LOSS OF CONSCIOUSNESS IN MANDIBULAR FRACTURES AN AUDIT OF 254 PATIENTS

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ABSTRACT

The purpose of this study was to seek association between mandibular fractures and loss of consciousness (LOC).

The present study is a retrospective chart review of 254 patients of fracture mandible at the Department of Oral and Maxillofacial surgery, Khyber College of Dentistry, Peshawar, Khyber Pukhtoonkhwa Province of Pakistan from July 2009 to July 2010. The demographic data, LOC, mechanism of injury, site of fracture and number of fractures per mandible were collected for each patient.

The frequency of LOC due to mandibular fractures in this study was 25.9%. The male to female ratio was 4.6:1. The mean age of the patients was 20.3 SD (±14.68). Age ranged from 2 years to 65 years in the group with LOC and from one year to 80 years in the group without LOC. The highest incidence of patients with LOC was found in 3rd decade of life (33.3%) while the highest incidence of patients in non LOC group was in 1st decade of life (33.5%). The most common cause of mandible fracture in patients with LOC was RTA (57.6%) followed by fall (37.9%) while in non LOC group was fall (46.8%) followed by RTA (41.5%). The most common site fractured in both groups was mandibular para-symphysis, accounting for 37% in LOC group and 38.9% in non LOC group.

In the LOC group, the predominant fracture pattern seen was non displaced fractures (51.5%), while in the non LOC group, displaced fractures were predominant (52.1%). Loss of Consciousness was more common when, there was a single mandibular fracture (54.5%), while in the non LOC group (51.6%) sustained double fractures. This observation is statistically non-significant with p- value (.18).

Key words: *Mandibular fractures, Loss of consciousness, LOC, Khyber College of Dentistry*

INTRODUCTION

Maxillofacial trauma is a major cause of mortality and morbidity world wide[1]. It not only hampers the function but also causes grim psychological and cosmetic insufficiencies.[2]Mandible is the only mobile bone of the facial skeleton which plays a major role in mastication, speech and deglutition.[3] It presents a greater number of fractures in comparison to the other facial bones, even though it is considered the strongest and most rigid bone in the facial skeleton. This could be explained by its anatomical peculiarity of form and location.[4] Mandible is the tenth most often injured bone in the body and the second most frequent facial bone to be fractured.[5, 6] In addition, excessive force of about (44.6 to 74.4 kg/m) is required to disrupt the sturdy mandibular architecture, which suggests this injury to be a significant indicator of associated trauma.[3,7]

The pattern of mandibular fracture depends on multiple factors including the amount and direction of applied force, presence of soft tissue bulk and biomechanical characteristics of the mandible such as bone density and mass or anatomic structures creating weak areas.[8] Road traffic accidents (RTA) have been reported as a leading cause of mandible fractures in many third world countries while interpersonal altercations are mainly responsible in the developed countries. The differences reflect a lack of traffic regulations including seat belt and helmet enforcements, absence of air bags in the vehicles and poor road infrastructure in the underdeveloped and alcohol abuse in the developed countries.[1]

The loss of consciousness (LOC) can be the manifestation of intracranial injury or concussion head injury.[9] It is an established consequence in many maxillofacial injuries especially mandibular fractures. The reported incidence of LOC in relation to facial fractures ranges from 10.8% to 55%.[10] The possible reason for this happening is that, the dissipation of

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energy is reduced and more force is transmitted to the cranial vault, thereby resulting in a higher incidence of LOC.[11,12]

METHODOLOGY

This study was a retrospective chart review carried out at the Oral and Maxillofacial Surgery unit of Khyber College of Dentistry, Peshawar from 1st July 2009 to 31st June 2010. The hospital records of 254 patients who sustained mandibular fractures were reviewed. The demographic data, LOC, mechanism of injury, site of fracture and number of fractures per mandible were recorded for each patient. The degree of displacement of mandibular fracture was recorded from conventional radiographs like orthopantogram (OPG), posteroanterior view of the face (PA- face), right and left lateral oblique view of the mandible. Any patient presenting with concomitant craniofacial injury was excluded from the study. In addition, any chart with disagreements in documentation for LOC was also excluded. The data was analyzed using various statistical tools and was presented in the form of tables and charts. The study hypothesis was that more the number of fractures less are the chances of loss of consciousness. Chi square test was applied and the level of significance was set as .05.

RESULTS

A total of 254 patients were recruited in the study. Amongst them, 66 patients sustained LOC, thus frequency of LOC with mandibular fractures was 25.9%. The male to female ratio in patients with mandibular fractures was 4.6:1 (Figure1).

