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The management of instrument separation using masserann kit: A case series

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Abstract

During root canal therapy, instrument separation within the root canal is an undesirable and distressing consequence. The separated fragment might cause difficulty in chemo mechanical preparation of the canal, which influences the outcome of the root canal therapy. Such a fragment should be mechanically retrieved when it becomes difficult to bypass it. The Masserann kit is one such device for orthograde removal of intracanal metallic obstructions. This paper reports the clinical cases of intracanal-separated instrument in maxillary central incisor using a Masserann technique under an Operating Microscope

Keywords: Endodontics, Instrument separation, Masserann Kit, Operating Microscope.

Introduction

Instrument separation during root canal treatment procedures is a constant risk. An incidence ranges between 2% to 6% during nonsurgical endodontic therapy (1). Its management determines the success of the treatment. On rare circumstances, a fracture fragment in a canal system may prevent access to the apical endpoint during nonsurgical root canal therapy.

Separated instrument immediately causes dejection, anguish, and but there are nonsurgical retreatment procedures to remove the instrument from the canal (2).Overwhelmingly prevalent reasons for separated instruments are improper use, physical property restrictions, insufficient access, root canal anatomy, and manufacturing flaws. (3).

The majority of stainless steel instruments separate due to high torque, whereas cyclic loading and torsion are

the main causes of fracture in NiTi rotary files (4). The fracture fragment prevents access for meticulous root canal cleaning and shaping procedures or irritates the periapex. This has a big impact on the way endodontic therapy turns out in a tooth (5).As a result, an attempt should be made to bypass or retrieve the fracture fragment before advancing to obturation, considering the level of separation or continuing with the surgical procedure.

One approach for removing foreign objects from the root canal is the Masserann technique. The success rate of this technique has been reported to be 55% when used to remove posts, silver points, and separated instruments from the root canal(6).

The armamentarium used consists of Operating microscope (Prime DNT, Lobomed), Gates-Glidden drills (Mani Inc., Japan); slow-speed, contra-angle hand piece (NSK, Japan); and Masserann kit (Micro Mega, France), which has an end-cutting trepan burs of increasing size which is color-coded and rotates in anticlockwise to create space around the coronal end of the fragment by cutting the surrounding root canal dentin. The exposed coronal end of the fragment is locked by the extractor, which resembles a tube and has a plunger rod (stylet), and can be retrieved by turning it anticlockwise. In the case series described here, a separated file was successfully retrieved under operating microscope utilizing the Masserann technique from the root canal dentin of a right maxillary central incisor.

Case Report

Case 1: A 24-year-old male patient reported to the Department of Conservative Dentistry and Endodontics with acute pain in his upper front tooth region since 1 month. IOPA revealed attempted root canal treatment of 11, and presence of calcification with no periapical defects.

Rubber dam isolation done and during an attempt to negotiate the canal using size10 K file, the file found to be separated. Radiographically, it was found in the root canal's junction of the middle and apical third. The patient was made aware of the instrument separation and the effort of bypassing the fragment was ineffective. Retrieval of the fracture fragment was chosen as the treatment plan using a Masserann technique under Operating Microscope.

By sequentially using Gates-Glidden drills under microscope to trepan the root canal, straight radicular access was achieved to the fracture fragment’s coronal end.

The remaining fragment of the instrument that had been separated was examined and the length of separated fragment remaining in the canal was found to be 6mm. In order to ditch the dentin and create a trench around the fragment's coronal end, the preselected trepan latched into a contra-angle hand piece and rotating anticlockwise. Radiographically, it was made sure that the trepan was centered over the fragment. The extractor was inserted into the trough to encase the fragment and following radiographic confirmation, manually rotated the plunger rod within the extractor tube clockwise to secure the fragment against its wall. Once the tactile sense detected the tightest hold, the complete assembly was twisted anticlockwise to release the fragment from the dentin, and it was then pulled back to see the piece be retrieved.

Followed by determination of working length using a size 10 K-file. Cleaning and shaping of the canal was done using NiTi Rotary Protaper Gold files up to size F5 with crown down technique, with frequent irrigation with 5.25% sodium hypochlorite solution and 17% EDTA, followed by obturation with gutta percha by

lateral compaction technique and zinc oxide eugenol sealer.

