

The prevalence of brain and neck injuries in patients with maxillofacial fractures in teaching hospitals of Rasht in 2016

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Abstract

This study aimed to determine the prevalence of brain and neck injuries in patients with maxillofacial fractures in teaching hospitals of the city of Rasht in 2016. This is an analytical retrospective study. Some 361 patients of the training centers of Rasht which had been diagnosed with maxillofacial fractures entered the study, 286 of which were male and 75 were female. Information collected through questionnaires and records of the patients who admitted to emergency department of Poursina and Velayat hospitals with maxillofacial fractures. The patients were examined to see whether they have brain and cervical spine injuries. The diagnosis of the fracture and brain and neck injuries had been separately written by the related doctors on the records of the patients based on clinical examination and Plain radiography and CT scans. After data collection, the results were analyzed. The results

showed that 61 percent of the fractures were due to accidents. Among the most common spine damage, (77 percent) was related to bone fractures. The highest frequency of brain damage was related to Extradural Hematoma by 23.65 percent. Results of the treatments also showed that 76% of the patients partially recovered.

Key words: brain injuries, neck injuries, maxillofacial fractures

Introduction

In the last 20 years, facial bone fractures have been common injuries in patients admitted to emergency departments of hospitals (1) so that nearly one third of injured patients have some kind of trauma in this area. Prevalence and causes of maxillofacial injuries vary in different countries. In developing countries, the most prevalent cause of maxillofacial injuries is car accidents (1). Statistics indicate an increase in death toll of traffic accidents in Iran in recent years (2). In developed countries such as America, damages resulting from trauma (especially vehicle crashes) is the seventh leading cause of death (3). Several studies conducted around the world show that young pedestrians (children and teenagers) and the elderly are two high risk groups in traffic accidents. Motorcycle riders are another high risk group in traffic accidents (2, 3). Mokerjy et al (4) demonstrated in their study that from 714 patients with fractures, traffic accident was the cause of 88 percent of the fractures. Shazia (5) also indicated that in all cases of maxillofacial fractures, the cause was traffic accidents.

The face is one of the most vulnerable parts of the body. At the time of an accident, due to the proximity of vital organs such as the brain and its sheaths, the spinal cord, the cervical spinal cord and eyes and also due to physiological problems (controlling airway and breathing), cosmetic and psychological factors, can lead to serious complications for patients (3).

The most common facial bones fracture is in the bones of the lower face (Mandible) and the less common one is in the upper face. The middle part of the face is in the intermediate state between Mandible and Frontal (6). The upper and middle part fractures are more severe than lower part fractures and if left untreated, will cause a lot of deformity (6). Maxillary bone forms most of the middle part. The bone plays a major role in forming the look and the beauty of the person. It also has a major role in the formation of lower lip and orbital bone. Maxillary fractures are of different types. The most common types of these fractures include fractures of Le Fort I, II, III, and fractures of alveolar maxilla and sagittal maxilla (6 and 7). Maxilla fractures are caused by a direct hit from the front or from the side. Today, most of these fractures are caused by traffic accidents. Face and jaw fractures are accompanied by complications such as nasal airway obstruction, the problem in the cranial cavity and Dura rupture, damage to the anterior part of the brain, dental occlusion disorder, obstruction of Lacrimal system, abnormalities in appearance, blindness, anophthalmia, diplopia, and loss of sensation in the territory of Infra orbital nerve (8). Several studies also show that fractures in the facial area have led to brain and spinal cord problems. The study of Grant et al (9), which was conducted in the US, determined that brain damage in people with facial fractures was generally at 67 percent. A study conducted by Farevash et al (18) revealed that among his population the fracture of Le Fort II was the most prevalent. As for associated fractures, zygomatic fractures were 62%, mandible fracture 25%, nasoethmoidal fracture 9% and skull base fracture was 4%. Hugh et al

(10) in a study showed that the incidence of brain damage associated with facial fractures is estimated to be 17.5 percent. Kraos et al (11) showed that facial fractures are very effective on brain injuries.

In many patients with facial fractures, there is likely not enough attention paid to brain and cervical spine damage and also given the importance of facial fractures and the fairly conflicting results of previous studies (12), we decided to investigate the relationship between maxillofacial fractures and brain and neck damage.

Materials and Methods

In this descriptive-analytical and retrospective study which was conducted as a cross-sectional study in 2016, 361 people who were admitted to the training centers in Rasht with maxillofacial fractures entered the study. 286 of them were male and 75 were female. The majority of the participants in this study (129 people) were between the ages of 21 and 30. Information was collected through questionnaires and patients' records who were admitted to the emergency department of Poursina and Velayat hospitals with maxillofacial fractures. The patients were examined to see whether they have brain and cervical spine injuries. The diagnosis of the fracture and brain and neck injuries had been separately written by the related doctors on the records of the patients, based on clinical examination and Plain radiography and CT scans. Cases that were incomplete for various reasons were omitted. Data was collected by questionnaires and was entered into SPSS software for analysis. To describe the data, descriptive tests were used.

