



RETRIEVAL OF SEPARATED ENDODONTIC INSTRUMENTS: A CASE REPORT

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ABSTRACT Instrument separation is one of the most upsetting endodontic errors, and it can occur at any time during root canal treatment. The separated instrument influences the final outcome and prognosis of the root canal therapy. It hinders the cleaning and shaping procedures as well as the irrigation of the canal portion apical to the level of obstruction. Hence, such a fragment should be properly retrieved when it becomes difficult to bypass it. A variety of techniques and tools are utilized for instrument retrieval; however, most of them are expensive, difficult to master, and technique sensitive.

KEYWORDS : Separated instruments, Instrument retrieval, Endodontic Micro Forceps, Maxillary molar

INTRODUCTION

During routine therapy, at any stage, an endodontic instrument can fracture due to flexural fatigue, torsion or manufacturing defects. For treating infected root canals, the removal of infected pulp tissue and debris is important for efficient disinfection and shaping of the canals.¹ All this in turn affects the final outcome of the treatment and prognosis of the tooth.²

The past decade has seen a significant rise in the incidence of separated instruments, mainly because of the increased use of nickel-titanium rotary instruments. Many factors can be attributed to the fracture of these instruments, which include operator experience, speed of rotation, degree of canal curvature, instrument design, torque, manufacturing process and most importantly absence of a well-established glide path.²

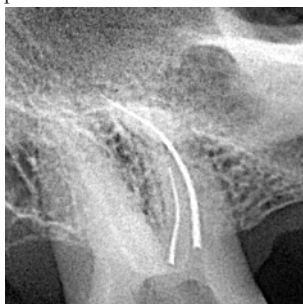


Figure 1: Separated Instruments seen in MB1 and MB2 in maxillary second molar (17)

A separated instrument poses major challenges such as limited or no accessibility for chemo-mechanical preparation of the canal apical to the separated instrument. Hence, removal of separated instrument or bypassing is necessary to gain access to the entire length of the canal.¹ According to clinical data, there is a 2%–6% chance that an instrument will separate from a root canal during chemo-mechanical preparation.³ The retrieval of instruments has no sure short formula, in fact it is a hit and trial method. The choice of any particular technique is made after critically evaluating the pros and cons of each technique. Different techniques have been described to retrieve the obstruction from canal including the Masseran kit, IRS kit, the braiding technique,

ulasonics, sonics, the combined technique, the wire loop technique and the endo-extractor technique, yet none of them is completely effective. This case report discusses the retrieval of two different separate instruments from different canals in maxillary molar, fractured in the tooth 17 extending 2 mm just before the apex.³

CASE STUDY

A 54-year-old man reported to the Department of Conservative Dentistry and Endodontics, with a chief complaint of pain in the upper right back tooth for which the patient had undergone previous dental treatment, but with no relief in pain. The tooth was sensitive to percussion but showed no mobility and probing depth with no signs of soft tissue injury or swelling in the affected area. Thermal tests were not performed because access had already been done. An intra-oral periapical radiograph showed a peri-apical radiolucency in relation to tooth 17. Cleaning & Shaping was initiated. During biomechanical preparation there was an accidental separation of Heroshaper 20.04 in Mb1 extending from coronal third up to 2mm beyond the apex and Protaper Gold (Shaper) Sx in Mb2 instrument extending from coronal third to middle third. (figure 1). The treatment plan aimed at retrieval of separated instruments followed by completion of the root canal treatment.

An ultrasonic tip (ProUltra ultrasonic tip No. 2) was used to achieve straight-line access to the Separated instrument so that the coronal portion of the separated instrument could be visualized through a dental operating microscope (ProErgo, Carl Zeiss Meditec). Because bypassing the fragment was unsuccessful due to the separated file's length of more than 5 mm approximately, the Super Endo Safe Root Endofile Retrieval system was employed for instrument retrieval.

