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Retrieval of a Separated Long Length H-file in a Young Patient Using BTR Pen Device - A Case Report

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Abstract

Instrument fractures within the root canal and / or beyond that during root canal treatment are an unwanted and a frustrating complication. It prevents complete cleaning and filling of the entire root canal space. Fracture of endodontic instrument often results from incorrect use or overuse. Retrieval of the instrument should be tried for better outcome of the therapy. Different devices and techniques like ultrasonic tips, microtube devices and pliers/forceps have been proposed and used by clinicians. This article reports a case of retrieval of long length separated H-file instrument with the help of a newer BTR (Broken Tool Removal) Pen from mesiobuccal canal of Right side mandibular first molar tooth of a young patient. A proper evaluation of case along with good armamentarium, and experience help the clinician to retrieve separated instruments successfully.

Keywords: Fractured instrument, BTR Pen, H-file, beyond apex

Introduction

Most of the dental treatment protocols have its own inherent complications if not followed properly. Similarly the most common endodontic mishap that

occurs during any root canal therapy is the separation of instrument inside the canal and / or beyond the apex. The presence of separated instrument inhibits the chemomechanical preparation and obturation of root canal affecting the final outcome and prognosis of the root canal therapy.[1] The reported incidence of broken files is 0.25% for hand instruments and 1.68%-2.4% for rotary instruments [2]. A broken file often occurs in the molar teeth, especially at the lower jaw because of poor access, small diameter, and sharp curvature of the root canal. [3]

In most cases, removal of the fractured instrument segment is the best alternative. But, this treatment protocol often requires special assistance because of the risk of complications such as pushing the file more apically, extruding fragments outside the apex, risk of tooth fracture due to dentin uptake excess, root perforation, and the occurrence of a ledge [4].

Although there is no standardized procedure for the removal of intracanal separated instrument, variety of instrument retrieval techniques and devices have been described in the literature. This includes use of injection or hypodermic needles, the Canal Finder system, needle holders, stainless-steel tubes and Hedström files, modified spreaders or K-files under ultrasonic vibration, file-removal systems, chloroform-dipped gutta-percha cones, microtubes with internal screw Wedges, ultrasonic tips, and extractors like Masserann kit and Endo Rescue kit, along with dental operating microscopes, and electrochemical processes. [5] One such most recent device, proposed for broken file removal is BTR Pen (cerkamed). Following case report describes retrieval of long length separated H-file instrument with the help of a newer BTR (Broken Tool Removal) Pen from mesiobuccal canal of right side mandibular first molar tooth of a young patient.

Case Report

A 15-year-old female patient was reported to Faculty of Dental sciences, Dharmsinh Desai University- Nadiad, with complaint of occasional pain in a cavitated lower right back tooth. On intraoral clinical examination, grossly carious mandibular right first molar (tooth #46) was present. The tooth responded negative to percussion, while the pulp responded negatively to the thermal cold test (ethyl chloride). Surrounding soft tissues were normal and no sinus tract was present. The radiographic examination showed a profound caries extending to the pulp cavity with a periapical radiolucency in tooth #46 [Figure 1]. A diagnosis of chronic apical periodontitis was made and conventional endodontic treatment was advocated.

The case was allotted to an undergraduate Intern student for endodontic therapy with tooth #46. After excess opening and pulp tissue extirpation, during working length determination, a 15 # H-file was separated in mesio-buccal canal while reaching till apex. An IOPA was taken to conform level of separation of file inside the canal which shows a long length H-file was separated in mesio-buccal canal at the level of orifice which was extended till beyond apex. [Figure 2] After informing the patient and parents about the file separation and about consequences and treatment options for the management of the condition, process for retrieval of separated instrument was initiated.

Initially a gates glidden drill and ultrasonic Kerr K-file tips (#15-20) were used to create staging platform keeping the broken instrument in its center and cutting a circumferential trough around the fragment [Figure 3]. BTR Pen kit (Cerkamed Medical Company) was used to retrieve the instrument. After exposing approximately 2-3 mm of coronal end of the separated fragment in the MB canal, the highly elastic BTR tip with nitinol tip was

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inserted into canal an fitted over the 'freed' end of the fragment to engage it tightly and was then removed from the canal which was confirmed radiographically. [Figures 4, 5]

Root canal treatment was then performed on the teeth. Working length was then established using K file #15. Root canal irrigation was performed by using warm 3% Sodium hypochlorite (NaOCl) solution and 17% EDTA was used to fully negotiate the narrow root canal. Canals were prepared using hand K files (Mesiobuccal & Distal canal up to 45 No. and Mesiolingual up to 35 No.). Obturation was done using 2% gutta-percha cones with lateral condensation technique. Access cavity was then sealed using hybrid composite (3M ESPE) [Figure 6]. Early treatment goals were achieved without complication and patient was referred to prosthodontic department for prosthetic need.

