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The Use of Mini-implants for the Fixation of Bilateral Mandibular Fractures

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Abstract
Background Closed reduction and open reduction with internal fixation (ORIF), bars and eyelet wiring are among the common MMF techniques. However, these techniques have their limitations, such as time consumption when placing it and the patient's uncomfortable. And arch bar technique causes movement of teeth in lateral and extrusive directions, constant traction applied to the wire can distract the fracture parts and possibly cause complications, difficulty to secure the arch bar in isolated posterior teeth, periodontal tissue injury, needle stick type of injuries to the operator, difficulty in maintaining good oral hygiene. **Objectives** In this case report a bilateral mandibular fracture was treated with mini-implants will be presented and discussed. **Materials and Methods** Thirty-two-year-old male patient attended the Department of Maxillofacial Surgery Center at Al-Wasiti Teaching Hospital, with 10 days history of a mandibular fracture due to trauma to the anterior region. **Results** During surgical planning, a decision was made of placing mini-implants originally designed for orthodontic anchorage systems between 13 and 14, 23 and 24, 33 and 34, 43, and 44, After intraoral incisions, these fractures were fixed with an L-shaped 4 holes 2.0 mini-plate and mono-cortical screws inserted in the tension region, followed by suturing of the incisions with silk suture size 0/3. **Conclusion** The mini-implant MMF technique is easy to perform does not require special expertise and is more convenient for the patient.

Keywords: Bilateral mandibular fractures; intermaxillary fixation; mini-implants.

Introduction

Mandibular fractures are the most common type of facial trauma (Murray, 2013). They account for about 60% of facial trauma because of mandibular bone prominence and relative lack of support (Murray, 2013). Treatment of mandibular fractures depends on the type, severity, and location of the fractures. Accordingly, there are two approaches for the reduction and fixation of mandibular fractures; closed reduction and open reduction with internal fixation (ORIF) (Coletti et al, 2007). Both techniques require initial maxillary-mandibular fixation (MMF) to ensure optimum reduction. Arch bars and eyelet wiring are among the common MMF techniques. However, these techniques have

their drawbacks. These drawbacks are related to their difficulty in application and their influence on patients' comfort, operation time, and tissue health (Baurmash et al, 1988; Lello and Lello, 1988). Recently, the use of orthodontic mini-implants has been suggested as an alternative MMF method in the management of mandibular fractures (Busch, 1994). This case report aims to demonstrate the use of mini implants in bilateral mandibular fracture

Case report

A thirty-two-year-old male attended the Department of Maxillofacial Surgery Center at Al-Wasiti Teaching Hospital in Baghdad/Iraq. He had a bilateral mandibular fracture due to trauma to the anterior region as a result of a car accident 10 days ago. He has no history of systemic diseases, he is a heavy smoker, though. Clinical examination showed poor oral hygiene with multiple carious teeth, with mild periodontitis. The fractures involved the para-symphyseal region with mild mobility. There was a stay-wire on the left side extending from #30 to 34 and #41 to 44 (Figure 1). The patient's CT scan revealed a fracture line extending obliquely from the upper border of the mandibular arch between #31 and 32 (Figure 2) to the lower border of the mandible. Another fracture line was also shown extending obliquely at #42 and 43 (Figure 3). After examining the panoramic radiograph for the patient, a decision was made to position four mini-implants originally designed for orthodontic anchorage systems (Vectortas™ Ormco Corporation, West Collins, Orange, CA, USA) with a diameter of 2 mm and a length of 10-12 mm was chosen for the initial fixation. These implants were placed between 13 and 14, 23 and 24, 33 and 34, and finally, between 43 and 44 (Figure 4). A 2mm diameter and 10 mm length, self-tapping implants were placed, with torque resistance up to 25 Newton-Centimeter (N-cm) according to the manufacturer's instructions) (Schneider et al, 2000). The chosen mini-implants were made of Titanium (Coletti et al, 2007). Four orthodontic mini-implants After their placement in the fractured area, After intraoral incisions Fractures were fixed with an L-shaped 4 holes 2.0 mini-plate and mono-cortical screws inserted in the tension region (Figure 5) followed by suturing of the incisions with silk suture size 0/3 (Figure 6). The patient was instructed to continue with a non-chew diet postoperatively to reduce the bite force on the fracture sites. Oral hygiene measures included using a mouth rinse solution twice daily for ten days and using tooth brushing daily after each meal and before going to sleep. Clinical examination to assess the status of oral hygiene and following instructions by the patient, the healing status of fractures, and tooth occlusion during the healing period.

