ISSN: 2581-5989
PubMed - National Library of Medicine - ID: 101738774

International Journal of Dental Science and Innovative Research (IJDSIR)
IJDSIR : Dental Publication Service
Available Online at:www.ijdsir.com
Volume – 7, Issue – 6, November – 2024, Page No. : 145 - 150

A Comparative Study between Transoral and Transbuccal Method for Open Reduction and Internal Fixation of Mandibular Angle Fracture

[1]Dr Pushan Maity, Assistant Professor, Department of OMFS, Haldia Institute of Dental Sciences and Research, Haldia, West Bengal

[2]Dr Subhransu Basu, Professor, Department of OMFS, Haldia Institute of Dental Sciences and Research, Haldia, West Bengal

[3]Dr Rajarshi Banerjee, Professor and Head, Department of OMFS, Haldia Institute of Dental Sciences and Research, Haldia, West Bengal

[4]Dr Sudipta Sahu, Associate Professor, Department of OMFS, Haldia Institute of Dental Sciences and Research, Haldia, West Bengal

[1]Dr Aniket Sarkar, Assistant Professor, Department of OMFS, Haldia Institute of Dental Sciences and Research, Haldia, West Bengal

Corresponding Author: Dr Pushan Maity, Assistant Professor, Department of OMFS, Haldia Institute of Dental Sciences and Research, Haldia, West Bengal

Citation of this Article: Dr Pushan Maity, Dr Subhransu Basu, Dr Rajarshi Banerjee, Dr Sudipta Sahu, Dr Aniket Sarkar, "A Comparative Study between Transoral and Transbuccal Method for Open Reduction and Internal Fixation of Mandibular Angle Fracture", IJDSIR- November – 2024, Volume –7, Issue - 6, P. No. 145 – 150.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Introduction: A single monocortical Plate is acceptable for open reduction and internal fixation(ORIF) of a non-comminuted angle fracture. This plate can be fixed at the external oblique ridge through a Transoral approach or through a Transbuccal approach via a Trocar system. In this study, we compare the Transoral method and the Transbuccal method for ORIF of mandible angle fracture with regards to operating time and various post operative complications.

Material and methods: 40 Patients with mandibular angle fracture, planned for Open Reduction and Internal Fixation (ORIF) were distributed equally between two Groups. Patients in Group A had ORIF done through a transoral approach. Whereas patients in Group B had ORIF done through a Tranbuccal approach. Comparison between these groups were done in terms of operating time and various post operative complications.

Results: There was no significant difference between the two groups in terms of mean operating time, maximum Inter-Incisal Distance, wound dehiscence and post-

operative malocclusion. However, in Group A we noticed 5/20(25%) cases of hardware failure which needed plate removal post operatively and in Group B, no such incidence was found.

Conclusion: In this study we find that miniplate fixation done on the lateral surface of mandible in ORIF of mandible angle fracture through the Transbuccal trocar system produces less complications when compared with plate fixation done on the external oblique ridge through the transoral approach.

Keywords: Maxillofacial Trauma, Mandible Fracture, Maxillofacial Surgery, Oral Surgery

Introduction

The Angle is a frequent site of fracture in Mandibular injuries[1]. According to the studies and recommendations of Champy et al.[2] and Michelet et al.[3], a single monocortical Plate is acceptable for open reduction and internal fixation (ORIF) of a non-comminuted angle fracture. This plate can be fixed at the external oblique ridge through a transoral approach obviating the need for an extraoral skin incision.[2] In cases with complicated or comminuted fracture, an extra-oral approach is preferred, especially where a rigid reconstruction plate fixation might be needed. [4,5] However, mandibular angle fracture also boasts a high rate of post-operative complications.[1] A study reveals infection rate of 13% in ORIF of mandibular angle fracture done through a transoral approach as compared to 2% infection rate when extraoral approach was used. [6] On the other hand, in the same study, extraoral approach was associated with an 8% incidence of Marginal Mandibular nerve weakness.[6] In recent times, transbuccal approach with updated designs of the trocar system has gained popularity.[7] Transbuccal approach enables a surgeon to place the plate at the lateral surface of the mandible while approaching through an intraoral incision and a miniscule stab incision extraorally. In this study, we compare the Transoral method and the Transbuccal method for ORIF of mandible angle fracture with regards to operating time and various post-operative complications.

