



SUCCESSFUL RETRIEVAL OF SEPARATED ENDODONTIC FILE IN EXTRA-RADICULAR REGION OF RETAINED MAXILLARY DECIDUOUS TEETH: A CASE REPORT

Dental Science

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ABSTRACT

Instrument separation beyond the root apex is an uncommon but clinically significant complication of endodontic therapy. When a fractured file is unintentionally displaced into the periapical tissues, it may act as a foreign body, contributing to persistent inflammation and delayed healing. Management becomes more challenging in cases involving retained deciduous teeth in adult patients due to altered root morphology and variable resorption patterns. This case report describes the management of patient presenting with a decayed retained maxillary deciduous 2nd molar associated with an apically separated endodontic file. Radiographic evaluation confirmed the presence of a radiopaque fragments beyond the root apex. Considering the poor prognosis of the retained tooth and the presence of a foreign body, extraction of deciduous tooth was planned. Following atraumatic extraction, careful periapical exploration and curettage were performed, and the separated fragment was successfully retrieved. Postoperative healing was uneventful, with no complications. This case emphasizes the importance of cone beam computed topography (CBCT) in locating separated file in three dimension for accurate diagnosis, appropriate surgical planning, and meticulous retrieval techniques to prevent damage to adjacent structures and ensure favourable clinical outcomes.

KEYWORDS

INTRODUCTION:

Successful root canal treatment depends on thorough cleaning, shaping, and three-dimensional obturation of the root canal system. Despite advances in instrumentation and materials, procedural complications such as instrument separation remain a clinical challenge. Fracture of endodontic instruments most commonly occurs due to cyclic fatigue and torsional stress, especially in curved or anatomically complex canals. Nickel–titanium (Ni-Ti) rotary instruments, although highly flexible and efficient, may fracture unexpectedly without visible signs of deformation. The reported incidence of instrument separation ranges from 0.5% to 5%, depending on canal anatomy, operator experience, and instrumentation technique.^{1,2}

Instrument separation within the root canal can be managed by bypassing or retrieving the separated part but when a fractured instrument is displaced beyond the apical foramen, it may act as a foreign body within the periapical tissues. This can interfere with adequate disinfection, sustain periapical inflammation, and compromise healing.³ The prognosis in such situations depends on several factors, including the location of the fragment within the canal, the presence of periapical pathology, the degree of canal curvature, and the amount of remaining radicular dentin.⁴

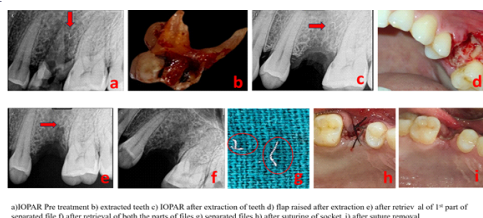
Retained deciduous teeth in adult patients present additional clinical considerations. These teeth often exhibit irregular root resorption, altered canal morphology, and reduced structural integrity, which may increase the risk of procedural complications during endodontic intervention.⁵ When a retained primary tooth has a poor restorative prognosis and is associated with an apically extruded fractured instrument, extraction combined with surgical retrieval of the fragment may represent the most predictable and biologically sound treatment approach.

A 39-year-old male patient presented to the Department of Periodontology, RUHS College of Dental Sciences (GDC), Jaipur, with the chief complaint of pain in the left upper posterior tooth region. The patient reported a history of undergoing root canal treatment one week earlier outside the department, during which an endodontic instrument was accidentally separated.

Clinical Examination

A carious retained maxillary 2nd deciduous molar i.r.t 2nd quadrant with tenderness on percussion present with grade I mobility & adjacent permanent teeth are clinically sound. Intraoral periapical radiograph revealed retained deciduous tooth with root caries and root resorption. Radiopaque z- shaped object beyond the root apex. The radiographic findings suggested a separated endodontic instrument extruded beyond the apex. (fig a & b)

FIG1



a)OPAR Pre treatment b) extracted teeth c) OPAR after extraction d) flap raised after extraction e) after retrieval of 1st part of separated file f) after retrieval of both the parts of files g) separated files h) after suturing of socket i) after removal



a)coronal b) sagittal c) axial views of CBCT showing exact location

Case Presentation

FIG2I

Treatment Plan

Considering grossly decayed crown structure, presence of foreign body beyond apex, age of patient (39 years), Hopeless long-term prognosis of deciduous teeth. A decision was made for surgical extraction of retained deciduous tooth and retrieval of separated file.

Surgical Procedure

Following attainment of profound local anaesthesia, an atraumatic extraction of the involved retained deciduous tooth was performed using periostomes and elevators to preserve the surrounding alveolar bone (Fig-b). A full-thickness mucoperiosteal flap was then carefully reflected to gain adequate surgical access and visibility.