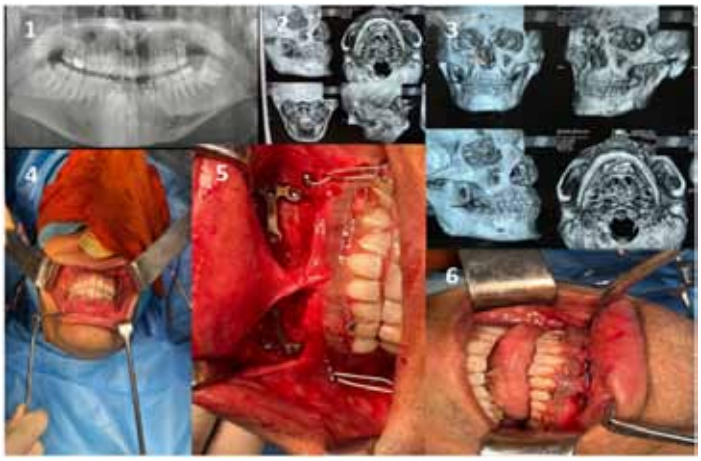

Figure (1): Placing wire on the left extends from 30 to 34 and 41 to 44.
Figure (2): CT scan revealed a fracture line extending obliquely from the upper border of the mandible arch between 31 and 32.
Figure (3): CT scan shows fracture line extending obliquely 42 and 43.
Figure (4): mini screws between 13 and 14, 23 and 24,33and 34, 43and44.
Figure (5): L-shaped 4 holes 2.0 miniplate and monocortical screws.
Figure (6): Suturing the incisions with silk suture size 0/3.

Discussion

The Maxillary Mandibular fixation technique has been a well-known fixation technique for many years (Sinbel et al, 2015). However, they have their problems. These problems include being time-consuming during placement; the patient being uncomfortable; lateral movement of teeth in lateral and extrusive directions when using the arch bar; constant traction applied to the wire can distract the fracture parts (Baurmash et al, 1988); difficulty to secure the arch bar in isolated posterior teeth; periodontal tissue injury; needle stick type of injuries to the operator; and difficulty in maintaining proper oral hygiene (Lello and Lello, 1988). In our case report, orthodontic mini-implants were used for MMF because of easy application, improved patient tolerance, well mechanical performance, low cost, and less trauma to the buccal Mucosa, and they are easily maintained with simple oral hygiene measures. Compared to other MMF techniques they reduce surgical time, and provide reasonable occlusal stabilization. The material for the mini-implant screws was titanium for strength and biocompatibility. They are self-tapping and inserted using a screwdriver. Self-tapping eliminates overheating of the surrounding bone during the drilling process (Cornelius and Ehrenfeld, 2010). The decision to use mini-plate as MMF, in this case, was based on easiness of placement, cost-effectiveness, and better patient tolerance. Furthermore, the placement of screws helps to stabilize occlusion for placement of rigid internal fixation by mini-plate (Uemura et al, 2012; Cornelius et al, 2010), and screws are better for maintaining good oral hygiene without causing trauma to soft tissues, with time patient does not recognize them (Wiechmann et al, 2007).

Conclusion

Mini-implant MMF technique is easy to perform, does not require special expertise, and is more convenient for the patient.

References

Baurmash H, Farr D, Baurmash M. Direct bonding of arch bars in the management of maxillomandibular injuries. J Oral Maxillofac Surg. 1988 Sep;46(9):813-5. https://doi: 10.1016/0278-2391(88)90197-8

Busch RF. Maxillomandibular fixation with intraoral cortical bone screws: a 2-year experience. Laryngoscope. 1994 Aug;104(8 Pt 1):1048-50. https://doi: 10.1288/00005537-199408000-00024

Coletti DP, Salama A, Caccamese JF Jr. Application of intermaxillary fixation screws in maxillofacial trauma. J Oral Maxillofac Surg. 2007 Sep;65(9):1746-50. https://doi: 10.1016/j.joms.2007.04.022

Coletti DP, Salama A, Caccamese JF Jr. Application of intermaxillary fixation screws in maxillofacial trauma. J Oral Maxillofac Surg. 2007 Sep;65(9):1746-50. https://doi: 10.1016/j.joms.2007.04.022

Cornelius CP, Ehrenfeld M. The Use of MMF Screws: Surgical Technique, Indications, Contraindications, and Common Problems in Review of the Literature. Craniomaxillofac Trauma Reconstr. 2010 Jun;3(2):55-80. https://doi: 10.1055/s-0030-1254376

Lello JL, Lello GE. The effect of interdental continuous loop wire splinting and intermaxillary fixation on the marginal gingiva. Int J Oral Maxillofac Surg. 1988 Aug;17(4):249-52. https://doi: 10.1016/s0901-5027(88)80050-x

Murray JM. Mandible fractures and dental trauma. Emerg Med Clin North Am. 2013 May;31(2):553-73. https://doi: 10.1016/j.emc.2013.02.002

Schneider AM, David LR, DeFranzo AJ, Marks MW, Molnar JA, Argenta LC. Use of specialized bone screws for intermaxillary fixation. Ann Plast Surg. 2000 Feb;44(2):154-7. https://doi: 10.1097/00000637-200044020-00005

Sinbel A, Shaaban A, and Shokry M. The efficacy of arthrocentesis on restoring mandibular function in unilateral sub-condylar fracture following maxillomandibular fixation (A clinic-radiographic study). Alexandria Dental Journal, Volume 40, Issue 1, July 2015, Page 51-57. https://doi: 10.21608/ADJALEXU.2015.58736

Uemura M, Motoyoshi M, Yano S, Sakaguchi M, Igarashi Y, Shimizu N. Orthodontic mini-implant stability and the ratio of pilot hole implant diameter. Eur J Orthod. 2012 Feb;34(1):52-6. https://doi: 10.1093/ejo/cjq157

Wiechmann D, Meyer U, Büchter A. Success rate of mini- and micro-implants used for orthodontic anchorage: a prospective clinical study. Clin Oral Implants Res. 2007 Apr;18(2):263-7. https://doi: 10.1111/j.1600-0501.2006.01325.x