Comparing the Post-operative Complications of Mandible Angle Fractures Treated by Extra Oral versus Intra Oral Reduction Approach

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ABSTRACT

Objective: To compare post-operative complications of mandible angle fractures treated by extra oral versus intra oral reduction approach.

Study Design: Randomized controlled trial study.

Place and Duration of Study: This study was conducted at the Oral and Maxillofacial Surgery, Jinnah Postgraduate Medical Center, Karachi and research was started from 25th June 2021 to 24th December 2021.

Materials and Methods: A total of 202 patients of angle fracture of mandible were enrolled and divided in equal two groups A & B, each group having 101 patients. In group A extra oral reduction approach and in group B intra oral reduction approach will be used for angle fracture of mandible.

Results: Pain was present in all our study cases on 1st to 2nd visits in both A and B groups with mean pain score 6.03 ± 0.44, 4.94 ± 0.42 and 5.98 ± 0.48, 3.96 ± 0.52 respectively while on 3rd visit less pain was observed in group B 57.4% with mean pain score 1.93 ± 0.91 and 70.3% with mean pain score 2.51 ± 1.33 which is more in group A cases. (p=0.000). In group A, 22.8% patients had infection and no any case was observed in group B caseson first visit. Also in group A, majority of cases showed infection on 1st and 2ndfollow up visits 25.7% and 16 (15.8%) respectively.

Conclusion: We observed more post-operative complications of mandible angle fractures treated by extra oral as compared to intra oral reduction approach.

Key Words: Mandible angle fractures, Maxillofacial, Extra oral reduction, Intra oral reduction.

INTRODUCTION

In the maxillofacial injuries with mandible angle fracture (MAF) is the 2nd most common emergency cause of hospital admissions and related to many complications[1].

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Overall incidence rate of mandible angle fractures were highly reported in literature ranging from 27-30%, due to thin area of this cross sectional angle and presence of third molar tooth[2]. Cases of mandible angle fractures are traffic accident, falls, industrial trauma, interpersonal violence and sports injuries[3].

Mandible angle fractures present with spectrum of clinical features that may depend upon site of injury. Majority of these MAF also related with 24% neurological injury, 32% facial lacerations, 20% orthopedic and others[4]. Change in pre trauma occlusion may be evident on clinical examination. Premature posterior dental contact and retrognathic occlusion may be resulted from bilateral mandible angle fractures. Unilateral open bite deformity is associated with a unilateral angle fracture[5].

Swelling on the affected side, pain, difficulty in chewing and mouth opening are few most common symptoms. Anesthesia, paraesthesia/dysesthesia of the lower lip may be evident[6]. Also radiographic examination along with the basis of displacement helps to decide the treatment modality for these fractures. Open reduction is generally performed when there is significant deviation and closed reduction for simple

fractures. The most common modality is open reduction with internal fixation (ORIF)[7].

Diagnosis of mandible angle fracture is based on history, clinical examination and plain radiography. Orthopantomogram is the best screening tool to rule out MAF fractures. CT scan has role in case of treatment planning while MRI can also be helpful in case of associated soft tissue injuries of temporomandible joint of all facial fractures. Fractures of mandible occur more frequently in Pakistan[8]. The mandible angular fractures can be managed by conservative technique and open reduction and internal fixation of any other fracture of facial skeleton[9]. In conservative technique closed reduction is done by avoiding direct exposure of fracture site, early mobilization of joint, restoration of occlusion and function. Open reduction and internal fixation includes direct surgical access, reduction of angle fracture and fixation with one or two miniplates under direct vision[10].

