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A series of complications following extrusion of root canal sealer: a rare case report

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Aim: In this study, we aimed to draw attention to the mismanagement of a rare complication that develops during root canal treatment. The report follows the guidelines of the Case Report Guide (CARE) and focuses on steps to eliminate the complication that has occurred. **Methods:** The widespread acute infection of a 51-year-old female patient who applied to our clinic with an extraoral abscess was first brought under control. Afterward, during the root canal treatment performed on the lower third molar tooth, which was the source of the infection, endodontic paste residues that penetrated the mandibular canal were surgically removed, and the patient was followed up. **Results:** It was understood that the source of the patient's widespread infection was the medicament-impregnated cotton that the endodontic treatment physician placed into the tooth extraction socket for analgesia. It was observed that the patient's paresthesia, which occurred due to nerve damage, did not regress during long-term follow-up. **Conclusion:** This case report shows that while it is essential to avoid complications in dentistry, the knowledge and ability to manage them are truly remarkable.

Keywords: Mandibular nerve injuries. Foreign bodies. Root canal therapy.

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Introduction

Nerve damage is a typical complication observed during oral and maxillofacial dentistry operations[1]. Procedures that may cause nerve damage include local anesthesia, impacted tooth extraction, orthognathic surgery, maxillofacial traumas and treatments, implant surgery, pre-prosthetic surgical procedures, temporomandibular joint surgery/arthroscopy, and endodontic treatments[2].

Although nerve injuries due to endodontic reasons are not very common, injuries have been reported in the literature as a result of mechanical trauma during excessive shaping of the protruding root canal, pressure resulting from overfilling at the apical area, the toxic effect of root canal irrigation solutions on tissues, and injuries caused by filling material invasion into the inferior alveolar canal due to overfilling of the canal through the apical foramen in the mandible[3-4].

Case

A 51-year-old patient without any systemic diseases and routine medication use presented to our clinic with a complaint of significant swelling and pain in the face (Fig. 1). According to the medical history obtained from the patient, root canal treatment was applied to the lower right third molar tooth in a private dental clinic. When the patient experienced pain, the dentist extracted the tooth and curetted the area. In the following two weeks, the patient reported using 1000 mg oral amoxicillin + clavulanic acid along with non-steroidal anti-inflammatory drugs. Over the last three days, the patient complained of extraoral swelling and pain in the buccal region of the lower right jaw.



Figure 1. The appearance of swelling and acute infection when the patient applied to our clinic.

When the patient presented to our clinic, trismus was evident. Limited intraoral examination revealed that the epithelialization of the extraction site had not occurred, but there was no apparent pus drainage. Additionally, the patient was found to have paresthesia in a wide area affecting the right lower jaw, cheek, and lip regions. Evaluation of the panoramic radiograph showed that the root canal filling paste used during the canal

treatment of the lower right third molar tooth had overflowed into the mandibular canal, and it was considered that this buccal abscess could be related to this situation (Fig. 2).

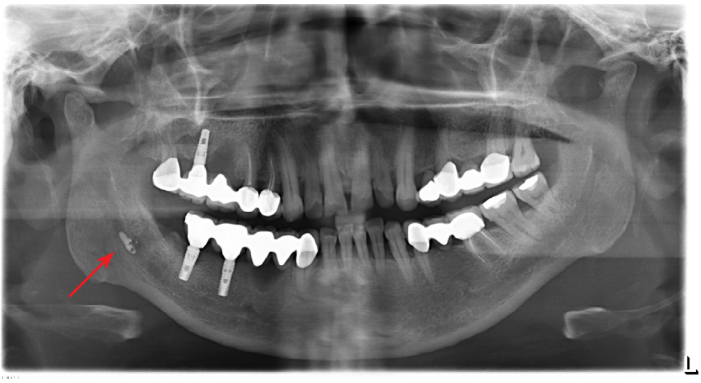


Figure 2. .Preoperative radiograph of the patient.

The patient was advised to perform extraoral warm compresses along with intravenous 1-gram cefazolin therapy. Extraoral drainage started on the second follow-up day, and a Penrose drain was sutured at the drainage site. The patient received regular medical dressing changes for five days, with 1 gram of cefazolin and 0.5% metronidazole therapy. At the end of the five days, a decrease in pus drainage and an improvement in mouth opening were observed. A surgical procedure under general anesthesia was planned for the patient.

During the operation, a full-thickness flap was raised, extending towards the ramus from the region of the second molar tooth. Afterward, the extraction socket of the third molar tooth was explored. During socket curettage, a cotton-like foreign body was found. Access to the mandibular canal was achieved through bone reduction made from the socket and buccal cortex. Carefully removing the root canal filling paste from the canal, ensuring the integrity of the nerve, was done with attention (Fig. 3). A collagen sponge was placed in the area and sutured. The cotton-like foreign body removed during the operation and the debris removed from the canal were sent for pathological evaluation (Fig. 4).



