

# The Evaluation of Mid face and Lower Face Fractures in Traumatic Patients Attended to Rasht Velayat Hospital: A Retrospective Study

## Original Article

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## Abstract

**Introduction:** The incidence and etiology of maxillofacial fractures are influenced by social, cultural, and environmental factors. Understanding the cause, severity, and temporal distribution of maxillofacial trauma provides an insight into the behavioral patterns of people from different countries and can also assist in establishing clinical and research priorities for effective treatment and prevention of these injuries.

**Materials and methods:** This is a descriptive retrospective study and its statistical population includes all traumatic patients with midface and lower face fractures, attended to from April 2015 to March 2016 Velayat Hospital in Rasht, Iran. Data collected included patients' age, gender, cause of accident, anatomical affected site, and treatment modality. A total of 430 medical records of patients with facial trauma were reviewed and then analyzed using SPSS 21.

**Results:** Patients' ages ranged from 2 to 90 years (mean age, 31 years). Most of the patients were in the 21- to 30-year-old age group. The ratio of men to women was 8:1. Majority of fractures were caused by traffic accidents (70.9%), followed by falls (12.3%), assaults (7.3%), work accidents (2.6%), and sports accidents (1.8%). Isolated midface fractures were most common (56.4%), followed by isolated lower face fractures (26%). Midface and lower face fractures accounted for 17.6% of the total fractures. Approximately 79.5% of patients were treated by open procedures, 15.9% with closed reduction, 3.2% using both procedures, and 1.3% received no treatment.

**Conclusion:** This retrospective study revealed that the most common cause of midface and lower face fractures were traffic accidents. A majority of the fractures occurred in people aged 20–30 years. Open reduction and internal fixation methods were more commonly used than closed ones.

### Key words:

•Mandibular Fractures •Patients •Wounds and Injuries •Prevalence.

## Introduction

Patients with maxillofacial trauma are among the most commonly seen cases in Oral and Maxillofacial Surgery Clinics. Maxillofacial fractures are often associated with severe morbidity, functional deficit, disfigurement, and significant financial cost.<sup>(1,2)</sup> The incidence, patterns, and etiology of maxillofacial fractures vary from one country to another and even within the same country, influenced by geographic location, socioeconomic status of the cohort, cultural factors, and the period of investigation.<sup>(3,4,5,6)</sup>

Several causes of maxillofacial fractures have been reported.<sup>(7)</sup> The primary causes reported worldwide are traffic accidents, assaults, falls, and sport injuries.<sup>(8)</sup> According to reports from developing nations, traffic accidents are the primary cause of maxillofacial fractures<sup>(9)</sup>, while data from developed countries point toward assaults as the most frequent etiology of such fractures.<sup>(9,10)</sup>

Understanding the cause, severity, and temporal distribution of maxillofacial trauma permits establishment of clinical and research priorities for effective treatment and prevention of these injuries.<sup>(10,11,12)</sup> There are numerous published reports on the incidence of craniomaxillofacial injuries from different countries. The aims of the present study were to review, analyze, and report the etiology and pattern of mid and lower facial fractures in 430 patients, attended to our trauma center Iran, Velayat Hospital, from April 2015 to March 2016.

## Materials and Methods

This is a descriptive, retrospective study and its statistical population included all traumatic patients with midface and lower face fractures, attended to Velayat Hospital from April 2015 to March 2016. This hospital is primarily directed toward trauma and receives major trauma cases from Rasht and its suburban areas.

The data of 430 patients with craniomaxillofacial fractures were retrieved, reviewed, and analyzed. The diagnosis of a fracture is performed by maxillofacial surgeons, based on the clinical history, signs and symptoms, visual findings, manual examination, and correct interpretation of radiographs.

Patients admitted for isolated upper facial

fractures or soft tissue lacerations were excluded from the study. The primary analysis outcome measures included the patients' name, file number, age, gender, occupation, cause of accident, anatomical affected site, and treatment modality. Maxillofacial fractures were distributed according to their etiological factors in traffic accidents (automobile, motorcycle, bicycle, and pedestrian motor vehicle accidents), assaults, falls, sports, work-related accidents, and others (gunshots, animal attacks,...). The fractures were classified as mid face fractures and lower face fractures. Mid face fractures were divided into nasal fractures, LeFort I, II, and III fractures, naso-orbital-ethmoid (NOE) fractures, zygomaticomaxillary complex fractures, dentoalveolar fractures, orbital fractures, and other fractures. Lower face fractures were also divided into subcondylar fractures, condylar head or neck fractures, coronoid fractures, ramus fractures, dentoalveolar fractures, mid symphysis or parasymphysis fractures, and mandibular body or angle fractures.

