

MANDIBULAR FRACTURES OF MAXILLOFACIAL SKELETON- THE EPIDEMIOLOGY & MANAGEMENT; A TWO YEARS EXPERIENCE IN A TERTIARY CARE HOSPITAL

Shahzad Hussain Qadri,¹ Irshad ul Haq¹, Mahmood Afzal¹

ABSTRACT

Background: The incidence of maxillofacial skeleton fractures is rising sharply world wide, the main contributors being road side accidents, interpersonal violence and falls from heights. If not treated properly, such fractures may lead to life long functional and structural disability. **Objective:** This study was planned to determine demographics, clinical features, patterns of mandibular bone fractures, management, postoperative evaluation and regulatory aspects of causes of such fractures. **Patients and methods:** This was a descriptive study, based on data of 150 consecutive patients of facial skeleton fractures, from January 2008 to December 2009. Variables examined included demographic & clinical features, patterns of mandibular bone fractures and results of open and closed reduction of isolated mandibular fractures using surgical stainless steel wires. Patients were followed up for one year. **Results:** There were 135 (90%) male and 15 (10%) females, age ranged from 5-70 years (mean age was 25 years). Most common causes were motor bike accidents (57%), and falls from different heights (16%). Nasal bone was the most commonly fractured bone, seen in 112 (75%) patients, followed by mandible fractures in 80 patients. In 62, selected cases of mandibular fractures postoperative complication rate was higher in closed reduction than in open reduction cases with internal fixation (ORIF). **Conclusion:** Long-term collection of epidemiological data regarding maxillofacial skeleton and management aspects of mandibular fractures are important for the evaluation of existing preventive measures and useful in the development of new methods of injury prevention and treatment.

Keywords: Closed Reduction (CR), Open Reduction with Internal Fixation (ORIF), Mandibular fractures.

INTRODUCTION

Fractures of maxillofacial skeleton remain a challenge for maxillofacial, dental and plastic surgeons, as well as otorhinolaryngologists. Most common causes of these injuries are road traffic accidents and interpersonal violence.¹ Facial trauma may be limited to superficial abrasions and lacerations, or may be severe enough to cause fractures of maxillofacial skeleton associated with multiple injuries to head, cervical spine, chest, abdomen or extremities.² Management of these fractures remains a challenge for most otorhinolaryngologists and dental surgeons. In developed countries and in well developed trauma centers, these injuries are usually dealt by trained maxillofacial surgeons. Mismanagement or delay in treatment may lead to serious structural or functional disability of nasal or oral region. Mandible occupies very prominent and vulnerable position on the face and is a much favored target in

intentional and unintentional impact.¹ It is the tenth most often injured bone of the body and the second most in the face.^{1,2} Type and site of fracture depends on multiple factors, firstly: nature, magnitude, and direction of impacting force; and secondly: condition and position of mandible at the time of impact.^{3,4} Fractures of mandible may be present alone or in any combination with other facial bones or fractures of any other region.^{5,6} At the time of impact, powerful contraction of muscles of mastication on internal and external aspects of mandible especially around the angle, may lead to disimpaction and overlapping of fractured segments causing serious occlusion problems. These are called unfavourable fractures.^{7,8} If fractured segments remain in contact with each other, then these are called favorable fractures. Whenever the mandible is fractured, treatment is mainly directed to the restoration of form and function of stomatognathic system.⁹⁻¹² Hippocrates was the first to describe reapproximation and immobilization using circumdental wires and external bandaging to immobilize the fracture.¹³⁻¹⁶ The importance of establishing proper occlusion was first described in a text book written in Salerno, Italy, in 1180. Maxillo-mandibular fixation was first mentioned in 1492, in an edition of the book *Syrugia* printed in Lyons. Chopart and Desault used dental prosthetic devices to immobilize fracture segments. Guglielmo

1. Department of ENT, Sheikh Zayed Medical College/Hospital Rahim Yar Khan.

Correspondence: Shahzad Hussain Qadri
Assistant Professor, ENT Department
Sheikh Zayed Medical College/Hospital,
Rahim Yar Khan.

Phone: 0300-6707252
Email: skskadri69@hotmail.com

was the first to accomplish the use of intermaxillary fixation.

