

Comparison of Outcome in Open Reduction Internal Fixation With and Without Maxillomandibular Fixation in the Management of Symphysis and Parasymphysis Fracture

Anum Iqbal¹, Zainab Shah³, Atta ur Rehman²

¹Department of Oral and Maxillofacial Surgery, Pakistan Institute of Medical Sciences, Peshawar

²Department of Oral and Maxillofacial Surgery, Khyber College of Dentistry, Peshawar

³Department of Oral and Maxillofacial Surgery, Sardar Begum Dental College, Peshawar

Abstract

Background and Objectives: Fractures of the jaw can cause malocclusion and widening of the face if ill-treated. To compare the results of ORIF (open reduction internal fixation) only versus open reduction internal fixation along with maxilla-mandibular fixation in the management of mandibular symphysis and parasymphysis fractures.

Methodology: In this study, 150 patients were divided into A and B groups (75 each group) by lottery method. One group (A) was treated with ORIF only, while other (B) was treated by ORIF and MMF. Miniplates were placed in accordance with Champy's principle. Each plate was fixed with monocortical screws that were 2-mm wide and 7-mm long.

Results: Our study shows that Group A had a mean age of 30 years with Standard Deviation ± 2.76 whereas the Group B mean age was 32 years with Standard Deviation ± 3.12 . 72% of the patients in Group A were male and 28% were female. In the case of Group B 75% patients were male and the remaining 25% were female. In Group A 5% of the patients had malocclusion, 3% patients had infection and 4% patients had wound dehiscence. 7% of the patients in Group B had malocclusion, 5% patients had infection and 7% patients had wound dehiscence.

Conclusion: Our study concludes that the difference of outcomes (malocclusion, infection, wound dehiscence) between open reduction internal fixation along with maxillomandibular fixation and open reduction internal fixation only in the treatment of mandibular symphysis and parasymphysis fractures, were not significant.

Key Words: open reduction internal fixation only, maxillomandibular fixation, mandibular symphysis parasymphysis fractures.

Introduction:

The mandible is the only bone of the body which is not fixed and plays a major role in speaking, eating, as well as chewing. The site of fracture is related to the type of injury, force of impact and anatomical location.¹

If ill-treated, fracture of the jaws in this area causes occlusal imbalances and widening of the face. The maxillary and mandibular teeth are brought into their proper position with the help of Arch bars and MMF with care of over tightening. Two plates are necessary for a symphyseal fracture sur to torsional forces generated during function. One miniplate is fixed at inferior border and second superiorly.²

The muscles of the face place considerable forces on the mandible i.e. Suprahyoid muscles and the muscles of mastication. The function of the suprahyoid muscles is to depress the mandible and the action of these muscles is crucial for proper functioning but any discontinuity in the mandible will cause problems in fracture healing.³ The management of jaw fractures has evolved from splinting teeth to the placement of osteosynthesis plates.⁴

In a study performed by Saman et al⁵, 49 patients with mandibular parasymphysis (PS) fractures were treated only with ORIF whereas 63 patients with mandibular PS fractures were treated with ORIF with post-operative MMF. The results showed wound dehiscence in 12% of patients treated with ORIF+MMF as compared to 10% in patients that were treated with ORIF only. Infection. Whereas 15% of the patients that were treated with ORIF only reported with infection.

In another study performed to compare outcome of open vs close reduction in management of gunshot injury to mandible, 13% patients treated with ORIF reported with complications.⁶ In study performed by Khan et al¹ 12.5% patients treated with ORIF only developed malocclusion.

The procedures used in mandibular fractures' therapeutics include close reduction with both MMF and ORIF. Use of MMF can be made in condylar, on-dislocated coronoid, parasymphysis, and alveolar fractures. However, oral hygiene issues, feeding problems and Temporomandibular

Corresponding Author:

Atta Ur Rehman
Department of Oral and Maxillofacial Surgery, Khyber College of Dentistry, Peshawar
dratta80@yahoo.com

Received: 5th January 2022

Revised: 12th February 2022

Accepted: 16th March, 2022

DOI: <https://doi.org/10.52442/jrcd.v3i1.66>

joint disorders may develop.