Upon flap reflection, the separated endodontic file fragments were identified with the help of CBCT embedded within the buccal cortical plate of the alveolar bone (fig 2a,2b,2c). Careful bone guttering was undertaken around the fragment using a fine ultrasonic tip under constant irrigation to facilitate its exposure.

The fragment was retrieved under direct visualization using a fine haemostat, ensuring minimal trauma to the adjacent bone and soft tissues (Fig-g). The surgical site was thoroughly irrigated with sterile normal saline to remove bony debris and ensure decontamination of the operative field.

The mucoperiosteal flap was repositioned and secured using 3-0 black silk sutures placed in a figure-of-eight configuration to achieve optimal wound adaptation and primary closure (Fig-1h).

Postoperatively, the patient was prescribed 0.12% chlorhexidine gluconate mouthrinse twice daily, systemic antibiotics (amoxicillin 500 mg three times daily for 7 days), and analgesics (diclofenac sodium 50 mg as required). The patient was recalled periodically for clinical evaluation and professional oral hygiene maintenance during the follow-up period to ensure uneventful healing.

DISCUSSION

Instrument separation is a recognized procedural complication in endodontic therapy and continues to pose clinical challenges despite advancements in rotary instrumentation systems. The reported incidence ranges from approximately 0.5% to 5%, depending on canal anatomy, operator experience, and the type of instrumentation used.^{6,7} The primary mechanisms responsible for file fracture include cyclic fatigue—caused by repeated tensile and compressive stresses in curved canals—and torsional failure, which occurs when the file tip binds within dentin while the shank continues to rotate. Although newer heat-treated nickel–titanium (Ni-Ti) alloys demonstrate improved flexibility and resistance to cyclic fatigue, the risk of unexpected separation cannot be completely eliminated.⁸

The biological impact of a separated instrument depends largely on its position and the presence of infection. When confined within the canal and bypassable, the fragment may not significantly affect prognosis if adequate cleaning and obturation can still be achieved. Evidence suggests that cases with pre-existing periapical pathology show reduced healing rates when intracanal disinfection is compromised by an obstructing fragment.¹⁰ However, displacement beyond the apical foramen alters the clinical scenario. An extruded fragment may act as a foreign body within the periapical tissues, potentially sustaining inflammation, delaying healing, and interfering with osseous repair.⁹ In the present case, the instrument was extruded beyond the apex and associated with symptoms, making removal biologically justified to eliminate a potential source of persistent inflammation.

Retained deciduous teeth in adult patients introduce additional anatomical and structural considerations. Such teeth frequently demonstrate irregular root resorption, altered canal morphology, and diminished dentinal thickness.¹¹ These factors increase susceptibility to procedural mishaps during instrumentation and reduce the long-term restorative prognosis. In the current case, the retained maxillary deciduous molar was grossly decayed with evidence of root resorption, further compromising its structural integrity. Attempting complex nonsurgical retrieval through a weakened primary tooth could have resulted in excessive dentin removal or root fracture. Therefore, extraction represented a predictable and conservative approach, simultaneously allowing direct access to the periapical region for controlled retrieval of the fragment.

Various management strategies have been described for separated instruments, including bypassing the fragment, orthograde ultrasonic retrieval under magnification, use of microtube or loop systems, and surgical approaches such as apicoectomy.¹² Ultrasonic techniques are widely accepted and demonstrate high success rates when the fragment is located coronally or within the straight portion of the canal. However, such approaches require removal of surrounding dentin to expose the coronal aspect of the fragment, which may weaken the root and predispose it to vertical fracture.¹³ When a fragment is displaced into periapical tissues, nonsurgical retrieval is often impractical and may risk further extrusion. In such cases, surgical intervention or extraction becomes the preferred option, particularly in the presence of symptoms or persistent infection.¹⁴

In the present report, atraumatic extraction converted the procedure into a controlled surgical field. Following flap reflection, the fragment embedded within the buccal cortical plate was carefully localized and exposed using ultrasonic instrumentation. Controlled bone removal and meticulous curettage minimized additional trauma while preserving surrounding structures. The absence of postoperative complications and satisfactory healing indicate that elimination of the foreign body and inflamed tissue facilitated normal bone repair.

Prognosis in cases of fractured instrument management depends on multiple variables, including the location and depth of the fragment, canal curvature, residual dentinal thickness, presence of preoperative periapical pathology, and timeliness of intervention.^{9,11} Early management in this case—within one week of separation—likely contributed to favourable healing by limiting chronic inflammatory changes.

Overall, this case highlights that while instrument separation remains an inherent risk of endodontic therapy, appropriate assessment and individualized treatment planning are critical. In structurally compromised retained deciduous teeth with apically extruded fragments, extraction combined with surgical retrieval may offer a biologically sound and predictable solution. Careful surgical planning, preservation of surrounding tissues, and thorough debridement are essential to ensure optimal clinical outcomes.

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