The Demographic Study of Otorhinolaryngological Trauma Among Patients with Head and Neck Trauma and Their Management in a Tertiary Care Centre

J. Singhai^{1,2} · R. Nigam¹ · A. K. Jain¹

Received: 1 January 2016 / Accepted: 5 April 2017 / Published online: 9 April 2017
© Association of Otolaryngologists of India 2017

Abstract The trauma has been increasing in frequency, especially in recent decades because of the higher number of automobile accidents and violence. The ear, nose and face region is the area in the body that is commonly involved in head and neck injury. Trauma to this region is often associated with mortality and varying degree of physical, functional and psychological damage. To study the demography, aetiology, clinical presentation, outcome of ENT trauma in our tertiary care centre and to compare our study with previous studies to see the changing trends with passage of time. A prospective study was conducted on 200 head and neck patients with ENT injuries during a period of 1 year from July 2014 to July 2015, who were admitted in ENT Department and Trauma Centre of Gajra Raja Medical College and J.A. Group of Hospital, Gwalior. Most of the patients were young adult males of age group 18–40 years (45, 22.5%) with a male:female ratio 1.78:1. Among them 53% patients were from rural area while 47% were from urban area. RTA is the most prevalent cause of ENT trauma (37%), followed by interpersonal violence (25%). 27% of the patients had facial injury and multiple region injury each. Among 200 patients 33% were managed conservatively on the other hand 66% patients required surgical interventions. Mortality rate was 8%. Among all 184 survivors 25.5% suffered from hearing loss, 14.5% had tympanic membrane perforation with hearing loss, 12% had pinna disfigurement, 10% had change in

voice, 6.5% had permanent nasal deformity, 2% had facial nerve palsy. Young male adults were the most prevalent victims of ENT trauma, and Road traffic accidents were responsible for majority of the ENT injuries. Screening of all the patients with head and neck injuries for the presence of trauma in the ENT region should be introduced to enable early detection and therefore prevention of complications.

Keywords Trauma · Demography · RTA · Assault · ENT

Introduction

All aspects regarding trauma have a great importance in the world today, being among the main causes of morbidity and mortality. Each day about 16,000 people die because of trauma [1].

Among the numerous injuries seen in urban trauma centres, ENT trauma is one of the most prevalent. Since it is the most exposed part of the body, and the one least protected, ENT is the region which is most associated with other organs or systems in emergency centers [2].

Injuries to the ear, nose and throat (ENT) regions are not uncommon in clinical practice and resulting from increased costs of care and varying degrees of physical, functional and cosmetic disfigurement [3, 4]. ENT injuries are avoidable cause of death and disability [5–7].

The causes and mechanism of ENT injuries have been reported to vary with age and geographic distribution [5, 6, 8]. ENT injuries occur in all age groups; however the mechanisms and causes differ between children and adults [5, 6, 9].

✉ J. Singhai
jaskeerti.singhai@gmail.com

¹ Department of ENT, Gajra Raja Medical College and JA Group of Hospitals, Gwalior, M.P., India

² Room No 22, Senior Girls Hostel, JAH Campus, Gwalior, M.P., India

Although the accidents caused by motor vehicles still represent the main cause of ENT trauma but recent data indicate that interpersonal violence has become another prevalent cause. The world trend in the reduction of ENT trauma associated with automobile accidents is associated to the combination of better road conditions, modern safety systems installed to the vehicles, implementation of punishment to drunk drivers, lowering speed limits, increase demands as far as safety systems in vehicles is concerned and the need to use a safety belt [10–12].

This study aims at establishing the magnitude of otorhinolaryngological trauma associated with head and neck injury. This will provide a focus on importance of thorough otorhinolaryngological examination to patients with head and neck trauma and therefore early ear, face and throat care for patients with head injury.

The results of this study will help to alert doctors of the possible associated ENT trauma when managing patients with head and neck injury thus providing required attention in holistic management of head injury.

Results from this study will also help the policy makers in planning for having more allocation of resources to the management of these injuries; it will also strengthen interdepartmental multidisciplinary approach which includes an otorhinolaryngologist, neurosurgeon and oral and maxillofacial surgeon in the management of head and neck injury patients.