It is necessary to perform ORIF in most of the displaced angulus, corpus, symphysis and parasymphysis fractures. MMF methods used in the past are now used instead by open reduction and internal fixation only or in combination. There has been a reduction in the rates of malocclusion, facial asymmetry and temporomandibular joint disorders due to frequent use of open reduction methods while the rate of infections have elevated.⁷

The rationale of this study is to provide a circumstantial evidence for practicing ORIF without maxilla-mandibular fixation, so that maximum advantage may be given to the patients in terms of less discomfort. To compare the outcome of open reduction internal fixation only and open reduction internal fixation plus maxilla-mandibular fixation in management of mandibular symphysis/Parasymphysis fractures.

Methodology:

Ethical Approval was granted from the Institutional Ethical Review Committee at Khyber College of Dentistry (KCD), Peshawar. Informed consent was also taken from all the participants. Complete history followed by clinical examination was carried out for all the patients. Radiographic studies like Orthopantomogram were advised. Patients were evaluated regarding fitness for general anesthesia. They were divided by lottery method into Group A and Group B. Group A was treated with ORIF only, while group B was treated by ORIF and MMF. Surgical approach was gingivolabial and gingivobuccal intraoral incisions under GA. Fracture was reduced and mini plate fixation with 2 plates was done using same plates in both groups. In group A for ORIF temporary MMF was carried out in order to achieve occlusion which is the key for reduction of jaw fractures. For MMF eyelets wiring was used. Miniplates were placed according to Champy's principle. Champy et al have formulated the osteosynthesis line for anchoring the jaw miniplates. At the base of the alveolar process a line is drawn which relates to tension line along with which the plates and screws are fixed. A line is drawn in the parasymphysis region to neutralize tension forces near the lower border. Each plate was fixed with monocortical screws of 2 millimeter wide and 7 millimeter long. The surgical procedures were carried out by a Consultant Oral and Maxillofacial Surgeon who was a Fellow of the College of Physicians and Surgeons, Pakistan. Outcome parameters like stability of the fracture segments was determined by fracture line mobility. Mouth opening and occlusion was determined on clinical examination. An Orthopantomogram radiograph was taken 24 hours after surgery to assess proper alignment of the fracture segments. Same parameters were checked post op after 2 weeks and then after 6 weeks. All the collected data was stored in the form of proforma. In order to avoid bias all the data was collected by single operator and checked by consultant who had a fellow of college of physicians and surgeons, Pakistan. The collected data was analyzed using Statistical Package for Social Sciences (SPSS) for windows v. 17.

Standard Deviation (SD) and Mean (M) will be calculated for variables (quantitative) like age. Percentages (%) and frequencies of variables (qualitative) were calculated like gender and outcome (malocclusion, infection, wound dehiscence). Chi-square test was applied to compare the outcome of Group B and A keeping significant p-value ≤ 0.05 . Outcome was compared among age (in years) and gender (M/F) to see effect modifiers. Post stratification Chi-square test was performed (p-value ≤ 0.05 as significant). T test was applied to compare the mean age between two group A and B keeping p-value as significant (≤ 0.05).

Results:

The age (in years) distribution among Group A and B was analyzed. In Group A 29(39%) patients were in age 20-30 years range, 23(31%) patients were in age 31-40 years range, 15(20%) patients 41-50 (y) and 8(10%) patients age range 51-60 (y). Mean age was 30 ± 2.76 . On the other hand in Group B 30(40%) patients were in age from 20-30 years, 25(33%) patients 31-40 years, 5(7%) patients 41-50 years and 5(7%) patients were from 51-60 years. Mean age was 32 ± 3.12 . (Table#1)

Gender distribution (Male/Female) of patients among the two groups was determined and it was found that in A group 54(72%) patients were male and 21(28%) females. Where as in B group patients (56(75%) were male and 19(25%) females. (Table#2)

Outcome among the divided two groups was determined as in A group 4(5%) patients were having malocclusion, 2(3%) patients were having infection and 3(4%) patients wound dehiscence. Where as in Group B 5(7%) patients had malocclusion, 4(5%) patients had infection and 5(7%) patients had wound dehiscence. There was no significant difference between two groups (Table#3).

