

Comparison of Transbuccal Versus Transoral Approach For Management of Mandibular Angle Fractures

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ABSTRACT

Objective: To compare the outcomes of a transbuccal approach with an intraoral approach for managing mandibular angle fractures.

Study Design: Quasi-experimental study.

Place and Duration of Study: Armed Forces Institute of Dentistry (AFID), Rawalpindi, Pakistan, from May 2021 to May 2022.

Methodology: A total of 140 patients with mandibular angle fractures with an age range of 15–60 years were enrolled. Group-1 was treated using transbuccal approach, and Group-2 using intraoral approach. Measurements of the fracture gap were conducted on three defined points with a manual ruler. All patients were instructed to have follow-up visits at 1 week, 1 month, and 3 months postoperatively. On follow-up visit after 1 week, occlusal discrepancy was noted, whether present or not, after 3 months, infection if present, was noted, necessitating the removal of all infected hardware.

Results: Mean percentage of patients treated with the intraoral approach who developed occlusal discrepancy at 1 week postoperatively was 45.71% compared with 8.58% patients who were treated with transbuccal approach. Postoperative infection after 3 months was found to be 10.0% with transbuccal approach, compared to 32.86% with intraoral approach.

Conclusion: In comparison to intraoral technique, transbuccal approach to managing mandibular angle fractures offered superior fracture reduction and reduced infection and occlusal discrepancy.

Keywords: Endoscopy, Intraoral Surgery, Mandibular Fractures, Surgical Wound Infection

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INTRODUCTION

Approximately two-thirds of all maxillofacial fractures are caused by mandibular fractures, of which mandibular angle fractures account for 25–35%, with the most common etiology being road traffic accidents.¹ The high frequency of mandibular angle fractures has been attributed to a number of factors, including an abrupt change in the anatomy at the mandibular angle region and the presence of impacted mandibular third molars.² with various treatment modalities available.³ for fixation of the mandibular angle fractures that comprise a close reduction, an open reduction, and internal fixation with semi rigid fixation through manipulates and lag screws as rigid fixation.⁴ Definitive surgical treatment is achieved with an extraoral approach which benefits from better exposure and direct hardware application. However, this method has drawbacks such as an unsightly scar, a chance of facial nerve injury, and sensory disturbance.³ The intraoral approach not only overcomes the disadvantages of the extra oral

approach, such as the risk of damage to the marginal mandibular nerve and an unaesthetic skin scar, but also provides the added benefit of direct visualization of occlusion during the time of fixation.⁴ The drawbacks of the intraoral approach are the difficulty of adapting plates and manipulating fracture segments but transorally applied titanium miniplates with mono-cortical screws have been widely accepted for treating angle fractures as the plates are positioned near the mandibular tension zone to protect the dentition and inferior alveolar nerve.⁵ An alternative approach is transbuccal approach, which includes a small extraoral stab incision corresponding the location of the fracture line. Trochar assembly is inserted through a stab incision extraorally, advancing and perforating the periosteum corresponding to site of plate fixation while the cheek retractor stabilizes the transbuccal system.⁶ This study aimed to compare the transbuccal approach with the intraoral approach for treating mandibular angle fractures.

METHODOLOGY

This Quasi-experimental study was conducted after gaining approval from the Ethics Committee (IRB number 90/ Trg-ABP1K2), at the Department of Oral

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and Maxillofacial Surgery, Armed Forces Institute of Dentistry (AFID), Rawalpindi, Pakistan. The study duration was from May 2021 to May 2022. Sample size was calculated using an online sample size calculator, taking level of significance 1%, power of test 95%, anticipated population proportion 1 p1 0.863, and anticipated population proportion 2 p2 0.64934. The estimated sample size came out to be 141 patients, but 1 patient did not present on surgery day, hence, the final sample size was 140.

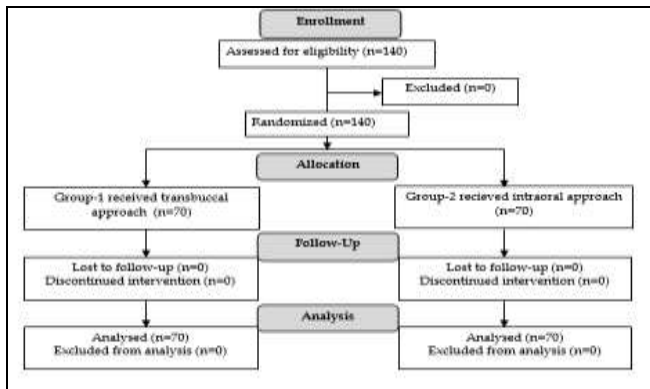


Figure-1: Patient Flow Diagram (n=140)



