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Original Article

Influence of the impacted mandibular third molars on fractures of the mandibular angle and condyle – A prospective clinical study

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ABSTRACT

Aims: This study was set out to evaluate the relationship between the presence and absence of unerupted mandibular third molar and fracture of mandibular angle/condyle, and to analyse if prophylactic removal of symptom-free unerupted mandibular third molar is beneficial.

Methods: Hundred patients of mandible fracture were selected randomly irrespective of age, sex, caste, creed and socio-economic status. Data were collected from the patients on the basis of history, clinical examination and radiographs for the following information: age, sex, aetiology of fracture, presence and status of the mandibular third molar and location of mandible fracture.

Results: In group A (partially/completely unerupted mandibular 3rd molar), the incidence of angle and condylar fracture was 44.44% and 13.33%, respectively, whereas in group B (fully erupted/missing mandibular third molar), the incidence of angle fracture was 14.45% and the incidence of condylar fractures was 31.77%.

Conclusion: Practice of prophylactic removal of mandibular third molar and resultant strengthening of angle region should be reconsidered, as it increases the risk of fracture at condylar region which is difficult to treat and associated with more morbidity.

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1. Introduction

The mandible occupies a very prominent and vulnerable position on the face since the projected chin is favoured target of adversary. The road traffic accidents, assaults, falls, sports

events and pathological fractures are among the major causes of mandibular fracture. The mandible has been compared to an archery bow, which is strongest at its centre (symphysis) and weakest at its ends (condyle), where it fractures often. It is the nature's bestowment on us that it is the condyle fracture which prevents the force of trauma to reach the base of skull.

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Table 1 – Gender distribution in both groups.

Sex	Group A (n = 31 patients and 45 fracture site)	Group B (n = 69 patients and 107 fracture site)	Total
Male	30	66	96
Female	1	3	4
Total	31	69	100
$\chi^2 = 0.070$; $df = 1$; $p = 0.791$; not significant.			

Table 2 – Distribution of aetiology.

Aetiology	Group A	Group B	Total
Vehicle accident	25	42	67
Inter-personal fight (assaults)	4	10	14
Fall	2	15	17
Other	0	2	2
Total	31	69	100
$\chi^2 = 5.126$; $df = 3$; $p = 0.163$; not significant.			

It has been observed that a relationship exists between the presence of unerupted mandibular third molar (M3) and fracture of the mandible. The presence of M3 decreases the cross-sectional area of bone, as a result of which angle fracture becomes more common.¹ Based on this evidence, removal of M3 to decrease the risk of angle fracture has been advocated.^{1–3}

However, it is observed that patients without M3 were more likely to have condyle fracture than those with M3.^{2,4} Moreover, treatment of condyle fracture is much more difficult than angle fracture. The condylar fractures are associated with many operative and postoperative complications, such as pain, restricted mandibular movement, muscle spasm, deviation of the mandible, malocclusion and pathological changes in temporomandibular joint, facial asymmetry and ankylosis.^{5,6} The condylar fracture may also be associated with fracture of tympanic plate, mandibular fossa fracture, displacement of the condylar segment into middle cranial fossa and growth disturbances.⁷ As the complications related with condylar fracture are more than those with angle fracture, it would be beneficial to retain asymptomatic unerupted mandibular third molar than to go for its prophylactic removal.⁸

2. Aim and objective

The aim of this study was to evaluate the relationship between the presence/absence of M3 and fracture of mandibular angle/condyle and to analyse if prophylactic removal of symptom-free M3 is beneficial.

3. Materials and methods

Subjects for the present study were selected from amongst the patients treated for mandibular fracture in the Department of Oral and Maxillofacial Surgery, Punjab Government Dental College and Hospital, Amritsar, India from November 2008 to July 2010. This prospective study was conducted after getting permission from university ethical committee. Hundred patients of mandible fracture were selected randomly irrespective of age, sex, caste, creed and socio-economic status. Data were collected from the patient's record for the following information – age, sex, aetiology of fracture, presence and status of the mandibular third molar and location of mandible fracture. In the present study, the mandibular fracture was classified into five regions: condyle, ramus, angle, body and symphysis (Kelly and Harrigan).⁹ From the obtained information, the patients were divided into two groups. Group A included patients with single or multiple fracture of mandible with partially/completely impacted M3. Group B included patients with single or multiple fracture of mandible with fully erupted/missing mandibular third molar. The data were analysed using a statistical package for social sciences (SPSS software 15.0).

