

# Outcome of Transbuccal and Transoral Technique in Open Reduction and Internal Fixation of Mandibular Angle Fractures

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## ABSTRACT

**Background:** Angle fractures have the highest percentage among mandibular fractures. It has many reasons like thinner cross section area, presence of third molar, muscle forces acting at the angle area and abrupt change of shape from horizontal to vertical rami.

**Aim:** To determine the outcomes of trans-buccal and trans-oral technique in open reduction and internal fixation of mandibular angle fractures.

**Study Design:** Randomized control trial.

**Methodology:** Total of 194 patients were recruited and divided in two groups. All patients underwent general anesthesia. In trans-oral group incision line was on external oblique ridge, exposing the ridge, the 5 holes mono-cortical plate were twisted and adapted to the ridge contour and fixed with 4 mono-cortical 2mm diameter screws. While in transbuccal approach, the angle region was exposed trans-orally. **Statistical analysis:** The collected data was analyzed by using SPSS version 25. Chi square was applied with p-value of less than 0.05 as significant.

**Results:** The result showed infection in trans-buccal group was 5.4% and in transoral group was 17.4%. Wound dehiscence in trans-buccal group was 2.2% while in transoral group was 10.9%. Plate or screw loosening in trans-buccal group was 1.1% and transoral group was 7.6%. Mal-union in trans-buccal group was 1.1% and in trans-oral group, it was 7.6%.

**Conclusion:** It was concluded that the trans-buccal is an effective procedure in terms of infection, wound dehiscence, mal-union and plate/screw loosening in comparison to trans-oral approach.

**Keywords:** Trans-buccal, Trans-oral, Infection and Wound Dehiscence.

## INTRODUCTION

Angle fractures have the highest percentage among mandibular fractures. It has many reasons like thinner cross section area, presence of third molar, muscle forces acting at the angle area and abrupt change of shape from horizontal to vertical rami<sup>1-4</sup>. The objective of treatment of the mandibular angle fracture is rapid healing by achieving pre-morbid anatomical position and occlusion and to restore function and appearance with minimum complications<sup>5-7</sup>. Treatment options include close reduction techniques and open reduction techniques. Close methods relying on immobilizing the jaws through intermaxillary fixation and open method involves Champy technique which have fewer post-op complications compared with others<sup>6-8</sup>. Champy justified the placement of single monocortical miniplate at the superior border of angle area in the region of tension band which is an ideal line of osteosynthesis. There are two surgical approaches for placement of fixtures in mandibular angle fractures. Firstly is the trans oral, which is operating through intraoral approach through oral mucosa. Secondly is trans buccal approach which involves both intra oral incision and small extra oral incision on facial skin which allows the use of trans buccal trocar for easy approach<sup>8,9</sup>. The use of trocar has made the trans buccal approach more preferable but this depends on surgeon's preference.<sup>7,9</sup> In both the approaches there is difference between anatomical position of plates<sup>9</sup>.

In trans oral the monocortical plate is fixed on the superior aspect of angle region i.e. on external oblique ridge, after adapting the plate to the anatomical contours of the ridge area<sup>2,3</sup>. This is the reason that the plate is prone to breakage. The area is covered by thin mucosa due to which there is chances of dehiscence<sup>10</sup>. There is more chances of screw loosening in trans oral approach because of lesser bone density compared to thicker lateral cortical plate<sup>8,9</sup>. While in trans buccal approach the plate is fixed on lateral cortex but at the superior aspect<sup>2,8</sup>. It has all the advantages over the trans oral technique but as it involves extra oral incision there is scar tissue formation and rarely damage to the marginal mandibular nerve<sup>6,7</sup>. Trans oral approach allows direct visualization of desired occlusion, absence of scar formation and no damage to

the marginal mandibular nerve.<sup>5,6</sup> There is prevalence of 16% complication in patients with trans oral approach and 10% complication in patients with trans buccal approach. The incidence of individual variables like fractured plate was 2.7% and 1.08%, dehiscence was 2.7% and 15.7%, loose screw or plate was 7.6% and 14.1%, removal of plate was 8.07% and 15.7%, infection was 8.07% and 14.7%, nonunion or malunion was 0.9% and 1.3% and redo due to fixture failure was 2.7% and 2.98% in trans-buccal and transoral groups respectively<sup>9</sup>.

There is no such study at local level so it will provide us a new better technique to be used in future. By comparing the complications of both the approaches we will be able to establish guidelines/protocol for management of mandibular angle fracture.

