SURGICAL MANAGEMENT OF EXTERNAL CERVICAL RESORPTION AND RADICULAR CYST OF AN ENDODONTICALLY TREATED TEETH

Abstract

Background

External cervical resorption (ECR) is a pathological process often associated with trauma or dental procedures, leading to the loss of tooth structure. When accompanied by periapical pathology such as a radicular cyst, management becomes complex, particularly in previously endodontically treated teeth. Cone-beam computed tomography (CBCT) plays a crucial role in accurately diagnosing and delineating such lesions.

Case Presentation

A 27-year-old male presented with cavitation and swelling in the upper right central (11) and lateral incisor (12) regions, both of which had been previously endodontically treated. Clinical and radiographic evaluation revealed Class 2Bd external cervical resorption in 11 and a large periapical lesion suggestive of a radicular cyst in 12. CBCT imaging confirmed the extent of the resorptive and cystic involvement.

Surgical intervention included application of trichloroacetic acid to the resorptive defect, thorough curettage, and enucleation of the cystic lesion. The resorptive defect and retrograde root ends were restored with mineral trioxide aggregate (MTA), and bone grafting was performed in the periapical area of 12. Minor gingival recession was managed postoperatively with composite restoration.

Conclusion

At one-year follow-up, both teeth showed healthy periodontal conditions and complete radiographic healing. This case highlights that meticulous surgical debridement combined with bioactive restorative materials like MTA can successfully manage complex cases of external cervical resorption and radicular cysts in previously treated teeth.

Keywords: Endodontics, Mineral Trioxide Aggregate, Radicular Cyst, Surgical Procedures, Operative, Tooth Resorption

INTRODUCTION

The term "tooth resorption" in dentistry describes the clastic cells' loss of both organic and inorganic tooth structural components. [1,2] Loss of enamel, dentine, and cementum can have a variety of effects, from probable infection of the root canal system and associated periodontal ramifications to structural deterioration of the tooth and the resulting risk of tooth loss. [3] In primary teeth, root resorption is normal and advantageous since it makes room for the permanent replacement to grow. Tooth loss and irreversible damage can result from permanent dentition root resorption.[4]

Depending on where it occurs on the root surface, root resorption can be either internal or external. External root resorption (ERR) might be surface, inflammatory, replacement, cervical, or temporary apical breakdown. External cervical resorption (ECR) is one of the least understood types of external resorption. Heithersay described the aggressiveness of this kind of external resorption as "invasive cervical resorption." Other names for ECR include subepithelial ERR, extracanal invasive resorption, supraosseous invasive resorption, peripheral cervical resorption, odontoclastoma, and peripheral inflammatory root resorption.[3,4]

Of all the tooth kinds, the maxillary anterior teeth are most commonly involved. It is an uncommon condition that affects 0.02% to 2.3% of people, but because it is sneaky and asymptomatic, it frequently results in tooth loss.[5]

The cause of ECR start is still unknown. It has frequently been linked to orthodontic therapy. A history of dental trauma, parafunctional behaviors, poor oral hygiene, and periodontal therapy are other characteristics that are commonly associated with ECR. Orthodontic treatment is frequently observed in conjunction with a history of prior dental trauma or parafunctional habits in cases of ECR. [3]

During the 10-year follow-up, the overall ECR prevalence among endodontic patients was 2.3%. Heithersay class 2 was the most common ECR diagnosis (38.8%), while maxillary anterior teeth had the highest frequency of ECR (31.6%). [6] The kind of ECR and the accessibility of the lesion determine how it is managed. The goals of treatment include Halt resorptive process, Restore the defect, Prevent recurrence, Ensure periodontal health.[4]

When caries causes an apical infection in primary teeth, radicular cysts may form. The preferred course of treatment for primary teeth with pulpitis or pulpal necrosis is pulp therapy. Sometimes, a side effect of pulp therapy is cyst formation. Grundy et al. claim that the pulp treatment drugs may cause necrotic and antigenic materials in the root canals, which would stimulate the periradicular area with antigens. [7] Treatment options for radicular cysts include decompression, marsupialization, and total enucleation, or both. If properly treated, these cysts hardly ever return. [7] This case report details a patient's therapy for a radicular cyst and external cervical resorption.