Material and Method

The present study was carried out on 200 patients attending the ENT department and trauma centre, Gajra Raja Medical College (M.P.) and associated J.A. Group of Hospitals, Gwalior (M.P.) during the period of July 2014 to July 2015 who were diagnosed as a cases of head and neck trauma and having ENT injuries.

A detailed history specially in reference to age, sex, residence, occupation, mode of trauma, presenting symptoms, general examination, local otorhinolaryngological examination was done on all the patients and noted on a specific proforma after taking an informed consent.

The following routine and special investigations will be performed in case as per requirement:

1. Routine biochemical and haematological examination
 - (a) Blood (haemoglobin, TLC, DLC, ESR, platelet count, RBS, urea)
 - (b) Coagulation profile (BT, CT, PT-INR)
 - (c) Urine—R/M (sugar, albumin and microscopy)
2. Otosopic examination

3. Anterior rhinoscopy, posterior rhinoscopy and sinus examination
4. Endoscopic examination
5. X-ray
 - (a) PNS (water's view)
 - (b) nasal spine (AP and lateral)
 - (c) B/L mastoid schullers view
 - (d) mandible and TM joint (AP and lateral view)
 - (e) OPG
6. CT scan
7. CSF examination.

Inclusion Criteria

All trauma patients of age between 2 and 80 years sustaining ENT injury with head and neck trauma.

Exclusion Criteria

Pre-existing ENT Disease

Age <1 year and >80 years.

Ethical Clearance

This study was channelled through the Research and Publication Ethical committees of Gajra Raja Medical College, Gwalior (M.P.) and associated J.A. Group of Hospitals, Gwalior (M.P.) for clearance.

Results

Out of 200 patients, 128 (64%) were males and 72 (36%) were females with male:female ratio 1.78:1. In our study youngest male was of 4 years and oldest of 80 years with mean age of 27.2 years, and youngest female was of 2.6 years and oldest of 75 years with mean age of 30.2 years.

106 (53%) patients belonged to rural area and 94 (47%) were from urban area.

Road traffic accident (74 cases, 37%) was the most frequent aetiology of the trauma found in our study followed by interpersonal violence (50 cases, 25%).

Road traffic accidents were more frequent in male (47 cases) as compared to women (27 cases).

Interpersonal violence was seen in 28 males and 22 females. It is important to stress that in this category more women were involved may be because domestic violence is very common in our society.

3rd Most common aetiology of ENT trauma was fall which was most common cause among the children (1–10 years) i.e. 2 male children and 4 female children and elderly (70 + years) i.e. 2 male and 2 female cases.

In our study sport injury was least common may be because of decrease interest of children in outdoor sport activities as they are more and more interested in computer and video games. Secondly better protective gear like helmets, gloves and pads etc. and security measures make the sports activity less injury prone as compare to past.

Among all 200 patients majority had facial injuries 54 patients (23%), multiple region injury 54 patients (23%) followed by ear injury 44 patients (22%), nasal injury 30 patients (15%), laryngotracheal injury 18 patients (9%).

The clinical presentations depend on the region involved. Bleeding (74%) from the different regions was the second most common presenting symptom only after the pain (99%). Laceration/cut/incised wound was the third most common symptom (55.5%) for which patient came to emergency ward.

Sensory numbness (5 patients, 2.5%), facial nerve palsy (4 patients, 2%), subcutaneous emphysema (3 patients, 1.5%), Anosmia (2 patients, 1%) were among the rare symptoms for which patients seek urgent medical attention.

Most of the patients required interventions depending on the severity of the trauma from repair of small wound to life supporting procedures like tracheostomy.

Among all, 105 (52.5%) patients underwent surgical wound debridement and repair, tracheostomy done on 26 (13%) patients, fracture treatment done on 17 (8.5%) patients, 16 (8%) patients had nasal packing, septal haematoma drainage done on 2 patients while 66 (33%) patients managed conservatively.

Discussion

Mostly male patients (128, 64%) were affected in ENT injuries as compare to females (72, 36%) and this finding was similar to other studies conducted by Mandubueze et al. Keith et al., Hashim et al., Bonguila et al., Lebeau et al., Chindia et al., Ontai et al. and Other studies in sub-Saharan Africa [13–18]. This high vulnerability of men to most types of trauma can be associated to the fact that in our society men has more freedom to have jobs and is more engaged in high risk activities, thus being more vulnerable to injuries.

