

Intermaxillary Fixation Screw Morbidity in Treatment of Mandibular Fractures—A Retrospective Study



Vlad Andrei Florescu, DDS, *Thomas Kofod, DDS, PhD, † and
Else Marie Pinholt, DDS, MS, Dr Odont‡

Purpose: The aim of the present retrospective study was to investigate the morbidity of screws used for intermaxillary fixation (IMF) in the treatment of mandibular fractures. A review of the published data was also performed for a comparison of outcomes. Our hypothesis was that the use of screws for IMF of mandibular fractures would result in minimal morbidity.

Materials and Methods: Patients treated for mandibular fractures from 2007 to 2013, using screws for IMF, using the international diagnosis code for mandibular fracture, DS026, were anonymously selected (Department of Oral and Maxillofacial Surgery, Rigshospitalet, University Hospital of Copenhagen, Copenhagen, Denmark). The fracture type, radiographic findings, treatment modality, screw type and number, and root damage were recorded. For the outcome comparison, a review of the published data regarding iatrogenic dental root damage caused by screw fixation was performed in May 2015.

Results: A total of 156 patients had undergone IMF with screws. The total number of screws was 793. The incidence of root lesions was 0.25% centrally and 0.88% peripherally. The incidence of screw loss was 0.13% and that of screw loosening was 1.89%. In the review, 737 related reports were identified in a search of PubMed and the Cochrane Library. Of these, 25 were considered suitable for inclusion. A lack of valid evidence resulted in a descriptive analysis, because a meta-analysis of the data was not possible.

Conclusions: The results of the present retrospective study have shown that the use of screws is a valid choice for IMF in mandibular fracture treatment with minimal morbidity. The 793 screws used for IMF resulted in a negligible amount of central and peripheral tooth root trauma.

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Recently, bone-supported devices in the form of screws have gained popularity in the achievement of IMF in the treatment of mandibular fractures.¹ Their simple and rapid insertion and quick removal and a lower risk of wire-stick injury have increased their use.¹ However, screws can cause iatrogenic damage to the neighboring dental roots at the point of insertion, with subsequent damage to the pulp, loss of tooth vitality, and the need for endodontic treatment. A number of classification systems have been developed to

describe the location of the dental lesion.^{2,3} Driemel et al² characterized 4 types of dental root lesions: 2 “central” types, constituting lesions above or in the apical third of the root (including the neurovascular bundle) and presumably including a pulp injury; and 2 “peripheral” types, constituting lesions located in the radicular dentin, cementum, or periodontal space, but not associated with pulp injuries. Fabbroni et al³ characterized root damage into “minor” and “major” according to the overlap between the hole left by the

*PhD Fellow, Institute for Clinical Medicine, University of Copenhagen, Copenhagen, Denmark.

†Department Head and Consultant Maxillofacial Surgeon, Department of Oral and Maxillofacial Surgery, Rigshospitalet, University Hospital of Copenhagen, Copenhagen, Denmark.

‡Professor, University of Southern Denmark, Faculty of Health Sciences, Institute for Regional Health Sciences, University of Southern Denmark Hospitals, Hospital of South West Denmark, Esbjerg, Denmark.

Address correspondence and reprint requests to Dr Florescu: Department of Otorhinolaryngology and Maxillofacial Surgery, Zealand University Hospital, Lykkebækvej 1, Køge DK-4600, Denmark; e-mail: vaflorescu@hotmail.com

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screw and the dental root. For minor damage, less than 50% of the hole overlapped the root. For major damage, more than 50% of the hole overlapped the root.³

The aim of the present retrospective study, performed from 2007 to 2013 at Rigshospitalet University Hospital (University of Copenhagen, Copenhagen, Denmark) was to investigate the morbidity due to the use of screws in accordance with the Driemel classification² when used for IMF in mandibular fractures. To compare the outcomes, a review of the published data was performed.

Our hypothesis was that the use of screws for IMF of mandibular fractures would result in minimal morbidity.

Materials and Methods

PATIENT SELECTION STUDY

The inclusion criteria were as follows:

- Diagnosis code DS026 (mandibular fractures) and subclassification (A and B) in the World Health Organization International Classification of Diseases.
- Mandibular fractures and screws used for IMF
- Digital orthopantomography immediately or at the latest 6 months postoperatively.

The patient medical records with a diagnosis code of DS026 from 2007 to August 2013 were selected from the Department of Oral and Maxillofacial Surgery (Rigshospitalet University Hospital, Copenhagen, Denmark) for the present study. The fracture type, radiographic findings, treatment modality, screw type, total screw number, and the following outcomes were recorded:

- Central iatrogenic damage to the dental roots as defined by Driemel et al.²
- Peripheral iatrogenic damage to the dental roots as defined by Driemel et al.²
- Screw loss.
- Screw loosening.
- No healing or secondary healing of fracture.
- Midline deviation.
- Lack of habitual occlusion.
- Sensory nerve damage, classified as damage to the inferior alveolar nerve, lingual nerve, and mental nerve.

The Danish Data Protection Agency approved the data collection (Journal-number, RH-2015-204 and I-Suite number, 04138). Only anonymized data were used.

PUBLISHED DATA REVIEW

A search was performed in the PubMed and Cochrane Library databases in May 2015 using the

following keywords and MeSH words alone and combined: IMF screw, screw, intracortical bone screw, intermaxillary fixation, mandibulomaxillary fixation, maxilla mandibular fixation, and mandibular fractures. The abstracts were reviewed according to the inclusion and exclusion criteria by 2 of us (V.F., E.M.P.), and the full text of the included reports was reviewed (Tables 1 and 2, Fig 1) according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement.⁴ If valid evidence was presented in randomized controlled trials (RCTs), a meta-analysis would be performed. Otherwise, we would perform a descriptive analysis of the reviewed data.

Results

PATIENT SELECTION STUDY

The total number of patients treated for mandibular fractures was 989. Of these 989 patients, 156 were treated with screws for rigid IMF intraoperatively, followed by 4 weeks of elastic IMF. The distribution of fractures within the 156 patients was mandibular body in 76%, mandibular condylar neck in 59%, mandibular condylar head in 2%, and mandibular ramus in 2% (Table 3). The treatment of the 156 patients included open reduction and internal fixation (ORIF) without subsequent elastic IMF in 11 patients (7%), ORIF and subsequent elastic IMF in 125 (80%), and conservatively with closed reduction and elastic IMF in 20 patients (13%; Table 4). The total number of screws used was 793, with an average of 5 screws per patient; 56 patients received 4 screws and the

Table 1. INCLUSION AND EXCLUSION CRITERIA

Criteria
Inclusion
Treatment of mandibular fractures with screws
Comparison between IMF screws
Clinical trials
Retrospective studies
Prospective studies
Randomized clinical studies
Literature reviews
Exclusion
Intraoral or extraoral fixation methods not involving screws/IMF screws
Fracture reduction without IMF screws
IMF for other purposes than treatment of fractures
Publications with unclear treatment modality
Editorial letters
Language other than English

Abbreviation: IMF, intermaxillary fixation.

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