

Broken File Retrieval in the Maxillary Central Incisor Using an H-file and Endodontic Micro Forceps - A Case Report

**Mansi Vandekar¹, Gayatri Pendse², Shivangi Sharma³, Roshan Vijay⁴,
Mandar Mahajan⁴, Henna Gulani⁵**

¹Professor & HOD, Department of Conservative Dentistry and Endodontics, D Y Patil School of Dentistry, Navi Mumbai, India;

²Associate Professor, Department of Conservative Dentistry and Endodontics, D Y Patil School of Dentistry, Navi Mumbai, India;

³Lecturer, Department of Conservative Dentistry and Endodontics, D Y Patil School of Dentistry, Navi Mumbai, India; ⁴MDS 1st year, Department of Conservative Dentistry and Endodontics, D Y Patil School of Dentistry, Navi Mumbai, India; ⁵MDS IInd year, Department of Conservative Dentistry and Endodontics, D Y Patil School of Dentistry, Navi Mumbai, India.

ABSTRACT

Introduction: Instrument separation is one of the most stressful endodontic mishaps, that can occur any time during the root canal treatment. Several techniques have been employed to facilitate instrument retrieval, however, most of them are technique sensitive, expensive and require great expertise. It is possible to successfully remove broken file from the root canal using sonic agitation coupled with H-files with minimal damage to radicular dentin, if the file separation is in the straight and visible part of the canal.

Case Report: A 29-year-old man reported to the Department of Conservative Dentistry and Endodontics, with a chief complaint of pain in the upper front teeth for which the patient had undergone previous dental treatment, but with no relief in pain. The patient gave a history of treatment in the same tooth at a private clinic 3 months back.

Conclusion: The technique used in this case report might be considered a conservative, secure, simple and low-cost option that can be performed by any professional in the day-to-day of the endodontic clinic.

Key Words: Instrument Separation, Endodontic Mishaps, Broken File Retrieval, Maxillary Central Incisor, H-file, Endodontic Micro Forceps, Instrument Retrieval

INTRODUCTION

The remarkable anatomical variances of root canals not only make treatment more difficult, but they also put patients at risk for a variety of iatrogenic problems, including missed canals, instrument separation, gouging, perforation and overextension of the obturation materials.¹ One such unfavourable occurrence is an instrument breaking, which may obstruct the cleaning and shaping processes and cause ongoing pain or discomfort. The outcome of endodontic therapy consequently has a poor prognosis.¹

According to clinical data, there is a 2%–6% chance that an instrument will separate from a root canal during chemo-mechanical preparation.

Instrument separation can occur for a number of reasons, including excessive instrumentation, improper filing techniques,

insufficient access, ignorance of root canal anatomy and possibly manufacturing defects. The fracture of rotary files is usually caused by torsional stress and cyclic loading while stainless steel hand files fracture due to excessive torque application during instrument manipulation.¹

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.² Different techniques have been described to retrieve the obstruction from canal including the Masseran kit, IRS kit, the braiding technique, ultrasonics, sonics, the combined technique, the wire loop technique and the endo-extractor technique, yet none of them is completely effective.¹ This case report discusses the retrieval of an S1 instrument, fractured in the apical third of tooth 11 extending 2 mm just before the apex.

Corresponding Author:

Dr. Mansi Vandekar, Professor & HOD, Department of Conservative Dentistry and Endodontics, D Y Patil School of Dentistry, Navi Mumbai, India; Email: mansi.vandekar@dypatil.edu

ISSN: 2231-2196 (Print)

ISSN: 0975-5241 (Online)

Received: 10.12.2020

Revised: 12.01.2021

Accepted: 15.02.2021

Published: 10.03.2021

CASE REPORT:

A 29-year-old man reported to the Department of Conservative Dentistry and Endodontics, with a chief complaint of pain in the upper front teeth for which the patient had undergone previous dental treatment, but with no relief in pain. The patient gave a history of treatment in the same tooth at a private clinic 3 months back. 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 11. Cleaning & Shaping was initiated. During biomechanical preparation there was accidental separation of S1 instrument extending from coronal third up to 2mm short of the apex. The treatment plan aimed at retrieval of separated instrument followed by completion of the root canal treatment.²

A two-step process was used to establish an access cavity under rubber dam isolation. The access was modified for better visibility using ultrasonics.

A # 10 K-File (Dentsply/Maillefer, Ballaigues, Switzerland) was introduced passively into the canal till it reached the apex. Working length was determined radiographically. The cervical and middle thirds were prepared with SX, S1 (Dentsply/Maillefer, Ballaigues, Switzerland). During biomechanical preparation there was accidental separation of S1 instrument extending from coronal third upto 2mm short of the apex.

Once again the access opening was modified with ultrasonics for better visibility of the fractured instrument. A # 10 K-File was used to bypass the separated S1 file, up to the apex. Next using two new H-files of ISO size 15, the broken instrument was engaged as deeply as possible using the file braiding approach. The H-files were inserted, buccal and lingual to the separated fragment and then the files were braided in the clockwise direction, in order to engage the fractured file segment inside the canal. After giving a clockwise turn, they were pulled out of the canal. This technique was done for several times till the instrument got disengaged from the apical foramen and moved into the middle third of the canal.

The canal was then irrigated with saline in conjunction with sonic agitation using an endo-activator (Dentsply, Tulsa Dental Specialties, Tulsa, OK, USA) at a speed of 6,000 cycles per minute for 3 minutes. In this process, the separated instrument vibrated into the access cavity and was retrieved with a tweezer.⁴

Working length was reconfirmed radiographically with #15K-File. Cleaning & shaping was done using # 30 K-File & completed till F3 Pro-Taper along with 3% sodium hypochlorite irrigation. A calcium hydroxide dressing was packed in the canal, tooth was temporized with zinc oxide

eugenol cement and the patient was recalled after 1 week.

