

Complications Using Intermaxillary Fixation Screws

Hamid Mahmood Hasbemi,* and Alireza Parhiz†

Purpose: The most important part of facial bone fracture treatment is immobilization. Bandaging of the fractured mandible was the first immobilization device used in ancient Greece. Since then, various methods with different shapes and uses were introduced in the treatment of maxillofacial trauma patients. Intermaxillary fixation (IMF) with bone screws was first used in 1981. This technique has advantages, including quickness, ease of use, less trauma, and reduced risk of needle-stick injury. We analyze the advantages and disadvantages of this technique.

Methods and Materials: In a retrospective study on 73 patients requiring IMF, the complications of IMF screws were analyzed. Complications were divided into 2 groups: dental and nondental. Follow-up examinations consisted of clinical and panoramic radiographic examinations.

Results: In 24 teeth (6.5%) in 13 patients (17.8%), dental complications occurred. No dental treatment was needed in 4 patients (5.5%). The site at which dental complications occurred during operation in the majority of cases was the anterior mandible. Nondental complications occurred in 63 screws (16.9%) in 39 patients (54.2%). The most common complication was screw loosening. Screw soft tissue coverage occurred in 21 screws.

Conclusion: The use of IMF screws is simple and decreases the time required for surgery, but because of their complications, they still require punctuality.

© 2011 American Association of Oral and Maxillofacial Surgeons

J Oral Maxillofac Surg 69:1411-1414, 2011

A basic and fundamental principle in the management of maxillofacial trauma and in orthognathic surgery is intermaxillary fixation (IMF). Traditionally, IMF has been achieved through an arch bar or interdental eyelet wiring. In modern practice, however, arch bars are considered the standard. Although arch bars provide an effective and versatile means for IMF, their use includes such consequences as risk of penetration injury to the surgeon, increased surgical time for both placement and removal, trauma to the periodontium, and compromised oral hygiene. Many of these issues were decreased when the technique of IMF with bone screws was developed in 1989.¹

The advantages of IMF screws include quick, easy, and safe insertion; compatibility with all plating systems; patient comfort; reduced trauma to the periodontium; appropriateness for use when teeth have been heavily restored; easier maintenance of gingival health compared with arch bars; reduced risk of needle-stick injury; and easy painless removal in outpatient departments without anesthesia. On the other hand, iatrogenic injury to dental roots is the most important complication with this procedure, but it can be minimized by an experienced surgeon. Despite wide use of this technique, little has been published about the complications that may arise.

The purpose of this study was to analyze advantages and disadvantages of IMF screws in comparison with other IMF procedures.

Materials and Methods

We performed a retrospective study on 73 Iranian patients requiring IMF (trauma or orthognathic patients) over a 3-year period (Nov 2005-Nov 2008) referring to the oral and maxillofacial surgery polyclinic of Shariati Hospital.

Received from the Department of Oral and Maxillofacial Surgery, Shariati Hospital, Tehran, Iran.

*Associated Professor.

†Chief Resident.

Address correspondence and reprint requests to Dr Parhiz: Department of Oral and Maxillofacial Surgery, Shariati Hospital, Chamran Highway, Tehran, Iran; e-mail: parhiz@razi.tums.ac.ir

© 2011 American Association of Oral and Maxillofacial Surgeons

0278-2391/11/6905-0039\$36.00/0

doi:10.1016/j.joms.2010.05.070

Bicortical screws of various brands (diameter, 2 mm; length, 8-12 mm) were placed in the interproximal or edentulous spaces at the mucogingival junction. The sites for screw insertion were determined on preoperative panoramic radiography. Postoperative panoramic radiography also was used to examine screw placement.

Follow-up examinations were performed weekly up to the end of the IMF period (6-8 weeks). During this follow-up period, we recorded data on complications related to IMF screws. These complications were divided into 2 groups: dental and nondental. Dental complications were defined as those requiring no treatment, those requiring only dental treatments, or those making the tooth hopeless. Other complications were defined as nondental complications.

