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Two Patients Requiring Surgical Management for Leakage of Calcium Hydroxide Paste from Root Canal into Infraorbital Space

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Abstract

Two patients requiring surgical management for leakage of calcium hydroxide paste from a root canal into the infraorbital space are reported. A paste root canal treatment material used at the time of maxillary root canal treatment had leaked out of the root canal in both patients. Computed tomography confirmed displacement of the root canal treatment material into the soft tissue, with extension into the infraorbital space. In both cases, foreign body removal was performed. Root canal treatment using a calcium hydroxide paste should be performed carefully without strong pressure.

Key words: Calcipex — Canine space — Root canal treatment — Foreign body — Injection-type syringe

Case Report

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Introduction

Traditionally, formalin preparations were used as medication in root canal treatment. However, such preparations can sometimes irritate the tissue. Therefore, calcium hydroxide pastes (Ca(OH)₂) are now widely used, as they allow irritation to be avoided while providing a long-acting antimicrobial effect. These include Calcipex® (Nippon Shika Yakuhin Co., Ltd., Yamaguchi, Japan), which has the advantage of being easy to handle, allowing the root canal to be filled directly. However, when the root apex is enlarged, injection under strong pressure can result in adverse events such as leakage and pain. In addition, a number of reports have described displacement into deeper tissues, leading to necrosis of the surrounding tissue. Moreover, inadvertent displacement of calcium hydroxide has been reported to occur, particularly into the maxillary sinus of the upper molar root apex. On the other hand, no displacement from the upper canines and first premolars into the deep soft tissues has been reported.

In this report, 2 cases in which calcium hydroxide paste leaked out of the root canal into the infraorbital space, requiring surgical management, are described.
Case Reports

1. Case 1

The patient, a 46-year-old woman, underwent root canal treatment of the upper left canine by a dentist about 1 month prior to attending our department. After root canal filling, she noticed a mass in her left cheek. Her symptoms did not improve, so she was referred to our department for evaluation. Her medical history was unremarkable, except for insomnia. Clinical examination revealed a palpable mass with mild erythema in the gingiva of the upper left canine root apex. A fistula with pus drainage was observed (Fig. 1A). Slight swelling was observed on the left cheek (Fig. 1B). Panoramic image and Water’s view revealed an X-ray opacity with

![Fig. 1](image1.png)

A: Lesion on oral mucosa caused by calcium hydroxide (arrow).
B: Slight swelling was observed on the left cheek.

![Fig. 2](image2.png)

Fig. 2 Panoramic image revealed X-ray opacity with distinct borders (arrow, case 1)
distinct borders in the cranial direction from the root apex of the upper left canine (Figs. 2, 3). Later, computed tomography revealed displacement of a foreign body from the upper left canine root apex into the soft tissues at the ventral maxillary sinus (Fig. 4).

Fig. 3 Water’s projection (case 1)
X-ray opacity with distinct borders was observed in cranial direction (arrow).

Fig. 4 Computed tomography revealed foreign body in soft tissues (arrow)
The situation was explained to the patient, and surgical removal of the foreign body was planned. Foreign body removal and an apicoectomy were performed under local anesthesia with intravenous sedation (Fig. 5A). A mucoperiosteal flap was elevated and reflected, and the root apex of canine was exposed. Removal and curettage of the foreign body in the infraorbital space was performed. The solid and brittle mass of the foreign body was white in the center and ivory peripherally (Fig. 5B). The area was thoroughly irrigated with sterile saline. Apicoectomy of the upper left canine was performed using a fissure bur under sterile saline irrigation. Postoperatively, there was mild discomfort in the left cheek, but no paresthesia. A satisfactory healing process was confirmed (Fig. 6).

