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Research paper

Newer condylar trapezoidal plate in treatment of mandibular condyle fractures : short clinical study

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Abstract

Mandibular condyle fracture is one of the most frequent injuries of the facial skeleton. The treatment ofmandibular condyle is either closed reduction or open reduction with internal fixation. The open reduction of mandibular condyle fractures has become more favorable and gaining popularity since various osteosynthesis materials and techniques were developed in the past few decades. These include fixation with Kirschner wires, intraosseous wiring, miniplates, and lag screw fixation. In response to a increased number of needs for improved treatment in this region, a variable morphological plates have been developed with specific designs to treat such fractures. We present a case series of use of new condylar trapezoidal plate (condylar fragment plate) in the treatment of mandibular condyle fractures.

Keywords: *Three-Dimensional (3D);Orthopantomogram; Osteosynthesis; Condylar Trapezoidal Plate; Miniplates*

1. Introduction

Mandibular condylefractures are one of the most common fractures maxillofacial region (Asprino L et al.2006 p.452-456 , Gealh WC et al.2009 p.738-743, Seemann R et al.2007 p.e1-4.) .These fractures account for between 25% and 35% of all mandibular fractures (AlkanA et al.2007p.145-149,EllisE et al.2005 p.115-134) . It is a protective mechanism in which the anatomical basis of the mandible ensures the distribution of traumatic forces along the mandible till the condyles, proceeding with theweakest part at the condyle i.econdylarneck to get fracture, thus minimizethe traumatic forces transferringofto the cranium. This is the reason for the high incidence of condylar fractures (Menon S et al. 2008 p. 2390-2393) .The mainaimin managementof condylar fracture isto regain theanatomy of condylar structures , to provide fracture stabilization, and to restore the functionality with the least morbidity. Till recent yearsclosed reductionwas performed in the majority of patients with a condylar fracture of the mandible. However, lately there have been reports of the successful treatment of fractures with a variety of fixation techniques. Mandibular condyle fractures is one of the most debatable topics in maxillofacial arena with regards to its classification, diagnosis, and especially treatment methods(Villarreal PM et al. 2004 p.155-163). Treatment modalities include the conservative technique (closed reduction) or by surgery (open reduction). There are various methods of open reduction and osteosynthesis for the condylar fracture including fixation with Kirschner wires, transosseous / intraosseouswiring, miniplates, and lag screw fixation. Treatment of condylar fracture with rigid internal fixation shows improvement over the years due to increased knowledge of biomechanical principles and materials with advancement in plate and screw fixation devices (Lauer G et al. 2007 p.412-417,HaugRH et al 2002 p. 73-80)

2. Materials and methods

The study comprised of 10 patients with moderately displaced mandibular subcondylarfractures requiring open reduction, having insignificant medical history.The selected cases were treated by open reduction and internal fixation with three-dimensional (3-D) titanium condylar trapezoidal plate. According to the principles of functionally stable osteosynthesis to the mandibularcondyle, that is, to put the plate as near as possible to the tensile strain lines formed during function, a 3D titanium condylar trapezoidal osteosynthesis plate [Figure 1] was specifically designed for the stabilization of subcondylar and condylarneck fractures [Figure 2]. The specific size of plate to be used is selected according to anatomical parameters. The position of plate is across the fracture line with the posterior arm along the axis of the condylar neck. The first screw is usually inserted in the condylar part of fracture segment in the upper posterior hole of the plate. The second screw is inserted into the lower posterior hole for temporary stabilization of the fracture and to allow for insertion of the upper and lower anterior screws.

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Figure 1 : 3-D titanium condylar trapezoidal osteosynthesis plate (ortho-max)

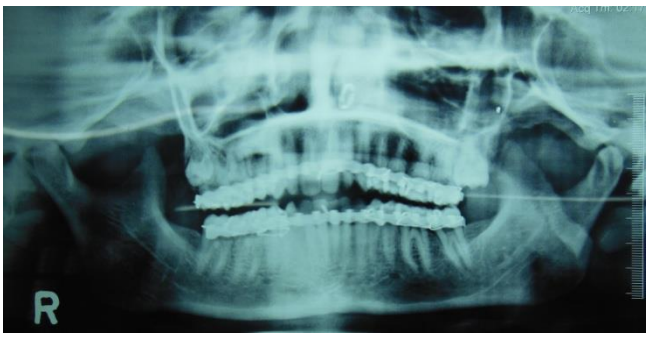


Figure 2: Pre operative O.P.G X ray showing fracture left subcondyle

3. Surgical procedure

All the cases were operated under general anesthesia. The operation time ranged between 40 and 80 min. The submandibular approach was used to gain access to condyle fracture by giving incision 2 cm inferior and parallel to inferior border of mandible or along existing skin crease for maximum cosmetic benefit. Dissection involves skin, subcutaneous tissue, platysmamuscle, white superficial layer of deep cervical fascia. The main neural structure is the marginal mandibular branch of the facial nerve (CN VII). The facial artery and vein are also encountered during this dissection, which was carefully isolated, clampted, and ligated.

