

Management of combined apico-marginal lesion and external root resorption with GTR using bio-resorbable membrane: A case report

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ABSTRACT

The presence of an apicomarginal defect is one of the reasons for the failure of endodontic treatment. The best treatment option to treat an apicomarginal defect is to perform endodontic surgery using Guided Tissue Regeneration (GTR) membranes. External apical root resorption in permanent dentition is usually pathological. Local factors are the most frequent causes of resorption, especially excessive pressure and inflammation. Depending upon the type of resorption and etiology, different treatment regimens have been proposed. This case report presents management of long standing persistent periapical infection with apico marginal lesion combined with external root resorption. MTA was used as apical filling material and Ketac Molar GIC was used to fill external root resorption. Healiguideresorbable membrane was used to cover the defect. 1 year follow up showed complete resolution of apical pathology and resorption site.

Keywords: external root resorption, apico-marginal lesion, ketac molar gic, bioresorbable membrane, mineral trioxide aggregate, apical surgery.

INTRODUCTION

The prime objective of endodontic treatment is to return the diseased tooth to a state of health and function¹. Most of the time teeth with periapical lesions heal satisfactorily after non-surgical endodontic treatment². However, failure after conventional root canal treatment calls for surgical intervention in order to remove the pathological tissues and to eliminate the source of irritation, which could not be removed by the orthograde root canal treatment³. Generally, the success rate of apicoectomy and retrograde fillings is 50% to 70%⁴. When the bony destruction by the pathologic process includes the buccal cortical plate, prognosis of the periapical surgery decreases to 27% to 37%^{5,6}. An apicomarginal defect can be defined as a total loss of the buccal bone plate extending from crestal bone to the apex of the tooth⁷. These defects are reported to have diminished prognosis following periapical surgery⁸. This decreased prognosis in such defects is due to downgrowth of epithelial tissue along the root surface⁸. The treatment of endodontic-periodontal combined lesions such as apicomarginal defects requires both endodontic therapy and periodontal regenerative procedures. Guided tissue regeneration (GTR) is an established treatment option for the management of these defects⁸.

Physiological root resorption is a process involving resorptive activity followed by periods of attempted repair. This results in variable tooth mobility in deciduous teeth before exfoliation. In contrast, the process of root resorption in the permanent dentition is usually pathological resulting in loss of dentin, cementum or bone²⁵. Invariably, tooth resorption results from injuries to or irritation of the periodontal ligament and/ or tooth pulp. It may arise as sequelae of traumatic luxation injuries, orthodontic tooth movement, or chronic infections of pulp or periodontal structures, neoplastic process, associated with systemic diseases and lesions of idiopathic origin. The treatment goal in the external apical root resorption is to remove or destroy bacteria to allow healing to take place in the periradicular space. Calcium hydroxide as an intracanal medicament best destroys the bacteria. A side effect, however of using calcium hydroxide for long term is weakening of the root structure

in immature teeth. In mature teeth, the problem apparently does not exist²⁴. This article presents successful management of case of external root resorption combined with apico-marginal lesion.

CASE REPORT

A 25-year-old male was referred to the Department of Endodontics, Post Graduate Institute of Dental Sciences with a chief complaint of pus discharge and pain in mandibular anterior region. The patient was systemically healthy and medical history was non-contributory. Root canal treatment was initiated by the referring dentist one month back (Fig. 1A), with no resolution of symptoms after two visits. Extra oral examination revealed no sign or symptom. Intraoral examination revealed temporarily restored mandibular left central and right lateral incisors. Palpation of mucosa around the apex produced pain, and purulent exudate from the buccal gingival sulcus of the tooth. Tooth was not tender to percussion. Periodontal probing revealed isolated narrow, deep pocket in mid buccal region of the tooth. Tooth exhibited grade II mobility. Thermal and electric pulp tests yielded negative results for both the teeth. Periapical radiograph showed a large periapical radiolucency associated with both the roots. Non-surgical endodontic treatment was planned, the tooth was accessed under rubber dam isolation and was found to be necrotic. Root canal preparation was done with hand Ni-ti instruments (Dentsply, Maillefer, Switzerland), accompanied with copious irrigation using 3% sodium hypochlorite between the instruments. Apical patency was maintained using #10 K file, 1mm beyond the working length (Fig. 1B & 1C). After chemo-mechanical preparation, a calcium hydroxide dressing was placed, and patient recalled after 1 week. The symptoms did not resolve after one week and a triple antibiotic paste dressing was given for further disinfection. After 3 weeks, pus discharge from the sulcus ceased, but the root canals still had exudation and could not be dried. So a decision to treat the tooth surgically was taken and periapical surgery was planned. All surgical procedures were done under an operating microscope (Moller Denta300; Haag Streit International, Koniz, Switzerland) except incision, flap elevation, and suturing. Following administration of local anaesthesia, a full thickness muco-periosteal flap was reflected (Fig. 1D).

