

**Assessing the Ignored Associated Injuries of the Ear, Nose and Throat in Patients with Multiple Trauma in Shahid Rahnamun Hospital of Yazd in 2012 and 2013**Zahra Sarafraz<sup>1</sup>, Mohammad Hossein Mirshamsi<sup>2</sup>, Seyyed Ali Musavi<sup>3</sup>, Mohammad Hossein Azaraein<sup>4</sup>

<sup>1</sup> Resident of Otolaryngology, Unit of Otolaryngology Medicine, Department of Otolaryngology, Faculty of Medicine and Health Sciences, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

<sup>2</sup> General surgeon, Unit of surgery Medicine, Department of surgery, Faculty of Medicine and Health Sciences, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

<sup>3</sup> Assistant professor of Otolaryngology, Faculty of Medicine and Health Sciences, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

<sup>4</sup> Student Research Committee, Faculty of Medicine and Health Sciences, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

**Type of article:** Original article**Abstract**

**Background:** Many trauma patients in the Emergency Department are unconscious, and this causes many other problems to go undiagnosed, resulting in the loss of valuable time in initiating the appropriate treatments. The purpose of this study was to determine the prevalence and types of injuries to the ears, nose, and throat that are ignored in patients with multiple traumas in an Emergency Department.

**Methods:** This study was conducted by assessing patients with multiple traumas who were admitted to the Emergency Department at Shahid Rahnamun Hospital in Yazd, Iran, in 2012 and 2013, and who were advised to acquire diagnostic workups and treatment in the Ear, Nose, and Throat Department. The patients' data were gathered by studying their records and by careful examinations, and the data were analyzed using the chi-squared test by SPSS version 18.

**Results:** Among the 230 patients who were counseled, 170 patients had multiple traumas that were caused by accidents, falls, conflicts between individuals, and natural disasters. Fifty-four patients with low Glassco Coma Scale (GCS) values who were admitted to the ICU were counseled after they regained consciousness. Among the 54 cases, 12 cases (22%) had nasal fractures and four cases had septal hematomas that resulted in infections and severe deformities. Twenty-four cases (44%) had lacerations of posterior auricular components, one case required extended debridement, and two cases had extensive necrosis that required a local flap. Two cases (3%) had paralyzed facial nerves, 8 cases (14%) had fractured mandibles, and 10 cases (18%) had laceration of the oral mucosa (lingual - buccal) that require extended debridement in the operating room.

**Conclusions:** It is recommended that complete physical examinations be done in patients with multiple trauma after they are stabilized; such examinations would require careful training of the medical staff and also careful and timely counseling.

**Keywords:** maxillofacial trauma, associated injuries, ENT

**1. Introduction**

In recent years, advances in technology and healthcare have improved people's lives; even so, fighting, conflicts, violence, and other traumatic phenomena, such as vehicle accidents, occupational accidents, and injuries sustained in the martial arts, have substantially intensified the physical damage that people can incur, such as oral and maxillofacial injuries (1). At the present time, injuries to the ears, nose, and throat are common. They cause

**Corresponding author:**

Dr. Zahra Sarafraz, Resident of Otolaryngology, Unit of Otolaryngology Medicine, Department of Otolaryngology, Faculty of Medicine and Health Sciences Shahid Sadoughi University of Medical Sciences, Yazd, Iran

E-mail: [zahra.sarafraz@yahoo.com](mailto:zahra.sarafraz@yahoo.com), Tel: +98.9125071121

Received: March 25, 2015, Accepted: July 11, 2015, Published: July 20, 2015

iThenticate screening: April 16, 2015, English editing: July 14, 2015, Quality control: July 18, 2015

© 2015 The Authors. This is an open access article under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

morbidity and mortality, increase healthcare costs, and cause physical and functional deficits, such as interference with mastication, swallowing, speech, breathing, and interacting with others; they also cause cosmetic problems, which, in turn, can cause psychological problems (2, 3). There are different causes and mechanisms of traumas, and their effects can depend on the location on the body and the victim's age and gender (4-7). In adults, the most common causes of such traumas worldwide are traffic accidents, violence, falls, and sports injuries (5). People's faces are among the most vulnerable areas of the body. Facial injuries as the result of trauma are divided to three main categories, i.e., injuries to the facial bones, injuries to soft tissues, and dentoalveolar injuries (8). The most important soft tissue injuries include lacerations, hematomas, contusions, and abrasions, with lacerations being the most common injuries to soft tissues caused by trauma (38%). The most common age range of people who suffer soft tissue injuries is 0-30 (61.5%), and the most common causes of such injuries are daily activities (49.4 %) and exercise (43.8 %) (8, 9).

