

**Instrument Retrieval - A case series**

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**Abstract**

Instrument separation is a common procedural error encountered during endodontic therapy. But a whole hearted attempt should be made to retrieve it for a better prognosis of the tooth. The Ni-Ti instruments separate more often than the stainless steel instruments due to cyclic and torsional fatigue.

The separated instrument by itself doesn't cause a failure, but it hinders effective cleaning and shaping of root canal system. Various ultrasonic tips are available for instrument retrieval, TFRK (Terauchi file retrieval kit) has got very fine and efficient ultrasonic tips. So the contribution of ultrasonics, magnification and co-axial illumination makes retrieval of separated instrument more predictable.

The following article describes the successful retrieval of separated Ni-Ti rotary files with the help of TFRK and Dental operating microscope.

**Key words:**TFRK (Terauchi file retrieval kit), Ultrasonic, Dental operating microscope, instrument retrieval.

**Introduction**

Rotary NiTi instruments are a boon to endodontics as they can shape the canals very efficiently and predictably hence allow adequate cleaning by the irrigants and provide a good prognosis for the treated tooth. In spite of development in NiTi metallurgy by various thermo-chemical treatments still they are prone to get separated in the canal while shaping without giving any warning.<sup>(1)</sup> Fractures often occur due to overuse or improper technique.<sup>(2)</sup> Separation incidence of Ni-Ti rotary

instrument is (1.3%-10%) as compared to the stainless instrument (0.25%-6%).<sup>(3)</sup> Every attempt must be made to retrieve the separated instrument if possible or at least bypass it since it prevents complete cleaning and shaping of root canal system. There are various techniques to retrieve separated instruments like – IRS (instrument removal system, Dentsply), Masseran kit (Micromega, France), ultrasonic proultra tips, U files (Mani), braided technique, super glue tube etc.<sup>(4)</sup> In the presented cases TFRK was used.

### **Case Report 1**

A 30 years old female patient reported to our department of conservative dentistry and endodontics with history of pain in left lower back tooth which had undergone root canal treatment few years ago. Clinical examination revealed vestibular swelling and tenderness on palpation in relation to tooth number 36. TOP was positive. Radiographic examination revealed two separated instruments, one in MB and other in ML canal, radiolucency was seen in the periapical region (Fig-1 a). Retrieval of instrument was planned with the consent of the patient.

Old composite restoration was removed using small round bur (BR-49, Mani) and ultrasonic tips (Start –X, Dentsply). Gutta – percha was retrieved from the canals using protaper retreatment files (Dentsply)

In the ML canal, a staging platform was made till the head of the separated instrument using modified gates – glidden bur.

When instrument was seen in the canal under microscope, a microtrephine (TFRK) was used at 600 rpm in anticlockwise direction to cut the dentin around the broken instrument.

Now a precurved ultrasonic spoon tip (TFRK) was used to cut the dentin in quarter of a circle along the inner wall of the canal, spoon facing towards the instrument, then a

precurved straight ultrasonic tip (TFRK) was used to extend this quarter preparation into a semicircular preparation along the inner wall of the canal. Frequent intermittent irrigation was done with cold saline to prevent heating of tooth and subsequent damage to PDL. This preparation was done very carefully as we have less dentin in this region but as the ultrasonic tip touched the separated file, it got fractured making it further challenging (Figure 1 e). The straight ultrasonic tip was sharpened using the stone available in the kit and the preparation was proceeded in the inner curvature along the separated file but making sure not to contact it. Soon the instrument was seen dancing in the canal. The canal was then loaded with liquid EDTA (17%) and the precurved straight ultrasonic tip was placed in the prepared space along the inner wall of the canal and was activated, the acoustic streaming played a good role at this stage and the instrument popped out of the canal.(Figure 1 b)

The separated instrument in MB canal was also retrieved using similar techniques (Figure 1 c). A perforation was located ( it existed pre-op which had an indication due to lesion present in preoperative radiograph) and sealed with MTA and obturation was done using continuous wave of compaction technique(Figure 1 d) followed by composite resin restoration.

