



Case Series

Retrieval of separated endodontic instruments using Talal's endodontic kit: A series of three case reports

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Abstract

Instrument fracture during the root canal treatment poses significant challenges. This report presents three cases where Talal's Endodontic Kit was effectively used to retrieve broken instruments from root canals. This specialized instrument enabled successful removal in all cases, facilitating the completion of endodontic treatment. Factors influencing retrieval success, including instrument position, type, and root anatomy, are discussed. The outcomes highlight the efficacy of Talal's Endodontic Kit in managing broken instruments, providing a valuable treatment option for endodontists and thereby improving the prognosis of endodontic treatment.

Keywords: Broken instrument, Endodontic retrieval, Talal's endodontic kit, Ultrasonic technique, Root canal treatment.

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1. Introduction

Root canal treatment removes infected pulp from a damaged tooth, relieving pain and preventing further infection. The procedure involves local anesthesia, access cavity preparation, canal measurement, cleaning, shaping, and filling. A crown or filling seals the tooth, saving it from extraction. With a 90-95% success rate, root canal treatment restores tooth function and prevents future complications, preserving natural teeth. The separation of endodontic instruments in root canals is a significant complication that can jeopardize the success of endodontic treatment. The presence of a separated instrument in the root canal creates considerable complications, including the risk of intracanal corrosion and restricted access for comprehensive cleaning, shaping, and obturation. Consequently, retrieving the broken instrument is crucial for achieving successful endodontic treatment. Factors contributing to instrument fracture include root canal anatomy, instrument design, manufacturing process, usage dynamics, instrumentation techniques, and operator expertise.¹⁻³

1.1. Management of separated instruments

To address this issue, all other treatment modalities should be considered depending upon the size and site of instrument separation. There are totally four techniques (i) No intervention (ii) Bypass technique (iii) Instrument retrieval (iv) surgical intervention. For separation of the instrument various techniques like ultrasonic techniques, braiding techniques, Masserann kit, Talal's endodontic kit and instrument removal system are suggested.⁴

2. Case Series

This report presents three cases where ultrasonic techniques were utilized to remove separated instruments from root canals under proper magnification and illumination.

2.1. Case report 1

A 48 years old male patient reported to the Department of Conservative Dentistry and Endodontics of our institute with the chief complaint of pain in relation to upper front tooth region. Pt history reveals the root canal treatment in relation

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to same tooth at a private clinic, 6 months back and was having pain since then. On Clinical examination showed RCT was initiated on left maxillary canine. Intraoral periapical radiograph (IOPA) revealed a separated instrument at the apical third of the root canal of 23. There was no periapical radiolucency or periapical changes were associated with the tooth.

A thorough assessment and treatment plan were developed to retrieve the separated instrument, the patient was explained about the treatment plan and consent was received. Several bypassing techniques were attempted including H file braiding, then file was retrieved using ultrasonic Dr. Talal's endodontic kit. After instrument retrieval cleaning, shaping and obturation of the root canal was completed.

Reason for the fracture: Improper angulation of file (or) worn out instrument (or) failure to achieve glide path may be reason.

