

A Comparative Review of Treatment of 80 Mandibular Angle Fracture Fixation with Miniplates Using Three Different Techniques

Sudesh Kumar · Vikram Prabhakar ·
Kiran Rao · Ramandeep Brar

Received: 19 October 2009 / Accepted: 13 June 2010 / Published online: 11 April 2011
© Association of Otolaryngologists of India 2011

Abstract Standard treatment of mandibular angle fracture with miniplates according to recommendations of Champy et al. (1976) consists of fixation with one miniplate at superior border of mandible ventral to external oblique line. In certain constellations, second miniplate at lower border may provide additional stability. In this retrospective study 80 patients with mandibular angle fracture were divided into 3 sub-groups reported at DIRDS Faridkot were treated by intraoral, extraoral and combined intraoral and transbuccal approach. There was no significant difference in complication rates encountered with these techniques. Decision regarding treatment approaches for open reduction of mandible fracture often relates to surgeon's experience and training. In some cases, choice is affected by availability of equipment. More difficult cases involving endentulous atrophic mandible or comminution should be considered for extraoral approach. Intraoral open reduction and fixation was used for non-comminuted and non-complicated fractures. The combined transbuccal/Intraoral procedure is now preferred method because of ease of use and facilitation of placement of plate in neutral mid point area of mandible.

Keywords Mandibular angle fracture · Fixation intraoral · Extraoral · Transbuccal/intraoral complications

S. Kumar · V. Prabhakar · R. Brar
Department of Oral Surgery, Dasmesh Institute of Research & Dental Science, Faridkot, Punjab, India

K. Rao (✉)
SGRD Institute of medical sciences and research,
Amritsar, Punjab, India
e-mail: drsudeshrao@yahoo.co.in

Introduction

Miniplate fixation of mandibular fracture has become the standard treatment of providing internal fixation. Fractures of mandibular angle represent largest percentage of mandibular fractures [1]. The frequent involvement of mandibular angle in facial fractures can be attributed to (1) Thinner cross-sectional area. (2) Presence of third molar. (3) Angle is subjected to muscle forces. There is also an abrupt change in shape from horizontal to vertical rami [1, 2].

Intraoral open reduction and fixation using a single miniplate ventral to oblique line of buccal cortex of mandible was described by Champy et al. (1976) and numerous authors have documented low complication rate with mono cortical miniplate fixation [3, 4]. 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 poses a risk of infection.

However, many surgeons doubt the degree of stability provided by intraoral miniplate [5].

In order to provide more stable fixation two miniplate fixation technique by extraoral approach is performed. A skin incision concealed in submandibular area provides a clean wound separating the sterile plates from contaminated oral cavity. However some patients develop unsightly scars and injury to marginal mandibular nerve [6].

In combined transbuccal/oral approach there is minimal requirement to bend the plate. It also facilitates the placement of plate in neutral mid point area of mandible [7]. It offers advantages of intraoral route with minimal scar and injury to nerve.

This study evaluates those criteria that are used in choosing between intraoral, extraoral and combined

transbuccal/intraoral open reduction and fixation of mandible angle fracture. Advantages and disadvantages of each technique, outcomes and criteria for choosing between surgical approaches are discussed. It also highlights certain aspects of fixation with two or single miniplate.

Methods

A retrospective review of inpatients and outpatient medical records of patients with mandibular fractures at Dasmesh Institute of Research and Dental Services, Faridkot from July 2003 to Aug, 2009 was performed.

To be included in this study, patients must have mandibular angle fracture that required open reduction and internal fixation. Patients with concomitant midface, parasymphiseal, and condylar fracture were excluded.

Charts of patients were reviewed for cause, age, gender, dentition, medical condition and extent of fracture, surgical approach and postoperative complications.

Fixation was with a four hole centrally spaced 2 mm miniplate placed either anteriorly on external oblique ridge via an intraoral approach or laterally via a combined oral and transbuccal approach. For extraoral approach skin incision was given in submandibular region, layer by layer dissection carried out to expose fracture fragments which are fixed with 2 mm two miniplates and 6–8 mm screws (Figs. 1, 2, 3).

All patients had preoperative and postoperative radiographs taken and were seen at weekly intervals for 3 months.



Fig. 1 Intraoral (single miniplate)



Fig. 2 Extraoral (two miniplates)

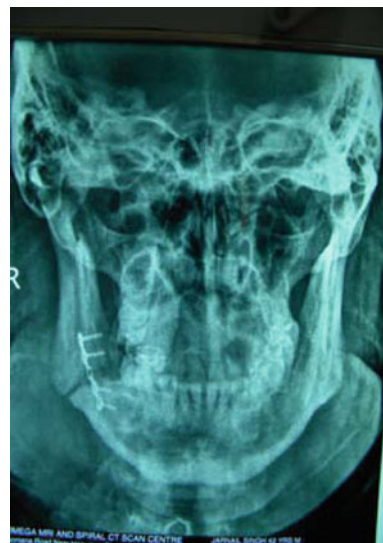


Fig. 3 Combined transbuccal/oral (single miniplate)

Results

A total of 306 patients with mandibular fracture treated during the study period (July 2003 to Aug 2009). The study population included 168 (55% patients with angle fracture). Eighty-eight of 168 (52%) patients were excluded for following reasons: 22 with other midfacial injury, 4 with subcondylar fracture and 66 with other mandibular fracture. Out of 80 patients 62 were male and 18 were female.

