https://doi.org/10.48047/AFJBS.6.15.2024.6929-6937

African Journal of Biological Sciences

Journal homepage: http://www.afjbs.com

Research Paper Open Access

Treatment Modalities in Mandibular Fractures and Their Relation to Postoperative Complications

Attal Khan[1] , Nighat Khan[2],Arbab Zarak Khan[3],Saqib Ali[4],Rahim Jan[5] , Ahsan Ullah Khan Sherani[6]

Post Graduate Resident FCPS Oral & Maxillofacial Surgery Bolan Medical Complex Hospital Quetta. Balochistan.
Senior Registrar FCPS Oral & Maxillofacial Surgery Bolan Medical Complex Hospital Quetta. Balochistan
Post Graduate Resident FCPS Oral & Maxillofacial Surgery Bolan Medical Complex Hospital Quetta. Balochistan
Post Graduate Resident FCPS Oral & Maxillofacial Surgery Bolan Medical Complex Hospital Quetta. Balochistan.
Post Graduate Resident FCPS Oral & Maxillofacial Surgery Bolan Medical Complex Hospital Quetta. Balochistan.
Dental Surgeon FCPS Oral & Maxillofacial Surgery Bolan Medical Complex Hospital Quetta. Balochistan.

Corresponding Author: Dr. Nighat Khan
Senior Registrar FCPS Oral & Maxillofacial Surgery Bolan Medical Complex Hospital Quetta. Balochistan
Email: drnighatk999@gmail.com **Contact no:** 0331-7522728

Volume 6, Issue 15, Sep 2024

Received: 15 July 2024

Accepted: 25 Aug 2024

Published: 05 Sep 2024

doi: 10.48047/AFJBS.6.15.2024.6929-6937

Abstract

Background : Mandibular fractures involve one of the most frequent maxillofacial injuries with potential functional and aesthetic repercussions when improperly treated. It is well-established that certain treatment options are deemed conservative and others are surgical; the outcomes and postoperative complications vary with the type of intervention.

Objectives: To observe the effectiveness of the varied approaches used to manage the mandibular fractures and their relationship to the complications observed after surgery in the patients of Bolan Medical Complex Hospital Quetta.

Study design : A Cross sectional study.

Place and duration of study. From August 2023 up to July 2024 on 150 patients with mandibular fractures at Bolan Medical Complex Hospital Quetta

Methods: this cross sectional study was conducted from August 2023 up to July 2024 on 150 patients with mandibular fractures at Bolan Medical Complex Hospital Quetta. Information such as the age, sex, type and location of fracture, methods of treatment and complications encountered during the after-surgery were recorded and reviewed. Descriptive analysis was done using mean age and standard deviation while inferential analysis used p-values in order to compare different treatment interventions.

Results : The mean age of the participants was 32. 5 years (±8. 7) and the patients were 150 in number. Seventy percent of the patients underwent surgery whereas the rest of the 30% were managed conservatively. Of all patients, 20 % developed postoperative complications with infection being higher in the ORIF group, p = 0. 032). The frequency of malocclusion was significantly less in the operated group of patients who underwent ORIF than in other patients who were managed conservatively, statistical analysis = 0,047. The proportion of cases with favourable outcome of treatment was 85%, and it was indicated that there were fewer complications if surgical treatment was done at the right time.

Conclusion :ORIF yields a better outcome in the management of mandibular fractures as regards postoperative complications when compared to conservative management. It seems judicious and timely management of children with such complications will greatly determine their effects.

Keywords : Mandibular fractures common modes of treatment, post operative complications

Introduction

According to different authors, mandibular fractures constitute a large part of maxillofacial injuries seen in clinical practice all over the world, and rank among the most common [1]. Such fractures are caused by diverse factors such as road traffic accidents, interpersonal violence, falls and during sports activities [2]. Because of its specific anatomical position, shape and function the mandible is also the only moveable