The mean age of the sample was 20.3 years $\pm$14.68. Age ranged from 2 years to 65 years in the group with LOC and from one year to 80 years in the group without LOC. Details of the age distribution of both groups i.e., with and without LOC is given in Table-1. The most common cause of mandible fracture in patients with LOC was RTA (57.6%) followed by fall (37.9%), while in non LOC group most of the patients sustained fall (46.8%) and RTA injuries (41.5%). (Table 2)

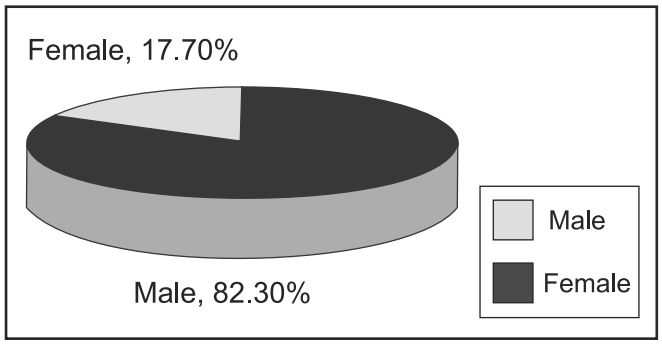

Fig 1: Gender distribution of the patients

TABLE 1: AGE DISTRIBUTION OF THE TWO GROUPS OF PATIENTS

Age in years	Patients with LOC		Patients without LOC	
	Count	%	Count	%
0-10	17	25.8%	63	33.5%
11-20	19	28.8%	50	26.6%
21-30	22	33.3%	48	25.5%
31-40	3	4.6%	10	5.3%
41-50	2	3.0%	8	4.3%
51-60	2	3.0%	2	1.1%
61-70	1	1.5%	5	2.6%
71-80	0	–	2	1.1%
Total	66	100%	188	100%

TABLE 2: MECHANISM OF INJURY OF MANDIBULAR FRACTURES

Mechanism of injury	Patients with LOC		Patients without LOC	
	Count	%	Count	%
Fall	25	37.9%	88	46.8%
RTA	38	57.6%	78	41.5%
Assault	2	3.0%	16	8.5%
Sport injury	0	–	5	2.7%
Work accident	1	1.5%	1	0.5%
Total	66	100%	188	100%

TABLE 3: DISTRIBUTION OF 411 MANDIBULAR FRACTURES IN 254 PATIENTS

Site of fracture	Patients with LOC		Patients without LOC	
	Count	%	Count	%
Dentoalveolar	6	6%	5	1.6%
Symphysis	8	8%	21	6.8%
Parasymphysis	37	37%	121	38.9%
Body	16	16%	25	8%
Angle	15	15%	56	18%
Ramus	2	2%	6	1.9%
Condyle	16	16%	77	24.8%
Total	100	100%	311	100%

The most commonly involved site of mandibular fracture in both patients with and without LOC was para-symphysis, accounting for 37% and 38.9% respectively. (Table 3)

In the LOC group, 54.5% sustained single mandibular fracture. In contrast, the non LOC group (51.6%)

TABLE 4: FREQUENCY OF SINGLE VS MULTIPLE MANDIBULAR FRACTURES

No. of fractures per mandible	Patients with LOC Count	%	Patients without LOC Count	%
Single fracture	36	54.5%	78	41.5%
Double fracture	27	40.9%	97	51.6%
Multiple fracture	3	4.6%	13	6.9%
Total	66	100%	188	100%

TABLE 5: CHI-SQUARE TESTS FOR SINGLE VS DOUBLE FRACTURES

	Value	df	P-value
Pearson Chi-Square	3.434	2	.180

sustained double fractures, p-value of .18 (Table 4 and 5). In LOC group, the predominant fracture pattern seen was non displaced fractures (51.5%) while in the non LOC group, displaced fractures were common (52.1%). Figure 2

DISCUSSION

Mandible plays an important role in mastication, speech and deglutition.[3] Though it is considered the strongest bone in the facial skeleton, it fractures more frequently as compared to other facial bones. This could be explained by its anatomical peculiarity of form and location.[4] Excessive force of about (44.6 to 74.4 kg/m) is required for the mandible to be fractured, which suggests this injury to be a significant indicator of concomitant trauma.[3,7]

Facial fractures and concomitant cranial injuries carry the significant potential for mortality and neurological morbidity. The LOC can be the manifestation of intracranial injury or concussion head injury.[9] The reported incidence of LOC in relation to facial fractures ranges from 10.8% - 55%.[10]

In the present study, the majority of patients involved in mandibular fractures were males as compared to females with the male to female ratio of 4.6:1. These results are consistent with the previously published reviews.[3,9,12,13] This high vulnerability of male gender for all types of trauma can be attributed to the facts that in Pakistani society males work outdoor and engage in risk-taking activities therefore, more vulnerable to accidents and fall injuries.[9]

In this study, the majority of victims were young adults with mean age of 20.3 years. This is in accordance with other studies.[1,3,6,14,15] This is possibly due to the fact that this age group is recognized as a phase of great personal independence, social excitement, intense mobility, careless driving on the roads, and exposure to violence. In addition, this age group represents the economically active section of society, which is more exposed to maxillofacial trauma risk factors.[14]