### **Case Report 2**

A 40-years-old male patient reported to the department with complain of pain in left lower back tooth. Pain was spontaneous and increased on taking hot and persisted for couple of minutes. Tooth was not tender on percussion. Clinical examination revealed a deep carious lesion, periodontal probing around tooth showed normal sulcular depth. Diagnostic radiograph revealed radiolucency approaching pulp space (Figure 2 a). Diagnosis of irreversible pulpitis was made and root canal procedure was started. An endo XP-shaper file got separated in the

middle mesial canal, it was tried to bypass and a radiograph was taken (Figure 2 b). An attempt to retrieve it was made. The microtrephine bur was used till the head of separated instrument, the canal was irrigated with cold saline then dried with paper points and straight ultrasonic tip was used in inner curvature, within couple of seconds the file was seen dancing in the canal, at this stage the canals were loaded with liquid edta (17%). As the middle mesial canal was confluent with the mesiolingual canal, irrigate ultrasonic tip was used to activate edta from mesiolingual canal and soon the file from middle mesial canal came out in the chamber (Figure 2 c and 2 d). Tooth was obturated with continuous wave of compaction technique (Figure 2 e) and was restored with composite resin restoration.

### Discussion

Though the conservation of root dentine is of paramount importance for long term survival of an endodontically treated tooth but one should evaluate the pros and cons of a very conservative preparation in a tooth which has complex anatomy.

Separation of instruments happen due to various reasons like inadequate access cavity preparation, forcing an instrument into the canal especially in curvatures, over use of an endodontic file. Separated instruments block the canal and hinder in shaping and cleaning of the root canal system resulting in adverse outcome.<sup>(5,6,7)</sup>

Straight line access is important for successful retrieval of separated instruments.<sup>(8,9)</sup> The success rate of instrument retrieval was around 85% when it was visible under operating microscope whereas around 47% when it was not.<sup>(10,11)</sup>

Ultrasonics play a critical role in instrument retrieval, it should be used in a pulsating fashion with intermittent coolant so as to avoid heat generation which is harmful for the periodontal ligaments. They should also be used in a

low power setting ( 2-3 in satelec) of the piezoelectric scaler, to avoid secondary fracture of separated instrument or separation of the ultrasonic tip itself.

A loop device (like Yoshi loop) should be used when separated file is longer than 4.5 mm so as preserve dentine and time<sup>(12,13)</sup>

In case report 2, the knowledge of root canal anatomy helped to retrieve the instrument from middle mesial canal, as it is very frequently confluent with the mesio-buccal or mesio-lingual canals.

### Conclusion

The combination of ultrasonics and magnification with the clinician's motivation and belief in himself / herself are the keys to success in retrieving separated instruments with minimal dentine loss.

