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3-D Titanium Miniplate In The Treatment Of Parasymphysis Fracture.

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Abstract

Oral and Maxillofacial trauma is a great cause of concern due to the road traffic accidents which has markedly increased over past few years, along with road accidents other causes of injuries to orofacial region are sports injuries, voilences etc. Treatment options for fracture of orofacial region varies from being conservative to open methods. Mandible due to its anatomic location is more prone to trauma and fracture. One of the recently introduced effective method of treating mandibular fractures include open reduction using 3 dimensional miniplates which have a quadrangular design formed by joining two miniplates by an interconnecting crossbar. It was developed by Farmand M in 1992. This article presents a case of 35 year old female patient with parasymphysis fractured which was treated with 3-D Titanium miniplate. The outcome of treatment was positive, making 3-D plate a better treatment modality in mandibular fractures.

Keywords: 3-D titanium miniplate, Mandible, Open reduction, Parasymphysis fracture.

Introduction

Among the frequently encountered road traffic accidents trauma, there is a significant increase in level of injury to craniofacial region and often involving mandible (about 38% of all orofacial trauma). Management of mandibular fracture should be the priority as left untreated or unattended would lead to severe cosmetic and functional consequences.[1] Range of treatment of mandibular fracture varies. It includes different treatment modalities such as splinting, closed method of reduction, open method of reduction, direct fixation with plates and screws.[2] Treating the mandibular fractures using plates and screws includes the following two methods: 1) Semirigid fixation- it is a modification of Michelet et al techinique. In this techinique using a miniplate, non cortical and subapical osteosynthesis is done based on the principle of "Champy's line of osteosynthesis"[3]. 2) Rigid fixation: Method was given by spies, the plates are rigidly fixed to the fractured segments of mandible with bicortical screws.[4] Three dimensional (3-D) miniplates were designed and developed by Farmand M in 1992. The design include two miniplates joined by an interconnecting cross bar. Since their introduction, they are the preferred method of mandibular fracture reduction. These 3-D plates are easy to use, provides better stability against torsional forces and requires fewer screws as compared to the conventional bone plates to stabilize the segments.[5] In the management of mandibular fracture , understanding the normal anatomy and function as well as form of mandible is important. 3-D plates provides effective treatment to restore the normal form and function of mandible. This article presents a case of road accident

trauma leading to left parasymphysis fracture in a 35 year old female which was treated by 3-D titanium miniplates.

Case Report

A 35 year old female patient reported to department of Oral and Maxillofacial Surgery with the chief complaint of pain and swelling in lower left anterior region of jaw since 1 day. Past history revealed the etiology was road accident. On intra-oral examination sublingual and labial hematoma was seen in lower left anterior region and the occlusion was disturbed post trauma (fig 1). Patient was advised OPG. On OPG, a radiolucent line was seen between lateral incisor and canine from alveolar crest running down obliquely to the inferior border of mandible (fig 2). On the basis of clinical and radiographic evaluation left parasymphysis fracture was diagnosed. Patient was appointed for surgery and the determined treatment plan was open reduction and internal fixation. Under all aseptic precaution , at first intermaxillary fixation was done to restore the occlusion then vestibular incision was made using 15 no blade from left central incisor to left first premolar. The fracture line was exposed and necessary reduction was achieved (fig 3). We used three dimensional titanium plate for internal fixation. The 3-D plate was adapted to the curvature of mandibular bone in the fractured region keeping in view the normal restored occlusion (fig 4, 6a,6b). Plate dimension was 2.0mm with four holes and the dimension of screws was 2.0x8.0mm. After fixation, irrigation was done with betadine and saline and closure was done using 3-0 silk suture(fig 5). Post operative OPG showed 3-D titanium plate at the fractured site and restored occlusion (fig 7). Patient was recalled after 24 hours for follow-up and after 7 days for suture removal. Healing was uneventful with no complaint of pain, paresthesia.

Fig.1: Pre- operative clinical

Fig.2 : Pre-operative OPG

Fig.3: Exposure of fracture line

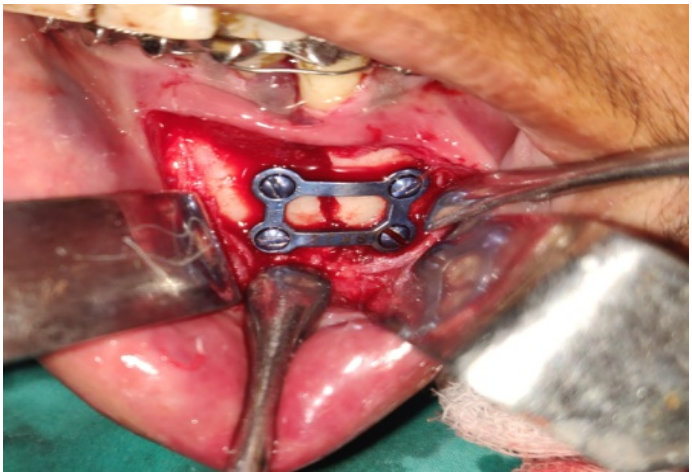

Fig. 4: 3-D titanium plate adapted to the fractured segment.

