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PATTERN OF MAXILLOFACIAL TRAUMA;
A FIVE YEARS STUDY OF 3360 CASES

Dr. Tahir Ullah Khan[1], Dr. Zafar Ali Khan[2], Dr. Muhammad Usman Khalid[3], Dr. Rozi Afsar[4], Dr. Zahid Qayum[5]

1. Assistant Professor, Oral and Maxillofacial Surgery Peshawar Dental College Warsak Road Peshawar.
2. Assistant Professor, Oral and Maxillofacial Surgery Frontier Medical & Dental College, Abbottabad.
3. Assistant Professor Oral and Maxillofacial Surgery Dental Section, Punjab Medical College, Faisalabad.
4. Assistant Professor Oral and Maxillofacial Surgery Peshawar Dental College Warsak Road Peshawar.
5. Assistant Professor Oral and Maxillofacial Surgery Margalla Institute of Health Sciences, Islamabad.

Correspondence Address:
Dr. Tahir Ullah Khan
Department of Oral and Maxillofacial Surgery
Peshawar Dental College
Warsak Road Peshawar Pakistan.
dr.tahir786@hotmail.com

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ABSTRACT... Objectives: To determine the pattern of maxillofacial injuries in the local population. **Study Design:** Retrospective clinical and epidemiologic study. **Period:** January 2009 to December 2013. **Setting:** Tertiary care hospital. **Methods:** 3360 patients reported for maxillofacial injuries. A number of parameters, including age, gender, facial bone fractures, laceration on face, injury of trigeminal and facial nerve branches, sensory and motor deficit in relation to soft tissue trauma and bone fracture, were evaluated. **Results:** Males were dominant and male to female ratio was 6.3:1. Patients of 3rd decade were more and constitute 63.2%. Road traffic accident was the common etiological factor (78%). Mandible fracture was dominant and it was present in 1591 patients (47.7%). Soft tissue laceration frequency was high in cheek region and was 13.7%. Sensory deficit (Trigeminal nerve injury) was present in 1167 patients (34.7%). Motor deficit (Facial nerve injury) was present in 249 patients (6.83%). Nerve injuries in relation to mandible fracture were common. **Conclusion:** Road traffic accident was the most common etiological factor and mandible fracture was common. Trigeminal nerve injuries were common and frequency of nerve injuries was high in relation to mandible fracture.

Key words: Nerve injury, maxillofacial trauma, facial nerve, trigeminal nerve.

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INTRODUCTION

Trauma is an external impact which causes damage to human tissue. Its severity varies from minor wound to death.[1] Trauma is one of the leading cause of death.[2] Trauma to the face is most prevalent among the patients presenting to trauma centers.[3] The etiological factors of maxillofacial injuries are road traffic accidents, interpersonal violence, fall, firearm injuries, bomb blasts, sports injuries, natural disasters and work related injuries.[4]

In the past, the pattern of maxillofacial trauma was very simple. In the beginning of the 20th century Rene le Fort mapped typical locations for maxillary fractures; Rene Le Fort mapped typical locations for maxillary fractures; as Le fort I, II and III that is helpful regarding management of maxillofacial trauma. Due to modern vehicles , better roads and the resultant high speed of traffic, the injuries produced following accidents are very complex in nature. Classical le Fort fractures and single site mandibular fractures are rare today. Facial injuries may present with pain, difficulty in eating, maloccculusion, bruising, and epistaxis, visual impairment, hearing loss, difficult breathing and facial deformity depending upon the severity of injuries.[5]

Face is an important structure in body because of its functional, esthetic and social value, so trauma to the maxillofacial region needs special attention.[6,7] Additionally, the psychological impact of disfigurement associated with maxillofacial trauma can be devastating and affect the social life of a person. Due to their close proximity and frequent involvement, the vital structures in the head and neck region must be evaluated whenever the head and face are injured. There is a remarkable regional variation in the incidence, sex, age, etiology, and site distribution of maxillofacial injuries depending upon the geographic conditions, cultural characteristics, and socioeconomic trends.[8,11] There is very limited data regarding pattern of maxillofacial injuries in the local population. Most of the studies focus on pattern of

bone fractured. In this study we included pattern of bone fractured, pattern of soft tissue injuries and especially the nerve injuries. The purpose of this study was to analyze the pattern of maxillofacial trauma in the local population.

