Successful Treatment of Persistent/Refractory Chronic Periapical Abscess following Multiple Endodontic Treatment Due to Failure in Detecting Foreign Body in Root Canal

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Abstract:
Refractory periapical periodontitis is a condition of the persistent periapical pathology of endodontic origin even after completion of root canal therapy. Although a plethora of reasons exists for failure, improper diagnosis of pulpal etiology is one of the primary causes for endodontic failures. Inability to diagnose the presence of foreign body can have risk on the success of endodontic treatment. Discovery of foreign bodies is always almost accidental in root canals of tooth. Foreign bodies lodged in pulp chambers or canals can often act as a nidus of infection. In the present case, we report a case of persistent/refractory chronic periapical abscess even after orthograde root canal treatment and retrograde periapical surgery (apicoectomy) and several regimens of multiple antibiotic therapies. Failure earlier can be attributed to inability of the previous operators to detect the presence of staple pin (foreign body) in root canal of tooth.

Case Report
A 12-year-old male child was accompanied by guardian to our clinic with the complaint of persistent pus discharge from the upper part of the mouth. Pus discharge was intermittent from past 1 year with episodes of swelling in the same region. Prior dental history revealed that (according to the chronology of history of occurrence) the patient had a full 3 years back following which the patient developed pain and swelling. The patient underwent root canal treatment for the same 1 week after the trauma. Following treatment, patient revealed the symptoms persisted even after treatment. The patient underwent surgery for the failed root canal treatment and multiple courses of antibiotic therapy. Even after the surgical intervention (apicoectomy) patient did not improve on symptoms. The patient, however, appeared to us because the recent episode of pus discharge that did not stop even after consumption of 10 days of prescribed antibiotic therapy. The parents wanted to get the tooth extracted.

Extraoral examination revealed the presence of swelling of upper lip. Lip was tender and edematous. Intraoral examination was carried out which revealed fractured and discolor tooth #21 (FDI notation). Tooth was tender even on palpation and showed severe degree of mobility; there was the presence of root canal access restoration in the same tooth (Figure 1). Palpating the area opposite the tooth revealed tenderness and fluffiness of mucosa indicating local loss of bone. There was the presence of sinus in the attached gingiva overlying fractured tooth. On palpating, there was abundant pus discharge from the sinus. Collected pus was sent for microbiological testing and antibiotic sensitivity test because of the long history of swelling and chronic infection.

Other findings included tilting of tooth #21 and #22, mesial migration of adjacent tooth #11 into the site of fracture,

Introduction
Refractory/recurrent periapical abscess occurs due to failure of endodontic therapy.¹ Refractory periapical periodontitis is a condition of the persistent periapical pathology of endodontic origin after the completion of root canal therapy. Common causes of refractory periapical abscess are inadequate endodontic access, poor debridement of canals, resistant endodontic microbial flora, leaky/faulty access restorations, and endodontic mishaps during therapy.¹,² Uncommon causes like failure to detect and remove foreign bodies can lead to endodontic failure too. Foreign bodies lodged in pulp chambers or canals can often act as a nidus of infection.³ Several foreign bodies such as wood picks, bobby pins, needles, metal screws, toothpicks, and pencil leads are found in root canals of teeth. Non-elimination of these puts jeopardy on endodontic success.³ In the present case, we report a case of persistent/refractory chronic periapical abscess even after orthograde root canal treatment and retrograde periapical surgery (apicoectomy) and several regimens of multiple antibiotic therapies. Failure earlier can be attributed to inability of the previous operators to detect the presence of staple pin (foreign body) in root canal of tooth.
this drifting of teeth would cause difficulty in restoring the morphology of fractured tooth (Figure 1) and increased overjet.

Provisional diagnosis
Based on history of symptoms and signs; a diagnosis of failed endodontic treatment was assumed.

Investigations
Radiographs (intraoral periapical [IOPA]) revealed irregularly obturated root canal spaces and overoburation in tooth #21. There was root end resection evident of prior endodontic surgery visible. Furthermore, the presence of large periapical radiolucency surrounding apex of tooth was evident (Figure 2). Microbiological test revealed mixed infection with aerobic as well as anaerobic bacteria. Culture tests revealed sensitivity to amoxicillin which was prescribed to the patient.

Confirmatory diagnosis
Refractory periapical periodontitis or periapical abscess was ascertained.

Figure 1: Intraoral view showing fracture tooth and mesial migration of adjacent teeth.

Figure 2: Presence of foreign body that was part of obturation previously.

Treatment and follow-up
Treatment plan
1. Since there was root end surgery that was already performed, repetition of surgical endodontic treatment could not be planned because it would severely compromise on the root:crown ratio of tooth (compounding factors - Patient’s teeth were longer, and there was the presence of deep bite). Hence, a decision to treat the patient conventionally with orthograde root canal treatment was decided.
2. Space gaining to achieve space for correct morphology of fractured tooth by uprighting of adjacent teeth utilizing “finger springs” on tooth #11, #21, #22 using removable appliance was planned.

Treatment performed
An informed consent was obtained from the patient. Access opening was performed and gutta-percha removal was done utilizing commercially available gutta-percha solvent. IOPAs were done to check for completeness of gutta-percha removal. However after several IOPAs, it was seen that certain radioopacity remained in the canal which was nonremovable. Hence, efforts using mechanical means to remove canal filling was done. To our surprise, there was recovery of metallic stapler pin (non-endodontic instrument) from the root canal (Figure 3). Authors assume that the failure to detect and remove foreign body both times was responsible for failure of root canal treatment after several attempts of orthograde root canal and retrograde apicoectomy and antibiotic therapy by previous operators.

