



# Dealing with Endodontist Fear: Retrieval of Separated Instrument. A case report

Shreya Dharni, Dakshita Joy Sinha\*, Nidhi Sharma and Anjali Meena

Conservative Dentistry and Endodontics, Inderprastha Dental College and Hospital, India

\*Corresponding author: Dr. Dakshita Joy Sinha, Conservative Dentistry and Endodontics, Inderprastha Dental College and Hospital, 46/1 Site 4, Sahibabad, Ghaziabad, Uttar Pradesh, India, Tel: +91 9760340728; Email: dvaghela52@gmail.com

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## Abstract

When an endodontic instrument fractures during root canal treatment, this immediately hinders the clinician from thoroughly cleaning and shaping the canal system and thus compromises the outcome of the treatment. The prognosis of the case is dependent on the stage of canal instrumentation at the time the instrument separates. The present case report shows the case of the separated instrument at the coronal end. Since the coronal end is blocked and further debridement of the canal is not possible, it becomes necessary to remove the separated instrument so that the canal space is well-debrided and probably free from infection. This case report highlights the removal of a separated instrument from the canal using a technique known as the braiding technique.

**Keywords:** Braiding Technique; Instrument Separation; Removal of Separated Instrument

## Introduction

The introduction of NiTi alloy to the endodontic world by Walia in 1988 revolutionized the way we shape the canal system; however, the improper use of NiTi rotary instruments has resulted in procedural mishaps [1]. There are various factors associated with instrument separation, like operator experience, rotational speed, canal curvature, instrument design technique, torque, manufacturing process, and the absence of a glide path [2]. The separation rates of nickel-titanium rotary instruments were reported to range between 1.3% and 10%, whereas the separation rates of stainless-steel instruments were reported to range between 0.25% and 6% [3]. The major reason for the higher fracture rate of NiTi files, which has been stated to be superior to SS hand files due to their flexibility, torsional fracture, and corrosion resistance, is difficulty in recognizing the deformation of the

file [4].

The instruments are usually separated by two different mechanisms: torsional fatigue or bending fatigue.

- Torsional fatigue occurs when the instrument binds against the canal walls and is usually associated with excessive apical force applied during instrumentation.
- Bending fatigue is caused by continuous stress applied to an instrument that is already weakened by metal fatigue, and breakage occurs when it reaches its point of maximum flexure, where the stress is greatest, and this is often seen in curved canals [5].

The management of separated instruments involves the four treatment protocols that have been suggested by the literature for the management of fractured instruments in root canals:

1. Allowing the separated instrument to be retained in the canal and treating the remaining portion of the canal. segment binds snugly in the apical third only.
2. Bypassing the separated fragment and treating the canal., when the instrument is bound in the coronal and middle thirds of the canal
3. Retrieving the separated fragment and treating the canal. separates the coronal third of the root canal from the middle or apical third.
4. Surgical approach for retrieval of separated fragments, followed by treatment accordingly [6].

The separate instrument itself may not cause treatment failure. However, the remaining fragment in the root canal can hinder the proper preparation of root canal space. Various techniques have been proposed for the retrieval of files, which include the Masseran kit, the IRS kit, the Endosicherheits system, the braiding technique, ultrasonics, the combined technique, the wire loop technique, and the endo-extractor technique [7].

This case report describes the removal of the separated

instrument using the braiding technique.

### Case Report

A 33-year-old male patient came to the Department of Conservative Dentistry and Endodontics with a chief complaint of faulty restoration i.r.t to his upper front teeth. Past dental history showed faulty restoration i.r.t 21,22 after trauma 15 years ago. Past medical history was not significant. Clinical examination revealed faulty restoration with respect to 21,22 and was not tender on percussion.

#### Radiographic examination

A diagnostic intra-oral periapical radiograph was taken that revealed faulty restoration extending to pulp, and large periapical radiolucency i.r.t 21 22. Electrical pulp testing showed no response. Periodontal ligament widening was evident and a periapical lesion was present.



**Figure 1:** Pre-operative radiograph.

So, the diagnosis was asymptomatic apical periodontitis. And treatment plan of non-surgical root therapy was suggested.

