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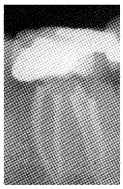

CASE REPORT

Foreign body in the apical portion of a root canal in a tooth with an immature apex: a case report

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Abstract

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Aim To describe the successful retrieval of a foreign object located in the apical portion of an immature root canal by simple orthograde techniques, avoiding the need for surgery or intentional reimplantation.

Summary A radio-opaque foreign object lodged in the apical portion of an immature root canal was discovered on radiographic examination of a patient with a complicated crown fracture. Attempts to retrieve it resulted in displacement into the periapical area. Eventually, the object was retrieved by a simple technique, followed by successful apexification, root canal filling and jacket crown placement.

Key learning points

- Foreign bodies in root canals should be carefully evaluated to determine their nature, position, size and the degree of difficulty that may be encountered during retrieval.
- Patience, care and appropriate techniques may be helpful in retrieving foreign bodies and avoiding periapical surgery.
- Complicated crown fractures should be managed promptly, and prolonged open drainage avoided in children if the risks of foreign body impaction are to be minimized.

Keywords: apical portion, foreign body, immature apex, non surgical technique.

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Introduction

Root canal treatment can be challenging in children and occasionally clinicians may encounter bizarre situations that require both skill as well as perseverance. Children have the habit of placing foreign objects in the oral cavity which can cause both hard and soft

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tissue injuries. At times, these objects can get lodged inside the pulp chamber or root canal of a tooth. This is more likely to occur in a tooth with an open pulp chamber caused by trauma, during root canal procedures in which canals are left open for drainage, and in the case of open carious lesions. Such foreign objects may become a potent source of pain and focus of infection for the patient. These objects can be retrieved with some ease if they are located within the pulp chamber, but once the object has been pushed apically, their retrieval may be complicated. Surgery or intentional reimplantation may sometimes be unavoidable.

The report describes the case of a foreign object impacted into the apical third of an immature maxillary central incisor which was finally retrieved by simple, intracanal means.

Case report

A 12-year-old male reported to the Department of Pedodontics and Preventive Dentistry, Bapuji Dental College and Hospital, India with a 1-month history of pain in an upper front tooth. He had suffered dental trauma 2½ years previously.

Intra-oral examination revealed a complicated enamel–dentine fracture with a slit-like opening into the pulp chamber of tooth 11 (Federation Dentaire Internationale). The tooth exhibited the following clinical features:

- grade I mobility;
- tenderness in the buccal sulcus;
- pain on percussion and
- a draining sinus on the attached gingiva.

An intra-oral periapical radiograph revealed the presence of a linear radio-opaque object in the root canal, extending from the middle third to the immature apex of the root (Fig. 1). After taking the clinical and radiographic findings into consideration, it was decided that root canal treatment should be initiated, with an attempt to retrieve the foreign object and thereafter complete the root canal treatment.

A conventional access cavity was prepared and the pulp chamber was cleared of debris by copious irrigation with saline solution. Attempts were made to retrieve the object using 40 size K-files (Mani, Inc., Nakaakutso, Japan) using a simple filing action; this was unsuccessful. A second intra-oral periapical radiograph was then obtained with a slightly different horizontal angulation. The object took on a different shape and was partly extruded into the periapical region (Fig. 2). Moreover, the second radiograph confirmed the presence of the object within the root canal rather than periodontal ligament space. As the root canal was large, a decision was made to retrieve the foreign object using a size 120 K-file by attempting to engage the object between the file and canal walls and then by pulling it out coronally. Exploration along the palatal portion of the canal was successful in retrieving the object towards the pulp chamber, which was then grasped with tweezers and removed.

The retrieved foreign object appeared golden in colour and measured approximately 4 mm in length (Fig. 3). The patient did not know what it was, and denied having inserted the object within the tooth. The patient's mother felt it could be a fractured piece of an ornament.

Following retrieval of the foreign object, an intracanal calcium hydroxide medicament was placed and apical closure was achieved in five and a half months (Fig. 4). The root canal was filled using the rolled cone technique (Gutmann & Heaton 1981) (Fig. 5), followed by core build up and a jacket crown.

Discussion

A number of cases have been cited in the literature describing various foreign objects being lodged in the pulp chamber or root canal. Most of the cases arose when the pulp

Figure 1 Radio-opaque object extending from the middle third of the root canal to the immature apex of tooth 11 with a complicated crown fracture.

chamber was wide open. These objects have ranged from pencil leads (Hall 1969), darning needles (Nernst 1972), metal screws (Prabhakar *et al.* 1998), to beads (Reddy & Mehtha 1990), paper clips (Cataldo 1976) and stapler pins (Macauliffe *et al.* 2005). Grossman (1974) reported retrieval of indelible ink pencil tips, brads, a tooth pick, adsorbent points and even a tomato seed from the root canals of anterior teeth left open for drainage. Toida *et al.* (1992) have reported a plastic chopstick embedded in an unerupted supernumerary tooth in the pre-maxillary region of a 12-year-old Japanese boy.

A common procedure employed during emergency root canal treatment involves leaving the pulp chamber open where pus continues to discharge through the canal and cannot be dried within a reasonable period of time (Cohen & Brown 2002). Such a procedure may place the patient at risk of foreign body lodgement in the canal. Numerous reports on foreign bodies being detected within the open pulp chamber and canal may question the safety of such procedures. Alternatively, Weine (2004) recommends that the patient remains in the office with a draining tooth for an hour or even more and finally ending the appointment by sealing the access cavity. With the access cavity closed, no new strains of microorganism systems are introduced and food debris and foreign body lodgement within the tooth can be avoided (Nair 2006).

