



Management of Extensive Periapical Lesion with or Without Periradicular Surgery: A Case Report

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Abstract

Traditional root canal therapy (RCT) for teeth has a long history of high success rate. However, the effectiveness of endodontic treatment for pulpless teeth with sizable periapical lesions is questionable. When apical periodontitis doesn't improve, further therapy should be considered. The aim of this report was to evaluate clinically and radiographically maxillary incisors that did not improved after RCT and presented with chronic periapical pathology. In case I reroot canal treatment (ReRCT) and periradicular surgery with retrograde MTA filling and platelet rich fibrin and bone graft was filled into the defect. Case II was treated with reRCT without any need of periradicular surgery. Patient was recalled after 6 and 9 months for reevaluation. Clinically both patients were asymptomatic and radiographically periapical radiolucency gradually reduced in size. In conclusion, most periapical lesion heals after reRCT. However, some periapical pathology may not respond to traditional RCT and require further periradicular surgery.

Introduction

The goal of endodontic therapy is to completely eliminate microorganism from the entire root canal system. In order to stop bacteria and/or endotoxins from reaching apical and periapical tissues, appropriate sealing must be established.¹

Biological, scientific, and technological advancements have led to an increase in the success rates of root canal cleaning and shaping treatments, which now range from 65% to 90%.² Nevertheless, despite the expansion, endodontic procedures are still performed through technical steps that are liable to fail.³

Indications for periradicular surgery are:

1. persistent periapical infections with chronicity and extensive apical radiolucent area
2. restricted coronal access due to insufficient retrograde sealing
3. root pins that are impossible to remove/perforate

4. fracture of the apical third
5. pulp calcifications in the cervical and middle third⁴.

Periradicular surgery is surgical removal of diseased tissue from a lesion at the apical level of a tooth is accomplished by a process known as periapical curettage.⁵ The surgical removal of a tooth's apex is known as an apicoectomy.⁶ The periapical curettage and apicoectomy of a tooth, together with a conventional filling of the canal system during the surgical operation, make up the canal obturation concurrent to the surgical procedure. When the canal is well-instrumented and numerous calcium hydroxide exchanges have already been made, it is indicated to treat cases of extensive chronic periapical lesions. However, the presence of inflammatory exudate can prevent the treatment from being completed, as happened in one of the cases that follows.

Through a case report, this study's goal is to illustrate how to treat an extensive apical lesion.

Case Report

Case I

A 32-year-old female patient reported with problem related to previously root-treated upper incisors. The patient complaint that she has a concern about periodic swelling and pus drainage from upper front teeth. She gave history of trauma about 15 years back. She has no pain, discolored 11, 21, a draining sinus in relation to labial vestibule of 21, 22 and no tooth mobility. (Fig.1) The 11, 21 and 22 have been conventionally root canal treated approximately 3 months ago. The extraoral examination did not reveal abnormality. Teeth were tender on percussion and palpation. Radiograph showed radiopaque coronal restoration, radiopaque root canal filling and large amount of sealer extruding beyond the apex of tooth 11, 21, and evidence of two radiolucency around apex of 11 and 21 separately. (Fig.2) The diagnosis of these teeth is previously treated tooth with symptomatic apical periodontitis on 11 and 21.

After discussion with the patient, the treatment option was to perform reroot canal treatment (reRCT) of 11, 21 and 22 followed by periradicular surgery using bone graft.

Preoperative explanation of the periradicular surgical procedures, benefits, and risks such as vertical root fracture, bleeding, swelling, pain and gingival recession were discussed with the patient.

The gutta-percha (GP) was removed from all three tooth and the root canals were prepared biomechanically using hand k-files up to no. 80 and 5% sodium hypochlorite (NaOCl) irrigation was done between each file. After biomechanical preparation of root canals were complete the canals were pooled NaOCl and activated for 60 sec using endoactivator. The calcium hydroxide Ca(OH)₂ dressing was placed which was changed every week for 1 month. Due to persistent exudation even Ca(OH)₂ after for 30 days it was decided to do periradicular surgery to remove the periapical lesion by apical curettage and simultaneously obturate the tooth with GP and MTA fillapex (Angelus®), followed by apicoectomy and retrograde filling. For this, three cartridges of 2.2 ml 2% lidocaine in 1:1,00,000 epinephrine (Xylocaine®) were administered to anesthetize the surgery field.

After 10 min from the administration of local anesthetic, a trapezoidal papillary-based design mucoperiosteal flap was reflected with two vertical releasing incision on 12, 23 and horizontal incision extending from mesial surface of 12 to mesial surface to 23 using BP blade 3. The flap was carefully raised using periosteal elevator, the flap was gently retracted with Austin retractor, constant bone contact was kept along the surgical procedure to prevent soft tissue trauma. Bone fenestration was present on the apical part with evidence of coronal reduction of bone height. The lesion was enucleated entirely with specific curettes and immediately placed in formalin solution and sent to histopathology laboratory in dental hospital for histopathological examination.

