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RESEARCH ARTICLE

Interdisciplinary approach to treat a large trauma induced chronic periapical pathology: A clinical Report

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Abstract

Most Dental trauma occurs primarily in the anterior region of the mouth with its detrimental consequences, affecting the maxillary more than the mandibular jaw. Quick and early management of such cases is mandatory. Pulp necrosis, chronic and cystic apical periodontitis can be the fate if these teeth are left untreated. Despite these serious complications, root canal treatment followed by apical surgery is considered a valid treatment option when such cases become complicated with large periapical lesions. However, whether a retrograde filling is essential to be placed or not is still a matter of debate. Mineral trioxide aggregate (MTA) as retrograde filling has been reported in literature. Another material with largely improved handling properties; Biodentine™ (Septodont, Saint Maur des Fossès, France) was introduced in 2011. It is a calcium silicate based material with promising results. The following case report embraces the use of Biodentine™ as a retrograde filling material.

Introduction:

Traumatic injuries to the anterior teeth are one of the common unanticipated events that cause pain, disfigurement, and psychological problems. Cyst-like apical periodontitis could be the fate of untreated traumatically injured teeth. Treatment options like periapical surgery have been proposed to manage such cases.[1, 2]

The response of the periraradicular tissues to various injuries is similar to that of other connective tissues elsewhere in the body. The response is manifested as an immunoinflammatory reaction. Although microbial infection of the pulp in the root canals is the primary cause of apical periodontitis, it is not caused directly by microbes themselves but by their toxins, noxious metabolic byproducts, and disintegrated pulp tissue in the root canal system. Intraradicular microorganisms being the essential aetiological agents of apical periodontitis[3], the treatment of the disease consists of eradicating the root canal microbes or substantially reducing the microbial load and preventing re-infection by root canal filling[4].

Surgical endodontics is a reliable method for the treatment of teeth with periapical lesions that do not respond to conventional root canal treatment. Successful outcomes have been reported in over 80% of cases as well as ranging from 41 to 94%. This high success rate may be due to modern surgical techniques, magnifying devices, microsurgery instruments, ultrasonic retrotips, and improved root end filling materials. [5]

The following case report describes successful management of a large periapical lesion using Biodentine™ as a retrograde filling material with 6 months evident follow-up.

A healthy 38-years-old female patient reported to the Department of Conservative Dentistry and Endodontics with a chief complaint of discolored tooth and a sore in the previously traumatized maxillary left anterior region. The patient gave a history of fall and broken tooth 7 years ago. She used to have on and off swelling for which no treatment was sought. The gingival sore that was there since 6 months made her seek the treatment. Medical history was noncontributory and clinical examination revealed a fractured and discolored maxillary left lateral incisor with a gingival dehiscence (Figure 1). Radiographic examination revealed well-defined rarefaction involving the left central and lateral incisor roughly of size > 5mm (Figure 2a).

Both the teeth presented no response to pulp testing and thermal testing using ice sticks. Endodontic treatment for both the incisors was scheduled. The endodontic treatment procedures were conducted under magnification with an aid of surgical loupes (2.5×, Heine, Germany). After an isolation under rubber dam, the access cavities were prepared followed by shaping and cleaning and placement of intracanal medicament of calcium hydroxide (Ultra Cal XS, Ultradent Products Inc, South Jordan, UT) (Figure 2c), which was renewed every 14 days for 3 months. Radiographic examination at 3 months proved no traits of periapical healing and hence a periapical surgery was scheduled.

The teeth were then obturated using cold lateral condensation (Figure 2). Raising a semilunar full mucoperiosteal flap, a periapical surgery was performed. A osteotomy size was prepared and curettage done (Figure 3). Maxillary left canine was apically resected at 3 mm from the apex with Endo-Z (Dentsply Malliefer, Ballaigues, Suisse) bur and retrograde cavity was prepared using ultrasonic tip (NSK Varios G1, Japan). Biodentine ^{TM} was placed as retrograde restorative material along with the bone graft (R.T.R. Beta Tricalcium Phosphate Bone Grafting Material - Septodont Inc., France) to fill the large defect. The flap was reapproximated (Figure 4) and the silk sutures placed. The retrograde restoration was validated with a radiograph. Biopsy of the enucleated lesion was sent for histopathology test.