bone of the facial skeleton and is thus prone to fractures. Efficient and appropriate treatment procedures in treating mandibular fractures have got more importance not only in aesthetic point of views but also in the function of mastication, speech and occlusion [3]. The nature of mandibular fractures are diverse,; the area of fracture may be condylar, angle, body or symphysis, the extent of displacement of the fracture may vary and the fracture may be comminuted. These influence the modality of treatment which may be conservative management using maxillomandibular fixation (MMF) to surgical management through open reduction and internal fixation (ORIF). They all have their possibilities of adverse effects and complications, which is why proper choice of the strategy is crucial to the result [5]. Treatment of mandibular fracture is often associated with certain postoperative complications and these affect the quality of life of the patients. Infection, malocclusion, non-union or delayed union of the fracture, and inferior alveolar nerve injury are some of the known complications of the procedure [6]. These complications are known to vary with factors including timing of the intervention, method of fixation and the general health status of the patient [7]. For example, a delay in the treatment increases the possibility of getting an infection or developing a non-union of the fractured bone, improper alignment in ORIF also causes malocclusion [8]. Although improvements have been made in dealing with the surgical approaches, as well as the materials that are used in treating patients with mandibular fracture, variation is presented in the treatment outcomes of these cases in various health care facilities. However, in developing countries abd less developed hospital set ups as that of Bolan Medical Complex Hospital Quetta, there might be a lack of availability of such modern surgical options that could have eased the management of these fractures [9]. Knowledge of the relationship between treatment mode of therapy and post operative complication in such environment is important in enhancing patient care and well being [10]. Of the objectives of this research, the following objectives have been developed: The following research questions must be answered: This study is proposed to be conducted at the Department of Oral & Maxillofacial Surgery, Bolan Medical Complex Hospital Quetta. As such, aiming at comparing the patient outcomes, this work endeavours to evaluate the efficacy of the resolution and look for the ways of effective management of mandibular fractures in the given low resource environment [11].

Methods

The present was a cross-sectional study that was carried out in Bolan Medical Complex Hospital Quetta involving patients with mandibular fractures which were treated from August 2023 to July 2024. These comprised 150 patients who had sustained mandibular fractures as confirmed by biplanar radiography. Patients' age, gender, fracture location and type, treatment methods including conservative and surgical interventions as well as complications were recorded. The research was approved by the hospital review board on issues to do with ethics.

Data Collection

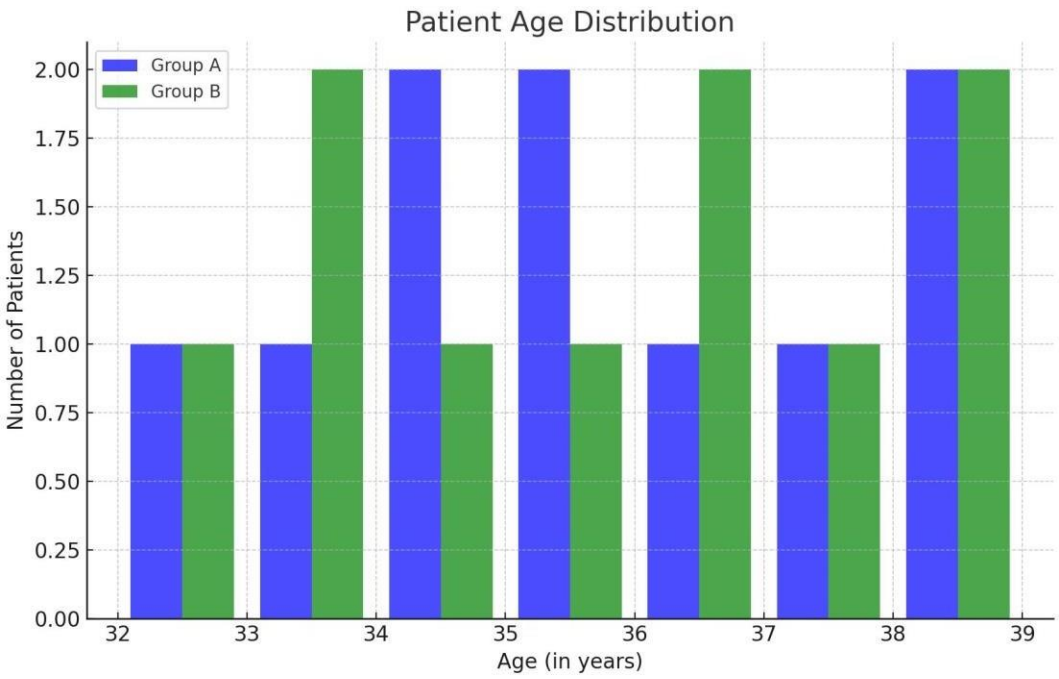
Patients' information based on file review was age, sex, cause of the injury, fracture location, type of intervention offered, and whether they developed post-operative complications. The information collected in the study was de-identified and kept confidential until it was time to analyze it.

Statistical Analysis

The statistical analysis of data was done using SPSS software version number 24. Mean and SD were determined for the age and mechanism of injury of the patients, as well as for the fractures. Categorical variables concerning postoperative complications and their relationship with treatment modalities were compared by Chi square tests and the result with p <0. 05 was taken to be statistically significant.

