

Case report**Retrieval of a Separated Instrument from the Root Canal using Ultrasonics -A Case Report**

Nidhi B Hathila¹, Chintan Joshi¹, Uma Gohil¹, Vishal Changlani¹, Digisha K Damor²

¹Karnavati School of dentistry, Uvarsad, Gandhinagar, Gujarat, India

²PDU Government Medical College and hospital, Rajkot, Gujarat, India

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ABSTRACT

Every endodontist may have encountered a variety of emotions associated with instrument separation during root canal treatment. The traditional methods to recover such obstructions often require removal of greater amounts of tooth structure, potentially leading to perforation or eventual vertical root fracture. Today, these dangers can be minimized with innovative headways in vision, ultrasonics and microtube retrieval methods. In particular, the dental operating microscope permits clinicians to imagine most broken instruments and satisfies the age old saying "If you can see it, you can probably do it". This case reports on successful retrieval of separated instruments by ultrasonic techniques under magnification.

Key words: Ultrasonics, Instrument Retrieval System, Dental operating microscope.

INTRODUCTION

Clinicians included in endodontic practice may confront different undesirable procedural errors at any phase of routine endodontic treatment. Among the different procedural mishaps, fracture of endodontic instruments within root canals is one of the most troublesome incidents [1]. Fractured root canal instruments may include endodontic files, sectioned silver points, a segment of lentulo spirals, gates glidden drills, a portion of carrier-based obturators, finger spreaders, and paste fillers, or any other instrument left inside the canal[2].

The clinical outcome of cases with fractured instruments depends on several factors, such as root canal anatomy, the type of instrument material, the location of the fragment in the canal, the plane in which the canal curves, the length of the separated fragment and the diameter of the canal itself. During root canal preparation procedures, the potential for instrument breakage is always present. There are three possible outcomes that may be encountered when treating these cases: (i) Retrieval, (ii) Bypass and sealing the fragment within the root canal space, (iii) True blockage[3]. The use of both nickel-titanium (NiTi) hand files and rotary instruments has become popular and as of now they are the backbone of root canal instrumentation. This is mainly because of the much greater flexibility of NiTi files compared to their stainless steel counterparts, which offers particular clinical favourable circumstances in curved root canals [4-6]. However, regardless of their certainly good qualities, there is a potential risk of

'unexpected' fracture with NiTi instruments. With the increased use of NiTi instruments there has been an unfortunate increase in the occurrence of broken instruments[7]. Instrument breakage during treatment leads to considerable anxiety, and then all attempts are made to non-surgically liberate the instrument from the canal[8].

The removal of separated instruments from root canals is very difficult and at times can be impossible, with a reported success rate ranging from 55 to 79%[7, 8]. A few techniques and devices for removal of the separated instrument have been described in the literature with most successful method being the use of ultrasonics along with a dental operating microscope [9, 10]. In this report, we demonstrate a case with separated instrument in which a combined technique of ultrasonic method along with dental operating microscope was used to retrieve the separated instrument fragment from the root canal.

CASE REPORT

A 45 year old female patient reported to the Department of Conservative Dentistry and Endodontics, Karnavati school of Dentistry, Gandhinagar with the chief complaint of pain in upper left back tooth region since last 2 months. On clinical examination involved tooth showed deep carious lesion. Tooth was tender on percussion. There was no associated swelling in relation to the involved tooth region. Surrounding gingival tissue appeared inflamed but the pocket depths were within the normal limits. According to clinical

findings we gave the provisional diagnosis of apical periodontitis in tooth #26. Pre-operative intra oral periapical radiograph (IOPA) revealed radiolucency involving enamel, dentine and pulp with periodontal widening. The medical history was noncontributory. Conventional root canal therapy was proposed.

Figure 1: IOPA of tooth #26 shows fractured instrument in mesiobuccal canal

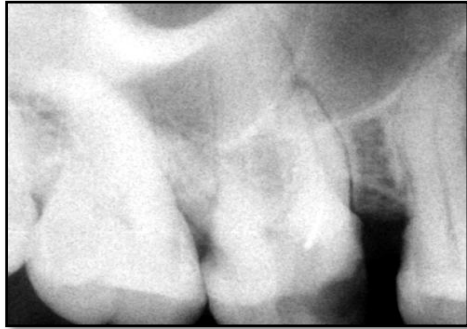


Figure 2: Fractured Instrument visible in coronal third of mesiobuccal canal under dental operating microscope



Figure 3: Radiograph shows retrieved instrument from mesiobuccal canal



Figure 4: working length determination



Figure 5: Mastercone Radiograph

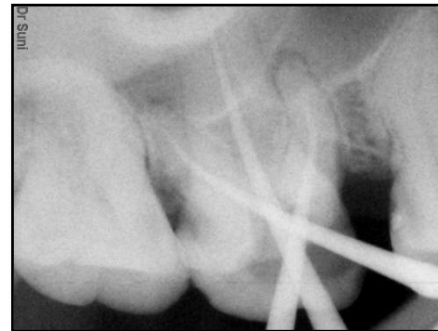


Figure 6: Obturation and Coronal Restoration Radiograph



Access cavity preparation was done under local anesthesia in tooth #26. Root canal orifices were located with the help of DG 16 explorer and widened using Gates Glidden drills (Dentsply International) (GG) and the patient was recalled for further treatment. During the next visit, the tooth was again isolated and opened, then working length was measured using electronic apex locator and then confirmed using IOPA and biomechanical preparation was carried out. During the course of biomechanical preparation, a S1 Hand Protaper Nickel- Titanium (NiTi) file got separated at the coronal region of the mesiobuccal root canal. On radiographic examination, as shown in **figure 1**, the separated instrument was visible in coronal region of mesiobuccal canal orifice. The patient was informed about the instrument inside the canal and ill-effects of keeping it untouched.