Figure-2: Postoperative Radiographic Interpretation of Fracture Reduction in Group-I



Figure-3: Postoperative Radiographic Interpretation of Fracture Reduction in Group-II

Inclusion Criteria: Adults of either gender, between 15 and 60 years of age, with mandibular angle fractures (unilateral or bilateral), other facial bone fractures, preoperative radiographic displacement of fracture segments and having American Society of Anesthesiologists (ASA) Class I, were included.

Exclusion Criteria: Pregnant women, nursing mothers, smokers, medically compromised patients, or having pathologies such as cysts, tumors, being on radiotherapy, chemotherapy, bisphosphonates, bone diseases, e.g., Paget's disease, comminuted fractures were excluded.

Prior to surgery, a consent form was signed by all patients, after they were informed about the clinical procedure and any potential benefits and risks. Patients were assigned one of two groups using the lottery method. Group-1 (n=70) underwent a transbuccal approach, and Group-2 (n=70) underwent intraoral approach, irrespective of gender and age. The operation was performed by the same operating surgeon. The duration of the operation was noted on the data collection form. Following one day of surgery, a postoperative orthopantomogram was obtained, and a line was drawn along the fracture and divided into three equal parts. Perpendicular lines were projected onto the fracture line to create reproducible measuring points, and measurements of the fracture gap were made at these four defined points. This allowed for a radiographic evaluation of fracture reduction between the two groups and was measured with a divider and scale. Postoperative radiographic tracing for both groups was done on the OPG to note the reduction of the fracture line. The patients were instructed to attend follow up visits at 1 week, 1 month, and 3 months postoperatively. On the first follow-up visit, the presence of occlusal discrepancy and surgical site infection was also checked. The data was analyzed using Microsoft Excel. Descriptive statistics were used to analyze the qualitative and quantitative variables. Quantitative variables such as age, duration of procedure, and distances between fracture segments at 3 equidistant points were measured as Mean±SD. Qualitative variables such as gender, post operative occlusal discrepancy at 1 week, and infection at 3 weeks were measured as frequency and percentage. Chi-Square test was applied to compare qualitative variables such as postoperative occlusal discrepancy at 1 week and infection at 3 weeks. An independent sample t-test (student test) was applied to compare quantitative variables such as distances between

fracture segments at four equidistant points between the two groups where a p -value ≤ 0.05 was considered as significant.

RESULT

Out of 140 patients, 82(58.57%) were males and 58(41.43%) were females, with a male-to-female ratio of 1.4:1. The age range was from 15 to 60 years, with a mean age of 38.15 ± 15.71 years, with mean age in Group-1 being 38.69 ± 15.67 years, and in Group-2, it was 37.97 ± 15.74 years. The majority of patients 76(54.29%), were between 16 and 40 years old as listed in Table-I along with other demographic characteristics. The mean fracture gap after reduction at three equidistant points with Group-1 was 0.65 ± 0.02 , 0.68 ± 0.02 , and 0.69 ± 0.02 , showing uniformity in reduction compared to the intraoral approach in Group-2, which was 0.88 ± 0.02 , 1.12 ± 0.05 and 1.65 ± 0.03 , showing an increased displacement between fracture segments as shown in Table-II. It was found that 45.71% of patients who were treated with intraoral approach developed an occlusal discrepancy at 1 week postoperatively, as compared to only 8.57% of patients who were treated with a transbuccal approach, who showed postoperative infection after 3 months to be only 10.0% compared to 32.86% with the intraoral approach, as shown in Table - III.

Table-I: Distribution of Patients According to Duration of Procedure (n = 140)

Duration (min)	Group-1 (n=70)	Group-2 (n=70)	Total (n=140)
≤ 35	26(37.14%)	23(32.86%)	49(35.0%)
> 35	44(62.86%)	47(67.14%)	91(65.0%)
Mean $\pm$ SD	36.76 ± 6.68	36.80 ± 6.74	36.77 ± 6.71

Table-II: Comparison of Distances Between Fracture Segments of Both Groups (n=140)

Distances between fracture segments	Group 1 (n = 70)	Group 2 (n = 70)	p -value
	Mean $\pm$ SD	Mean $\pm$ SD	
Point A	0.65 ± 0.02	0.88 ± 0.02	0.0001
Point B	0.68 ± 0.02	1.12 ± 0.05	0.0001
Point C	0.69 ± 0.02	1.65 ± 0.03	0.0001