Stratification of outcome show that no significant difference was found between two groups regarding age (in years) and gender as the P value are < 0.05 (table no 5,6,7,8,9,10)

Group A: ORIF only

Group B: ORIF along with MMF

TABLE NO 1. Distribution of Age (Y) (n=150)

AGE (Y)	GROUP A	GROUP B
20-30	29(39%)	30(40%)
31-40	23(31%)	25(33%)
41-50	15(20%)	15(20%)
51-60	8(10%)	5(7%)
Total	75(100%)	75(100%)
Mean and SD	30 year ± 2.77	32 year ± 3.12

P value was 0.0001 when T Test was applied

TABLE NO 2. Distribution by Gender (M/F) (n=150)

GENDER	Group A	Group B
Male	54(72%)	56(75%)
Female	21(28%)	19(25%)
Total	75(100%)	75(100%)

P value was found to be 0.7119 after applying the Chi Square test

TABLE NO 3. Comparison Of Outcome Between

AGE	MALOCCLAT ION	GROUP A	GROUP B	P value
20-40 years	Yes	3(6%)	3(5%)	0.9436
	No	49(94%)	52(95%)	
Total		52	55	
41-60 years	Yes	1(4%)	2(10%)	0.4680
	No	22(96%)	18(90%)	
Total		23	20	

Groups (n=150)

TABLE NO 4. COMPARISON OF OUTCOME WITHRESPECT TO AGE STRATIFICATION (MALOCCULATION)

OUTCOME		GROUP A n=75	GROUP B n=75	P values
Malocclusion	Yes	4(5%)	5(7%)	0.7310
	No	71(95%)	70(93%)	
Infection	Yes	2(3%)	4(5%)	0.4047
	No	73(97%)	71(95%)	
wound dehiscence	Yes	3(4%)	5(7%)	0.4674
	No	72(96%)	70(93%)	

Chi Square Test was applied

TABLE NO 5. COMPARISON OF OUTCOME WITH RESPECT TO GENDER STRATIFICATION (MALOCCULATION)

GENDER	MALOCCULATION	GROUP A	GROUP B	P value
Male	Yes	3(6%)	4(7%)	0.7331
	No	51(94%)	52(93%)	
Total		54	56	
Female	Yes	1(5%)	1(5%)	0.9421
	No	20(95%)	18(95%)	
Total		21	19	

TABLE NO 7. COMPARISON OF OUTCOME WITH RESPECT TO GENDER STRATIFICATION (INFECTION)

GENDE R	INFECTIO N	GROUP A	GROUP B	P value
Male	Yes	1(2%)	3(5%)	0.3262
	No	53(98%)	53(95%)	
Total		54	56	
Female	Yes	1(5%)	1(5%)	0.9421
	No	20(95%)	18(95%)	
Total		21	19	

TABLE NO 6. COMPARISON OF OUTCOME WITH RESPECT TO AGE STRATIFICATION (INFECTION)

AGE	INFECTION	GROUP A	GROUP B	P value
20-40 years	Yes	2(4%)	2(4%)	0.9544
	No	50(96%)	53(96%)	
Total		52	55	
41-60 years	Yes	0(0%)	2(10%)	0.1203
	No	23(100%)	18(90%)	
Total		23	20	

TABLE NO 8. COMPARISON OF OUTCOME WITH RESPECT TO AGE STRATIFICATION (WOUND DEHISCENCE)

GENDER	WOUND DEHISCENCE	GROUP A	GROUP B	P value
Male	Yes	2(4%)	4(7%)	0.4272
	No	52(96%)	52(93%)	
Total		54	56	
Female	Yes	1(5%)	1(5%)	0.9421
	No	20(95%)	18(95%)	
Total		21	19	

TABLE NO 9. COMPARISON OF OUTCOME WITH RESPECT TO AGE STRATIFICATION (WOUND DEHISCENCE)

AGE	WOUND DEHISCENCE	GROUP A	GROUP B	P value
20-40 years	Yes	2(4%)	3(5%)	0.6935
	No	50(96%)	52(95%)	
Total		52	55	
41-60 years	Yes	1(5%)	2(11%)	0.4930
	No	21(95%)	18(89%)	
Total		22	20	

Discussion:

The mandible is an extremely vulnerable and significant bone of the face which makes it very prone to trauma and impact. It is the only bone of the body which is not fixed and plays a major role in speaking, eating, as well as chewing. The site of fracture is related to the type of injury, force of impact and anatomical location.¹The unique shape of the mandible and the muscle force needs to be understood for assessment and treatment along with nerve and blood supply. ⁸ The traditional Orthopantomogram is not enough and CT scan should be advised to the patients. ⁹The etiology of the injuries (falls, road accidents and interpersonal trauma) needs attention for prevention purposes. ¹⁰ The treatment for mandible fracture varies from maxillomandibular fixation to splints to lag screws, compression plates, mono and bicortical plates and the recent three-dimensional plates. ¹¹ The symphysis and Parasymphysis are one of the most common regions of fractures in the lower jaw. ¹² Male population in general is more prone to these injuries because of the nature of jobs and outdoor activities. ¹³ Close reduction versus open reduction has been widely debated in the literature for treating these injuries. ¹⁴The sequelae of plating is usually infection while mal union in case of wiring only. ¹⁵

Our study showed that in mean age 30 years with SD ± 2.77 in group A. Whereas its 32 years with Standard Deviation ± 3.12 in group B. In Group A 72% patients were male and 28% patients were female. Group B had 75% patients were male and 25% female. In Group A 5% patients had malocclusion, 3% patients had infection and 4% patients had wound dehiscence. Group B 7% patients were having malocclusion, 5% patients infection and 7% patients wound dehiscence.

In a study performed by Muzzafar K et al¹⁶, 63 patients with mandibular parasymphysis (PS) fractures were treated with ORIF with post-operative Maxillomandibular fixation (MMF) whereas 49 patients with mandibular PS fractures were treated only with ORIF. The results showed wound dehiscence in 12% of patients treated with ORIF+MMF

compared to 10% in patients treated with ORIF only. Malocclusion was reported in 2% patients treated with ORIF+MMF compared to 4% in patients treated with ORIF only. Nonunion was reported in 2% of patients who were treated with ORIF+MMF whereas 2% of patients reported with nonunion treated with ORIF only. Infection was reported in 17% of patients treated with ORIF +MMF whereas 15% patients treated with ORIF only reported with infection.

In another study performed to compare the results of open vs close reduction in management of gunshot injury to mandible, 13% patients treated with ORIF reported with complications.⁶ In study performed by Khan et.al¹⁷ 12.5% patients treated with ORIF only developed malocclusion. A study in India found that among other complications, infection of the osteosynthesis plates was the reason for plate removal in mandible fractures.

A study by Saman M¹⁸ et al studied complication rates in symphysis and Parasymphysis fracture i.e. infection, plate removal, malunion and occlusal disharmony. A study by Valentino and Marenette¹⁹ showed same results in complication rates between the two groups. Another study that was conducted by Kumar et al²⁰ compared outcomes between patients that were treated with postoperative MMF and those that were not, and showed significant difference statistically.

Conclusion:

Our study concludes that there were no significant difference in the outcome (malocclusion, infection, wound dehiscence) between open reduction internal fixation along with maxilla-mandibular fixation and open reduction internal fixation only for treating mandibular symphysis, para-symphysis fractures.

CONFLICT OF INTEREST: NONE

FUNDING SOURCES: NONE

References:

1. Khalifa M, Hesham E, El-Hawary and Mohamed M. Hussein. Titanium Three Dimensional Miniplate versus Conventional Titanium Miniplate in Fixation of Anterior Mandibular Fractures. Life Sci J 2012;1006-1010
2. Schaaf H , Kaubuegge S Streckbein P, Wilbrand J, Kerkmann H, Howald H. Comparison of miniplate versus lag-screw osteosynthesis for fractures of the mandibular angle Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2011;111:34-40.
3. Saluja H, Dehane V, Kini Y, Mahindra U. Use of miniplates in parasymphysis fracture: A survey conducted among Oral and Maxillofacial surgeons of India. Int J Head Neck Surg 2012 3:8-10
4. Vineeth K. a, R.M. Lalitha a, Kavitha Prasad a, K. Ranganath a, V. Shwetha b, Jasmeet Singh. A comparative evaluation between single noncompression titanium

