

Tooth Multi-Sectioning with the Use of Magnification, for Extraction of a Deeply Impacted Lower Second Molar with Entrapment of the Inferior Alveolar Nerve: Report of a Case

SUMMARY

Inferior alveolar nerve injury is one of the most serious complications of mandibular molar surgery and may lead to litigation for mal-practice. Entrapment of the inferior alveolar nerve to roots of an impacted mandibular molars is extremely rare. The aim of this case report is to stress the importance of tooth multi-sectioning with the use of magnification for the safe removal of a deeply impacted second molar with entrapment of the inferior alveolar nerve in its proximal root.

Keywords: Impacted Lower Molar; Inferior Alveolar Nerve; Entrapment; Magnification

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CASE REPORT (CR)

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Introduction

Injuries to the inferior alveolar nerve can occur during major maxillofacial operations or dentoalveolar surgery. The latter includes extraction of the mandibular third molar, dental implant placement, and apicectomies or endodontic treatment of the mandibular molars or premolars¹⁻³. Inferior alveolar nerve (IAN) injury is one of the most serious complications of mandibular molar surgery, which may affect the quality of the patient's life and may cause the litigation for mal-practice⁴. Permanent injury to the IAN is estimated between 0.4-23%^{1,5,6}.

Suspect radiographic signs of the IAN proximity to the roots of an impacted mandibular third molar have been described in the past, and they are well known by oral and maxillofacial surgeons. Diversion of the inferior alveolar canal, interruption of the mandibular canal and darkening of the root of the impacted molar are the most striking radiological signs associated with possibility of IAN damage^{7,8}. In these cases, a further radiological examination with cone beam computed tomography (CBCT) may be recommended to justify the relation of the roots of the impacted tooth to the IAN in 3-dimensional view⁹. Even though CBCT is not more accurate in predicting exposure of the IAN during third molar surgery, it still helps to elucidate the precise bucco-

lingual relation of the IAN to the roots of the impacted teeth¹⁰.

Entrapment of the IAN by roots of an impacted mandibular molar is an extremely rare occurrence and few well documented cases have been presented in the literature¹¹⁻¹⁴. This situation usually affects impacted third molars and rarely partially erupted third molars¹⁵.

The aim of our study is to stress the importance of tooth multi-sectioning with the use of magnification for the safe removal of a deeply impacted second molar with entrapment of the IAN by its proximal root, and to review the literature.

Report of a Case

In August 2010, a 19-year-old male was referred to our clinic by his orthodontist for removal of a deeply impacted lower second molar. The panoramic x-ray showed a second molar in vertical position, near to the lower edge of the mandible, along the course of the IAN (Fig. 1). A DentaScan was performed to delineate the relation between the impacted tooth and the IAN. The examination revealed that the inferior neurovascular bundle ran through the proximal root, at its apical end

(Fig. 2). The patient was informed about this situation and about the possibility of nerve damage and he consented to the removal of the tooth.