The objective of the study was to determine the outcomes of trans-buccal and trans-oral technique in open reduction and internal fixation of mandibular angle fractures.

## METHODOLOGY

Present study was a randomized control trail that enrolled 194 patients with 87 patients in each group. Non probability consecutive sampling technique was performed. All patients of 15 to 40 years of age with unilateral mandibular angle fractures presented to hospital within three days with either no pre-operative swelling or when swelling has completely subsided were enrolled. Patient with pan-facial trauma i.e. fracture in all upper, middle and lower third of face assessed through clinical examination and CT scan, infected, pathological, old or malunited fractures were excluded from current study.

Patients treated by trans-oral approach were put in group A and those treated by trans-buccal approach were put in group B. Before doing the procedure, written informed consent was taken from all patients included in the study by explaining the risks and benefits associated with the procedure. All patients underwent general anesthesia. In trans-oral group incision line was on external oblique ridge, exposing the ridge, the 5 holes mono-cortical plate were twisted and adapted to the ridge contour and fixed with 4 mono-cortical 2mm diameter screws. While in transbuccal approach, the angle region was exposed trans-orally, same monocortical plate was adapted to the superior portion of the buccal aspect of angle region, then a stab in the skin

Received on 03-01-2022

Accepted on 22-06-2022

corresponding to the angle region was made and through trocar hole is made connecting extra-oral stab to the intra-oral angle region, transbuccal system was applied through the skin stab and 5 holes monocortical plate was fixed with same 4 screws to the upper border of angle region on buccal aspect. In both the groups the intra-oral incisions was closed with 3/0 vicryle and in transbuccal approach extra-oral skin stab was sutured with proline 3/0. All patients were on soft diet for 4 weeks post-operatively and each patient was evaluated for wound dehiscence, mal-union, plate/screw loosening and infection after one week and three weeks by the operationized criteria.

**Statistical analysis:** Data was analyzed by using SPSS v.25. For age distribution, age range, mean±SD and percentages of age groups were computed and presented in the form of tables. For gender distribution frequencies and percentages. Post-operative wound dehiscence, plate/screw loosening, malunion and swelling frequency and percentages were computed for each group. Comparison between the two groups was done. Effect modifier like gender was controlled through stratification. Post stratification chi square values were calculated and P-values of less than 0.05 were considered significant.

**RESULTS**

Among total 184 patients, males were 90.2% while 9.8% were females. Mean± SD for age was 26.68±6.83. Total of 111(60.3%) patients were present in 15-27years age group while 73 (39.7%) patients were present in other age group 28-40 years. Infection in transbuccal group was 5.4% and in transoral group was 17.4%. Wound dehiscence in transbuccal group was 2.2% while in transoral group was 10.9%. Plate or screw loosening in transbuccal group was 1.1% and transoral group was 7.6%. Malunion in transbuccal group was 1.1% and in transoral group, it was 7.6% as shown in table-1. Chi square test was applied on all the variables and P values of the all the variables is less than 0.05.

Table-1: Comparison of post-op complications in both groups at 1 week

Variables	Categories	Transbucca	Transoral	Total	P-value
Infection	Present	5(5.4)	16(17.4)	21	0.011*
	Absent	87(94.6)	76(82.6)	163	
Wound-dehiscence	Present	2(2.2)	10(10.9)	12	0.017*
	Absent	90(97.8)	82(89.1)	172	
Plate/screw-loosening	Present	1(1.1)	7(7.6)	8	0.030*
	Absent	91(98.9)	85(92.4)	176	
Non-union	Present	1(1.1)	7(7.6)	8	0.030*
	Absent	91(98.9)	85(92.4)	176	

\*Statistically significant

Table 2: Rate of Complications in Both Groups After 1 Week

Techniques	Frequency	Complication		Total
		Present	Absent	
Transbuccal technique	Count	12(13%)	80(70%)	92(100%)
Transoral technique	Count	35(38%)	57(62%)	92(100%)

\*Statistically significant P value 0.000\*

Table-3: Stratification of all the variables with Gender.

Variables	Categories	Male	Female	Total	P value
Post-op infection	Present	19	2	21	0.966
	Absent	147	16	163	
	Total	166	18	184	
Post-op wound dehiscence	Present	9	3	12	0.066
	Absent	157	15	172	
	Total	166	18	184	
Malunion	Present	6	2	8	0.139
	Absent	160	16	176	
	Total	166	18	184	
Plate/screw loosening	Present	6	2	8	0.139
	Absent	160	16	176	
	Total	166	18	184	

The rate of complication one week after the procedures were 13% in transbuccal group while 38% in transoral group. Transoral group had 25% more rate of complication as shown in table-2. All the variables were stratified against gender (table-3) while chi square test was applied. Outcomes of variables (3-weeks) after the procedure were different. The complication rate in transbuccal group is 2.2% while in transoral it is 17.4%. There is almost 15% difference as shown in table-4.

