



FILE RETRIEVAL USING BTR PEN-A CASE REPORT

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ABSTRACT

Background: Instrument separation during endodontic therapy is a common complication, particularly with nickel–titanium (NiTi) rotary instruments. Retrieval of such instruments, especially in curved or narrow canals, poses clinical challenges and may affect treatment prognosis. **Case Report:** This report describes the management of a separated instrument in the distobuccal canal of mandibular molar (tooth 36) in a 49-year-old female. The fragment extended beyond the apex and was successfully retrieved using the BTR (Broken Tool Removal) Pen, a device equipped with a flexible nitinol loop designed for minimally invasive retrieval. The procedure was supported by ultrasonic staging and magnification. Canal preparation, disinfection, and obturation were subsequently completed. **Conclusion:** The BTR Pen proved effective in retrieving a fractured file from a difficult location with minimal dentin removal, preserving tooth structure. This case highlights the device's utility in managing complex instrument separation cases and improving endodontic outcomes.

KEYWORDS : Separated instrument, BTR Pen, endodontics, instrument retrieval, fractured file, nitinol loop, case report

INTRODUCTION

During routine therapy, at any stage, an endodontic instrument can fracture due to flexural fatigue, torsion or manufacturing defects (1). Instrument separation is a common iatrogenic error in endodontics, with a higher occurrence rate of 6%–10% when using nickel–titanium (NiTi) rotary instruments. Contributing factors to this type of error may include inadequate evaluation of caries extent, failure to consider the angulation of the crown prior to treatment, and premature use of NiTi rotary instruments before fully identifying the root canal anatomy. (2) Instrument separation typically occurs due to a combination of mechanical stress, canal anatomy, and operator technique. Factors such as inadequate access preparation, failure to establish a proper glide path, excessive use of files beyond their recommended lifespan, improper torque or speed settings on rotary devices, and the use of larger tapered instruments in narrow or curved canals increase the likelihood of separation. Instrument separation not only hinders cleaning and shaping of the canal system but also complicates obturation, which may adversely affect the long-term prognosis of the tooth [3]. Clinicians are often faced with three options when managing a separated instrument retrieval, bypassing the fragment, or leaving it in place. The decision depends on various factors, including the location of the fragment within the canal, its length and type, the canal curvature, presence of symptoms or pathology, and the clinician's skill and available equipment. Retrieval is generally the preferred approach when the fragment is

located coronally or above the curvature, where access is feasible and the risk of complications is lower [4]. However, attempts at retrieval must be made cautiously, as excessive dentin removal can compromise the structural integrity of the tooth, potentially leading to root perforation, vertical fracture, or canal transportation [5]. Over the years, a variety of instrument retrieval systems and techniques have been developed and documented in the literature. These include the use of hypodermic needles, Hedström files, the Canal Finder system, microtube-and-loop techniques, ultrasonic vibration systems, and more complex devices such as the Masseran kit, Endo Rescue system, and Instrument Removal System (IRS). Many of these systems are used in conjunction with magnification and illumination provided by the dental operating microscope, which has greatly enhanced the success rate of such procedures [6].

A recent advancement in this field is the BTR (Broken Tool Removal) Pen, developed by Cerkamed. The BTR Pen employs a thin, highly flexible nitinol loop that allows precise engagement of the coronal end of the separated fragment. This device is designed to operate in narrow and curved canals with minimal removal of dentin, making it a valuable tool in the retrieval of broken instruments from difficult locations. Its ergonomic design and single-handed operation provide better control and visibility during the retrieval process. The availability of multiple loop sizes also allows clinicians to adapt to the dimensions of the canal and

fragment [7,8].

This case report presents the clinical management of a separated instrument in the distobuccal canal of a mandibular first molar in a young patient. The fragment, which extended beyond the apex, was successfully retrieved using the BTR Pen, demonstrating its efficacy as a minimally invasive and reliable retrieval tool in endodontic practice.

CASE REPORT

A 49-year-old female patient reported to the Department of Conservative Dentistry and Endodontics at DY Patil Dental Hospital, Navi Mumbai, with a complaint of pain in the lower left back tooth region of the jaw for the past 15 days. In her dental history, she mentioned that a root canal treatment had been initiated at a private clinic in Navi Mumbai, during which an instrument separated inside the distobuccal canal. She was informed about the instrument separation. The pain was described as throbbing, worsened during chewing, and was relieved by medication. There was no significant medical history.

Vitality testing was conducted using both cold and heat test, and the tooth did not respond to either of them, indicating it was non-vital.

Upon clinical examination, a temporary filling was observed in tooth number 36. Radiographic evaluation revealed a radiopaque structure in the distal root, suggestive of a separated endodontic instrument, which extended beyond the apex. A radiolucent area was also noted at the periapical region of the mesial root, suggesting periapical pathology as seen in fig 1 and 2.

The patient was informed about the presence of the broken instrument, potential complications, and various treatment options. After obtaining consent, the procedure to retrieve the separated instrument was undertaken.

