Two Case Reports of Fracture And Bypassing Separated Instruments in The Root Canal

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Abstract: Separation of anedonticinstrumentintherootcanalisacommonmishapthatmay occur during endodontic treatment. It may have potential impact on the outcome of the treatment as it hinder cleaning and shaping of the root canal. Removal of these separated instruments is often advised but factors like poor access and visibility to these separated instrument makes it difficult and also the amount of dentin to be removed is more. As an alternative, non-removal, bypassing techniques are very effective and conservative. This article describes the management of cases with separated instrument in the root canal, bypassing those separated instrument.

Keywords: Bypassing, cold lateral condensation, fine file, obturation, separated instrument.

I. Introduction

The primary objectives of root canal treatment are proper cleaning, shaping and D-Fluid tight sealing of the root canal system. These objectives will be made impossible if an instrument gets separated in the root canal. The success of root canal treatment is determined by the clinician fail to achieve the asepsis and primary objectives. Endodontic has developed over time with the introduction of CBCT in diagnosis, dental operating microscope, ultrasonics, surgical lightpette. Even though root canal treatment is being done under much developed conditions, mishaps like instrument separation are inevitable. Evaluation of post-endodontic radiographs shows that 2-6% of the cases have separated instruments.

The presence of a separated instrument in the root canal leads to failure of root canal treatment. The prognosis depends on the degree of contamination of canal at the moment of instrument separation. Proper assessment should be made whether the canal can be instrumented even in the presence of a fractured instrument. If the canal cannot be instrumented adequately, the separated instrument should be removed.

The probability of removing a separated instrument is directly related to visibility, i.e., whether the fragment can be visualized. The visibility depends on the location of the separated instrument. When the fragment is inside the root, beyond the curvature, visibility is required. When the fragment is inside the root, beyond the curvature, visibility is required. When the fragment is inside the root, beyond the curvature, visibility is required.

An alternative technique that does not require direct visibility to the fragment is "bypass," where the file is inserted between the fragment and the root canal wall and the canal is negotiated using a canal preparation instrument and obturation with the fragment remaining in situ. Incorporating the fragment in the root canal obturation material considerably improves the case prognosis.

In this article, I present two case reports in which separated instruments were successfully bypassed with the eventful postoperative period.

II. Case Reports

2.1. Case Report 1

A 59-year-old man presented to the private dental clinic in Duhok City, Iraq with the chief complaint of spontaneous pain. He was a left tooth for 2 weeks. The pain intensified by thermal stimulation. History revealed intermittent pain in the same tooth with hot and cold stimuli for the past month. The patient’s medical history was non-contributory. Intra-oral examination revealed a necrotic pulp in the mesial root. The tooth was not mobile. On vitality testing, using heated gutta-percha (Dentsply), it was cold. Treatment involved pain, the pulp vitality test, caused a premature response. An operative radiograph revealed a distal radiolucency near the pulp and periodontal ligament space widening. From clinical and radiographic findings, a diagnosis of symptomatic irreversible pulpitis with symptomatic apical periodontitis was made. Since the first two molars were missing and the tooth under study was a good candidate for an abutment, root canal treatment was planned. The tooth was anesthetized with 1.8 ml 2% lignocaine containing 1:200,000 adrenaline followed by rubber dam isolation. An endodontic access cavity was established. While cleaning and shaping the canals, a 15 size K file was separated in the mesio-

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buccal canal. On taking IOPA, it was found that the separated file was located below the curvature of the root. Since the fractured segment could not be visualised and was below the root curvature, bypassing was preferred over retrieval. The access cavity was filled with chelating agent-17% EDTA (Avuprep) and 6K file was introduced into the mesio-buccal canal for searching away to bypass the instrument. After a few tries, it was able to get the 6K file past the instrument. Working length was confirmed radiographically. During the shaping of canals, copious irrigation with 5% sodium hypochlorite and saline was performed. Patency was kept with an 8 size K file between every instrument. Shaping of mesial canals was done up to 4% taper shaper file and for distal canal up to X2 Protaper Next file. The complete shaping sequence in the mesio-buccal canal where the instrument was separated is listed in table 1. Aftershaping and cleaning, calcium hydroxide (Avulc) was placed in canals and the cavity was sealed with cotton pellet and temporary restoration was given. After 2 weeks, patient reported for the second appointment. The tooth was again isolated and temporary restoration was removed. Calcium hydroxide was removed using sterile saline solution. Canals were dried using paper points. 4% gutta-percha (Dentsply) was fitted in mesial canals and 6% gutta-percha (Dentsply) was fitted in distal canal. Obturation was done using cold lateral condensation technique. Postobturation radiographs were taken. Recall visits were uneventful and the patient is still under review.