Current established methods in the management of mandibular fractures include conservative treatment with maxillomandibular fixation (MMF) by surgical dental wiring, arch bars and Gunning splints, open reduction and intraosseous wiring, open reduction with rigid internal fixation by miniplates, non-compression plates, compression plates and lag screws^{13,14}

Whether closed or open reduction methods are used, main objective is to restore the integrity of mandible to original position so that normal healing process may be completed.¹² Presently, most of these fractures are dealt with by open reduction with internal fixation (ORIF), which causes earlier and better patient recovery with oral functions. However, a number of studies like that of Brown JS et al shows better results of MMF as compared to ORIF.¹⁷ Because of unavailability of trained maxillofacial surgeons in most of District hospitals, management of these patients creates problems, both for surgeons and patients. As most of these patients belong to poor families and repeated visits are required for reassessment purpose to a distant specialized center, hence, there is always fear of mismanagement of these patients leading to avoidable serious, life long complications like malunion, non union, malocclusion and psychosomatic problems associated with facial disfigurement.⁵ This study was planned to determine demographic & clinical features, patterns of mandibular bone fractures, management & postoperative evaluation and regulatory aspects of causes of such fractures.

PATIENTS AND METHODS

In this two year descriptive study, data was collected on 150 consecutive cases of facial bone fractures and management aspects of sixty two isolated mandibular fractures were evaluated. This study was based on the patient data files from January 2008 to December, 2009. During this period total number of admissions in E.N.T. department were 2863 and these injuries were 5% of the total admissions. In majority of the patients, we used stainless steel wires for internal fixation and MMF. Clinical and radiographic data of patients with single mandibular fractures was collected and post operative results of closed and open reduction with internal fixation using

surgical stainless steel wires were analysed. Patients with multiple fractures of mandible, condylar fractures, pathological fractures and systemic metabolic diseases like diabetes were excluded. On clinical and radiological evaluation, sixty two patients were enrolled in the study. Data was collected and analysed based on age groups, gender distribution, pattern and type of fractures, mechanism of injury and treatment modality.

Out of 62 selected cases of mandibular fractures, twenty two patients had favorable fractures of mandible, whereas, forty patients had unfavorable fractures with overlapping or displaced fractured fragments. In the group of favorable fracture, eye-lets wiring was passed and after proper dental occlusion, MMF was done to ensure rigid fixation and was kept for six weeks. In three children below ten years of age, general anesthesia was given. Other seventeen patients got closed reduction under local anesthesia.

Forty patients with unfavorable fractures underwent ORIF under general anesthesia. After exposing the fractured segments by corresponding skin incision and ensuring exact opposition of fractured segments with proper dental occlusion, fractured segments were drilled with pneumatic drill and surgical dental wires were passed through drilled holes and tied. Wounds were closed in layers. MMF was done in all patients for additive stability. Patients with closed reduction were discharged within twenty four hours on average, while patients with ORIF were discharged between twenty four to seventy two hours with instructions about feeding and antiseptic measures. In all the patients with ORIF, we removed MMF wiring after three weeks and with closed reduction, we removed MMF wiring after six weeks. State of dental occlusion and temporomandibular joint along with complications were noted down and evaluated for one year at 2, 5 and 12 months.

RESULTS

In this study, data was collected on 150 consecutive cases of facial bone fractures and management aspects of sixty two isolated mandibular fractures were evaluated. During study period of two years, sixty two patients with age range from five years to seventy years (5-70 years) and male to female ratio of 7:1 were enrolled. The most common age group involved was 21 to 30 years with the mean value of 25.8 ± 9.4 years

In eight female patients, four got mandibular

fracture due to fall from height, three by slipping and one got fire arm wound. As shown in Tab no. I, motor bike and interpersonal violence were the most common causes.

Table I
Mode of Injury

Etiology	No.of Cases	% age
Motor bike accidents	30	48.44 %
Interpersonal violence	18	29.00 %
Falls from height	08	13.90 %
Fire arm	03	04.83 %
Slips	03	04.83 %
Total	62	100 %

We also collected the data of driving licences. Twenty six patients (86.66%) out of 30 cases of road traffic accidents had no driving license and all these 30 patients (100%) were not wearing helmets at the time of accident.