Material and methods

Approval from the Institutional Ethical committee was taken for this Prospective study. 40 Patients with isolated, non-comminuted mandibular angle fracture, planned for Open Reduction and Internal Fixation (ORIF) under General Anaesthesia were distributed equally between two Groups. Patients in Group A had ORIF done through a transoral approach with a 4 hole spaced 2mm miniplate adapted and fixed at the external oblique ridge.(Fig. 1,3) Whereas patients in Group B had ORIF done through a Tranbuccal approach with a 4 hole spaced 2mm miniplate adapted and fixed at the Lateral surface of the mandible. (Fig. 2,4)The Same team of Surgeons operated on both groups with identical perioperative and postoperative medications. Patients were reviewed at one week, one month and three month post operatively.

Inclusion Criteria

1. Isolated, unfavourable mandibular angle fracture
2. 18-40 years of Age
3. Planned for ORIF under GA

Exclusion Criteria

1. Comminuted Fracture
2. Presence of Third Molar in the Fracture Line
3. Multiple Fractures of the Maxillofacial Skeleton
4. Medical conditions affecting healing and immune response

Outcome Variable

1. Operating Time (min)
2. Maximum Inter-Incisal Distance (mm)
3. Presence of Post-Operative Malocclusion

4. Presence of Post-Operative Wound Dehiscence
5. Presence of Post-Operative Hardware Infection

Recorded data were analyzed with the help of the Statistical Package for the Social Sciences (SPSS Inc, Chicago, IL, USA). The significance of differences was assessed with Fisher's exact test, chi square test or Mann–Whitney U-test as indicated.

Results

The mean age in Group A was 28.45, whereas the mean age in Group B was 26.7 and there was no significant difference between the two groups (p=0.41). In Group A there were 16(80%) male patients and 4(20%) female patients, whereas in Group B there were 15(75%) %) male patients and 5(25%) female patients. There was no significant difference between the two groups in terms of gender distribution (p=0.7). All the cases included in the study, though not deliberately were unfavourable Angle fracture. The mean operating time for Group A was 61.45min whereas for Group B it was 62.05min and there was no significant difference between the two groups (p=0.84). In terms of Maximum Inter-Incisal Distance, Group A patients showed a man of 38.1mm whereas, in Group B it was 37.5mm and there was no significant difference between the two groups (p=0.52) Patients in Group A showed 4/20 (20%) incidence of Post-Operative Malocclusion, whereas in Group B it was 2/20(10%) and there was no significant difference between the two groups. (p=0.66) However, the malocclusions were corrected by elastic traction with arch bars over two weeks. In group A, 2/20(10%) showed wound dehiscence at the incision site, whereas in Group B, there were no such cases, but there was no significant difference between the two groups.(p=0.49) However, there was significant difference between the groups in terms of Hardware infection (p=0.04). In Group A we noticed 5/20(25%) cases of hardware failure which needed plate removal post operatively and in Group B, no such incidence was found. (Table 1) Out of the 5 cases of hardware infection, 3 were managed by removal of the infected plate under Local Anaesthesia and 2 cases needed surgery under General Anaesthesia to remove the infected plate and fixation of a Rigid Plate(2.5mm). Additionally, there was no incidence of Permanent Neuro-Sensory Deficit, CNVII injury or scar formation.

Discussion

This study shows that the incidence of postoperative infection is significantly higher in patients undergoing ORIF of mandibular angle fracture through transoral approach when compared to transbuccal approach. A study by Sugar et al. states similar results, where the authors found 36% hardware infection in transoral approach compared to 20% in Transbuccal group.[7] Similar results were found in other studies also. Laverick et al. found significantly higher rate of infection in the transoral group than the Transbuccal group.[8] Wan et al.[9] also found the rate of infection to be higher in transoral approach (15. %) when compared to transbuccal approach (2.7%). A study also shows the transoral approach has 1.71 times greater odds of developing complication when compared transbuccal approach.[9] Infection rate in Transoral approach was found to be 2.4% to 28 % in various studies.[6,7,10-17] In this study we found the infection rate in Transoral approach to be 25%, significantly higher than those placed with Transbuccal approach. The probable cause for this might be that Transorally placed plates on the external oblique ridge are in a close relation with the dentition, causing increased chance of bacterial adhesion as stated by Wan et al.[9] Also, the overlying mucosa in transorally placed plate is relatively thin as compared to much thicker soft tissue covering over the lateral plate placed with

transbuccal approach as stated by Laverick et al. and Wan et al.[8,9] Moreover, the additional bending and twisting of the plate required for adapting the plate to the external oblique ridge may be a contributing factor.

