

Minimal access fixation of mandibular angle fracture

ABSTRACT

Angle fractures represent the highest percentage of mandibular fractures. Fixation using a single miniplate ventral to oblique line of buccal cortex of the mandible was described by Champy *et al.* (1976). Ellis has documented low complication rate with monocortical miniplate fixation as a treatment for angle fractures. Most often used approaches are (a) extraoral approach, (b) intraoral approach, and (c) transbuccal approach. Each of these techniques has its pros and cons. We, in this note, propose an approach which sidelines the drawbacks of these approaches and has the combined advantages of these techniques. This technique results in no external scarring or injury to marginal mandibular nerve, and it also allows direct visualization and confirmation of occlusion during plate placement. This approach is through a contaminated area that poses a risk of infection. This approach of ours is based upon this pioneering works of Forrest. The approach proposed by us can aid an experienced maxillofacial surgeon to provide economical outpatient-based care to patients with minimally displaced/undisplaced angle fracture in a routine dental setup. This technique can be breakthrough for introduction of endoscopic approach for treating angle fracture.

Keywords: Angle fractures, intraoral fixation, minimal access

INTRODUCTION

Angle fractures represent the highest percentage of mandibular fractures.^[1] The frequent involvement of the mandibular angle in facial fractures can be attributed to (a) thinner cross-sectional area, (b) presence of third molar, (c) the fact that angle is subjected to muscle forces, and (d) the fact that there is also an abrupt change in shape from horizontal to vertical rami.^[1]

Fixation using a single miniplate ventral to oblique line of buccal cortex of the mandible was described by Champy *et al.* (1976). Ellis^[2] has documented low complication rate with monocortical miniplate fixation as a treatment for angle fractures.^[2] Since then, miniplate fixation of mandibular fracture has become the standard treatment of providing internal fixation for angle fractures.

Approaches for this treatment are varied. Most often used approaches are (a) extraoral approach, (b) intraoral approach, and (c) transbuccal approach. Each of these techniques has its pros and cons. We, in this note, propose an approach

which sidelines the drawbacks of these approaches and has the combined advantages of these techniques. This technique results in no external scarring or injury to marginal mandibular nerve, and it also allows direct visualization and confirmation of occlusion during plate placement. This approach is through a contaminated area that poses a risk of infection. This approach of ours is based upon this pioneering works of Forrest.^[3]

We have been using this approach in our setup for approximately 3 years now, and in due course of time, we have treated around 10 cases of minimally displaced/undisplaced mandibular angle fracture with this approach and the results have been satisfactory.

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SURGICAL TECHNIQUE

This technique was specifically used for patients with minimally displaced/undisplaced fractures of the angle of mandible.

The surgical procedure was done under aseptic conditions under local anesthesia.

The fracture was reduced manually by an assisting surgeon and held into place with arch bars and intermaxillary fixation (IMF).

A stab incision of <0.5 cm length was placed just below the attached gingiva in the distal to second premolar region or approximately 1 cm from cemento-enamel junction of the mandibular premolars [Figure 1]. Using a periosteal elevator, a submucoperiosteal flap was reflected along the incision length such that a tunnel (parallel to inferior alveolar nerve and crest of mandibular ridge, at the level of stab incision)

was created across the fracture line up to the external oblique ridge. The fracture line was felt with the sharp end of periosteal elevator.

A 4-hole miniplate with gap stainless steel plate was then tunneled through the incision and was adapted [Figure 2].

Vertical positioning of the plate was maintained and evaluated through a stab incision 1 cm below the attached gingiva in the interdental region between the first and second molar.

After adequate adaptation of the plate, the IMF was opened, and adaptation was verified using an intra oral periapical (IOPA) [Figure 3] radiograph image such that plate was accurately positioned along the fracture line.

The plate was fixed to the position with one screw on one side; again, IOPA radiograph was taken to



Figure 1: The incision behind premolar just below attached gingiva



Figure 2: The plate being tunneled through the incision



Figure 3: The adapted plate seen positioned across fracture



Figure 4: The plate with one screw near to fracture line



Figure 5: Incision closed, note the second punch incision for stabilizing plate in between and apically in alveolar mucosa

verify the position of screw close to the fracture line [Figure 4].

IMF was redone and the plate was again fixed across the fracture, through another stab incision distal to second molar; the screw was fixed through this incision. IMF again released and Incision was closed using 3-0 silk suture [Figure 5]. A final orthopantomograph was taken to evaluate plate fixation [Figure 6]. Antibiotics were maintained for 5 days postoperatively. All patients were advised soft diet and given oral hygiene instructions.