The study also included treatment modalities that were divided into surgical interventions (requiring at least one intervention for reduction and/or fixation of the facial fractures) and untreated cases (comprising patients who had refused treatment, had been referred to other facilities, or died before treatment). The surgical interventions used were closed reduction (with arch bars, eye loops, and intermaxillary fixation) or open reduction and fixation of bone segments with wiring technique or internal rigid fixation with plates, miniplates, and screws, as appropriate. For each case, data were recorded on a special data sheet and subsequently transferred to an Excel spreadsheet for further analysis.

Descriptive statistics and statistical analysis for significance were performed using SPSS version 21.0 software. Student's t-test was performed for parametric data, and Chi square tests were performed for nonparametric data. P values <0.05 were regarded to be significant.

## Result

### Demographic pattern of the patients and trauma mechanisms

Of the 381 patients, 339 (73.7%) male and 42 (26.3%) female patients were included in this study and the male-to-female ratio was 8:1. Mean

age was 31 years, with a range of 2–90 years. Majority of the patients ( $n = 133$ , 34.9%) were aged between 20 and 30 years and were predominantly male. The most common cause of injuries were traffic accidents, accounting for 70.9% ( $n = 270$ ) of the sample, followed by falls 12.3% ( $n = 47$ ) and assaults 7.3% ( $n = 28$ ) (Figure 1). No statistically relevant data were identified between gender, age group, and trauma causes. Table 1 illustrates the age and gender distribution. Regarding the patients' social activity (Figure 2), 53.3% of them were self-employed and 16.8% of the others were students.

### Type of injury

Of the 430 patients, 381 had mid and lower facial fractures and 49 had other skeletal injuries or soft tissue injuries of the craniofacial region.

### Midface fractures and cause of Injury

Among 282 patients with mid face fractures, 215 patients had isolated midface fractures and 67 patients had midface fractures associated with mandibular fractures. The most common fracture site was the zygomaticomaxillary complex and orbital (18.1%), followed by the nasal complex (14.2%), NOE fractures (13.5%), and Le Fort III fractures (9.2%) (Figure 3). Midface fractures were most often caused by traffic accidents (162 patients), followed by falls (19 patients) and

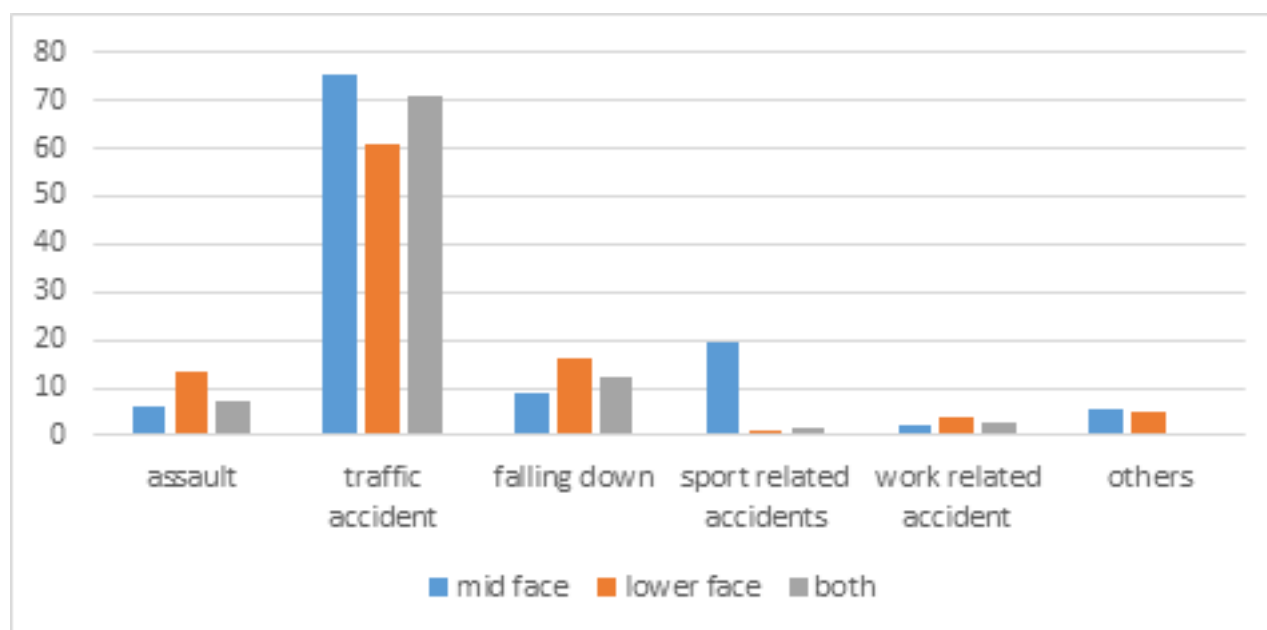
assaults (13 patients) (Figure 1). The incidence of isolated nasal fractures was higher among patients with assault- and work-related trauma and that of zygomaticomaxillary complex and orbital fractures was higher among patients with traffic accidents, falls and sports-related trauma (Figure 3).

