

RETAINING OR EXTRACTING A TOOTH IN THE LINE OF MANDIBULAR FRACTURE — A STUDY

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ABSTRACT

The purpose of the study was to compare the treatment outcome of extractions and non-extractions of teeth in the lines of mandibular fractures and to determine the most common complications. A Quasi-experimental study was undertaken in the Department of Oral and Maxillofacial surgery, Khyber college of Dentistry Peshawar from January 2007 to January 2008. A total of 100 patients having tooth in the line of mandibular fracture were recruited in the study. The patients were divided into two groups of 50 patients each. In Group A the tooth was retained in the line of fracture, and while in Group B the tooth was extracted. Each patient was evaluated for postoperative results and the differences between them assessed. Statistical analysis included chi-square test. Results were considered significant if $p < 0.05$. Majority of the patients were young adults. The most common site was parasymphysis while the most commonly involved teeth in the fracture line were incisors. The major operative morbidity proved to be infection followed by malunion and malocclusion. Both groups were not different in relation to postoperative infection ($P = 0.461$), malocclusion ($P = 0.5577$), malunion ($P = 0.5577$) delayed union and non-union. There was no significant difference in the outcome between the extraction and non-extraction of a tooth in the line of fracture.

Key words: Mandibular fractures, Tooth in fracture line, Khyber College of Dentistry, Peshawar.

INTRODUCTION

Restoration of the mandibular functions in particular, as part of the stomagnathic system must include the ability to masticate properly, to speak normally and to allow articular movements.

Different treatment modalities are available for the mandibular fractures. They are firstly, intermaxillary fixation (IMF) alone by dental wiring, arch bars and Gunning splints. Secondly, IMF with osteosynthesis without intermaxillary fixation by miniplates, non-compression plates, compression plates and lag screws. Treatment of fractured mandible, irrespective of treatment modality is associated with different complications such as infection, malocclusion, malunion, non union, delayed union, limited mouth opening and

sensory disturbances. Nearly all mandibular fractures in the teeth bearing area are compound fractures, in contact with the oral cavity through periodontal ligament and gingival sulcus.^{1,2,3}

The damage to the tooth or teeth involved at the fracture site may include exposure of the root surface, subluxation, avulsion or root fracture. The tooth involved may become devitalized as a result of injury or may have a pre-existing pulpal, periodontal or periapical conditions of pathology. All these factors either alone or combined can predispose the fracture to infection and may complicate healing.⁴

The presence of teeth may be one of the determinants of mandibular fractures. Similarly, the incidence, treatment methods, healing rate and post treat-

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ment complications of these fractures may also be influenced to a greater or lesser degree by the state of the dentition.⁵ The fate of the tooth in the fracture line and its effect on bone healing remain an important outcome event. Tooth in the line of fracture needs special consideration and a decision has to be made whether to remove the tooth from the line of fracture.⁶ Making a decision to extract or preserve the tooth in the fracture line is a complex process and there is still a controversy on the appropriate management.⁷ In the past, teeth in the line of fracture were always removed because some authorities recommend that tooth in the line of fracture is a contributory factor and increases the risk of post operative complications,⁸ but today the opinions are different, and they suggest that fracture do not pose any problem unless its badly damaged or periodontally involved,⁹ and majority of them can be saved if appropriate antibiotic therapy and fixation techniques are used.¹⁰

METHODOLOGY

This Quasi experimental study was carried out in the Department of Oral and Maxillofacial surgery, Khyber College of Dentistry, Peshawar. It is a tertiary care hospital, where cases are referred from all over the province of Khyber Pakhtunkhwa, Pakistan and adjoining tribal areas (FATA). The duration of the study was one year from 10th January 2007 till 9th January 2008. A total of 100 patients were studied with mandibular fracture and having tooth in the line of fracture. They were divided into two treatment groups (group A & group B) by lottery method. Each group had 50 patients. In group A the tooth was retained in the line of fracture while in group B the tooth was extracted. While, known diabetes mellitus, patients taking steroids, patients presenting more than 7 days after

fracture and comminuted fractures with gunshot injuries were excluded from the study. Orthopantomogram (OPG) was the standard radiograph and when required was supplemented by lateral oblique view, intraoral periapical x-rays, posterior-anterior (P.A) and lower occlusal view. Informations were collected and the data were used to fill up a specially designed proforma.

A certain criteria were set for extraction of a tooth in the line of fracture like excessive mobility, root exposure due to distraction of the fracture, tooth vertical split fracture with pulp exposure and caries with pulp exposure.

