

Broken Instrument Retrieval : A Case Report

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Abstract

In endodontic treatments a clinician may face endodontic procedural mishaps which can affect the prognosis of endodontic treatment. Fracture of endodontic instruments during endodontic therapy in root canal is a common incident. The prognosis of such teeth depends upon preoperative condition of periradicular tissues and instrument retrieval. An attempt to remove broken instruments should be undertaken in every case. There have been many different devices and techniques developed to retrieve instruments fractured during endodontic procedures. This report describes a case of broken instrument and its retrieval. Broken instrument was found in a case which was retrieved by using two Hedstrom-files with 5% NaOCl irrigation and the instrument was retrieved under higher magnification by canal troughing & creating space, instrument was pulled out, a successful attempt of instrument followed by conventional obturation using gutta percha points with lateral compaction method.

Key Words: Separated instrument, Endodontic mishap, Procedural accident.

Introduction

Every clinician who has performed endodontics has experienced a variety of emotions ranging from the thrill-of-the fill to an upset like the procedural accident of breaking an instrument. During root canal preparation procedures, the potential for instrument breakage is always present. When instrument breakage occurs, it immediately provokes despair, anxiety, and then the hope that nonsurgical retreatment techniques exist to liberate the instrument from the canal. Evaluation of endodontic recall radiographs have indicated that the frequency of remaining fragments ranges between 2% and 6% of the cases investigated¹. However, it has been shown that less than 1% of endodontic failures are due to instrument fractures².

With the advent of rotary NiTi files, there has been an unfortunate increase in the occurrence of broken instruments and the factors contributing to breakage have been identified.³ The consequences of leaving, versus removing broken instruments from the canal have been discussed in the literature and a variety of approaches for managing these obstructions have been presented.^{3,5} Broken instruments usually prevent access to the apex, and the prognosis of teeth with broken instruments in the curved canals may be lower than for the normal ones. The removal of fractured instruments from root canals can be difficult and time-consuming, with a reported success rate ranging from 55% to 79%.⁶ There have been many methods

proposed for the removal of broken instruments in root canals. Methods using chemical agents such as iodine trichloride, mechanical methods such as hand instrumentation, ultrasonic devices, canal finder system, Masseran Kit, Endo Extractor System, and several kinds of pliers⁷. Specifically, the dental operating microscope allows clinicians to visualize most broken instruments and fulfills the age old adage, "If you can see it, you can probably do it".

The most common causes for file separation are improper use, limitations in physical properties, inadequate access, root canal anatomy, and possibly manufacturing defects.⁸ The separated fragment blocks the access to thorough root canal cleaning and shaping procedure apical to the level of separation or irritates the periapex when it juts out of the root apex. This is significant in a tooth, as it affects the final outcome of the endodontic therapy.⁹ Hence an attempt to bypass or retrieve the instrument should be made before leaving it and obturating to the level of separation or embarking upon surgery. This paper describes a case of broken instrument and its removal followed by completion of root canal treatment.

Case Report

A 55-year-old female patient reported in the department of endodontics of our college with the complaint of pain in maxillary right first molar. On clinical examination it was found that tooth had pain on percussion & previously root canal treatment has been attempted. Radiographic examination revealed the presence of radiopaque separated instrument in the mesiobuccal root extending from the cervical 1/3 to the 2/3 length of MB root canal. (Fig. 1) After removal of the coronal temporary filling, the pulp chamber was rinsed with a 2.5% sodium hypochlorite solution. The pulp chamber floor was explored & all the canal orifices were relocated & explored & initial cleaning & shaping in other canals was done with hand instruments up to no. 20 done under copious irrigation with sodium hypochlorite, and 15% EDTA (RCPrep) was used for chelation, Under Operating Microscope MB canal troughing was done by using long thin tapered diamond bur up to 3mm inside MB canal around the fractured instrument, care must be taken not to touch the fractured instrument. This exposed the coronal part of fractured instrument & sufficient space was then available around it, initially one H-file was used to bypass the broken instrument to middle third of the canal, followed by another H-file which was inserted gradually. Then under copious irrigation these files were rotated in order to grasp and pull out the

fragment. Repeating this procedure engaged the fragment which pulled it out about 2mm in length from canal & then a long beak thin needle holder was then introduced in the canal & the exposed part of the instrument was grasped by it. Slowly & carefully fractured instrument was pulled out from the MB canal. After the instrument removal, MB, DB & P canals were preflared up to middle third by using GG drills (Mani, INC, Japan) sizes 1 to 3 have maximum diameters of 0.5, 0.7, 0.9 & 1.1 mm respectively, canals were cleaned & shaped by the rotary protaper system up to F1 (Dentply Mallifer, Switzerland) & master cone was selected for all three canals (Fig. 2) & obturation was done by lateral condensation method. (Fig. 3).



