Refractory suppurative apical periodontitis due to cellulose fibers in the periapical tissues: case report

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The use of a cotton pellet as a spacer or as a medication carrier in the tooth pulp chamber between root canal therapy appointments is an accepted and common practice. Retaining the pellet in the proper position within the tooth is very important. Cellulose fibers from disposable drapes, gowns and cotton can cause foreign body reactions if left in a surgical wound. In addition, cellulose fibers from paper points, sealed inside the pulp canal, can cause refractory apical periodontitis.

The following is a report of refractory suppurative apical periodontitis, apparently secondary to foreign material in the periapical area. It is suspected that the foreign material consisted of cotton fibers that were displaced from the pulp chamber, through the canal, into the periapical area.

Case report

History

A 10-year-old Caucasian male presented to an emergency room 1 1/2 hr after sustaining a blow to the face during a kickball game. His chief complaint was "my front tooth is cracked." The patient reported good health, was taking no medications and had no contraindications to treatment. The mesial segment of the maxillary right permanent central incisor had class III mobility. Sulcular hemorrhage was evident. No other soft tissue injury was recorded. A radiographic evaluation revealed a mesioincisal fracture of the maxillary right permanent central incisor (Fig 1). At this time no attempt was made to remove the fractured portion of the tooth. The mesial segment was secured in place with Silux composite resin™ (3M Dental Products Division, St Paul, MN) on the facial and lingual surfaces of the tooth. One week later, the fragment was removed, a calcium hydroxide pulpotomy completed, and the fragment bonded in place with Silux composite resin.

Two months later, the patient had a draining sinus tract in the mucosal tissues facial to the maxillary right permanent central incisor, with no other signs or symptoms. A diagnosis of necrotic infected pulp with suppurative apical periodontitis was made. Chemomechanical instrumentation was completed and formocresol on a paper point was sealed inside the canal space. Three months later, the patient returned complaining of painful, swollen gums, and the sinus tract was still present. Radiographic evaluation revealed a radiolucent area apical to maxillary right permanent central incisor (Fig 2). Chemomechanical instrumentation, calcium hydroxide paste, and cotton pellet were repeated. The tooth was sealed with composite resin. Two weeks later, the sinus tract had still not resolved. The canal was reinstrumented and calcium hydroxide was replaced.

The patient returned again after 6 months, having fractured the mesial fragment of the tooth. Evaluation
revealed necrosis of the marginal gingiva, mesiofacial
to the maxillary right permanent central incisor (Fig 3) 
and sinus tracts on both facial and palatal tissues. The
mesial fragment was removed, calcium hydroxide was
replaced, and a restoration was placed using APH™
composite resin (LD Caulk Division, Dentsply Interna-
tional Inc, Milford, DE). The patient was at this time
referred to our office.

Examination

The patient reported to our office 13 months after the
original trauma. Review of the patient’s medical his-
tory revealed no contraindications to treatment. Exami-
nation confirmed the mesial crown/root fracture. Soft
tissues appeared healthy with the exception of mar-
ginal gingivitis localized around the maxillary right
permanent central incisor and open facial and palatal
sinus tracts. The patient, though currently asymptom-
atic, reported periods of discomfort. The tooth re-
responded normally to percussion and palpation and had
normal mobility. Mesial periodontal probing depths
were 5 mm and followed the contours of the fractured
surface. Distal probing depths were 3 mm. Radio-
graphic evaluation (Fig 4) revealed nearly complete
root formation, a 10x13-mm radiolucent area apical to
maxillary right permanent central incisor and inade-
quate coronal restoration. Adjacent teeth responded
within normal limits to vitality testing and probing. A
diagnosis of necrotic infected pulp with suppurative
apical periodontitis was made.

Clinical treatment

Under rubber dam isolation, the restoration was re-
moved and the canal was accessed. Cotton fibers were
found in the apical portion of the canal system. An at-
tempt was made to retrieve the cotton with barbed
broaches. After removing the cotton from the apical
portion of the canal, broaches intentionally passed be-
yond the apex of the tooth indicated that cotton was
located beyond the apical foramen (Fig 5). The tooth
was instrumented and calcium hydroxide powder was
vertically condensed into the canal. Two weeks later the
patient returned with facial and palatal sinus tracts still
present. Because cotton fibers were suspected to have
been displaced beyond the apex of the tooth, surgical
curettage of the periapical area was necessary. Root
canal therapy was completed in conjunction with api-
coectomy and the apical gutta percha (Mynol™, Block
Drug Co Inc, Jersey City, NJ) filling was cold burnished.
The tooth was temporarily restored with a Ketac Sil-
ver™ glass ionomer filling (ESPE-Premier Corp,
Norristown, PA) for coronal seal and an APH compos-
ite restoration. One week after the procedure, the soft
tissues were healing within normal limits and the pa-
tient had been asymptomatic. Pathological diagnosis

Fig 3. After 6 months the sinus tract facial to maxillary 
right permanent central incisor was still present. Marginal 
gingival tissue mesial to the tooth was necrotic, possibly 
due to impingement by the restoration or chemical burn 
by the restoration.

Fig 4. At the time of 
referred the radiolucent 
area was present apical to 
maxillary right permanent 
central incisor. Restoration 
with open margins is shown.

Fig 5. A broach with 
attached cotton fibers that 
were retrieved from 
beyond the apical foramen 
of the maxillary right 
permanent central incisor.

Fig 6. Photomicrograph (original magnification 40X) 
hematoxylin and eosin stain of birefringent material 
retrieved during surgery on the maxillary right permanent 
central incisor. Mild chronic inflammatory infiltrate is 
seen.
was a dental granuloma with chronic inflammation, darkly staining foreign material, and birefringent material present (Fig 6).

One year after the treatment, the patient reported that he had been asymptomatic, adjacent teeth responded normal to vitality testing, the tooth responded normally to palpation and percussion and had normal mobility. Sinus tracts were not present and soft tissue healing was complete. Radiographic evaluation revealed formation of a periodontal ligament apically and osseous filling of the pathological, surgical defect (Fig 7).

**Discussion**

It is conceivable that a calcium hydroxide pulpotomy (Cvek pulpotomy) followed by an adequate coronal seal at the initial emergency visit might have eliminated the need for root canal therapy in this case. It has been shown that an increased time interval between injury and calcium hydroxide pulpotomy treatment significantly decreases the prognosis of this therapy. After initiating root canal therapy, the placement of a temporary restorative material against hard-packed calcium hydroxide prior to bonding the coronal segment may also have eliminated the need for a cotton pellet. The space gained by not using a cotton pellet may have increased the retention of the restoration and allowed a better seal. Why a formocresol pulpotomy was done when the patient presented with a necrotic pulp is not known. Because of the refractory nature of the lesion presented here, it is thought that foreign material played a major role in maintaining the inflammatory condition. However, the persistence of bacterial insult through coronal leakage or from the periapical area cannot be ruled out. It is also conceivable that the displaced cotton prevented the calcium hydroxide from reaching the apical part of the root canal and therefore reduced its effectiveness. For these reasons apical surgery was indicated. Root canal therapy was completed in conjunction with surgical therapy and the apical gutta percha filling was cold burnished.

Friedman concluded in a review of surgical techniques that these two procedures, if performed in conjunction, would provide the best prognosis when compared to retrofilling only. Kaplan et al. have shown that cold burnished gutta percha provided significantly less leakage than retrograde amalgam or heat-sealed gutta percha fillings. Retrograde instrumentation was not completed as it was felt that the canal space was optimally disinfected. The use of calcium hydroxide as an intracanal medicament has been shown to effectively disinfect the root canal space after 30 days.

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