Data were statistically analyzed with SPSS statistical software (SPSS, Chicago, IL) by use of the χ^2 test.

Results

In total, 373 screws in 73 patients, comprising 29 female patients (39.7%) and 44 male patients (60.3%), were analyzed. In 33 patients 4 screws were used (2 in the maxilla and 2 in the mandible of each patient, with 132 screws in total). In 40 patients 6 screws were used (3 in the maxilla and 3 in the mandible of each patient, with 240 screws in total).

Dental complications, which all had their entrance in the dental roots, occurred in 24 teeth (6.5%) in 13 patients (17.8%) (Table 1). Among these cases, 11 teeth in 4 patients required no treatment (Fig 1, Table 1) and the rest required dental treatment or extraction (Figs 2-4). Complications leading to extraction occurred mostly in the anterior mandible (4 cases) (Table 1).

Nondental complications comprised entrance in the maxillary sinus, entrance in the incisive canal, screw loosening, and screw soft tissue coverage (Table 2). These complications occurred in 63 screws (16.9%) in 39 patients (54.2%). The most common complication was screw loosening before

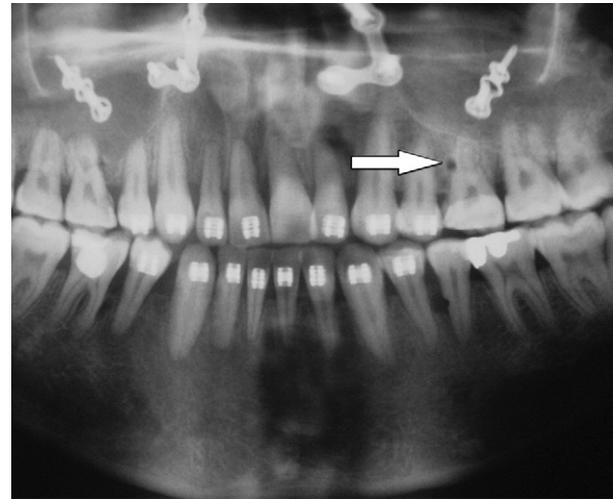


FIGURE 1. Complication with no need for dental treatment.

Hashemi and Parbiz. *Complications With IMF Screws. J Oral Maxillofac Surg* 2011.

completion of the IMF period (80% of them loosened after 5 weeks and the remainder loosened in less than 5 weeks). This occurred in 28 screws in the maxilla (15%) and 11 screws in the mandible (5.9%). This difference was statistically significant ($P = .008$).

Screw soft tissue coverage before the screw exited (Fig 5) occurred in 21 screws (5 in the maxilla, 4 in the anterior mandible, and 12 in the posterior mandible; $P < .05$).

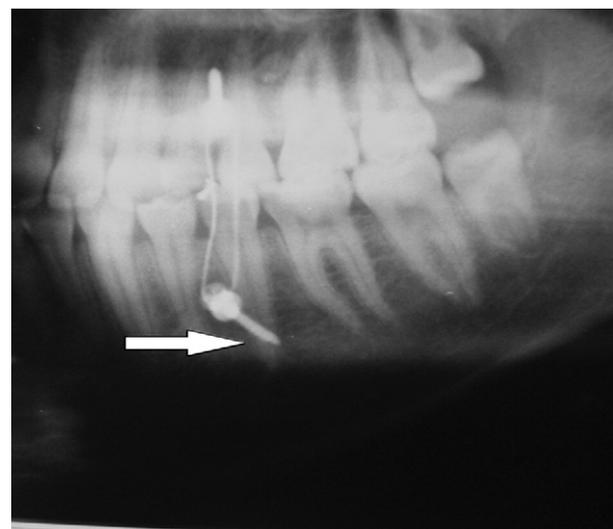


FIGURE 2. Screw placement on dental root requiring dental treatment.

