
Anesthesia following overfilling of a root canal sealer into the mandibular canal: A case report

Banu Gürkan Köseoğlu, DDS, PhD,^a Şinasi Tanrıkulu, DDS,^b
Rüstem Kemal Sübay, DDS, PhD,^c and Serra Sencer, DDS, PhD,^d Istanbul, Turkey
ISTANBUL UNIVERSITY

The surgical treatment of a case of anesthesia that occurred with the extrusion of Endomethasone root canal sealer into the mandibular canal is presented. Endomethasone is a neurotoxic root canal sealer containing paraformaldehyde and eugenol. The literature indicates immediate surgical decompression on the extrusion of Endomethasone into the mandibular canal. In our case, the decompression surgery was done 3 weeks after the endodontic mishap. The nearly complete resolution of anesthesia 4 months following the decompression surgery suggests that the neurotoxic effects of Endomethasone are still reversible after 3 weeks. (*Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2006;101:803-6)

Serious complications may occur inadvertently during root canal treatment. Undesirable complications such as anesthesia, paresthesia, hypoesthesia, hyperesthesia, and dysesthesia can follow the extrusion of a canal sealer into the mandibular canal.¹⁻¹³

Overinstrumentation of the root canal with hand or mechanically driven files can perforate the mandibular canal, allowing the extrusion of sealers, dressing agents, and irrigation solutions, and the passage of microorganisms into the canal, during endodontic treatment. Experimental studies have shown that eugenol and paraformaldehyde are the main materials causing neurotoxic reactions.¹⁴⁻¹⁷ However, sealers and filling materials differ chemically and include AH26, Hydron, Diaket, Iodoform, Calasept, Endoseal, and chloropercha, which can cause serious neurotoxic complications when extruded into the mandibular canal.^{4,10,11,18}

Although spontaneous healing after an endodontic mishap has occurred, most of the anesthesia or paresthesia cases related to the extrusion of a sealer into the canal persist when no decompression surgery is done.⁴ The surgical removal of different sealers from the mandibular canal is reported to result in almost complete resolution of the anesthesia or paresthesia.¹⁻⁵

The following report presents the surgical treatment of an anesthesia case that followed the inadvertent

extrusion of Endomethasone root canal sealer into the mandibular canal.

CASE REPORT

A 32-year-old woman was referred to the Oral and Maxillofacial Surgery Department of Istanbul University for consultation and the management of prolonged anesthesia in her right mandibular region following root canal treatment. The patient reported that her local dentist had performed root canal therapy in her right first mandibular molar 3 weeks earlier. She had returned to the dentist with numbness on the right side of the mandible and right lower lip the following day. The dentist had decided to wait for several days for a possible spontaneous recovery. Then, the dentist removed the tooth, but no healing occurred in the 3 weeks following the extraction.

Clinically, testing with light touch showed anesthesia in the region served by the right inferior alveolar nerve. The buccal gingival tissues over the right mandibular molar and premolar teeth felt no sensation. The lingual gingival tissues responded within normal limits to stimulation with an explorer. There was no sensation to thermal or mechanical stimuli in either the right lower lip or buccal gingivae. She reported no pain after the root canal treatment or after the extraction. There was no clinical evidence of infection.

A panoramic radiograph revealed the presence of radiopaque canal sealer in the mandibular canal (Fig. 1). According to the information obtained from her dentist, the root canal treatment technique that was performed involved canal shaping with hand files, saline irrigation, and obturation with a lentulo using Endomethasone root canal sealer.

To treat the prolonged anesthesia of the lip, we proposed decompressing the nerve by removing the canal sealer surgically and informed the patient of all possible complications that can occur during and after the surgery. After the patient consented to surgical treatment, the canal sealer was removed under local anesthesia. The inferior dental nerve was gently retracted to clean all the sealer from the canal. The nerve appeared normal visually. There was no granulation or fibrous tissue at the periphery of the nerve. As soon as the sealer on the nerve and

^aAssociate Professor, Department of Oral and Maxillofacial Surgery, School of Dentistry.

^bResearch Assistant, Department of Oral and Maxillofacial Surgery, School of Dentistry.