Preendodontic build up was done using composite as shown in Fig 3.

The access cavity was refined using ultrasonic instruments, and a staging platform was created using ED4D and ED3D tips from Woodpecker. (Fig 4 and 5) Approximately 2–3 mm of the coronal portion of the separated fragment was exposed. A flexible BTR retrieval system with a nitinol tip was then inserted into the canal, engaged over the exposed end of the fragment, and the separated instrument was successfully removed as seen in Fig 6. This was confirmed with a radiograph. (Fig 7)

Following retrieval, the working length was established using a #15 K-file. (Fig 8) Irrigation was carried out with 3% sodium hypochlorite (NaOCl), and 17% EDTA was used to facilitate cleaning of the narrow canal. The canals were shaped using rotary files with a taper of 25-04%. Obturation was completed using 4% gutta-percha cones with the lateral condensation technique (Fig 8). Post obturation restoration was done using composite. (Fig 9)



Fig 1(a and b)-Pre operative photo and radiograph

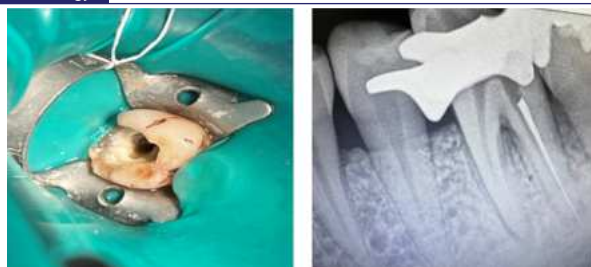


Fig2- Pre Operative Photo Under Rubber Dam



Fig 3- Pre-endodontic build up was done using composite restoration



Fig 4- Tip number td3 and td4 ultrasonic tips were used



Fig 5-Staging platform was created



Fig 6(a and b)- File retrieval was done using BTR pen



Fig 7-RVG After The Instrument Is Retrieved



Fig 8(a and b)- Working length and Master cone selection done



Fig 9(a and b)-Obturation is done using bioceramic sealer

DISCUSSION

Instrument fracture in root canals often results from repeated use, incorrect technique, or inadequate access. Common causes include lack of a glide path, excessive apical pressure, inappropriate file selection for curved/narrow canals, and operator inexperience [9]. When a file breaks inside the canal, clinicians must weigh the benefits and risks of retrieval versus bypassing or retaining the fragment.

Although numerous retrieval tools exist, many involve significant dentin removal, risking structural compromise or procedural errors such as ledging or perforation [10]. If a fractured instrument extends into the periodontal space, it may trigger a foreign body reaction or chronic inflammation, warranting removal [11].

The BTR Pen is a mechanical retrieval device featuring a nitinol loop and adjustable grip mechanism. It includes:

- A loop adjusting knob,
- A loop closing slider,
- Interchangeable nitinol loops in three sizes.

To operate the device, the selected loop is bent to approximately 45°, inserted into the canal, positioned over the exposed coronal segment of the file, and tightened using the slider mechanism [12].

The nitinol loop used in the BTR Pen offers several advantages:

- Flexibility: It adapts to canal anatomy, reducing the need for excessive canal enlargement.
- Precision: The loop can be tightened precisely around the exposed segment of the fragment, enhancing grip and reducing the risk of pushing the fragment apically.
- Minimally invasive: Because it works with minimal dentin removal, the structural integrity of the root is better preserved compared to rigid tube systems or aggressive ultrasonic techniques [8]
- In terms of technique sensitivity, the BTR Pen system

requires a refined tactile sense and proper visualization under magnification, such as a dental operating microscope. The creation of an adequate staging platform is also crucial for success. Ultrasonic tips play a pivotal role in uncovering the coronal portion of the broken file without transporting the canal or causing perforation [9]. In the presented case, the combination of ultrasonic staging and the BTR Pen system allowed for efficient retrieval of an instrument that extended beyond the apex. This outcome reinforces the growing evidence that loop-based systems can be reliable alternatives to traditional methods in complex cases.

However, it is essential to recognize that not all cases are ideal candidates for retrieval using the BTR Pen. Fragments located deep apically, beyond canal curvatures, or in calcified canals may still require bypassing or may need to be left in situ when removal poses too great a risk. Therefore, case selection and clinician expertise remain paramount [10].

Recent studies suggest that while ultrasonic techniques alone have a high success rate (up to 100% in some cases), combining them with loop systems enhances success and reduces procedural time and iatrogenic complications [11,12]. As technology advances, newer designs like the BTR Pen continue to provide clinicians with safer, more ergonomic, and more predictable options for managing separated instruments.

CONCLUSION

Fractured instruments pose a significant challenge in endodontic treatment. Successful management depends on accurate assessment, appropriate technique, and the use of specialized equipment. The BTR Pen represents a significant advancement in instrument retrieval, offering an effective, minimally invasive method for retrieving broken instruments, particularly in narrow and curved canals. With proper technique and case selection, the BTR Pen can enhance treatment outcomes and improve long term prognosis of the tooth.

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