CASE REPORT

A 27-year-old patient was referred to the Department of Conservative Dentistry and Endodontics at AJ Dental College and Science, Mangalore by a General dental practitioner for the treatment of 11 and 12 (upper right central and lateral incisor).

On Clinical examination cavitation was observed extending from the cervical region of the crown to the subgingival area wrt 11 (Figure:1A) and round to oval swelling which was located over labial mucosa of maxillary lateral incisor region (Figure:1A). High sensitivity to vertical and horizontal percussion tests was reported, and palpation of the periapical region also revealed sensitivity wrt 12. Periodontal probing was performed, and deep cavitation was observed on the labial surface wrt 11. The patient gave a history of previous endodontic wrt both 11 and 12 (upper right central and lateral incisor).

A two-dimensional radiograph revealed that the root canals of the upper right central and lateral incisors were well obturated. However, a radiolucent area was observed in the cervical region of the crown and extending into the coronal third of the root on the mesial aspect of the upper right central incisor. Additionally, a substantial periapical radiolucency was noted at the apex of the upper right lateral incisor, indicating a significant periapical lesion (Figure 1: B).

A CBCT (Cranex 3Dx, Soredex, KaVo Imaging, PA, USA) with a small field of view (FOV) 40×40 mm and voxel size 0.125 mm was performed to assess an extent of the resorption (Figure 1:C). The diagnosis Class 2Bd external cervical resorption according to Patel *et al.* was diagnosed wrt 11 (upper right central incisor) and radicular cyst wrt 12 (upper right lateral incisor) was made.