Table II:
Sites of Fractures

Site of fracture	No.of Cases	CR	ORIF	% age
Para - symphysis	18	05	13	29.03 %
Angle	15	02	13	24.19 %
Body	12	07	05	19.45 %
Ramus	11	06	05	17.76 %
Symphysis	06	02	04	09.66 %
Total	62	22	40	100 %

Regarding postoperative complications, infection was the most common. In total, it was 9.67% (n=6). In favorable fracture group, it was 18.18% while in unfavorable fracture group, treated with ORIF it was 5%.

Table III:
Comparison of postoperative results.

Variables	Favorable Fracture group (n=22) %	Unfavorable Fracture group (n=40) %
Infections	4(18.18%)	2(5%)
Normal occlusion	21(95.45%)	39(92.85%)
Mal occlusion	2(9.09%)	No.case
Mal union	1(1%)	No case
Delayed union	No case	No case
Non union	1(5%)	No case
Sensory disturbances	No case	2(5%)
Mouth opening	28.7	42.4

DISCUSSION

Restoration of physical integrity and earliest possible functional life with minimum morbidity is the ultimate goal of maxillofacial surgeons for the management of maxillofacial fractures. In cases of mandibular fractures, goal of treatment is to restore anatomical and functional integrity and to minimize postoperative complications.

Prevalence of maxillofacial fractures depends on geographical conditions, socioeconomic status, cultural characteristics and era.⁵ Because of the prominence of nose and mobile nature of mandible, these two bones are more prone to fractures. Like other studies, our study also indicates higher prevalence of these fractures.^{10,14,17}

Demographic features, patterns and frequency of facial bone fractures in our study is in correlation with other studies.³ The investigation results of mandibular fracture patients, who were treated in our department, were largely in agreement with those of previous reports.¹⁷ The age and gender distribution of the study population over a two year period indicates predominant mean age of (15 to 30 years) and male to female ratio of 7:1. This is also in accordance with most of the studies.¹⁸

Etiology of maxillofacial fractures varies according to the socioeconomical status of the region under study. Many authors have reported motor vehicle accidents as a major cause of mandibular fractures^{7,10} whereas others have recorded physical assault as dominant cause.^{12,15} Motor bike accidents were the most frequent cause of jaw fracture in our study (48.44%) followed by physical violence (29%).

Using the Dingman and Navig classification, the anatomical pattern of presentation, was in agreement to few and in contrast to other.^{6,7} Our study shows similarities with many studies but differs from others. This allows the conclusion that the pattern of presentation is a multi-factorial variable.

In our study, infection was the most common complication in both groups (Table III). In total it was 9.67% (n=6). In favorable fracture group, it was 18.18%, while in unfavorable fracture group (treated with ORIF) it was 5%. Post operative wound infections depend on multiple factors like degree of antiseptic measures adopted during reduction procedures or contamination of wound through wound margins by not following postoperative instructions by the patients.^{16,17}

Regarding malocclusion, mal union, delayed union and non union, there were collectively four patients in favorable fracture group and no case in

unfavorable fracture group treated with ORIF. Similarly, much better results regarding postoperatively mouth opening were seen in ORIF cases. Our findings show similarities with the results of Adim et al and Smith WP et al,^{19,20} however, differ from the findings of Kuriako MA et al and Iizuka et al.^{21,22} They found higher postoperative complications in ORIF as compared to closed reduction cases. This again allows the conclusion that postoperative complications depend on multifactorial variables. Our study also revealed that none of the motor bike drivers was wearing helmet and majority (86%) did not have a driving license.

CONCLUSION

Our results suggest that at District or Tehsil hospital most of the cases of mandibular fractures can be dealt by cooperation of dental surgeons and otorhinolaryngologists. Using strict aseptic techniques and surgical wires gives satisfactory results, which can be used in non affording patients. It can reduce the difficulties of patients as well as burden on already over burdened maxillofacial centers.

Since, road traffic accidents are the major cause of these injuries, which in turn seems to be largely due to drivers without driving licenses and the fact that people do not strictly follow traffic rules and regulations, so strict measures are suggested to reduce the incidence of these serious injuries.