MATERIAL AND METHODS

A five years retrospective study from January 2009 to December 2013 was conducted at the department of Oral and maxillofacial surgery, King Edward Medical University Lahore, Pakistan. Data was collected from the record files of patients who were treated for maxillofacial injuries. Patients of less than ten years were excluded from the study due to poor cooperation of these patients in neurosensory examination. Details of the patients in terms of age, sex, etiology of trauma, site of trauma, bone(s) fractured, sensory and motor deficit and soft tissue injuries were obtained. All the fractures of facial skeleton were recorded separately. They were grouped separately into patients having zygomatic bone, maxilla, mandible, dento-alveolar, and two or more bones fractured. Location of lacerations on the forehead, infra-orbital, cheek, chin, lower lip and intra orally were documented separately for each area. Sensory deficit on face in the distribution of trigeminal nerve was documented for each patient. Motor deficit on face in the distribution of facial nerve was recorded for each patient. These nerve injuries were documented just after the trauma and before the surgical intervention. The etiology was further classified into road traffic accidents, assault, fire arm injuries, bomb blast, sports injuries, work related injuries and fall. SPSS version 16 was used for data analysis. Frequency, mean and standard deviations were obtained for categorical variables.

RESULTS

The total number of patients presenting with maxillofacial trauma was 3360. There were 2899(86.3%) male and 461(13.7%) female patients. The male to female ratio was 6.31 to 1.The most common etiological factor was road traffic accident and was 78%. The details of etiological factors are given in Table-I. The frequency of mandibular fractures were high as compared to other bones (Table-II). The details of laceration on face are shown in Table-III.The number of patients in which sensory deficit was present was 1167 (34.7%). The details of altered sensation in the distribution of infra orbital nerve, inferior alveolar nerve, mental nerve, and lingual nerve are shown in Table-IV. The number of patients in which motor deficit was present was 231 (6.83%). Table-V shows the injury of four branches of facial nerve i-e temporal, zygomatic, buccal and marginal mandibular.

S. No	Etiology	Frequency	Percentage
1	Road traffic accident	2621	78%
2	Fall	269	8%
3	Assault	67	2%
4	Bomb blast	101	3%
5	Fire arm	101	3%
6	Sports	33	1%
7	Industrial , work site related	168	5
Total		3360	100%

Table-I. Etiology of maxillofacial trauma (n=3360)

S. No	Name of bone fractured	Frequency	Percentage
1.	Mandible	1591	47.4%
2.	Zygomatic bone	813	24.2%
3.	Maxilla	71	2.1%
4.	Dentoalveolar	71	2.1%
5	Multiple bones	708	21.1%
6.	No fracture	106	3.2%
Total		3360	100%

Table-II. Frequency of bone fractured (n=3360)

S. No	Site of laceration	Frequency	Percentage
1.	No laceration	1626	48.4%
2.	Forehead	353	10.5%
3.	Infra orbital region	425	12.6%
4.	Cheek	460	13.7%
5.	Lower lip & chin	389	11.6%
6.	Intra oral	107	3.2%
Total		3360	100%

Table-III. Frequency of laceration on face (n=3360).

DISCUSSION:

The pattern of maxillofacial trauma varies in dif-

S.No	Name of branch	Region of altered sensation	Frequency	Percentage
1.	Infraorbital nerve	Infraorbital region	424	12.6%
2.	Inferior alveolar nerve	Lower lip	531	15.8%
3.	Lingual nerve	Tongue	0	0%
4.	Mental nerve	Lower lip	212	6.3%
5.	No nerve injury		2193	65.3%
Total			3360	100%

Table-IV. Frequency of Trigeminal nerve branches injury (n=3360)

S. No	Branch name	Facial expression lost	Nerve injury present	Percentage
1.	Temporal	Producing wrinkles on forehead	35	1.05%
2.	Zygomatic	Closure of eye	54	1.57%
3.	Buccal	Whistling	19	0.5%
4.	Mandibular	Showing teeth	88	2.63%
5.	All branches	Half face paralyzed	35	1.05%
6.	No nerve injury	Facial expressions intact	3129	93.15%
Total			3360	100%

Table-V. Frequency of Facial nerve branches injury (n=3360)

ferent regions due to different social and cultural trends. The victims of maxillofacial trauma were mainly young people (21-30 age group) and are in accordance with other studies.[13,19] This is possibly due to behavioral changes and socioeconomic and emotional conflicts to which these young adults are exposed. This age group is recognized as a phase of great personal independence, social excitement, intense mobility, careless driving on the roads, and exposure to urban violence.[20]