The consecutive application of the horizontal grounding of gate gliddens drills to remove the radicular dentin surrounding the broken instrument, the trepan was slowly spun in an anticlockwise direction and made a platform around the separated instrument so that instrument tip gets caught in and pull outside the canal. Radiographical monitoring was done to see how far the trepan had advanced. File retrieval cannula of size 1.1 slid into the trough to sleeve the fragment and pushing the push cap forward so that the needle cannula clamps the broken file. When the tightest grip was felt by the tactile sense, the entire assembly was rotated in an anticlockwise direction to unscrew the fragment from the dentin and withdrawn to see the fragment retrieved. (Fig.2, Fig.3, Fig.4).



Figure 2: Both files retrieved from MB1 and MB2 in maxillary second molar (17)



Figure 3: BTR (Broken Tool Removal) Pen with separated instrument



Figure 4: Measurement of retrieved separated instrument (A) (B)

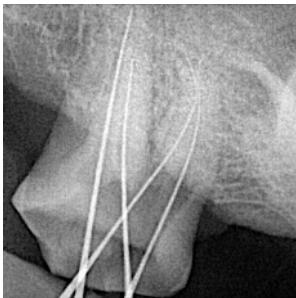


Fig 5: Working length determination

Working length determination was done with 10 k files. (figure 5) and rotary preparation was made. Master cone fit was made. (figure 6)

A calcium hydroxide dressing was packed in the canal and the patient was recalled after 1 week. After one week, the patient was asymptomatic, hence obturation was performed using Gutta-percha by single cone technique and AH plus sealer (Dentsply Ballaigues, Switzerland) and the access cavity was sealed by a composite restoration. (figure 7)



Fig 6: Master Cone fit



Fig 7: Obturation with post endodontic buildup

DISCUSSION

Machtou & Reit 2003 suggested that when an instrument fractures, the best approach is to retrieve it. However, according to the literature, there is no specific procedure that may be used to remove a broken instrument from the root canals. Although there are many specialized instrument-retrieval kits and systems available, they come with their own set of drawbacks, such as excessive dentin removal from the root canal, ledging, perforation, limited use in roots that are narrow and curved, and extrusion of the fractured portion through the apex. Hence, the clinician must evaluate the options of attempting to remove the instrument, bypassing it or leaving the fractured portion in the canal.^{3,4}

Fracture of an endodontic instrument is one of the most common procedural errors, which may occur during the course of an endodontic treatment and may hinder with a successful predictable approach. The main cause of failure in these cases is that the broken instrument impedes access to the root apex, which in turn acts as a hurdle in the cleaning and shaping of the root canal.^{2,5,6}

Prognosis in such cases depends on the condition of the root canal (vital or non-vital), 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.^{2,7,8,9,10}

The whole process is better guided by the use of a microscope or magnifying loupes, which minimizes injury to the canal dentine. The position of the instrument in relation to the canal curvature, the depth of the instrument within the canal, the type of separated instrument and the size of the fragment all plays a role in the successful removal of separated instruments. If an instrument is lying in the straightaway area of the of its whole length is exposed, it can be easily retrieved. According to Nevares et al., the success rate of retrieval was 85.5% when the separated fragment was visible using a dental microscope, compared to 47.7% when the fragment was not visible. It is frequently impossible to retrieve a broken instrument that is apical to canal curvature.¹

According to Ruddle, a staging platform can be created by choosing a Gates Glidden drill whose maximum cross-sectional diameter is marginally greater than the instrument being visualized.^{11,12,13} The Gates Glidden drill's is modified by cutting it perpendicular to its long axis at the diameter of its largest cross-section. This staging platform aided in the introduction of ultrasonic instruments for the safe removal of the peripheral dentin surrounding the exposed fragment, which improved the instrument's hold with the extractor and permitted the retrieval of the fragment.^{4,14,15}

In our case, the separated instrument was tightly lodged in the apical third of the maxillary second molar. Since attempts to get around it were unsuccessful, the superendo file retrieval kit was utilized. The trepan's centering over the piece was made easier by having direct access to it. By carefully cutting the peripheral dentin surrounding the fragment, this assured circumferential release of the coronal end of the fragment. This provided a firm grasp on the fragment and helped retrieve it along the long axis of the root, enabling routine retreatment.

