

A Comparison Between Intra Oral and Extra Oral Approaches for Reduction of Mandibular Angle Fracture

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ABSTRACT

The mandible is the strongest of all the facial bones it is the only mobile bone of facial skeleton. It is roughly horseshoe shaped with the symphysis being the most prominent part. It has thick cortical plates. The main causes would be road traffic accident, assaults and sports injury. Treatment modalities and complication varies according to the fracture that occurs at the posterior portion of the mandible. So the fracture of the mandibular angle is quite challengeable and difficult. Most of the fracture of angle of the mandible are due to the indirect and direct hit to the bone. The third molars are located in the angle region and when they are impacted they occupy lot of space in the bone and undermine it. This abrupt change in the course of bone grain also makes the bone weak. All those factors makes the mandible vulnerable for fracture at this sites. Open reduction and internal fixation of mandibular angle fracture can be performed by two approaches, gingiva buccal approaches intra and Risdon's extra oral approaches both the approaches have their own advantages and disadvantages. The aim of the study is to compare post operative results of intraoral and extraoral approaches for management of angle fracture of mandible.

Key words: Mandibular Bone grains, Superior border fixation,
Risdon's incision, sub mandibular approach.

INTRODUCTION

Mandibular fractures represents approximately two-thirds of all the maxillofacial fractures (nearly 70%) out of which fractures of mandibular angle represent for 26-35% respectively^{1,2}. Fracture of this region involves the junction of posterior end of the alveolar process and body of the mandible with the ramus, from where the fracture line extends downwards. When the third molar is present, the fracture usually involves its crypt or socket and occasionally passes in front or behind the wisdom teeth. Angle fractures are caused due to the impact over the same side of the mandible between the canine and the second molar region or from violence to chin point to the opposite side. Fracture at the angle of the mandible are influenced by both the lateral and medial

pterygoid. Among these the force of contraction exerted by the lateral pterygoid is more and results in the upward, forward and inward displacement of the posterior fragment.

Decision regarding treatment approaches for reduction and fixation of angle fractures are often can be decided by the type of fracture, location of fracture, amount of displacement, surgeon's experience and training. Most of the confusion and question will be about the right approach for fractures of the mandibular angle. There are certain prerequisites for choosing approach: Type of fracture, amount of displacement of fractured segments, number of fractured segments, ease of accessibility and visibility, perfect anatomic reduction of the segments, perpendicular application of drilling device for fixation and

approach related complications Hence a prospective study was performed in patients with mandibular angle fractures between intraoral and extraoral (submandibular or risdon's approach for management of mandibular angle fractures to evaluate ease of accessibility, time taken for the procedure, ease of anatomic reduction and complications.

MATERIALS AND METHODS

A prospective study was done in 30 patients reporting to the Department of Oral and Maxillofacial surgery, sreebalaji Dental College and Hospital, chennai, Tamil nadu who were randomly divided in two groups A and group B based randomization chart. Group A constituted 15 patients requiring ORIF were approached Intra intrasorally and Group B constituted 15 patients requiring ORIF were approached extraorally. The inclusion criteria of this study was: Unilateral displaced mandibular angle fractures with deranged occlusion, mandibular angle fractures associated with other maxillofacial injuries and patients with undisplaced angle fractures ,fractures of middle third of the face. Patients who were not willing for intermaxillary fixation (IMF). Patients who had fractures of mandibular angle but not willing for open reduction, medically compromised patients who were not fit for general anaesthetic procedures, mandibular angle fractures treated elsewhere before/malunited were excluded from the study. Ethical approval was obtained from Institution Review Board and a structural informed consent was taken from all patients included in this study before the operative procedure

All patients included in the study were advised for pre operative radiograph that includes ortho pantamograph, ct 3D facial bone lateral skull view are taken. followed by pre operative routine blood investigation, chest antero posterior view radiograph and echo cardio gram were done, neuro surgery opinion and anaesthesia fitness were obtained .

Procedure

Intraoral Approach(Gingivo Buccal)

After administering local anaesthesia at the surgical site , 3 cm vestibular incision was given

distal to 2nd premolar extending to external oblique ridge until the ascending border of ramus IMF was placed and after achieving occlusion Mucoperiosteal flap was elevated And reflected until the lower border of the mandible and fracture site was exposed and was reduced manually. then the fracture was fixed with 4 holed 2.5 mm stainless steel miniplate at the external oblique ridge with 2.5 mm x 8 mm stainless steel screws Closure was done with 3-0 vicryl .occlusion was checked and IMF was released before extubation.