Figure 1. Panoramic X-ray showing a deeply impacted second molar

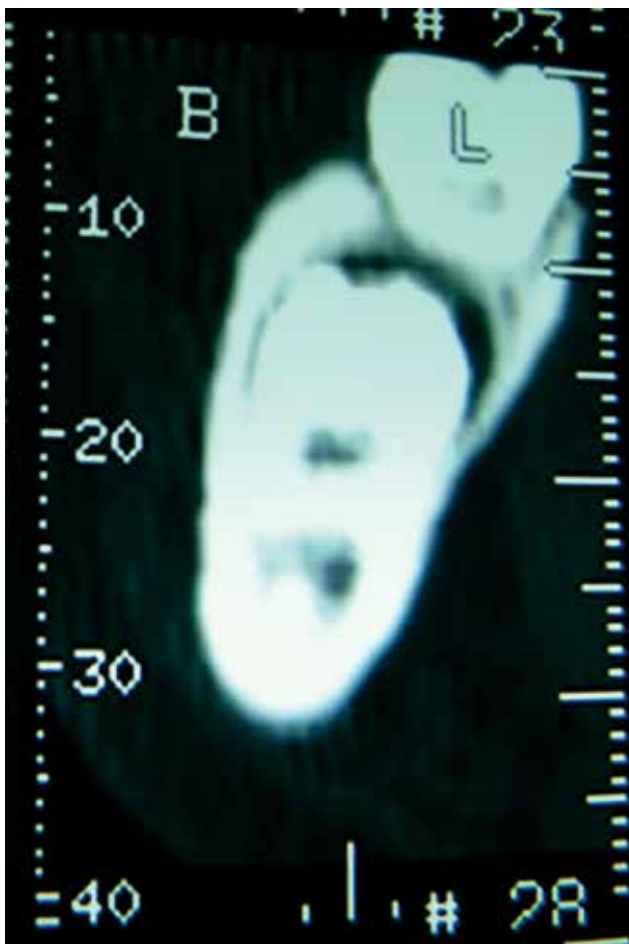


Figure 2. DentaScan in the region of the impacted tooth, where the entrapment of the inferior neurovascular bundle between the roots of the impacted molar is depicted

The operation was performed under local block anaesthesia of the IAN using mepivacaine and local infiltration around the impacted molar with lignospan (containing adrenaline). A classic trapezoid flap was

performed and after raising of the mucoperiosteal flap, a buccal osteotomy exposed the crown of the tooth until its bifurcation, like presented at the schema (Fig. 3A). The crown was sectioned horizontally and was removed to make room for better access to the roots (Fig. 3B). The next surgical step was performed with the use of loupes magnification (5X) which was of utmost importance in order to micro-dissect and divide the proximal from the distal root of the molar (Fig. 3C). With gentle luxation, the distal root was removed, leaving a wider operative field (Fig. 3D). The IAN was recognized to run through a hole of the proximal root. At this stage, as the connection between the proximal root and the nerve was clearly defined, the root was cut under magnification and was intentionally fractured into 2 pieces (Fig. 3E). The upper and smaller part of the root fragment was gently removed, leaving the lower, bigger part attached to the nerve (Fig. 3F). Then, always under magnification, the remaining part of the proximal root was cautiously mobilized and freed from the neurovascular bundle, leaving it intact (Figs. 4 and 5).