The patients were assessed after an average period of 10 days and 6 weeks. The outcome was assessed in terms of infection, union, mal-union, delayed union, non-union and malocclusion. The data collected from two treatment groups was evaluated by applying descriptive statistics (mean+ standard deviation frequency, percentage, ratio, and range). Chi-square test was applied on the outcome of two treatment groups. The level of significance was set at $P < 0.05$. SPSS version 10 was used for statistical analysis.

RESULTS

A total of 100 patients were treated for mandibular fracture in this study. Gender distribution of the study shows that 78% ($n = 78$) patients were male, while the remaining 22% ($n = 22$) were female, with the male to female ratio of 3.5:1 (Fig 1). The age range was 15-50 years, with the mean value of 26.77 ± 9.88 SD years. The maximum number of patients ($n=39$) were present in the second decade followed by 3rd decade ($n = 32$). The elderly age

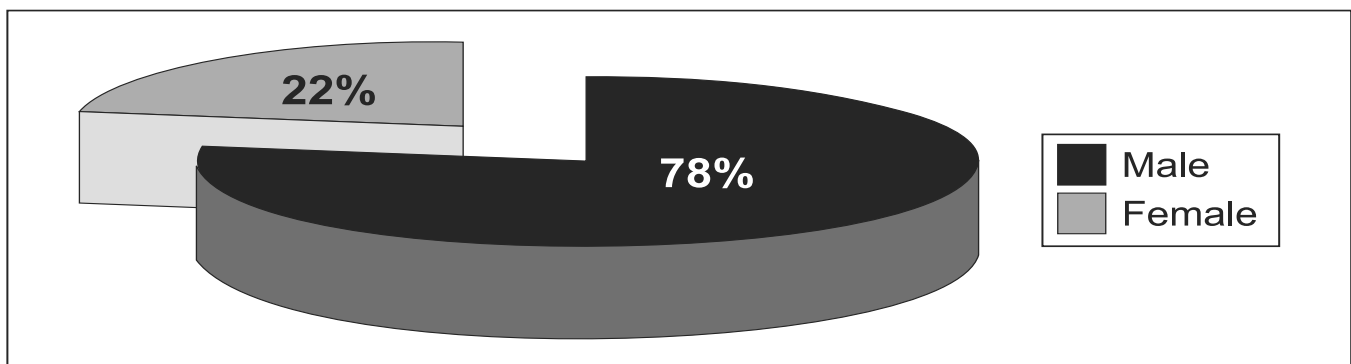


Fig 1: Gender distribution of the patients

group 41-50 years showed the least involvement (n = 11) with mandibular fractures, the details are given in Table 1. Mandibular fractures were most commonly seen in the parasymphysis region (48%) followed by the angle fractures (24%) and body (17%) in descending order of frequency. Symphysis area showed the least involvement and accounts for 11% of the total fractures (Table 2). Incisors were most frequently involved teeth in the fracture line accounting for 51%. Bicuspid 13%, first and second molars 13% and third molars were involved in 25% of the teeth in fracture lines (Table 3).

Regarding the post operative complications, 5 patients experienced infection in Group A and 3 patients in Group B (p=0.4610). Mal-union was encountered in one patient in group A and 2 patients in group B respectively (p=0.5577). Malocclusion was experienced by 2 patients in Group A and one patient in Group B (P=0.5577). None of the patients experienced delayed union and non union. (Fig 2) Overall complications were observed in 8 patients in group A and 6 patients in group B. The p value was 0.7732 (Table 4). In none of the cases the p- value was statistically significant

TABLE 1: AGE AND GENDER DISTRIBUTION OF PATIENTS

Age in years	GENDER		Total	%
	Male	Female		
15-20	33	6	39	39
21-30	25	7	32	32
31-40	13	5	18	18
41-50	7	4	11	11
Total	78	22	100	100

TABLE 2: SITE DISTRIBUTION OF THE FRACTURES

Site of Fracture	Group A n = 50	Group B n = 50	Total n= 100	%
Symphysis	5	6	11	11
Parasymphysis	22	26	48	48
Body	12	5	17	17
Angle	10	14	24	24
TOTAL	50	50	100	100

TABLE 3: DISTRIBUTION OF THE TEETH INVOLVED IN THE FRACTURE LINE

Teeth Involved in Fracture line	Group(A) n = 50	Group(B))n = 50	%
Incisors	26	25	51%
Premolars	6	7	13%
First Molar /second molar	8	5	13%
Third molar	12	13	25%
Total	50	50	100