Exact location of separated instrument within the canal was confirmed under the dental operating microscope (PRISMA DNT, labomed) which is seen in **figure 2**. The separated instrument was located in the centre of mesiobuccal canal. Mesiobuccal canal orifice was enlarged using Gates Glidden drills up to #3. Modified Gates-Glidden drills (Dentsply International) were used to create circumferential staging platform to expose 2-3 mm of the coronal most part of the broken instrument. After this ProultraUltrasonic tip no. 7 in satelec ultrasonic handpiece at a power setting of 3 was placed into the mesiobuccal canal between the exposed end of the file and the prepared staging platform and activated to loosen the fractured instrument and continuous irrigation was done. Following the ultrasonic activation, the instrument fragment floated out from the canal. Fractured instrument was found to be approximately 5mm in length. **Figure 3** shows radiograph after removal of fractured instrument. The patency of the mesiobuccal canal was confirmed under the dental operating microscope and an IOPA was taken to confirm the same. **Figure 4** shows confirmed working length radiograph.

Biomechanical preparation was completed by step-back technique using 2% sodium hypochlorite and 17% ethylene diamantetraacetic acid (EDTA) (Glyde, Dentsply International).

Interappointment dressings of calcium hydroxide were given and the patient was recalled for obturation. Master cone was selected and checked radiographically as seen in **figure 5**. The root canals were obturated by single cone technique using guttapercha and AH Plus root canal sealer. Coronal restoration was done with silver amalgam. **Figure 6** shows completed obturation and post endodontic coronal restoration on radiograph.

DISCUSSION

This report describes the successful removal of a NiTi fragment from mesiobuccal canal of tooth #26. Removal of broken NiTi fragments from the root canal is more difficult than that of stainless steel fractured instruments[11].

One of the most troublesome incidents is the fracture of endodontic instruments within root canal. Therefore straight-line access is mandatory for successful removal of the separated instrument and it is also necessary for prevention of instrument separation[11]. Treatment option and long term prognosis of treatment subsequent to file fracture is influenced by many factors: canal preparation stage, level of microbial contamination and intracanal location of separated file. There are three nonsurgical modalities available for treatment of fractured files: removal of fractured instrument from

canal space, to bypass the fractured file and if above two are not possible then prepare and obturate the accessible part of the canal[12].

Presence of separated instrument in the canal hinders accessibility to the apical terminus thus compromising cleaning and shaping procedure. So that, attempt to retrieve the separated instrument is considered as a more favourable option. However, one should keep in mind that the removal of separated instrument should not weaken the existing radicular tooth structure further as the instrument retrieval systems, such as Masseran kit may lead to removal of excessive radicular structure in order to gain access to the separated fragment and retrieving it would lead to root weakening, risk of perforation and postoperative fracture, thereby reducing the long-term prognostic value of the tooth [12].

To date, no standardized procedure for the safe removal of fractured instruments exists, although various techniques and devices have been suggested. To date, no standardized procedure is present for retrieval of fractured instruments from root canal. Ultrasonic technique, however, is simpler and less invasive. The contra-angled design of Ultrasonic tips and availability of different lengths and sizes of tips enable its use in deeper parts of the canal [13].

A technique was described by Ruddle et al which comprised of modified Gates-Glidden burs, ultrasonic devices, and a dental operating microscope[14]. In this technique, GG drill with maximum cross-sectional diameter slightly larger than the separated fragment is selected. The bud of the GG drill is altered by cutting it perpendicular to its long axis at its maximum cross-sectional diameter. It is used to create a small staging platform that facilitates the introduction of an ultrasonic instrument. This method combined with the dental operating microscope has improved magnification thus; the separated instrument from the canal can be removed easily.

CONCLUSION

Till date there exists no standardized technique for effective and ensured removal of separated instrument from the canal. Among the various techniques available, the ultrasonic endodontic device advocated for retrieval of fractured instruments is highly effective as its use is not restricted by position of fragment in the root canal or tooth involved. Therefore, enhanced visualization combined with a conservative approach, balanced with favorable prognosis is the treatment option of choice.

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Corresponding Author:

Dr. Nidhi B. Hathila,
Resident,
Department of Conservative Dentistry and
Endodontics, Karnavati school of dentistry, Uvarsad,
Gandhinagar, Gujarat, India.
Email: nidhithathila@gmail.com

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