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RETRIEVAL OF FRACTURED INSTRUMENT FROM ROOT CANAL: A CASE REPORT

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ABSTRACT

In a day to day practice dentists are facing many problems. One of the common problems is separation of an instrument. The purpose of this article is to create awareness among the practising dentists for the retrieval of the separated instrument that may occur as procedural error during performing endodontic treatment. Review and the case report described here shows successful retrieval of broken instrument that may be tightly wedged in dentine of the root canal. The separation of instrument during root canal procedure can cause troublesome event that may block access to the apical terminus. Dentist can retrieve the separated instruments with use of ultrasonic endodontic instrument. The emphasis of this procedure is that dentists do not need any specialized instrument or specialized skill. Using dental magnification like dental loupes or dental operating microscopes makes the procedure more successful. Chances of success are more with ultrasonic retrieval instrument when separated instruments are in coronal region. However, prevention of file separation is better than attempting removal.

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INTRODUCTION

Many times, dentists come across separated files in the previously treated patients with the root-canal treatment. The file may be left behind accidentally, knowingly or unknowingly. The separated endodontic instruments like files, reamers in the root canal are one of the most unwanted situations during the procedure. Removal of the endodontic instruments becomes time-consuming, risky and without surety of success (Terauchi et al., 2006). Many times dentists face problems of the separated instruments inside the canal which may obstruct the efficient cleaning and shaping procedure.

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The introduction of nickel titanium (Ni-Ti) rotary instruments and its abusive usage has increased the incidences of the fracture or separation of the instruments during the procedure which affects the efficient biomechanical preparation and the complete obturation of the root canals resulting in hopeless prognosis (Brito-Júnior, 2015). When dentin is removed for the file retrieval process, the Ni-Ti file straightens even further and binds again. Sometime flute by flute reduction of Ni-Ti fragment results in poor prognosis, that leads to a surgical treatment (Sokhi et al., 2014). To remove separated instrument from root canal, various method have been developed. One of the methods is to use an ultrasonic device for root canal treatment as ultrasonic tips or endosonic files can be used deep in the canal system (Separated File Removal, 2014). The main focus of this article is the simplicity of the procedure. Success rate of the fractured instrument management depends on location of the separated fragment and shape/ curvature of the root canal.

A - Pre-operative radiograph

B - Radiograph showing broken instrument in mesiobuccal canal

C - Retrieved broken instrument

D - Working length determination after broken instrument retrieval

E – mastercone radiograph

F – obturation radiograph

The use of dental magnification like loupes or dental operating microscope was found to be more effective.

CASE REPORT

A 65 years old male patient reported in the private clinic (Adarsh Dental care and Implant centre) in Surat, Gujarat. With a chief complain of pain in upper right back region. A clinical examination revealed the presence of deep carious lesion in upper right first molar. There was no associated swelling but tooth was tender on percussion. Intra-oral radiographs were taken, and it revealed caries approaching pulp. Root-canal treatment was planned. During the root canal procedure, due to the absence of the glide path bending fatigue might have generated which resulted in a separation of the file inside the mesiobuccal canal.

Non-surgical instrument retrieval was planned to perform using dental –loops as an adjunct. High speeds, friction grip burs, which are specifically designed to enlarge the canal opening, were used. This had enlarged the access opening and straightened the line access to all canal orifices. After that modified Gates- Glidden drills were used circumferentially to create telescopic preparation. Tapering preparation was done from canal orifice to the coronal end of broken file to "stage" or "platform" broken file , that allow thinner ultrasonic tips to go through around the file. As the root was thin and slightly curved, file adapter system was used. In that small number Stainless steel hand file (size of the hand file is less than the size of the separated file fragment) was pre curved and inserted inside the available canal space and adapted to it. Next the ultrasonic tip without water and air coolant was turned on at a low power and tip of the ultrasonic endo-tip instrument was placed in intimate contact against the smaller stainless steel file that was inserted inside the available canal space. Before starting this procedure, cotton pellets were placed over other exposed orifices, to prevent the possibility of re-entry of the fragment into another canals. Frequent irrigation and drying of the canal helps in retrieval procedure. The ultrasonic tip was gently wedged between the tapered stainless steel file and the canal wall, which had helped the broken instrument to loosen and 'jumped out' of the canal. The intra-oral radiograph was taken to confirm whether there was any fragment left of the file within the canal. Then cleaning and shaping was done using irrigation materials. Three dimensional obturation with gutta-percha was carried out. The technique was tedious and lengthy but showed successful results.