MATERIALS AND METHODS

Study was conducted at department of Oral and Maxillofacial Surgery, Jinnah Postgraduate Medical Center, Karachi. It was started from 25th June 2021 to 24th December 2021 and informed consent was taken from each patient. Complete history and examination were collected. Patients confirmed to have angle fracture of mandible clinically and radio-graphically. Patients meeting inclusion criteria were included in the study. After taking demographic, base line data on first visit and a follow up of minimum 4 weeks for assessment of pain, infection, malocclusion and paresthesia were noted for study purpose. Patients were divided in two groups by using random number table i.e. group A with odd number and group B with even number. In group A extra oral reduction approach and in group B intra oral reduction approach were used for angle fracture of mandible. Procedure was performed by consultant and assisted or observed by researcher. Patients were called for follow up at 1st week, and after one month for the procedure to evaluate the complications (mouth opening, pain, infection, malocclusion and paresthesia) as defined in operational definitions by consultant neither involved in study nor in surgical procedure.

Data was entered and analyzed with SPSS version 20. Descriptive statistics was used for both quantitative and qualitative variables. Mean ± S.D. was calculated for quantitative variables like age, and mouth opening, pain score of patients. Frequencies and percentages were calculated for qualitative variables including gender, residential status, road traffic accident, assault, fall, sport injury, pain, infection, malocclusion and paresthesia. Pearson Chi Square was applied to compare pain, infection, malocclusion disturbances and paresthesia. Effect modifiers like age, gender, and residential status, were controlled by stratification. Post

stratification chi-square test was applied to see their effect on outcome. A p-value of ≤ 0.05 was considered significant.

RESULTS

Overall, there were 100% (n=202) patients. This study population was divided into two equal groups, each group has 100% (n=101) patients. There were 85 (84.2%) male while 16 (15.8%) were female in group A, in group B male and female were 82 (81.2%) and 19 (18.8%) respectively.

Table-No.1: Demographicsof patients

Characteristics	Frequency (%) in group A	Frequency (%) in group B
Gender		
Male	85 (84.2%)	82 (81.2%)
Female	16 (15.8%)	19 (18.8%)
Age of patients		
Upto 30 years	17 (16.8%)	27 (26.7%)
30-40years	70 (69.3%)	68 (67.3%)
Above 40 years	14 (13.9%)	6 (5.9%)
Residential status		
Rural	63 (64.4%)	58 (57.4%)
Urban	38 (37.6%)	43 (42.6%)
Occupation		
House hold	56 (55.4%)	69 (68.3%)
Labourer	27 (26.7%)	20 (19.8%)
Servant	15 (14.9%)	10 (8.9%)
Student	3 (3%)	2 (2%)
Etiology		
RTA	63 (62.4%)	72 (71.3%)
Assault	18 (17.8%)	9 (8.9%)
Fall	15 (14.9%)	11 (10.9%)
Sports Injury	3 (3%)	3 (3.5%)
Other	2 (2%)	6 (5.9%)

Table No.2: Study outcomes, mouth opening and pain score

Characteristics	Group A Mean ± SD	Group B Mean ± SD
Mouth Opening		
Visit 1	20.1 ± 1.05	20.4 ± 1.38
Visit 2	24.5 ± 1.29	24.6 ± 1.58
Visit 3	40.3 ± 1.68	41.1 ± 3.05
Pain Score		
Visit 1	6.03 ± 0.44	5.98 ± 1.38
Visit 2	4.94 ± 0.42	3.96 ± 0.52
Visit 3	1.33 ± 1.93	1.93 ± 0.91

The mean age in group A was 31.66 ± 6.05 years and 30.04 ± 6.54 years in group B cases (with minimum age was 18 years while maximum age of our all study cases was 45 years). (p=0.070). Our study results have indicated that majority of our study cases in group A i.e. 70 (69.3%) were aged from 31-40 years. Our study

population of group A was 63 (62.4%) from urban areas and 38 (37.6%) belongs to rural areas while 58 (57.4%) were from urban and 43 (42.6%) belongs to rural areas in group B. Occupation of our study cases showed that house hold 56 (55.4%), labourer 27 (26.7%), servant 15 (14.9%) and students 3 (3%) were in group A while in group B house hold 69 (68.3%), labourer 20 (19.8%), servant 10 (9.9%) and students 2 (2%) were respectively. The etiological factor showed majority of our study cases with road traffic accident (RTA) followed by assault, fall, sport injury and others in group A, 63 (62.4%), 18 (17.8%), 15 (14.9%) 3 (3%) and 2 (2%) respectively while in group B 72 (71.3%), 9 (8.9%), 11 (10.9%), 3 (3%) and 6 (5.9%) respectively. Out of these RTA 135 (66.8%) cases also major of our study cases presented with fracture due to motorcycle accident 94 (69.6%) a few with car accident 19 (14.0%) and 22 (16.2%) due to others types of accident (Table 1).