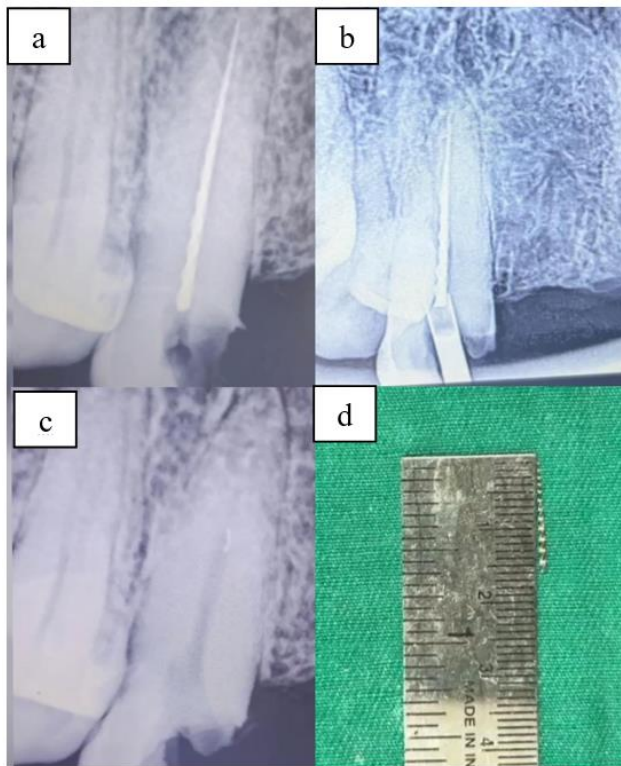


Figure 1: Sequence of instrument removal in case 1. (a): Intraoral periapical showing separated instrument in maxillary canine. (b): Intraoral periapical showing separated instrument removal from the canal. (c): Intraoral periapical showing a clear canal (d): Retrieved instrument

2.2. Case report 2

A 58 years old male patient reported to the department of Conservative Dentistry and Endodontics of our institute with the chief complaints of pain in relation to upper right back tooth region. History reveals root canal treatment with the same tooth at a private clinic, 3 months back and was having pain since then. Intraoral periapical radiograph (IOPA)

revealed calcified root canal and a separated instrument of 8mm length in disto buccal root of maxillary 1st molar from the orifice level. There was no periapical radiolucency or change were associated with the tooth.

A thorough assessment and treatment plan were developed to retrieve the separated instrument, the patient was explained about the treatment plan and consent was received. After attempting various methods, including file braiding, the separated instrument was successfully retrieved using Dr. Talal's Endodontic Kit with ultrasonic technology. Subsequently, the root canal was thoroughly cleaned, shaped, and obturated.

Reason for the fracture: Completely calcified canal, improper assessment of pre-operative x-ray and improper armamentarium selected.

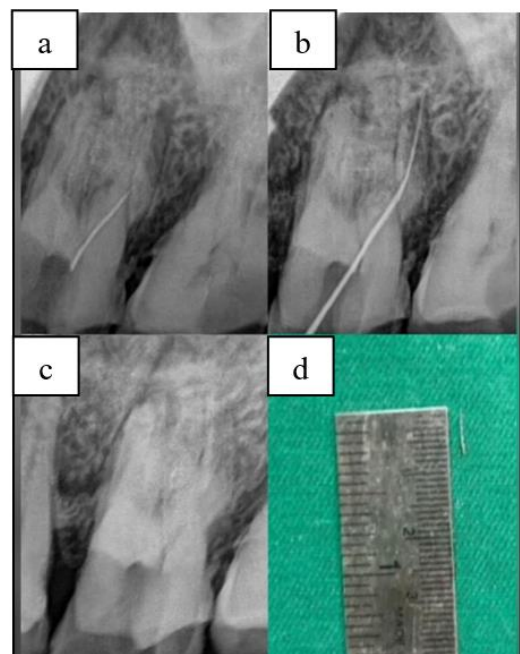


Figure 2: Sequence of instrument removal in case 2. (a): Intraoral periapical showing separated instrument in disto buccal root of maxillary 1st molar. (b): Intraoral periapical showing separated instrument removal from the canal. (c): Intraoral periapical showing a clear distobuccal canal (d): Retrieved instrument

2.3. Case report 3

A 30 years old female patient reported to the department of Conservative Dentistry and Endodontics of our institute with the chief complaint of pain in relation to upper front tooth region. History reveals root canal treatment with the same tooth at a private clinic, 1 month back and was having pain since then. Clinical examination showed RCT initiated with upper right lateral incisor. The tooth was tender on percussion. Intraoral periapical radiograph (IOPA) revealed calcified root and a separated instrument of 12mm length in root of right lateral incisor. There was no periapical

radiolucency or periapical changes were associated with the tooth.