Table 1: sequence of shaping files used to bypass the separated instrument in case 1

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<tr>
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Figure 1: IOPAR of 38 showing fractured file in MB canal

Figure 2: fractured file bypassed and working length determined
2.2. Casereport 2

A 22-year-old woman presented to the private dental office in Duhok City, Iraq with the chief complaint of gross decay of lower right back teeth. Teeth were asymptomatic. On examination, carious mandibular first and second molars were found. Both teeth were root canal treated elsewhere 5 years before. Postendodontic restorations were fractured. On radiographic examination, it was noticed that both teeth were poorly root canal treated with furcation involvement in 46 and a separated instrument in 47. Since the prognosis for 46 was poor, it was advised to extraction. Patient reported to the emergency clinic 3 months later, after extraction of 46. The tooth was anaesthetized with 1.8 ml 2% lidocaine containing 1:200,000 adrenaline followed by rubber dam isolation. The fractured restoration was removed.

Endodontic access cavities were prepared by the previous dentist with a modified Gates Glidden bur. Gutta-percha from the canals were removed with the help of G/P solvent (GPsolve). On introducing ISO size K-files to the canals, obstruction was felt in the mesiobuccal canals suggestive of a separated instrument. The canal was kept under the field of vision (Seiler) but the separated instrument could not be visualized. Owing to the fact that the file could not be visualized and limited thickness of the root, it was decided to bypass the separated file. Bypassing was started by introducing a file of size K-file, 17% EDTA (Avuprep) was used along with the file inside the canal between the separated instrument and the axial wall of the canal. The same procedure had been repeated again to get patency of the canal and to reach the apex. Finally, the separated instrument was successfully bypassed and the file was reaching till the apical constriction. It was confirmed radiographically and by working length was also determined. During the shaping procedure, thorough irrigation of the canal was done with 5% sodium hypochlorite and sterile saline solution using alternatively. Intracanal medicament was given with calcium hydroxide (avulca) and patient was relieved.

On the second visit, after removing calcium hydroxide, shaping of the canal was done and copious irrigation was carried out with 5% sodium hypochlorite and sterile saline solution. The complete shaping sequence to bypass the separated instrument was listed in Table 2. Canals were dried using paperpoints. After taking mastercone IOPA, obturation was done with gutta-percha cones (Dentsply), using cold lateral condensation method. Follow-up was carried out after 1 month which was uneventful.
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Table 2: sequence of shaping files used to bypass the separated instrument in case 2

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<td></td>
<td>Hero Shaper99 25-4%</td>
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</tbody>
</table>

Figure 5: A fractured file in the mesial canal of 47

Figure 6: Fractured file bypassed

Figure 7: IOPAR of 47 with master cone along with fractured file
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III. Discussion

The presence of a separated instrument seriously affects the outcome of the root canal treatment, as it usually prevents access to the apex, impedes thorough cleaning and shaping of the root canal, inhibits the drainage from periapical lesions, and prevents three-dimensional fluid-tight obturation of the root canal system. When an instrument gets separated in a canal, the clinician has two options: either to retrieve the separated instrument or bypass it. Making an instrument visible requires straight-line access. Both these options are needed. When the fragment is located inside or beyond the root canal, curvature, visibility, and the straightening of the root canal are different, as well as the amount of dentin and root weakening even perforation. Current information from scientific literature on the subject of broken instruments’ retrieval is insufficient and mainly comprises clinical case presentations. In both cases we have mentioned in this article, the separated instrument was located beyond the root curvature. Considering the relatively smaller size of the root, retrieving the fragment was not opted for treatment. An alternative technique that does not require direct visibility to the fragment is called “bypass,” where a fine file is inserted between the fragment and root canal wall, and then used to negotiate the canal. If working length and thorough instrumentation and obturation with the fragment remaining in situ, incorporating the fragment into the root canal obturation material considerably improves the case prognosis.

Before bypassing the separated instrument, the clinician should examine different horizontally and vertically angulated radiographs. Proper coronal access should be made before bypassing a separated instrument. Different techniques may be employed in flaring the canal coronal to the intra-canal obstruction. However, the unpredictable and easily sequential use of initially hand files, followed by Gates-Glidden (GG) drills sizes 1 to 3, they should be used cautiously in approximation to the obstruction. Careshould be ensured to use them away from the canal and to prevent transportation. In the cases mentioned in this article, we used the auxiliary shaping file Protaper SX to get proper coronal access. Flushing the canal system with irrigating solution facilitates flaring of the root canal walls. The irrigation protocol, the delivery sequence in which they are delivered, the importance of removing smear layer, and the sequence in which they are delivered can happen. Decision should be made whether to bypass or retrieve the separated instrument and it depends on various factors. Success of the treatment depends on the decision taken by the endodontist. From the two cases mentioned in this article, we were able to reach a conclusion that if these separated instruments are able to be bypassed, it is more conservative than retrieving the separated instrument.

IV. Conclusion

The best method for managing separated instruments is to root canal canalis prevention of such incidences. Thorough knowledge of the anatomy and various instruments used, following proven concepts and applying safe and modern techniques can prevent such an incidence. Even if a practitioner follows a correct treatment protocol, instrument separation can happen. Decisions should be made whether to bypass or retrieve the separated instrument and it depends on various factors. Success of the treatment depends on the decision taken by the endodontist. From the two cases mentioned in this article, we were able to reach a conclusion that if these separated instruments are able to be bypassed, it is more conservative than retrieving the separated instrument.

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