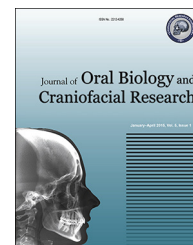


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Original Article

Management of mandibular angle fractures using a 1.7 mm 3-dimensional strut plate



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ABSTRACT

Aim: We report our experience with the use of 1.7 mm 3-dimensional (3D) strut plate for the management of mandibular angle fractures.

Methods: This prospective study enrolled 15 patients in whom mandibular angle fractures were treated with 1.7 mm 3D plate using trans-buccal trochar. Patients were evaluated at 72 h, 2 weeks, 6 weeks and 12 weeks for fracture stability, occlusion, soft-tissue swelling, infection and post-operative inferior alveolar nerve damage. Other complications like wound dehiscence, non-union, mal-union and hardware failure were also assessed.

Results: In the immediate post-operative period, fracture instability was seen in 1 (6.7%) patient which resolved by 2 weeks. Mild occlusal discrepancy was also noted in 1 (6.7%) patient. Wound dehiscence was seen in 5 (33.3%) patients and all resolved by local measures. 1 (6.7%) patient developed post-operative nerve paraesthesia. Immediate post-operative radiographic evaluation demonstrated optimal reduction in all cases with no inferior border gaping. No case of infection, hardware failure, non-union and mal-union was noted.

Conclusion: Within the limitations of the study, 1.7 mm 3D strut plate was found to be effective for management of non-communitated mandibular angle fractures.

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1. Introduction

Management of mandibular angle fractures is one of the most widely discussed topics in maxillofacial literature. The aim of the treatment is to restore the anatomical form and

function as well as establishing the pre-operative occlusion. With ease of application and low complication rates, Champy's 2 mm miniplate is the widely used treatment modality for management of mandibular angle fractures.¹ This semi-rigid fixation utilizes a single miniplate placed along the superior border which acts as a tension zone. However,

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the superior border tension zone is seen only if load is applied along the incisal edge. Biomechanical studies have shown that ipsilateral molar loading causes lower border splaying with Champy's technique.^{2,3} Also, in vitro studies point out the greater stability of two point fixation (2 bone plates) in angle fractures as compared to one.⁴ However, clinical studies provide a different picture. Ellis noted that the application of 2 mini-plate is associated with significant complications (29%) as compared to a single one (2.5%).¹ Other studies have found no difference in the use of either treatment modality.^{5,6}

To overcome the disadvantages of 2 plate application and to provide additional stability with a use of a single plate, 3-dimensional (3D) plates were developed. It consists of two 4-hole miniplates joined by 4 interconnecting cross struts.⁷ This provides room for additional screw placement adding to torsional and 3D stability of the fracture.^{4,8} Studies have reported the use of 2 mm 3D strut plate in angle fractures and have compared it with Champy's technique. We report our experience with a 1.7 mm 3D strut plate in the management of mandibular angle fractures.

2. Materials and methods

This institutional review board approved prospective study enrolled 15 adult patients requiring open reduction and internal fixation of mandibular angle fractures, reporting to our unit between July 2011 and June 2012. Patients with additional fractures of the mandible were also included provided they were fixed with rigid fixation. Exclusion criteria included patients with: associated midface fractures, comminuted fractures, edentulous fractures, angle fracture in combination with condylar fracture, major systemic illness and pregnant or lactating females. Informed written consent was obtained from all patients prior to inclusion in the study.

Emergency care was provided to all patients prior to surgery. Demographic details, abusive habits, mode of trauma, fracture sites, inferior alveolar nerve paraesthesia and time duration from trauma to surgery were recorded. Pre-operative radiographs were obtained in two planes (orthopantomogram and postero-anterior [PA] mandible view) to evaluate the fracture site (Figs. 1 and 2).



Fig. 1 – Pre-operative orthopantomogram showing displaced left angle fracture.



Fig. 2 – Displaced left angle fracture on a PA mandible view.

2.1. Surgical procedure

Surgical procedure was carried out under local or general anaesthesia depending upon patient compliance. Pre-operative antibiotic in the form of injection amoxicillin + clavulanic acid 1.2 g IV was given 1 h prior to the procedure after antibiotic sensitivity testing. Chlorhexidine 0.2% was used to prepare the oral cavity pre-operatively. Standard intra-oral vestibular incision with full thickness muco-periosteal flap was used in most cases to expose the fracture site. In few cases, an extended third molar crevicular incision was used wherever third molars were to be extracted. Third molars with gross caries, periodontal involvement, crown/root fracture, excessive mobility and those interfering with reduction of the fracture segments were extracted. Temporary maxillo-mandibular fixation (MMF) was done with tie-wires after obtaining satisfactory occlusion. Fixation of additional mandibular fracture was done with a load bearing locking plate with bicortical locking screws or with two miniplates; the plate at the lower border was fixed with bicortical screws to provide rigid fixation.

After proper reduction of angle fracture, fixation was carried out using a 1.7 mm × 10-hole titanium straight 3D strut plate (Stryker-Leibenger, Freiburg, Germany). It was positioned on the lateral surface of the mandible with the struts paralleling the fracture line. A trans-buccal trochar system was used to fix mono-cortical screws with 4 screws on either side of the fracture line. MMF was released and occlusion was checked. The operated site was closed with 3-0 vicryl and an extra-oral pressure dressing was applied. Post-operatively, the same antibiotic was continued for 3 days (2 dosages in a day). Analgesics and chlorhexidine 0.2% mouthwash were also prescribed. Strict oral hygiene instructions

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