^cProfessor, Department of Endodontics, School of Dentistry.

^dAssociate Professor, Department of Neuroradiology, Medical Faculty. Received for publication Feb 23, 2005; returned for revision Jul 4, 2005; accepted for publication Jul 6, 2005.

1079-2104/\$ - see front matter

© 2006 Mosby, Inc. All rights reserved.

doi:10.1016/j.tripleo.2005.07.015



Fig. 1. The presence of the extruded root canal sealer in the mandibular canal.

in the canal was removed, the patient felt sensation. Following surgery, an antibiotic (clindamycin, 1200 mg/day), B vitamin complex (vitamins B₁ and B₆), and an analgesic (naproxen sodium, 1100 mg/day) were prescribed.

After 1 month, the right lower lip showed signs of paresthesia. Slight paresthesia was present on the lip and buccal gingivae 4 months after the surgery; a control panoramic radiograph showed no pathologic changes to the mandibular canal (Fig. 2).

After 18 months, very slight paresthesia remained in the right lower lip. Magnetic resonance imaging was performed with a 1.5T MR scanner (Somatom Vision; Siemens, Erlangen, Germany). T2-weighted fat-suppressed sequences of the mandible were obtained in the axial, coronal, and oblique sagittal planes. T1-weighted scans before and after gadolinium injections were also done in the axial and coronal planes. On the T2-weighted sequences, a local hyperintense signal corresponding to slight edema and inflammation was detected in the alveolar socket of the corresponding tooth; this is a normal radiographic finding following a surgical procedure involving the jaw bone, such as a tooth extraction (Fig. 3).

DISCUSSION

The proximity of the mandibular canal to the apices of the premolar and molar teeth requires a careful radiographic diagnosis when endodontic treatment of these teeth is planned. In some patients, there is contact between the apices of the molar teeth and the mandibular canal, and the inadvertent extrusion of the root canal sealer is most likely to occur in such cases. An initial pretreatment radiograph of the mandibular teeth will reveal the proximity of the canal to the apices. During endodontic treatment, a radiograph taken with the files in position will not only ensure the correct working length but also prevent perforation of the canal and possible subsequent damage to the inferior alveolar nerve resulting from the endodontic treatment.

Physical-, chemical-, and infection-related hazards can affect the inferior alveolar nerve during endodontic treatment. Although the mandibular canal is surrounded by dense hypermineralized bone, it can be perforated by



Fig. 2. The radiograph obtained after surgery.

a rotating file on a hand-piece or sometimes even with hand files. During instrumentation with files, the nerve or blood vessels can be damaged directly. The irrigation solutions, such as sodium hypochlorite and EDTA, may leak into the canal and damage the nerve chemically. The use of lentulo spirals increases the risk of sealer extrusion into the canal. The presence of a sealer in the mandibular canal can affect the functions of the nerve via chemical toxicity. Another possible inadvertent complication of endodontic treatment of infected mandibular molar or premolar teeth is the spread of infection to the mandibular canal or the mental foramen. Morse¹⁸ stated that the microorganisms and their products might spread beyond the apex during endodontic treatment and breach the protective perineurium, impairing nerve conductivity.

In vitro experiments on the isolated nerves of laboratory animals have shown that different root canal sealers, which contain paraformaldehyde, eugenol, calcium hydroxide, and other additives, can inhibit conduction of the action potential of the nerves to varying degrees.¹⁴⁻¹⁶ However, sealers that contain both eugenol and paraformaldehyde, such as Endomethasone and N2, were found to be the most toxic.^{14,16} Brodin et al.¹⁴ reported that Endomethasone can irreversibly inhibit the conduction of the action potential in the rat phrenic nerve. Serper et al.¹⁶ found that the inhibitory effect of Endomethasone on isolated rat sciatic nerves is reversible but is more pronounced than the effect of Sealapex or Calciobiotic root canal sealers and that only 10%-20% recovery is observed within 2 h. The reported cases of paresthesia and anesthesia following endodontic treatment using Endomethasone demonstrate the neurotoxic effects of this sealer.^{3,5,11}