On recall after one week, patient was asymptomatic. Final Irrigation was done with sodium hypochlorite & liquid EDTA followed by saline. Canals were dried using paper points & obturation was performed by Cold Lateral Compaction technique using Gutta-percha # 30 6% and AH plus sealer (Dentsply Ballaigues, Switzerland). The access cavity was sealed by a composite restoration.

DISCUSSION

Machtou & Reit 2003 suggested that when an instrument fractures, the best approach is to retrieve it.¹ 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 specialised 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 has to evaluate the options of attempting to remove the instrument, bypassing it or leaving the fractured portion in the root canal.²

Rocke & Guldener suggested an array of factors to be considered before decision making such as the pulp status, presence of periapical infection, the canal anatomy, the position of the fractured instrument and the type of the fractured instrument. Literature proposes that it is difficult to bypass the fractured instrument, particularly in cases where the fragment is restricted in the apical one-third of canal or beyond the canal curvature as its removal may lead to unnecessary removal of dentine. In the present case, the separated file was not only lodged approximately 2mm before the radiographic apex, but also associated with a peri-apical pathology as well. There are several orthograde as well as surgical approaches for the management of separated endodontic instruments extending into the periapical area. Retrieval was essential in this case as the patient was symptomatic. It was decided to implement a non-surgical approach prior to an invasive therapy.³

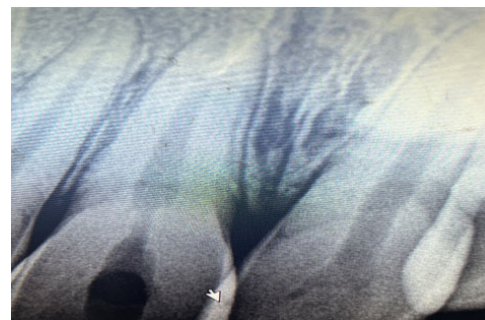


Figure 1: Preoperative Radiograph.



Figure 2: Rubber Dam Isolation.



Figure 3: Fractured Instrument Extending into Peri-Apical Space.

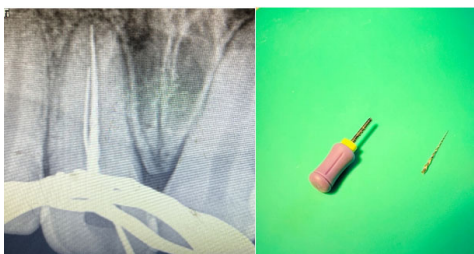


Figure 4: Fractured Pro-Taper S1- File Retrieved from the Canal; Separated File Tip Retrieved



Figure 5: Working Length Taken.



Figure 6: Master Cone Radiograph Obturation Radiograph.

Instruments separated in incisors, canines and the palatal roots of maxillary molars are easier to remove than posterior teeth canals, which are concave and narrow. Furthermore, Hülsmann and Schinkel suggested that longer fragments would be easier to remove than short fragments, whereas B. Suter and colleagues reported that stainless steel instruments were easier to remove in comparison to flexible NiTi instruments.^{1,4}

However, Suter et al. (2005) demonstrated a lower probability of retrieval for the cases when the fragment was to be removed from the apical third than from the medium or coronal third.

Hence, all these factors were contemplated and finally removal was attempted non surgically as it would improve working length control and facilitate effective obturation of the root canal system. A non-surgical removal was preferred over surgical removal as surgery is invasive, requires considerable skill and may reduce the crown-root ratio of the tooth.

According to a retrospective study by Wiegand & Kanzow, which examined the impact of repairing endodontic access canals with dental composites on the survival of single crowns, it was determined to seal the access cavity with nanohybrid composite. They came to the conclusion that filling in access cavities with composite lengthens the life of single crowns, which have a 10-year survival rate.¹

As the tooth in the present case report was a maxillary incisor, no staging platform needed to be built in order to get access in a straight line to the - separated instrument's coronal end. The separated fragment was bypassed and the conventional braiding technique was employed initially but the braiding technique in this case could only disengage the file. Hence, an additional step of Sonic agitation with an Endo-activator for approximately 3 minutes was employed in or-

der to retrieve the separated file. The use of ultrasonics was avoided as Sonic unit is more cost-effective, versatile and tips could be pre-bent more easily than ultrasonic tips.²

The broken section was successfully recovered with little dentin damage using a combined technique. Although the success rate varies and may vary from case to situation.

CONCLUSION

The technique used in this case report might be considered a conservative, secure, simple and low-cost option that can be performed by any professional in the day-to-day of the endodontic clinic.

ACKNOWLEDGMENT

Authors acknowledge the immense help received from the scholars whose articles are cited and included in references of this manuscript. The authors are also grateful to authors / editors / publishers of all those articles, journals, and books

from where the literature for this article has been reviewed and discussed.

Source of Funding: Self

Conflict of Interest: None

Authors' Contribution: All authors contributed equally towards the data collection, data analysis & compilation

REFERENCES

1. Kaur N, Nikhil V, Gupta S, Rai S, Vats S. File retrieval with sonics: A retreatment case report. *IP Indian J Conserv Endod.* 2022;7(2):72-75
2. Kerekes K, Tronstad L. Long-term results of endodontic treatment performed with a standardized technique. *J Endod.* 1979;5(3):83-90.
3. Grossman LI. Guidelines for the prevention of fracture of root canal instruments. *Oral Surg Oral Med Oral Path.* 1969;28(5):746-52.
4. Wiegand A, Kanzow P. Effect of Repairing Endodontic Access Cavities on Survival of Single Crowns and Retainer Restorations. *J Endod.* 2020;46(3):376-82.