If a clinician decides to leave the pulp chamber open following access cavity preparation, the patient and parents should be warned about the risks of any foreign object being lodged in the open canal. However, the clinician should always consider the benefits and risks associated with leaving the pulp chamber open for prolonged periods of time.

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Figure 2 Periapical film at a different angulation: the object had extruded into the periapical region.

Foreign bodies in root canals may act as obstructions for the smooth passage of endodontic instruments. A radiograph can be of diagnostic significance especially if the foreign body is radio-opaque. Specialized radiographic techniques such as radiovisiography, 3D CAT (computerized axial tomography) scans can play a pivotal role in the localization of the exact position of these foreign objects inside the root canal.

Foreign bodies in root canals can act as focus of infection. Actinomycosis following placement of piece of jewellery chain into a maxillary central incisor has been reported (Goldstein *et al.* 1972). Foreign bodies pushed through root canal into the sinus are one of the causes of chronic maxillary sinusitis of dental origin (Costa 2006). Hence, prompt attempts at their retrieval should be initiated.

Retrieval of foreign objects lying in the pulp chamber or canal using ultrasonic instruments (Meidinger & Kabes 1985), the Masserann kit (Williams & Bjorndal 1983), modified Castroviejo needle holders (Fros & Berg 1983) have been described in the literature. There is also a description of an assembly of a disposable injection needle and thin steel wire loop formed by passing the wire through the needle being used. This assembly was used along with a mosquito haemostat to tighten the loop around the object (Roig-Greene 1983).

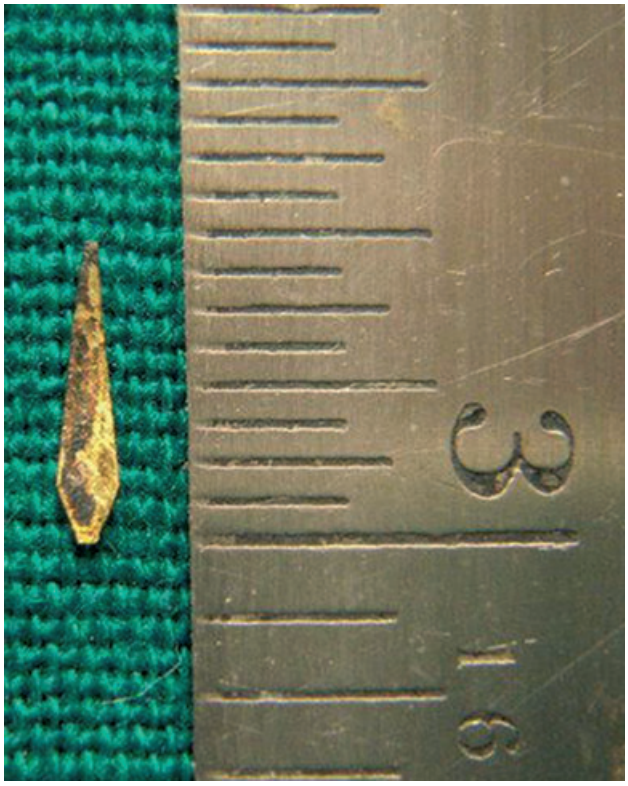

Figure 3 Retrieved foreign object.

The use of an operating microscope is also beneficial. The microscope gives light and illumination inside the canal and provides the clinician with the ability to visualize any intraradicular obstruction and locate its position in relation to surrounding root canal walls. Nehme (2001) has recommended the use of operating microscope along with ultrasonic filing to eliminate intracanal metallic obstructions.

Nonetheless, retrieval of the object may become difficult when it is lodged in the periapical region. Srivastava & Vineeta (2001) have suggested periapical surgery or intentional reimplantation to remove such objects. They reported retrieval of a straight pin lodged in the periapical area of maxillary central incisor by periapical surgery. Zillich & Pickens (1982) also resorted to the surgical approach for removing the apical portion of a hat pin lodged in a maxillary lateral incisor.

In the present case, the foreign object was located within the root canal and retrieved successfully by a simple nonsurgical technique. It is essential that the dentist, when faced with retrieval of a foreign body, obtains a thorough history, carries out a detailed examination and necessary investigation to determine the position, size, likely composition, and degree of difficulty that will be encountered during its retrieval.

As a foreign object can act as a source of pain and cause difficulty in the elimination of infection from the root canal, prompt but cautious attempts should be made to retrieve it first by simple nonsurgical means. Finally, when the foreign object resists all efforts for removal and when a strong possibility of failure exists, a surgical procedure may be the only viable alternative. This technique however eliminates the possibility of apex closure in the case of an immature apex. Numerous reports on foreign bodies detected within the open pulp chamber and canal question the safety of open drainage during endodontic treatment.

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Figure 4 Intracanal calcium hydroxide dressing following retrieval of the foreign object.

Conclusions

A radio-opaque foreign object lodged in the apical portion of an immature root canal was discovered on radiographic examination of a patient with a complicated crown fracture. Attempts to retrieve it resulted in displacement into the periapical area. Eventually, the object was retrieved by a simple technique, followed by successful apexification, root canal filling and jacket crown placement.

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Figure 5 Root canal filled with gutta-percha cones following successful apexification 80 × 104 mm (600 × 600 DPI).

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