Table No. 3: Infection among study group

Infection	Visits	Frequency (%) in group A	Frequency (%) in group B
Yes	1st n = 23 (11.4%)	23 (22.8%)	00 (00%)
	2nd n = 37 (18.3%)	26 (25.7%)	11 (10.9%)
	3rd n = 24 (11.9%)	16 (15.8%)	08 (7.9%)
No	1st n = 179 (88.6%)	78 (77.2%)	101 (100%)
	2nd n = 165 (81.7%)	75 (74.3%)	90 (89.1%)
	3rd n = 178 (88.1%)	85 (84.2%)	93 (92.1%)

The mean mouth opening of our study cases on 1st visit (base line) in group A was 20.10 ± 1.05 mm and 20.46 ± 1.38 mm in group B cases. (p=0.042). The mean mouth opening on 2nd and 3rd follow up was 24.55 ± 1.29 mm and 40.35 ± 1.06 mm in group A and increased in group B cases 24.64 ± 1.58 mm and 41.19 ± 3.05 mm respectively. (p=0.016). Pain was present in all our study cases on 1st to 2nd visits in both A and B groups with mean pain score 6.03 ± 0.44, 4.94 ± 0.42 and 5.98 ± 0.48, 3.96 ± 0.52 respectively while on 3rd visit less pain was observed in group B58 (57.4%) with mean pain score 1.93 ± 0.91 and 71 (70.3%) with mean pain score 2.51 ± 1.33 which is more in group A cases. (p=0.000).(Table No. 2). In group A, 23 (22.8%) patients had infection and no any case was observed in group B on first visit. Also in group A, majority of cases showed infection on 1st and 2nd follow up visits 26

(25.7%) and 16 (15.8%) respectively while lower results 11 (10.9) and 8 (7.9%) in patients of group B.(Table No. 3).Malocclusion on 1st visit, 2nd visit, 3rd visit of our study cases was 61 (60.4%), 27 (26.7%), 15 (14.9%) respectively noted in group A and 54 (53.5%), 30 (29.7%), 11 (10.9%) respectively in group B. (Table No. 4).Majority of our study cases of group B showed increased number of patients with paresthesia on 1st visit, 2nd visit and 3rd visit 81 (80.2%), 46 (45.5%) and 29 (28.7%) than patients of group B, 68 (67.3%), 40 (39.6%) and 16 (15.8%) respectively. (Table No. 5).

Table No.4: Malocclusion among study groups

Malo-cclusion	Visits	Frequency (%) in group A	Frequency (%) in group B
Yes	1st n = 115 (56.9%)	61 (60.4%)	54 (53.5%)
	2nd n = 57 (28.2%)	27 (26.7%)	30 (29.7%)
	3rd n = 26 (12.9%)	15 (14.9%)	11 (10.9%)
No	1st n = 87 (43.1%)	40 (39.6%)	47 (46.5%)
	2nd n = 145 (71.8%)	74 (73.3%)	71 (70.3%)
	3rd n = 176 (87.1%)	86 (85.1%)	90 (89.1%)

Table No.5: Paraesthesia among study variables

Pares-thesia	Visits	Frequency (%) in group A	Frequency (%) in group B
Yes	1st n = 149 (73.8%)	81 (80.2%)	68 (67.3%)
	2nd n = 86 (42.6%)	46 (45.5%)	40 (39.6%)
	3rd n = 45 (22.3%)	29 (28.7%)	16 (15.8%)
No	1st n = 53 (26.2%)	20 (19.8%)	33 (32.7%)
	2nd n = 116 (57.4%)	55 (54.5%)	61 (60.4%)
	3rd n = 157 (77.7%)	72 (71.3%)	85 (84.2%)

DISCUSSION

Mandible angle fracture (MAF) is the 2nd most common cause of hospital emergency admission in maxillofacial injuries with many complications and it was reported in literature up to 30% due to thin area of this cross sectional angle and also with the presence of third molar tooth[11]. Cases of mandible angle fractures are road traffic accident, falls, industrial trauma, interpersonal violence and sports injuries[12].

