Original Article

MANDIBULAR FRACTURES AND THEIR MANAGEMENT USING ARCH BAR WITH ONE PLATE

Akif Mahmud*, Muhammad Arshad Badar**, Zahur Qayyum***
*Assistant Professor (Oral & Maxillofacial Surgery), Women Medical College, Abbottabad, Pakistan.
**Associate Professor and Head (Oral & Maxillofacial Surgery) University Medical & Dental College, Faisalabad, Pakistan.
***Associate Professor and Head (Oral & Maxillofacial Surgery), Women Medical College, Abbottabad, Pakistan.

INTRODUCTION

Facial trauma is relatively common in Pakistan and the lower third facial fractures occur in greater frequency than the middle third.[1] Accidental fall particularly from trees, stairs and buildings, Road traffic accidents (RTA) and interpersonal violance are the leading causes for the fracture of mandible followed by child abuse, sports injuries and industrial accidents.[2,3]

Socio-economic status in underdeveloped countries has strong effect on the outcome of the facial trauma particularly in the poorly assessed far areas of villages and unavailability of specialists in these areas is again a psychic dilemma to the patient.

In the past decade, there has been a significant increase in maxillofacial trauma especially mandibular fractures. A number of factors contribute to the strength of mandible and these include the presence of strong musculature, the U-shaped thick bone and the presence of teeth in the jaw.[4]

The fractures with different frequency may occur at symphysis, parasymphysis, body, angle, condylar, coronoid process and combination of any of the above. Condylar region is commonly involved, followed by the parasymphysis and angle, respectively. [5]

The management of mandibular fractures remains a challenge for maxillofacial surgeons, demanding both skills and high level of expertise and ranges from conservative to close and open reduction with or without fixation.[6] There are many factors which influence the treatment modalities to these fractures and they include age of the patient, type of fracture, its location along with availability of adequate facilities and expertises.[7] The arch bar and Ivy eyelet are commonly used gadgets for closed reduction of mandibular fractures.[8.9] Titanium miniplates and microplates with assorted thickness and length of screws are valuable means of rigid fixation of these fractures. The cost effectiveness is one of the limitations of their use in developing countries. There are many complications associated with miniplate osteosynthesis of mandibular fractures and these include malocclusion, exposure of mini plate, delayed union and infection.

The rationale of the study is to evaluate a method to treat symphyseal and parasymphyseal fractures which is cost effective with less iatrogenic trauma and minimal implant related complications.

MATERIALS AND METHODS

It was descriptive case series study. It was conducted on mandibular fractures at the Department of Oral and Maxillofacial Surgery, Punjab Dental Hospital, Lahore over a period of six months. It is a tertiary care treatment facility that caters patients from all over Punjab for maxillofacial injuries.

All patients irrespective of age and gender reporting with symphysis ans parasymphysis mandibular fractures to the hospital for treatment were included in this study. Total 50 patients of all ages and either gender were

Corresponding Author:
Dr. Akif Mahmud
Assistant Professor (Oral & Maxillofacial Surgery), Women Medical College, Abbottabad, Pakistan.
Phone: +92321-4468188
Email: peerzada76@hotmail.com

included in the said study. Patients who were not fit for general anesthesia, malunion cases, previously treated cases and pathological mandibular fracture were excluded from the study. After recording a thorough history of all the patients, a detailed clinical examination was performed of all the patients with injury to mandible. All subjects with suspicion of mandibular fractures were ordered orthopantomogram (OPG), a postero anterior view and lateral oblique view of mandible. Final diagnosis of mandibular fractures was established with the help of clinical and radiographic findings.

All the patients were treated under general anesthesia. After reducing the fracture fragments manually, the Eric arch bar was applied to upper and lower teeth to achieve the maxillomandibular fixation. Open reduction at the fracture site was performed to adapt 2mm single titanium miniplate with 7mm long titanium screws of 2mm in diameter. The patients were followed up for two months on weekly basis.