Table-III: Comparison of Postoperative Occlusal Discrepancy and Infection Between Both Groups for Management of Mandibular Angle (n=140)

	Group-1 (n=70)		Group-2 (n=70)		p -value
	Yes	No	Yes	No	
Occlusal discrepancy	06 (8.57%)	64 (91.43%)	32 (45.71%)	38 (54.29%)	<0.001
Infection	07 (10.0%)	63 (90.0%)	23 (32.86%)	47 (67.14%)	<0.001

DISCUSSION

For treatment of facial fractures using an open approach, there is an advantage to an early return to function⁷ with ultimate goal to have adequate approximation of fracture gaps, fixation and restoration of full function⁸. Angle fractures can be approached by intraoral and transbuccal approach, for which one study compared both and found that 46.66% patients who were treated with intraoral approach developed occlusal discrepancy at 1 week postoperatively as compared to only 6.66% patients who were treated with transbuccal approach, similar to our study results⁹. While there is no gold standard approach for fractures of face in patients with preexisting comorbidities of patient, multiple studies have been conducted for assessment and management¹⁰ where one study on mandibular angle fractures by transbuccal approach reported no case of malocclusion, similar to our study.¹¹ While this author compared the two techniques by using 3D strut plate, both approaches produced satisfactory results, but another author preferred latter due to ease of technique and hardware placement.¹² Another study reported that 3D plate for unilateral angle fracture showed better fracture reduction.¹³ as complicated biomechanical relationships between the muscles of mastication and the supra-hyoid group of muscles makes the management of fracture of mandible challenging.¹⁴ The rate of such post operative events ranges from 0-32 %.¹⁵ unlike our study where fractures treated by transbuccal approach had only 6.66% post operative infection after 3 months as compared to 20% with intraoral approach. One study concluded that there was only 5.4% infection in transbuccal group as compared to 17.4% in transoral group and in the transbuccal group, the dehiscence rate of the wound was 2.2%, whereas, in the transoral group, it was 10.9%.¹⁶ A modified percutaneous transbuccal approach is also being tested for accurate screw placement and minimal scar formation.¹⁷ Surgeons benefit from this approach as it leaves no visible mark and enables confirmation of occlusion during osteosynthesis with malocclusion incidence among transbuccal group was up to 12.5% as compared to 22.5% of extraoral group.¹⁸

In another study, the use of two- mini plates can be employed when fracture is horizontally unfavorable and displaced.¹⁹ similar to another author who used an angulated screw driver via a transoral technique to treat any mandibular angle fracture and proposed that regardless of the direction of displacement, it can be adopted with ease.²⁰ as treating a fracture angle of the mandible using a two plate fixation approach, noted a statistically significant risk of postoperative sequelae like wound dehiscence, scarring, and hardware failure.²¹ One prospective study noted that preoperatively clinical judgment is necessary in deciding the fate of extraction of molar if present in fracture line as extraction of this tooth can make reduction a fixation difficult and unstable.²² but another study noted that tooth removal is not associated with increased complexity.²³ One study compared intraoral approach using an angulated screwdriver with the transbuccal trocar assembly and concluded that the former is an easy effective technique for osteosynthesis with miniplates of mandibular angle as fixation with angular screwdriver took 28.10±3.3 minutes while the transbuccal approach was completed in 37.40±1.75 minutes.²⁴

LIMITATION OF STUDY

This study has several notable limitations. Its quasi-experimental design means patients were not randomly assigned to each surgical group, which can introduce selection bias and make the groups less comparable. The method for measuring the fracture gap—a manual ruler at three points—is a relatively crude and imprecise technique that lacks the objectivity of standardized radiographic measurements. Furthermore, the follow-up period of only three months is quite short for assessing long-term outcomes such as bone healing, permanent occlusal changes, or late-onset complications. Finally, as a single-center study, its findings may not be generalizable to other settings or patient populations.

CONCLUSION

The transbuccal technique for treating mandibular angle fractures was found to be effective in this study as it provides better fracture reduction with reduced complications such as infection and malocclusion. Hence, it should be used routinely for the management of mandibular angle fractures.

Conflict of Interest: None.

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Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

AH & YSB: Data acquisition, data analysis, critical review, approval of the final version to be published.

MA & AB: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

AAK & NK: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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