Fig. 1 : Separated instrument in MB root of 16



Fig. 2 : Instrument removal & master cone selection



Fig. 3 : Obturation with 16

Discussion

Although various techniques and devices for retrieving the fragment have been

described, no standardized procedure for the successful removal of broken instrument in the root canal exists.^{6,7} Each individual case may require a different approach depending on various factors like tooth anatomy, size of fragment, location of fragment etc. Instrument fragment retrieval can be tried starting with the simplest and least invasive method like troughing & creating space around fractured fragment was used in this case.

Intracanal separation of instruments usually prevents access to the apex, impedes thorough cleaning and shaping of the root canal, and thus may compromise the outcome of endodontic treatment and reduce the chances of successful retreatment.^{7,10} In such cases, prognosis following an endodontic therapy depends on the condition of the root canal (vital or nonvital), tooth (symptomatic or asymptomatic, with or without periapical pathology), level of cleaning and shaping at the time of separation, the level of separation in the canal; and is generally lower than that with normal endodontic treatment.¹¹

There are various factors that may contribute to the successful management of fractured instruments within root canals. The success rate in maxillary teeth is found to be higher than that in mandibular teeth.¹² Degree of curvature is another factor that influences the successful management of broken instruments. Studies have shown that NiTi instruments fractured mostly in canals with severe curvature. The success rate of removal was lower in severe curvatures.^{12,13} Location of the fragment in the canal is another factor. Fragments located before the root canal curvature were removed completely.¹⁴ The length of fragment also tends to affect the success rate. Fragments shorter than 5 mm present the lowest success rate.⁶

Among the various methods used for broken instrument retrieval, one is chemical method using chemical agents like iodine trichloride, nitric acid, hydrochloric acid and sulfuric acid etc. These methods may help in achieving intentional corrosion of the metal objects, but could be irritant to the periapical

tissues when extruded through the apical foramen.⁷ Although use of Masserann kit has shown successful results for fragment removal^{15,16} it requires a large loss of root canal dentin, thus could result in perforation or fracture of narrow roots. In addition, it has high risk of perforation in apical part of root canal.⁷

In our case, two hedstroem files under copious irrigation with 15% EDTA and sodium hypochlorite were used. The two files were braided and the instrument fragment was grasped and pulled out about 2mm which is similar to previously tried procedures^{11,18}.

EDTA a chelating agent, is helpful as a lubricant¹⁷. Then canal troughing was done around fractured instrument up to 3mm under operating microscope so as to expose & to create sufficient space around the instrument fragment which was then grasped by the beak of long thin needle holder & the instrument was slowly pulled out. Studies have shown that if it is possible to bypass the instrument then there are greater chances of removal¹⁷. In our case, the fragment could be bypassed for few mm but it was extending up to 2/3rd length of the canal it was decided that removal of the broken instrument from a root canal must be performed with a minimum damage to the tooth and supporting tissues¹⁸.

Thus, this method was employed which lead to successful removal of the fragment with least amount of damage to the tooth and surrounding tissues.

Conclusion

By being little meticulous with techniques and better application of our knowledge regarding various instruments, root canal anatomy and methods of performing root canal treatment, endodontic accidents can be reduced but still they are not inevitable. Despite these accidents, there are chances of treatment success with several approaches to the broken instrument removal being available. To begin with, the simplest and easily available technique must be the goal. However, on occasion, an instrument will break and in spite of the best existing technologies and techniques, the broken file

segment may not be able to be retrieved. In these instances, and in the presence of clinical symptoms and/or radiographic pathology, surgery or extraction may be the best treatment option.

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- Swelling or sores in or on your mouth, face or neck
- Red, White or dark patches in your mouth.
- Pain or numbness in your mouth, face or neck.
- Persistent bleeding in your mouth.
- Pain or difficulty when swallowing, talking or eating.
- On-going earache. • Unexplained loose teeth. • Altered sense of taste



IF YOU OR SOMEONE YOU KNOW, HAS ANY OF THESE SIGNS, CONTACT A DENTIST OR DOCTOR FOR A CHECK-UP.