The ethical aspect of the study was approved by the ethical committee, de'Montmorency Institute of Dental Sciences Lahore. The data collected was entered in SPSS 22 version and results were analyzed through its statistical package. The quantitative data like age of the patients and qualitative like Gender, cause of trauma and postoperative complications were assessed with the help of 'Chi square' test. A p-value of less than 0.05 was considered as significant

RESULTS:

A total number of 50 patients with mandibular parasymphyseal fractures reported to department of Oral and Maxillofacial Surgery at Punjab Dental Hospital, Lahore were included in the study. Among these 50 patients, 45 were male constituting 90% of the sample whereas only 5 (10%) were female showing a definite male preponderance with a male to female ratio of 9:1. (Figure 1)

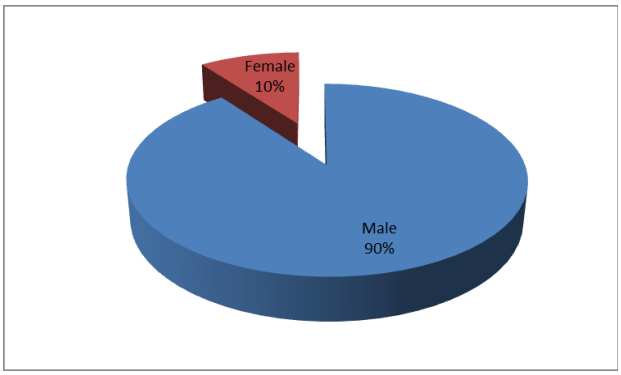

Figure 1: Gender Distribution:

Road Traffic Accidents were the leading cause of these fractures. They accounted for 66% mandibular fractures in these patients followed by interpersonal violence (12%) and fall (10%) and sports injury (10%). Workplace accident accounted for 2% of these fractures. (Figure 2)

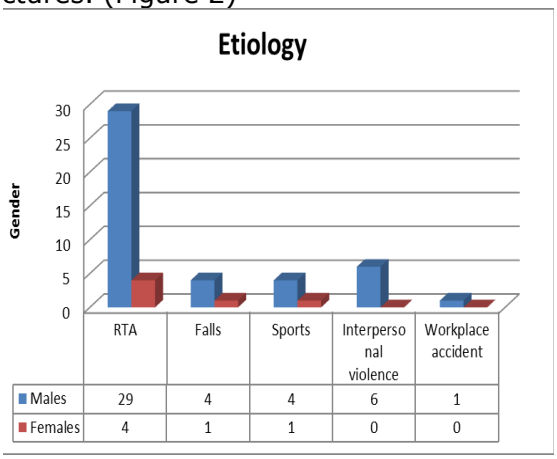

Figure 2: ETIOLOGY AMONG MALE AND FEMALE:

The mean age for the patients with mandibular fractures in this study was 26.62 (SD ±10.07). The youngest patient included in this study was 14 and the oldest one was 60 years old. Most of the patients (50 %) presented at an age range of 21-30 years. The patients who sustained parasymphyseal fracture on the right side constituted 54 % of the sample whereas 42 % had fractures on left side. Only 4 % had fracture on their symphyseal region.

All of these patients with mandibular parasymphyseal fractures were treated with

Arch Bar and Single Miniplate at the lower border.

After the surgical procedure, all the patients were evaluated for the post operative complications. Of these 50 patients, 42% had excellent pain control after the administration of non steroidal anti inflammatory drugs even in the early post operative period. However, 44 % complained of mild discomfort and pain. Only 7 patients (14 %) had moderate pain immediately after the operation which necessitated additional means of pain control. In 70 % of patients, there was no clinical evidence of bleeding whereas in 30 % mild oozing was seen immediately after the operation which was controlled by pressure packing. Mild swelling was displayed by 84 % of patients whereas moderate swelling was seen in 16 % of patients which improved spontaneously in one week's time. In 90 % of these patients, no occlusal discrepancy was recorded whereas only 10 % complained of disharmony between upper and lower teeth which was successfully managed by minor occlusal grinding. The P-value is 0.156 so the attributes are not significant. Post operative complications like pain, bleeding, swelling and occlusal discrepencies can vary from patient to patient. They depend on type of fracture, cause of fracture and most important site of surgery , length of surgical procedure and expertise of the operating surgeon.

DISCUSSION:

Mandibular fractures are common and increased awareness about esthetics and need for earliest functional recovery has led the maxillofacial surgeons to seek for better options for their treatment. This study was conducted on 50 patients. Among these 50 patients, 45 were male constituting 90% of the sample whereas only 5 (10%) were female showing a definite male preponderance with a male to female ratio of 9:1. Abbas et al 1 reported 90.5 % of mandibular fractures to occur in males in the same centre in 2003. However, unlike a male to female ratio of 9: 1 in our study, Qudah et al[10] in his study on mandibular fractures conducted in Jordan came up with a much higher percentage of adult female patients (29 %) and with a male to female ratio of 2.5: 1. This higher percentage of female mandibular fractures suggests a more active role of women in Jordanian society. Therefore, it can be concluded that social norms of a country have a direct influence on the incidence of mandibular fractures.