4. Results

The present study was conducted on a total of 100 patients (152 sites of mandible fractures) randomly divided into two groups. Group A (31 patients with 45 fracture sites) included patients with M3 and group B (69 patients with 107 fracture sites) included patients in whom either mandibular third molar was erupted or absent (Table 1).

Road traffic accident was the most common cause of mandible fracture in both the groups (Table 2). The statistical analysis showed that the age of patients was a significant factor and it was observed that group B patients were older than group A patients (Table 3).

There was no significant relation between angle/condyle fractures and status of mandibular third molar in either of the groups as far as the single fracture site is concerned (Table 4).

The relation of multiple site of mandible fracture and status of mandibular third molar was observed. The incidence of angle with symphysis fracture (64.3%) was found to be significantly higher when mandibular third molar was unerupted (group A), although the condylar fracture associated with symphysis fracture was more observed with erupted or absent mandibular third molar group (group B) (Table 5).

A statistically significant relation was found between overall incidence of mandibular fractures and position of mandibular third molar. In group A, the overall incidence of angle and condylar fracture was found to be 44.44% and

Table 3 – Average age of patients in both groups.

Group	No of patients	Mean $\pm$ SD	't' value	p value	Significance
A	31	26.74 $\pm$ 9.83	2.606	0.011	Significant
B	69	34.04 $\pm$ 14.12			

Table 4 – Distribution of single fracture site in both groups.

Fracture site	Group A (n = 31 patients and 45 fracture site)	Group B (n = 69 patients and 106 fracture site)	χ^2	df	p value
Angle	8 (47%)	10 (27.02%)	1.855	1	0.173 ^{NS}
Condyle	2 (11.7%)	4 (10.8%)	0.016	1	0.8993 ^{NS}
Symphysis	5 (29.4%)	15 (40.5%)	0.421	1	0.516 ^{NS}
Body	2 (11.7%)	7 (18.9%)	0.356	1	0.551 ^{NS}
Ramus	0	1 (2.7%)	0.454	1	0.500 ^{NS}
Total	17	37			

^{NS} $p > 0.05$; not significant.

Table 5 – Distribution of multiple fracture sites in both groups.

Fracture	Group A	Group B	χ^2	df	p value
Angle + Symphysis	9 (64.28%)	6 (18.7%)	6.938	1	0.008 ^{**}
Condyle + Symphysis	3 (21.4%)	18 (56.2%)	3.472	1	0.062 ^{NS}
Symphysis + Bilateral Condyle	0	6 (18.7%)	2.868	1	0.090 ^{NS}
Symphysis + Ramus	0	0	–	–	–
Angle + Condyle	1 (7.14%)	0	2.248	1	0.134 ^{NS}
Angle + Angle	1 (7.14%)	0	2.248	1	0.134 ^{NS}
Condyle + Condyle	0	0	–	–	–
Symphysis + Body	0	2 (6.25%)	0.917	1	0.338 ^{NS}
Total	14	32			

^{NS} $p > 0.05$; not significant.
^{**} $p < 0.01$; significant at 1% significance level.

Table 6 – Overall incidence of fracture.

Site	Group A	Group B
Angle	20 (44.44%)	16 (14.45%)
Condyle	6 (13.33%)	34 (31.77%)
Symphysis	17 (37.77%)	47 (43.9%)
Body	2 (4.4%)	9 (8.41%)
Ramus		1 (0.93%)
Total fracture site	45	107
$\chi^2 = 17.12$; df = 4; $p = 0.0018$; Significant at 1% significance level.		

13.33%, respectively, while in group B, the condylar fracture (31.77%) was more common than the angle fracture (14.45%) (Table 6). These results signify that the angle fracture is commonly associated with unerupted mandibular third molar, whereas the incidence of condylar fracture is common when mandibular third molar is either erupted or absent.