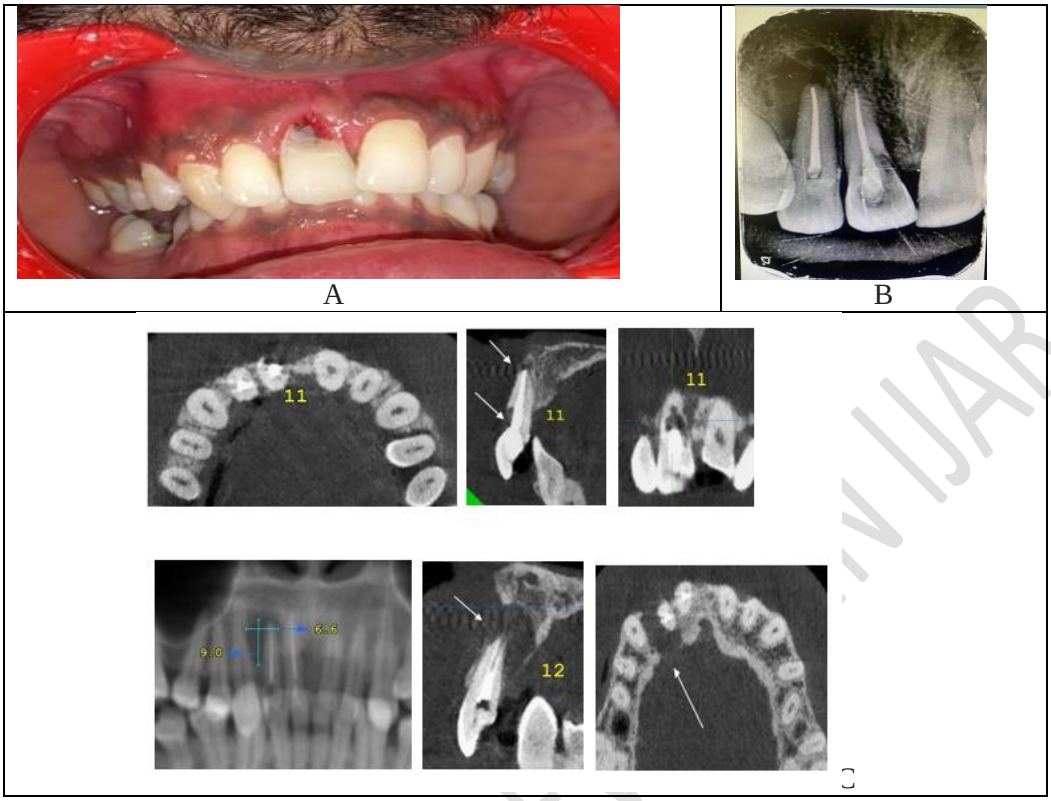

Figure 1: Clinical and radiographic and cbct image wrt 11 and 12. A) pink discolouration in the cervical region wrt 11and mild swelling noted in the periapical region wrt 12. B) X-ray revealed well obturated Root canal wrt upper right central and lateral incisor and radiolucency was noted mesially wrt 11 and a huge periapical lesion noted wrt 12.C) A CBCT (Cranex 3Dx, Soredex, KaVo Imaging, PA, USA) with a small field of view (FOV) 40×40 mm and voxel size 0.125 mm revealed A well-defined radiolucent lesion noted in the maxillary anterior region involving periapicalregion extending mesio-distally [6.6mm] from mesial aspect of 12 to mesial aspect of 13 and superioinferiorly [9.0mm] extending from 5 mm away from floor of nasal cavity to middle third of the roots of 12 and 13 Labio-palataly: Extending from labial cortical wall towards the palate with decortication of labial and palatal cortical plates suggestive of bone loss.

MANAGEMENT

The Patient was offered a treatment plan consistent with the European Society of Endodontology recommendations for class 2Bd external resorption, which included reflecting a flap, removal of the resorptive tissue and then filling of the defect with Mineral trioxide aggregate (Maarc, india) wrt 11 and Enucleation of cyst wrt 12 followed by retrograde filling using Mineral trioxide aggregate (Maarc, india).

After explaining the procedure to the patient, written informed consent was obtained from the patient. Under local anesthesia of 2% lidocaine with epinephrine (Xylodont 1:50000, Molteni Stomat, Kraków, Poland) Intrasulcular incision from tooth 11 to 12 with vertical incision mesial to 13 and distal to 21 was given, and a trapezoidal mucoperiosteal flap was raised to expose the resorptive defect wrt 11 and cyst wrt 12. (Figure 2: A, B).