A literature review of paresthesia and anesthesia cases attributable to the extrusion of a root canal sealer indicated that the surgical removal of the sealer from the mandibular canal is an effective treatment and might restore normal sensation in the affected region.¹⁻⁶ However, the length of time since the endodontic mishap,

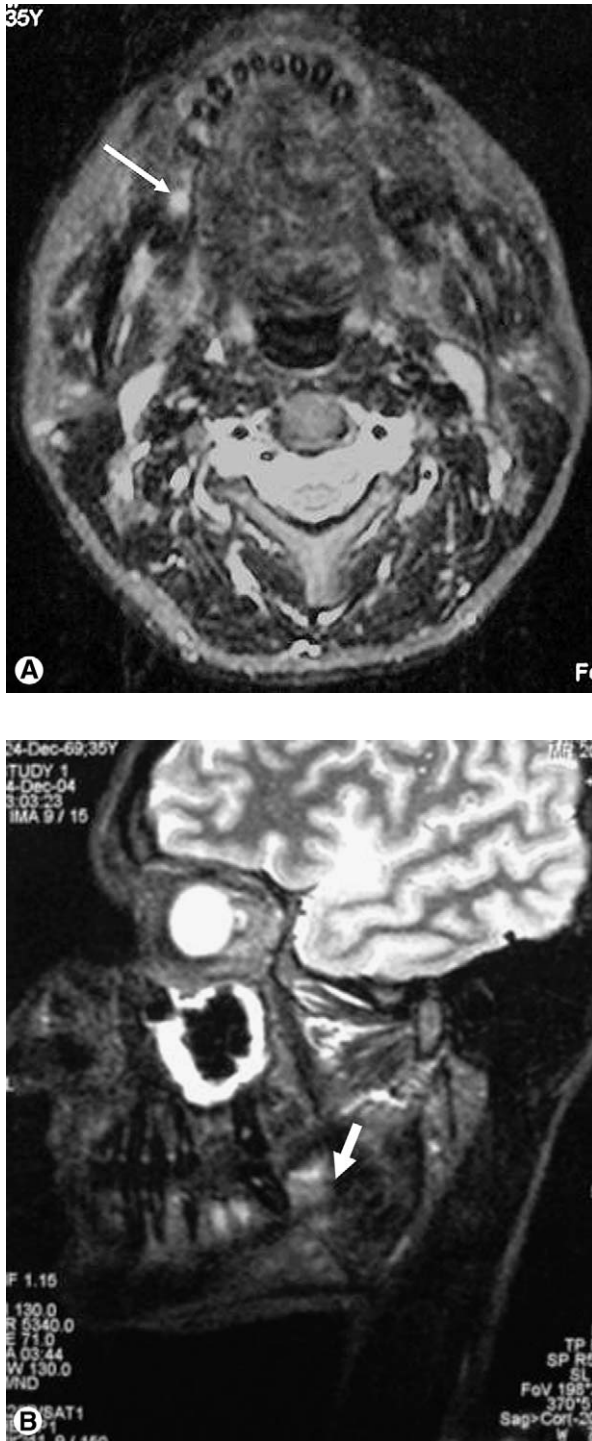


Fig. 3. Sagittal (A) and axial (B) fat-suppressed T2-weighted magnetic resonance images of the mandible show bright lesions (arrows), suggesting inflammation and bone marrow edema. Normal bone shows low (dark) signal in this sequence owing to suppression of trabecular bone.

the chemical properties of the sealer, and the location of the sealer in the inferior alveolar nerve segments are all important factors affecting the recovery with surgical treatment. A longer wait-and-see period might increase the risk of irreversible damage to the inferior alveolar nerve when the more toxic sealers, such as Endomethasone, are extruded into the canal. The prolonged presence of a root canal sealer on the nerve might prevent resolution of the ischemia to the nerve and might cause epineural edema, which can further press on the nerve and subsequently lead to connective tissue proliferation and epineural fibrosis.¹ Gatot and Tovi¹ advised the use of corticosteroids to alleviate the pathologic consequences related to the extrusion of a canal sealer into the mandibular canal. Demph and Hausemen⁶ indicated that, if sealers extrude within the endoneurium between the nerve bundles, the affected nerve part must be resected and bridged using transplants.