Figure 3. Exposure of the mandibular canal and cleaning of the root canal sealer.

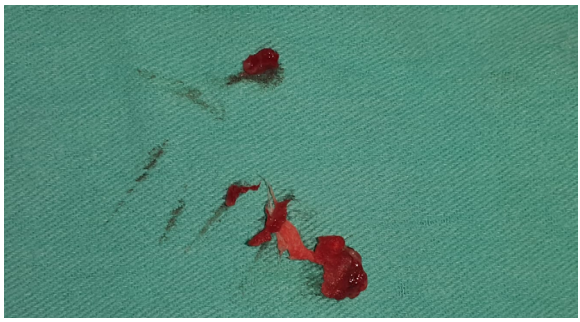


Figure 4. Foreign body removed during curettage of the socket.

After the operation, a panoramic radiograph taken immediately revealed that the material in the canal had been largely removed, with only a tiny piece still present.

The pathology report regarding the materials removed during the operation confirmed the preliminary diagnosis. It indicated that the foreign body was consistent with cotton, and the material removed was identified as root canal filling paste. The discussion with the patient revealed that the dentist who performed the canal treatment and extraction had placed an analgesic agent, analgesic-impregnated cotton, in the area when the patient's symptoms worsened.

At the 6-month follow-up, it was learned that the patient did not experience a recurrence of pain and swelling symptoms, but the preoperative paresthesia persisted. In the panoramic radiograph, it was observed that the unrecoverable remnants of the paste had shrunk in size (Fig. 5).



Figure 5. Radiograph of the patient taken 6 months after the procedure.

Discussion

According to published research, the most frequent causes of endodontic nerve injuries are root canal overshaping-related mechanical trauma, overfilling-related pressure at the apex, root canal irrigation solutions' toxic effects, and filling material extrusion from the apical foramen into the mandibular inferior alveolar canal[3-5].

When root canal filling materials come into touch with neural tissues, they can cause toxic consequences such as anesthesia, hypoesthesia, paresthesia, or dysesthesia, which can be permanent[6].

Root canal sealants are another thing that might cause paresthesia. Chemical toxicity is the primary cause of paresthesia brought on by sealers. In endodontic treatments, sealers based on zinc oxide and eugenol are most frequently used. Eugenol's neurotoxic effects, which have been shown to produce paresthesia or anesthesia when in direct contact with the inferior alveolar nerve, are the main reason for toxicity. According to a study by Trowbridge et al.[7], intradental nerve activity is inhibited by freshly mixed zinc oxide eugenol.

Sealers based on calcium hydroxide (Ca[OH]2) are also frequently used. Clinical studies have validated the irreversible nerve damage caused by Ca[OH]2-based sealers, as Boiesen and Bodrin[8] reported in their experimental model[9]. Ahlgren et al.[10], reporting on a case of mechanical compression causing paresthesia, was caused by the extrusion of a large amount of Ca(OH)2-based sealer into the periapical area close to the inferior alveolar nerve.

Numerous past clinical reports suggest that surgically removing the root canal filling material from the mandibular canal is a successful treatment that resolves the problem completely[11-13]. On the other hand, it has been noted that routine radiographic follow-up without surgical intervention is appropriate in certain clinical cases where the patient has no complaints[14,15].

In the cases reported by Garde et al.[16] and Köseoğlu et al.[11], the preference was surgical removal of the canal sealer to decompress the nerve. However, rather than surgically removing the sealer, Gonzáles-Martín et al.[13] and Poveda et al.[17] conducted periodic follow-up visits. Typically, a patient's symptoms and preferences guide the selection of treatment options. A patient should be monitored clinically and radiologically if they refuse surgical treatment, as some patients may do.

Considering that the canal filling paste led to an extraoral abscess in the patient, we preferred surgical removal. During the operation, we concluded that the medicated cotton we removed from the cavity was the reason for the infection. Although the surgery was successful and did not result in any iatrogenic nerve injury, we learned at the 18-month follow-up that the pre-existing paresthesia in the patient persisted without any improvement.

In conclusion, the information presented in this clinical case emphasizes the importance of careful root canal preparation and avoiding excessive root canal filling paste use. Additionally, being aware of the neurotoxic effects of materials used as root canal filling paste or pulpal medicaments is crucial for preventing complications or effectively managing the situation when complications arise. Knowledge of emergency interventions in case of such complications is also essential.

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Conflicts of Interest

The authors report no conflicts of interest in this case report.

Data Availability

Datasets related to this article will be available upon request to the corresponding author.

Author Contribution

All authors were actively involved during the production of this study, as the author and all co-authors were engaged in the clinical case investigation, creation, writing, revision, and final approval of the manuscript. **Bilgesu Kurt** participated in surgical planning, surgery, and patient follow-up, and was also responsible for data collection, manuscript writing, and final approval. **İnci Rana Karaca** was responsible for manuscript writing, findings, writing, revision and approval of the final version of the manuscript for final approval.

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