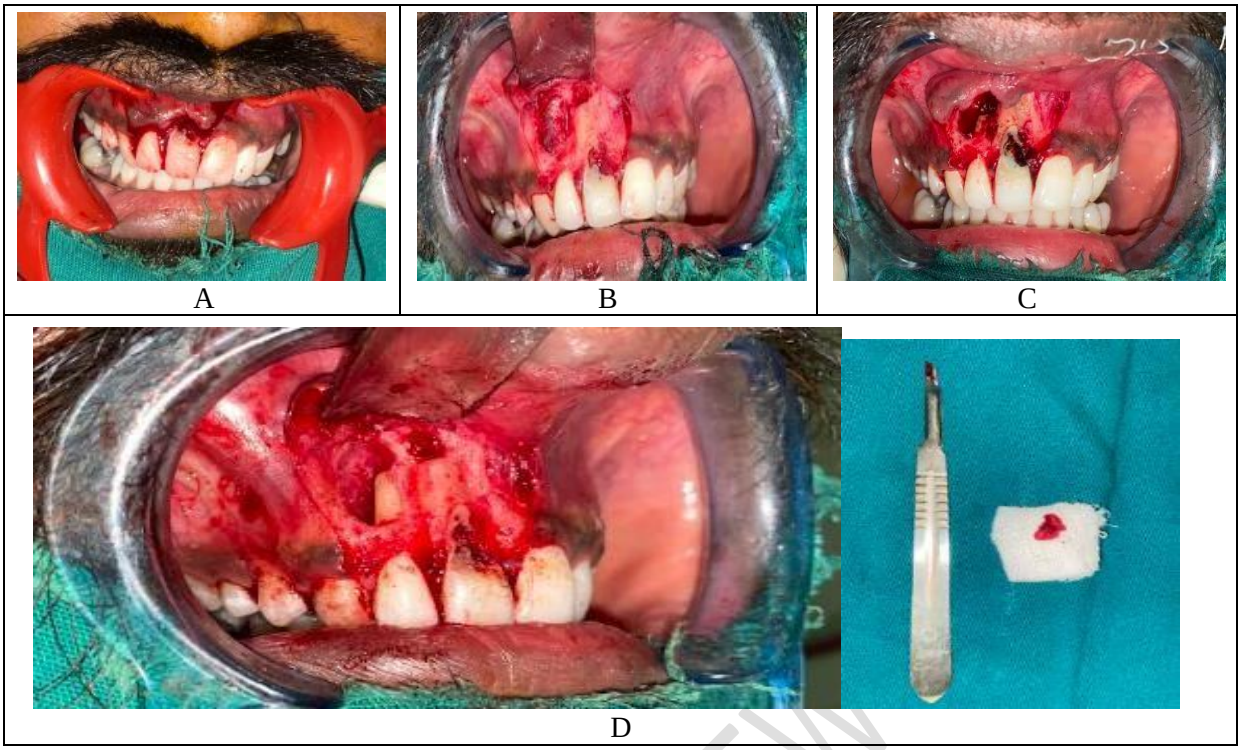

Figure 2: Steps in management of the external cervical resorption and radicular cyst

Granulomatous tissue was seen housing the resorptive defect. A small cotton pellet dipped in 90% trichloroacetic acid (TCA) was applied on the tissue with gentle pressure for 1 min. Care was taken to squeeze the excess TCA from the cotton pellet with a gauze before application to avoid contact with adjacent bone. The necrotic tissue was scooped out with the help of a spoon excavator. This procedure of application of TCA and removal of necrotic tissue was carried out till a sound dentinal base was seen (Figure 2: C). The sharp edges of the resorptive defect were smoothened with straight hand bur under low speed followed by the resorptive area was cleaned with sterile saline.

The cystic lesion was clearly seen wrt 12 as the buccal cortical bone had undergone resorption (Figure 2: B). Complete curettage, along with granulation tissue removal and enucleation of cystic lesion was done and it was sent for histopathological evaluation (Figure 2: D). This was followed by thorough irrigation with betadine and normal saline, After the Enucleation of the cyst, 3mm of the root was resected wrt 11 and 12 followed by 3mm of gutta-percha was removed from the apical third of the root and retrograde filling was done using Mineral trioxide aggregate (Maarc, india) (Figure 3:A) and the cervical resorptive defect wrt 11 was filled with Mineral trioxide aggregate (Maarc, india) (Figure 3: B)and the defective periapical area wrt 12 was packed with Bone graft (Figure 3: C).

Figure 3: Shows a steps of surgical intervention steps wrt 11 and 12.

The flap was repositioned back and absorbable sutures were placed and post-operative radiograph was taken (Figure 3: D, E).

One week after a surgery patient was recalled to evaluate the healing, slight amount of gingival recession was noted with respect to 11. It was corrected by placing 2 mm of pink color composite (Shofu Beautifil Flow Plus) in the cervical area (Figure 4: A, B)