The apical 3 mm root end was measured with William probe. Then measured root tip of 11 and 22 was resected at 90° of tooth long axis using micromotor handpiece and straight bur, and normal saline was used as coolant. A root end cavity of 3 mm was prepared by using ultrasonic root-end tips (Tun ES1 tip). Continuous irrigation by saline to keep retrograde cavity clean. During retrograde filling, hemostasis was achieved by applying sterile gauze soaked into local-anesthetic solution (2% Xylocain®). Gauze was used to dry the created cavity before mineral trioxide aggregate (ProRoot®-MTA) was inserted. 10 ml blood was withdrawn for preparing Platelet rich fibrin (PRF) and mixed with bone graft (Perioglas®) filled into the defect and soft tissue was sutured using 3-0 silk suture (Ethicon). Antibiotics and analgesics were prescribed along with Chlorhexidine mouth wash during immediate post-operative period.

After 7 days, the suture was removed. Regular follow-up was done from the time of operating procedure as 6 months and 12 months. (Fig. 3)



Fig. 1 preoperative view showing discolored 11, 21 and sinus in relation to 21.

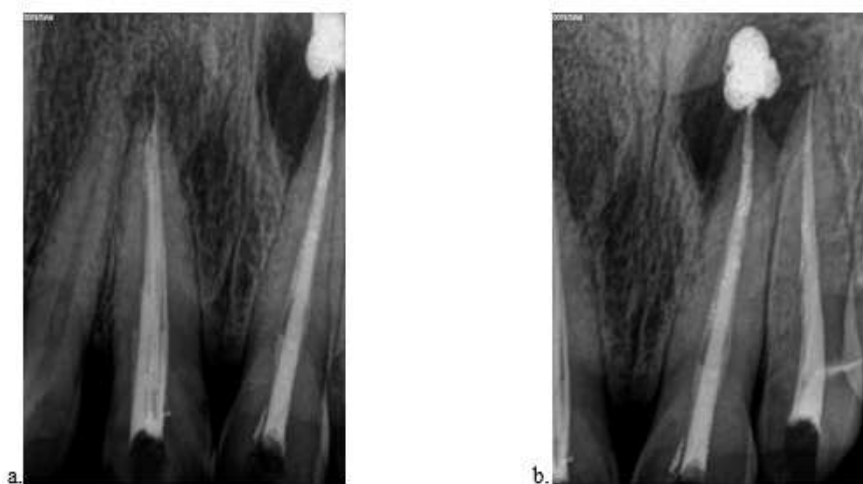


Fig. 2 Preoperative radiograph showing inadequate radiopaque root canal filling.