Dentoalveolar injuries include crown fractures, luxation, avulsion, and subluxation. Facial bone injuries include fractures of the Lefort I, II, III, orbital, nasal, zygomatic, mandibular, and maxillary bones, and 58% of patients with fractured facial bones were 20-40 years old. Common daily activities and occupational activities account for 28.7% of such fractures, and accidents account for 21.5% (8). These injuries can be either an isolated trauma (involving only the face) or a multiple trauma (damage to multiple parts of the body), that can include limb, abdominal, intrathoracic, and intracranial injuries (10). In many countries, cranial injuries are the most common injuries in maxillofacial trauma patients, and with such injuries, patients can experience nausea, vomiting, loss of consciousness, and even coma (2, 10). In developing countries, such as Iran, accidents are the most common etiology of injury, but, in developed countries, the trauma associated with accidents has been reduced significantly due to the use of seat belts in vehicles and the penalties for driving after drinking alcohol, so violence has become the most common etiology of injury. Traffic accidents are one of the most common causes of trauma, with 1.2 million people killed and 50 million others suffering morbidity each year. The statistics in Iran indicated that 27,567 people were killed and 276,762 were injured in traffic accidents in 1997. These figures are higher than those in the Eastern Mediterranean and American countries. Thus, the study of the causes, types, and severity of injuries in Iran is very important (5, 8). Unfortunately, there are no specific organizations in Iran that have the responsibility of recording the short- and long-term medical consequences of traffic accidents. Such information is recorded sporadically by the Ministry of Health, the Ministry of Labor, and others (6).

In patients admitted to hospitals with medical emergencies, acute and life-threatening problems are dealt with first, and many other problems and injuries may be overlooked and diagnosed later, with the delayed diagnoses potentially causing irreparable problems. The purpose of this study was to investigate the prevalence and type of overlooked injuries that are associated with the ears, nose, and throat in patients with multiple traumas who are admitted to the Shahid Rahnamun Hospital in Yazd, Iran, in 2012 and 2013.

## **2. Material and Methods**

This retrospective study was conducted in multiple trauma patients who were admitted to the Emergency Department at Shahid Rahnamun Hospital in 2012 and 2013. These patients were sent to ear, nose and throat (ENT) Department and given counseling. Originally, there were 78 patients who were candidates for this study. However, 17 patients died, and seven others were sent to other healthcare facilities. Thus, the study was conducted with the remaining 54 patients. All of the patients with multiple traumas and a GCS score of less than 13 who were admitted to ICU were given counseling and then sent to the ENT Department.

All patients with a GCS score greater than 13 and a GCS score less than 3 were excluded from the study. Those with GSC scores greater than 13 were excluded because of the areas of pain and injuries that were reported, and those with GSC scores less than 3 were excluded due to the likelihood that cerebral comas and lack of consciousness could occur. Demographic and etiology data of the main injury and the other associated injuries were obtained by studying the hospital's file for each of the patients, and the type, severity, and location of their injuries were determined by careful examination of the ears, nose, and throat. Research ethics required that the patients' data remain confidential during and after the study.

This study was approved by the Research Committee of Yazd Medical University from a research ethics perspective. The raw data were analyzed by SPSS version 18 (SPSS. Chicago, Illinois, USA) using the chi-squared test.

### 3. Results

Among the 230 patients who were counseled by staff members of the ENT department in 2012 and 2013, 170 cases were related to trauma. Among these, 54 cases were admitted to ICU after they regained consciousness. The mean interval between trauma and the diagnosis of associated injuries was 10 days, and the range was from three to 17 days. The injuries were divided to two groups based on their etiologies that included five basic types, i.e., accidents, violence, chores, occupation, and exercise, and the locations of the injuries, i.e., soft tissue, bone, dentoalveolar, and neural injuries. The most common etiology of injury was accidents, followed by violence, daily activities, occupation, and sports injuries. In all cases of etiology, the injuries were more common in men ( $P < 0.001$ ) than in women. Among the locations of the injuries, the most common were soft-tissue injuries, followed by bone, dentoalveolar, and facial nerve injuries (Table 1).

