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Case Report

INFERIOR ALVEOLAR NERVE PARESTHESIA RELIEVED BY MICROSCOPIC ENDOODONTIC TREATMENT

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Abstract

We experienced two cases of inferior alveolar nerve paresthesia caused by root canal medicaments, which were successfully relieved by microscopic endodontic treatment. In the first case, the paresthesia might have been attributable to infiltration of calcium hydroxide into the mandibular canal through the root canals of the mandibular left second molar tooth. In the second case, the paresthesia might have been attributable to infiltration of paraformaldehyde through the root canals of the mandibular right second molar tooth. The paresthesia was relieved in both cases by repetitive microscopic endodontic irrigation using physiological saline solution in combination with oral vitamin B₁₂ and adenosine triphosphate.

Key words: Inferior alveolar nerve—Paresthesia—Endodontic medicaments—Microscopic endodontics

INTRODUCTION

Inferior alveolar nerve paresthesia may be caused by endodontic treatments such as periapical surgery, implant insertion, over-instrumentation, irritant root canal medicaments, and overfilling by filling materials. Of these, most cases can be ascribed to an overfilling of paste-like medicaments in close proximity of the inferior alveolar nerve[5], especially in the treatment of molar teeth. The recovery of paresthesia caused by nerve injury can take a long time, sometimes more than three or four months, and even then it may be incomplete.

In the present report, we experienced two cases of inferior alveolar nerve paresthesia in which infiltration of irritant root canal...
medicaments may have contributed to the symptom. In these cases, repetitive microscopic endodontic irrigation with physiological saline solution was effective in relieving the symptoms in a relatively short term.

Case 1
The patient was a 36-year-old male who underwent root canal treatment of the mandibular left second molar tooth. After the second treatment using calcium hydroxide, the patient complained of numbness in the area innervated by the left mental nerve. In addition, tingling pain occurred in mandibular anterior teeth region. These symptoms were not improved by additional root canal treatment. Three weeks after the onset of paresthesia, the patient visited Tokyo Dental College Chiba Hospital. A dental X-ray photograph showed that the apex of the molar tooth root without an enlarged apical foramen close approximated the mandibular canal (Fig. 1). It was suggested that infiltration of calcium hydroxide into the mandibular canal had produced the symptoms. Accordingly, microscopic endodontic treatment was selected to remove the root canal medicament by irrigation with physiological saline solution (Fig. 2). This treatment was performed once a week. After each treatment, no medicament was applied to the root canal. In addition, the patient was given vitamin B₁₂ (1.5 mg/day) and adenosine triphosphate (120 mg/day) orally. As a result, the symptoms disappeared three months after the beginning of the microscopic endodontic treatment.

Case 2
The patient was a 27-year-old male who underwent pulpectomy of the mandibular right second molar tooth. After the treatment, paraformaldehyde was applied into the root canal. Several hours later, the patient noted numbness in the area innervated by the right mental nerve. This symptom did not change with additional root canal treatment. Four weeks after the onset of paresthesia, the patient visited Tokyo Dental College Chiba Hospital. A dental X-ray photograph showed that the apex of the molar tooth root without an enlarged apical foramen was closed to the border of the mandibular canal (Fig. 3). These findings suggested that infiltration of paraformaldehyde into the mandibular canal produced these symptoms. Microscopic endodontic treatment once a week was selected to remove the root canal medicament by irrigation with physiological saline solution (Fig. 4). After each treatment, no medicament was applied to the root canal. The patient

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Fig. 1 The X-ray at the time of the first medical examination in this hospital. A dotted line shows the upper edge of the mandibular canal.

Fig. 2 The image under the operative microscope. The paste-like calcium hydroxide is observed in the root canal. (arrow)
was given vitamin B₁₂ (1.5 mg/day) and adenosine triphosphate (120 mg/day) orally. The symptoms disappeared three months after the beginning of the microscopic endodontic treatment.

**DISCUSSION**

1. **Paresthesia following endodontic treatment**

Nerve damage following endodontic treatment may result from physical and/or chemical injuries. Paresthesia may be caused from filling sealers and application of root canal medicaments containing formaldehyde or calcium hydroxide into the canal of the root, which is close to the nerve trunk.

Calcium hydroxide has been used for root canal filling, pulp capping, and pulpotomy in endodontic treatment for a long time. Calcium hydroxide forms a necrotic layer followed by a new-calcified layer of pulp tissue. If medicaments containing calcium hydroxide are applied for root canal fillings, this damage sometimes will be extended to the nerve trunks and result in paresthesia of the regional area. In a clinical report on *Calasept*, it is described that paresthesia in the buccal and mentum region lasted for five years after filling medicaments containing calcium hydroxide into the root canal of the mandibular right second premolar tooth.

In another paresthesia case, the effects of a formaldehyde paste containing calcium hydroxide and barium sulfate placed into the root canal of the mandibular right second molar tooth were discussed. Vitapex, a root canal filling material containing calcium hydroxide, also elicited degeneration of the inferior alveolar nerve.

In the first case, the previous doctor used paste type calcium hydroxide as a root canal medicament. Because this calcium hydroxide preparation did not contain a contrast medium, it did not appear in the dental X-ray photograph. No findings of enlarged apical foramen suggested that small part of this preparation might have infiltrated beyond the apex of the root to cause paresthesia of the inferior alveolar nerve. In the furcal perforation model, calcium hydroxide produced a 30µm thick necrotic layer in adjacent periodontal membrane.

Paraformaldehyde, as used in the second case, is a potent neurotoxin and may cause chemical destruction of the nerve axon because of its gaseous nature. A severe paresthesia case (persisting for more than 6 years) was reported in which a paraformaldehyde-containing paste...
entered the mandibular canal through the root canal of the mandibular right second molar, occupying the anterior two thirds and posterior one third of its whole length.  

2. Microscopic endodontic treatment  
Treatments for paresthesia include a removal of the cause and conservative (promotion of nerve regeneration) or surgical (nerve repair) procedures. The former can be applied to neurapraxia and axonotmesis, while the latter can be applied to neurotmesis. Because calcium hydroxide and paraformaldehyde both produce chemical nerve damage, neurapraxia and axonotmesis of the nerve fibers are more likely to develop than neurotmesis. The difference between neurapraxia and axonotmesis should derive from such factors as volume, concentration, and/or affective duration of the chemicals. Therefore, promotion of nerve regeneration along with the removal of the cause is fundamental to relieving paresthesia.  

Repetitive microscopic endodontic irrigation using physiological saline solution was effective in relieving the symptoms in the present two cases. This irrigation treatment can reliably remove root canal medicaments that cause nerve damage. To obtain successful results, the degree of the nerve damage should be precisely evaluated. In the present two cases, the patients felt numbness in the lower lip and mental region. Therefore the inferior alveolar nerve had not suffered complete damage or neurotmesis. However, neurapraxia and axonotmesis were not precisely differentiated in the present two cases.  

These patients also received vitamin B12 and adenosine triphosphate orally. These are most common agents to promote nerve regeneration, although they may be less effective than stellate ganglion blockade.  

In conclusion, a combination of microscopic endodontic irrigation treatment and oral medication effectively relieved paresthesia of the inferior alveolar nerve after root canal medicaments with calcium hydroxide or paraformaldehyde in our two patients. Microscopic endodontic treatment may be of clinical value for removing the cause of nerve damage when root canal medicaments possibly induce neurapraxia or axonotmesis.  

REFERENCES  

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