

## Case Report

### **Inferior Alveolar Nerve Paresthesia Related to Apical Periodontitis of Mandibular Third Molar**

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**Abstract:** Paresthesia of the inferior alveolar nerve (IAN) as the result of preapical inflammation or endodontic treatment is a rare but serious occurrence. The following case report describes the diagnosis and management of paresthesia related to an endodontic periodical lesion of a mandibular third molar.

**Keywords:** Inferior alveolar nerve, mandibular third molar, Paresthesia

#### **INTRODUCTION**

Paresthesia has been defined as “an abnormal sensation whether spontaneous or evoked” such as burning, tingling, prickling, itching or formication, which is not unpleasant [1]. The chemical neurotoxicity and the mechanical pressure are two principle mechanisms are responsible for the damage of the nerve [2].

Edema due to the host inflammatory process through a periodical lesion formation may cause parasthesia as a result of increased pressure on the neural bundles. A subsequent hematoma can also cause pressure on the nerve fibers sufficient to induce a paresthesia. Microbial by-products such as gram negative bacteria are another probable cause of neuropathies. It is also possible that distorted tissue metabolism in the region of the infection could impair neural conduction [3, 4].

Radiographic examination is an essential component of an endodontic treatment. It underpins all aspect of endodontic procedure from diagnosis and treatment planning to assess of treatment outcome. Conventional film and digitally captured periapical radiographs provide limited information by the fact that the three-dimensional anatomy of the area being the radiographed is compressed into a two dimensional image. In these periodical radiographs, superimposition of neighboring anatomical structures impinging on three-

dimensional depiction of the anatomy. In addition, there may also be geometric distortion of the anatomical structures being imaged [5].

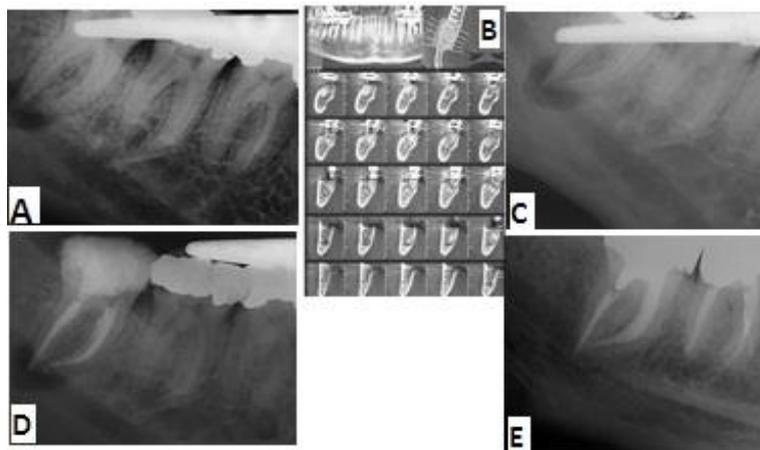
Several modalities have been used overcome to these problems including conventional tomography, computed tomography (CT), and the most recently introduced cone beam computed tomography(CBCT) [6-8].

CBCT imaging has the advantage of anatomical superimposition elimination, and absence of image magnification. Furthermore CBCT presents short scanning time, and radiation dose up to 15 times lower than multislice CT (MSCT) [9]. Examination of the affected area can be done using thermal, mechanical, electrical or chemical test provoking subjective responses [10].

The following case report describes the diagnosis and management of paresthesia related to an endodontic periodical lesion of a mandibular third molar.

#### **CASE REPORT**

A 36-year-old female was referred from oral and maxillofacial surgery department to endodontic department for root canal treatment of right mandibular third molar. The patient's chief complaint was periauricular pain and lip numbness.



**Fig-1: (A) Preoperative radiograph (B) a regional CBCT imaging, demonstrating the mandibular third molar in Close Proximity to the Inferior Alveolar Canal (C) Working length (D) Postoperative radiograph (E) 12 months follow up**

Her past medical and familial history was found to be noncontributory. Radiographic evaluation revealed deep carious lesion of right mandibular third molar and large periapical lesion. In addition root apices of the tooth had a close proximity to the inferior alveolar nerve canal (Fig1-A). To provide more accurate information on the anatomical relationship between inferior alveolar nerve and root apices, a regional CBCT imaging was prescribed (Fig1-B).

Anatomical proximity between root apices of tooth #32 and inferior alveolar nerve canal as well as involvement of the canal with large endodontic lesion were confirmed by CBCT. Surgical extraction and/or root canal therapy of tooth #32 were offered to patient as possible treatment options. The patient finally opted for root canal treatment. Informed consent was taken.