On the other hand Bonguila et al., Lebeau et al., Mandubueze et al., Keith et al. [13, 14, 16, 17] observed a higher male:female ratio as compare to our study i.e. M:F::1.78:1.

The dissimilarity between our study and others regarding male:female ratio may be because of the involvement

of Indian females in more household trauma and domestic violence (Table 1).

The age distribution of the patient with ENT trauma in our study showed that the young patients (11–20 years old) were the most prevalent among males with mean age 27.2 years and 30–40 years of age group was most common in females with mean age of 30.2 years similar to other studies like Mandubueze et al., Keith et al., Hashim et al., Bonguila et al., Lebeau et al., Chindia et al. [13–17]. The reason for high prevalence of ENT trauma to this age group (10–20 years) in males as compared to other age groups could be related to activeness and carelessness of this age group in activities which lead to the increase in accidents and violence and are more often involved in risky situations but in case of females age group 30–40 years involves the married females which are most prone to domestic violence (Table 2).

Of all the categories responsible for ENT trauma in our study, Road traffic accidents (37%) was the most prevalent when compared to the second most frequent category, interpersonal violence (25%). These results are similar to Bonguila et al., Keith et al., Steffen et al., Khan et al., Bilsk et al., Chan et al. [14, 16, 19–22].

Although fall was the third category in order to frequency, it was the one which proved to be the most important trauma mechanism in age extremes, stressing that 4 cases were above 70 years and 6 cases were children. Aging is characterized by the gradual reduction in biological functions, with multiple sensory deficits, visual and auditory among them, changes in cognition and memory, and bone and muscle disorders increasing the risk of falls; while in children, a number of factors cause falls, since it is not only neurological centres which are involved, but also all those associated with balance and movement which are still being developed, and children do not know the difference between dangerous actions and the safe ones (Table 3).

Table 1 Age distribution

Age (year)	No. of males	Percentage	No. of females	Percentage	Total
0–10	4	2	6	3	10
11–20	49	24.5	8	4	57
21–30	27	13.5	12	6	49
31–40	10	5	15	7.5	25
41–50	20	10	13	6.5	33
51–60	7	3.5	6	3	13
61–70	8	4	7	3.5	15
70 +	3	1.5	5	2.5	8

Out of 200 patients, majority 57 (28.5%) were of age group 11–20 followed by other groups

Table 2 Sex distribution

Sr. no	Sex	Number of patients	Percentage
1	Male	128	64
2	Female	72	36
	Total	200	100

Out of 200 patients, 128 (64%) were males and 72 (36%) were females

The ratio of male: female among trauma patients is 1.78:1

Table 3 Rural/urban distribution

Age (year)	Rural patients	Urban patients
0–10	3	7
11–20	31	26
21–30	24	15
31–40	16	9
41–50	15	18
51–60	8	5
61–70	7	8
70 +	2	6

People belongs to rural area were 53% and urban area were 47%

Table 4 Distribution according to site of injury

Sr. no	Region involved	No. of male	No. of female	Total	Percentage
1	Ear	28	16	44	22
2	Nose	19	11	30	15
3	Face/throat	31	23	54	27
4	Laryngotracheal	14	4	18	9
5	Multiple region	36	18	54	27
	Total	128	72	200	100

Among 200 patients who had trauma in ENT region, majority had facial injuries 54 (23%) and multiple region injury 54 (23%) followed by ear

Among 54 (27%), patients who had facial trauma and multiple region injury majority were males 31 and 36, respectively

Table 5 Mode of injury

Mode of injury	0–10		11–20		21–30		31–40		41–50		51–60		61–70		70+		Total
RTA	1	1	19	4	9	5	5	5	8	3	1	3	4	4	3	2	74
Assault	0	1	11	2	7	3	2	7	4	5	3	3	0	1	1	0	50
Fall	2	4	8	1	5	2	1	1	2	2	3	0	2	2	2	2	39
Animal	1	0	3	0	0	0	1	1	2	1	0	0	0	0	0	1	9
Firearm	0	0	1	0	2	0	1	1	1	0	0	0	0	0	0	0	6
Sport	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Hanging	0	0	6	1	4	2	0	0	3	2	0	0	1	0	1	0	20