Extraoral Approach(Risdon'S Incision)

Incision was roughly marked with methylene blue paint. Extraoral submandibular incision of length 5 cm was placed 2 cm below the lower border of the mandible in the first neck crease/ submandibular shadow at the lower border to have an inconspicuous scar and avoid inadvertent damage to marginal mandibular branch of the facial nerve. A subplatysmal flap was elevated. Facial artery and vein were identified and ligated. Dissection of the pterygomassetric sling was done and further dissection exposed the periosteum of inferior border of mandible which was incised thereby exposing the fractured site. IMF was placed and occlusion was checked . Fracture was reduced and fixed with 4 holed 2.5 mm stainless steel miniplates on inferior border of angle of mandible and 2 holed 2.5 mm stainless steel plate on superior border of angle of mandible with 2.5 mm x 8 mm stainless steel screws. Closure of periosteum, pterygomassetric sling, platysma muscle and subcutaneous tissues were closed with 3-0 vicryl and skin closure done with 40 ethylon sure material. IMF was released before extubation for all patients

Post operatively all patients were advised to continue with antibiotics for next 5 days from the time of discharge, none of the patients required inter maxillary fixation post operatively. ortho pantamo graph and lateral skull view radiographs were taken post operatively to evaluate the reduction and fixation of the plate for the functional movements of the mandible.

The ease of accessibility was based on visual analogue scale by the operating surgeon and categorized and it is valued as: No accessibility-0, good-1, fair-2 and poor-3. The time

taken for the procedure from the time of incision until closure of skin was recorded with same digital clock for all patients. The difficulty level of the procedure was measured by the time taken for the procedure starting from the incision and fixation of fractures and approach related complications were recorded post-operatively. It was divided into three groups based on the time taken: Less than 1 h - minimum, 1-1.30 h- moderate, greater than 1.30 h- severe.

Accessibility

The ease of access to the fracture site was more good in extra oral approach than the patients treated with intra oral approach.it was calculate time taken for the incision, exposure till closure of the fracture site, difficulty level for fixation of fractures and complications reported post-operatively. time was calculated by the same digital clock in both groups. Group A patients approached transorally , while that of Group B patients approached

extraorally .intra oral approach took less time to reach fractured site.

Time taken

The difficulty level of both the groups which was calculated based upon the duration of the time recorded. It was divided into three groups: Less than 1 h- minimum, 1-1.30 h- moderate, greater than 1.30 h- severe. Group A had a minimum difficulty level of 60%, moderate difficulty level of 20.2 % and severe difficulty level of 7%. Group B patients had a minimum difficulty level of 46.7%, moderate difficulty level of 46.7% and severe difficulty level of 6.7% . Group I had minimum difficulty level in the management of the fractures. This increase in difference might be due to careful manipulation of the fractured segments to avoid inadvertent damage to vital structures. In Group B patients there was a slight better chance of obtaining a good anatomic reduction and fixation of the mandibular angle fractures when compared with Group A.

Extra Oral (Sub Mandibular Or Risdon”S Approach)



Fig. 1: Pre operative



Fig. 2: CT 3D facial



Fig. 3; Fracture site exposed through incision



Fig. 4: Fracture reduced and fixed



Fig. 5: Post operative scar



Fig. 6: Post operative OPG

Infection rate

3 Patients treated with intra oral approach of group A showed exposure of the plate and secondary infection , whereas in group B 4 patients treated with extra oral approach showed secondary infection respectively.Rubber Drain was placed to evacuate the infection.

Normal occlusion and scar

Out of 15 patients of group A 12 patients showed normal molar and canine occlusion . patients treated with extra oral approach . intra orally operated 14 patients showed proper molar and canine occlusion with little occlusal discrepancy.

All 15 patients treated with extra oral approach showed satisfactory scar marks , and it was totally absent in intra oral approach. It was evaluated by the question are forms given to the patients post operatively after few visits.

Difficulty level index

Post-operative complications noted in both groups. In Group A one patient (6.7%) had an infection of operated site 3 months following the surgery for 2 patients . Infected plate removal was

done under local anaesthesia and post-operative empirical medications were given. The healing of the fractured site and the overlying soft-tissues was uneventful. In Group B patients, one patient had a post-operative transient marginal mandibular nerve weakness on the operated side. There was a complete recovery of the sensation after 6 months. Hence, statistically there was no much of significant complication noted in either of the groups. There was a satisfactory healing of extra oral incision 4 weeks following the surgery and the scar was inconspicuous. Post-operative follow-up of all the patients were carried out at intervals of 1 month, 3 months, 6 months and 12 months respectively.