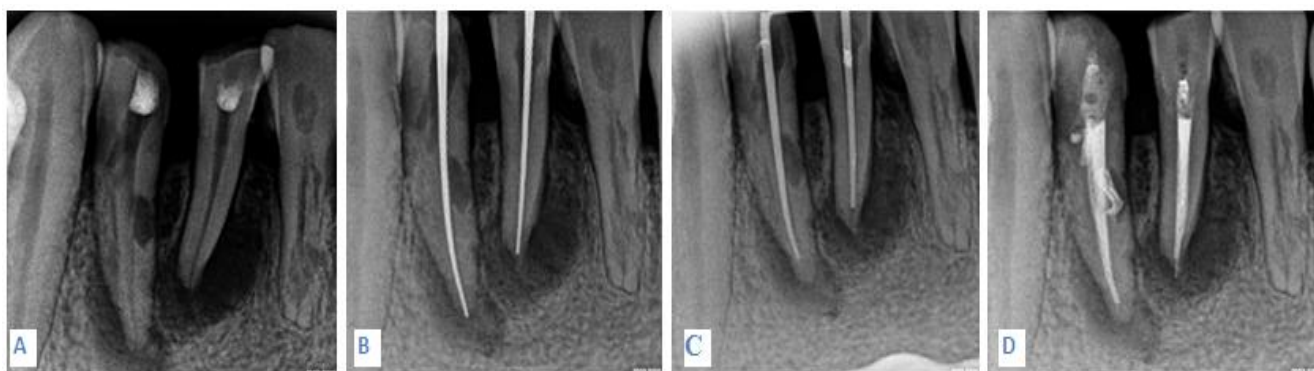


Figure 1: A-pre-operative radiograph, B-working length x-ray, C-master cone x-ray, D-obturation x-ray,

All granomatous tissue was removed to allow complete visualization of the defect. Complete loss of the cortical plate was seen on the facial aspect of both the teeth. Apical 3mm of both roots were resected and retro preparations were done with ultrasonic tips (Fig. 1E-F). Retrograde filling was done with mineral trioxide aggregate (MTA). Root resorption were disinfected with 90% TCA (trichloroacetic acid) for 1 minute. Resorption space then filled with Ketac Molar GIC.



Figure 1: E-flap reflection, F & G-root resection photograph,

Healiguide bio-resorbable membrane was covered as such that it extends 1-2 mm apically, mesially and distally (Fig. 1H). The mucoperiosteal flap was sutured in place and a periapical radiograph was taken. Patient was instructed regarding the postoperative care and kept under antibiotic coverage along with 0.2% chlorhexidine gluconate solution as mouth rinse for a period of 5 days. Suture removal was done after 7 days, and the patient was periodically reviewed after 3 months (Fig. 1I), 6 months (Fig. 1J), and one year (Fig. 1K). Patient was asymptomatic during one-year follow-up. At one-year follow-up, the periapical radiograph confirmed satisfactory healing of the lesion.