Another important variable that was considered was Operating time, measured from incision to closure. Transbuccal approach needs an additional stab incision along with the use of the trocar system which increases operating time. However, when comparing between the groups, there was no significant difference in operating time. (Group A =61.45min, Group B =62.05min p=0.84) The reason for this is, although the transoral approach doesn't have the additional incision and instrumentation, it requires more time to bend and twist the plate to be adapted to the complex contour of the external oblique ridge, whereas, in transbuccal approach, the relative flat lateral surface of mandible reduces the time taken for adapting the plate. This is similar to the findings of other studies, where no significant difference in operating time was noted.[8]

In this study, the extraoral stab incision used in transbuccal approach didn't cause scarring or injury to the marginal mandibular nerve. Similar outcome can be seen in a study by Bhardwaj et al. where, transbuccal approach results, good cosmetic outcome, ease of use and no injury to marginal mandibular nerve.[18]

Although most of the literature showed better outcome with transbuccal approach when compared to Transoral approach, two studies found no difference in between these approaches.[19,20]

A meta-analysis of five studies comparing Transoral and Transbuccal approach concluded that there is a 2.10 times more chance of developing complications when ORIF of mandible angle fracture is done through the transoral approach than through transbuccal approach.[21] In this study we report similar findings.

With regards to operator preference, though subjective, the transbuccal method did not appear too technique sensitive or time consuming than the transoral technique. Moreover, the transbuccal technique is somewhat favoured due to the better postoperative outcomes. However, as this study was designed to include cases operated by a single surgeon, so proper objective comparative data is unavailable.

Conclusion

In this study we find that miniplate fixation done on the lateral surface of mandible in ORIF of mandible angle fracture through the Transbuccal trocar system produces less complications when compared with plate fixation done on the external oblique ridge through the transoral approach. The additional instrumentation doesn't increase the Operating time and the extraoral stab incision on the skin is not associated with scarring and marginal mandibular nerve injury. We acknowledge few limitations in this study, i.e. the effect of smoking, drinking, status and maintenance of oral hygiene, presence of third molar near the fracture line, changes in masticatory forces and the surgical team's proficiency in using the Transbuccal trocar system were not considered. A thorough multi-center study, with all these variables and a larger sample size will help in determining the advantages of the transbuccal approach. Although there is plenty of studies showing similar results, use of the Transbuccal system is still sporadic, especially in the peripheral healthcare setups. We hope that this study will add onto the weight of evidence favouring the Transbuccal method for miniplate fixation in non-comminuted mandibular angle Fracture.

References

1. Assael LA, Prein J. Stable Internal Fixation of Osteotomies of the Facial Skeleton. In: Prein J, editor. Manual of Internal Fixation in the Cranio-

Facial Skeleton. Springer Berlin Heidelberg; 1998 p. 185–98.