CONCLUSIONS

Prevention is the best antidote for a separated file in the canal. Clinicians should be aware of techniques and various instruments. With proper knowledge about root canal anatomy, root canal

treatment, various accidents like instrument fracture can be reduced. However, on occasion, an instrument might break and despite the best existing technologies and techniques, the retrieval may not be successful. In these instances, and in the presence of clinical symptoms and/or radiographic pathology, surgery or extraction may be the best treatment option.

REFERENCES:

- 1) Hindlekar A, Kaur G, Kashikar R, Kotadia P. Retrieval of Separated Intracanal Endodontic Instruments: A Series of Four Case Reports. *Cureus*. 2023 Mar 2;15(3):e35694. doi: 10.7759/cureus.35694. PMID: 37012963; PMCID: PMC10066733.
- 2) Zende N, Sarnot M. Instrument retrieval from maxillary central incisor: A case report. *IP Indian J Conserv Endod* 2018;3(1):26-28
- 3) Mansi Vandekar, Gayatri Pendse, Shivangi Sharma, Roshan Vijay, Mandar Mahajan, Henna Gulani. Broken File Retrieval in the Maxillary Central Incisor Using an H-file and Endodontic Micro Forceps - A Case Report *International Journal of Current Research and Review*. Recent Advances in Dentistry for better Oral Health, March, 148-151
- 4) Umre U, Sedani S, Nikhade PP, Mishra A, Bansod A. The Good Old Masserann Technique for the Retrieval of a Separated Instrument: An Endodontic Challenge. *Cureus*. 2023 Sep 23;15(9):e45811.
- 5) Rath C, Chandak M, Modi R, Gogiya R, Relan K, Chandak M: Management of separated endodontic instrument: 2 case reports. *Med Sci*. 2020, 24:1663-8. 10.4103/jdmimsu.jdmimsu.192.22
- 6) Agarwal PK, Ahir B, Wani AB: Retrieval of a separated instrument extending periapically using ultrasonics: a case report. *IP Indian J Conserv Endod*. 2019, 4:105-7. 10.18231/j.ijce.2019.025
- 7) Rambabu T: Management of fractured endodontic instruments in root canal: a review . *J Sci Dent*. 2014, 4:40-8.
- 8) Arya A, Arora A, Thapak G: Retrieval of separated instrument from the root canal using ultrasonics: report of three cases. *Endodontology*. 2019, 31:121-4. 10.4103/endo.endo.25.18
- 9) Machtou P, Reit C: Non-surgical retreatment. *Textbook of Endodontology*. Bergenholtz G, Horsted-Bindslev P, Reit C (ed): Wiley-Blackwell, Hoboken, NJ; 2010. 2:335-46.
- 10) McGuigan MB, Louca C, Duncan HF: Clinical decision-making after endodontic instrument fracture. *Br Dent J*. 2013, 214:395-400. 10.1038/sj.bdj.2013.379
- 11) Kaur N, Nikhil V, Gupta S, Vats S: File retrieval with sonics: a retreatment case report . *IP Indian J Conserv*. 2022, 7:72-5. 10.18231/j.ijce.2022.015
- 12) Hülsmann M, Schinkel I: Influence of several factors on the success or failure of removal of fractured instruments from the root canal. *Endod Dent Traumatol*. 1999, 15:252-8. 10.1111/j.1600-9657.1999.tb00783.x
- 13) Terauchi Y, Ali WT, Abielhassan MM: Present status and future directions: removal of fractured instruments. *Int Endod J*. 2022, 55:685-709. 10.1111/iej.13743
- 14) Nevares G, Cunha RS, Zuolo ML, Bueno CE: Success rates for removing or bypassing fractured instruments: a prospective clinical study. *J Endod*. 2012, 38:442-4. 10.1016/j.joen.2011.12.009
- 15) Ruddle CJ: Nonsurgical endodontic retreatment. *J Calif Dent Assoc*. 1997, 25:769-75.