Level of mouth opening

In group A patients who were treated with intra oral approach . 12 patients showed normal mouth opening with more than 30 mm (three finger width) remaining 3 patients had difficulty due to presence of trismus , and after further follow-ups there was fair improvement in mouth opening. Whereas in group B patients . 14 patients showed normal mouth opening more than 32 mm(three

Intra oral (gingivo buccal approach)



Fig. 1: Pre operative



Fig. 2: Pre Operative OPG



Fig. 3: Gingivi buccal incision



Fig. 4: Fracture Reduced



Fig. 5: Post Operative OPG



Fig. 6: Post operative occlusion

finger width) the upper and lower incisal tips of anterior incisors were measured with divider and the readings are measured with ruler scale. And the calculations are performed.

DISCUSSION

Mandibular angle fractures are one of the most common types of fractures encountered in the maxillofacial region. Treatment Plan and modalities range from simple maxillo-mandibular immobilization to rigid internal fixation of bone fragments.^[3]Fracture can occur either anterior or posterior to mandibular third molar but rarely involving it. Previously traditional methods i.e. Maxillomandibular fixation and Trans osseous wiring were the mostpopular methods used for mandibular fracture fixation. These are still commonly used methods¹⁷The basic need of rigid internal fixation is primary bone healing under conditions of functional stability. Rigid internal fixation must neutralize all forces (tension, compression, torsion, shearing) developed during functional loading of the mandible to allow for immediate function during the healing period.[4]Hamill et al. stated that successful fixation of the bony fragments method depends upon the choice of approach^[5]The main aim of any approach is to promote rapid healing and restore the anatomical form and function with particular care to reestablish the functional occlusion and facial aesthetics with minimal disability and complications. A very few studies have been done by Raveh et al., Ellis and Karas, to discuss the differences between intraoral and extraoral approaches^[6,7,8,9,10]Another popular approach is transbuccal which includes both intraoral and extraoral stab incision for fixation of mandibular angle fractures. Sugar et al.^[11] in 2009 randomly studied 140 patients with mandibular angle fractures to compare fixation with a single mini plate either placed from a combined transbuccal and transoral approach, or intra-orally alone and concluded that transbuccal approach was more preferred by surgeons with the principal reasons being easy to use, minimal requirement to bent fixation in the plate and facilitation of placement of the plate in the neutral mid-point area of the mandible. If the fracture line is starting posterior to the third molar or fracture line extending high in the ramus, extra oral approach provides a better choice.

It provides a sterile environment for the fixation devices, an excellent direct visual exposure, accessibility and control of proximal as well as distal fractured segments for reduction to get an excellent anatomical contour and occlusion of the mandible. It also helps in direct application of fixation devices without difficulty to retract the tissue as seen in intraoral approach.^[12,13] The advantage of extraoral approach is fixation of 2 miniplates, one at the superior border and one at the inferior border of the mandible to control the tension forces in upper border and compression forces in lower border however certain authors suggest a single superior border plating is enough using intraoral approach.^[14] Miniplates are easier to adapt to bony curvatures than compression or reconstruction plates⁽¹⁵⁾. Lack of adequate stabilization lead to chronic inflammations, which impair the normal healing process and can result in delayed union, non-union, or infection.²⁰ Lack of adequate stabilization lead to chronic inflammations, which impair the normal healing process and can result in delayed union, non-union, or infection.²⁰ On fractures treated before or after 3 days of the injury. Most of the infections were due intra oral approach with or without associated tooth in fracture line irrespective whether it was extracted or retained.^[9,19,20] Malocclusion was assessed in this study solely through patient complaints as in other studies⁽¹⁷⁾

RESULTS

All the patients were clinically evaluated post operatively to determine various post operative

complications and difficulty in ridged fixation associated with two surgical procedures (intra oral and extra oral approach) used for reduction of mandibular angle fractures

On evaluating the post operative complications of infection, nerve damage, hypertrophic scar, ease of Approach to the fracture site, malocclusion and limitation in mouth opening of both the approaches .intra oral gingivi buccal approach showed superior advantages than the extra oral sub mandibular approach.

CONCLUSION

The use of a single miniplate on the superior border of the mandible for noncomminuted angle fractures and an extraoral approach with larger reconstruction plates for comminuted fractures are the current preferred methods of treatment. undisplaced and favourable fracture can be precisely treated intra orally along with inter maxillary fixation. by comparing the post operative complications and successful outcome of the surgery , the results of this study it was concluded that the intra oral approach is an effective and better technique with less post operative complications inn treating mandibular angle fracture .

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