The higher frequency of maxillofacial trauma in males is documented in the literature.[21,23] Males are at greater risk due to their greater participation in the active population, mainly in non-developed countries, which increases their exposure to risk factors such as driving vehicles, sports that involve physical contact, an active social life and drug use, including alcohol. However, in some regions maxillofacial trauma is high in females probably due to changes in women's social behavior, including their involvement in non-domestic work, a more active social life, participation in vehicular traffic and sport[24]. Cultural and socioeconomic status have significant influence in gender prevalence rates of maxillofacial injuries. In countries such as Australia where women participate widely in social activities, the male-to-female ratios for the occurrence of maxillofacial trauma were reduced by 2:1. On the other hand, Ahmed et al reported a high prevalence of males (11:1), mostly due to cultural aspects of the United Arab Emirates, where men are usually responsible for work and few women drive vehicles.[12]

Traffic accidents were the main cause of maxillofacial injuries, supporting other international studies.[14,16,23] Despite existent traffic regulations about preventive measures such as use of seat belts, helmets and children's car seats, adherence to preventive measures is very minimal in the local population. Motorcyclists did not wear helmets despite increased exposure to maxillofacial injuries. The roads are of poor quality and the vehicles are always overloaded. The drivers rarely follow the traffic rules.

The most common bone fractured was mandible coinciding with other studies.[24,26] Mandible is more prone to be fractured during road traffic accidents because of its prominent position and its morphology. During motor cycle accidents patients usually fell down and hit the ground or hit with vehicle with which it strikes. Amir dibaie evaluated 272 patients sustaining maxillofacial injuries in 2005 at Forensic medical center of Ahwaz, Iran. They observed in their study that nasal bone fractures were high followed by dentoalve-

olar fractures. Their results contradict with our study. The reason is that in their study assault was a main etiologic factor i-e 61% and during interpersonal violence nasal bone is more easily fractured due to its prominent location and needs less force to fracture.

There is a lot of variation in frequency of trigeminal nerve injury in the literature and its incidence varies from 1% to 90%.[18,24-32] The peripheral branches of trigeminal nerve i-e supra orbital, infra orbital, inferior alveolar, mental, lingual, and masseteric nerve are injured during maxillofacial trauma. These injuries to peripheral nerve occur either due to direct transaction of nerve fibers, compression between fractured bone segments or pressure from edema of traumatized soft tissues. Nerve injury in maxillofacial trauma occur most frequently to inferior alveolar, mental and infra orbital branches because these nerves travel through mandible and zygomatic bone respectively and these bones are more prone to be fractured during maxillofacial trauma.[29,30]

Facial nerve injury varies from 1% to 7%.[33] In our patients the frequency of facial nerve injury was slightly higher because patients were examined only at their presentation. Just after trauma the soft tissue becomes swollen and patients might not perform various facial movements because of swelling and not because of true nerve injury. The other reason might be that in our study nerve were damaged due to pressure only. Among facial nerve branches, the marginal mandibular injury frequency was greater than all other branches. The frequency of mandibular branch injury is higher because it is more prone to injury due to its anatomical position. In our study, it was injured more in mandibular fractures. In most of the cases it was not due to transaction of nerve but due to compression or blunt trauma. In few cases it was transected due to fire arm and knife injury. Motor deficit was also high in relation to mandibular fractures. Marginal mandibular branch of facial nerve passes very closely to mandible so it is more prone to injury by dislocated mandibular fracture due to compression. Another reason in our study was that soft tissue injuries were more in cheeks and lips area.

The frequency of trigeminal and facial nerve damage was also high in patients who had a fracture and also soft tissue lacerations together. This indicates that soft tissue injury directly cause nerve injury as all the peripheral branches of facial nerve run in soft tissue through all their course and also some parts of peripheral branches of trigeminal nerve like infra-orbital nerve, mental nerve and supraorbital nerve can be damaged due to soft tissue laceration only.[30]

CONCLUSION

The most common cause of maxillofacial trauma was road traffic accident and the most common bone fractured was mandible. The frequency of nerve injury in maxillofacial trauma is high was special emphasis should be given on its management.

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"By failing to prepare,
you are preparing to fail."

Benjamin Franklin

AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
1	Dr. Tahir Ullah Khan	Literature review	
2	Dr. Zafar Ali Khan	Data collection	
3	Dr. M. Usman Khalid	Data collection	
4	Dr. Rozi Afsar	Composing & Literature Reivew	
5	Dr. Zahid Qayum	Statistics