

A Combined Rotary Endodontic Therapy And Periaical Surgery In 14 Year Old Boy Using Recent Biocompatible Material And Placement of Bone Graft In Treating Radicular Cyst : A Case Report

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Citation of this Article: Dr Vinay Bal Singh Thakur, Dr Munnasha Uppal, Dr Karan Thakur, Dr Diksha Sharma, Dr Pallavi Mishra, “A Combined Rotary Endodontic Therapy And Periaical Surgery In 14 Year Old Boy Using Recent Biocompatible Material And Placement of Bone Graft In Treating Radicular Cyst : A Case Report”, IJDSIR- July - 2020, Vol. – 3, Issue -4, P. No. 21 -26

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Type of Publication: Case Report

Conflicts of Interest: Nil

Abstract

Periapical inflammatory lesion is the local response of bone around the apex of tooth that develops after the necrosis of the pulp tissue or extensive periodontal disease. Pulpal necrosis and chronic or acute apical periodontitis with cystic changes are the most common sequelae of the dental traumatic injuries, if the teeth are not treated immediately. Such lesions are to be treated with conventional root canal therapy as well as by surgical approach. The present case reports a case of a periapical lesion treated with curettage of the lesion followed by

apicectomy, and root end obturation on maxillary left central and lateral incisors .

Keywords: Apicoectomy; enucleation; Radicular cyst; root canal treatment

Introduction

Traumatic injuries to the anterior teeth are one of the most common unanticipated events that cause pain, disfigurement, and esthetic problems. Surgical endodontics is a reliable method for the treatment of teeth with periapical lesions that do not respond to conventional root canal treatment. The goal of a periapical surgery is to

gain access to the affected area, evaluate the root circumference and root canal anatomy, and place a biocompatible seal in the form of root end filling that stimulates the regeneration of periapical hard and soft tissues. The prognosis depends on several factors such as different surgical procedures and materials, clinical and radiographic evaluation, systemic conditions, local factors, such as involved teeth and their anatomy, previous treatment and its quality¹. Paraendodontic surgery comprehends a set of procedures recommended in periapical diseases treatment, when traditional endodontic therapy does not obtain favorable outcomes. The surgery goal is periapical lesion removal and the apical third sealing, allowing soft and hard tissue regeneration. According to the meta-analysis of Tsesis et al. paraendodontic surgery success rate is 91.6%, while failure rate is 4.7%². The objectives of surgical approach are to remove diseased tissue, debride the canal system as far as possible and to seal the cavity or defect to prevent or reduce the spread of microorganism in the periradicular tissues, thereby providing an environment conducive of regeneration of a normal periodontal apparatus. An ideal retrograde filling material have some qualities like easy and moisture independent application, high sealing capacity, biocompatibility, radiologically confirmable seal and non-absorbable properties etc. MTA is one such preferable material because it is insensible to moisture, biocompatible and has the property of good seal. MTA provides superior seal when compared with Amalgam, IRM and Super EBA. The ideal healing response after periradicular surgery is the re-establishment of an apical attachment apparatus and osseous repair³. Thus the aim of this case report is to demonstrate the enucleation of the radicular cyst followed by resection of the apical end of roots of 21 and 22 and placement of retrograde filling with

MTA and placement of allograft to initiate rapid bone repair.

Case Report

A 14 year old male patient reported to the department of Pedodontics and Preventive Dentistry of Himachal Dental College with the chief complaint of continuous pus discharge from the upper front tooth region accompanied by continuous pus discharge since last 1 month. Patient also gave history of trauma from sports injury nearly 2 years back. Medical history of the patient was noncontributory. Clinical examination revealed tenderness on percussion of 21 and 22. Periodontal probing and mobility was within normal limits when compared with adjacent and contralateral teeth. The swelling was soft and fluctuant with respect to 21 and 22. Tooth was non vital as diagnosed on the basis of electronic pulp testing. On radiographic examination there was periapical radiolucency along the root surface of maxillary left central and lateral incisor. Radiolucency of the periapical lesion revealed well defined margins.

On the basis of clinical and radiographic examination and previous history of trauma 2 years back and histopathological examination of aspirated contents, the diagnosis suspecting radicular cyst was made. Radiograph of the cystic lesion revealed well defined borders. The treatment modality decided was to carry out surgical endodontic treatment, Apicoectomy with respect to 21 and 22 teeth followed by placement of biocompatible material (MTA) after root end resection and placement of a bone graft to initiate bone healing. Parents of the patient were explained both the surgical and non surgical treatment prospective of procedure of apicoectomy in detail.