DISCUSSION

Treatment of mandibular fractures mainly focuses on adequate surgical repositioning and internal skeletal fixation. The healing complications to be analyzed are infection in the fracture line and malocclusion.^[4]

The four revised principles of the AO/ASIF (1994) are as follows:

1. Anatomic reduction
2. Functionally stable fixation (previously “rigid fixation”)
3. Atraumatic surgical technique
4. Immediate active function.^[4]

Although works of Ellis and Champy *et al.* have eliminated and reduced the role of IMF in treatment of angle fracture, yet the problems faced by the patients treated with IMF need a mention. Patients treated by IMF have a restricted airway, have loose excess weight, and are more vulnerable to the sequelae of postoperative hemorrhage and edema. Furthermore, IMF for 6 weeks may cause marked thinning and disruption of the normal organization of the articular cartilage. Further, in cases where tooth is not present in the distal segment, its application is not possible.^[4]



Figure 6: With one more stab incision, all screw fixed with final radiograph

Internal fixation of mandibular fractures partially eliminates the need for IMF and facilitates stable anatomic reduction, while reducing the risk of postoperative displacement of the fractured fragments, allowing immediate return to function.^[2] Internal fixation is associated with rapid bone healing, which reduces the risk of infection by reduced mobility of the fracture. Less potential for relapse and elimination or shortening of the intermaxillary period of immobilization results in early and complete restoration of function.^[4]

A skin incision concealed in submandibular area provides a clean wound separating the sterile plates from contaminated oral cavity.^[5] However, some patients develop unsightly scars and injury to marginal mandibular nerve. Additional drawbacks of this approach are: (1) it requires longer operation time and (2) it is more traumatic procedure.^[1]

The advantages of a transoral approach with miniplates include less risk of facial nerve damage and formation of hypertrophic scar, ease of adaptation, ability to confirm occlusion during surgery, and early mobilization of the patient and are also less likely to be palpable because of their smaller size and thinner profile.

The transoral approach provides inadequate access to allow correct reduction and immobilization.^[1,6]

In combined transbuccal/oral approach, there is minimal requirement to bend the plate. It also facilitates the placement of plate in the neutral midpoint area of the mandible.^[6] It offers advantages of intraoral route with minimal scar and injury to the nerve. Requisite for specialized instruments and dexterity makes it less common; furthermore, the transbuccal incision can lead to unaesthetic scars.

We have used this technique of our in 10 patients in 3 years span. Our technique involves three small stab incisions and therefore avoids undue tissue trauma to temporalis tendon and mucoperiosteum. It also reduces the risk of surgical site

contamination as the incision lies far away from the fracture line. Less hemorrhage no specialized instruments are required no general anesthesia required. It is quite reproducible as well because we have used dentition as landmark and reference of inferior alveolar nerve is also given.

In our series of 10 cases, the problems we faced were reduced accessibility, multiple incisions were required, multiple IOPA images were taken, plate was adapted and fixed under indirect vision, and also the need to open and redo the IMF multiple times makes the procedure tedious and time taking. We only treated minimally displaced fractures as unfavorable/displaced fractures may also require plating at lower border through extraoral approach. In our technique the need to reopen IMF many times reduces the possibility of treating severely displaced fracture as every time we opened the IMF reduction was lost; thus, we resorted to treat only minimally displaced or undisplaced fractures.

Minimal assess allowed for minimal periosteal trauma and hence minimal postoperative complications.

The periosteum also serves to preserve the fracture hematoma, which if onset is one of the factors that may lead to improper or late bony union. It is shown that unnecessary stripping of periosteum and consequent devascularization of the bone are inter-related and is common finding in the elderly.^[4] In our approach, major blood supply to the mandible is preserved because integrity of periosteal attachment along the lingual aspect and inferior border of the mandible is not disturbed. Radiographic exposure for taking IOPA is minimal and not a potent source of complication.

CONCLUSION

Although a retrospective study by Perez *et al.*^[1] suggests that complication rate is indifferent of approach used for fixation of mandibular fracture, yet it is wiser to take cautions and make use of full armamentarium available to “do no harm.”

Surgeons should consider the best approach for treatment of fracture based on severity and location, ability to adequately visualize and reduce the fracture, and personal experience with the techniques.

If taken care of these minor setbacks, the approach proposed by us can aid an experienced maxillofacial surgeon to provide economical outpatient-based care to patients with minimally displaced/undisplaced angle fracture in a routine dental setup. This technique can be breakthrough for introduction of endoscopic approach for treating angle fracture. We also are proponent of the thought that every technique has its own limitations but can be of prime importance in certain cases as well; thus, we think this minimal access technique is of prime importance in minimally or undisplaced angle fractures of mandible.

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Conflicts of interest

There are no conflicts of interest.

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