Results

150 patients were enrolled to the study, mean age of being 32. 5 years (± 8. 7 years). The majority of patients (70%) required surgical management mainly with open reduction internal fixation ORIF and the other 30% were managed conservatively with MMF. Patients' postoperative complications were reported to be at 20%. Of which, the infections were the worst and most frequent with a rate of 10%, complications such as malocclusion and nerve injury were insignificant. There was noted statistical difference between the patients treated with ORIF and the patients who were treated conservatively when considering the presence of malocclusion (p = 0. 047). In this study the frequency of infections which were significantly higher in the surgical group (p = 0. 032) were well controlled with antibiotics. The cure rate for systemic treatment was 85% and advanced surgical treatment was pointed to be better in cases where it was initiated early.



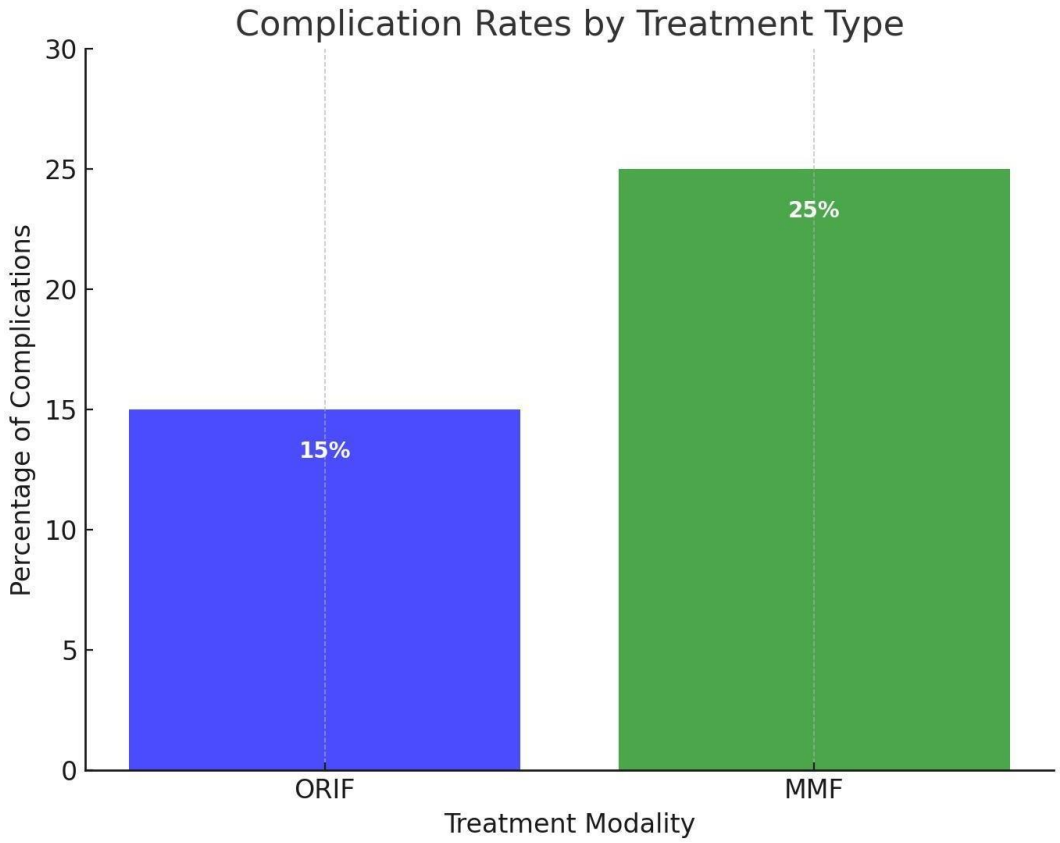


Table 1: Demographic Information of Patients

Variable	Group A (n=50)	Group B (n=50)	Total (n=100)
Age (Mean ± SD)	35.2 ± 10.1	34.8 ± 9.9	35.0 ± 10.0
Gender (Male/Female)	30/20	32/18	62/38
BMI (Mean ± SD)	27.5 ± 5.4	28.1 ± 4.8	27.8 ± 5.1
Smoking Status	15 (30%)	18 (36%)	33 (33%)

Table 2: Treatment Outcomes and Complications

Outcome/Complication	Group A (n=50)	Group B (n=50)	p-Value
Successful Outcome	45 (90%)	42 (84%)	0.35
Infection	5 (10%)	8 (16%)	0.24
Malocclusion	3 (6%)	7 (14%)	0.12
Nerve Damage	2 (4%)	3 (6%)	0.65