Case 2: A 18 year-old male patient reported with acute pain in the upper front tooth region of mouth since 1 week. Clinical examination revealed attempted root canal therapy of 11 and 12. On radiographic examination disclosed separated instrument extending beyond the apex from the junction of coronal and middle third of root.

The Masserann kit was selected as the treatment method, and the patient was made aware about the instrument separation and fragment recovery procedure. On rubber dam isolation, the fracture fragment was analyzed under the operating microscope and trephination done using Gates Glidden drills, fracture fragment retrieval done by using Masserann technique as explained in Case 1

Followed by working length determination and the canal was chemo-mechanically prepared by using the same protocol as explained in the case 1, followed by obturation with gutta percha by lateral compaction technique and zinc oxide eugenol sealer.

Discussion

The outcome of endodontic therapy may be compromised as a result of Intracanal separation of instruments, frequently prevents access to the apex and makes it difficult to thoroughly clean and shape the root canal. This lowers the likelihood of a successful retreatment (7).The prognosis in these circumstances depends on the root canal's viability (vital or no vital), the tooth's asymptomatic or symptomatic state, the presence or absence of periapical pathology, the extent of cleaning and shaping at the time of separation, along with the level of separation in the canal. (8). Thus, every attempt should be made to bypass the fracture fragment or to retrieve it.

The ability to retrieve a fracture fragment from a root canal depends on the size, position, and level of attachment or impaction of the fragment within the canal as well as the canal's length, curvature, and cross-sectional diameter, the thickness of the root's dentin, and the material of the instrument and its cutting motion (clockwise or counter clockwise).The most often used techniques for retrieving separated instruments include ultrasonic devices, extraction tubes (Masserann kit), the Canal Finder system, and manual instruments.

For removing metal obstructions from anterior teeth with broad, straight roots, the Masserann kit has proven beneficial with a claimed success rate of 73% when used on anterior teeth, it has been around for more than 30 years as a tool for retrieving fracture fragment (7).The extractor's locking mechanism offers a great deal of retention while grabbing and removing a fracture fragment that is firmly wedged in the canal. By achieving straight access to the fragment, the trepan’s centering over the fragment was made easier. By carefully cutting peripheral dentin surrounding the separated instrument, this ensured the coronal end of the separated instrument would release circumferentially. As a result, the fragment was more likely to be tightly gripped and retrieved through the root's long axis, following retreatment (8).

It has limited application in teeth with thin and curved roots or when removing instruments that have separated apically since using relatively large, rigid trepans weakens teeth and increases the chances of perforation (5).The greatest approach to avoiding the stress and anxiety caused by instrument separation is to prevent it (9).Safe retrieval or bypassing of fragment should be done in the course of separation. The Masserann approach is a time-consuming and technique-sensitive method (11).

In accordance with clinical restrictions and the operator's skill, with the added advantage of operating microscope, fracture fragments were retrieved from maxillary central incisor as explained in this case report

