

EVALUATION OF MANAGEMENT OF MANDIBULAR ANGLE FRACTURE BY USING DIFFERENT APPROACHES

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ABSTRACT

Introduction

Mandible is frequently involved bone in facial fracture with angle fracture accounting for 27-30% of cases. Various methods and approaches have been tried for treatment of angle fracture of mandible.

Objective

To correlate the different surgical approaches with its outcome postoperatively.

Methodology

A hospital based descriptive observational study was conducted in 30 patients at dental department in Nepalgunj Medical College from October 2016 to April 2019. ASA I patients having mandible angle fracture either isolated or combined with other facial bones were included in the study. Different approaches were used for management of angle fracture of mandible. Patient characteristics were presented using frequency table and percentages.

Result

The mean operative duration was lesser in transbuccal approach (111.25 minutes) compared to transbuccal (lower border) approach (120 minutes) and intraoral (122.5 minutes) in case of isolated angle fracture. Ease of surgical access was good in transbuccal approach 7 patients (70%) compared to intraoral approach 6 patients (42.86%). Occlusal discrepancies were more in transbuccal approach (50%) compared to intraoral approach (21.43%). Scar was barely visible in 2 patients (14.29%) out of 14 patients where transbuccal incision was made.

Conclusion

All patients had pretrauma occlusion by 6th week after surgery regardless of their approaches. None of the approaches were associated with visible scar. The result of our study showed intraoral approach to be more difficult than transbuccal approach with increase in surgical time.

KEY WORDS

Angle fracture, intraoral approach, transbuccal approach, mandible.



INTRODUCTION

Mandible is frequently involved bone in facial fractures with angle fracture accounting for 27-30% of cases.¹ Angle fracture pose a unique clinical challenge and no general consensus has been agreed on the optimal treatment. Various methods used range from maxilla-mandibular fixation(MMF) to combinations of MMF and wire osteosynthesis, lag screw, and plate fixation.² Access to the fracture site can be gained through either intraoral or extra oral incisions (transbuccal, submandibular). The intraoral surgical approach is a good option for treating favorable angle fractures with adequate mouth opening whereas, transbuccal approach is indicated in cases where there is trismus with restricted mouth opening and extraoral submandibular approach is specifically indicated in cases of displaced unstable fracture segments.³ The ultimate goal for treating mandible angle fracture is establishment of the patient's preinjury occlusion, function and addressing patients esthetic demand.^{2,4} The surgeons intraoperative decision to shift from intraoral to extraoral approach is associated with increase in complication rates.⁴ Various studies have been conducted to compare the different approaches for treatment angle fracture of mandible reporting different advantages and disadvantages for each technique. We designed this study to observe the outcome of mandible angle fracture treated via different approaches and to observe the effectiveness of transbuccal (lower border) approach in two-miniplates fixation in unstable mandible angle fracture. The general objective of the study was to see the age group, gender distribution and cause of mandible angle fracture. The specific objective of the study was to correlate the different surgical approaches with its outcome postoperatively.

METHODOLOGY

A hospital based descriptive observational study was conducted in 30 patients as a sample size at probability 16.65 acceptable margin of error 6% and confidence interval 95%. Study was conducted in patients at dental department, Nepalgunj Medical College from October 2016 to April 2019 on the basis of non – probability selective sampling method to meet the objectives of study. The Ethical approval was taken from the Institutional Review Committee before the study. American Society of Anesthesiology (ASA) I patients having angle fracture of mandible either isolated or combined with other facial bones were included in the study. Patient having facial bone fractures other than mandible angle, only soft tissue injury were excluded from the study. Patient demographics, date of injury, mechanism of injury, date of admission, date of intervention, total anesthesia duration, mode of intervention (in case of open reduction and internal fixation:- approach, numbers of miniplate used, ease of surgical access), and postoperative complications were recorded. Follow up was done on 1st week (Suture removal and reinforcement of postoperative advice and early intervention of complications), 6 weeks, 3 months and/or 6 months (Re-evaluation and necessary treatment). All the treatment was done by single maxillofacial surgeon. The study tools used were self-

administered, pre-tested trauma records, Preoperative X-rays, and postoperative photographs to evaluate the outcome. The data were entered in Microsoft Excel 2007. Patient characteristics were presented using frequency table and percentages.

Surgical procedure:

Surgical access was via 1) intraoral approach (mandibular vestibular incision from 1st molar to anterior border of ramus and superior border plating was done), 2) Transbuccal approach (incision was placed along the resting skin tension line guided by passing 10/20 ml syringe needle through the skin to the fracture site and lateral border plating was done), 3) Transbuccal (lower border) approach (superior border plating was done via intraoral approach and lower border plating was done via transbuccal approach), 4) Pre-existing lacerations.

Intermaxillary Fixation (IMF) was done intraoperatively with eyelets placed between two premolars. Fixation was done with single 2mm - 5 hole continuous miniplate with two screws on each side of fracture line on superior border/ lateral border or two 2 mm – 5 hole miniplates with 4 screws in case of unstable/unfavorable fractures. Closure was done with 3-0 polygalactin-910 intraorally and 4-0 polypropylene suture on skin.