### Lower face fractures and cause of injury

A total of 166 patients (43.6%) had lower face fractures (99 with isolated mandibular fractures and 67 with associated midface fractures). The most common mandibular fracture site was the dentoalveolar region (16.9%), followed by the body (12%) and the angle region (9.6%) (Figure 4). Among traffic accident fractures (270 patients, 70.9%), the dentoalveolar region was most frequently involved (21 patients, 12.7%). Similar trends were observed for falls fractures. Among assault-related fractures, the mandibular angle was the most common (3 patients, 1.8%) (Figure 4).

### Treatment

More than half (50.8%) of the cases underwent open reduction and internal fixation and 49.2% were treated with closed methods (Table 2). This reflects that the current trend of treatment is toward open reduction and internal fixation.



**Figure 1.** Causes of injuries in relation to the site of fractures in 381 maxillofacial trauma patients.

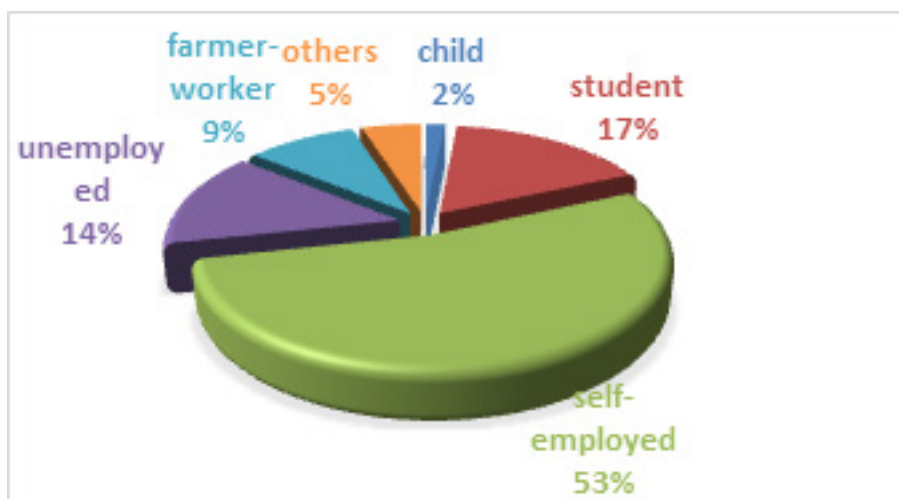


Figure 2. Social activity distribution of the patients in our study.