The mean mouth opening of our study cases on 1st visit (base line) in group A was 20.10 ± 1.05 mm and 20.46 ± 1.38 mm in group B cases. (p=0.042). The mean mouth opening on 2nd and 3rd follow up was 24.55 ± 1.29 mm and 40.35 ± 1.06 mm in group A and increased in group B cases 24.64 ± 1.58 mm and 41.19 ± 3.05 mm respectively. Bakry al[13] in 2022 reported immediate postoperative mouth opening was 25.42 ± 4.64 and 23.57 ± 2.63 in extraoral group and intraoral group with no significant difference (p=0.376). After 4 weeks reported different results with more mouth opening in extra-oral group 36.71 ± 2.92 mm than 32.00 ± 2.64 mm in intraoral group.

In another study conducted by Abduhaki movichet al[14] in 2022 reported mouth opening at 1st visit in extra oral as 23.17 mm and 23.71 mm in intra oral group and after 1 month in extraoral and intraoral group 40.10 mm and 40.83 mm were observed which results are similar to our study findings. Also similar observation was reported by Sudhakaret al[15] in 2015 which is in favor of our study findings

Pain was present in all our study cases on 1st to 2nd visits in both A and B groups with mean pain score 6.03 ± 0.44, 4.94 ± 0.42 and 5.98 ± 0.48, 3.96 ± 0.52 respectively while on 3rd visit less pain score was observed in group B (intraoral) 57.4% with mean pain score 1.93 ± 0.91 and more 70.3% with mean pain score 2.51 ± 1.33 in group A. A recent study was conducted by Bilal et al[16] in 2020 similarly reported that, the pain score on base line, 2nd visit and 3rd visit 6.00 ± 0.75, 4.16 ± 0.76 and 2.46 ± 0.50 respectively in patients of extraoral group while 6.04 ± 0.78, 4.70 ± 0.78 and 2.88 ± 0.77 respectively in intraoral group which are near to our study results. Khaireet al[17] in 2018, also reported similar kinds of results which is also supported our findings.

Our study results showed that patients of group A had 22.8% infection and no any case was observed in group B cases on first visit. Also in group A, majority of cases showed infection on 1st and 2nd follow up visits 25.7% and 15.8% respectively while lower results 10.9% and 7.9% in patients of group B. Ali et al[18] in 2010 also observed infection after 6 weeks of procedure was more 16.6% in extraoral group while less 13.3% in intraoral group which is also supported our findings.

In our study malocclusion on 1st visit, 2nd visit, 3rd visit of our study cases was 60.4%, 26.7%, 14.9% respectively noted in group A and 53.5%, 29.7%, 10.9% respectively in group B. The rates of malocclusion in extraoral 15.79% and 9.58% in intraoral group reported by Hsueh et al[19] in 2015 which is similar to our study results. Majority of our study cases of group B showed increased number of patients with paresthesia on 1st visit, 2nd visit and 3rd visit 81 (80.2%), 46 (45.5%) and 29 (28.7%) than patients of group B, 68 (67.3%), 40 (39.6%) and 16 (15.8%) respectively. Hsueh et al[19] in 2015 showed that neurosensory disturbance occurred in 50% of extraoral approaches but only 26.74% of intraoral approaches.

CONCLUSION

We observed more post-operative complications of mandible angle fractures treated by extra oral as compared to intra oral reduction approach. All clinicians treating such patients should anticipate MAF for early diagnosis and timely management with intraoral reduction approach to improve quality of life of these patients.

Author's Contribution:

Concept & Design of Study:	Sapna Kumari
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