Retrieval of a stapler pin from the root canal of mandibular first premolar: A case report

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Abstract: A variety of metallic objects broken by the dentist or the patients have been discovered inside the root canals. A number of techniques are mentioned in the literature for the retrieval of these foreign objects from the root canals with minimal loss of tooth structure and to avoid surgical intervention. Most of these techniques are effective for the removal of broken files/instruments. But there is no standardized procedure is available for successful removal of unusual foreign metallic objects. This case report describes the successful retrieval of a stapler pin from the root canal of mandibular premolar using instrument removal system.

Keywords: Foreign object, fracture, nickel-titanium instrument, root canal treatment.

INTRODUCTION

Successful root canal therapy requires thorough mechanical and chemical debridement of the entire root canal, followed by a 3-dimensional obturation and a final coronal restoration to prevent access to microorganisms (1, 2). An important step of non-surgical root canal treatment is to prepare the root canal biomechanically, however during this stage various endodontic instruments used inside the root canal can fracture and a fragment may become trapped within the canals (3). Root canals can be blocked by the presence of broken instruments, canal obturation materials and in some case by foreign objects inserted by the patients themselves (4).

When an instrument fracture occurs during root canal preparation procedures, the clinician has to evaluate the treatment options with consideration for the pulp status, the root canal infection, the root canal anatomy, the position and type of fractured instrument and the amount of damage that would be caused to the remaining tooth structure. Removal of the fractured segment, bypassing and sealing the fragment within the root canal space or true blockage are chosen approaches. The consequences of leaving, versus removing broken instruments from the canal have been discussed in the literature and a variety of approaches for managing these obstructions have been presented (5, 6).

No standardized procedure for successful removal of unusual metallic objects even in difficult cases exists, but a number of different techniques are recommended, such as: the use of Stieglitz pliers or a small mosquito hemostat to remove silver cones, ultrasonic instrument, operating microscopes or microtube delivery methods (3, 5-8) This case report describes a rare clinical case of a stapler pin,
CASE REPORT

A 26 year old male patient was referred to the department of Conservative Dentistry and Endodontics in our institute. Patient complains of decayed tooth and food accumulation in left mandibular posterior region. Oral examination revealed deep occlusal caries in tooth #21. Periapical radiograph of the involved tooth revealed some foreign metallic object inside the root canal (Fig. 1A). The periapical tissue appeared normal with no associated pathology. One more periapical radiograph at 20 distal angulation was taken to identify the foreign object. The second radiograph revealed the presence of a stapler pin inside the root canal of tooth #21 (Fig. 1B). History of the patient revealed that a stapler pin was stuck accidentally inside the affected tooth while removing the food debris from the tooth using it. The incident occurred approximately one year back. Clinical examination of involved tooth revealed deep occlusal caries while the surrounding periodontium was usual and the pocket depth was within normal limits (Fig. 2A). Tooth was non tender on percussion. Based on the clinical and radiographic examination the tooth was diagnosed with chronic irreversible pulpitis with pulp necrosis.

The patient was explained about the treatment plan. All the carious tooth structure was removed and the tooth was build-up with restorative GIC before initiating the treatment and to facilitate the rubber-dam application (Fig. 2B). Under the rubber-dam isolation, modified gates-glidgen drills were used to create circumferential staging platform to expose 2-3 mm of the coronal most part of the stapler pin (Fig. 2B).

The Instrument Removal System (iRS™) microtube (Dentsply, Tulsa Dental, Tulsa, Oklahoma) was then selected and inserted inside the canal of tooth No. 21 to engage the coronal-most part of the stapler pin. After positioning the microtube, the same color coded screw wedge was inserted and slid internally through the microtube’s length until it contacts the obstruction. The instrument was engaged by gently turning the screw wedge handle CCW by a few degrees. When engaged, the obstruction was unwound and removed by rotating the microtube and screw wedge assembly CCW. The stapler pin was recovered from the canal wedged with the iRS microtube (Fig. 2C, D). A radiograph was then taken too confirm the removal of the obstruction from the canal space (Fig. 2E).
preparation for the placement of porcelain fused to metal crown, but the patient never turned up for the remaining treatment due to the cost of the treatment.

**Figure 3.** (A) Working length radiograph. (B) Post-operative radiograph confirming the quality of obturation.

**DISCUSSION**

Instrument fractures during root canal treatment hinder the clinician from optimal preparation and obturation of the entire root canal system. This affects the long term prognosis of root canal treatment negatively (9), other than the conventional files a variety of objects have been reported to break and subsequently become lodged in root canals including nails, pencil leads, toothpicks, tomato seeds, hat pins, needles, pins and other metallic objects (10).

Many methods are describes to remove broken instruments or objects within root canals, such as hand instrumentation, ultrasonic devices, Masserann Kit, canal finder system or, sometimes surgical methods also are employed (11). The factors influencing broken instrument removal should be identified and fully appreciated. The ability to nonsurgically access and remove a broken instrument will be influenced by the diameter, length and position of the obstruction within a canal and the skill of the operator. In spite of the technological advancements the success rate for the removal of foreign objects from the root canals is 55-79% (12).

The technique for the removal of foreign objects lodged inside the root canals by the patients themselves remains the same. First, the operator should take a good periapical radiograph to ascertain the type of object, its location and to evaluate its surgical or non-surgical retrieval. In the initial radiograph it was observed that some metallic object was lodged inside the root canal. A second radiograph from a distal angulation revealed the presence of stapler pin as a foreign object. A modified gates-gllidden drill was used to create the circumferential staging platform and to expose coronal 2-3 mm of the stapler pin. Then instrument removal system (Dentsply Tulsa Dental; Tulsa, Oklahoma) was used to retrieve the foreign object from the root canal successfully.

Instrument Removal System (iRS™) (Dentsply Tulsa Dental; Tulsa, Oklahoma) is a new two-component system designed to mechanically engage broken instruments. Each microtube has a small-sized plastic handle to enhance vision during placement, a side window to improve mechanics, and a 45° beveled end to “scoop up” the coronal end of a broken instrument. The iRS is indicated when ultrasonic efforts prove to be unsuccessful and may be used to remove broken instruments that are lodged in the straightaway portions of the root (11). The instrument with the black handle is 19 gauge (1.00 mm) and is designed to work in the coronal one-third of larger canals, whereas the instrument with the red handle is 21 gauge (0.80 mm) allowing it to be placed deeper into more narrow canals. Each complete instrument is comprised of a color coordinated microtube and screw wedge.

Careful pre-endodontic tooth examination, observation of the preoperative radiograph and a straight line access to the foreign object inside the root canal guides its successful retrieval no matter which technique is employed.

**CONCLUSION**

The instrument removal system is a useful technique for the retrieval of a foreign object from the root canal. The operator is successful with this technique when object is located in straighter part of the canal and the coronal 2-3 mm of it can be exposed/visualized.

**REFERENCES**


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