Results

The results of the data collection showed that traffic accidents were the most prevalent cause of the fractures in the patients of this study (61 percent). Data also showed that the pattern of maxillofacial fractures was as follows: mandibular fractures (51%), maxillary fractures (4%), zygomatic fractures (6%), frontal fractures (10%), nose fractures (10%) and compound fractures (8 percent). So, the mandible was the most common area of fractures in patients. In all fractured areas, frequency in men was more than in women. As for the fracture pattern, there was a significant difference between patients ($p=0/0001$) as well as between the two sexes (men and women).

In Table 1, the results of the most common injuries of the cervical spine in patients are presented.

The most common cervical spine injuries were as follows bone fractures (77.8 percent), cervical vertebrae dislocation (33.34 percent), disc herniation (11.12 percent) and spinal cord contusion (11.12 percent). Considering the types of cervical spine injuries, there was a statistically significant difference between patients ($p=0/0001$). In Table 2, the most common brain damage in patients is presented.

Table 1: The most common cervical spine injuries

Percent	Number	
77.8	7	Bone fracture
33.34	3	Cervical vertebra dislocation between 5 and 6
11.12	1	Disc herniation
11.12	1	Spinal cord contusion

Table 2: The most common brain injuries

Percent	Number	
23.69	52	Extradural hematoma
18.89	41	Subdural hematoma
12.90	28	Subarachnoid hematoma
35.42	96	Skull fracture

Table 3: Results of treatment (recovery, death, etc) in the patients

Percent	Number	
2	4	Transfer
11	40	Recovery
76	275	Partial recovery
7	27	Personal satisfaction
4	15	Death
100	361	Total

Among the different types of skull fractures, fractures of the frontal bone were of the highest frequency among patients (37.5 percent) which were followed by Ethmoid bone fractures (29.32 percent), orbital roof (16.67 percent) and the sphenoid bone fractures (13.54 percent) ($p = 0/041$). Table 3 presents the results of treatment (recovery, death, etc.) in the studied patients.

The majority of patients (76%) left the hospital with partial recovery. 11 percent improved and 7 percent were discharged with personal satisfaction. 4% of the patients died and 2% transferred to other medical centers.

Discussion and Conclusion

As discussed, trauma is one of the leading causes of death in the communities. Maxillofacial fractures are one of the main problems of trauma patients. Facial Fractures are likely to be associated with complications such as brain and spinal cord damage. With this description, this study aimed to examine the prevalence of brain and cervical damage in patients with maxillofacial fractures. The first finding of the present study was that the most important cause of maxillofacial fractures is car accidents with 61 percent. In most studies in Iran (13, 14, and 15), car accidents have also been considered as the most common cause of fractures. Also, similar results were obtained from studies of Patrocinio et al (16), Adebayo et al (17), Klenk and Kovacs (18). In a review article by Oikarinen et al (19), etiologic differences of maxillofacial fractures in Kuwait, Canada and Finland were compared. The researchers found that traffic accidents were the cause of 55 percent of fractures in Kuwait, 33 percent of fractures

in Finland and 7% in Canada. These results are consistent with information obtained by the Kuwaiti researchers who showed that Eastern countries do not observe the traffic rules. However, the percentage of injuries caused by conflict in Kuwait is (12%), Finland (37%) and Canada (54 %).

The second finding of the present study is that the mandible (51%) was the most common site of fractures in patients. This finding was consistent with the findings of Akrami Abargouei et al (20) Kamoliga et al (21), Maliska et al (22), Blasilirov and Pasry (23), Karkaovik et al (24), and it is inconsistent with research of Dongas and Hall (25). Akrami Abargouei et al (20) reported that in patients with maxillofacial fractures, the most common site of involvement is the nasal bone (67.4%) followed by mandible (18.7 percent). In this study, the most common site of involvement in the mandibular condyle (31.47 percent) and the body of the mandible (26.73 percent). Dongas and Hull in their study reached the conclusion that the fracture of the middle third of the face is the most common site of involvement.

The third finding of the study is that the most common injury of the cervical spine of the subjects of this study was bone fracture (77.8%) and cervical vertebrae dislocation (33/34 %). The findings of the study were similar to those of Mokerji et al (4). In his study, fracture and dislocation of the cervical vertebrae was a total of 63 percent and disc herniation and spinal cord contusion were 37% among the patients. The researchers also noted that 70 percent of the injuries of the cervical spine have occurred at levels of C1 / C2 or C6 / C7.

The fourth finding of this study is that among various types of skull fractures, frontal bone fracture had the highest frequency in samples of this study (37.5 percent). This is consistent with the findings of Yadave et al (26). In the study of Yadave et al (26), extradural hematoma, subdural hematoma and subarachnoid hematoma in patients with maxillofacial fractures were also reported 22, 17 and 14 percent, respectively. In this study, frontal fracture, sphenoid fracture and orbital roof fracture were 21, 11 and 14 percent respectively.

Although this study has limitations including lack of generalizability of the results, according to the findings of the study, it can be summarized that the maxillofacial fractures are accompanied by brain and spinal cord injuries and this fact was confirmed in the subjects of this study. Traffic accidents were the main cause of maxillofacial fractures in this study. World Health Organization's guidelines on the main factors in preventing accidents are as follows: the use of safety belts, helmets, seats for children, not using mobile phones while driving and improving the safety of roads. Better design of roads and highways, training courses for drivers and implementation of more serious measures should also be considered. Despite the preventive laws for mandatory use of safety devices, indices of cooperation in the society affect the performance of these safety solutions.

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