A thorough assessment and treatment plan were developed to retrieve the separated instrument, the patient was explained about the treatment plan and consent was received. Several bypassing techniques were attempted including H file braiding, then file was retrieved using ultrasonic Dr. Talal's endodontic kit. After instrument retrieval cleaning, shaping and obturation of the root canal was completed.

Reason for the fracture: Improper use of file sequence.

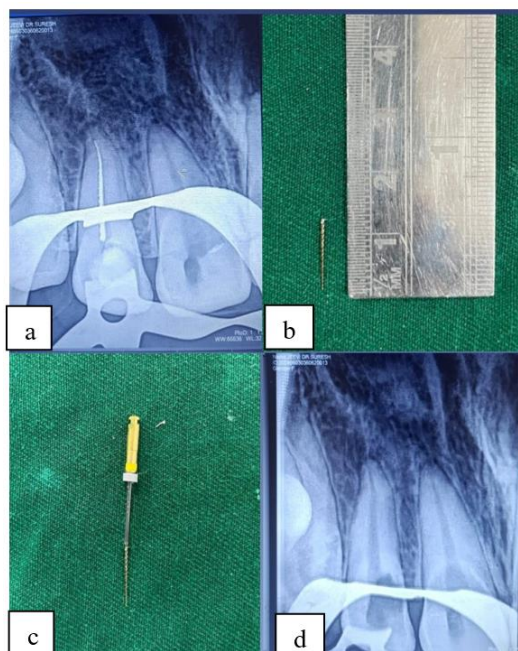


Figure 3: Sequence of instrument removal in case 3. (a): Intraoral periapical showing separated instrument in maxillary lateral incisor. (b) and (c): Retrieved instrument (d): Intraoral periapical showing a clear canal

3. Discussion

Instrument fracture is a common complication in endodontics, occurring in an estimated 1-6% of procedures. The incidence varies according to factors such as instrument type, canal anatomy, operator experience, and file design. Studies report a prevalence of 2.5-5.6% of root canals treated having instrument fractures, with 1.4-3.4% being irretrievable. Fracture of instrument most commonly occur in the apical third of the canal, and ideally in curved, narrow, or calcified canals. The main causes include instrument fatigue, excessive force, incorrect file selection, and inadequate technique used.^{5,6}

Instrument fracture during root canal treatment is a complicating factor that can affect effective cleaning and shaping of the root canal, potentially irritating periapical tissues. Non-surgical retreatment strategies are a. Bypassing the fragment b. Removing the fragment using specialized

instrumentation c. Preserving the fragment in place with coronal sealing.⁹ Surgical intervention (apicoectomy) include ideal treatment outcome which involves successful retrieval of the separated instrument, facilitating thorough root canal debridement, disinfection, and obturation to eliminate microorganisms and ensure a favorable prognosis. Factors influencing successful retrieval are 1. Fragment position (apical, coronal, or middle). 2. Instrument type (stainless steel or NiTi) 3. Fragment length and width 4. Root anatomy (curvature, depressions, width). A trained operator with adequate technical resources is essential.⁸⁻¹⁰ Studies show that ultrasonic is the most effective tool for removal. Microscopic visibility doubles success rates.¹¹ Root canal anatomy knowledge is crucial. Operating microscopes and small-diameter ultrasonic tips enhance minimally invasive preparation and safety.¹² Success rates vary based on instruments before canal curvature are high success rate, followed by those in curvature and reduced for those beyond curvature Canal curvature measurement and ultrasonic instrument assistance under microscopic visualization are critical.¹³ Key considerations are heat generation and potential periodontal tissue damage, proper irrigation for cleanliness and reduced risk and Titanium-niobium alloy and diamond-coated tips for effective removal.^{14,15}

4. Conclusion

Ultrasonic techniques, when combined with magnification, can effectively retrieve separated endodontic instruments with minimizing damage to dentin. Proper training and adherence to established principles can minimize the incidence of instrument fractures.

5. Source of Funding

Nil.

6. Conflicts of Interest

There are no conflicts of interest.

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