Procedure

The treatment procedure was initiated with the administration of local anesthesia. Cervical incision was given from distal surface of 11, 21, 22 to distal surface of

23 along with two vertical releasing incision, one from the distal side of right central incisor and second on distal surface of left canine . A full-thickness rectangular flap was retracted with periosteal elevator. The bone surrounding the apex of the tooth was assessed for the presence of necrotic bone . A thin bony plate over the apex was removed gently with curettes. Enucleating of the cystic lesion was done after that. Copious irrigation was with betadine and saline was done throughout the procedure to avoid the bone and flap from drying out. Access openings of 21 and 22 were done on the same day followed by canal debridement using rotary NiTi protaper (gold), orifice and coronal part was prepared with S_x, S₁ and S₂ files using crown down technique with 5.25% of NaOCl, 15% EDTA (RC prep) . Copious irrigation of the canals was carried out with sodium hypochlorite, saline intermittently and chlorihexidine.

Root-end resection was then performed with a tapered fissure bur . Resection was done at apical 2 to 3 mm portion of the root end. The root end was examined to ensure there were no cracks before preparation for a filling. After complete inspection of the root end ,retrograde filling was done with MTA. Moist cotton pellet was placed inside the canals followed by placement of temporary restoration. Allograft was then placed in the apical end of the tooth to stimulate bone healing . Suturing of flap was donethereafter .Patient was recalled the next day for checking the barrier formation and completing the final step of obturation .The following day, tooth of the patient was evaluated for the apical barrier formation by using 15 no. GP point.

After satisfactory inspection of the barrier, the tooth was prepared for obturation. Tooth was obturated using F2 and F3 cones after taking a preoperative radiograph. Post obturation restoration was done and patient was recalled after one week for suture removal.

Patient was also prescribed antibiotic and analgesic and chlorhexidine mouthwash for one week and also was strictly instructed to maintain oral hygiene. After one week the patient's intraoral status was inspected. Suture removal was done and an IOPA was evaluated. There was no pus discharge from the site of previously removed cystic lesion. Patient was reevaluated after one month . There was no inflammation of the previously removed cystic lesion and there was no evidence of pus discharge now. The postoperative IOPA was also done following evaluation .



Fig.1: Preoperative Intraoral photograph and IOPA



Fig.2: Raising of the mucoperiosteal flap



Fig.3: A. Root resection B. Placement of Allograft C. Suturing the Flap



Fig.4: Pre obturation Radiograph



Fig.5: Post obturation radiograph



Fig.6: Follow up after one week



Fig.7: Follow up after one month

Discussion

Traumatic dental injuries (TDIs) occur frequently in children and young adults, comprising 5% of all injuries. Twenty-five percent of all school children experience dental trauma and 33% of adults have experienced trauma to the permanent dentition, with the majority of the injuries occurring before age 19. The goal of periradicular surgery is to remove all necrotic 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 formation of a new attachment apparatus. Apicectomy allows minimal apical resection and enables the placement of material for retrograde sealing. The success rate of apical surgery is 75-90% and is evaluated through clinical exploration and radiographic controls after nearly half a year. Radicular cysts are the most commonly occurring cystic lesions in the oral cavity with

the percentage ranging from 52% to 68%. The commonest location of radicular cyst is maxilla⁴. Traumatic injuries to the anterior teeth are one of the most common unanticipated events that cause pain, disfigurement, and esthetic problems. Radicular cyst also known as periapical cyst, root end cyst or dental cyst, originates from epithelial cell rests of malassez in periodontal ligament because of inflammation due to trauma or pulp necrosis. Radicular cysts are generally asymptomatic and are detected by radiography but long standing cases may show an acute exacerbation of the cystic lesion and develop signs and symptoms like swelling, tooth mobility and tooth discoloration. The present case report also showed swelling, pain and mobility of 21 and 22, with associated teeth non vitality and discoloration of the involved teeth. Radiographically radicular cyst appears as radiolucent lesion in the periapical region with well-defined borders. Radicular cysts are rare in the primary dentition, representing only 0.5–3.3% of the total number in both primary and permanent dentitions. The choice of treatment depends on extension of the lesion, relation with associated structures, clinical characteristics of the lesion, and systemic condition of the patient. Treatment options for radicular cysts may be conventional, nonsurgical RCT when lesion is confined to a small area or surgical treatment like enucleation, marsupialization or decompression in case of larger lesions⁵. This case report presents surgical enucleation of large radicular cyst followed by Apicoectomy of the involved teeth. Non-surgical treatment modality was not possible with the present case as this required multiple visits by the patient, for which the parents of the patient were not willing. The choice of treatment may be determined by factors such as the extension of the lesion, relation with noble structures, origin, and clinical characteristics of the lesion, and co-operation and systemic condition of the patient⁶. To