The patient was recalled after a week for suture removal. The patient was kept under symptomatic and radiographic observation for the purpose of postoperative evaluation of healing of the periapical intervention in intervals of 1, 3, 6 months (Figure 2c). Biopsy report confirmed the periapical pathology to be a periapical cyst. Periodic radiographic evaluation of the area of intervention showed progressive healing with uptake of the bone graft and healing of the gingival defect (Figure 5). At the end of 6 months, tooth preparation for porcelain bonded to metal crown was done giving patient a positive psychological boost (Figure 6).

Discussion:

The universal goal of endodontic treatment is to prevent or cure apical periodontitis (AP), caused by infection of the root canal systems of the affected teeth.[6]

Traditionally. long-term calcium hydroxide dressings have been recommended for the conservative management of large periapical lesions. However, calcium hydroxide therapy has some disadvantages such as variability of treatment time, difficulties with patient follow-up and prolonged treatment periods that increase the risk of root canal contamination via microleakage and crown fractures.[7]

The goal of a periradicular 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 tissues. The principal modality available to manage failure of conventional orthograde endodontic treatment for a large nonhealing periapical lesion is apical surgery.[8]

If the root apex is close to the buccal cortical plate, apical fenestration can occur, leading to persistent symptoms. Reduction of an apically fenestrated root apex below the level of the surrounding cortical bone allows remodeling of the bone over the tooth structure.[8]

Hirsch et al. stated the retrograde filling is a major prognostic factor.[9] If we accept that apical lesions result primarily from bacterial infection in the root canal, the presence/absence of an apical barrier will therefore affect the long-term prognosis of surgical treatment. The success rate can be increased by 10% to 13% if a retrograde filling is used.[10]

Mineral Trioxide Aggregate was specifically developed as a root end filling material. Since, its inception, it has undergone numerous investigation with promising results.[11,12,13]

Biodentine (Septodont, Saint Maur des Fossès, France) is new calcium silicate–based restorative cement introduced in 2011 with dentin-like mechanical properties, which can be used on crowns and roots similar to how MTA is used. It has a positive effect on vital pulp cells and stimulates tertiary dentin formation. In direct contact with vital pulp tissue, it also promotes formation of reparative dentin. Biodentine consists of a powder and liquid. The powder mainly contains tricalcium and dicalcium silicate ($3CaO\ SiO_2$ and $2CaO\ SiO_2$), the principal component of Portland cement, as well as calcium carbonate ($CaCO_3$). Zirconium dioxide (ZrO_2) serves as contrast medium. The liquid consists of calcium chloride ($CaCl_2.2H_2O$), which is used as a setting accelerator and water-reducing agent in aqueous solution with an admixture of polycarboxylate (a superplasticizing agent). The consistency of Biodentine is similar to that of phosphate cement. The material can be applied directly in the restorative cavity with a spatula as without any conditioning treatment.[14]

There is sparse literature on the use of Biodentine as retrofilling material. However, with the evidence supporting Biodentine on its healing ability, it was chosen to be used in this case. The positive outcome observed in this case validates the use of Biodentine as MTA.

Figure 1: Discolored 21 with gingival dehiscence in 22

Figure 3: Osteotomy site with retropreparation in 22

Figure 4: Suture placement

Figure 5: Complete Healing of the Defect

Figure 6: PFM crown in 21

Figure 2 (a): Initial presentation with rarefaction in 21,22

Figure 2 (b): Working Length determination

Figure 2(c): Obturation in 21 and with retrofilling in 22 with bone graft been taken up at 6 months

Conclusion:

This case has allowed us to explore the use of Biodentine in one of the ways that could help us use material at our disposal. This case study should prompt investigators to carry out research further new dimensions.

Conflict of Interest: None

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