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Case Report

Gripping the Gripped: Removal of Foreign Bodies from Root Canal System

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Abstract

Introduction: Presence of foreign body in the root canal system is a troublesome situation as they prevent the access to thorough root canal cleaning and shaping procedure apical to their level. They might also irritate the periapex when they protrude out of the root apex. This affects final outcome of endodontic therapy. Hence an attempt to bypass or retrieval of the foreign body should be made before leaving and obturating till the level of their presence or proceeding to surgery. The procedure for removal will vary depending on the nature of the foreign body and its position within the canal. Many different devices and techniques have been developed to retrieve foreign bodies from the root canal system, but none of them can consistently remove them from the canals.

Case Presentation: Three cases requiring removal of foreign bodies from the different positions in the canals are presented. These cases present the conservative management of an inadvertently lodged foreign body in the root canal system during a routine dental procedure and describe the management strategies for their retrieval.

Conclusion: Provided one has good patient cooperation, management of the situation can be quite straight forward if the appropriate diagnostic and treatment tools are utilized.

Keywords: Foreign bodies, Retrieval, Instrument fracture, Canal obstruction.

Introduction

One of the complications of endodontic therapy is having an instrument fracture or presence of foreign body in the root canal space. Over the years, as techniques and instrumentation have developed, there have been various types of endodontic instruments that have broken off in the canal. These fractured instruments or foreign bodies hinders the clinician from thoroughly cleaning and shaping the canal system and thus compromises the outcome of the treatment. The prognosis of case is dependent on the stage of canal instrumentation at the time when the foreign body separates. It has been suggested that separation of foreign body occurring in later stages of canal instrumentation, especially if it is at the apex, has the best prognosis, because the canal is probably well debrided and free from infection [1].

In most cases it is difficult to determine the true extent of how well the canal is disinfected, when the foreign body separates, especially if it is short of working length and therefore it is important to be able to bypass or retrieve the separated foreign body without further damage to the tooth.

The removal of foreign body from the root canal system in most cases is difficult and at times impossible. There are various methods and devices developed to retrieve them.

It is the clinicians who have to evaluate the options of attempting to remove the foreign body, bypassing it or leaving the fracture portion in the root canal itself. This decision should be made with consideration for the pulp status, canal infection, canal anatomy, the position of the fractured foreign body and its type [2].

The main determinant for removal of the foreign body is its location in relation to the curvature of the root canal. The foreign body removal is possible if it is located coronal to the curve, and becomes impossible if the separation is beyond the curvature [3,4].

The clinicians need to weigh out the advantages and disadvantages of retrieval of foreign body fragments. It has been shown that attempts at removal of these fragments usually result in the removal of a large amount of root dentin which ends up reducing the root strength by 30-40% [1]. Hence the decision to retrieve the fragments lies in the judgment of the clinician.

Case Reports

Case 1

An 18-year-old male patient reported to the private clinic with discolored upper left central incisor. The case history revealed that the tooth had been treated up till biomechanical preparation a year back.

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Patient did not report for obturation to the clinician and later a gingival abscess developed with the same tooth along with pain. The patient removed the temporary and used a bobby pin to remove food lodged in the pulp chamber. The intraoral periapical radiograph revealed a radio-opaque object in the canal identified as a bobby pin. Access cavity was modified to achieve straight line access and with the help of small size K-file and EDTA the pin was bypassed. H file was used on with circumferential filing and pin was removed from root canal walls. Biomechanical preparation was completed, and canal was disinfected by placing Ca(OH)_2 intracanal medicament for one week. Finally, the tooth was obturated with MTA followed by post endodontic restoration.



Figure 1: An intraoral periapical radiograph revealed a radio-opaque object in the canal identified as a bobby pin.

Case 2

A 16-year-old male patient reported to the private clinic with discolored lower anterior tooth. The intraoral periapical radiograph revealed a radio-opaque object in the cervical third of the canal. On careful history from the patient, it was revealed that the patient had inserted a piece of metallic pin in the open pulp chamber of the lower central incisor. After a conventional access cavity the pin was bypassed using No. 8, 10 and 15 K files with Ethylene Diamine Tetra Acetic acid (EDTA). Once bypassed the pin was successfully removed using 15# H file by engaging the pin. Biomechanical preparation of the canal was then done followed by obturation and post endodontic restoration.

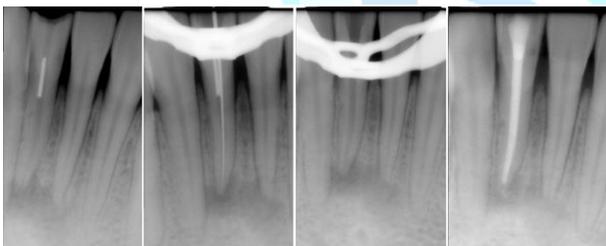


Figure 2: An intraoral periapical radiograph revealed a radio-opaque object in the cervical third of the canal.