Among 200 patients which had trauma in ENT region, majority involved in road traffic accidents (RTA), 74 (37%) and most of them were males, 49 (24.5%)

Face (27%) was the most involved site which included 31 male and 23 female followed by multiple region injury (27%). Similar findings were described by Sharma et al., Khan et al., Odhiambo et al., Goddison et al., Da Lily et al. [20, 23–26] in their studies that faciomaxillary region was the most commonly injured site during trauma because it is the most exposed and unprotected part of body (Table 4).

Pain (99%), bleeding from different regions (74%) are the most common presenting symptoms in trauma patients due to normal physiology of human body similarly Hijino et al., Razavi et al., Dagan et al., Gilyoma et al. [8, 27–29] found the similar finding (Tables 4, 5).

In our present study it was observed that most of the patients required interventions depending on the severity of injury from repair of the small lacerated wound (52.5%) to life supporting procedure like tracheostomy (13%) while 33% patients managed conservatively. Gilyoma et al., Carvalho et al., Cobzeanu et al., Mukhtarhmed Khan et al., Grant et al. [8, 30–33] came with the similar findings. The trauma management provides the basic information about hospital facilities, ICU care, faculty and life supporting systems, infrastructure required (Table 6).

In our study we found that following few preventive measures we can minimize the complications and alter the outcome of trauma for example using better safety precautions during driving, restriction of alcohol during driving, construction of better roads and proper lights on the roads can minimize the number of RTA which was the main cause of trauma in our study specially in young adults.

Fall was the main cause of trauma among elderly patients which can be prevented by better security in houses and proper health check ups to rule out underlying medical condition leading to fall e.g. hypertension, CVA (Table 7).

Domestic violence was the most common factor among the female patients, by proper law and police reinforcement we can minimize that too.

Table 6 Sign and symptoms

Sr. no	Sign/symptom	Male	Female	Total	Percentage
1	Altered sensorium	35	17	52	26
2	Nausea/vomiting	40	21	61	30.5
3	Respiratory distress	46	28	74	37
<i>Ear</i>					
4	Hearing loss	34	17	51	25.5
5	Otalgia	37	23	60	30
6	CSF Otorrhoea	6	1	7	3.5
7	Bleeding	23	13	36	18
8	Tinnitus	7	5	12	6
9	Laceration/cut/avulsion/incised wound	26	19	45	22.3
10	Abrasion/haematoma/contusion	12	15	27	13.5
11	TM perforation	17	6	23	11.5
12	Facial palsy	3	1	4	2
<i>Nose</i>					
13	Pain	27	17	44	22
14	Epistaxis	21	12	33	16.5
15	CSF rhinorrhoea	3	1	4	2
16	Laceration/cut/tissue loss/incised wound	12	9	21	10.5
17	Abrasion/haematoma/contusion	15	10	25	12.5
18	Anosmia	1	1	2	1
19	Nasal obstruction/swelling	6	4	10	5
20	Fracture/crepitus/deviation	11	8	19	9.5
<i>Throat/face</i>					
21	Odynophagia/dysphagia	43	27	70	35
22	Cut/laceration/tissue loss	21	16	37	18.5
23	Abrasion/contusion/haematoma	15	7	22	11
24	Swelling	26	17	43	21.5
25	Facial deformity/dental malocclusion/crepitus/ tenderness over bony prominence	27	20	47	23.5
26	Sensory numbness/paresthesia	3	2	5	2.5
27	Bleeding	38	24	62	31
<i>Laryngotracheal</i>					
28	Haemorrhage	14	3	17	8.5
29	Laceration/cut throat (superficial and deep)	7	1	8	4
30	Subcutaneous emphysema	1	2	3	1.5
31	Haematoma/contusion	8	2	10	5
32	Fracture of laryngeal cartilaginous framework	1	0	1	0.5
33	Pain	20	4	24	12

Among all the patients pain was the most common symptom (99%) followed by bleeding from various region 74%

Laceration/cut/incised wound was the third most common symptom (55.5%) for which patient come to emergency ward

Facial palsy, anosmia, sensory numbness, subcutaneous emphysema were among the rare symptoms for which patients seek medical attention

Apart from social preventive measures, as a clinicians earliest possible management of trivial ENT trauma can prevent the serious complications like good, prompt and primary wound repair, early management of TM rupture, temporal bone fracture, septal haematoma etc. can prevent facial disfigurement, ear discharge, hearing loss, facial nerve palsy, septal abscess respectively.

