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MULTIDISPLINARY APPROACH FOR THE TREATMENT OF A CASE WITH BIODENTINE AS RETROGRADE FILLING MATERIAL: A CASE REPORT

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ABSTRACT A cystic lesion, which is unable to heal non-surgically, heals well with surgical intervention and use of mineral trioxide aggregate (MTA) as retrograde filling have been reported in literature. Another material with largely improved handling properties; Biodentine™ (Septodont, St. Maurdes Fossés, France) was introduced in 2011. It is a calcium silicate-based material and manufacturers claim that it can be used for crown and root dentin repair treatment, repair of perforations or resorptions, apexification, and root end fillings. This article presents a case of surgical management of a large cystic lesion using Biodentine™ as retrograde filling material.

KEYWORDS : Dis-impaction, apicectomy, Biodentine, retrograde filling, PRF membrane.

INTRODUCTION

Numerous materials for root-end filling have been used including amalgam, gutta-percha, zinc oxide-eugenol based cements, glass-ionomer cements, composite resins and silicates. All these materials have been shown to be compatible with tissue cicatrisation and the reconstitution of periradicular alveolar bone, but none of them will induce cementum formation and full periodontal ligament repair.

Mineral trioxide aggregate (MTA), a calcium silicate-based material developed by the modification of Portland cement, has been introduced to address this problem and has shown good biocompatibility and sealing properties[1-3]. MTA material permits a full regenerative healing which can be considered as the material of choice in endodontic surgery[4]. In addition, the sealing properties of MTA are not affected by moisture during treatment. MTA has all the properties of root end filling material except its handling properties because of long setting time of 3 hours and the requirement of additional moisture for activation of setting reaction[5]. Many new materials have been developed and tried as root-end filling materials such as bio-aggregate, ceramicrete[6] and Biodentine[7]. Biodentine is a new material based on calcium silicate technology. The powder contains dicalcium silicate, tricalcium silicate, calcium carbonate and iron oxide, and zirconium oxide filler. Liquid consists of calcium chloride which is acting as accelerator and a polymer which is acting as a water reducing agent[8]. Due to its better handling properties with a setting time of around 45 min, this material can be alternatively used as a retrograde filling material.

CASES PRESENTATION

A healthy 19-year old female patient reported to the Department of Conservative dentistry and Endodontics with a chief complaint of pain in previously traumatized maxillary anterior region. The patient gave a history of fall 2 years back (Fig 1). Clinical examination revealed draining sinus tract in relation to 21. Radiographic examination revealed well defined radiolucency in respect to 13, 21, 22 and impacted supernumerary tooth in the periapical area of 21, 22. Congenitally missing 11, 12 (Fig 2). Endodontic treatment was done in respect to 13, 21 and 22 (Fig 3). Palatal flap was reflected and extraction of supernumerary tooth in respect 21 and 22 was done. Periapical surgery was performed and periapical pathosis was enucleated 13, 21 and 22 were apically resected 3 mm from the apex and retrograde cavity was prepared and Biodentine was placed as retrograde restorative material of 3 mm thickness (Fig 4). $^{PRF\ membrane}$ and bone graft material placed (Fig 5). Post-operative healing and crown preparations done in respect to 13, 21 and 22 and follow up after 6 months. Prosthetic rehabilitation done (Fig 6).

Fig. (1) pre-operative **Fig. (5) bone graft** **Fig. (6) post-operative**

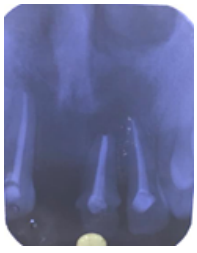

Fig. (2) preoperative **Fig. (3) RCT** **Fig. (4) apicectomy**

DISCUSSION

Periradicular surgery is performed to gain access to the affected area, evaluate the root circumference and root canal anatomy, and place a seal in the form of root end filling that stimulates the regeneration of periapical tissues. Failure of conventional orthograde endodontic treatment for a non-healing periapical lesion is apical surgery with the success rate being 86-92%[9]. Non-surgical approach being one of the options for managing such cases. However, it requires multiple visits for intracanal medicament placement before permanent filling of the root canal space[10]. Therefore, may not be suitable for time constrained patients. This case in an indication for a calcium silicate cement.

The following results confirm the biological observations of the lack of toxicity and genotoxicity (Ames' test, micronuclei test on human lymphocytes, single-cell gel (Comet assay), immuno-cytochemical detection of human pulp fibroblasts function, 3- [4, 5-dimethylthiazol-2-yl]-2,5 diphenyl tetrazolium bromide (MTT) assay[11] according to the ISO10993 standardisation. In addition to its lack of toxicity, Biodentine displayed bioactivity, i.e., activation of angiogenesis and activation of progenitor pulpal cells promoting healing and remineralization[12]. The sealing properties of Biodentine from a biomechanical point of view, have been reported to be superior to MTA[13].

The formation of mineral tags[13] was similar to those observed with MTA[14-15]. Resistance to acid degradation, as observed in inflammatory sites. The main difference between Biodentine and commercially available MTA is the absence of calcium aluminates and calcium sulfate in the formulation which are known to bring decreased mechanical strength as well as increase setting time[16].

Biodentine is similar to MTA in its basic composition. The powder mainly contains tricalcium silicate, calcium carbonate, and dicalcium silicate; the principal components of MTA. Zirconium oxide serves as the radiopacifier. The liquid consists of calcium chloride in aqueous solution with an admixture of polycarboxylate. The addition of setting accelerators, which is calcium chloride, not only results in fast setting but also improves the handling placement of biocompatible retrograde filling material like Biodentine for management of endodontic periapical lesions of chronicity would positively affect the treatment outcome, properties and strength. Calcium silicate cements have

setting times in the range of several hours. Decreasing the setting time was achieved by a combination of different effects. First particle size greatly influences the setting time, since the higher the specific surface, the shorter the setting. Also, adding calcium chloride to the liquid component accelerates the system. Finally, the decrease of the liquid content in the system decreases the setting time to harden within 9-12 min[17].

High pH and released calcium ions are required for a material to stimulate mineralization in the process of hard tissue healing suggested by research. Sulthan carried out a study to evaluate the pH and calcium ion release of MTA and Biodentine when used as root end fillings. He concluded that Biodentine presented alkaline pH and ability to release calcium ions similar to that of MTA.[18]

Han and Okiji that compared the uptake of calcium and silicon released from MTA and Biodentine used as endodontic materials into root canal dentine concluded that the elemental uptake into dentine was more prominent for Biodentine than for MTA[19].

Biodentine has become a material of choice for retrograde filling there is very less literature barring manufacturer's scientific file on its clinical use as a retrograde filling material. Therefore, it was proposed in this case to use Biodentine as a retrograde filling material and clinically observe for at least a period of 12 months to authentically exhibit the results those can be relied upon.

CONCLUSIONS

PRF improves early wound closure, maturation of bone, and the final aesthetic result of the periodontal soft tissues. This case report has shown that routine endodontic therapy followed by surgical intervention with a placement of biocompatible retrograde filling material like Biodentine for management of endodontic periapical lesions of chronicity would positively affect the treatment outcome.

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