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### Legends Figures

#### Case 1:



Fig 1 A

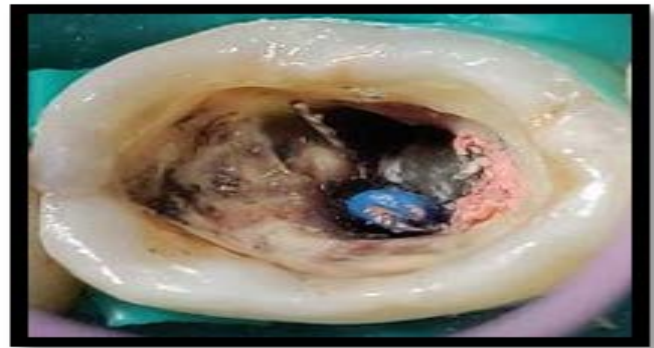


Fig 1 B

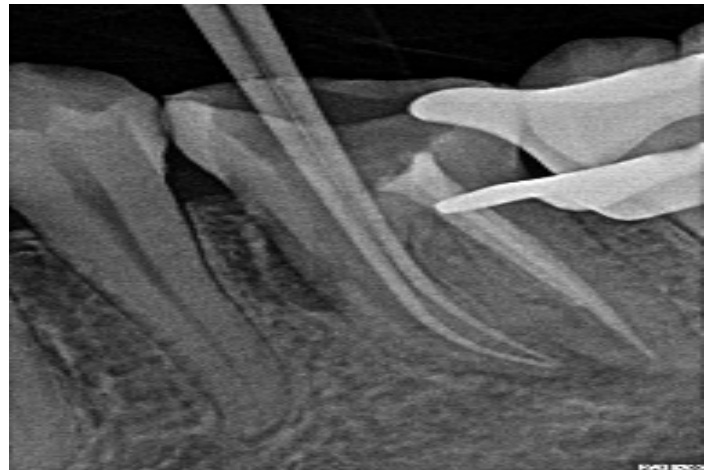


Fig 1 C



Fig 1 D

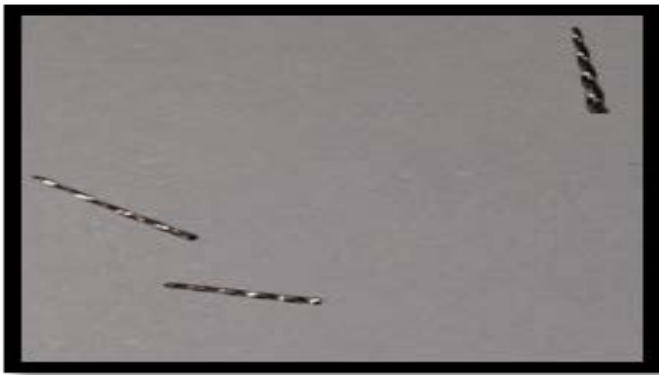


Fig 1 E  
Case 2



Fig 2 c

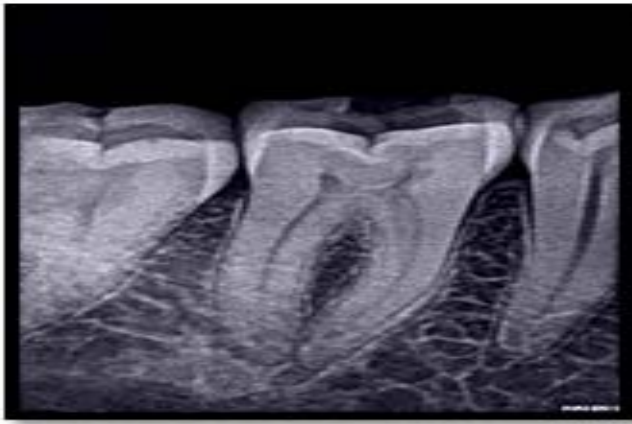


Fig 2 a



Fig 2 d

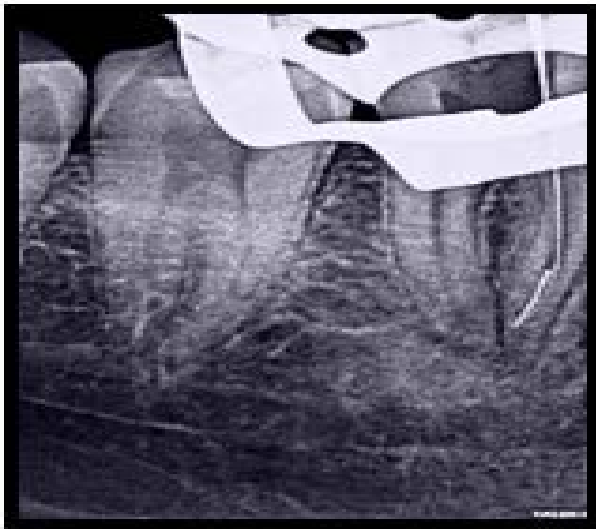


Fig 2 b



Fig 2 e