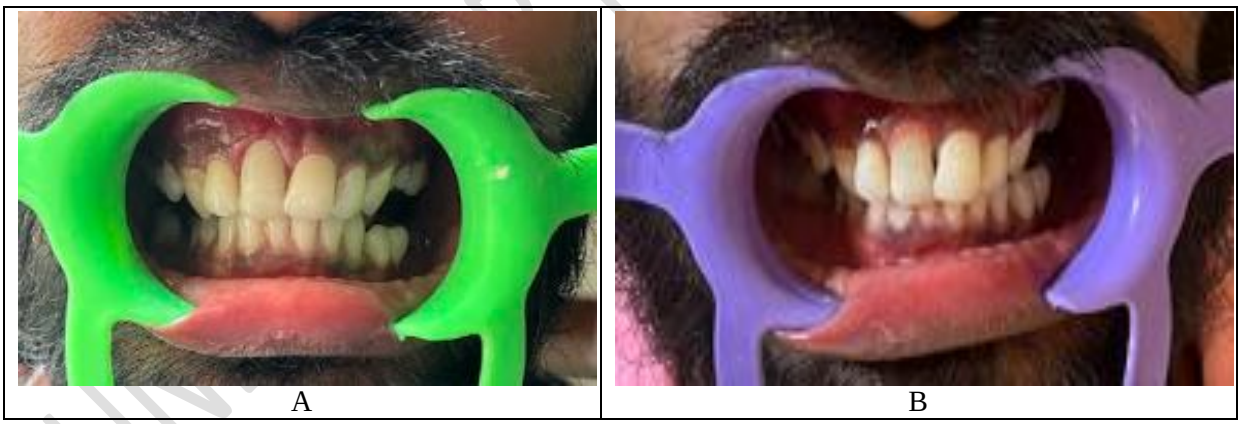

Figure 4: Post operative follow up.

POST-OPERATIVE FOLLOW-UP-

At the one-year follow-up, clinical examination of tooth #11 indicated healthy periodontal status, with probing depths within the normal range of 1–3 mm, CBCT evaluation [Figure 5] demonstrated complete periapical healing of the defect wrt 12 and effective sealing of the resorptive defect wrt 11, with no observable changes in the surrounding osseous tissue.

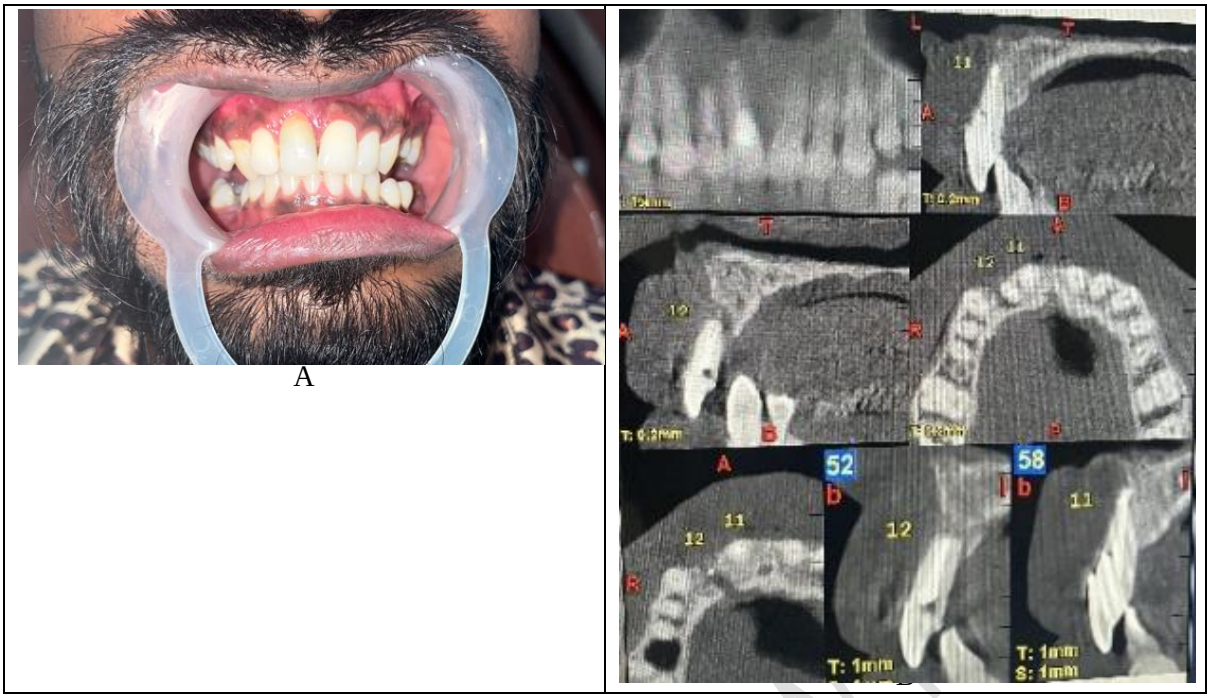

Figure 5: A) clinical image showing good esthetic effect, B) CBCT frontal, sagittal and axial views of treated tooth demonstrate periapical healing wrt 12 and sealing of resorptic defect wrt 11.

