

Original research article

A Retrospective study to evaluate the outcome of intra-oral and extra-oral approaches to mandibular angle fractures**Dr. Shazia Khatoon^{1*}, Dr. Samir Jain²****¹Senior Resident, Department of Dentistry, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India.****²Professor and HOD, Department of Dentistry, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India****Corresponding Author: Dr. Shazia Khatoon****Abstract**

Aims: The aim of this study was to compare the outcomes of intra-oral and extra-oral approaches to mandibular angle fractures.

Material and methods: A Retrospective study was conducted in the Department of Dentistry, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India from April 2019 to September 2019. Total 120 Patients with angle fracture that required open reduction and internal fixation were include in this study. All the Patients were reviewed for age, gender, presence of other fractures, type of surgical approach, number of plates, OT time, which was calculated from the beginning of the incision till the closure. Length of admission and complications such as malocclusion, non- union, re-operation, post-op infection, neurosensory deficit, facial nerve injury, implant retrieval, scarring and wound dehiscence were also studied.

Results: There were a total of 120 patients with mandibular angle fracture who underwent open reduction and internal fixation, 60(50%) of them were treated intra-orally and the remaining 60 (50%) of them extra orally. Male patients formed the majority of mandibular angle fractures (91.67%) in extra-oral group and 95% in intra-oral approaches (p=0.81). the mean age of patients in intra-oral group was 33.28 years and 36.77 years in the other group with a standard deviation of 11.87 and 12.95 respectively. The mean operating room time for intra-oral approach was 95.93 minutes when compared to 103.06 minutes for extra-oral approach with a p value of 0.58. Malocclusion was seen in 15% of extra-oral cases and 18.33% of intra-oral approach patients, with a p value of 0.77. Non union was not seen in any of the cases. Re-surgery was performed in 13.33% of the extra-oral cases and none in the intra-oral group. (p value-0.32). Post-op infection was observed in 11.67% of intra-oral cases and 26.67% of extra-oral cases with a p value of 0.28. Neurosensory disturbance occurred in 15% of extra-oral cases and 31.67% of intra-oral cases (p value-0.93). facial nerve injury occurred in 31.67% of extra oral cases and none in the intra-oral group, p vale of 0.016 which is found to be significant. In the entire sample. Extra-oral scarring occurred in 35% of extra-oral cases and none of intra-oral cases (p value-0.011).

Conclusion: we conclude the use of intraoral approach while clinically favorable with single miniplate along the superior border.

Keywords: Mandbular angle fracture, Intra oral approach, extra oral approach

Introduction

Mandibular angle fractures constitute 20 % of mandibular fractures on the whole.¹ Various approaches for the reduction of fracture at the angle region have been described in the literature. They include intraoral and extra oral approaches like transbuccal and submandibular approach etc. Each technique has its own advantages. Selection of technique

is dependent on the type of case such as displaced or undisplaced fracture of mandibular angle, or whether it is associated with other fractures of the maxillofacial region. The main reason of the fracture of mandibular angle are thinner cross-sectional area, the anatomical change from horizontal to vertical rami and presence of third molar and muscle force present in that region.^{2,3} Most common cause of mandibular fracture occurs as a result of road traffic accident, followed by assault, and interpersonal violence.^{2,3} Poor law and order situation and lack of legislation in the region resulting in rash behavior while driving, particularly motorcycles is another reason of fractures in young population. Certain other studies conducted at national and regional levels have the same observations. Fractures of the mandibular angle are common and comprise 31% of all mandibular fractures.⁴ Current studies show that the danger of mandibular angle fracture is increased if impacted lower 3rd molars are present.⁴ Alternative and important factor which makes mandibular angle more prone to fracture is the unforeseen change in shape from horizontal to vertical rami.⁵ Mandibular angle fractures are treated by variety of techniques with different incisions like intraoral and trans-buccal approach.⁵ Open reduction and internal fixation with the plate and screw fixation is the method of choice for the treatment of mandibular angle fracture.^{5,6} However the mandibular angle fracture biomechanics of the angle make treatment difficult.^{7,8} Extraoral approaches were traditionally used for open reduction and internal fixation of mandibular angle fractures. It has the potential disadvantage of leaving an unaesthetic scar and risks damage to the facial nerve, though the advantages are better exposure and direct application of plate fixation.⁹⁻¹¹ The transbuccal approach has the advantages of no external scarring and direct visualisation of the occlusion during placement of the bone plates injury to branches of the facial and other anatomic structures were reduced.¹⁰⁻¹³ In our study, the ease of approach to the site in relation to time taken for the surgery, visualization of fracture site, ease of fracture reduction and post-operative complications involved were compared for intra oral and extra oral approaches.