TABLE 4: COMPARISON OF POST OPERATIVE COMPLICATIONS

S/No	Study Variable	Group A n=50	Group B n=50	Calculated χ^2 and t- values	DF	P-Value
1	Infection	5 (10%)	3 (6%)	0.543	1	0.461
2	Malunion	1 (2%)	2 (4%)	0.344	1	0.5577
3	Malocclusion	2 (4%)	1 (2%)	0.344	1	0.5577

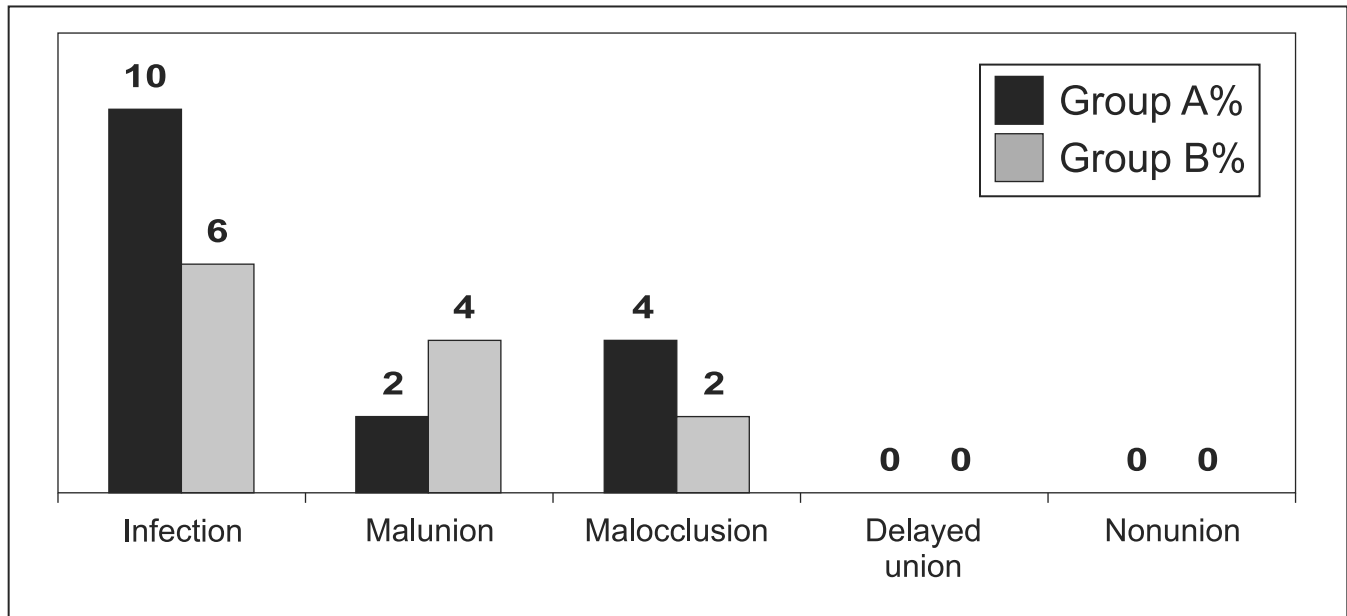


Fig 2: Rate of complications

DISCUSSION

Approximately 50% of fractures of the mandible occur in teeth bearing area and whether teeth situated in the line of fracture should be extracted or retained has always been a subject of heated debate.¹¹ Treating a mandibular fracture with a tooth in fracture line, a number of factors play a role in the development of complications. Those mentioned are retention or extraction of the tooth, closed or open reduction time from trauma to treatment, mobility after fixation and antibiotic treatment.¹²

Consistent extraction of teeth in the line of mandibular fracture has no scientific basis and has distinct disadvantages. Extraction of tooth entails further trauma to bone tissue and also presents technical difficulties when the fragments are highly mobile. Extraction of the tooth also increases the risk of the contamination of the fracture through the empty alveolus, which may sometimes be difficult to suture.^{12, 13} Subsequent prosthodontic treatment may also pose

problems.^{12, 13} A normal coagulum may not always form, occasionally leading to localized alveolar osteitis of the extraction site. The presence of tooth constitutes an occlusal reference and provides a posterior stop.¹² In a recent experimental study, the pressure of tooth at the fracture site was found not to impede bone healing and had a stabilizing effect on the fractures.¹⁴