Hashemi and Parbiz. *Complications With IMF Screws. J Oral Maxillofac Surg* 2011.

Table 1. IMF SCREW DENTAL COMPLICATIONS (ENTRANCE IN DENTAL ROOT)

Complication	No. of Teeth	No. of Patients
Complication leading to extraction	8	6
Complication requiring dental treatment	5	5
Complication requiring no dental treatment	11	4
Total numbers—common cases	24	13

Hashemi and Parbiz. *Complications With IMF Screws. J Oral Maxillofac Surg* 2011.

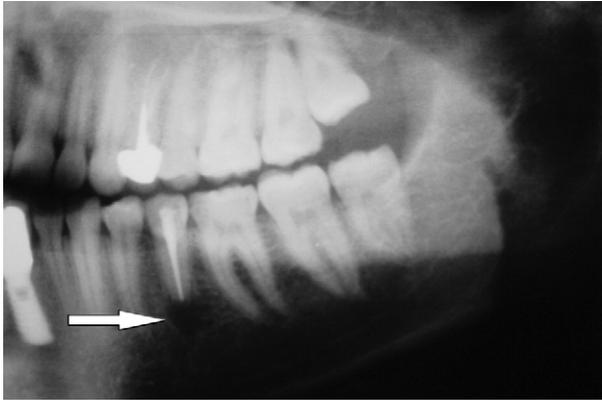


FIGURE 3. Tooth in Figure 2 after root canal therapy (RCT).

Hashemi and Parbiz. Complications With IMF Screws. J Oral Maxillofac Surg 2011.

Discussion

As mentioned previously, the use of screws for IMF provides many benefits to patients and surgeons. Some researchers believe that the IMF screw is a reliable alternative to the arch bar in trauma and orthognathic patients.¹⁻⁵

Coburn et al³ used IMF screws in their study on 122 patients with mandibular fractures. Complications including fracture of the screws upon insertion and iatrogenic damage to teeth causing tooth loss and bony sequestra around the area of screw placement occurred in 5 patients (4%). In our study no sequestration occurred around the screws.

Ueki et al,⁶ in a study to assess skeletal stability after mandibular setback surgery with and without an IMF screw, reported that 6 screws were covered by oral mucosa. In our study this complication occurred in 21 screws (in 13 patients) out of 373 screws.

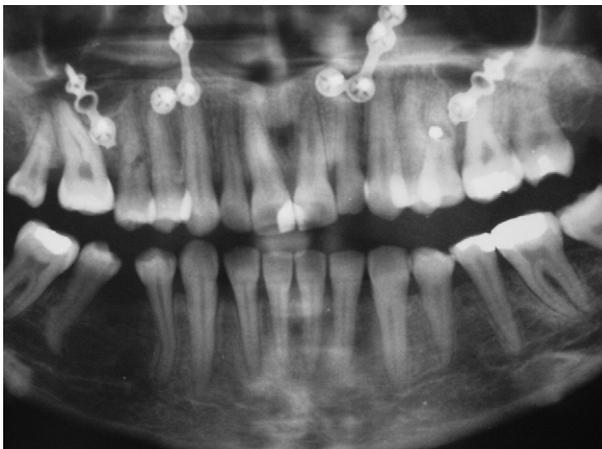


FIGURE 4. Dental complication leading to extraction.

Hashemi and Parbiz. Complications With IMF Screws. J Oral Maxillofac Surg 2011.

Table 2. IMF SCREW NONDENTAL COMPLICATIONS

Complication	No. of Screws	No. of Patients
Entrance in inferior dental canal	6	6
Entrance in maxillary sinus	4	2
Entrance in incisive canal	3	3
Screw loosening	39	22
Screw soft tissue coverage	21	13
Total numbers—common cases	63	39

Hashemi and Parbiz. Complications With IMF Screws. J Oral Maxillofac Surg 2011.