Material and methods

A Retrospective study was conducted in the Department of Dentistry, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India from April 2019 to September 2019, after taking the approval of the protocol review committee and institutional ethics committee.

Inclusion criteria

- Patients with angle fracture that required open reduction and internal fixation
- Age between 20-60 years

Exclusion criteria

- Patients with pre-existing medical conditions
- Infected fracture site
- Patients who were treated by closed reduction

Methodology

Charts of patients were reviewed for age, gender, presence of other fractures, type of surgical approach, number of plates, OT time, which was calculated from the beginning of the incision till the closure. Length of admission and complications such as malocclusion, non-union, re-operation, post-op infection, neurosensory deficit, facial nerve injury, implant retrieval, scarring and wound dehiscence. Intraorally the fixation was done with four hole centrally spaced 2.5mm miniplate placed anteriorly on the external oblique ridge. For extra oral approach skin incision was given in the submandibular region followed by layered

dissection and fixation of fracture with one miniplate. Preop and postop radiographs were taken and the patients were followed up for 4 months.

Results

There were a total of 120 patients with mandibular angle fracture who underwent open reduction and internal fixation, 60(50%) of them were treated intra-orally and the remaining 60 (50%) of them extra orally. Male patients formed the majority of mandibular angle fractures (91.67%) in extra-oral group and 95% in intra-oral approaches (p=0.81). the mean age of patients in intra-oral group was 33.28 years and 36.77 years in the other group with a standard deviation of 11.87 and 12.95 respectively. The main etiology of injury was RTA in both the groups 90% in extra-oral group and 91.67% in intra-oral approaches . 5% of cases in intra-oral group and 10% in the extra-oral group were bilateral angle fractures with a P value of 0.75. Of the cases approached intra-orally, 60% had multiple fractures, whereas 75% of the extra-oral cases were associated with other fractures (P value- 0.86). The mean operating room time for intra-oral approach was 95.93 minutes when compared to 103.06 minutes for extra-oral approach with a p value of 0.58. Further Mann-Whitney test was applied for the operating room time for which a score of 159 was obtained. There was not much of difference in the length of hospital stay between the 2 groups. Intra-oral approach had a mean length of stay of 2.84 days and 2.95 days for extra-oral approach with a p value of 0.69 and a standard deviation of 0.81. Malocclusion was seen in 15% of extra-oral cases and 18.33% of intra-oral approach patients, with a p value of 0.77. Non union was not seen in any of the cases. Re-surgery was performed in 13.33% of the extra-oral cases and none in the intra-oral group. (p value-0.32). Post-op infection was observed in 11.67% of intra-oral cases and 26.67% of extra-oral cases with a p value of 0.28. Neurosensory disturbance occurred in 15% of extra-oral cases and 31.67% of intra-oral cases (p value-0.93). facial nerve injury occurred in 31.67% of extra oral cases and none in the intra-oral group, p vale of 0.016 which is found to be significant. In the entire sample. Extra-oral scarring occurred in 35% of extra-oral cases and none of intra-oral cases (p value-0.011).

Table 1: Demographics of study population

Parameter	Intra-oral approach (n=60)	Extra-oral approach (n=60)
Age (mean)	33.28 years	36.77
Sex (Male)	55((91.67%)	57(95%)
Multiple fractures	60%	75%
RTA Injury	54(90%)	55(91.67%)
Mean Operating Time	95.93 minutes	103.06 minutes

