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Recommended Citation

Ghafoor, R., Rehman, K. (2016). Bilateral radicular cyst with severe destruction of the buccal cortical plate secondary to endodontic failure. *JCPSP: J Coll Physicians Surg Pak*, 26(4), 323-325.

Available at: http://ecommons.aku.edu/pakistan_fhs_mc_surg_surg/164

Bilateral Radicular Cyst with Severe Destruction of the Buccal Cortical Plate Secondary to Endodontic Failure

Robia Ghafoor and Kiran Rehman

ABSTRACT

Large apical radiolucencies after endodontic treatment are usually advised orthograde retreatment, apical surgery and that too with a guarded prognosis. Microsurgical techniques, the use of ultrasonic and magnification aides, have been in use in the developed countries for the past few decades and have shown significant improvement in long-term success of such cases. MTA is proposed as one of the best materials for sealing root end surfaces. In this report, the healing response of cases of 2 large apical radiolucencies, found separately in the anterior maxilla, which were treated by orthograde as well as retrograde endodontic treatments and guided tissue regeneration techniques.

Key Words: Radicular cyst. Endodontic failure. Periradicular surgery.

INTRODUCTION

Apical surgery refers to the surgical resection of a cystic lesion associated with the roots of an infected or necrotic tooth, which cannot be resolved by orthograde endodontic treatment alone. It is a standard of care to proceed with orthograde endodontic treatment prior to apical surgery.¹ Information of success rates after surgical or non-surgical endodontic retreatment is abundant but inconclusive. Reported healing frequencies vary between 45% and 90%. Such a wide range of difference is attributed to differences in the methods and tools employed for the surgical procedure.² The prognosis of apical surgery has shown significant improvement since the introduction of microsurgical instruments, endoscopes, microscopes and magnification loupes. Successful healing has been reported to be more frequent for the microsurgical technique than for the conventional technique.³

The present case report highlighted the healing response of 2 large cystic lesions with retrograde surgery using microsurgical technique followed by bone grafting.

CASE REPORT

A 24-year female patient presented to the AKUH dental clinics in June 2009 with complaint of esthetically unpleasing mismatched crowns on her upper anterior teeth placed 10 years ago. Her past medical history was unremarkable and her past dental history revealed that

she had fractured her upper central incisors in late childhood due to a fall and those teeth were later endodontically treated and splinted PFM crowns placed on them.

On her clinical examination, chipped porcelain at the cervical margin of both splinted porcelain fused to metal crowns on 11 and 21 was noted. On percussion, tooth 12, 11, 21 and 22 were tender to percussion and tooth 12 and 22 were no-vital on vitality testing. On her radiographic examination, 2 separate large apical radiolucencies of more than 1 cm in diameter were seen associated with teeth 11, 12 and 21, 22 (Figure 1).

The treatment plan advised to her was removal of splinted crowns, endodontic retreatment of 11, 21 with post and core buildups, endodontic treatment of teeth 12, 22, followed by apicectomy of all four anterior teeth and new full ceramic crowns to improve the esthetic outcome.

As advised, root canal treatment was started in all 4 anterior teeth. After removing GP points from tooth 11 and 21, pus exudation was noted and necrotic pulp was



Figure 1: Periapical radiographic reveals 2 large apical radiolucencies of more than 1 cm in diameters involving teeth 11, 12 and 21, 22.

Figure 2: Periapical radiograph taken after 6 months of surgery reveals complete healing of bony defects.

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Received: February 19, 2015; Accepted: August 27, 2015.

found in tooth 12, and 22. Preparation of all 4 teeth was completed with the protaper rotary system upto full working length of 18 mm, F3 in 11, 21 and F2 in 12, 22. Intra-canal calcium hydroxide with iodoform (Metapex) was placed in all 4 teeth and obturation was planned at 7-day follow-up visit. The teeth were temporized with the same splinted PFM crowns during healing phase.

At the second visit, the canals were found ready for obturation and therefore, completion of root canals and post-core buildups were completed. At the same visit, after obturation, retrograde surgical treatment was also initiated. Ochsenbein-luebke incision was made and a full thickness mucoperiosteal flap was raised, which showed 2 large separate infected cysts involving all 4 anterior teeth and complete erosion of buccal cortical plate was also noted. After removal of infected cystic lesion from both the cavities, excavated tissue was sent for histopathological examination. Roots of 11, 12, 21, 22 were resected at apical 3 mm, retrograde cavity prepared with ultrasonic device. Root surfaces of all anterior teeth, conditioned with tetracycline and retrograde root end filling, was done using MTA. The bony wall of the cystic cavity was irrigated with normal saline and filled with tricalcium phosphate sphere as bone graft material.