Fig. 5: Closure with 3-0 silk suture.

Fig.6a: Restored occlusion on left side.

Fig.6b: Restored occlusion on right side.

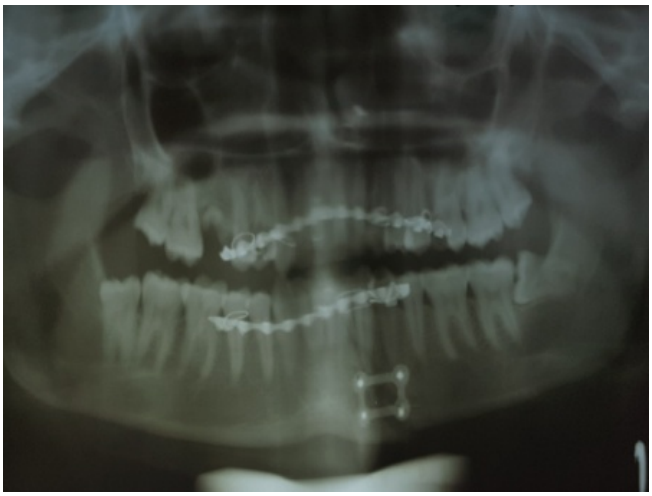

Fig.7: Post- operative OPG

Discussion

As the rate of orofacial trauma is increasing, the need for better treatment option is also arising. Mandible being the mobile bone in orofacial regions is mostly prone to trauma and fractures. In a study reported by R. Balakrishnan et al it was shown that out of 12 patients reported with mandibular fractures, parasymphysis region fracture has maximum incidence (about 58%) and 50% of it was due to road accident trauma.[6] Fracture of mandible must be treated early to avoid complications. Aim of the treatment should be to restore the normal occlusion and function of mandible with minimum complications. Three dimentional plates introduced by Farmand M have proved

to be efficient in fracture reduction due to their advantages over conventional plates. Because of its anatomic adaptation it hardly interferes with adjacent vascular supply.[7] Recently , open reduction with internal fixation has been more in use with titanium miniplates to immobilize the fractured segments of jaw. In the region of symphysis and parasymphysis fracture three dimensional plating system is more advantageous as less foreign material is required that means one plate and 4 screws are enough to stabilize the fracture as compared to the conventional plates where two plates and 8 screws were usually required and moreover patient experiences normal functioning of jaw within few days of treatment with minimal complications reported.[8]. Miniplates are placed inclose contact to the tension zone of mandible and the monocortical screws helps to prevent injury to alveolar nerve and to the dentition.[9] 3-D plates provides with better stability, easy application and reduction of mandibular fracture. Also provides with simultaneous stabilization of compression and tension zones, thus makes 3-D plates a good time saving alternative to conventional plates.[10]

Various researches have stated that 3-D plates offer favourable biological and mechanical behavior as compared to conventional plates in terms of strain resistance and stability.[11] About 1 mm of standard three dimentional plate can withstand about 690 N of traction forces.[12] The advantages of three dimentional miniplates over conventional miniplates can be summarized as :

- Requires fewer plates and screws as compared to conventional ones. [13]
- More stabilized fractured segments.
- Decreased operative time.
- Less foreign material used.
- Easy to manipulate
- Compact in design (about 1.0mm thick 3-D plate is as stable as 2.0mm conventional plate)

Three Dimensional Titanium Miniplate: Titanium is a metal of choice for fixation plates as compared to stainless steel. It is highly biocompatible and easy to manipulate. Can get easily adapted to the curvature of mandible as compared to stainless steel 3-D plate.[14] In our case titanium 3-D plate was used and the result was effective with no encountered complication.

Conclusion

After follow up of patient, normal occlusion and good stability of the fractured segments was achieved. We can say that 3-D miniplates is a better treatment modality in open reduction of fractures of mandible with titanium metal being biocompatible with the tissues. This method of internal fixation is effective and desireable as it restores normal form and function of jaw with minimal complications. In our case the outcome was positive with no complications seen.

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