DISCUSSION

A combination restorative and periodontal strategy is frequently necessary for the successful treatment of External cervical root resorption. However, because of the size, location, and restorability of the damaged tooth, among other criteria, treating root resorption is not always possible. In the management of ECR, thorough case selection is essential to achieving consistent and long-term success.[8]

When treating external cervical resorption, the main objective is remove all of the resorptive tissue and halt the resorptive process. Traumatic injury is the case report's etiological factor. To prevent further infection, the resorptive defect the cyst was managed in a single session. Chemica agents like trichloroacetic acid (TCA) was used in this case study to remove the granulation tissue.

As an alternative, 5% sodium hypochlorite (NaOCl) can also be used for debridement (Prime Dental Products Pvt. Ltd., Mumbai, India). To enhance mineral trioxide aggregate (MTA) adaptation, a final washing with sterile water was carried out at the resorption site. Resorptive faults have been managed with a variety of restorative materials, In the past, amalgam, GIC, super EBA, and IRM were utilized to fix the restoration; however, these materials are linked to the development of periodontal defects.[9,10]

According to a previous study, amalgam used as a retrograde filling material provides a weak seal and does not stop microbes and their byproducts from penetrating the periradicular tissues. A clinical case of paresthesia resulting from widespread amalgam retrograde fillings in the soft tissues and upper jaw was reported by Georgiev T et al. [11]

According to Pitt Ford TR et al., Super-EBA has a tissue response that is both acceptable and significantly better than amalgam when used as a root-end filling. In addition to being moisture sensitive, ZOE cement first irritates tissue and has dubious reasonability. However, super-EBA is method sensitive and radiolucent. Tissue irritation could result from super-EBA's eugenol concentration.[12]

In 1993, Torabinajed and colleagues created mineral trioxide aggregate (MTA) at Loma Linda University in California. MTA has demonstrated superior seal and hard tissue repair as compared to alternative root-end filling materials. In the presence of moisture, the powder's hydrophilic particles can solidify. When the powder is hydrated, a colloidal gel is created that solidifies.[13]

According to tissue culture studies, MTA promotes cementogenesis and allows cementoblasts to adhere and proliferate. MTA is known to accelerate cell proliferation and release large amounts of calcium, although it has no harmful effects on cells. [14] Introduced in 2010, biodentine is a calcium silicate-based substance used for root-end fillings, resorption repair, and perforation repair.[15]

MTA demonstrated the best seal and the lowest dye absorbance in an in vitro investigation comparing the sealing capabilities of calcium phosphate cement, biodentine, and MTA. Compared to MTA, biodentine displayed a somewhat lower seal.

Fischer et al. measured how long it took for Serratia marcescens to pierce a 3 mm layer of zinc-free amalgam, Intermediate Restorative Material (IRM), Super-EBA, and MTA when these materials used as a retrograde filling in his investigation.. [16] According to their findings, bacteria began to leak out of the majority of samples that had zinc-free amalgam within 10 to 63 days. Within 28 to 91 days, IRM started to leak. Super-EBA started to leak between 42 and 101 days. It wasn't until day 49 that MTA started to leak.

When MTA was applied as a root-end filler, the surrounding tissues appeared to mend. The existence of connective tissue following the first postoperative week was the most distinctive tissue reaction of MTA. Radicular cysts can be treated using a variety of techniques, such as enucleation, marsupialization, or decompression in the case of bigger lesions, or with a traditional, nonsurgical RCT in situations when the lesion is small and restricted. The surgical enucleation of a chronic radicular cyst associated with 12 is presented in this case report.

CONCLUSION

Early diagnosis and timely surgical intervention are crucial in managing external cervical resorption and associated radicular cysts to preserve the affected tooth and surrounding structures. In this case, a combined approach involving thorough debridement, cyst enucleation, and the use of biocompatible materials such as mineral trioxide aggregate (MTA) resulted in favorable clinical and radiographic outcomes. This case highlights the importance of a multidisciplinary strategy and long-term follow-up to ensure successful treatment and prevent recurrence.

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