Road traffic accidents was found to be the leading cause of mandibular fractures with a contribution of 66 % followed by interpersonal violence (12%) ,falls (10 %) and sports injuries (10%). King et al[11] conducted a study on mandibular fractures to define current patterns and causes of these fractures in United States. They found out that interpersonal violence accounted for most of these fractures (50 %) while motor vehicle accidents contributed to only 29% of these injuries. This is very pleasing to note the decline in the incidence of falls related mandibular fractures from 24 % in 2003 to 5 % in 2007. Abbas et al[1] identified kite flying as the most frequent reason behind falls and proposed effective law making against kite flying in order to reduce these traumatic accidents. While fall related accidents kept on rising because of kite flying, the government of Punjab took serious notice of this issue and imposed ban on kite flying in 2006. Therefore there has been significant reduction in fall related injuries after the imposition of this ban which is reflected in our study.

Use of two miniplates for parasymphyseal fractures is recommended by many authors.[12] In our study, we used arch bar as tension band in place of upper sub apical plate to achieve the optimal stability and neutralization of torsional stresses during function in mandibular osteosynthesis. The reduction in implant material and implant related complications have made the procedure easy, reliable, safe and cost effective.

In our study, we followed up these patients and evaluated for their post operative complications in terms of pain, swelling, bleeding, occlusion, oral hygiene, wound healing, mal union, non union and sensory neural deficit. Post operative pain was evaluated by patient's subjective perception. It was found that 42 % of these patents were completely pain free even in the early post operative period after the administration of

NSAIDs whereas 44 % complained of mild discomfort. Only 14 % experienced moderate pain which was controlled by simple non opioid analgesics like acetaminophen. Wen et al [13] in their study explored the clinical effects of miniplate osteosynthesis on the treatment of mandibular fractures. They compared the treatment outcomes of two groups of patients. One group was treated with IMF and the other one with miniplate osteosynthesis. They confirmed the superiority of miniplate osteosynthesis over IMF in terms of rehabilitation of occlusal relation. Moreno and colleagues treated mandibular fractures with different treatment modalities which included simple IMF and 2mm miniplate osteosynthesis.[14] They found that the incidence of malocclusion in the IMF group was (2.9 %) less than that of miniplate group (4.4 %).

In present study, we used single miniplate thus reducing the chances of technical errors with the manipulation of implant. Therefore, the incidence of malocclusion in our study (4 %) is comparable with other studies in which two miniplates were used in the parasymphysis area.[15]

In our study the healing of both soft tissue incision and bone fracture was satisfactory and no patient was found with non union whereas only one patient (2 %) was seen with wound dihiscence. Haug and Schwimmer showed a 3.2 % incidence of non union with the body of mandible being the most common site.[16] Another factor that must be considered as a cause of non union is delay in treatment. Maloney et al reported a high incidence of non union in patients having delayed treatment. However, Ellis and Walker noted an average delay of 3.1 days with no difference in results reported for those patients treated from 1 to 16 days after the injury.[17] Lamphier et al[18] conducted a study to compare the complications of mandibular fractures treated with closed and open reduction . They showed that the incidence of non union in open reduction (6.3 %) group was higher than that of closed reduction (3. 8 %). However, they explained this observation that this statistically significant difference in the complication rates between open and closed reduction treatments is due to the fact that less complicated fractures which are generally more amenable to closed treatment are selected for this treatment group.

Inspite of monocortical design, miniplate osteosynthesis can injure dental roots directly as well as damage dental structure indirectly by interrupting the apical blood stream.However, this dental injury during miniplate fixation in parasymphyseal region is usually caused by upper sub apical plate because of its proximity to the roots of mandibular teeth. We, in our study, omitted the sub apical plate and used arch bar as tension band thus minimizing the risk of dental injury. Therefore, in our study we found no patient with root injury. However, 6 % of our patients complained of altered or diminished sensation in the area of distribution of mental nerve on the operated side. This paresthesia/ hypoaesthsia improved with time and no patient was seen with this complaint six weeks after the operation.