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Legend Figures

Case 1

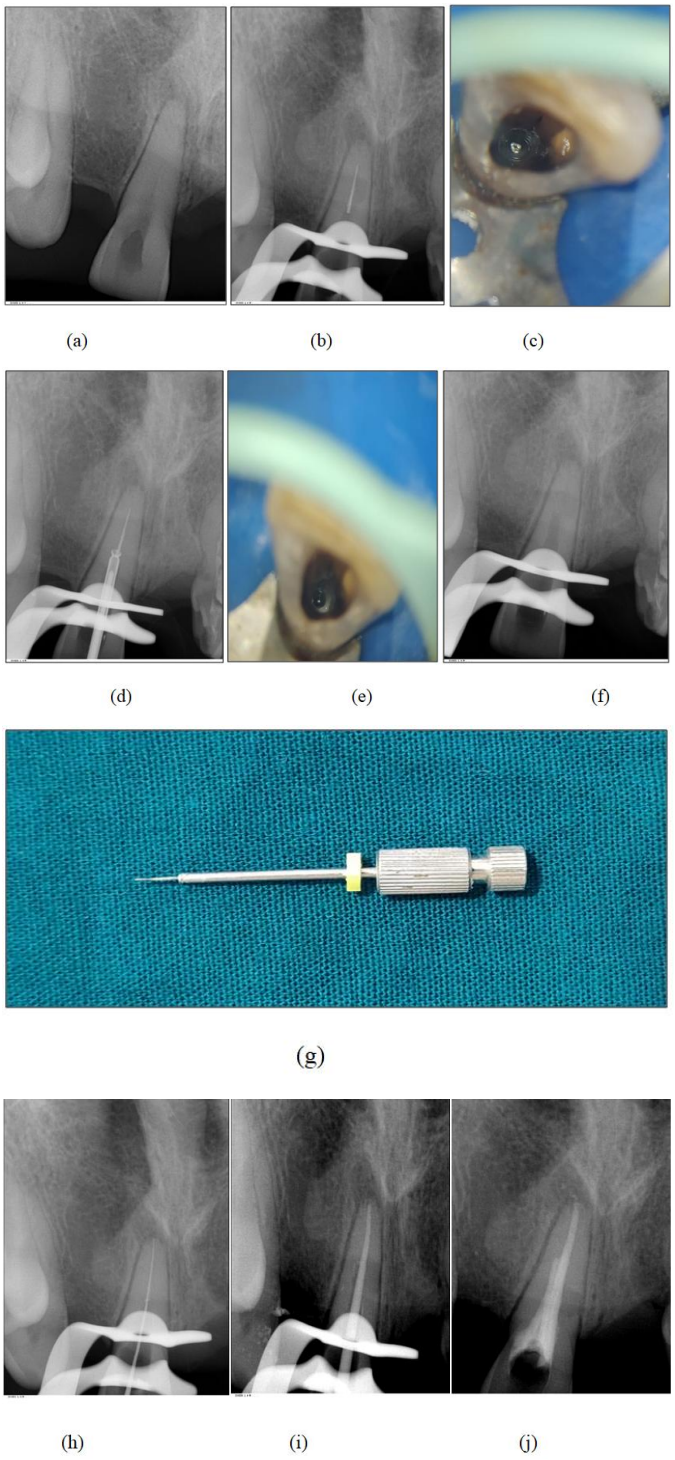

Figure 1: (a) – Pre Operative Radiograph; (b) –separated fragment; (c) – Separated fragment under microscope; (d) - Trephan centered over the fragment; (e) - Trephination under microscope; (f) -Post instrument retrieval; (g) - separated instrument fragment; (h) – Working Length using 10K file; (i) – Master cone; (j) – Obturation.

Case 2

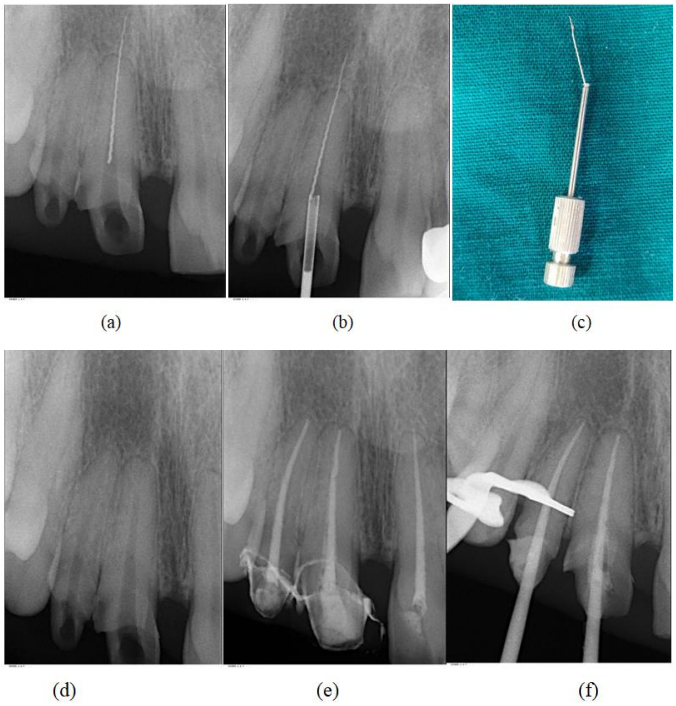

Figure 2: (a) – Pre Operative radiograph of separated fragment; (b) - Trephan centered over the fragment; (c) - separated instrument fragment; (d) -Post instrument retrieval; (e) – Master cone; (f) – Obturation