- miniplate and three dimensional titanium miniplate in treatment of mandibular angle fracture A randomized prospective study J CraniomaxillofacSurg.2013; 103-109
5. Malhotra K, Sharma A, Giraddi G, Shahi AK. Versatility of Titanium 3D Plate in Comparison with Conventional Titanium Miniplate Fixation for the Management of Mandibular Fracture . J Maxillofac Oral Surg. 2012 ;11:284-90.
 6. Prasad R, Thangavelu K, John R. The role of 3-D Plating System in Mandibular Fractures: A Prospective Study. JPharmBioalliedSci.2013;5(Suppl 1):S10-3
 7. Sadhwani BS, Anclia S. Conventional 2.0mm miniplates versus 3-D plates in mandibular fractures. Ann Maxillofac Surg .2013;3:154-9
 8. Panesar K, Susarla SM. Mandibular Fractures: Diagnosis and Management. In Seminars in Plastic Surgery 2021 Nov (Vol. 35, No. 04, pp. 238-249). Thieme Medical Publishers, Inc..
 9. Albassal A, Al-Khanati NM, Harfouch M. Could a digital panoramic X-ray not detect a displaced fracture of the mandible?. Quantitative imaging in medicine and surgery. 2021 Aug;11(8):3890.
 10. Jung HW, Lee BS, Kwon YD, Choi BJ, Lee JW, Lee HW, Moon CS, Ohe JY. Retrospective clinical study of mandible fractures. Journal of the Korean Association of Oral and Maxillofacial Surgeons. 2014 Feb;40(1):21.
 11. Srinivasan B, Balakrishna R, Sudarshan H, Veena GC, Prabhakar S. Retrospective analysis of 162 mandibular fractures: an institutional experience. Annals of maxillofacial surgery. 2019 Jan;9(1):124.
 12. Rashid S, Kundi JA, Sarfaraz A, Qureshi AU, Khan A. Patterns of mandibular fractures and associated comorbidities in Peshawar, Khyber Pakhtunkhwa. Cureus. 2019 Sep 25;11(9).
 13. Diab J, Flapper WJ, Anderson PJ, Moore MH. Patterns of mandibular fractures in South Australia: epidemiology, treatment, and clinical outcomes. Journal of Craniofacial surgery. 2022 Jun 1;33(4):1018-22.
 14. Zavlin D, Jubbal KT, Echo A, Izaddoost SA, Friedman JD, Olorunnipa O. Multi-institutional analysis of surgical management and outcomes of mandibular fracture repair in adults. Craniomaxillofacial trauma & reconstruction. 2018 Mar;11(1):041-8.
 15. Perez D, Ellis III E. Complications of mandibular fracture repair and secondary reconstruction. In Seminars in plastic surgery 2020 Nov (Vol. 34, No. 04, pp. 225-231). Thieme Medical Publishers, Inc..
 16. Muzzafar K. Management of maxillofacial trauma. AFID Dent J 1998; 10: 18-21.
 17. Schon R, Roveda SIL, Carter B. Mandibular fractures in Townsville, Australia: incidence, aetiology and treatment using the 2.0 AO/ASIF miniplate system. Br J Oral Maxillofac Surg 2001; 39: 145-8.
 18. Saman M, Kadakia S, Ducic Y. Postoperative Maxillomandibular Fixation After Open Reduction of Mandible Fractures. JAMA Facial Plast Surg. 2014;16(6):410-413.
 19. Valentino J, Marentette LJ. Supplemental maxillomandibular fixation with miniplate osteosynthesis. Otolaryngol Head Neck Surg. 1995; 112(2):215-220.
 20. Kumar I, Singh V, Bhagol A, Goel M, Gandhi S. Supplemental maxillomandibular fixation with miniplate osteosynthesis-required or not? Oral Maxillofac Surg. 2011;15(1):27-30.

How to cite this article?

Iqbal A, Shah Z, Rehman A. Comparison of Outcome in Open Reduction Internal Fixation With and Without Maxillomandibular Fixation in The Management of Syphysis and Parasymphysis Fracture. J Rehman Coll Dent 2022; 3(1):1-4

Author Contributions

1. Anum Iqbal - Study Design and Article Writing
2. Atta Ur Rehman - Proofreading
3. Zainab Shah- Data Collection