Conclusion

In this study, a total of 200 cases of trauma were studied. The most common growth stage involved was 10–20 years. The incidence of trauma among males were 128 (64%) and females were 72 (36%) with M:F ratio 1.78:1.106 (53%) were rural and 94 (47%) were urban patients.

Table 7 Treatment Modalities

	No. of patients	Percentage
Wound debridment/dressing/repair (R)	105	52.5
Nasal packing (P)	16	8
Fracture treatment (nasal bone reduction/IMF/plating) (F)	17	8.5
Tracheostomy (T)	26	13
Conservative (C)	66	33

Most of the patients required interventions depending on the severity of injury from repair of the small lacerated wound to life supporting procedure like tracheostomy

52.5% patients required surgical repair compare to 33% patients which managed conservatively

74 (37%) trauma patients were injured during road traffic accidents (which includes self -driving a vehicle/hit by a vehicle or railway accidents).

99% of the patients presented with pain, 74% with bleeding from various ENT sites, 55% with lacerated or incised wounds.

Among 200 patients 66% patients required surgical intervention while 66 (33%) managed conservatively.

Head and neck trauma represents one of the most frequent location of a traumatic event and a major cause of death or debilitating disease due to mechanic injuries. However, even in major trauma, most of the lesions of the cephalic extremity are minor injuries, most often not requiring any ENT or oral surgical treatment. In these circumstances, especially in severe trauma, ENT exam is postponed until life-threatening lesions are stabilized. Due to minor symptoms, frequently spontaneously resolved during recovery for other lesions, the patient will skip the head and neck examination. Our study underlies the opportunity of an ENT complete examination that may disclose unknown lesions, some of them with heavy impact onto the prognosis of the patient and the quality of its life.

Compliance with Ethical Standards

Conflict of interest None.