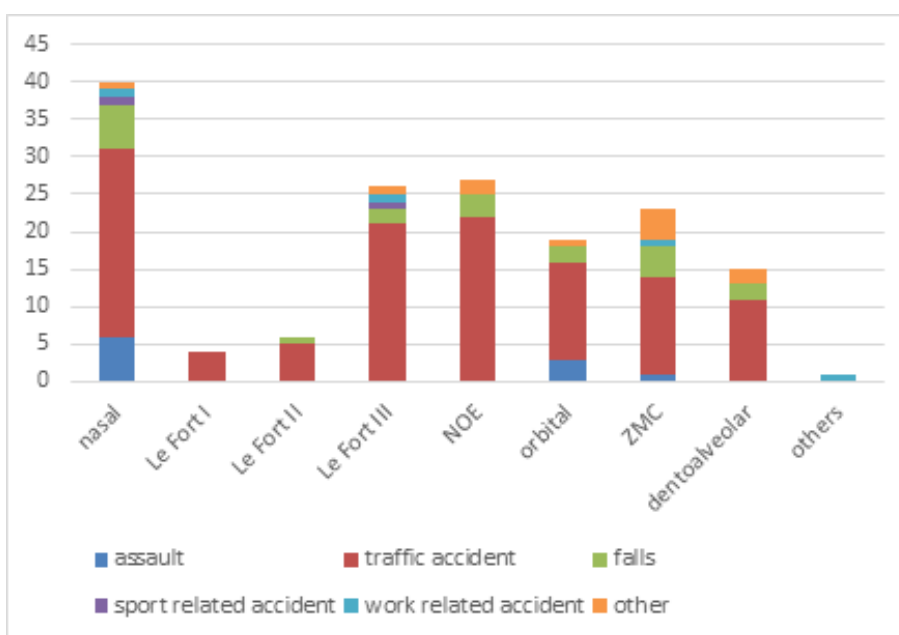


Figure 3. Site and etiology distribution of isolated mid face fractures.

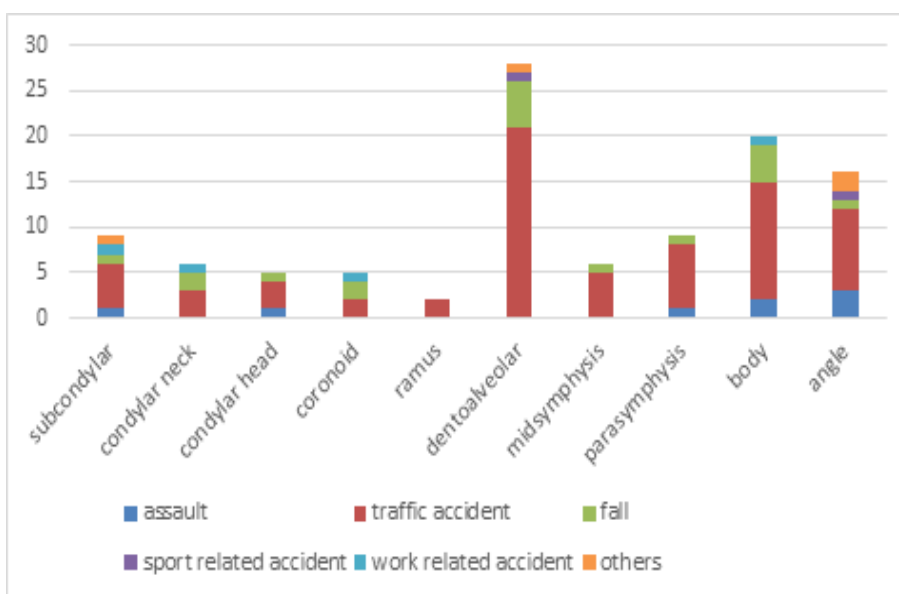


Figure 4. Site and etiology distribution of isolated lower face fractures.

**Table 1.** Age and gender distribution of patients in our study

Age group	Male	Female	Total
0–10	10	7	17
10–20	77	7	84
20–30	122	11	133
30–40	46	5	51
40–50	47	5	52
>50	37	7	44
Total	339	42	381

**Table 2.** Treatment modalities for mid face and lower face fractures

Age group	Number of patients	%
Open reduction	245	79.5
Closed reduction	49	15.9
Open + closed reduction	10	3.2
No treatment	4	1.3
Total	308	100

## Discussion

Epidemiological surveys vary with geographic region<sup>(5)</sup>, population density, socio-economic status, regional government, time, and type of facilities in which the study was conducted. This study was conducted to evaluate the epidemiological data of the pattern of fractures of the facial skeleton and its relation to various etiological factors.

The results revealed that the highest incidence of fractures was observed in people aged 21–30 years. These findings are similar to other studies that indicate that young people suffer more trauma.<sup>(9,10,13,14,15)</sup>

A possible explanation for this result was that individuals aged between 20 and 30 years frequently take part in dangerous exercises and sports, drive motor vehicles carelessly, and are more likely to be involved in violence.<sup>(10)</sup>

As would be expected, there was a male preponderance, with 73.7% of the cases being men and 26.3% being women, in the ratio of 8:1. This can be explained by the fact that the majority of such casualties result from traffic accidents, falls, assaults, work-related accidents, and violence, where men are more often involved.<sup>(4,13,16,17,18)</sup>

The results of our study indicate that the most frequent cause of maxillofacial fractures were traffic accidents. In the Middle East, the primary

cause of maxillofacial fractures still appears to be motor vehicle accidents. The reasons for this high frequency are difficult to postulate, but it may be due to the following factors:

- \* inadequate road safety awareness,
- \*unsuitable road conditions without expansion of the motorway network,
- \*violation of speed limit,
- \*old vehicles without safety features such as anti-burst locks and energy-absorbing materials,
- \*failure to wear seatbelt or helmets,
- \*entry into opposite traffic lane,
- \*violation of the right of the way,
- \*violation of highway code,
- \*use of alcohol or other intoxicating agents,
- \*inexperienced, young drivers, and
- \*behavioral disorders and sociocultural insufficiencies of some drivers.<sup>(9)</sup>

Recently, assault has also been found to be the most common etiology of facial trauma in several urban centers in developed countries. Heachl et al.<sup>(14)</sup> in Austria, Iida et al.<sup>(5)</sup> in Germany, and Laski et al.<sup>(19)</sup> in the United States demonstrated that developed countries have an increased incidence of interpersonal violence that becomes a leading cause of facial injury.

With the implementation of programs to reduce road traffic accidents and the advances in restraints, the ease of acquiring weapons, and increasingly aggressive behavior in urban centers, assaults have replaced road accidents as the leading cause of maxillofacial trauma in these regions.<sup>(10)</sup> In this study, isolated mid facial fracture was the most common type of craniomaxillofacial fracture. This is consistent with findings in some other studies<sup>(20)</sup> but different from other studies showing higher rates of mandibular fractures.<sup>(7,21,22)</sup>

In our study, the most common site of mandibular fracture was the dentoalveolar region, followed by the body of the mandible. This is in agreement with some studies<sup>(23,24)</sup>, but not with others, in which the angle<sup>(25)</sup>, condyle<sup>(5)</sup>, or parasymphysis<sup>(26)</sup> was the most common site of fracture.

Treatment of maxillofacial fractures varies from surgeon to surgeon and also depends on available instruments. However, treatment should relate more to the type of injury than to the desire of an individual surgeon to practice a particular technique.<sup>(9,27)</sup>

In our study, most of the patients were treated using open procedures. This is in contrast to the previous studies by Ahmed et al.<sup>(13)</sup>, Ansari<sup>(9)</sup>, and Erol et al.<sup>(4)</sup> in which closed reduction was more frequently used.

### Conclusion

This retrospective survey of 381 cases of facial fractures shows that the most common cause of fractures were traffic accidents. The second most common cause was a fall from height, followed by assault. Majority of fractures occurred in people aged 20–30 years. Open reduction and internal fixation methods were more commonly used than closed ones. Legislation on preventive measures should be enforced and followed by every citizen.

