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Surgical management of instrument separation beyond apex in a mandibular first molar

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Abstract

During routine endodontic treatment clinicians encounter instrument separation. It can be due to various causes and management depends on factors including level of separation, size of the separated fragment, remaining tooth structure, presence of periapical pathology, etc. In the present case report a rotary file was separated beyond apex in a mandibular first molar with preexisting periapical lesion. Full thickness mucoperiosteal flap was elevated and apicectomy was done. Patient is asymptomatic and complete healing is seen in 1 year follow up radiograph.

Keywords: Instrument Separation, Peri Apical Surgery, Apicectomy

Introduction

All the dentists performing root canal treatment must have experienced instrument separation at some point in their clinical practice.

The main drawback of instrument separation is it occludes the particular canal and hinders in cleaning and shaping of the portion apical to it resulting in inadequate removal of the bacterial colonies and persistent infection and thus, chances of failure of the root canal treatment becomes high. The rotary instrument often separates without notice and it is not necessary to have signs and deformities on the surface of a rotary file before separation.[(1)]

About 77% to 89% of all cases of instrument separation are during the treatment of molars.[2],[3] In the case of mandibular molars, mesial roots have frequently distal and buccolingual curvature so incidents of instrument separation are more common in a mesiobuccal canal as compared to the mesiolingual canal because of its lingual curvature.[4]

The prognosis of the tooth with a separated instrument does not affect much regardless of the treatment approach, used for the management of a particular case. Studies state that in only those cases in which preoperative periapical pathologies were present, treatment outcome was compromised.[5]

Case report

A 21-year-old male patient reported the chief to complain of pain in the lower right back tooth region for 15 days. The pain was spontaneous and aggravated on chewing and relieved following medication. Medical history was insignificant.

Upon clinical examination, proximal caries (mesio-occlusal) were present in relation to the mandibular right first molar. Pulp vitality test was done using a cold test (Edofrost, coltene), the tooth was non vital. Upon percussion and palpation tooth was tender, patient also gave a history of not chewing from that side for few days. Upon radiographic examination caries was present on the mesial aspect of the tooth reaching up to pulp and Bone loss in the furcation area was also visible.

After local anesthesia administration, Access opening was done followed by pre-endo build-up (Ivoclar Viva dent packable composite). Two mesial canals and one large distal canal were negotiated and irrigated using 3% sodium hypochlorite. The working length measurement was done using an apex locator (Propex Pixi, Dentsply). Glide path was prepared up to 15k file (m access, Dentsply) following which cleaning and shaping were initiated using Protaper Next files (Dentsply). During Rotary filing, the X2 file was separated in the mesiobuccal canal which was the last file to be used before obturation of the canals.

After copious irrigation, Calcium hydroxide dressing was given followed by temporary restoration (Cavit). A periapical radiograph was taken to confirm the location of the file. The file fragment was 3.5mm long. The patient was informed about file separation and was assured.

The patient recalled after 3 days; file bypass was attempted with 10k ss file. The patient was informed about all possible treatment plans and their outcomes. The patient agreed to surgical removal of the file.

Obturation of all 3 canals was done with single cone obturation, sealer used was MTA fill apex. In the mesiobuccal canal, the portion coronal to file was obturated. The tooth was restored with a composite restoration.

Before surgery OPG was taken to see the relation of the inferior alveolar nerve with a separated instrument to avoid any postsurgical neurologic complications.

Before surgery patient's consent was taken. Local anesthesia i.e., inferior alveolar nerve block and buccal nerve block was given.

After confirming adequate anesthesia, incisions were placed, one crevicular incision from the lower right second premolar to the lower right second molar, and an anterior releasing incision distal to the second premolar were given. The area surrounding the mandibular first molar was only exposed to keep the flap as conservative as possible.

A full-thickness mucoperiosteal flap was elevated and buccal cortex was exposed and a bony window was created to expose the root apex. The separated instrument was exposed. Apicectomy of the mesial root

was done along with it separated file was removed. The exposed gutta-percha in the apical end was sealed with a hot burnisher and then the cavity was cleaned thoroughly and the flap was closed. Sutures were given (4-0 vicryl) and the patient was advised to take antibiotics and anti-inflammatory drugs orally for 5 days and recalled after 7 days.