Evaluation:

Postoperative complications such as scar, occlusal discrepancy, infection, nonunion, and malunion were evaluated at each regular follow-up period.

Evaluation of scar was done with photographs at the 3rd month postoperatively. The scoring for the scar was as follows: 1, invisible scar; 2, barely visible scar; and 3, visible scar.6

Postoperative occlusion was evaluated using the following scoring system: 1, pre trauma; 2, minor discrepancy; and 3, major discrepancy.7

RESULTS

Mean age in this study was 25.07 years (range, 7-56 years), with male: female ratio of 27 (90 %): 3 (10 %). Road-traffic accident was most common etiology 18 (60%) followed by physical assault 6 (20 %), fall 4 (13.33%), sports injury 1 (3.33%) and domestic violence 1 (3.33%). Isolated mandible angle fracture was seen in 12 patients (40%), with a higher incidence of right sided fracture 18(60%) when compared to the left 12 (40%) (Fig 1).

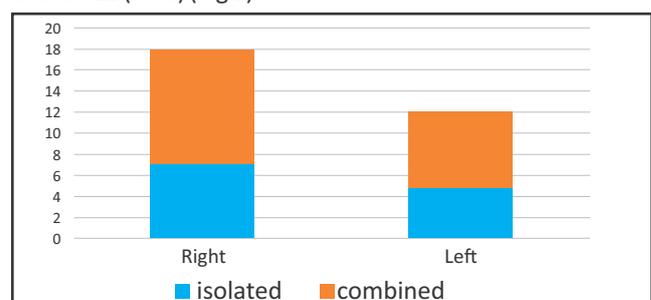


Figure 1: A stacked bar diagram showing frequency of isolated angle fracture on the bottom and frequency of angle fracture combined with other facial bone on the top.

The most common combination seen was angle and parasymphysis 16(88.89%). Out of 30 cases 29 cases were treated surgically and one patient was treated with Intermaxillary fixation with upper and lower arch bars. Access was made via intraoral approach in 14 cases, transbuccal approach in 10 cases, transbuccal (lower border) approach in 4 cases and pre-existing laceration in submandibular region in 1 case. The mean operative duration was lesser in transbuccal approach (111.25 minutes) compared to transbuccal (lower border) approach (120 minutes) and intraoral (122.5 minutes) in case of isolated angle fracture. (Table 1).

Table 1: Comparison of mean anesthetic time based on approach

| Mean anesthetic time (min) | Isolated (cases) | Combined (cases) |
|----------------------------|------------------|------------------|
| Intraoral | 122.5 (6) | 160 (8) |
| Transbuccal | 111.25 (4) | 155 (6) |
| Transbuccal (Lower border) | 120 (2) | 125 (2) |
| Extraoral | — | 140 (1) |

Ease of surgical access was good in 7 patients (70%) and fair in 2 patients (20%) and poor in 1 patient (10%) treated via transbuccal approach. Whereas, 6 patients (42.86%) had good, 5 Patients (35.71%) had fair and 3 patients (21.43%) had poor access in intraoral approach. (Table 2).

Table 2: Table showing ease of surgical access based on approach

| Ease of surgical access | Intraoral | Transbuccal approach | Transbuccal (Lower border) | Extraoral |
|-------------------------|------------|----------------------|----------------------------|-----------|
| Good | 6 (42.86%) | 7 (70%) | 4 | 1 |
| Fair | 5 (35.71%) | 2 (20%) | 0 | 0 |
| Poor | 3 (21.43%) | 1 (10%) | 0 | 0 |

With regard to postoperative occlusion 3 patients (21.43%) in intraoral approach and 5 patients (50%) in transbuccal approach showed minor discrepancies in occlusion in first postoperative week (Table 3), which was self-corrected during re-evaluation at 6th postoperative week.

Table 3: Table showing postoperative occlusion based on surgical access

| Postoperative occlusion | Intraoral | Transbuccal approach | Transbuccal (Lower border) | Extraoral |
|-------------------------|-------------|----------------------|----------------------------|-----------|
| Pretrauma | 11 (78.57%) | 5 (50%) | 4 | 1 |
| Minor discrepancies | 3 (21.43%) | 5 (50%) | 0 | 0 |
| Major discrepancies | 0 | 0 | 0 | 0 |

Scar was barely visible in 2 patients (14.29%) out of 14 patients where transbuccal incision was made. (Table 4).