**Table1.** Distribution of associated injuries based on the types of trauma, injuries, and gender

Etiology						Injury Groups			
Gender	Occupation	Sports	Violence	Traffic	Daily Work	Soft Tissue	Dentoalveolar	Bone	Neural
Male	4	3	5	26	4	19	2	15	2
Female	1	0	2	8	1	15	5	5	0
Total	5	3	7	34	5	34	7	20	2

Undiagnosed injuries included nasal fractures (12 cases) and septal hematomas (4 cases). At the time of diagnosis, the patients had necrosis, nasal cartilage, and saddle nose malformations. Twenty-four cases had posterior auricular lacerations and, due to the lack of diagnosis, severe infections. One case required extended debridement, and two cases required locoregional flaps due to extended necrosis. Two cases had grade 6 facial paralysis (complete paralysis) that was, in both cases, due to a fractured longitudinal temporal bone that had not been diagnosed. There were eight cases in which mandibular fractures had occurred, and, in four of those cases, granulation tissue was present in the line of fracture, the reduction of the fracture was not complete, and occlusion (correct alignment of the teeth) was not achieved. These issues occurred due to the extensive time that passed after the injury with no medical intervention. Ten patients had varying degrees of intraoral lacerations (oral lacerations) in different areas, especially the lingual and buccal areas, which were due to the passage of time without any repair, resulting in severe infections that required extended debridement that produced malformations (Table 2).

**Table2.** Type and percent of undiagnosed associated injuries of the ear, nose, and throat

Undiagnosed Injuries	Male, %	Female, %	Total, %	p
Intraoral Laceration	16	2	18	< 0.005
Nasal Fracture	17	5	22	< 0.005
Posterior Auricular Laceration	40	3	43	< 0.005
Mandibular Fracture	9	5	14	< 0.005
Facial Palsy	3	0	3	< 0.005

### 4. Discussion

Facial injuries are common in trauma, and they increase the risk of morbidity and mortality (deaths) due to physical-functional defects as well as mental disturbances in patients; they also increase the cost of healthcare (2, 3). The most common causes of trauma are accidents, violence, falls, daily activities, and exercise, but their incidences are different in different countries and at different ages (4, 5, 7). In developing countries, due to the lack of preventive laws or failing to observe them, such as not fastening seat belts, traffic accidents are the most common cause of facial injuries (5, 8). In developed countries, due to the use of safety belts and observing the rules about not drinking alcohol while driving, the trauma of traffic accidents has decreased in recent years, and violence has replaced traffic accidents as the most common etiology of injuries. In this study, the most common reasons for injuries were traffic accidents (63%), violence (13%), occupations and chores (9.2 %), and participating in sports activities (5.5%). Facial injuries have been classified as dentoalveolar, soft tissue, and bone injuries in various studies, most studies found that soft tissue injuries, especially lacerations, were the most common form of injury (8-11).

In the present study, 34 cases (62%) of diagnosed injuries included soft tissue injury (posterior auricular and oral laceration). Due to the lack of attention during the oral examination of emergency patients, dentoalveolar injuries were overlooked, which resulted in patients' suffering with complications as time passed and they became fully

conscious (12-15). This type of injury is more common in young people, and its incidence decreased by 4.5% with every year of increasing age (16-21). Seven patients had some degree of tooth fractures and six associated mandibular fractures were found among them. Therefore, in patients with tooth fractures due to trauma, the mandible also should be examined carefully to rule out a possible fracture. Facial bone fractures in trauma, especially trauma from accidents and daily activities, are common (8). In children, the mandible is the most commonly-fractured facial (10, 22). In some studies, nasal bone fractures were the most common fractures of facial bones (9), and, in some other studies, fractures of the orbital floor were the most common, followed by fractures of the zygomatic bone. In the present study, fractures of the nasal bone occurred in 22% of the cases, followed by fractures of the mandible at 14%. Due to delayed diagnoses, four cases of nasal bone fractures were irreversible due to septal hematoma and nose cartilage necrosis that resulted from the lack of careful examination.