### Procedure

5. The tooth was isolated using a rubber dam (Hygienic Coltene).

6. Access cavity was prepared using an endo access bur (Dentsply International, York PA).
7. With the help of small-sized instruments (6,8,10 (Dentsply Maillefer K files) the canal was negotiated and the working length was determined with the help of an apex locator (Woodpecker) and later confirmed using a radiograph.



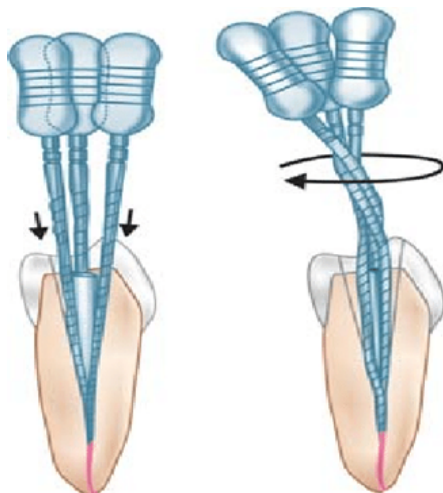
**Figure 2:** Working length radiograph.



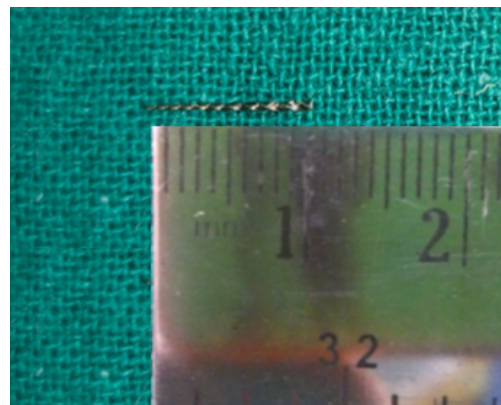
**Figure 3:** Separated Fragment at the coronal end.

8. Cleaning was done till 20K hand file (Mani K files).
9. Then, Cleaning and shaping was done using Neoendo flex rotary instruments (Orikam)
10. Irrigation was performed using 2.5% sodium hypochlorite solution (Qualikems, India) and normal saline (0.9% w/v) during canal preparation.
11. During cleaning and shaping by Neoendo flex rotary instruments (Orikam) 20 4%, the instrument got separated.

12. The coronal access in tooth 21 was refined using Gates Glidden drills. When the coronal portion of the obstruction was freed from the dentin, artery forceps were guided into the canal to encircle and grip the obstruction.
13. But the grip was not secured enough to pull the instrument out and the fragment kept on slipping even after many attempts.
14. So, the decision was made to use the braiding technique to retrieve the instrument
15. Firstly a #15 k file was inserted into the buccally to engage with the fragment. Then a #20 K file and #25 H file were inserted palatally into the canal to get the grip around the fractured instrument.
16. Braiding of these files and slight outward pull resulted in the instrument being removed from the canal.