Ethical Clearance All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

References

- Krug EG, Sharma GK, Lozano R (2000) The global burden of injuries. *Am J Public Health* 90:523–526
- Alvi A, Dohert T, Lewen G (2003) Facial fractures and concomitant injuries in trauma patients. *Laryngoscope* 113:102–106
- Aremu SK, Alabi BS, Segun-Busari SW, Omotoso SW (2011) Audit of pediatric ENT injuries. *Int J Biomed Sci* 7:218–221
- Singh I, Gathwala G, Gathwala L, Yadav SPS, Wig U (1993) Ear, nose and throat injuries in children. *Pak J Otolaryngol* 9:133–135
- Matilda I, Lucky O, Chibuike N (2012) Ear, nose and throat injuries in a tertiary institution in Niger delta region Nigeria. *J Med Res Prac* 1:59–62
- Arif RK, Naseem U, Inayat U, Shah ED, Noor SK (2006) Causes and complications of ear, nose and throat injuries in children. A study of 80 cases. *J Med Sci* 14(1):57–59
- Sogebi OA, Olaosun AO, Tobih JE, Adedeji TO, Adebola SO (2006) Pattern of ear, nose and throat injuries in children at Ladoko Akintola University of technology teaching hospital, Osogbo, Nigeria. *Afr J Pediatr Surg* 3:61–63
- Gilyoma JM, Chalya PL (2011) Endoscopic procedures for removal of foreign bodies of the aerodigestive tract: the Bugando Medical Centre experience. *BMC Ear Nose Throat Disord* 11:2
- Arif RK, Saatea A (2005) Ear, nose and throat injuries in children. *Injury* 17:54–56
- Ogundare BO, Bonnick A, Bayley N (2003) Pattern of mandibular fractures in an urban major trauma center. *J Oral Maxillofac Surg* 61:713–718
- Adeyemo WL, Ladeinde AL, Ogunlewe MO, James O (2005) Trends and characteristics of oral and maxillofacial injuries I Nigeria: a review of the literature. *Head Face Med* 1:7–15
- Lee KH, Snape L, Steenberg LJ, Worthington J (2007) Comparison between interpersonal violence and motor vehicle accidents in the aetiology of maxillofacial fractures. *ANZ J Surg* 77:695–698
- Madubueze CC, Chukwu CO, Omoke NI, Oyakhilome OP, Ozo C (2011) Road traffic injuries as seen in a Nigerian teaching hospital. *Int Orthop* 35(5):743–746. doi:10.1007/s00264-010-1080-y
- Keita M, Doumbia K, Diani M, Diallo M, Coulibaly M, Timbo SK, Ag Mohamed M. Head and neck injuries: 184 cases in Mali. *Med Trop (Mars)* 70(2):172–174
- Hashim H, Iqbal S (2011) Motorcycle accident is the main cause of maxillofacial injuries in the Penang Mainland, Malaysia. *Dental Traumatol* 27:19–22
- Bouguila J, Zairi I, Khonsari RH, Jablaoui Y, Hellali M, Adouani A (2008) Epidemiology of maxillofacial traumatology in Tunis. *Rev Stomatol Chir Maxillofac* 109(6):353–357
- Lebeau J, Kanku V, Duroure F, Morand B, Sadek H, Raphael B (2006) Facial injuries treated in the Grenoble University Hospital. *Rev Stomatol Chir Maxillofac* 107:23–29
- Onotai LO, Ibekwe U (2010) The pattern of cut throat injuries in the University of Port-Harcourt Teaching Hospital, Portharcourt. *Niger J Med* 19(3):264–266
- Steffen A, Klaiber S, Katzbach R, Nitsch S, Frenzel H, Weerda H (2007) Epidemiology of auricular trauma. *Handchir Mikrochir Plast* 39(2):98–102
- Khan AA (1988) A retrospective study of injuries to the maxillofacial skeleton in Harare, Zimbabwe. *Br J Oral Maxillofac Surg* 26:435–439
- Bilski T (2003) Pattern of head and neck injuries. *J Trauma*
- Chen CC, Pai YM, Wang RF, Wang TL, Chong CF (2005) Isolated oculumotor palsy from minor head trauma. *Br J Sports Med* 39:34–36
- Yojana S, Mehta K, Girish M (2012) Epidemiological profile of otorhinolaryngological emergencies at a medical college, in rural area of Gujarat. *Indian J Otolaryngol Head Neck Surg* 64(3):218–224
- Odiambo WA, Guthua SW, Macigo FG, Akama MK (2002) Maxillofacial injuries caused by terrorist bomb attack in Nairobi, Kenya. *Int J Oral Maxillofac Surg* 31:374–377

25. Goodisson D, MacFarlane M, Snape L, Darwish B (2004) Head injury and associated maxillofacial injuries. *N Z Med J* 117:1045
26. Da Lilly-Tariah OB (2007) University of Port Harcourt Teaching Hospital, Port Harcourt, Nigeria. *Niger Postgrad Med J* 14(2):121–124
27. Hijano R, Hernández A, Martínez-Arias A, Homs I, Luisa Navarretec M et al (2009) Epidemiological study of emergency services at a tertiary care center. *Acta Otorrinolaringol* 60(1):32–37
28. Razavi A, Skinner R (2014) Acute nasal injury. *BMJ* 349:g6537
29. Dagan E, Wolf M, Migirov LM (2012) Why do geriatric patients attend otolaryngology emergency rooms? *Isr Med Assoc J* 14(10):633–636
30. Carvalho TB, Cancian LR, Marques CG et al (2010) Six years of facial trauma care: an epidemiological analysis of 355 cases. *Braz J Otorhinolaryngol* 76(5):565–574
31. Cobzeanu MD, Palade D, Manea C (2013) Epidemiological features and management of complex neck trauma from an ENT surgeon's perspective. *Chirurgia* 108(3):360–364
32. Khan MA, Khan MA, Afzal A et al (2013) ENT emergencies: an experience. *Indian J Sci Res Technol* 1(3):62–65
33. Grant JR, Arganbright J, Friedland DR et al (2008) Outcomes for conservative management of traumatic conductive hearing loss. *Otol Neurotol* 29(3):344–349