Interappointment intracanal medicament - calcium hydroxide was later placed in canal for 3 months until there was total absence of symptoms and there was resolution in periapical healing evaluated through radiographs. Mineral trioxide aggregate (MTA) was planned to be used an apical barrier to provide seal; this was placed by means of forming a custom-made gutta-percha which can be used to carry and condense MTA in the apex of the tooth (Figure 4).

During the period of endodontic treatment, removable “finger-spring” appliance was delivered to patient to gain space mesiodistally allowing proper fabrication of future crown prosthesis on that is undergoing endodontic therapy (Figure 5 shows spacing between anterior teeth compared to Figure 1). Following space gain, non-metallic post core was done and later restored with a provisional acrylic crown. Adjacent teeth were also modified with composite restorations to a more aesthetic look to patient. Patient is advised for a regular check-up and replacement to a permanent full veneer crown after the age of 18 when there is full settling of occlusion. Further removable orthodontic treatment is being done to treat high overjet (Figure 6).
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Discussion
Endodontic treatment has salvaged several pulpal involved teeth over the years. However, a few of these teeth fail due to variety of reasons. It has been said that there is no such thing as failure, just different degrees of success. “Success” is defined as the lack of disease while “failure” is defined as the presence of any signs or symptoms indicating disease; just lack of signs and symptoms do not mean successful treatment.

Endodontic failures/refractory periapical periodontitis occur due to several reasons such as inadequate endodontic access, poor debridement of canals, resistant bacteria, leaky access restorations, and endodontic mishaps are putforth.1,2 Improper diagnosis of pulpal etiology is one of the primary causes for endodontic failures; inability to diagnose the presence of foreign body can have risk on success of endodontic treatment. Discovery of foreign bodies is always almost accidental.3 Usually, foreign bodies are difficult to diagnose for following reasons – (1) Presence of a foreign body in canals is an unusual occurrence, (2) there are no presence of positive case history of placing foreign bodies in mouth, and (3) certain foreign bodies are not radiopaque; hence, their presence in diagnostic X-rays are not evident.

The common act of placing foreign objects would be to remove food and other deposits lodged in the pulp chamber/canals. Children especially have the masochistic habit of placing foreign objects in mouth, hence such a possibility should be assumed in mind especially in the case of open pulp chambers to alleviate pain.4 In present case failure to predict the presence of foreign body in canal could have led to refractory chronic periapical abscess even after treatment with orthograde root canal therapy and retrograde apical surgery. Although the treatment provided episodic relief of symptoms, failure to eradicate the etiology caused the symptoms to recur.

After diagnosing the foreign objects, several factors play a role in determining its complete retrieval such as type of object, location, canal morphology, canal curvature, wedging action, dimensions of foreign body, solubility to endodontic irrigants, and radioopacity.5,6 Antibiotic sensitivity was done since the lesion was chronic in nature and history of several regiments of antibiotics not curing the lesion. Also because of association bacterial like actinomyces and Enterococcus species and other resistant bacteria to refractory periapical abscess.7 The use of interappointment medicament-calcium hydroxide was used; which would allow better healing of periapical pathology.8

Figure 3: Foreign body or stapler pin removed from the canal.

Figure 4: Placement of mineral trioxide aggregate as a barrier at apex due to presence of blunderbuss canal.

Figure 5: Space gaining using removable appliances to allow fabrication of crown of fracture tooth.

Figure 6: Post endodontic and orthodontic rehabilitation of tooth.
Recently, MTA has been shown to provide good apical barrier seal. MTA is highly biocompatible, sets in wet environment and provides good seal, thus sealing the root canal space from periapical tissue and viz.\textsuperscript{10} In the present case, because of presence of large open apex, MTA was placed orthogradely utilizing custom made gutta-percha. Studies have shown the ill effects of the use of metallic posts on compromised thin dentinal walls of young permanent teeth. In this regard, use of a non-metallic post (light cure fiber post) was done in our case to prevent thin dentin from fracturing in the future.\textsuperscript{11}

Following the loss of tooth material by caries or fracture, there is tipping of adjacent teeth to occupy the lost space. If reconstruction of original tooth form is required, then orthodontic movement of teeth can achieve good space for providing good contour to teeth. In the present case, removable finger spring appliance was used to gain tooth movement of adjacent teeth during the endodontic healing of tooth #21 so that time to move tooth will be utilized during healing phases of endodontic treatment. Since the patient was in transitional dentition, the patient was given an acrylic full veneer crown; which would be later replaced with ceramic full veneer crown after total establishment of occlusion. Cosmetic recontouring utilizing composites in the end for adjacent teeth to establish a total esthetic appearance for patient.

**Conclusion**

Foreign body can act as a nidus of infection and recurrence of periapical pathosis if not removed. Careful scouting of root canals both clinically and radiographically is essential to prevent such a mishap.

**Learning points/take home messages**

- Inability to diagnose the presence of foreign body can have risk on success of endodontic treatment
- Usually, foreign bodies are difficult to diagnose for following reasons – (1) Presence of a foreign body in canals is an unusual occurrence, (2) there is no presence of positive case history of placing foreign bodies in mouth, and (3) certain foreign bodies are not radiopaque; hence, their presence in diagnostic X-rays is not evident
- After diagnosing the foreign objects, several factors play a role in determining its complete retrieval such as type of object, location, canal morphology, wedging action, dimensions, solubility, and radioopacity.

**References**