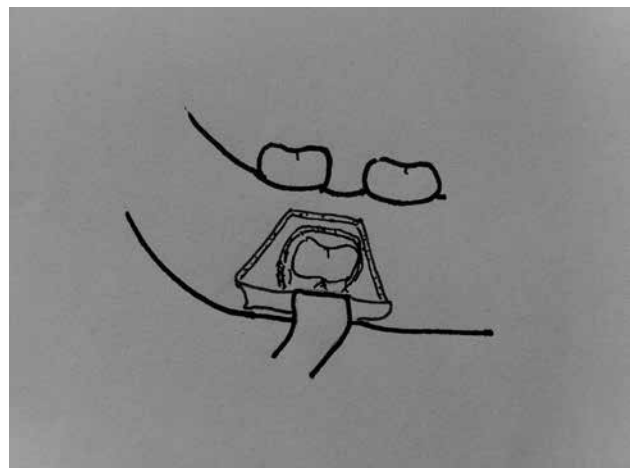


Figure 3A. Buccal osteotomy to expose the crown of the impacted tooth

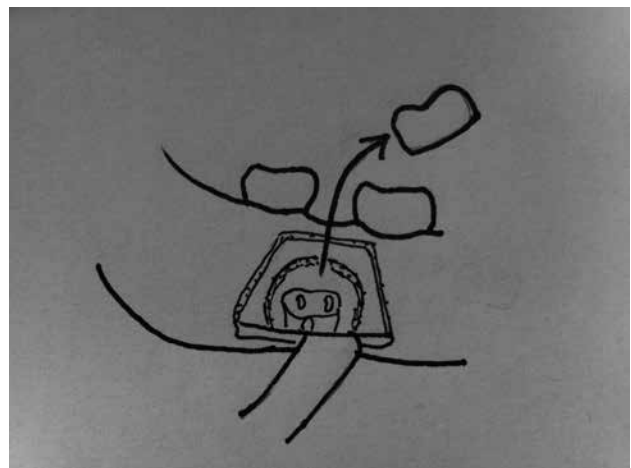


Figure 3B. Sectioning of the crown of the tooth



Figure 3C. Separation the proximal from the distal root

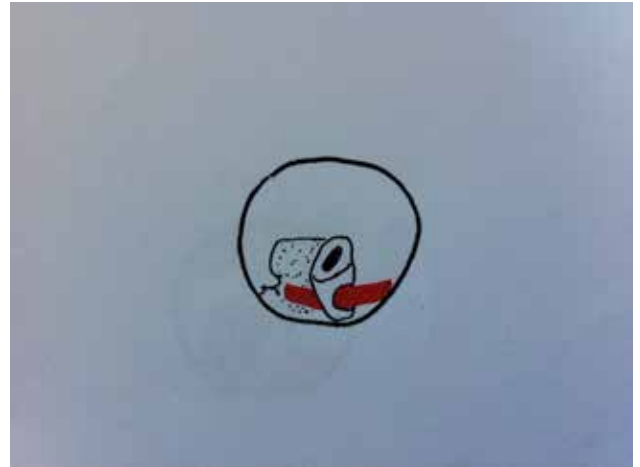


Figure 3D. Removal of the distal root



Figure 3E. Separation of the proximal root in two segments



Figure 3F. Removal of the small upper fragment



Figure 4. The surgical field after tooth removal, where the inferior alveolar neurovascular bundle can be seen



Figure 5. The fragment of the root depicting the hole through which the neurovascular bundle ran

The postoperative course was uneventful, with the exception of an episode of inflammatory swelling, 15 days after extraction, which subsided with a short course of antibiotics. Postoperative hypoesthesia of the ipsilateral site of the lower lip subsided completely 4 months later, and the patient remains free of symptoms to this day (Fig. 6).



Figure 6. Postoperative panoramic X-ray showing the area of tooth extraction

Discussion

Even though thoroughly studied and reviewed, the issue of impacted molar surgery still remains of central concern for oral surgery. The great number of impacted tooth removals, the close relation to important anatomic structures and the possibility of third molar surgery complications associated with psychosocial issues, which may affect the quality of the patient's life with long term complications¹⁶, represent popular topics for discussion among surgeons.

The roots of the impacted mandibular molar, especially the third molar, are sometimes in close proximity to the IAN. The roots of the deeply impacted teeth may show a groove on their surface, or may be bent by the pressure of the inferior alveolar nerve or, in extremely rare cases, the content of the mandibular canal may be entrapped between the roots of impacted tooth¹⁴. How the nerve becomes entrapped between the roots is unknown, but a possible explanation is the high dynamic potential of the odontogenic epithelium of the root that is developed near the inferior alveolar nerve¹⁵.

The close relation of the impacted tooth to the IAN and of tooth movement to the occlusal plane, explains the divergence or loop of the nerve as seen in plain radiographs, a fact which necessitates a more detailed imaging to be identified. Suspect radiographic signs which demonstrate a close relation of an impacted molar to the IAN, can be identified on panoramic x-ray. However, even though CBCT is not more accurate in predicting IAN exposure during tooth removal, it can still elucidate the exact relationship of the tooth root to the neurovascular bundle, in order to identify the cases where the IAN is at

risk during surgery¹⁰. Although a CT scan may be more accurate than panoramic radiography, it is not routinely used as for preoperative third molar diagnosis¹⁷.

The close relation between the roots of the third molar and the IAN led some authors to propose coronectomy as an alternative to the standard third molar surgery, to avoid possible nerve disturbances during tooth extraction¹⁸. Even though this technique theoretically prevents nerve damage, it was criticized in the past because the necrotic pulp was considered responsible for periapical or orofacial infections¹⁹. Coronectomy also carries the risk of subsequent complications if the need for the removal of any remaining part of the tooth arises¹³. Especially in cases with nerve entrapment, coronectomy carries the risk of neurovascular bundle transposition to the direction of the oral cavity, as the tension of eruption of the remaining root still exists²⁰.

There is a wide range of techniques for the removal of impacted molars entrapping the IAN. Some of them include minor modifications of the well-known standard surgical procedures performed for third molar surgery¹²⁻¹⁴. Some authors propose buccal corticotomy for the removal of the deeply impacted mandibular molars²¹, while other surgeons propose major surgical operation, like vertical ramus osteotomy, to safely remove the impacted tooth²³.

In our opinion, the initial step to avoid permanent nerve damage is recognition of suspected cases and thorough information to the patient about the risk of the IAN injury. The next step is exact delineation of tooth-nerve relation, by computer tomography or CBCT. The standard surgical approach, with minor modifications, is a minimally invasive procedure to safely remove impacted molars engaging the inferior alveolar neurovascular bundle.

Impacted tooth sectioning, not only in 2 but in multiple pieces, as was done in our case, is helpful, as it expands the surgical field near the neurovascular bundle. The addition of loupes magnification (5X), in our opinion, is the second most important modification for the safe removal of the deeply impacted mandibular molar in order to retain the integrity of the inferior alveolar neurovascular bundle.

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