Radiographic and clinical follow-up was taken at 8 months and 12 months. Complete healing could be appreciated in 12 months follow-up radiograph.(Fig II F)

Discussion

For management of a tooth with the separated instrument, various factors are to be taken care of like pulpal status of the tooth, remaining dentin structure, curvatures, location of instrument separation, size, taper and metallurgy of separated instrument, the stage of endodontic treatment during which the fracture occurs, and the presence of preoperative periapical radiolucency. etc.[2]

When instrument separation occurs beyond root apex very little can be done with help of a non-surgical approach and may increase the complications. In such cases, a surgical approach is desirable which includes options like periapical surgery with apicectomy, hemisection, intentional reimplantation. In the presented case the patient was explained about all treatment options and associated risks with it and the case was managed by doing periapical surgery with apicectomy as in this particular case it seemed the most desirable treatment option.

When instrument separation occurs in the initial stages of cleaning and shaping and there is preexisting periapical pathology, in such cases prognosis is poor.[3]

The placement of a root-end filling material following root resection in endodontically treated teeth has always been in debate. While some author's state that root-end filling should be placed routinely, others state that it is not necessary when the root end portion is not accessible to instrumentation and the source of infection has been removed, provided that the exposed root filling is of good quality. In the presented case, following resection of the root, the gutta-percha in the remaining portion of the mesial root was found to be adequately sealing the root canal, hence a retrograde filling was not done.[4][5]

Conclusion

Endodontic surgery is classically considered as the last resort for treating endodontically involved teeth. However, when ortho grade retreatment fails to remove the cause of persisting infection, endodontic surgery has to be performed. Furthermore, when clinical and biological principles are meticulously followed, endodontic surgery results in a higher success rate and a good long-term prognosis

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Legend Figures

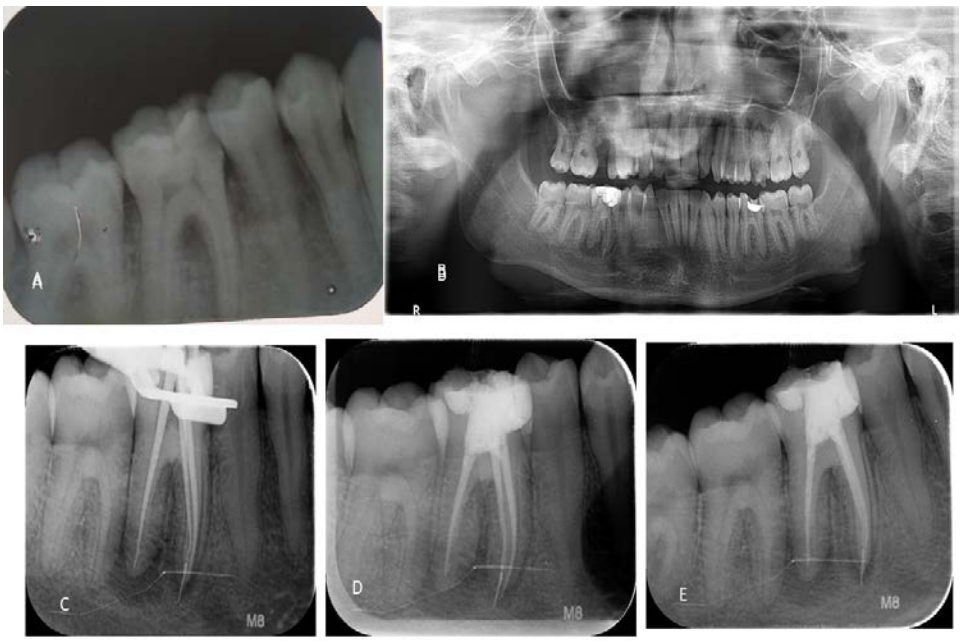

Fig. 1: A- preop xray , B- OPG taken after instrument separation to measure the distance from inferior alveolar nerve and mental foramen, C- master cone xray, D,E- obturation

Fig. 2: A- flap design, B- ostectomy site and exposed instrument, C- root apex and retrieved instrument, D- separated part with x2 rotary file, E- 8 months follow up, F- 1 year follow up.