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Endodontic

# BIODENTINE AS RETROGRADE FILLING MATERIAL AFTER ENDODONTIC SURGERY: A CASE REPORT

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**ABSTRACT** Among the many factors contributing to the success of endodontic surgery, the obturation material plays a critical role. The properties of the ideal root-end filling material are as follows: biocompatibility, promotion of tissue regeneration without causing inflammation, ease of handling, less solubility in tissue fluids, bonding to dental tissue, non-absorbable, dimensional stability, radio-opacity and no staining of surrounding tissues.

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 bioaggregate, 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.

**KEYWORDS :**

## CASE REPORT

A healthy 24-year-old male patient was reported to the Department of Conservative Dentistry and Endodontics with a chief complaint of discolored tooth and swelling in the previously traumatized maxillary anterior region. The patient gave a history of fall and broken tooth 2 years ago. Medical history was noncontributory and clinical examination revealed discolored maxillary right lateral incisor [Figure 1a]. Radiographic examination revealed well defined radiolucency (figure 1a) and discolored maxillary right lateral incisor and central incisor.

Both the teeth presented a negative response to pulp testing and endodontic treatment for both the incisors were scheduled. The endodontic treatment procedures were conducted. After teeth isolation the access cavities were prepared followed by shaping and cleaning and placement of intracanal medicament of calcium hydroxide (RC Cal, Prime Dental Products, India), which was reviewed every 15 days for 3 months. Radiographic examination at 3 months proved no traits of healing and hence a periapical surgery was scheduled.

The teeth were then obturated using cold lateral condensation [Figure 1b]. Raising a double vertical trapezoidal flap, a periapical surgery was performed and periapical pathosis was enucleated. Maxillary lateral incisors were apically resected 3 mm from the apex and retrograde cavity was prepared using ultrasonic tip. Biodentine™ was placed as retrograde restorative material of 3 mm thickness (figure 2b). The placement of the retrograde filling material was confirmed using a radiograph (Figure 1b) and the sutures were placed. Biopsy of enucleated lesion was sent for histopathology tests.

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, 6, 12, and 18 months. Biopsy report confirmed the periapical pathology to be a periapical cyst. Periodic radiographic evaluation of the area of intervention showed progressive healing and 6 months follow-up X-ray showed bone formation and tooth was asymptomatic (Figures 1c).


**Figure 1: (a) preoperative discoloured lateral incisor, (b) biodentine capsule, (c) placement of biodentine in 3mm of apical area of root.**

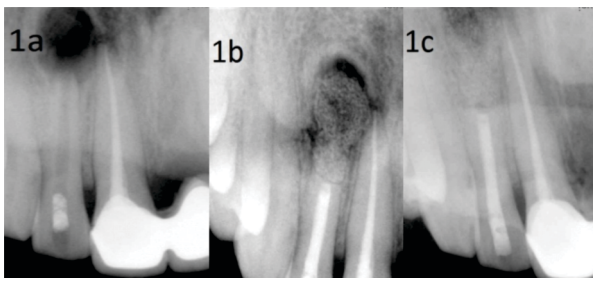


**Figure 2: (a) preoperative x-ray, (b) after enucleation of cyst and bone graft placement (c) follow up after 6 months**

## DISCUSSION

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 non-healing periapical lesion is apical surgery with the success rate being 86-92%.[9] Large cyst-like periapical lesions can drastically change the treatment to more complex procedures with nonsurgical 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]. Thus may not be suitable for time constrained patients.

Calcium silicate cement can be used successfully in this indication.

These 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 ISO 10993 standard. 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]. From a biomechanical point of view, the sealing properties of Biodentine have been reported to be superior to MTA[13]. The formation of mineral tags[13] was similar to those observed with MTA[14–15]. along with resistance to acid degradation, as observed in inflammatory sites. The main difference between Biodentine and commercially available MTA calcium silicates is the absence of calcium aluminates and calcium sulfate in the formulation which are known to bring decreased mechanical strength as well as longer 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].

Kokate and Pawar conducted a study that compared the microleakage of glass ionomer cement, MTA, and Biodentine when used as a retrograde filling material and concluded that Biodentine exhibited the least microleakage when compared to other materials used[18].

Research suggests that the high pH and released calcium ions are required for a material to stimulate mineralization in the process of hard tissue healing. 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[19].

In another study by 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[20].

Since the introduction of Biodentine to be 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. So it was proposed in this case to use Biodentine as a retrograde filling material and clinically observe for at least a period of 18 months to authentically exhibit the results those can be relied upon.

