Protocol for Removal of Third Molar Root Tips from the Inferior Alveolar Canal—Crossing the line

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Abstract

Introduction The safe removal of third molars involved with the inferior alveolar canal (IAC) has been an area of concern since long. Many times we hesitate for the removal of third molars, fearing injury to the inferior alveolar nerve. **Materials and Methods** The authors here describe a simple technique which can be used to remove third molars showing evidence of proximity to IAC on presurgical radiographic evaluation, as well as those root tips which, during removal, accidentally enter the IAC space. **Conclusion** A step-by-step protocol is presented along with necessary precautions during the operative procedure.

Keywords Third molar · Root tip · Inferior alveolar canal · Neurovascular bundle · Coronectomy · Inferior alveolar nerve injury · Third molar root tips removal

Introduction

Safe removal of third molars and/or their roots showing approximation or involvement with the inferior alveolar canal (IAC) has been an area of concern for oral and

maxillofacial surgeons since a long time. In practice, many times we refrain from removing third molars indicated for removal owing to pathology or otherwise, fearing injury to the IAC and its contents. Alternatively, some operators resort to heroic attempts of removal, landing up with IAC damage, the management of which is confusing and uncertain [1]. Various other modalities have also been resorted to [2, 3] in order to preserve the function of the inferior alveolar nerve (IAN) and varied outcomes have been reported in the literature [4].

The authors, here present a novel technique of removing roots of third molars involved with IAC. With this simple technique, the operator can attempt to remove many third molars which on presurgical evaluation satisfy criteria given by Rood and Shehab [5] or pose to be a risk factor for IAN injury [6–8].

Materials and Methods: The Technique

After achieving successful pulpal anesthesia with an IAN block, preferably a modified ward's incision for better access to a greater depth and improved visibility is made. If necessary, a gutter of bone on the buccal and distal aspect of the third molar may be prepared, using the Moore and Gillbe [9] collar technique. After this the tooth is sectioned if necessary (as dictated by the angulation and presurgical evaluation). The suggested *protocol* is as follows:

1. More often than not, the root usually fractures at this point spontaneously on application of an elevator, after splitting the tooth. The root tip if curved or in proximity with the IAC is sectioned intentionally, to leave just the tip, apically.
2. Remove the bone in the furcation region using a small round bur. A slow speed “touch and go” motion under

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Fig. 1 **a** Technique of de-roofing the superior cortex of IAC. **b** Gentle teasing of the root tip with an apexo-elevator. **c** Elevating the remaining tooth to achieve straight line access. **d** Use of thin beaked, long shank tissue forceps

heavy irrigation with normal saline may be used to shave the bone at the angle formed between the superior cortex of the inferior dental canal and the interradicular bone (Fig. 1a).

3. Under dripping saline irrigation, to keep the neurovascular bundle moist at all times, an apexo-elevator or the broad end of a Mitchell's trimmer (depending on access) may be used to gently tease the root tip even if within the cortex of the IAC (Fig. 1b).
4. After this point it is made sure that in case the tooth is sectioned all other fragments of the tooth have been removed to allow straight line access to the IAC/base of the socket for further instrumentation which could be otherwise impeded (Fig. 1c).
5. Next, insertion of a thin beaked, long shanked, non toothed tissue forceps under drop-by-drop irrigation by the assistant, aids in retrieval of the tooth root tip (Fig. 1d).

The procedure is best carried out using $2.5\times$ surgical loupe magnification although it is not mandatory.

Discussion

Extreme care, caution and patience is mandatory in carrying out this technique with proper informed consent of the patient. In case severe bleeding especially during or

after de-roofing the IAC superior cortex is encountered or if the patient complains of severe pain despite adequate pulpal anesthesia, the procedure should be abandoned without any further attempts of removal till at least the next 3 weeks to allow healing in the socket. Thereafter, the removal can be undertaken, if nerve function is found to be intact on clinical testing. Else, it may be considered wise to retain the roots thereby avoiding further nerve damage.

Coronectomy or intentional root retention is associated with chances of infection due to retained pulp tissue [2, 3, 10] and is a controversial issue [10]. Also, the concept is relatively new, has no long term studies supporting it [10] and seems too conservative to the authors because of the concept of retaining a tissue which is indicated for removal. This paper stands against the concept of doing a coronectomy for all cases showing radiographic proximity to the IAC, due to above mentioned reasons and proposes that, only those cases where intraoperatively severe bleeding is encountered be taken up for root retention if complete removal is found to be impossible without further damaging the nerve.

The first author has been practicing this technique (Fig. 2) for the last 2 years now and has been successfully able to remove third molar root tips with this method which on pre-surgical evaluation presented with signs of proximity. There have been only 2 incidents of nerve injury so far in terms of partial anesthesia of the lip and alveolus, the

Fig. 2 Illustrative case example

first recovered within 1 month with oral Mecobalamin 1,500 mcg OD till complete recovery and the second patient took nearly 2 months for complete recovery, although she was able to recover most of her sensation in the first 10 days itself with the same regimen, following which she was unwilling to continue the medicine.

There is evidence to suggest that factors like older age, bone cutting distal to the third molar and the radiologic

relationship between 3rd molar and IAC alongwith deflection of the mandibular canal, increase the risk of IAN damage [11].

Conclusion

The authors hereby conclude that the technique follows the simple principle of ‘prevention is better than cure’ and suggest that, when practiced with extreme caution and preferably under magnification, with a good assistant, this technique yields good results. The patient should however be informed about the risks of the procedure clearly before undertaking the procedure to avoid law suits. To increase the success of this technique the authors even advocate the use of a higher magnification (3.5–4×) with fibreoptic headlight to improve visibility and precision.

Conflict of interest No conflicts of interest.

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