5. Discussion

Several factors have been proposed to influence the location of mandible fractures, including site, force and direction of impact, systemic disease, bony pathology and presence of impacted teeth.^{10,11} Many authors have reported that patients with unerupted mandibular third molars are more likely to have an angle fracture than those patients without unerupted mandibular third molars.^{2,10,12,13} The possible explanation for this relationship is that mandibular third molars weaken the mandible by decreasing the cross-section area of bone.^{10,14,15} Krimmel et al.¹⁶ reported that mandibular angle region with an impacted third molar is an area of lowered resistance to external forces. This observation has also been confirmed by the

experimental studies on monkey mandible. Rettzik et al. performed a study on monkey and described that the mandible with unerupted third molars required 40% less force to be fractured than the mandible with fully erupted third molar.¹⁷

In our study, we also observed the incidence of condylar/angle fractures in relation to mandibular third molar and found that the incidence of condylar fractures was higher in the patients having erupted/absent mandibular third molar (group B, 31.77%), whereas angle fracture was more common where the mandibular third molar was partially/completely unerupted (group A, 44.44%).

Similar observation was made by Zhu et al.¹ They found a relation between presence of unerupted mandibular third molar with incidence of condyle fracture and provided strong clinical evidence to suggest that the removal of unerupted mandibular third molar predisposes the mandible to condyle fracture.^{13,14} This suggests that if the mandibular angle region is made more resistant to fracture under a traumatic force, such trauma would create a fracture elsewhere and specially in the mandibular condyle.

In terms of the precise reduction and fixation of mandibular fractures, difficulties are often encountered in repositioning the condylar fragments and performing accurate placement of the plate and screws. In addition, there is the possibility of facial nerve injury. On the other hand, excellent reduction and stable fixation in angle fractures are easily performed because the access and visibility to the angle fractures for the plating are much better.²

Thus, it might not be appropriate to strengthen the mandibular angle region and to make the mandible more vulnerable to condylar fractures by means of removing the unerupted third molars, because the treatment of condylar fractures is more challenging than that of angle fractures.

Therefore, the prophylactic removal of symptom-free unerupted third molars may not be beneficial as means for reducing the chances of angle fracture in those patients at risk of maxillofacial trauma.

Mandibular third molars were seen more frequently in teenage patients and in patients in their twenties than those in their thirties or forties. This probably explains why mandibular angle fractures were more frequent among teenagers or people in their twenties, and why those in their thirties or forties are more vulnerable to a mandibular condyle fracture.¹⁴ Similar relation was also observed in our study and we found that group A (impacted third molar) patients were younger group than group B (erupted/absent third molar) patients.

Hence, it can be emphasised that prophylactic removal of unerupted mandibular third molar is not beneficial as it leads to an increase in the incidence of condylar fractures, which is difficult to treat and associated with more morbidity.¹⁸

An additional interesting finding in our study was a statistically insignificant relation between single fracture site and status of mandibular third molar. This implies that a single fracture caused by a direct impact was not related to the status of mandibular third molar. It has already been proposed that when large direct forces are applied to a small area of the mandible, the fracture will occur at the point of impact, regardless of the architecture of the mandible at the site.² Therefore, the majority of the patients who have a high force of impact at chin region would result in a parasymphysis fracture though this area has the largest cross-sectional area. The indirect impact transmitted along the mandible creates another fracture site and this site is decided by the local bony architecture and status of mandibular third molar. Although in our study the relationship between fracture and position of impacted third molar was not observed, a recent study observed this relation and concluded that no relation appeared to exist between M3 position and fracture pattern.¹⁹

6. Conclusion

On the basis of the results of the present study, it can be concluded that the incidence of angle fracture is commonly associated with unerupted mandibular third molar, whereas the incidence of condylar fracture is more common when mandibular third molar is either erupted or absent.

Thus, the presence of a third molar protects the subcondylar region, by permitting fracture preferentially at the angle of the mandible. Practice of prophylactic removal of symptom-free mandibular third molar and resultant strengthening of angle region should be reconsidered, as it increases fracture at condylar region, which is difficult to treat and associated with more morbidity.

Conflicts of interest

The authors have none to declare.

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