CONCLUSION:

Treatment of mandibular symphyseal and parasymphyseal fractures with archbar and single miniplate at lower border is an effective, simple and economical method which has reduced half of the hardware cost and operating time also. Additionally this approach of treatment does not require intermaxillary fixation post operatively.

REFERENCES:

1. Abbas I, Ali K, Mirza YB. Spectrum of mandibular fractures at a tertiary care dental hospital in Lahore. J Ayub Med Coll Abbottabad. 2003;15:12-4.
2. Patrocinio LG, Patrocinio JA, Borba BH, Bonatti BD, Pinto LF, Vieira JE et al. Mandibular fractures: Analysis of 293 patients treated in the hospital of clinics, federal university of Uberlandia. Rev Bras Ottorrinolaringol 2005; 71: 560-65
3. Barber DH, Bahram R, Woodbury SC, Silverstein KE, Fonseca RJ. Mandibular fractures. In: Fonseca RJ, Walker RV, Betts NJ, Barber DH, Powers MP, editors. Oral & maxillofacial trauma. 3rd ed. St. Louis: Mosby; 2005. 479-522
4. Yaltirik M, Tanyel CR, Katiboglu B. A comparative study of clinical aspects and

relationship between fractures of mandibular angle and the presence of lower third molar. Turk J Med Sci 2002; 32: 391-395
5. Hussain S, Ahmad M, Khan I, Anwar M, Amin M. Ajmal S et al. Maxillofacial trauma: current practice in management at Pakistan Institute of Medical Sciences. J Ayub Med Coll 2003; 15: 8-11.
6. Sojat AJ, Meisami T, Sandor GK, Clokie CM. The epidemiology of mandibular fractures treated at the Toronto general hospital: a review of 246 cases. J Cann Dent Assoc 2001; 67: 640-4
7. Gawelin PJ, Thor AL. Conservative treatment of paediatric mandibular fracture by the use of orthodontic appliance and rubber elastics: report of a case. Dental Traumatology 2005; 21: 57-59
8. Ho SK, Tan WK, Loh HS. Case reports: The use of intermaxillary screws to achieve intermaxillary fixation in the treatment of mandibular fractures. Ann Acad Med Singapore 2000; 29: 534-7
9. Shinohara EH, Mitsuda ST, Miyagusko JM, Horikawa SK. Madibular fracture reduction without intraoperative intermaxillary reduction: A technique using two modified reduction forceps. J Contemp Dent Pract 2006; 7: 150-56
10. Qudah MA, Al-Khateeb T, Bataineh AB, Rawashdeh MA. Mandibular fractures in Jordanians: a comparative study between young and adult patients. J Craniomaxillofac Surg 2005; 33: 103-6
11. King RE, Scianna JM, Petruzzeli GJ. Mandible fracture pattern: a suburban trauma centre experience. Am J Otolaryngol 2004; 25: 301-7
12. Champy. Lodde JP. Mandibular synthesis. Placement of the synthesis as a function of mandibular stress. Rav Stomatol Chir Maxillofac 1976; 77:971-6
13. Wen XF, Mo XD, Ou WJ. [Comparison in results of 59 patients with mandibular fractures treated by rigid internal fixation and inter maxillary ligation.] Shanghai Kou Qiang Yi Xue 2004; 13: 227-9
14. Moreno CJ, Fernandez A, Ortiz JA, Monalvo JJ. Complication rates associated with different treatments of mandibular fractures. J Oral Maxillofac Surg2000; 58: 273- 280
15. Ogundare BO, Bonnick A, Bayley N. Pattern of mandibular fractures in an urban major trauma cenre. J Oral Maxillofac Surg 2003;61: 713-718
16. aug R, Schwimmer A. Fibrous union of the mandible. J Oral Maxillofac Surg 1994; 52: 832
17. Ellis E, Muniz O, Anand K. Treatment considerations for comminuted mandibular fractures. J Oral Maxillofac Surg 2003; 61: 861-70
18. amphier J, Ziccardi V, Ruvo A, Janel M. Complications of mandibular fractures in an urban teaching center. J Oral Maxillofac Surg , 2003; 61:745-749

Submitted for publication: 15-02-2016

Accepted for publication: 20-05-2016

SR #	AUTHOR NAME	CONTRIBUTION
1	Dr. Akif Mahmud	Principle researcher
2	Dr. Muhammad Arshad Badar	Technical support and article write up
3	Dr. Zahur Qayyam	Literature review and data collection