2. Champy M, Wilk A, Schnebelen JM. [Tretment of mandibular fractures by means of osteosynthesis without intermaxillary immobilization according to F.X. Michelet's technic]. Zahn Mund Kieferheilkd Zentralbl. 1975;63(4):339–41.
3. Michelet FX, Deymes J, Dessus B. Osteosynthesis with miniaturized screwed plates in maxillo-facial surgery. J Maxillofac Surg. 1973 Jan;1:79–84.
4. Prein J, Spiessl B, Rahn B, Perren SM. [Madibular fracture healing after surgical treatment]. Fortschr Kiefer Gesichtschir. 1975;19:17–21.
5. Spiessl B. Rigid internal fixation of fractures of the lower jaw. Reconstr Surg Traumatol. 1972;13:124–40.
6. Ellis E, Walker LR. Treatment of mandibular angle fractures using one noncompression miniplate. J Oral Maxillofac Surg. 1996 Jul;54(7):864–71.
7. Sugar AW, Gibbons AJ, Patton DW, Silvester KC, Hodder SC, Gray M, et al. A randomised controlled trial comparing fixation of mandibular angle fractures with a single miniplate placed either transbuccally and intra-orally, or intra-orally alone. Int J Oral Maxillofac Surg. 2009 Mar;38(3):241–5.
8. Laverick S, Siddappa P, Wong H, Patel P, Jones DC. Intraoral external oblique ridge compared with transbuccal lateral cortical plate fixation for the treatment of fractures of the mandibular angle: prospective randomised trial. Br J Oral Maxillofac Surg. 2012 Jun;50(4):344–9.
9. Wan K, Williamson RA, Gebauer D, Hird K. Open Reduction and Internal Fixation of Mandibular Angle Fractures: Does the Transbuccal Technique Produce Fewer Complications After Treatment Than the Transoral Technique? J Oral Maxillofac Surg. 2012 Nov;70(11):2620–8.
10. Ellis E, Walker L. Treatment of mandibular angle fractures using two noncompression miniplates. J Oral Maxillofac Surg. 1994 Oct;52(10):1032–6.
11. Schierle HP, Schmelzeisen R, Rahn B, Pytlik C. One- or two-plate fixation of mandibular angle fractures? J Cranio-Maxillofac Surg. 1997 Jun;25(3):162–8.
12. Ellis E. Treatment methods for fractures of the mandibular angle. Int J Oral Maxillofac Surg. 1999 Aug;28(4):243–52.
13. Lamphier J, Ziccardi V, Ruvo A, Janel M. Complications of mandibular fractures in an urban teaching center. J Oral Maxillofac Surg. 2003 Jul;61(7):745–9.
14. Mehra P, Murad H. Internal Fixation of Mandibular Angle Fractures: A Comparison of 2 Techniques. J Oral Maxillofac Surg. 2008 Nov;66(11):2254–60.
15. Seemann R, Schicho K, Wutzl A, Koinig G, Poeschl WP, Krennmair G, et al. Complication Rates in the Operative Treatment of Mandibular Angle Fractures: A 10-Year Retrospective. J Oral Maxillofac Surg. 2010 Mar;68(3):647–50.
16. Kuriakose MA, Fardy M, Sirikumara M, Patton DW, Sugar AW. A comparative review of 266 mandibular fractures with internal fixation using rigid (AO/ASIF) plates or mini-plates. Br J Oral Maxillofac Surg. 1996 Aug;34(4):315–21.
17. Gear AJL, Apasova E, Schmitz JP, Schubert W. Treatment Modalities for Mandibular Angle Fractures. J Oral Maxillofac Surg. 2005 May;63(5):655–63.
18. Bhardwaj B, Singh J, Mahajan S. Transbuccal Approach in Management of Mandible Angle

Fracture. Indian J Otolaryngol Head Neck Surg. 2020 Dec;72(4):457–62.

19. Kumar S, Prabhakar V, Rao K, Brar R. A Comparative Review of Treatment of 80 Mandibular Angle Fracture Fixation with Miniplates Using Three Different Techniques. Indian J Otolaryngol Head Neck Surg. 2011 Apr;63(2):190–2.
20. Pattar P, Shetty S, Degala S. A Prospective Study on Management of Mandibular Angle Fracture. J Maxillofac Oral Surg. 2014 Dec;13(4):592–8.
21. Al-Moraissi EA, Ellis E. What Method for Management of Unilateral Mandibular Angle Fractures Has the Lowest Rate of Postoperative Complications? A Systematic Review and Meta-Analysis. J Oral Maxillofac Surg. 2014 Nov;72(11):2197–211.

Legend Table and Figures

Table 1:

Table 1

	Group A	**Group B**	**p Value**
Age	Mean (SD)= 28.45(6.33)	Mean (SD)= 26.7(5.55)	0.41
Sex	M=16(80%) F=4(20%)	M=15(75%) F=5(25%)	0.7
Operating Time (min)	Mean (SD)= 61.45(5.18)	Mean (SD)=62.05(4.22)	0.84
Maximum Inter-Incisal Distance(mm)	Mean (SD)= 38.1(3.43)	Mean (SD)=37.5(3.45)	0.52
Malocclusion	4/20 (20%)	2/20(10%)	0.66
Wound Dehiscence	2/20(10%)	0/20(0%)	0.49
Hardware Infection	5/20(25%)	0/20(0%)	**0.04**

Figure 1: Position of Plate in Group A

Figure 2: Position of Plate in Group B

Figure 3: Fixation Group A

Figure 4: Fixation Group B