Figure1: Pre-Op IOPA: Proximal Deep Carious Lesion present with periapical radiolucency in tooth # 46

Figure 2: Pre-Op IOPA: Separated H-file in MB Canal (Coronal to beyond apex) in Mandibular right first molar tooth.

Figure 3: Making a channel around the separated instrument to accommodate the loop of BTR Pen over separated instrument tip.

Figure 4: Seperated H-file(13mm) engaged with loop of BTR Pen from MB canal of mandibular right 1st molar tooth.

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Figure 5: After removal of Separated H-file from MB canal of Mandibular right first molar tooth.

Figure 6: A) Working Length determination B) Master cone and. C) Obturation in Mandibular right first molar tooth.

Discussion

Instruments separate or break only when they are used incorrectly or overused. Most common causes of instrument separation are inadequate access opening, absence of glide path, overuse of the instrument, excessive apical pressure during shaping, larger sized/larger taper instrument in extremely thin and curved canals, operator inexperience, using the instrument with improper torque/speed etc. [6] In our case the cause of instrument fracture could be inadvertent pushing of hand instrument beyond apex due to limited experience of operator.

Whenever there is an instrument fracture in the root canal system, a clinical judgement has to be made to leave, bypass or retrieve the fragment on an assessment of the potential benefit over the risk of complication. [7] Though higher chances of successful removal of a fractured instrument is reported (53 to 95%), attempts to remove fractured instruments may lead to secondary instrument breakage, ledge formation, over enlargement and transportation of prepared root canal or can lead to perforation [7,8,9,10] Variety of factors must be considered before attempting retrieval like the location, length and type of fractured instrument, the tooth/canal involved, and the clinician's skill, knowledge and available armamentarium. The main determinant for removal of the fractured fragment is the location of the fragment in relation to the curvature of the root canal. If the fragment is situated coronal to the curve, removal of the fragment is easier and possible compare to the separation beyond the curvature.[11] It is also suggested that longer, stainless steel hand instruments are easier to remove compared to shorter fragment, NiTi and rotary instruments, respectively.[8,10,12,13]

In the presented case considering patient's young age and separation of a long length headstrom file (H file) during the early phase of treatment above the canal curvature makes this case appropriate for instrument retrieval rather than bypassing or leaving it. A wide array of techniques and devices has been developed to facilitate the process of instrument retrieval e.g.ultrasonic tips, pliers/forceps(Steiglitz forceps), microtube devices like Endo Extractor (Brasseler), Masserann Kit (Medidenta International), Extractor system (Roydent), Instrument Removal System (Dentsply Sirona), Separated Instrument Retrieval (S.I.R.) System (Vista

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Dental Products),Mounce extractor (SybronEndo) etc. [6]

BTR Pen (cerkamed) is one such device which works on the wire loop and tube technique. . It is a single-tool system made up of high-quality surgical steel and can be used using one hand only. It uses an ultrathin and flexible working tip with a durable nitinol loop which allows easy access to fragments of separated instruments. Three working tips of different sizes are available allowing professional to easily select the tip size to fit a clinical case into narrow and curved canals. [14,15] In our case after creating a staging platform around coronal 2-3 mm of separated instrument using GG drills, proper grip of separated file is achieved by grabbing the file and squeezing the nitinol loop by moving the slider's cap up and removed easily with few side moves and upward strokes.

Conclusion

Use of BTR Pen after creating a staging platform is very effective for removing separated instruments from the root canal. Many times attempts to remove fractured instruments can lead to iatrogenic complications like ledge formation, over enlargement and transportation of prepared root canal or perforation. Therefore proper evaluation and planning of Individual case along with good armamentarium and experience of dentist are essential for a successful outcome without adversely affecting the prognosis of tooth.

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