The Mean Age was 26.6 years (range 16–62 years). The most common etiology was Roadside accident 70% followed by interpersonal violence 20%, sporting injury 6% and falls 4%.

Out of 80, 35 were treated by intraoral single miniplate, 30 by extraoral 2 miniplate approach and remaining 15 by

combined transbuccal/intraoral approach using a single miniplate.

Seventy-three out of 80 patients (92%) were associated with impacted or erupted 3rd molar.

The patients were examined for major complications including nonunion, malunion and osteomyelitis. Minor complications included bone and soft tissue infection, wound dehiscence, plate exposure, malocclusion.

Route	Plates used	Number of patients	Number of complications
Intraoral	Single	35	6 (17%)
Extraoral	Two	30	5 (16%)
Combined transbuccal/ oral approach	Single	15	2 (13%)

Discussion

We reported the outcomes of 80 mandibular angle fracture treated at Oral and Maxillofacial Surgery Unit of DIRDS Faridkot. There were 62 males and 18 females with a mean age of 26.6 years. Road traffic accident 70% was the main etiologic factor.

A third molar was present in the fracture line in 73 (92%) of 80 patients. There is no consensus regarding the need to remove third molar in line of fracture [8]. Our practice has been to remove tooth that are loose within socket with no apical blood supply.

Minor complications encountered were soft tissue infection and plate exposure in intraoral route in 5 patients. These were managed by local irrigation and antibiotics. One patient required removal of plate after bone healing. Minor occlusal discrepancy in one patient was managed by light guiding elastics. The extraoral route often cause an undesirable scar; there is also a probability of damage to branches of facial nerve. On the other hand application of miniplate is facilitated by direct exposure and lighting associated with extraoral route. Infection occur in 5 patients treated via this route might be due to presence of extra hardware. These were treated by antibiotics and removal of plates in one case. No occlusal discrepancy was noted.

In combined transbuccal/oral approach 2 complications were encountered. One wound dehiscence intraorally managed by local irrigation and second slight occlusal discrepancy which was managed by guiding elastics.

There were no major complications requiring hospitalization, such as osteomyelitis, nonunion or malunion in this study.

In conclusion our study demonstrates no significant difference in complication rate between three techniques and route which suggests that there are not only biomechanical but other important factors play a role in development of infection after fixation.

Two plate fixation by extraoral approach requires longer operation time, but provides additional stability. Therefore, cases like old, comminuted, infected or severely dislocated fracture as well as fracture of edentulous mandible might be indications for two miniplates technique even though this might be a more traumatic procedure.

One miniplate at external oblique ridge is used for non comminuted, noncomplicated and minimally displaced fracture [3, 4].

The combined use of transbuccal/intraoral technique produced excellent results. There is minimal requirement to bend the plate and it also facilitates the placement of plate in neutral mid point area of mandible [6].

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.

References

- Schierle HP et al (1997) One or two plate fixation of mandibular angle fractures? *Journal of Craniomaxillofac Surg* 25:162–168
- Ellis E III (1999) Treatment method for fracture of the mandible angle. *Int J Oral Maxillofac Surg* 28:243
- Champy M, Lodde JH, Must D (1978) Mandibular osteosynthesis with miniaturized screwed plates via buccal approach. *J Maxillofac Surg* 6:14
- Michelet FX, Deynos I, Dessus B (1973) Osteosynthesis with miniaturized screwed plate in Maxillofacial Surgery. *J Maxillofac Surg* 1:79
- Choi BH, Kim KN, Kang HS (1995) Clinical & in vitro evaluation of mandibular angle fracture fixation with two miniplate system. *Oral Surg* 79:692
- Toma VS, Mathog HR, Toma SR, Meleca JR (2003) Transoral versus extraoral reduction of mandible fractures: a comparison of complication rates and other factors. *Otolaryngol Head Neck Surg* 128(2):215–219
- Sugar AW, Gibbons AJ, Patton DW, Silvester KC, Hodder Sc, Gray M, Snooks H, Watkins A (2009) A randomised controlled trial comparing fixation of mandibular angle with a single miniplate placed either transbuccally and intraorally, or intraorally alone. *Int J Oral Maxillofac Surg* 38:241–245
- Shetty V, Frey Miller E (1989) Teeth in line of fracture. A review. *J Oral Maxillofac Surg* 47:1303