## CONCLUSIONS

This case report has shown that routine endodontic therapy followed by surgical intervention with the placement of a biocompatible retrograde filling material like Biodentine for management of endodontic periapical lesions of chronicity would positively affect the treatment outcome.

## REFERENCES


1. Parirokh M, Torabinejad M. Mineral trioxide aggregate: a comprehensive literature review—Part I: chemical, physical, and antibacterial properties. J Endod 2010; 36(1): 16–27.
2. Torabinejad M, Parirokh M. Mineral trioxide aggregate: a comprehensive literature review—Part II: leakage and biocompatibility investigations. J Endod 2010; 36(2): 190–202.
3. Parirokh M, Torabinejad M. Mineral trioxide aggregate: a comprehensive literature review—Part III: clinical applications, drawbacks, and mechanism of action. J Endod 2010; 36(3): 400–413.
4 Baek SH, Lee WC, Setzer FC et al. Periapical bone regeneration after endodontic microsurgery with three different root-end filling materials: amalgam, SuperEBA, and mineral trioxide aggregate. J Endod 2010; 36(8): 1323–1325.
5 Torabinejad M, Chivian N. Clinical applications of mineral trioxide aggregate. J Endod 1999; 25(3): 197–205.
6. Leal F, De-Deus G, Brandão C, Luna AS, Fidel SR, Souza EM. Comparison of the root-end seal provided by bioceramic repair cements and White MTA. Int Endod J 2011; 44(7):662-8.
7. Malkondu Ö, Karapinar Kazandag M, Kazazoglu E. A review on biodentine, a contemporary dentine replacement and repair material. Biomed Res Int 2014; 2014:160951.
8. Grech L, Mallia B, Camilleri J. Investigation of the physical properties of tricalcium silicate cement-based root-end filling materials. Dent Mater 2013; 29(2):20-8.
9. Girish CS, Ponnappa K, Girish T, Ponappa M. Sealing ability of mineral trioxide aggregate, calcium phosphate and polymethylacrylate bone cements on root ends prepared using Erbium: Yttriumaluminium garnet laser and ultrasonics evaluated by confocal laser scanning microscopy. J Conserv Dent 2013; 16:304-8.
10. Fernandes M, de Ataide I. Nonsurgical management of periapical lesions. J Conserv Dent 2010; 13:240-5.
11. Laurent P, Camps J, de Me´oMet al. Induction of specific cell responses to a Ca3SiO5-based posterior restorative material. Dent Mater 2008; 24(11): 1486–1494
12. Zanini M, Sautier JM, Berdal A et al. Biodentine induces immortalized murine pulp cell differentiation into odontoblast-like cells and stimulates biomineralization. J Endod 2012; 38(9): 1220–122612 Molven O, Halse A, Grung B. Observer strategy and the radiographic classification of healing after endodontic surgery. Int J Oral Maxillofac Surg 1987; 16(4): 432–439.
13. Han L, Okiji T. Uptake of calcium and silicon released from calcium silicate-based endodontic materials into root canal dentine. Int Endod J 2011; 44(12): 1081–1087.
14. Sarkar NK, Caicedo R, Ritwik P et al. Physicochemical basis of the biologic properties of mineral trioxide aggregate. J Endod 2005; 31(2): 97–100.
15. Reyes-Carmona JF, Felippe MS, Felippe WT. Biomineralization ability and interaction of mineral trioxide aggregate and white portland cement with dentin in a phosphatecontaining fluid. J Endod 2009; 35(5): 731–736.
16. Li Z. Advanced concrete technology. New York: John Wiley & Sons, 2011: 23–93.
17. SeptodontBiodentine™ Active Biosilicate TechnologyTM scientific file, 2010.
18. Kokate SR, Pawar AM. An in vitro comparative stereomicroscopic evaluation of marginal seal between MTA, Glass Inomer Cement&Biodentine as root end filling materials using 1% methylene blue as tracer. Endod 2012;2:36-42.
19. Sulthan IR, Ramchandran A, Deepalakshmi A, Kumarapan SK. Evaluation of pH and calcium ion release of mineral trioxide aggregateand a new root-end filling material. e-Journal of Dentistry 2012;2:166-9
20. Han L, Okiji T. Uptake of calcium and silicon released from calcium silicate — based endodontic materials into root canal dentine. Int Endod J 2011;44:1081-7.