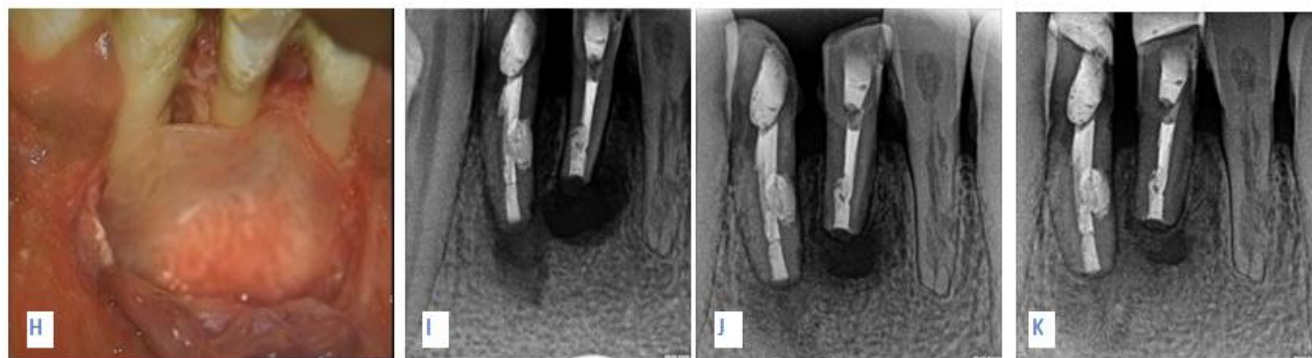


Figure 1: H-ketac molar and resorbable membrane application, I-3 month post op x-ray, J-6 month post op x-ray, K-12 month post op x-rays.

DISCUSSION

Presence and size of periapical lesion influence the success of both primary and secondary root canal treatment¹³. Large periapical lesions may persist after root canal treatment because of more bacterial diversity¹⁴. They also are indicative of long standing infections in which microbes may have penetrated deep into dentinal tubules or to peripheral aspects of root canal system¹⁵. This makes removal of such microbes and biofilms even more difficult by routine non-surgical root canal treatment. On the other hand, large lesions may also persist in case of extra radicular infection and true cyst formation, both of which cannot be eliminated by non-surgical root canal treatment. Sinus tract may also facilitate influx of bacteria from the oral cavity which can colonize the peri-apex and result in extra radicular infection. The goal of periapical surgery is to remove all pathologic tissues from the surgical site, to completely seal the entire root canal system, and to facilitate the regeneration of hard and soft tissues including the restoration of attachment apparatus¹⁶. In present case 12 month follow up radiograph showed significant peri-radicular bone fill. These results corroborate with previous studies which reported high success rate (>60%) in apico-marginal defects without using GTR technique^{11,12}. The results observed in present case can be attributed to the microsurgical technique employed for management of the present case. One of the major limitations of traditional surgical methods is the inability to optimally manage the resected root surface, leading to incomplete sealing of the infected root canal system¹¹.

On the other hand high magnification provided by microscope enables the clinician to accurately detect details of the canal anatomy after apicoectomy¹¹. In addition, the use of ultrasonic instruments for retro-preparation resulted in conservative, coaxial root-end preparation, which was then sealed with biologically acceptable root-end filling material (MTA) and was able to satisfy the requirements for mechanical and biologic principles of endodontic surgery¹¹. Another factor which determines healing is morphology of defect. Lesions that solely involve buccal surface are reported to have favorable prognosis as compared to lesions with bone loss in proximal region¹⁷. This case is a Class I, type 3 apico-marginal defect where the infection is confined to the tooth treated. These types of lesions are reported to have high success rate following endodontic surgery¹⁸.

The 'apical seal' has long been considered paramount to the success of peri-radicular surgery. Many materials have been used for apical sealing including reinforced zinc oxide-eugenol cement, amalgam and MTA but MTA exhibited significantly less inflammation, more cementum formation and regeneration of peri-radicular tissues when used as retro-filling material¹⁹. Hence, MTA was used to fill retro preparations in present case. Calcium hydroxide was used as intracanal medicament in this case as it is bactericidal and neutralizes the remaining tissue debris in the root canal system²⁰⁻²³. Furthermore, it mediates the neutralization of lipopolysaccharides and thus helps in disinfecting the root canal. Despite of successful resolution of signs and symptoms and favorable radiographic healing at follow up, this case report has a limitation of short follow-up period of 12 months. Also, the use of advanced imaging techniques like cone beam computed tomography would have helped to more accurately assess the post treatment periapical healing.

CONCLUSION

Based on limited follow-up of one year it can be said that bio-resorbable membrane remains viable treatment option for apico-marginal lesion. Also external root resorption treated with Ketac Molar GIC remains favorable treatment option compared to other costly materials.

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