Table 2: Complications following intraoral and extraoral procedures

Parameter	Level	Extra oral		Intra oral		P value	Chi-square value
		N	%	N	%		
Malocclusion	Yes	9	15	11	18.33	0.77	0.001
	No	51	85	49	81.67		
Non-union	Yes	0	0	0	0	-	-
	No	60	100	60	100		
Re-operation	Yes	8	13.33	0	0	0.32	1.39
	No	52	86.67	60	100		
Post-op infection	Yes	16	26.67	7	11.67	0.28	0.79
	No	44	73.33	53	88.33		

Neurosensory deficit	Yes	9	15	19	31.67	0.45	0.93
	No	51	85	41	68.33		
Facial nerve injury	Yes	19	31.67	0	0	0.016*	5.79
	No	41	68.33	60	100		
Wound dehiscence	Yes	18	30	8	13.33	0.65	0.29
	No	42	70	52	86.67		
Implant retrieval	Yes	5	8.33	0	0	0.42	0.89
	No	55	91.67	60	100		
Extra-oral scarring	Yes	21	35	0	0	0.011*	5.63
	No	39	65	60	100		

Discussion

The ideal approach for the treatment of mandibular angle fractures continues to be a topic of research and debate.¹⁴ we intended to compare the introral and extraoral approaches for the treatment of angle fractures in terms of outcomes. Male patients formed the majority in our study as appeared in other studies. In our study it was observed that average age of the patients in extra oral group were 3 years older than the intra oral group. Although this age difference is not clinically significant, it may point to the fact that patients age may change the surgeons decision for approach. As it reflects the surgeons desire to avoid extra oral scarring in younger individuals or a supposition for better healing in younger individuals.¹⁵ Presence of additional mandibular fractures was moderately associated with an extraoral approach to repair. This may mean that more complicated mandibular fractures were approached extraorally. Rate of complications in this study were comparable or slightly higher, especially with the extraoral approach, than those present in other studies. This may be due to the small sample size considered for the study. The most common complication with mandibular fractures is infection, especially angle region. Intra oral infection rate was 11.67% versus 26.67% for the extra oral group as compared with the other studies ranging from 1.5% to 28%.¹⁶ increased extra oral infection rate could be attributed to increased OT time and improper patient maintenance and wound dehiscence as seen in our study. Plate retrieval was higher in the extra oral group than the intra oral group (13.33% v/s 0.0%). This need for plate removal was attributed to infection and wound dehiscence.¹⁷ Neurosensory disturbance was seen in 31.67% of intraoral group when compared to 15% of extraoral group. A rate ranging from 3.3%-20% is reported in the literature.^{15,18} in 35% of extra oral cases unfavourable scarring was reported, as compared with reports ranging from 3.3% to 6.15%.^{15,18} 15% of the extraoral cases experienced transient malocclusion when compared to 18.33% of intraoral cases. This may implicate towards the difficulty experienced during anatomic reduction of the fracture as well as accessibility to the surgical site when approached intraorally. A range of 3.3%-8.3% is reported in the literature.¹⁸ both the methods of fixation are comparably successful for the treatment of mandibular angle fractures. A slightly higher rate of complications was seen for postop infection, facial nerve injury, wound dehiscence, implant retrieval and unfavorable scar in cases approached extraorally. A weighted statistical analysis revealed clinically significant increased complication rate for extra oral group for facial nerve injury and unfavorable scarring. (p=0.016) operating room time was significantly lower for intra oral group, a mean of 95.93 minutes when compared to 103.06 minutes for extra oral approach, Which is in contrast to Toma et al.⁹ who's study showed an additional 17-18 minutes of operating time for intra oral approach. Length of hospital stay was slightly higher in the extra oral group compared to the intra oral groups. One of the limitations of our study is that it is a retrospective review, it is not possible to compare intra oral versus extra oral approaches

without randomization. Why a surgeon chooses a specific method of approach to the angle fracture cannot be reasoned out precisely. Some of the determining factors are the age of the patient, severity of the fracture, patient preference and finally the comfort and training of the surgeon. However it is confirmed by other studies, including Ellis that the intra oral technique of angle fracture treatment with single miniplate along the superior border is associated with fewest complications. Future prospective studies of angle fracture repair will provide more clarity on the most appropriate approach for angle fracture treatment. A 7 year long retrospective analysis done by Mehra and Murat on isolated angle fracture, treated with a single monocortical plate intraorally and inferior border plating extraorally, showed similar results as our study. They recommended intra oral approach for the fixation of mandibular angle fractures.¹⁵

Conclusion

Both the methods of fixation are useful in the treatment of angle fractures of the mandible. On the basis of our results we recommend to use intraoral approach while clinically favorable with single miniplate along the superior border.