Maxillofacial trauma was more common in males than in females by a ratio of 3 to 1 in most studies. The most common age was older than 30, and the common range was 20-40 (60% of cases). In this study, 43 of the 54 patients who were diagnosed late were male ( $P < 0.001$ ), and the age range was similar to that of previous studies (8, 10). Twenty-five percent of patients with facial injuries have associated injuries in other parts of the body, including abdominal, intrathoracic, limb, and intracranial injuries (10). In most studies, the most common associated injuries, due to the proximity of skull to the face, were cranial injuries, particularly intracranial hemorrhages and skull base fractures (8, 21). This, in turn, can decrease the level of consciousness and the patient's GCS. Among the patients examined in this study, subarachnoid hemorrhage (SAH) was the most common associated intracranial injury (80%), and it decreased the patients' consciousness levels. Low consciousness, lack of patients' complaining about associated problems, and lack of careful examinations led to delayed diagnoses after seeing various complications and after the patients' consciousness levels improved.

In a study of 54 patients with orbital floor fractures in Turkey, the most common cause was traumatic violence, and most patients were diagnosed and underwent surgery between 6-96 hours after the trauma; all patients were given thorough examinations and appropriate actions were taken within 96 hours (11). The reason this could be done was that the medical staff paid close attention to the patients' clinical symptoms, such as enophthalmos and diplopia, and they used quick and timely coronal CT scans with fine (2 mm) slices (11). The approach of most studies in the case of facial trauma is to investigate the common types of facial injuries in trauma as well as the incidence and types of associated injuries (12, 15). The fact that this study examined the case of undiagnosed facial injuries in unconscious trauma patients and investigated the type, incidence, and complications of such injuries in these patients differentiates it from other studies related to maxillofacial trauma. Full examinations upon admission and after the patients have been stabilized, daily serial examinations to detect signs of injury, early use of imaging, and consultation if suspicious symptoms are observed will help in the early diagnosis, treatment, and prevention of complications and problems that impose significant costs on the country's healthcare organizations. These activities also will eliminate ineffective and incomplete diagnoses that complicate the treatment process and cause irreparable problems for patients, including both physical and psychological damage.

## **5. Conclusions**

The results of this study showed that the incidence of ENT associated injuries is high in patients with multiple trauma. Overlooking such injuries intensifies the problem and causes complications, such as increased length of time in the hospital, increased risk of infection and mortality, and incomplete correction of side effects. It is recommended that complete and thorough physical examinations be conducted for patients with multiple traumas after they are stabilized, a process that will require careful training of the medical staff and also careful and timely counseling.

## **Acknowledgments:**

The authors thank the staff and directors of Shahid Rahnamun Hospital for their help in this study.

## **Conflict of Interest:**

There is no conflict of interest to be declared.

## **Authors' contributions:**

All authors contributed to this project and article equally. All authors read and approved the final manuscript.