Table 4: Table showing postoperative scar based on surgical access

| Scar | Transbuccal approach | Transbuccal approach (Lower border) | Extraoral |
|----------------|----------------------|-------------------------------------|-----------|
| Invisible | 8 (80%) | 4 (100%) | 0 |
| Barely visible | 2 (20%) | 0 | 1 |
| Visible scar | 0 | 0 | 0 |

DISCUSSION

Fracture of angle of mandible is defined as a fracture located posterior to the second molar extending from any point on the curve formed by the junction of the body and ramus in the retro-molar area to any point on the curve formed by the inferior border of the body and posterior border of the ramus of the mandible.⁸ Mandibular angle fracture accounted from 12.30% to 17.9% of total mandibular fracture as per studies conducted in our country Nepal.^{5,9-10} Frequent involvement of angle of mandible in fractures can be attributed to its thin cross-sectional area, the presence of a third molar, severity, direction, and point of impact. Champy et al. recommended the use of a single non-compression miniplate on the superior border of the mandible along the external oblique ridge which can be placed either vertically, screws being inserted sagittally through intraoral approach or alternatively the plate being adapted on the lateral surface of the mandible and fixation at a neutral midpoint of mandible via transbuccal approach for angle fractures.^{1,12} In cases of old, comminuted, infected or severely displaced fracture and fracture of edentulous mandible more than two plates are placed mostly via extraoral submandibular approach.^{12,13}

In our study of 30 cases with mandibular angle fracture mean age was 25.07 years (range, 7-56 years), with male predominance (90%) and road traffic accidents as a most common etiology 18 (60%) and right side predominance 18(60%). The finding of this study is comparable to that by Purva Vijay Sinai Khandeparker³ and Sudesh Kumar¹³. Whereas study by Albert J. Fox¹¹ and Wook J Yun¹⁴ has shown a higher mean age with physical assault to be the most common etiology and left predominance which was attributed to the fact that injury had resulted from the right handed people. Our study reported angle fracture in a smaller age group (7 years) and domestic violence was reported as a cause of angle fracture.

Out of 30 cases 29 cases were treated surgically where access was made via intraoral approach in 14 cases, transbuccal approach in 10 cases, transbuccal (lower border) approach in four cases and via pre-existing laceration in submandibular region in one case. IMF was done in one case because patient couldn't pay for surgery.

The mean operative duration was lesser in transbuccal approach (111.25 minutes) compared to transbuccal (lower border) approach (120 minutes) and intraoral (122.5 minutes) in case of isolated angle fracture. The mean operative time is greater in our study because we took total anesthetic duration (time from intubation to time of extubation) where as other studies^{3,8,12,13} took time from incision to closure. Our study showed greater time for transbuccal (lower border) approach because two miniplates were used for fixation. The mean operative duration was greater in intraoral approach than transbuccal approach in our study which is in contrast to study by Chari H,⁸ Goparaju V. S. Sudhakar¹² who reported longer surgical time in transbuccal approach. This could be because of poor



access to the site of fracture in intraoral approach as mentioned by El-Anwar and Sweed⁴⁵ particularly during screw fixation leading to increase in operative time.

Ease of surgical access was good in 7 patients (70%), fair in 2 patients (20%) and poor in 1 patient (10%) treated via transbuccal approach. Whereas, 6 patients (42.86%) had good, 5 Patients (35.71%) had fair and 3 patients (21.43%) had poor access in intraoral approach. The finding of our study is in contrast to study by Purva Vijay Sinai Khandeparker³, who reported no poor surgical access in both intraoral approach and transbuccal approach, Chari H⁸ reported 90% of cases to have easy access via transbuccal approach.

With regard to postoperative occlusion we reported 78.57% treated with intraoral approach and 50% of patient with transbuccal approach to have a pretrauma occlusion. Whereas, 3 out of 14 patients (21.43%) in intraoral approach and 5 out of 10 patients (50%) in transbuccal approach showed minor discrepancies in occlusion at first postoperative week. All the cases in transbuccal (lower border) approach had pretrauma occlusion postoperatively at first postoperative week. At 6th postoperative week all the patient had pre-trauma occlusion without any intervention. The result of our study is in contrast to study by Purva Vijaya Sahani³ who reported intraoral group to have more occlusal discrepancies than transbuccal group.

Scar was barely visible in 2 patients (20%) out of 10 patients treated via transbuccal approach. Scar was invisible in all 4 cases treated via transbuccal (lower border) approach. We treated one case via pre-existing laceration on submandibular region and the scar was barely visible. Study by Goparaju V. S. Sudhakar², Pradeep Pattar¹⁶ has shown that extraoral route can cause an unsightly scar as compared to transbuccal approach. Sudesh Kumar¹³ used extraoral approach for 2 miniplate fixation and recommended it for fracture requiring additional stability. We used transbuccal (lower border) approach for 2 miniplate fixation in cases requiring additional stability.

We had reported one case with surgical wound infection treated via transbuccal approach which was managed by incision and drainage postoperatively via intraoral route.

CONCLUSION

All patients had pretrauma occlusion by 6th week after surgery regardless of their approaches. None of the approaches were associated with visible scar. The result of our study showed intraoral approach to be more difficult than transbuccal approach with increase in surgical time.

RECOMMENDATION

In cases with unfavorable fractures we advise to place the miniplate via intraoral approach first. After that release the IMF and check for fracture stability intraoperatively, If questionable or unstable, place the second miniplate on lower border via transbuccal approach. This approach provides the surgeon with additional benefit of change in intraoperative treatment plan on fracture fixation without the additional risk of increase in postoperative complications.

LIMITATION OF THE STUDY

This study was carried out in single institution with small sample size. We suggest a multicenter study with a greater number of sample size to be carried out.

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CONFLICT OF INTEREST

None

FINANCIAL DISCLOSURE

None

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