Published data from different studies on the etiology tend to vary from one country to another, perhaps because of the differences in social, cultural and environmental factors. RTA was found to be the most common cause of mandible fracture followed by fall in many studies.[6,9,16] This corresponded to the findings of the present study. The reasons of RTA in underdeveloped countries is due to socioeconomic conditions, violation of traffic rules, poor maintenance of vehicles, poor roads and bad driving whereas in developed countries, accidents are mostly due to alcoholic intoxication.[1,2,17] In the literature, there is a high incidence of head and cervical spine injuries associated with maxillofacial trauma in RTA victims. This is due to the fact that when a forward moving vehicle is brought to an abrupt halt, the unrestrained occupants will be thrown upwards and forwards until their movement is arrested by some part of the vehicle, or if they are forcefully ejected from the vehicle on contact with the ground or other objects. The head may come in contact with the windscreen or the roof of the vehicle and thus absorbs maximum energy of the impact.[18]

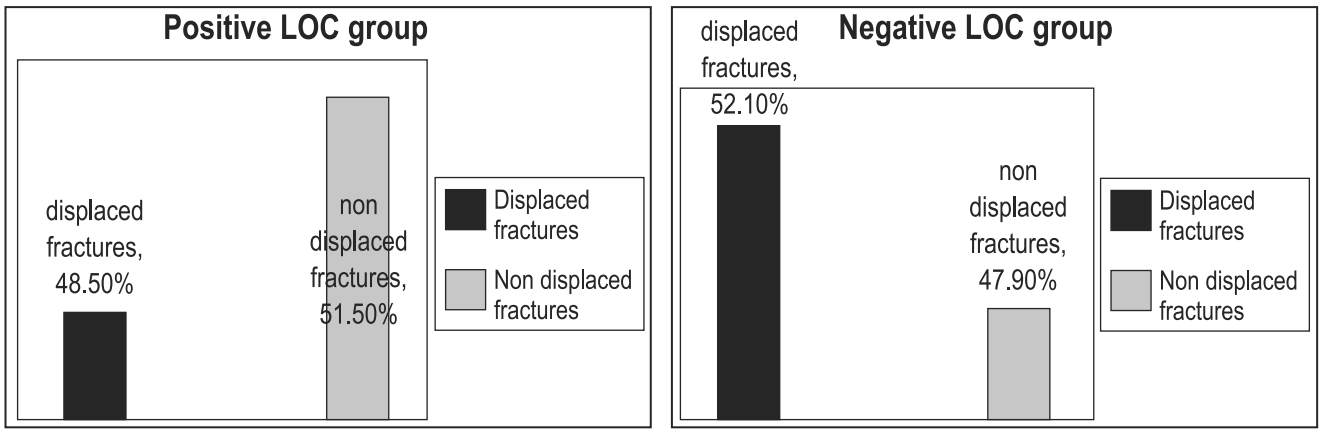

Fig 2: Degree of displacement

The most commonly involved site of mandibular fracture in patients with and without LOC was parasymphysis followed by condyle. This finding is in accordance with other studies.[1,17,19,20,21] In contrary to this, Hung[12] showed that the body/angle is the region with the highest rate of fractures. This is due to the fact that direction and magnitude of force vectors resulting from assault tend to produce isolated body or angle fracture, where as RTA or fall leads to double symphysis/ parasymphysis and condylar fractures.[19]

The present data revealed that in the positive LOC group, the majority of patients (54.5%) sustained single mandibular fracture while in the negative LOC group, the majority of patients (51.6%) sustained double fractures. It was also observed that in the positive LOC group, the predominant fracture pattern seen was non displaced fractures (51.5%) while in the negative LOC group, displaced fractures were predominant (52.1%). Overall, the severity of fractures was greater in the negative LOC group. These findings indicate that patients with multiple fracture sites within in the mandible are less likely to sustain LOC. It has been hypothesized that when the mandible sustains fewer fractures, the dissipation of energy is reduced and more force is transmitted to the cranial vault, thereby resulting in a higher incidence of loss of consciousness. Multiple fracture patterns likely serve as a neuroprotective mechanism, allowing greater dissipation of forces and resulting in less residual energy to be transmitted to the cranial vault.[12, 16, 22]

CONCLUSION

Head injury is a major cause of long-term disability and economic loss to society. Much of the neurological damage resulting from a head injury does not occur immediately, but in the minutes, hours and days that follow. It is for this reason that so much emphasis is placed on the management of head-injured patients.

Though statistically non-significant, the number of fractures is inversely proportional to the loss of consciousness. Higher the number of fractures in the mandible, less likely is the loss of consciousness which suggests that less energy of impact is transmitted to the cranial base, resulting in loss of consciousness.

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