According to Russell et al.⁵ and Kothari and Cannell,² when a sealer containing eugenol and paraformaldehyde is extruded into the mandibular canal, the sealer should be removed from the mandibular canal as soon as possible. Kothari and Cannell² speculated that even a 4-day delay in the surgical removal of a nonresorbable phenol-based sealer could result in persistent paresthesia. Russell et al.⁵ observed only partial recovery in anesthesia cases when surgical removal of Endomethasone from the mandibular canal was delayed by 2 weeks. They also noted that there was complete recovery from anesthesia when the decompression surgery was done within 3 days.

In our case, there was complete anesthesia due to the extrusion of Endomethasone root canal sealer into the mandibular canal when the patient visited our clinic 3 weeks after the endodontic mishap. Thus the decompression surgery was performed 3 weeks after the mishap. The return of almost normal sensation after 4 months following the decompression surgery suggests that the neurotoxic effects of Endomethasone on the inferior alveolar nerve are reversible after 3 weeks. The clinical success in our case indicates that surgical intervention should still be undertaken 3 weeks after an endodontic mishap.

REFERENCES

1. Gatot A, Tovi F. Prednisone treatment for injury and compression of inferior alveolar nerve: report of a case of anesthesia following endodontic treatment. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1986;62:704-6.
2. Kothari P, Cannell H. Bilateral mandibular nerve damage following root canal therapy. *Br Dent J* 1996;180:189-90.
3. Scolozzi P, Lombardi T, Jaques B. Successful inferior alveolar nerve decompression for dysesthesia following endodontic treatment: report of 4 cases treated by mandibular sagittal osteotomy. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2004;97: 625-31.

4. Orstravik D, Brodin P, Aas E. Paraesthesia following endodontic treatment: survey of the literature and a case report. *Int Endod J* 1983;16:167-72.
5. Russell DI, Ryan WJ, Towers JF. Complications of automated root canal treatment. *Brit Dent J* 1982;153:393-8.
6. Dempf R, Hausemen JE. Lesions of the inferior alveolar nerve arising from endodontic treatment. *Aust Endod J* 2000;26:67-71.
7. LaBlanc JP, Epker BN. Serious alveolar nerve dysesthesia after endodontic procedure: report of three cases. *J Am Dent Assoc* 1984;108:605-7.
8. Neaverth EJ. Disabling complications following inadvertent over-extension of a root canal filling material. *J Endod* 1989;15:135-9.
9. Allard KUB. Paraesthesia—a consequence of a controversial root-filling material? A case report. *Int Endod J* 1986;19:205-8.
10. Tamse A, Kaffe I, Littner MM. Paraesthesia following over extension of AH26: report of two cases and review of the literature. *J Endod* 1982;8:88-90.
11. Rowe AHR. Damage to the inferior dental nerve during or following endodontic treatment. *Br Dent J* 1983;153:306-7.
12. Kaufman AY, Rosenberg L. Paraesthesia caused by Endomethasone. *J Endod* 1980;6:529-31.
13. Erişen R, Yücel T, Küçükay S. Endomethasone root canal filling material in the mandibular canal. A case report. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1989;68:343-5.
14. Brodin P, Roed A, Aars H, Orstravik D. Neurotoxic effects of root filling materials on rat phrenic nerve in vitro. *J Dent Res* 1982;61:1020-3.
15. Brodin P. Neurotoxic and analgesic effects of root canal cements and pulp-protecting dental materials. *Endod Dent Traumatol* 1988;4:1-11.
16. Serper A, Üçer O, Onur R, Etikan İ. Comparative neurotoxic effects of root canal materials on rat sciatic nerve. *J Endod* 1998;24:592-4.
17. Kozam G, Newark NJ. The effect of eugenol on nerve transmission. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1977;44:799-805.
18. Morse DR. Infection-related mental and inferior alveolar nerve paresthesia: Literature review and presentation of two cases. *J Endod* 1997;23:457-60.

Reprint requests:

Banu Gürkan Köseoğlu, DDS, PhD
Fener Caddesi, No:1/A 34380 Yeşilyurt
Istanbul, Turkey
banugr@e-kolay.net