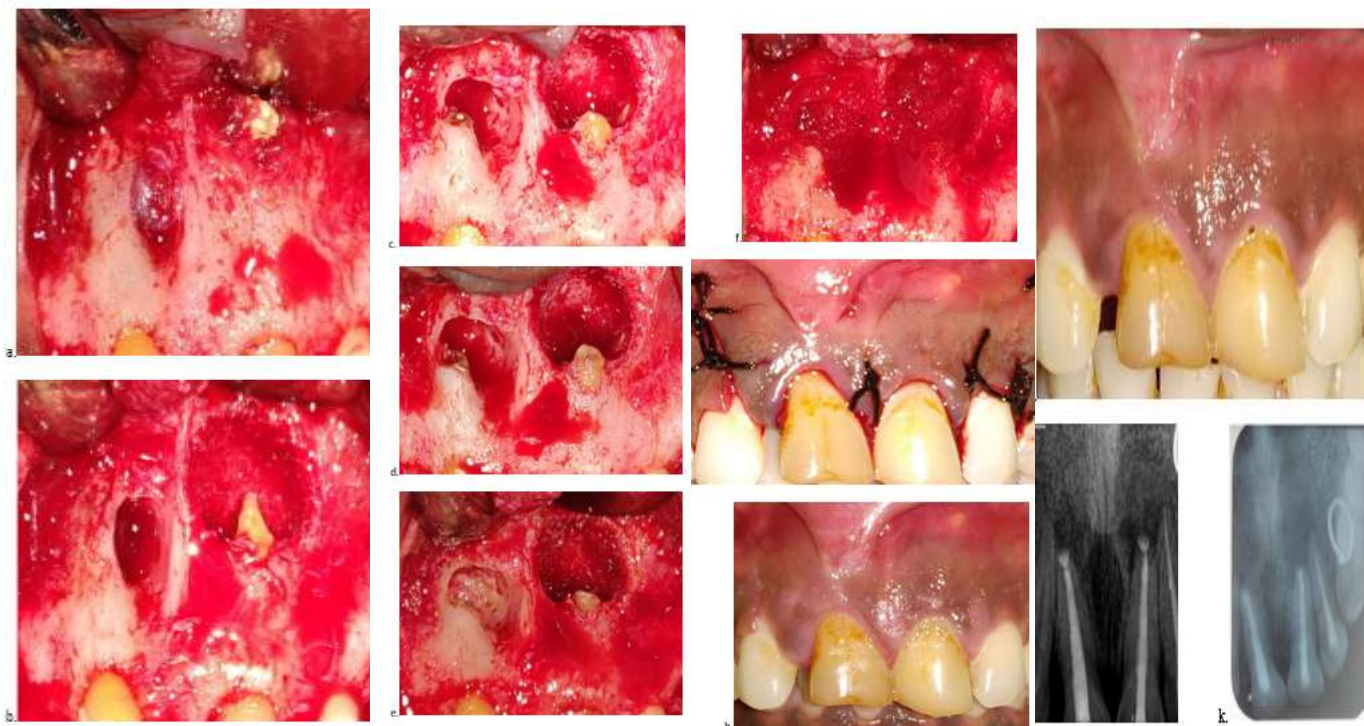


Fig. 3 a. full thickness mucoperiosteal flap reflected and fenestration evident in relation to 11, 12 with cystic lining. b. cystic lining enucleated. c. root end resection 3mm from the apex. d. root end cavity prepared. e. MTA filled in root end cavity. f. PRF and bone graft filled into to defect. g. flap approximated using 3-0 silk suture. h. post operative after 7 days, suture removed and reduce size of sinus is visible. i. post operative after 12 months. j. 6 months post operative show reduced radiolucency k. 12 months post operative IOPA shows complete healing of the periapical lesion.

Case II

A 50-year-old female patient reported with pain, palatal swelling and discolored 21, 22. She also gave a history of trauma about 20 years back. She had similar symptoms 4 years back for which tooth 21 and 22 have been conventionally root canal treated. The teeth were tender on percussion and palpation. Radiograph revealed inadequate root canal filling in relation to 21 and 22, and presence of well-defined periapical radiolucent lesion of considerable size in 22. (Fig. 4)

The decision was made to proceed with reRCT of 21 and 22. Old GP was removed from both teeth. Then the root canals were prepared biomechanically using hand k-files up to no. 60 and 5% sodium

hypochlorite (NaOCl) irrigation was done between each file. After biomechanical preparation of root canals were complete the canals were pooled NaOCl and activated for 60 sec using endoactivator. Then calcium hydroxide dressing was placed for one month, this dressing was changed every week. In this case, the treatment went well, and after a month, the palatal swelling had subsided and there was no exudation coming from the canal. At this consultation, GP and MTA fillapex (Angelus®) was used to obturate the canal. Frequent Monitoring was done at intervals of 6 and 12 months.