Table-4: Rate of Complications in Both Groups After 3 Weeks

Techniques	Frequency	Complication		Total
		Present	Absent	
Transbuccal technique	Count	2(2.2%)	90(97.8%)	92(100%)
Transoral technique	Count	16(17.4%)	76(82.6%)	92(100%)

P value 0.001\*

\*Statistically significant

**DISCUSSION**

In present study we compared two groups by performing different techniques. One group was operated with transbuccal technique and other with transoral technique. The findings of this study clearly shows that the outcomes of transbuccal technique in open reduction and internal fixation of mandibular angle fractures are superior to the transoral technique both after 1 week of the fixation and after 3 weeks of fixation. There was clear difference in complications of both procedures. Transbuccal group has 25% less rate of complication compares to the transoral group. There was 13% complication rate in transbuccal group and 38% complication rate in transoral group. Different studies were performed on open reduction and internal fixation of mandibular angle fractures and they compare different approaches, some compare transoral and extraoral approach others compare transoral and transbuccal approach like our study. The variable they studied is different in different studies, like comparison of time taken in each procedure, ease of plating, frequency of infection, facial nerve damage, extraoral scar in case if extraoral approach has been used, frequency of malunion, nonunion, failure of hardware in the form of loosening or breakage and others. Toma in 2003 perform a study in which he compare transoral and extraoral approaches. They did comparison in terms of malunion or nonunion, infection, hematoma and wound dehiscence. They found that transoral has 8.6% complication rate compare to extraoral which was 25%. These findings are consistent with our study. Specifically, the nonunion rate was higher in transoral group compare to the extraoral group.<sup>5</sup> Sugar in 2009 conducted a study in which he compare the transbuccal and transoral approaches at 1 week, 1 month and 3 months in terms of wound dehiscence, infection, plate exposure, dry socket if third molar removed at surgery, malocclusion, scar, mouth opening and facial nerve weakness. He reported that the outcomes like wound dehiscence, infection, malocclusion and loose screws were all greater in transoral group compare to transbuccal group at week one which is consistent with our findings.<sup>3</sup> Kale in 2010 performed a study comparing the extra oral and transbuccal approach. He reported no complication with the transbuccal technique but few complications with the extraoral approach. His conclusion was that transbuccal approach was preferable technique provided, you have complete armamentarium like transbuccal system or trocar<sup>6</sup>.

In 2011 kumar study performed three different techniques for open reduction and internal fixation of mandibular angle fractures. Transbuccal has less complication rate of 13% compare to 16% in transoral approach and 17% in extraoral approach. The findings in our study are greater than this study but the conclusion is same. Another study was performed by Leverich in which he compared the infection rate, post-operative occlusion and few other variables in transoral and transbuccal groups. Transbuccal system has 5% rate of complication compare to 20% in transoral group which matching with our results. His findings were consistent with the previous studies like less rate of infection, plate removal etc. in

transbuccal group. He made the same conclusion of preferring the transbuccal approach<sup>8</sup>.

Same study was performed by Wan et al and he reported a complication rate of 16% in transoral group and 19% in transbuccal group. These findings are less than those which we have found in our study but the preference of transbuccal approach to transoral approach is valid. Pattar compare three groups, extraoral approach, transoral approach and transbuccal approach. He found no significant difference between the transbuccal and transoral approach in terms of variables he studied<sup>4</sup>. The difference in outcomes in our study and the study performed elsewhere is dependent on many factors like patient compliance, socioeconomic status, postoperative care, mode of measurement of complications and hospital setup and facilities.

## CONCLUSION

It was concluded that the transbuccal is an effective procedure in terms of infection, wound dehiscence, mal-union and plate/screw loosening in comparison to trans-oral approach, but the complication rate is higher in both these approaches in our study compared to the previous studies conducted elsewhere.

**Authors' Contribution:** **HU& SK:** Conceptualized the study, analyzed the data, and formulated the initial draft, **SU,SK&MM:** Contributed to the proof reading.

**Limitations:** This study lacked genetic workup among patients in-order to find the genetic cause with limited resources and financial constrains.

Conflict of interest: None

Funding: None

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