Postoperative hygiene care given to patient. Patient was prescribed analgesics and antibiotics for 7 days postoperatively. Biopsy report of the cystic lesion revealed infected radicular cyst. After one week, the patient was observed on a follow-up visit and it was seen that the surgical site was healing well and patient was maintaining good oral hygiene. Follow-up radiographs at 3 and 6 months of surgical site showed good healing response with bone filling (Figure 2). Patient was advised for making new crowns in all upper anterior teeth.

DISCUSSION

Apical surgery is indicated as a complementary procedure when the conventional endodontic treatment fails,⁴ or when orthograde retreatment alone is impractical to allow resolution of a peri-radicular lesion. Microsurgical technique has significantly improved the outcomes for healing of periapical lesion when compared to traditional approach to endodontic surgery. Success rate have been shown to be comparable with conventional orthograde treatment. The surgical treatment can be further broken down into: apical curettage, apical root-end resection, root amputation or hemi-section. Researchers have suggested that insufficient apical seal is a major cause of endodontic surgical failure.⁵ Apical resection is the preferred option because it would eliminate the untreated apical ramifications of the canal system that could lead to

micro-leakage of bacterial contents into the peri-radicular tissue spaces, therefore, making the tooth susceptible to post-treatment disease, or a non-healing lesion.

The purpose of placing a root-end filling after root-end resection and preparation is to establish an effective barrier between the root canal and the periapical tissues.⁵ Apical leakage studies show that the ideal root-end preparation depth is at least 3 mm or more.^{6,7} This depth is not only sufficient to receive and retain the filling material but also to prevent micro-leakage and a depth of less than 3 mm would not sufficiently remove all the apical ramifications and lateral canals.

Various root-end filling materials are reported in literature including amalgam, zinc oxide eugenol cements, conventional and resin modified glass ionomer cements as well as MTA. MTA has been recently developed and has been shown to provide better sealing ability than other restorative materials. However, a depth of 2 - 5 mm has been reported in literature for the use of MTA as a retrograde plug. MTA is not only biocompatible but also has osteogenic potential. It has been hypothesized that this is due to its calcium phosphate phase that it causes an induction in osteoblasts to adhere to the MTA.

The use of certain osteoinductive or osteoconductive materials such as human lyophilized bone in peri-radicular surgery has been indicated and might be very helpful in some situations.⁴ These biomaterials can be classified on the basis of their mechanism of bone formation as: osteoconductive, osteogenic, osteopromotive and osteoinductive. Osteopromotive materials are those which prevent fibroblast proliferation into the cavity where osteoblasts should grow, thereby preventing the growth of fibrous tissue or a callous scar formation. However, osteopromotive materials will not stimulate the growth of osteoblasts per se. Membranes placed in guided tissue regeneration would, therefore, be osteopromotive materials. Osteoinductive materials have the capacity to induce differentiated or undifferentiated mesenchyme cells into osteoblast, thereby inducing bone formation, and these materials themselves are resorbed with time as bone takes their place. Osteoconductive materials are those that serve as a scaffold for new bone growth that is providing a framework for the osteoblasts to become organized in order to form new bone.

Radicular cysts are usually less than one centimeter in diameter and they are bordered by a thin rim of cortical bone.³ However, in this case, the radicular cyst was unusually large and present bilaterally with a diameter of 2 - 3 cm, which resulted in complete destruction of the buccal cortical plate, so after microsurgical endodontic retreatment bony defect was filled with osteoinductive

bone regenerative material. A radiographic evaluation done at 3 and 6 months after surgery revealed gradual reduction in periradicular radio-lucency, suggestive of a favourable healing process. A radiograph, which was taken one year postoperatively, demonstrated excellent periradicular repair with the presence of lamina dura and bone trabeculae in relation to teeth 11, 12, 21, 22.

The use of biomaterials was important in this case not only because it has become a protocol but also because of the presence of 2 large radiolucencies present distinct from each other. The histo-pathological report confirmed the presence of residual cyst thereby confirming the diagnosis of apical periodontitis secondary to necrotic and inadequately root-filled teeth.

The patient could not be evaluated again after one year follow-up because she never turn back to clinic even after numerous reminders and telephone calls. It emphasizes the need to make the patients understand the consequences of non-treatment and the importance of follow-up visits.

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