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CLINICAL STUDY

IMF Screw: An Ideal Intermaxillary Fixation Device During Open Reduction of Mandibular Fracture

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Abstract Intermaxillary fixation (IMF) is conventionally used for treatment of fractures involving maxillomandibular complex both for closed reduction and as an adjuvant to open reduction. To overcome the cumbersome procedure of tooth borne appliances cortical bone screws were introduced in the year of 1989 to achieve IMF which is essentially a bone borne appliance. In our institution we treated 45 cases of mandibular fracture both single and multiple fractures by open reduction over a period of 24 months. IMF screws were used to achieve dental occlusion in all the cases. Various advantages, disadvantages and complications are discussed. In our institutional experience we found that the IMF screws are an ideal device for temporary intermaxillary fixation for the cases having only mandibular fracture.

Keywords IMF screw · Intermaxillary fixation · Mandibular fracture

Introduction

Intermaxillary fixation (IMF) is an age old procedure which is used for treatment of fractures involving maxillomandibular complex. Conventionally various types of tooth mounted devices like arch bars, dental and interdental wiring, metallic and nonmetallic splints are used to achieve intermaxillary fixation. However tooth borne devices are always associated with problems like poor oral hygiene, periodontal health, extrusion of teeth, loss of tooth vitality, traumatic ulcer of buccal and labial mucosa and needle stick injury to the operator. Besides this, the procedure is time consuming. It is also not suitable in patients having multiple missing teeth, grossly carious teeth, crown and bridge work, extensively restored and periodontally weakened teeth (Fig. 1).

To overcome these problems, Arthur and Bernado [1] described the technique of IMF with the use of bone screws which is essentially a bone borne appliance, hence achieving dental occlusion by bone to bone fixation while eliminating the teeth related problems.

In our institution we have treated 45 cases of mandibular fracture by open reduction and bone plate fixation in which only IMF screws were used to achieve intermaxillary fixation intraoperatively and for a short duration postoperatively. We observed that the IMF screw is an ideal device for achieving IMF for open reduction of mandibular fractures.

Materials and Methods

The trauma cases having only mandibular fractures, both single and multiple fracture lines were included in the study (Fig. 2). All the cases were taken up for open reduction and mini-plate fixation under general anesthesia. 2 mm diameter self tapping stainless steel center drive IMF screws having hole in the head of 6–12 mm length were selected. We used one screw in each quadrant.

In maxilla trans-mucosal drilling was done with 1.6 mm diameter drill bit under coolant just above the mucogingival junction between canine and first premolar. Left index finger was placed in the canine fossae which not only

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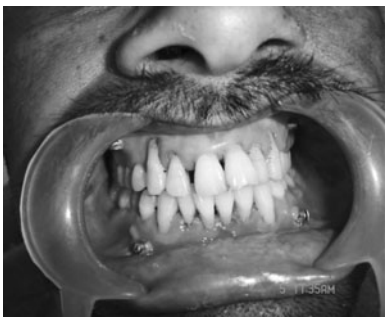