Dissection continues till only tissue remaining on inferior border of mandible is periosteum or pterygomasseteric sling, which was then incised to expose inferior border or angle of mandible. Sharp periosteal elevator was used to strip masseter muscle from lateral ramus keeping intimate contact with bone, exposing entire lateral surface of ramus upto subcondyle, coronoid and sigmoid notch [Figure 3]. Intraoperative IMF (Intermaxillary fixation) was done to ensure occlusion. Manual manipulation was done to reduce fractured fragment. Some overlapping condylar fracture cases required inferior pulling of mandible through traction wire for reduction. Reduced fracture was then fixed with 3-D condylar plate and screws [Figure 4]. Intermaxillary fixation was removed and occlusion was rechecked after plating. Closure of incision was done with 3-0 vicryl for deeper tissue and 4-0 nylon for skin by subcuticular suturing.



Figure 3: Surgical exposure of fracture site.

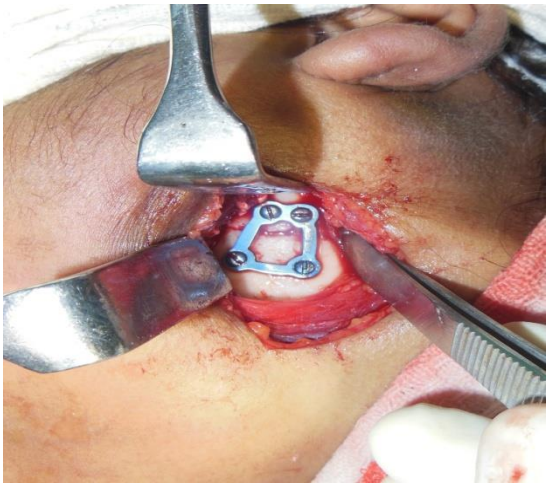


Figure 4: Fracture Reduction and plate fixation.

4. Results

All the patients were put on IMF for 2 weeks and were followed-up for at least 6 months over which results shows that functional parameters returned to normal, with an average mouth opening of 35 mm, protrusion of 5 mm, and laterotrusion of 6 mm. Radiographic controls showed good fracture alignment in 18 cases immediately after the surgery [Figure 5] and in 2 cases, 6 months after the surgery. No plate fracture or bending was observed. One case presented with neurosensory deficit, but recovery takes place in due course of time and one case presented with persistent pain, for which surgical site was explored, loose screws were found, requiring plate removal.

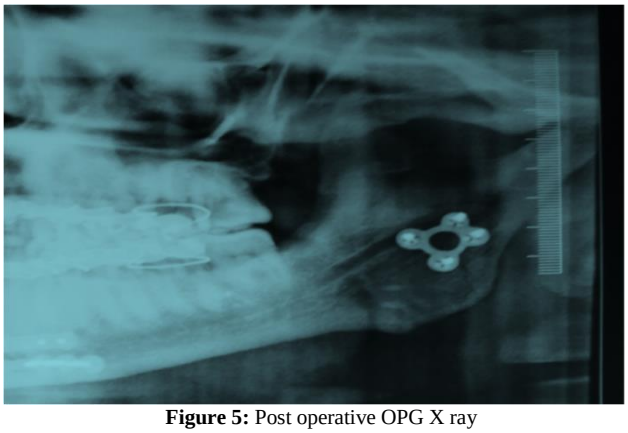


Figure 5: Post operative OPG X ray

5. Discussion

Management of mandibular condylefracturesis one of the most controversial areain the field of maxillofacial trauma. This controversy rests around the positive and the negative aspects of open and closed reduction approaches for the treatment of this fractures. Open reduction techniques gives good reduction and osteosynthesis but carry a increased risk of injury to the facial nerve and produce extraoral facial scars. Closed techniques (intermaxillary fixation) decrease the risks but correct anatomic reduction is very difficult, and complications such as ankylosis of TM joint, and condylar necrosis affect mandibular growth causing abnormal occlusion. Despite all the associated risks, closed techniques are currently the most popular treatment. The adequateanatomical reconstruction of the fracture condylar process is an importantrequirement for re-establishing TM Jointfunction. A number of reports now suggest that the treatment of condylar fractures consisting of open reduction, and rigid fixation leads to much better anatomic results. The stabilization of subcondylar fractures today involves the placement of two straight 4-or 6-hole miniplate vertically in the axis of the condylar neck or axil lag screw or 3-D rectangular plates. These plates are based on the principles of functionally stable osteosynthesis. Of all 3-D, plates provide better stability (Meyer C et al. 2006 p. 173-181). As our treatment results, with single plate and fewer numbers of screws, the 3-D condylar plates improved the stability of the assembly when compared with using two straight plate and more number of screws and the system allowed for osteosynthesis of small fragments. Therefore, this plate is suitable for the treatment of condylar neck and subcondylar fractures.

6. Conclusion

The use of a 3-D trapezoidal condylar plate was proven to be an easy and eff ective method for fixing the fracture fragments and maintaining stable osteosynthetics for patients with condylar neck and subcondylar fractures.

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Conflict of Interest: None Declared

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