2. Case 2

The patient, a 31-year-old woman, underwent root canal treatment of the upper left first premolar by a dentist 3 days prior to visiting our department. As hypesthesia of the left cheek developed and the symptoms gradually worsened, she was referred to our department. Her medical history was positive for hyperventilation syndrome. On examination, the oral mucosa was normal, with no signs of inflammation. Localized hypesthesia was noted in the area of the left infraorbital

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**Fig. 5** Surgical removal of foreign body was performed
A: Foreign body identified in soft tissue beneath periosteum.
B: Specimen of removed foreign body.

**Fig. 6** Postoperative radiographic examination confirmed favorable healing process (case 1)
nerve. On Semmes Weinstein Monofilament (SWM) testing, the threshold was Filament no. 4.08/1 g. Panoramic image, Water’s view and periapical radiograph, revealed an X-ray opacity with distinct borders in the cranial direction from the upper left first premolar root apex (Figs. 7–9). Computed tomography revealed displacement of a radio-opaque foreign body into the soft tissues in the ventral maxillary sinus (Fig. 10).

The situation and treatment for foreign body removal were explained to the patient and consent obtained. A mucoperiosteal flap was elevated and reflected and the root apex of first premolar exposed with a Neumann incision under intravenous sedation (Fig. 11A). Using a sharp curette and surgical gauze ball, the foreign body was removed from infraorbital space, and the area thoroughly irrigated with sterile saline. The for-
eign body was a solid and brittle composite (Fig. 11B). During surgery, a skull radiograph was obtained to confirm absence of the foreign body, and then the wound was closed. The affected tooth was preserved without extraction at the patient’s request. Postoperatively, radiography confirmed the absence of the foreign body (Fig. 12).

Two months after surgery, pain developed in the affected tooth, the upper left first premolar. The tooth could not be preserved, so extraction was performed. Postoperatively, the wound healing process was good. Hypesthesia on SWM testing improved to Filament no. 3.61/0.4 g in the infraorbital nerve area.

**Discussion**

The soft tissue near the canine root apex is fatty tissue covered by the levator labii superioris, levator anguli oris, orbicularis oris, and levator labii superioris alaeque nasi muscles. This fatty tissue is called the infraorbital[10] or canine space[16]. Regarding the upper canines and first premolars, Al-Belasy and Hairam[2] reported that infection can easily spread to the infraorbital space. Meanwhile, regarding the frequency of perforation of the labial wall of the maxillary alveolar process, Evangelista *et al.*[6] reported rates of dehiscence and fenestration of 18.73 and 17.87%, respectively, for canines and 18.45 and 18.06%, respectively, for first premolars. In other words, with the syringe method for calcium hydroxide paste, if root canal configuration is inappropriate, then, anatomically, leakage from the root apex and displacement into the infraorbital space can easily occur.

In the present cases, calcium hydroxide paste had leaked out of the upper canine and upper first premolar root apex through the infraorbital space and come close to the infraorbital foramen. The infraorbital space
has a vertically narrow configuration, and the upper end connects with the infraorbital foramen. Sharma et al.\textsuperscript{(15)} noted that, with an injection-type syringe method, the pressure may be stronger than arterial pressure.

In this report, patient 2 developed infraorbital nerve hypesthesia. When calcium hydroxide paste is used as a root canal medication, the anticipated effects include long-acting antimicrobial activity, analgesia, hemostasis, exudate control, cleansing of the root canal wall, and the induction of hard tissue\textsuperscript{7,12}. However, the effects on soft tissue have not been clarified\textsuperscript{5}. Calcipex® is strongly alkaline, with a pH of 12.4, and chemical burns of the mucosa have been reported\textsuperscript{3,4,14,15}. Intentional

Fig. 11 Foreign body was removed
A: Foreign body identified in soft tissue beneath periosteum (arrow).
B: Specimen of removed foreign body.

Fig. 12 Postoperative radiographic examination confirmed favorable healing process (case 2)
extrusion from the root apex may be effective\textsuperscript{13}, but as pointed out in this case report, leakage into soft tissue can occur. Therefore, careful attention is needed when using a syringe-type calcium hydroxide paste.

References


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