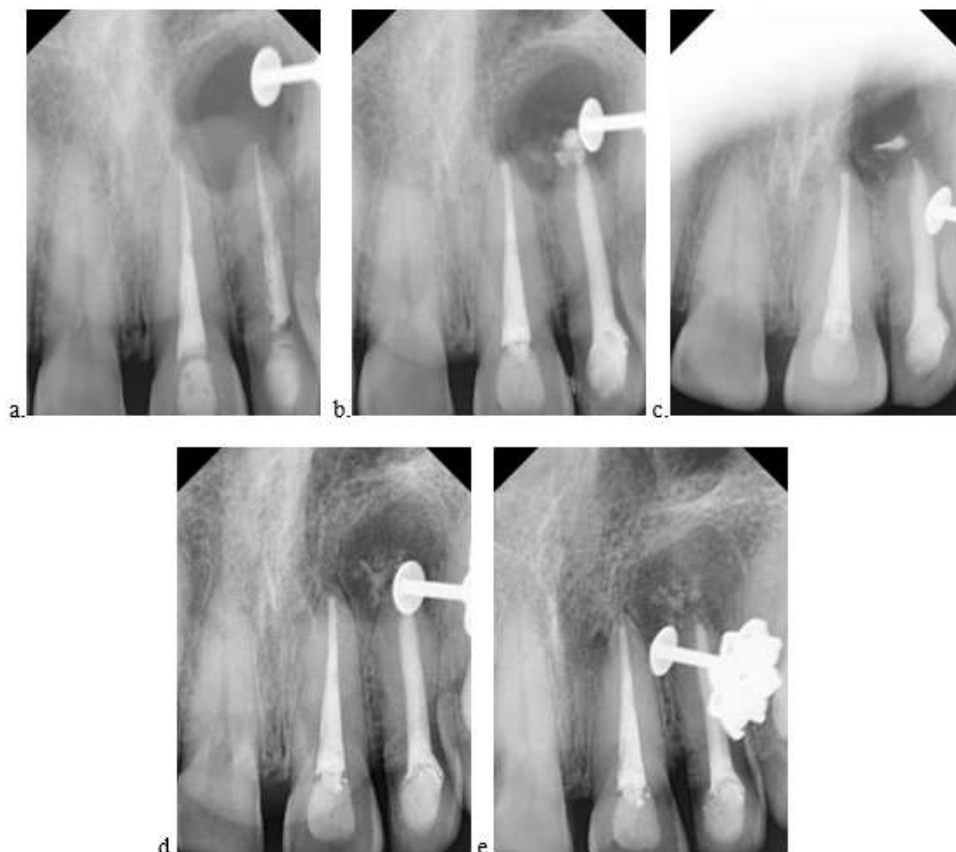


Fig. 4 a. peroperative radiograph showing periapical radiolucency in 11, 12 and inadequate radiopaque root canal filling. b. retreatment of 11, 12 done and immediate post op. c. 3 months post operative showing zones of radiopacity in the periapical lesion. d. 6 months post operative. e. 12 months post operative.

Results

For all both cases, post-obturation radiographs were taken at the interval of 6 months and 12 months. (Fig. 3j,3k,4d,4e) The amount of periapical radiolucency gradually changed in size.

Clinically, patients were asymptomatic at their follow-up visits and the post-obturation radiographs showed considerable change in periapical defects with visible radiopacity around the root canals suggestive of bone formation.

Results were very much satisfactory in both treatment modalities as both showed completed healing of the periapical pathology both clinically as well as radiographically.

Discussion

Periapical lesions are commonly seen in anterior region following a history of trauma. They are slow growing and may cause bony expansion, involve adjacent teeth, root resorption and may get secondarily infected. The biomechanics of the root canal are made easier by the surgical exposure of the apex, which enables a more effective filling and strong condensation without worrying about the obturator material spreading. A duct free of exudate is obtained by eliminating the diseased material from the periapical area, which favors the complete obturation and regeneration of the supporting tissue.⁷

Numerous materials have been recommended for root end obturation and many studies have attempted to identify an ideal material. The ideal material has not yet been discovered. MTA and IRM are the two materials that are used the most. Recent research demonstrates that while IRM had the best histological and radiographic healing outcomes, these outcomes were not statistically different from MTA.⁸

In case I both maxillary central incisors were involved with extensive periapical lesion, which was not responding to Ca(OH)₂ dressing and therefore completion of reRCT was done simultaneously along with periradicular surgery, along with retrograde filling with MTA was done to obtain better seal.

We performed apicoectomy and root end cavity preparation, the MTA was placed within the created cavity to close the path of communication between infected root canal system and periradicular tissues due to its ideal properties.⁹ Zhu et al (2000)¹⁰ in a two-year follow-up study with MTA as root-end filling material reported a high success rate.

After achieving proper seal with MTA, 10 ml blood was withdrawn for preparation of Choukrans PRF and was mixed with PerioGlas® bone graft and was filled in the defect. Fibrin matrix in PRF guides the healing processes. PRF contains growth factors that play a role in guiding the regenerative cells to the healing area. PRF does not enhance cellular proliferation in long term, but play an important role in the revascularization of the graft by supporting angiogenesis.¹¹

Bioactive glass has been widely used in periodontics for the regeneration of the periodontal defects. It stimulates bone regeneration, primarily in interproximal intrabony defects. This has resulted in reduction in size of defect to 50-70%.¹² Pantchev A et al demonstrated that when PerioGlas® was used along with super EBATM success rate was 72% while with EBATM alone it was 56%.¹³

The periapical pathology regarding this case was inflammatory cyst as from the histologic investigation where buccal cortical bone was lost. But the most common type of periapical radiolucency is granuloma (73%) than cystic (15%) or abscess (12%) type of lesion.¹⁴ It is documented that a granuloma heals after endodontic therapy. The question of whether periapical cysts heal after endodontic therapy has, however, been a subject of ongoing discussion among dentists. It is the prevailing opinion that pocket cysts heal after endodontic therapy¹⁵, but true periapical cysts may not heal after nonsurgical endodontic therapy and subsequent requires surgical intervention of such a lesion. ¹⁶

Conclusion

Long standing periapical lesion after a failed RCT may respond to retreatment by conventional method. However, if the lesion is not responsive to retreatment, periradicular surgery and apicoectomy is choice of treatment for tooth that does not respond to conventional root canal treatment.

Further use of MTA provides excellent apical barrier between the root canal and periradicular region enhancing healing of the surrounding tissue. PRF and PerioGlas also speeds up the healing process, as shown in our case report in which PRF with PerioGlas is effective in healing of the bone defect resulting from the lesion enucleation in faster rate radiographically.

The results of this case report shows that MTA, PRF and PerioGlas can be successfully used for obtaining periapical regeneration.

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