### References

1. Kieser J, Stephenson S, Liston PN, Tong DC, Langley JD. Serious facial fractures in New Zealand from 1979 to 1998. *Int J Oral Maxillofac Surg.* 2002;31:206–209. doi: 10.1054/ijom.2002.0208.
2. Lim LH1, Lam LK, Moore MH, Trott JA, David DJ.. Associated injuries in facial fractures: review of 839 patients. *Br J Plast Surg.* 1993;46:635. doi: 10.1016/0007-1226(93)90191-D.
3. Cavalcanti AL, Bezerra PKM, D. Moraes de Oliveira DM, Granville-Garcia AF. Maxillofacial injuries and dental trauma in patients aged 19–80 years, Recife, Brazil. *Rev Esp Cir Oral Maxilofac.* 2010; 32:11–16.
4. Erol B, Tanrikulu R, Görgün B. Analysis of demographic distribution and treatment in 2,901 patients (25-year experience). *J Craniomaxillofac Surg.* 2004;32:308–313. doi: 10.1016/j.jcms.2004.04.006.
5. Iida S, Kogo M, Sugiura T, Mima T, Matsuya T. Retrospective analysis of 1,502 patients with facial fractures. *Int J Oral Maxillofac Surg.* 2001;30:286–290. doi: 10.1054/ijom.2001.0056.
6. Subhashraj K, Ramkumar S, Ravindran C. Pattern of mandibular fractures in Chennai, India. *Br J Oral Maxillofac Surg.* 2008;46:126–127. doi: 10.1016/j.bjoms.2006.10.004.
7. Al-Khateeb T, Abdullah FM. Craniomaxillofacial injuries in the United Arab Emirates: a retrospective study. *J Oral Maxillofac Surg.* 2007;65(6):1094-101.
8. Van den Bergh B, Karagozoglu K. H, Heymans M. W, Forouzanfar T. Aetiology and incidence of maxillofacial trauma in Amsterdam: A retrospective analysis of 579 patients. *Journal of Craniomaxillofacial surgery.* 2012; 40: 165- 169.
9. Ansari MH. Maxillofacial fractures in Hamedan province, Iran: a retrospective study (1987-2001). *J Craniomaxillofac Surg.* 2004;32:28-34.
10. Brasileiro BF, Passeri LA. Epidemiological analysis of maxillofacial fractures in Brazil: A 5-year prospective study. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2006;102(1):28-34. Epub 2006 22.
11. Gassner R1, Tuli T, Hächl O, Rudisch A, Ulmer H. Cranio-maxillofacial trauma: a 10 year review of 9543 cases with 21067 injuries. *J Craniomaxillofac Surg* 2003;31:51-61.
12. Gassner R, Tuli T, Hächl O, Moreira R, Ulmer H. Craniomaxillofacial trauma in children: a review of 3,385 cases with 6,060 injuries in 10 years. *J Oral Maxillofac Surg.* 2004;62:399-407.
13. Ahmed HE, Jaber MA, Abu Fanas SH, Karas M. The pattern of maxillofacial fractures in Sharjah, United Arab Emirates: A review of 230 cases. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2004; 98: 166e170.
14. Hächl O, Tuli T, Schwabegger A, Gassner R. Maxillofacial trauma due to work related accidents. *Int J Oral Maxillofac Surg* 2002; 31: 90e93.
15. Naveen Shankar A, Naveen Shankar V, Hegde N, Sharma, Prasad R. The pattern of the maxillofacial fractures- A multicenter retrospective study. *Journal of Craniomaxillofacial Surgery.* 2012; 40: 675- 679.
16. Iatrou I, Theologie-Lygidakis N, Tzerbos F. Surgical protocols and outcome for the treatment of maxillofacial fractures in children: 9 years' experience. *J Craniomaxillofac Surg.* 2010; 38(7): 511e516.
17. Li R, Wang H, Guo L, Tang W, Long J, Liu L, et al. Analysis of maxillofacial fracture victims in the Wenchuan earthquake and Yushu earthquake. *Dent Traumatol.* 2010; 26: 454e458.

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18. Kostakis G, Stathopoulos P, Dais P, Gkinis G, Igoumenakis D, Mezitis M, et al. An epidemiologic analysis of 1142 maxillofacial fractures and concomitant injuries. *Oral Surg Oral Med Oral Pathol Oral Radiol.* 2012; 114: s69- s73.
19. Laski R, Ziccardi VB, Broder H, Janal M. Facial trauma: a recurrent disease, The potential role of disease prevention. *J Oral Maxillofac Surg.* 2004;62:685-8.
20. Subhashraj K, Nandakumar N, Ravindran C. Review of maxillofacial injuries in chennai (India): a study of 2748 cases. *British j of Oral & maxillofacial surgery.* 2007; 45(8):637-639.
21. Motamedi MHK. An assessment of maxillofacial fractures: A 5-year study of 237 patients. *J Oral Maxillofac Surg.* 2003;61:61.
22. Hussain SS, Ahmad M, Khan MI, Anwar M, Amin M, Ajmal S, et al. Maxillofacial trauma: Current practice in management at Pakistan Institute of Medical Sciences. *J Ayub Med Coll Abbottabad.* 2003;30:8.
23. Ugboke VI, Odusanya SA, Fagade OO. Maxillofacial fractures in a semi-urban Nigerian teaching hospital. A review of 442 cases. *Int J Oral Maxillofac Surg.* 1998;27:286-9.
24. Ellis E, Moos KF, el-Attar A. Ten years of mandibular fractures: an analysis of 2,137 cases. *Oral Surg Oral Med Oral Pathol.* 1985; 2: 120e129.
25. Ogundare BO, Bonnick A, Bayley N. Pattern of mandibular fractures in an urban major trauma center. *J Oral Maxillofac Surg.* 2003;61:713.
26. al-Qurainy IA, Stassen LF, Dutton GN, Moos KF, el-Attar A. The characteristics of midfacial fractures and the association with ocular injury: A prospective study. *Br J Oral Maxillofac Surg.* 1991;29:291.
27. Bataineh AB. Aetiology and incidence of maxillofacial fractures in the north of Jordan. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 1998;86: 31-35.