**References**

- 1) Saddas RS. Maxillofacial war injuries during the Iraq-Iran War: An analysis of 300 cases. *Int J Oral Maxillofac Surg.* 2003;2(2):209-14. PMID: 12729785. doi: 10.1054/ijom.2002.0285
- 2) Aremu SK, Alabi BS, Segun-Busari SW, Omotoso SW. Audit of Pediatric ENT Injuries. *Int J Biomed Sci.* 2011;7(3):218–21. PMID: 23675239, PMCID: PMC3614839
- 3) Singh I, Gathwala G, Gathwala L, Yadav SPS, Wig U. Ear, Nose and Throat injuries in children. *Pak J Otolaryngol.* 1993;13(3):133–5.
- 4) 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;13(3):59–62.
- 5) 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):57–9.
- 6) Pakgohar A, Esmaili A. Seatbelt role in reducing mortality and morbidity in traffic road. *Traffic manag.* 2010;4(4):55-70.
- 7) Gilyoma JM, Chalya PL. Endoscopic procedures for removal of foreign bodies of the aerodigestive tract: The Bugando Medical Centre experience. *BMC Ear, Nose Throat Disorders.* 2011;13(3):2. Doi: 10.1186/1472-6815-11-2
- 8) Kraft A, Abermann E, Stigler R, Zsifkovits C, Pedross F, Kloss F, et al. Craniomaxillofacial trauma: synopsis of 14654 cases with 35129 injuries in 15 years. *Craniomaxillofac Trauma Reconstr.* 2012;5(1)41-50. Doi: 10.1055/s-0031-1293520
- 9) Scherbaum M, Ferdinando D, Bortoli M, Engelmann L, Rocha F. Associated Injuries in Patients with Maxillofacial Trauma at the Hospital São Vicente de Paulo, Passo Fundo, Brazil. *J Oral Maxillofac Res* 2013 (Jul-Sep);4(3):1. DOI: 10.5037/jomr.2013.4301
- 10) Isik D. Presence of accompanying head injury in patients with maxillofacial trauma *Ulus Travma Acil Cerrahi Derg* 2012;18 (3):200-6 doi: 10.5505/tjtes.2012.0104722
- 11) Baser N. Clinical management and reconstruction of isolated orbital floor fractures: The role of computed tomography during preoperative evaluation. *Ulus Travma Acil Cerrahi Derg* 2011;17 (6):545-53. doi: 10.5505/tjtes.2011.47135
- 12) Arif RK, Saate A. Ear, nose and throat injuries in children. *Ayub med Coll Abbottabad.* 2005;13(3):54–6.
- 13) Figueriedo RR, Azevedo AA, Kos AO, Tomita S. Complications of Ear, nose and throat foreign bodies. *Braz J Otorhinolaryngol.* 2008;13(3):7–15.
- 14) Dongas P, Hall GM. Mandibular fracture patterns in Tasmania, Australia. *Aust Dent J.* 2002;47(2):131-7. Doi: 10.1111/j.1834-7819.2002.tb00316.x
- 15) Ansari MH. Maxillofacial fractures in Hamedan province, Iran: a retrospective study (1987-2001). *J Craniomaxillofac Surg.* 2004;32(1):28-34. PMID: 14729047. Doi: 10.1016/j.jcms.2003.07.010
- 16) Alvi A, Doherty T, Lewen G. Facial fractures and concomitant injuries in trauma patients. *Laryngoscope.* 2003 Jan;113(1):102-6. PMID: 12514391. Doi: 10.1097/00005537-200301000-00019
- 17) Xydakis MS, Bebartha VS, Harrison CD, Conner JC, Grant GA, Robbins AS. Tympanic-membrane perforation as a marker of concussive brain injury in Iraq. *N Engl J Med.* 2007 Aug 23;357(8):830-1. PMID: 17715421. DOI: 10.1056/NEJMc076071
- 18) Hackl W, Hausberger K, Sailer R, Ulmer H, Gassner R. Prevalence of cervical spine injuries in patients with facial trauma. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2001 Oct;92(4):370-6. PMID: 11598569. DOI: 10.1067/moe.2001.116894
- 19) Gassner R, Bösch R, Tuli T, Emshoff R. Prevalence of dental trauma in 6000 patients with facial injuries: implications for prevention. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 1999 Jan;87(1):27-33. Doi: 10.1016/S1079-2104(99)70290-8
- 20) Gassner R, Tuli T, Hächl O, Rudisch A, Ulmer H. Cranio-maxillofacial trauma: a 10 year review of 9,543 cases with 21,067 injuries. *J Craniomaxillofac Surg.* 2003 Feb;31(1):51-61. Doi: 10.1016/S1010-5182(02)00168-3
- 21) Chalya PL, Mabula JB, Dass RM, Mbelenge N, Ngayomela IH, Chandika AB, Gilyoma JM. Injury characteristics and outcome of road traffic crash victims at Bugando Medical Centre in Northwestern Tanzania. *J Trauma Manag Outcomes.* 2012 Feb 9;6(1):1. PMCID: PMC3292995. doi: 10.1186/1752-2897-6-1
- 22) Arvind RJ, Narendar R, Kumar PD, Venkataraman S, Gokulanathan S. Maxillofacial trauma in Tamil Nadu children and adolescents: A retrospective study. *J Pharm Bioallied Sci.* 2013 Jun;5(Suppl 1):S33-5. PMID: 23946572. DOI: 10.4103/0975-7406.113290.