Case 3

A 25-year-old male patient reported to the private clinic with pain in lower left posterior region. The case history revealed history of endodontic treatment 3-4 years back in 46. Intraoral periapical radiograph was taken which indicated silver point obturation in 46. The canal orifice was enlarged with the help of gate glidden drill No. 1,2,3. The ultra-sonic (piezoelectric) (SybronEndo) tip was used for the retrieval of the silver points. It was introduced into the canal in contact with the canal wall, activated for one or two minutes with a light touch. The objective was only to transmit vibration to the silver points so that it may be dislodged from the canal. This maneuver was repeated several times, until the canal space was cleared of the silver points. After that canals were enlarged with protaper system and obturation was done.

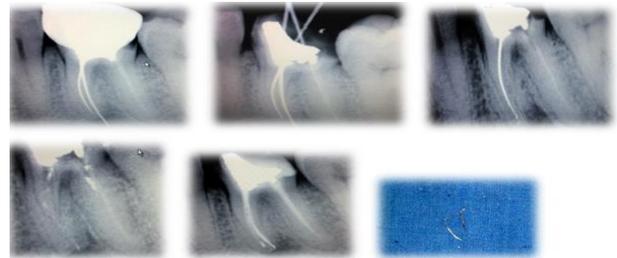


Figure 3: An intraoral periapical radiograph indicates silver point obturation in 46.

Discussion

One of the most troublesome incidents is the fracture of endodontic instruments within root canal. Separation incidences according to the number of teeth or canals were significantly higher ($P < .05$) in molars than those in premolars or anterior teeth [5]. Many foreign objects have also been reported to break and subsequently become lodged in root canals. Presence of these foreign bodies might affect the prognosis of endodontic treatment. Though not all the problems lead to a reduced prognosis, but any error that compromises microbial control is likely to increase the risk of a poor outcome.

Technical equipment should not be considered the only factor influencing success or failure of removal procedures. The experience and skill of the operator as well as the anatomical factors are also important, although the removal of foreign objects sometimes is difficult, and the success rate has been reported as 55% to 79% [6].

Many methods are described to remove broken instruments or objects within root canals, such as hand instrumentation, ultrasonic devices, Masserann Kit, canal finder system or, sometimes surgical methods also are employed [7,2].

In all cases, a careful examination with fine endodontic instrument should be the first step. In order to observe in a high magnification, the microscope should be used as an auxiliary tool.

Gencoglu and Helvacioğlu [8] concluded that visualization of an operative microscope influences the success of the fractured instrument management. Operating under high power magnification enables precise use of ultrasonic, avoiding unnecessary dentin removal thereby increasing the success rate by 67%-95% [9,10].

The removal of foreign bodies from a root canal must be performed with minimum damage to the tooth and the surrounding tissues [1]. Ideally, the original canal shape should be preserved as much as possible, just like during the cleaning and shaping of a canal. Wilcox et al showed that canal enlargement of 40 to 50% of the root width increased susceptibility to vertical fracture [11].

Several studies showed that ledges were inevitably created in the process of file removal attempts because of the staging platform. Ward et al. reported the use of an ultrasonic technique in simulated canals and on extracted teeth can cause a portion of the separated instruments to occasionally break off from the original fragment, leaving a shorter fragment behind. This is frequently observed during the ultrasonic removal of NiTi fragment [12,13].

Therefore, these results suggest that it is necessary to avoid the direct contact of the ultrasonic tip with the foreign objects. A shorter fragment is more difficult to retrieve than a longer fragment, definitely complicating the job at hand [1].



Suter [2] recommended that removal attempts of fractured instruments from root canals should not exceed 45 to 60 minutes because the success rates may drop with increased treatment time.

He suggested that the lowered success rate could be because of operator fatigue or from over enlargement of the canal, which compromises the integrity of the tooth and increase the risk of perforation. It is recommended that after this period of time serious consideration should be given to other treatment options.

Since the success of an endodontic treatment is dependent on degree of infection of the canal system at the time of foreign bodies separation, if the signs of failure or symptoms are present in these cases, surgery or extraction will be required to solve the problem.

Conclusion

A foreign body can be removed through K-files interlaced and it is able to preserve the dental structure, however this kind of procedure depends on the operator experience and also of what and where metallic objects are found. Microscopy and ultrasonic tips are used as auxiliary tools, increasing the chance of removal and ensuring the integrity of the tooth structure.

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