REFERENCES

- Rahim AU, Warraich RA, Ishfaq M, Wahid A. Pattern of mandibular fractures at Mayo hospital, Lahore. *Pak Oral Dent J* 2006; 26: 239-42.
- Ogundare BO, Bonnicksen A, Bayley N. Pattern of mandibular fractures in an urban major trauma centre. *J Oral Maxillofac Surg* 2003; 61: 713-18.
- Peled M, Laufer D, Helman J, Gutman D. Treatment of mandibular fractures by means of compression osteosynthesis. *J Oral Maxillofac Surg* 1989; 47: 566-69.
- Jaques B, Richter M, Arza A. Treatment of mandibular fractures with rigid osteosynthesis: using the AO system. *J Oral Maxillofac Surg* 1997; 55: 1402-06.
- Hussain S. Single plate management of mandibular fractures with immediate postoperative functional recovery. *Pak Oral Dent J* 2005; 25: 145-50.
- Adebayo ET, Ajike OS, Adekeye EO. Analysis of the pattern of maxillofacial fractures in Kaduna, Nigeria. *Br J Oral Maxillofac Surg* 2003; 41: 396-400.
- Eyrich GKH, Gratz KW, Sailer HF. Surgical treatment of fractures of the edentulous mandible. *J Oral Maxillofac Surg* 1997; 55: 1081-87. 24
- Valentino J, Levy FE, Marentette LJ. Intraoral monocortical miniplate of mandibular fractures. *Arch Otolaryngol Head Neck Surg* 1994; 120: 605-12
- Shetty V, Atchison K, Leathers R, Black E, Zigler C, Belin TR. Do the benefits of rigid internal fixation of mandible fractures justify the added costs? Results from a randomized controlled trial. *J Oral Maxillofac Surg* 2008; 66: 2203-12.
- 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: 12-14.
- Mwaniki DL, Guthua SW. Occurrence and characteristics of mandibular fractures in Nairobi, Kenya. *Br J Oral Maxillofac Surg* 1990; 28: 200-02.
- Telfer MR, Jones GM, Shepherd JP. Trends in the aetiology of maxillofacial fractures in the United Kingdom (1977-1987). *Br J Oral Maxillofac Surg* 1991; 29: 250-55.
- 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 Abbottabad* 2003; 15: 8-11.
- Sawhney CP, Ahuja RB. Faciomaxillary fractures in North India a statistical analysis and review of management. *Br J Oral Maxillofac Surg* 1988; 26: 430-34.
- Khan AA. A retrospective study of injuries to the maxillofacial skeleton in Harare, Zimbabwe. *Br J Oral Maxillofac Surg* 1988; 26: 435-39.
- Washington ET. Hippocrates: oeuvres completes. Cambridge, MA: Harvard University Press; 1928.
- Brown JS, Grew N, Taylor C, Millar BG. Intermaxillary fixation compared to miniplate osteosynthesis in the management of the fractured mandible: an audit. *Br J Oral Maxillofac Surg* 1991; 29: 308-11.
- Moreno JC, Fernandez A, Ortiz JA, Montalvo JJ. Complications rates associated with different treatments for mandibular fractures. *J Oral Maxillofac Surg* 2000; 58: 273-80.
- Adi M, Ogden GR, Chisholm DM. An analysis of mandibular fractures in Dundee, Scotland (1977-1985). *Br J Oral Maxillofac Surg* 1990; 28: 194-99.
- Smith WP. Delayed miniplate osteosynthesis for mandibular fractures. *Br J Oral Maxillofac Surg* 1991; 29: 73-76.
- Kuriakose MA, Fardy M, Sirikumara M, Patton DW, Sugar AW. A comparative review of 266 mandibular fractures with internal fixation using rigid (AO/ASIF) plates or miniplates. *Br J Oral Maxillofac Surg* 1996; 34: 315-21.
- Iizuka T, Lindqvist C. Rigid internal fixation of fractures in the angular region of the mandible: An analysis of factors contributing to different complications. *Plast and Reconst Surg* 1993; 91: 265-71.

