The authors acknowledge the residents in Otorhinolaryngology department that assisted in data collection.

References

1. Matilda I, Lucky O, Chibuike N: Ear, nose and throat injuries in a tertiary institution in Niger delta region Nigeria. *J Med Res Prac* 2012, **1**:59-62.
2. Sogebi OA, Olaosun AO, Tobih JE, Adedeji TO, Adebola SO: Pattern of ear, nose and throat injuries in children at Ladoke Akintola University of technology teaching hospital, Osogbo, Nigeria. *Afric J. Pediatr Surg.* 2006, **3**:61-63.
3. Saimanohar S, Gadag RP, Subramaniam V.A Study of Pinna Injuries and their Management *Intl J Health Rehab Sci.* 2012; 1(2): 81-86.
4. Afolabi OA, Aremu SK, Alabi BS Segun-Busari S. Traumatic Tympanic Membrane perforation: An aetiological profile. *BMC Res Notes.* 2009; 2: 232. doi: 10.1186/1756-0500-2-232.
5. Okafor BC. Otolaryngology in South Eastern Nigeria I: Pattern of Diseases of the Ear. *Nig Med J.* 1983; 13:11-19.
6. Bhattia PL, Varughese R. Pattern of Otolaryngological Diseases in Jos Community. *Nig Med J.* 1987; 17:67-73.
7. Ladapo AA. Danger of foreign body in the ear. *Nig Med J.* 1979; 9(1):120-122.
8. Ijaduola GTA, Okeowo PA. Foreign body in the Ear and its importance: The Nigerian Experience. *J Trop Paed.* 1986; 32:4-6.
9. Tulloh BR Diagnostic accuracy in head-injured patients. An emergency department audit. *Injury.* 1994; 25:231-234.

10. Linn S et al. Errors in pre-hospital diagnosis by flight physicians. *Am J Emerg Med.* 1997; 15: 316-320.
11. Schwaber Mitchell K. In: Ballenger's Otorhinolaryngology Head and Neck Surgery. Sixteenth. James B Snow Jr, John Jacob Ballenger, editor. Vol. 14. DC Becker Inc; 2003. Trauma to the Middle Ear, Inner Ear, and Temporal Bone; pp. 345–356.
12. da Lilly-Tariah OB, Somefun AO. Traumatic perforation of the tympanic membrane in University of Port Harcourt Teaching Hospital, Port Harcourt. Nigeria., *Niger Postgrad Med J.* 2007; 14(2):121–4.
13. Gilyoma JM, Chalya PL. Ear, nose and throat injuries at Bugando Medical Centre in northwestern Tanzania: a five-year prospective review of 456 cases. *BMC Ear, Nose and Throat Disorders.* 2013; 13:4. Doi 10.1186/1472- 6815-13-4.
14. Arif RK, Naseem U, Inayat U, Shah ED, Noor SK. Causes and complications of ear, nose and throat injuries in children. A study of 80 cases. *J Med Sc.* 2006; 13(1):57–59.
15. Schall GD, Bennett JR (2003): Otolaryngology Head & Neck Surgery Patients. In: Aeromedical Evacuation (Hurd WW, Jernigan JG Eds) New York, Springer & Verlag.
16. Fasanla J, Ibekwe T, Adeosun A: Preventable Risks in the Management of Aural Foreign Bodies in Western Nigeria. *The Internet Journal of Otorhinolaryngology.* 2007 7(1). DOI: 10.5580/18fe
17. Ette VF. Pattern of Ear, Nose and Throat Foreign Bodies seen in Uyo Nigeria. *Ibom Medical Journal.* 2012; 5(1). DOI: 41.203.67.54
18. Podoshin L, Fradis M, Hearing loss after head injury. *Archives of Otolaryngology.* 1975;101:15-8
19. Ologe FE, Traumatic perforation of tympanic membrane in Ilorin, Nigeria *Nig. J. Surg.* 2002; 8 (1) :9-12
20. Arif RK, Saatea A: Ear, nose and throat injuries in children. *Ayub med Coll Abbottabad* 2005, 17:54–56
21. Orji FT. Non-explosive blast injury of the tympanic membrane in Umuahia, Nigeria. *Nig J Med* 2009 18(4): 365-69.
22. Adedeji T.O. Sogebi O.A, Bande S.A. Ear Syringing - Trends from a young ENT practice in Nigeria. *Natl J Med Res* 2013; 3(2): 126-129.
23. Smith M, Darrat I, Seidman M. Otologic complications of cotton swab use: one institution's experience. *Laryngoscope.* 2012; 122(2):409-11. doi: 0.1002/lary.22437. Epub 2012 Jan 12.
24. Mick P, Moxham P, Ludemann J. Penetrating and blast ear trauma: 7-year review of two pediatric practices. *J Otolaryngol Head Neck Surg.* 2008; 37(6):774-6.
25. Afolabi AO, Kodiya AM, Bakari A, Ahmad BM. Attitude of self ear cleaning in black African: any benefit? *East Afr J Public Health.* 2009; 6(1): 43 – 46.
26. Liberman M, Mulder D, Lavoie A, Denis R, Sampalis JS: Multicenter Canadian study of prehospital trauma care. *Ann Surg* 2003; 237(2): 153 – 160.
27. Hempel JM, Becker A, Müller J, Krause E, Berghaus A, Braun T. Traumatic tympanic membrane perforations: clinical and audiometric findings in 198 patients. *Otol Neurotol.* 2012; 33(8):1357-62. doi: 10.1097/MAO.0b013e31826939b5
28. Grant JR, Arganbright J, Friedland DR. Outcomes for conservative management of traumatic conductive hearing loss. *Otol Neurotol.* 2008; 29(3):344-9. doi: 10.1097/MAO.0b013e3181690792.