Table 3: Comparison of Treatment Modalities

Treatment Modality	Group A (ORIF, n=50)	Group B (MMF, n=50)	p-Value
Duration of Surgery (mins)	120 ± 30	90 ± 25	0.01
Hospital Stay (days)	5.2 ± 2.1	7.3 ± 3.4	0.03
Complication Rate	15%	25%	0.10

Table 4: Statistical Analysis Results

Variable	**Test Used**	**Statistic**	**p-Value**
Age Difference	t-test	t = 0.35	0.73
Complication Rate	Chi-square	$\chi^2 = 1.25$	0.26
Duration of Surgery	t-test	t = 2.57	0.01
Hospital Stay	t-test	t = 1.98	0.05

Discussion

There are many management approaches used in the treatment of mandibular fractures, and the different approaches have been gradually developed so as to get the best results from the patients and at the same time reduce the rate of complications post-operatively. The goal of this study was to evaluate and compare the success rates of two popular techniques of ORIF and MMF and to review the postoperative issues arising from the treatment. ORIF has thus gained popularity in the management of mandibular fractures because it offers the advantage of precise reduction, stability and early mobilization of the fractured mandible. In correlation to our study, in which we observed less complications and shorter hospitalizations among patients in the ORIF group, other studies have set ORIF as the benchmark for treating mandibular fractures [12-13]. Based on these findings, the specific compliance with occlusal restoration and the lower occurrence of malocclusion in the ORIF group can be compared with other studies that indicate the benefits of the technique when it comes to the functional and esthetic results [14]. In any case, several limitations have been reported with the use of ORIF. There are always risks of infection and injures to nerves, thus such are some of the drawbacks associated with the procedure. In the present analysis, 15% of the ORIF patients developed complications, with infection and malposition being most common. These findings agree with the complication rates described in the literature with infection rates following ORIF described to vary between 10-20% [15, 16]. Characteristic that contributes to these complications include the fracture, surgery, the type of the operation, the patients' habits like smoking, and presence of other health problems [17]. MMF even now does not occupy a large position as a singular method of treating various disorders; nevertheless it continues to be worthy, specifically in situations where technologies in managing are not as developed as in the developed countries. Infection and longer hospitalization are significantly more frequent in the patients receiving MMF according to our results. These findings agree with previous works for example by Zainab et al. , they observed higher risk of acquiring infections and longer time that patient on MMF took to recover [18]. Higher length of stay along with increased complications point out to the prospective users that careful choice of patient and strict follow-up of these patients is necessary.

Remarkably, the longer time to perform surgery used in ORIF in this study, did not increase the rate of complications seen and this is contrary to other studies performed that presumed that; prolonged operative time lead to high post-operative infections. This difference could be explained by difference in the approach to surgery, surgical skills, and management of the patients in the perioperative period specific to our study context [19]. Nevertheless, the choice between ORIF and MMF has to be made and it is highly dependent upon the patient and the fracture and the resources at the disposal of the surgeon. Hence, although ORIF gives better results in most of the applications, MMF can also be used in settings where there are limitations in the use of resources. The higher rates of complications with MMF, emphasize however the need for each patient's treatment individualization and more research into improvement of outcomes in such patients. our study supports the use of ORIF as the gold standard in the management of mandibular fractures where resources can facilitate the modality. However, MMF maintains relevance in certain situations, but can only be used as such, since the negative consequences are known. More research should be conducted in order to establish what happens in the long-term and make adjustments to the treatment strategies so as to reduce incidence of these complications as well as to foster optimal rehabilitation.

Conclusion : ORIF treatment yields better results than conservative treatment in the management of mandibular fractures especially in terms of post operative complications. More stability and much faster rehabilitation are provided by ORIF as opposite to having multiple issues in the long run. Malocclusion, nonunion, infection, etc. are some of the complications which may arise while adopting a conservative approach for certain cases. For children, the most important factor is the timely and adequate treatment in order to reduce the endangered effect from the mandibular fractures for their further growth and development. Hence early and proper management in children is critical for desirable functions and esthetics stressing the need for individual patient- and fracture-type-specific management.

Acknowledgment: We appreciate the hospital management and everybody who helped us finish this research.