Local anesthesia was administered, isolation with rubber dam was applied then access cavity was established. The canal orifices were defined and explored with a #10-K file (Dentsply, Maillefer). Working length was determined using No.15 K file which was then confirmed using electronic apex locator (VDW GmbH, Munich, Germany) (Fig1-C). All of root canals were prepared in a crown-down method using ProTaper nickel-titanium rotary instruments (Maillefer, Dentsply, Ballaigues, Switzerland). Chemical irrigation was performed with 5.25% sodium hypochlorite solution without positive pressure in the canal. The root canal was dried with sterile paper points and dressed with calcium hydroxide paste (Calen, SS White, Rio de Janeiro, RJ, and Brazil). The cavity was filled with temporary filling material (Fig1-D).

After 10 days, the patient reported that periradicular pain was resolved. The intracanal dressing was removed and the root canals were obturated with gutta-percha and AH-26sealer using lateral compaction technique. A temporary filling was placed and referred the patient for appropriate coronal restoration.

The patient experienced no postoperative complications after 12 months of follow-up, the tooth was asymptomatic and functional. Radiographic finding revealed that apical lesion was healing. Patient sensation was completely recovered (Fig 1-E).

## DISCUSSION

To understand the consequences of physical injury to the peripheral nerves as well as prognosis, it is useful to introduce the classifications used to grade the nerve injury [11]. Seddon described 3 levels of neural injuries based on the severity of tissue injury, prognosis for recovery, and time for recovery: neuropraxia, axonotmesis, and neurotmesis. Neuropraxia is characterized by local myelin damage with axon continuity and no distal wallerian degeneration. It is most commonly due to nerve compression; recovery is complete and takes a few hours to days. Axonotmesis, typical of crush injuries, is defined as loss of continuity of axons, with preservation of the neural connective tissue sheath, which can support axonal regeneration. Distal wallerian degeneration of the axons occurs and further axons regenerate at a rate of approximately 1mm per day. Recovery is incomplete and takes several months. Neurotmesis is the severest grade of peripheral nerve injury. It occurs when the axon and endoneurium, perineurium, and epineurium are damaged and disrupted or transected [12].

It is essential to assess the position of inferior alveolar canal to the apices of the lower third molar preoperatively to prevent possible neurosensory damage. Neurosensory damage lead to functional, social and psychological distress [13]. CBCT is an excellent preoperative diagnostic tool for visualization of the mandibular canal [14].

Denio *et al.* evaluated the spatial relationship between the posterior teeth and the mandibular canal in 22 mature dried human skulls. The mandibular canal

was located directly beneath the root apices of the posterior teeth in 5% of cases. They also showed that by decreasing the mandibular height, the distance between the canal and root apices to decreased [15].

In some patients, there is contact between the apices of the molar teeth and the mandibular canal [16]. According to one study, this distance varies between 1 to 4 mm in case of the first mandibular molar; it is less than 1 mm with the second and third mandibular molars [17]. The distance between root apices and the mandibular canal increases with eruption of mandibular teeth [18].

Age and sex differences appear to affect the proximity of the mandibular canal to root apices; however, the course of the canal traverses through the mandible might vary in individual patients [19]. In a study by Givol *et al.*, most patients complaining of the paresthesia of the IAN were female [20-22].

Literature regarding the IANP and mental nerve paresthesia due to periapical condition is scarce [23, 24]. Givol in his study reported that of 262 cases of sensory disturbances, 6.1% occurred after endodontic treatment [21]. Garisto *et al.* proposed rate of sensory disturbances following endodontic treatment was 5.8% [25].

Activity of intracanal microorganisms and the inflammatory products released toxic metabolites. They are responsible for sensory disturbances of inferior alveolar nerve or mental nerve in some endodontic patients [26].

Clinician should be aware of this condition and know that the longer neural irritations magnitude nerve degeneration and risk of permanent paresthesia.

## CONCLUSION

Cone beam computed tomography can be considered an accurate and noninvasive method to overcome limitations of two-dimensional periapical images. Close proximity of endodontic lesions to inferior alveolar nerve canal could alter patient's sensation. Even though anatomical proximity between root apices of the mandibular canal may pose a serious risk of neural injury subsequent to an endodontic treatment, modern armamentarium and careful modalities could guarantee the healing of ever extensive endodontic lesions and recovery of their neurosensory disorders.

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