Coletti et al,⁷ in a retrospective study on 49 patients, indicated that the most common complication was screw loosening (6.5%). Other complications were root fracture (4%), screw sheer (2%), malocclusion (2%), and ingested hardware (2%). Roccia et al² reported that the most important event in screw placement was iatrogenic damage to dental roots (1.5%). About 5% of the screws in their study were covered by oral mucosa, which is similar to our study. In addition, 1.9% of the screws in their study were lost and none was broken.

Because dental injury is a common finding among most studies on IMF screws, some researchers have tried to show how and where we can insert screws safely. For example, Poggio et al⁸ indicated that a 1-mm thickness of alveolar bone around the screw is sufficient for good periodontal health. Hernández et al⁹ also showed that 2 possible places for IMF screw insertion in the mandible are the incisal area and the molar area.

Our experience in this study indicated that although about one third of screws resulted in complications, most of these complications can be avoided by inserting screws carefully. The decision to use IMF screws instead of an arch bar is certainly

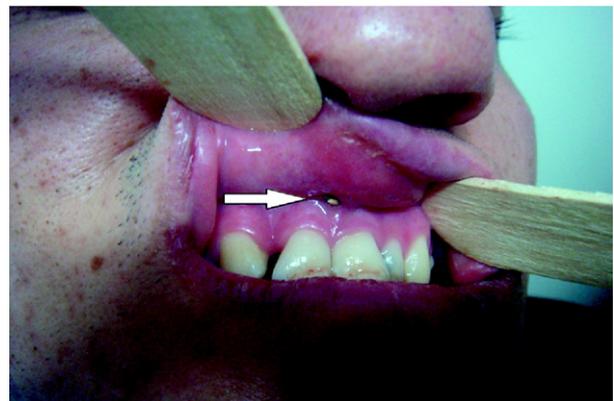


FIGURE 5. Soft tissue coverage on screw.

Hashemi and Parbiz. Complications With IMF Screws. J Oral Maxillofac Surg 2011.

dependent on the surgeon's interest and skill. Clearly, the use of IMF screws is increasing, and the ease of IMF screw placement may be the most important factor in this trend.

References

1. Arthur G, Bernando N: Simplified method of maxillo-mandibular fixation. *J Oral Maxillofac Surg* 47:1234, 1989
2. Roccia F, Tavolaccini A, Dell'Acqua A, et al: An audit of mandibular fractures treated by intermaxillary fixation using intraoral cortical bone screws. *J Craniomaxillofac Surg* 33: 251, 2005
3. Coburn DG, Kennedy DWG, Hodder SC: Complications with intermaxillary fixation screws in the management of fractured mandibles. *Br J Oral Maxillofac Surg* 40:241, 2002
4. Jones DC: The intermaxillary screws: A dedicated bicortical bone screw for temporary intermaxillary fixation. *Br J Oral Maxillofac Surg* 37:115, 1999
5. Gordon KF, Read JM, Anand VK: Results of intraoral cortical bone screw fixation technique for mandibular fractures. *Otolaryngol Head Neck Surg* 113:248, 1995
6. Ueki K, Marukawa K, Mayumi S, et al: The use of an intermaxillary fixation screw for mandibular setback surgery. *J Oral Maxillofac Surg* 65:1562, 2007
7. Coletti DP, Salama A, Caccamese JF: Application of intermaxillary fixation screws in maxillofacial trauma. *J Oral Maxillofac Surg* 65:1746, 2007
8. Poggio PM, Incorvati C, Velo S, et al: "Safe areas": A guide for miniscrew positioning in the maxillary and mandibular arch. *Angle Orthod* 76:191, 2006
9. Hernández LC, Montoto G, Rodriguez MP, et al: "Bone map" for a safe placement of miniscrews generated by computed tomography. *Clin Oral Implants Res* 19:576, 2008