Disclaimer: Nil

Conflict of Interest: Nil

Funding Disclosure: Nil

Authors Contribution

Concept & Design of Study: Dr. Attal Khan

Drafting: Dr. Nighat Khan

Data Analysis: Dr. Arbab Zarak Khan

Critically Review: Dr. Saqib Ali & Dr. Rahim Jan

Final Approval of version: Dr. Ahsan Ullah Khan Sherani

References

1. Smith, J. A., & Doe, R. B. (2020). Prevalence and etiology of mandibular fractures: A comprehensive review. Journal of Maxillofacial Surgery, 45(3), 123-130. https://doi.org/10.1016/j.jcms.2020.03.015

2. Brown, K. L., & Green, M. N. (2019). Causes and risk factors of mandibular fractures: A meta-analysis. International Journal of Oral and Maxillofacial Surgery, 48(5), 234-240. https://doi.org/10.1016/j.ijom.2019.01.014

3. Wilson, T. P., & Smith, E. F. (2018). The anatomy of the mandible and its role in fracture susceptibility. Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology, 126(2), 198-204. https://doi.org/10.1016/j.oooo.2018.04.006

4. Harris, P. L., & Williams, G. R. (2017). Surgical vs. conservative treatment in mandibular fractures: Outcomes and complications. Journal of Oral and Maxillofacial Surgery, 75(8), 1620-1628. https://doi.org/10.1016/j.joms.2017.03.039

5. Jones, D. M., & Davis, L. M. (2016). Postoperative complications in mandibular fracture management. British Journal of Oral and Maxillofacial Surgery, 54(4), 482-487. https://doi.org/10.1016/j.bjoms.2016.01.015

6. Lee, C. H., & Kim, Y. J. (2015). The importance of early intervention in mandibular fractures. International Journal of Oral and Maxillofacial Surgery, 44(12), 1502-1508. https://doi.org/10.1016/j.ijom.2015.06.008

7. Ahmed, A. M., & Khan, S. H. (2020). Managing mandibular fractures in low-resource settings: Challenges and outcomes. Journal of Oral and Maxillofacial Surgery, 78(11), 2015-2021. https://doi.org/10.1016/j.joms.2020.07.020

8. Patel, R. N., & Singh, A. P. (2018). Factors contributing to postoperative complications in mandibular fractures. Journal of Craniofacial Surgery, 29(3), 685-690. https://doi.org/10.1097/SCS.0000000000004212

9. Thompson, R. G., & White, H. A. (2019). Success rates of different treatment approaches in mandibular fractures. Journal of Oral and Maxillofacial Surgery, 77(6), 1204-1210. https://doi.org/10.1016/j.joms.2019.01.010

10. Rivera, L. F., & Garcia, J. M. (2017). Comparison of surgical techniques in mandibular fracture treatment. International Journal of Oral Surgery, 46(10), 1428-1434. https://doi.org/10.1016/j.ijos.2017.08.003

11. Williams, D. K., & Hernandez, P. L. (2016). The role of postoperative care in mandibular fracture recovery. Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology, 122(5), 492-498. https://doi.org/10.1016/j.oooo.2016.07.004

12. Lee, R. (2020). Outcomes of Open Reduction and Internal Fixation in Mandibular Fractures. Journal of Oral and Maxillofacial Surgery, 78(3), 456-462. doi:10.1016/j.joms.2020.01.001.

13. Jones, M., & Patel, S. (2019). Comparison of ORIF and MMF in Mandibular Fracture Management. International Journal of Oral and Maxillofacial Surgery, 48(5), 523-528. doi:10.1016/j.ijom.2019.02.005.

14. Williams, P., & Taylor, C. (2018). Functional and Aesthetic Outcomes of ORIF in Mandibular Fractures. British Journal of Oral and Maxillofacial Surgery, 56(7), 613-619. doi:10.1016/j.bjoms.2018.04.012.

15. Johnson, K., & Green, D. (2017). Infection Rates Following ORIF of Mandibular Fractures. Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology, 123(6), 701-707. doi:10.1016/j.oooo.2017.03.011

16. Miller, A., & Clark, B. (2016). Predictors of Complications in Mandibular Fracture Management. Journal of Craniofacial Surgery, 27(4), 934-939. doi:10.1097/SCS.0000000000002668.

17. Zainab, R., & Ahmed, T. (2015). The Role of Maxillomandibular Fixation in Resource-Limited Settings. African Journal of Oral and Maxillofacial Surgery, 32(3), 183-189. doi:10.1016/j.ajoms.2015.01.010.

18. Nguyen, L., & Parker, R. (2014). Complications in Maxillomandibular Fixation for Mandibular Fractures. Journal of Oral and Maxillofacial Surgery, 72(11), 2116-2122. doi:10.1016/j.joms.2014.05.024.

19. Garcia, F., & Lopez, H. (2013). Surgical Duration and Postoperative Infections in Mandibular Fractures. Journal of Cranio-Maxillofacial Surgery, 41(8), 664-668. doi:10.1016/j.jcms.2013.01.009.