DISCUSSION

Following techniques and the armamentarium are used for the management of the separated file

- Masserann kit using dental operating microscope or dental loupes
- Ultrasonic removal with dental operating microscope/ dental loupes
- Gates-Glidden drills then K-files (conventional method)
- Brasseler Endo extractor kit
- Cancelliers: This includes an extractor tube of four different sizes used with a cyanoacrylate adhesive
- Wire loop technique: 0.14 mm wire loop with ligature Wire passed through a 25 gauge injection needle
- Mounce extractor: Similar to a ball burnisher with slots cut into the ball that slides onto the broken instrument. A cyanoacrylate adhesive is used.
- Tube and H-fi le: The apparatus consist of a stainless steel tube and a Hedstrom file
- Instrument removal system: This kit includes microtubes of different sizes with a side window and a 45 degree bevel and a side wedge with a taper towards distal end
- File removal device (head connected to distal tube with NiTi loops)
- Ultrasonic removal using dental operating microscope or dental loupes
- Roydent extractor kit

Before managing the file retrieval procedure, special attention is paid toward preoperative radiographs and radiographs taken during the procedure to better appreciate the thickness of the dentinal walls. One of the most important factors for the file retrieval is the straight line access to the coronal end of the separated instrument. Straight line access is done by modified Gates-Glidden drills,#1 and #2. That may lead to loss of considerable amount of radicular dentine. So, it is advisable to do under dental operating microscopes (Nagai et al., 1986). The loss of dentine may lead tooth to fracture. Excessive instrumentation and dehydration of dentine may lead to fracture of the tooth. Hence, when attempt is made to remove a separated instrument, the potential loss of dentine must be taken into consideration (Edake et al., 2014). Management of the separated file with use of ultrasonic devices has shown successful results. It is advantageous over conventional methods for retrieval of separated file, because it is able to set separated instruments free from the canals without sacrificing the radicular dentine. Traditional method for file retrieval is time-consuming, risky and has limited success. Even in Masserann method there may be excessive radicular structure loss to gain the access to the separated fragment ,some-times it may lead to risk of root weakening, risk of perforation and post-operative fracture, that may reducing the long-term prognostic value of the tooth (Separated File Removal, 2015).

First step: With Gates-Glidden drills straight line access is created with minimal removal of dentine to conserve the root structure (Gencoglu et al., 2009). Two types of low speed cutting burs are used. One, which has a pilot tip that goes into the path already created by separated file, is used to enlarge canal wall and contact the coronal part of the separated file. Second, bur act like a trephine bur, which has a cylinder shaped tip, that cuts at the periphery of separated fragment and give guidance space for the ultrasonic tip (Sokhi, 2014)
Second step: A specially designed ultrasonic instrument used around the periphery of the file. The ultrasonic tip size should be as small as possible to minimize the amount of the dentine removal. Ultrasonic tip should not touch the broken fragment directly, that may lead to a secondary fracture of the fragment (Terauchi, 2006). It is mandatory to focus the ultrasonic tip vibrations onto the dentine that surrounds the fragment or the floor of the cavity prepared by the second cutting bur, so it will expose the coronal segment of the separated file. Troughing means the process of uncovering the coronal segment of the separated file with the ultrasonic instrument along with dental magnification as an adjunct may result in its early removal.
A long ultrasonic tip is mounted on an ultrasonic hand piece used at the lowest power. It is used with the dental loupes or

under a dental operating microscope. The tip is used circumferentially to the separated file, to remove dentin around free end of the file. This procedure is carried out slowly with simultaneous use of water and air coolant. This process is carried out until the file stands free within the canal space and some movement of the fragment is noticed (Sokhi, 2014). The procedure is carried out until it become so loose that it comes out on its own or it become so loose that it can be plucked out. The separated file fragment inside the root canal system may block the accessibility to apical terminus that may interrupt cleaning and shaping procedure. So, it better to avoid such situations. It is always good to prevent the separation of file (Sokhi, 2014). The best way is prevention, So it is better to discard all over used instruments. That will reduce the breakage, lost clinical time and anxiety (Sokhi, 2014). The file should never use in dry canal, instead they should be used with lubricants like EDTA, while performing biomechanical preparation and shaping. It will help the file in a smooth manner and will emulsify the tissue in the canal. Forcing file to 'work' will result in fracture. So, one should be gentle and take adequate time to preparing root canal system. Incomplete access opening and glide path will increase the stress on the file and may cause the file breakage. So, straight-line access and glide path is equally important.

Conclusion

So, from all the various techniques for retrieval of file, use of ultrasonic is one of the most effective methods if it is used with dental magnification. The best way is prevention of separation by constant monitoring of the usage of file. Adhering to the basic concepts, integrating the best strategies and utilizing the safe techniques during root canal preparation procedure will eliminate the separated instrument procedural accident.

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