Fig. 1 Clinical picture of IMF screws

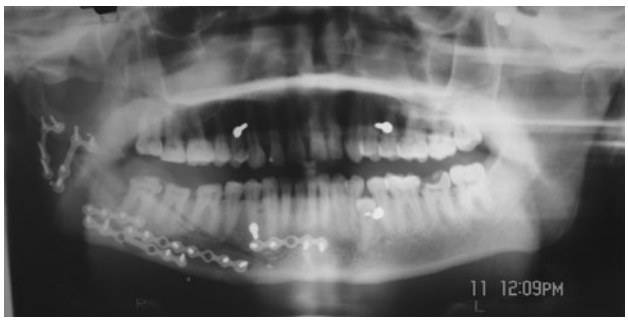

Fig. 2 Multiple fracture mandible

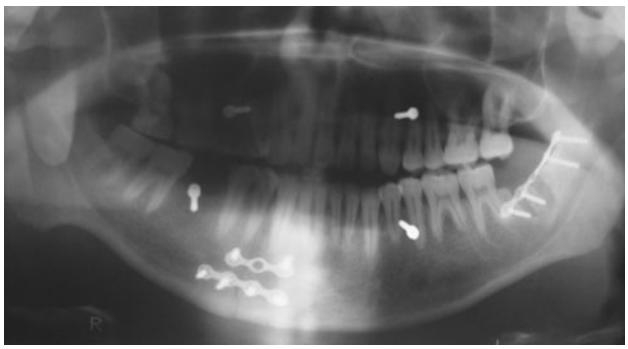

Fig. 3 Screw in edentulous area

acts as a guide but also compress the vestibular tissue volume hence minimizing entangling of soft tissue to the drill bit. IMF screw was inserted into the pre-drilled hole till the screw head just touched the underlying mucosa.

In mandible the screw position was determined by the location of fracture line and the proposed site of incision. The most preferred site was between canine and first premolar followed by the space between the premolars. In a few cases, screw was placed in the edentulous first molar area (Fig. 3).

Fractures above the angle of mandible was approached extra-orally where as rest were approached intra-orally. Intermaxillary fixation was done with stainless steel wire secured to the IMF screws after reduction of fragments. The reduced segments were stabilized with titanium miniplate and screws. IMF was released, occlusion checked and wound closure was done.

Single fracture cases had no postoperative occlusal discrepancy hence elastic traction was not used. Mild postoperative occlusal discrepancy was noted in cases with multiple mandibular fractures and this was corrected by elastic traction for 3–4 days. All the IMF screws were removed on the seventh postoperative day without anesthesia.

Result

All the fractures healed uneventfully. There was no infection associated with the IMF screws. Five screws, three in maxilla and two in mandible had slight mobility. After the removal of screws two patients had sensitivity in maxillary first premolar which subsided within 1 week without any treatment.

Discussion

The ultimate goal of treating mandibular fracture is to restore the mandibular form and function to its pre-traumatic condition. Intermaxillary fixation is an indispensable requirement to achieve temporary dental occlusion during preoperative, operative and postoperative phase of treatment. However in the present era of small plate osteosynthesis, both the patient and surgeon prefer open reduction, reducing the duration of hospitalization with minimal discomfort to the patient and early return to the work. The mandibular fracture cases are taken up for early surgical intervention to eliminate the need of preoperative intermaxillary fixation. Intraoperative application of tooth borne intermaxillary fixation devices are time consuming and increases the duration of anesthesia. In contrast we took average 5 minutes for fixation of four IMF screws. There was no requirement of any additional armamentarium.

The preferred site for screw placement was the alveolar bone between canine and first premolar. But the cases having fracture line in canine and premolar area, the screw position was changed depending the fracture site and line of incision. In two cases we have placed the screw in the edentulous first molar area. According to Thota and Mitchell [2] the best position for IMF screw placement for orthognathic surgery cases is between canine and first premolar. Posterior placement may be complicated by penetration into maxillary antrum and inferior dental canal.

During transmucosal drilling we should be very particular about coolant. The soft tissue acts as a cuff around the drill bit, preventing coolant to reach the bone. It causes thermal necrosis and subsequent loosening of screw. In our cases loosening of five screws may be attributed to thermal

necrosis. In 2007, Coletti et al. [3] reported 6.5% incidence of screw loosening.

Coburn et al. [4] reported iatrogenic damage to the root leading to tooth loss in 4% of cases. None of our cases had damage to the root. We feel this complication can be avoided by selecting 2 mm diameter screw instead of 2.5 mm. Secondly during drilling initial resistance is felt while penetrating the outer cortex followed by minimal resistance in cancellous bone. In case of continuous resistance drilling may be abandoned and an alternate site may be selected.

We placed 180 screws in 45 patients out of which only two had thermal sensitivity in left maxillary first premolar after removal of the screw. Both the patients were evaluated by radiographs and vitality test. X-rays revealed breach in continuity of lamina dura without any damage to the root. Both the cases recovered within 1 week without any treatment. In a follow-up after 6 months both the teeth were vital.

Hence it is our observation that the IMF screw is an ideal device for temporary intermaxillary fixation (for less than 7 days) for the cases having only mandibular fracture.

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