reduce microbial load mechanical instrumentation and proper irrigation of the canal are very important. However, medicament with bactericidal action is still needed to ensure optimum disinfection. Calcium hydroxide is the most commonly used intracanal medicament to disinfect the canal. So for the success of treatment of large periapical lesions, two things are important. Firstly, removal of the conditions responsible for the expansion of the lesion and secondly, removal of the microbiological etiology and disinfection of root canal along with long-term calcium hydroxide medicament⁷. Nonsurgical root canal treatment should always be the first choice in cases of nonvital teeth with infected root canals. Elimination of bacteria from the root canal is the key of periapical lesions treatment. Vitapex, Metapex, and Tegapex are commercially available premixed calcium hydroxide-iodoform-silicon-oil paste. Calcium hydroxide has ionic effect observed by chemical dissociation into calcium and hydroxyl ions. Calcium and hydroxyl ions have antimicrobial effects and induce mineralization. Iodoform has bacteriostatic property by releasing free iodine. Thereby, iodine eliminates the infection of root canal and periapical tissue by precipitating protein and oxidizes essential enzymes. Silicone oil is a lubricant, which ensures complete coating of canal walls and solubilizes calcium hydroxide to remain active in root canal. Singh et al concluded that extrusion of Metapex unintentionally into periapical lesion showed no negative effects or complications⁸

MTA was developed as a new root-end filling material at Loma Linda University, California, USA. In a review article regarding concepts in endodontic surgery, Kim and Kratchman stated that MTA is the most biocompatible root-end filling material and can be used with predictable outcomes in endodontic surgery. Since it was introduced in 1993, the use of MTA has increased many folds. It is

considered as the gold standard for root-end restoration material. Regarding the retrograde filling materials, currently MTA remains the material of choice, which has been proven to be advantageous in terms of its sealing ability, marginal adaptation and biocompatibility. The aim of the root-end preparation is not only to remove the gutta-percha from the root canal and irritants, but also to create a cavity that can be effectively sealed⁹. Over the years, many materials have been used as retrograde filling substances such as Amalgam, IRM (Dentsply Caulk, Milford, DE, USA), Super-EBA (S-EBA, Bosworth, Skokie), Glass Ionomer Cement, Composites, Optibond (Kerr, Orange, CA, USA), Geristore (Den-Mat, Santa Maria, CA, USA), and most recently, MTA (Pro Root MTA, Dentsply Tulsa Dental), Biodentine (Septodont). Being a relatively new material, there is very little clinical evidence and printed literature on the use of Biodentine™ as a root-end filling in surgical endodontics¹⁰. In the present case report, there was a need of inserting bone graft at the site of enucleation to promote rapid healing. Bone grafts can be used to achieve favorable healing and regeneration of the periapical defect area after degranulation⁶. In endodontic surgical sites these materials are employed with the intention to act as bone fills and scaffolds which facilitate wound healing, normal trabecular bone formation and prevent proliferation of the oral epithelium into such defects ensuring healthy clinical outcome. Bone grafts are rarely indicated in pediatric cases, as the high turnover rate of cells and rich blood supply warrants quick healing. However, treatment of nonvital young permanent teeth with large open apices, extensive periapical radioluscencies and thin dentinal walls warrant special deliberation¹¹. Bone formation following periapical surgery can be accelerated by placing bone graft into the bony defect. Various types of bone grafts are available including autografts, allografts, xenografts, and

alloplasts. The ideal bone graft replacement material should be biologically inert, not carcinogenic, easily maneuverable to fit the osseous defect, and should be structurally stable. It should serve as a base for new bone formation and slowly resorb to permit replacement by new bone¹². In this case, bone graft material was used, and there was no need to use a membrane barrier as there was enough marginal bone.

Conclusion

Large cystic bony defects warrant possibility of pathological fracture; hence, they should be treated cautiously. Various treatment options have been recommended depending on the size and location of cyst. Large lesions endodontic treatment is followed by surgical enucleation however some authors propose nonsurgical management of small lesions. This case presents surgical management of a large radicular cyst with endodontic treatment.

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