Reference

1. Champy M, Lodde JP, Schimdt R et al (1978) Mandibular osteosynthesis by miniature screwed plates via buccal approach. *J Oral Maxillofac Surg* 6:14–21
2. Sugar AW, Gibbons AJ, Patton DW, Silvester KC, Hodder SC, Gray M, et al. A randomized controlled trial comparing fixation of mandibular angle fracture with a single miniplate placed either transbuccally and intra-orally alone. *Int J Oral Maxillofac Surg* 2009; 38:241-5.
3. Yazdani J, Talesh KT, Kalantar Motamedi MH, Khorshidi R, Fekri S, Hajmohammadi S. Mandibular Angle fractures: Comparison of one miniplate vs Two miniplates. *Trauma Mon.* 2013; 18:17-20.
4. Iida S, Hassfeld S, Reuther T, Nomura K, Mühling J. Relationship between the risk of mandibular angle fractures and the status of incompletely erupted mandibular third molars. *J Craniomaxillofac Surg* 2005 30; 33:158-63.
5. Ellis E. A prospective study of 3 treatment methods for isolated fractures of the mandibular angle. *J Oral Maxillofac Surg.* 2010; 68:2743-54.
6. Barry CP, Kearns GJ. Superior border plating technique in the management of isolated mandibular angle fractures: A retrospective study of 50 consecutive patients. *J Oral Maxillofac Surg* 2007; 65:1544-9.
7. Siddiqui A, Markose G, Moos KF, McMahon J, Ayoub AF. One miniplate versus two in the management of mandibular angle fractures: A prospective randomized study. *Br J Oral Maxillofac Surg.* 2007; 45:223-5.
8. Mehra P, Murad H. Internal fixation of mandibular angle fractures: A comparison of 2 techniques. *J Oral Maxillofac Surg* 2008; 66:2254-60.
9. Toma VS, Mathog RH, Toma RS, Meleca RJ. Transoral versus extra-oral reduction of mandible fractures: A comparison of complication rates and other factors. *Otolaryngol Head Neck Surg.* 2003;128(2): 215–19.
10. Sudhakar GV, Rajasekhar G, Dhanala S, Vura N, Ramisetty S. Comparison of Management of Mandibular Angle Fractures by Three Approaches. *J Maxillofac Oral Surg.* 2015;14(4):979-85.
11. Pattar P, Shetty S, Degala S. A Prospective Study on Management of Mandibular Angle Fracture. *J Maxillofac Oral Surg.* 2014;13 (4): 592-8.
12. Gulses A, Kilic C, Sencimen M. Determination of a safety zone for transbuccal trocar placement: an anatomical study. *Int J Oral Maxillofac Surg.* 2012;41(8):930-33.

13. Kale TP, Baliga SD, Ahuja N, Kotrashetti SM. A comparative study between transbuccal and extra-oral approaches in treatment of mandibular fractures. *J Maxillofac Oral Surg*. 2010;9(1):9-12.
14. Hsueh WD, Schechter CB, Tien Shaw I, Stupak HD. Comparison of intraoral and extraoral approaches to mandibular angle fracture repair with cost implications. *The Laryngoscope* 2016;126(3):591-5.
15. Mehra P, Murad H. Internal fixation of mandibular angle fractures: a comparison of 2 techniques. *J Oral Maxillofac Surg* 2008;66:2254–60.
16. Potter J, Ellis E 3rd. Treatment of mandibular angle fractures with a malleable noncompression miniplate. *J Oral Maxillofac Surg* 1999;57:288–92
17. Pattar P, Shetty S, Degala S. A Prospective Study on Management of Mandibular Angle Fracture. *J Maxillofac Oral Surg* 2014;13(4):592-8.
18. Moreno JC, Fernandez A, Ortiz JA, Montalvo JJ. Complication rates associated with different treatments for mandibular fractures. *J Oral Maxillofac Surg* 2000;58:273-80.

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