Mandibular fractures vary over a wider age range and may occur at any age. In the present study the age range was taken as from 15-50 years. The mean age of the patients was 26.77 years. The most common age group was 15-20 years (39%) followed by 21-30 years (32%). Similar results have been reported by Delilbasi et al.¹⁵ According to the present study the male to female ratio was 3.5:1 which is consistent with findings of Abbas et al.¹⁶ and Hussain.¹⁷

The most common site of mandibular fracture was the parasymphysis accounting 48% followed by the angle (24%) and body (17%). Similar results are shown by Renton¹⁸ and Moreno¹⁹ where parasymphysis pre-

dominated other sites of mandible while Adi²⁰ reported a higher percentages of body and condylar fractures.

In the present study incisors were the most frequently involved teeth in the fracture line accounting for 51%, bicuspid (13%), first/second molars 13% and third molars were involved in 25% of the teeth in fracture line. Kyzas²¹ also shows similar results about the distribution of the teeth in fracture line with the involvement of anterior teeth in 50.4% and molars in 20.3% of cases. The reason for more fractures in anterior and molar teeth is the long root of the canine, and the sharp trajectory and difference in the thickness of bone between the body and ramus.

The current study showed an overall complications rate of 14%. In group A the complications were 16% while in group B they were 12%. Similar results were reported by Antanasov²² (12.5%), Nickerson²³ (15.5%), and similarly by other studies²⁴ when the tooth was retained in the line of fracture. Results of studies conducted by Choung²⁵ (14%) and wagner²⁶ (13%) in which the tooth was removed from the fracture line also correlates with the current study. However, studies of Neal²⁷ (37.3%), Amaratunga¹⁰ (19.1%) and Ellis III²⁴ (19%) showed higher complications rate when the tooth is removed from the line of fracture. The current study showed that infection was the common complication in both groups, in total it was 8%. It was 10% in group A and 6% in group B. A study by Lizukat¹² showed similar rate of infection to group B. However the infection rate may be as low as 0.4%¹¹ to as high as 20.5%²³ when the tooth is retained in the fracture line. The high range of infection rate reported may be due to the fact that a number of factors play a role in the development of infection including closed or open reduction, time from trauma to treatment, mobility after fixation and antibiotic treatment.

In this study 2% mal union encountered in group A and 4% in group B. A study by

Seth²⁸ shows malunion of 8% in the teeth retained in fracture line. The malunion in our study in both groups were minor in nature and required no surgical intervention. The occlusal discrepancies were eradicated with occlusal equilibration procedures.

In our study Malocclusion was encountered in 4%. Similarly one patient had malocclusion in a series of

eleven patients studied by Gerbino²⁹. Slightly higher number of patients had malocclusion in a study done by Marker¹¹ in which 5 patients suffered malocclusion in a series of 29 patients. The relatively low rate of malocclusion in this study may be due to the fact that in this unit maxillomandibular fixation (MMF) is done in almost every patient having mandibular fracture even with miniplates and take occlusion as a guide for reduction. None of the patients developed delayed union and non union in the present study, which is similar to the findings of Marker¹¹, Baykul⁹ and Al-Belasy.³⁰ However, Seth²⁸ showed a non-union of 3% (n = 2) in his study. Choung and Donoff²⁵ found delayed wound healing in 3.6% while Hague and Schivmmer³¹ reported 4.4% of fibrous union in 714 patients.

CONCLUSION AND RECOMMENDATIONS

Differences between the results of the two groups were not statistically significant. Each fracture in a dentulous mandible involves a number of variables and treatment modalities also differ from operator to operator. There is no rule of thumb for these situations. An individual decision must be made in every case as to whether the tooth in the fracture line can be left in place.

In the light of this study and the observations of various authors reviewed, certain guidelines may be useful.

Intact teeth in the fracture line should be left in situation if they show no evidence of severe loosening or inflammatory change.

Impacted molar especially complete bony impactions should be left in place. Exceptions are partially erupted molars with pericoronitis.

Teeth with fractured roots and which prevent reduction of fractures should be removed.

Teeth with exposed root apices, extensive periodontal damage and with broken alveolar walls should be removed.

Teeth that appear non vital at the time of injury should be treated conservatively, keeping in mind their potential for recovery and their importance in simplifying fracture treatment and subsequent prosthodontic rehabilitation.

The timing of the fracture treatment should be a factor in the decision to extract the tooth. Complication will be an exception when fracture reduction and adequate fixation is instituted as soon as possible.

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