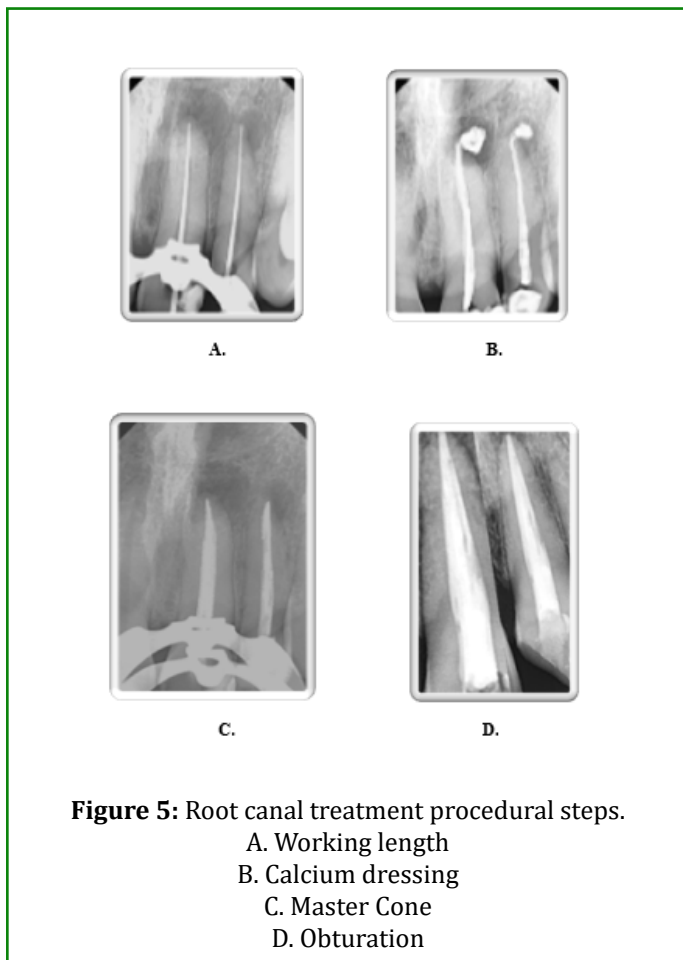


**Figure 4A:** Diagrammatic image depicting.



**Figure 4B:** Separated instrument removal braiding technique.

17. Canals were further shaped and cleaned using Neoendo flex rotary instruments (Orikam) up to 30 6 % and irrigation was carried out using 2.5% sodium hypochlorite and normal saline (0.9% w/v) and 17% EDTA.
18. Calcium hydroxide dressing was given for two subsequent visits due to the presence of a large periapical lesion.
19. In the next visit, a master cone radiograph was taken to confirm the correct cone fit up to the working length.
20. Absorbent points were used to dry the canals and obturated using Gutta-percha points (Dentsply Maillefer), sealer (Seal apex sealer, Kerr), and lateral condensation was done and the access opening was restored with glass ionomer cement (GC Gold Label-II).



## Discussion

Separated instruments in the canal usually prevent access to the apex, impede thorough cleaning and shaping of the root canal, and thus may compromise endodontic treatment and reduce the chances of successful retreatment. Retrieval may lead to successful non-surgical treatment or retreatment, which is the more conservative approach. Removal of

broken files can be conducted in dry or wet conditions. Dry conditions provide better visibility with a microscope, thus preventing procedural errors. However, heat generated from ultrasonic vibrations is unavoidable, and the temperature can increase to more than 10 °C on the external root surface, causing damage to the periodontal tissue [8].

Braiding is a simple technique that can be used to remove fractured instruments from deeper in the root canal. In the file-braiding technique, two or three different sizes of new H-files were gently screwed into the canal alongside the fragment, wound around each other, and withdrawn together with an outward stroke [9]. This method can be effective when the fragment is positioned deeply in the canal and not visible, the clinician is relying on tactile sense, or the fragment is loose but cannot be retrieved by using other means. The largest possible size of files should be used with caution because of the possibility of separation of the braided files [10].

Fracture of an endodontic instrument during root canal treatment hinders further cleaning and shaping of the root canal system [11]. This inability to further clean and shape the root canal system can compromise the treatment outcome. The prognosis of any particular case depends on the canal preparation stage at the time of instrument separation. Separation of an instrument at the apex, at later stages of treatment when considerable debridement and disinfection of the canal have been achieved, has the best prognosis [12,13].

The use of a microscope guides the instrument retrieval and minimizes the damage to the canal dentin. It is advisable to remove the separated instrument under magnification [14]. The length of the fragment also tends to affect the success rate. Fragments shorter than 5 mm present the lowest success rate, whereas those longer than 10 mm show better results and prognosis [15].

One of the most important factors to be considered before instrument retrieval is obtaining straight-line access to the coronal end of the separated instrument through the use of modified Gates Glidden drills. A close inspection of preoperative radiographs and knowledge of root anatomy is imperative before attempting the removal procedure in any tooth to ascertain the relative amount of surrounding dentin and the risk of perforation [16,17].

## Conclusion

File separation inside the root canal has become a common error in endodontics. The separated instrument, particularly a broken file, leads to root canal obstruction and prevents

thorough cleaning and shaping procedures. These procedures were simple, cost-effective, and less harmful to the tooth. At last, this case followed a successful prognosis due to the perfect sealing of the root canal system. One needs to take care that every necessary step must be taken to prevent instrument separation by employing preventive techniques.

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