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CASE REPORT

AN EXPLORATION INTO THE POTENCY OF PERIAPICAL SURGERY WITH BIODENTINE USED AS A ROOT-END FILLING WITH ONE YEAR FOLLOW UP - A CASE REPORT

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ABSTRACT

At present when endodontic surgery is considered, the gold standard as retrograde filling material which comes to mind is the Biodentin. However there are certain other materials available in the market but due its improved physical properties in the clinical application, this material is considered as the first option. This case report represents a endodontic surgery of a mandibular anterior teeth in which Biodentin was used as a root end filling material which resulted in complete healing of the case at 1 year with absence of clinical symptoms and radiographic evidence of regeneration of the periapical tissues.

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INTRODUCTION

The scope of surgical endodontics is to accomplish the three dimensional cleaning, shaping and obturation of the apical portion of the root canal system which cannot be treated via an access cavity, but only via a surgical flap. Apical surgery belongs to the field of endodontic surgery that includes incision, drainage, closure of perforations, and tooth or root resections. The target of apical surgery is to surgically preserve a tooth that has an endodontic lesion which cannot be resolved by conventional endodontic retreatment and can be achieved by root end resection, root end cavity preparation, and a bacterial tight closure of the root canal system at the cut root end with a retrograde filling. In addition, the periapical pathological tissue should be completely debrided by curettage in order to remove the extraradicular infection, foreign body material, or cystic tissue (Bhagwat *et al.,* 2016). The term apicoectomy refers to a stage of the operation only. The principal objective is to seal the canal system at the apical foramen from the periradicular tissues. The aim of resection is to present the surface of the root so that the apical limit of the canal can be visually examined and to provide access for retrograde cavity preparation. Approximately 3 mm of root is removed which will include almost all lateral canals. Root end resection must be an adjunct measure to orthograde root treatment for two reasons.

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Firstly, there is very little chance of being able to seal all the lateral communications between the canal and the periodontal ligament with a retrograde root-filling technique. Secondly, the area of root-filling material exposed will be greater and the long-term success affected, because all root-filling materials are, to some extent, irritant to the tissues (Nasseh *et al.,* 2015). Retrograde filling materials such as amalgam, gutta percha, zinc-oxide eugenol cements (IRM, Super-EBA), Glass ionomer cements, composite resins, compomers, diaket, Ceramicrete, Bioaggregate, etc. are commonly used in endodontic surgical procedures. All of these materials have been shown to be compatible with tissue cicatrisation and the reconstitution of periradicular alveolar bone, but none of them is able to 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. This material permits a full regenerative healing and can be considered as the material of choice in endodontic surgery. In addition, the sealing properties of MTA are not affected by moisture during treatment. However, there are several drawbacks to its use such as its difficult handling properties and its long setting time (Castelluci). Several new calcium silicate-based materials have recently been developed with the aim of improving clinical use and overcoming MTA limitations. One of these materials, Biodentine has shown reduced time setting with interesting physical and biological properties as a dentine restorative material (Thomas, 2011).

Therefore, the purpose of this study was to clinically and radiographically evaluate the healing rate of lesions using Biodentin in cases of endodontic surgery by utilizing cone beam computed tomography

The steps for carrying out this procedure are:

1. Pre-operative care.
2. Anaesthesia and haemostasis.
3. Soft-tissue management.
4. Hard-tissue management.
5. Curettage of area.
6. Resection of root.
7. Retrograde cavity preparation.
8. Retrograde filling.
9. Replacement of flap and suturing.
10. Post-operative care (Evans *et al.,* 2001).

CASE REPORT

A 25 year old female patient reported to the Department Of Conservative Dentistry & Endodontics with a chief complaint of pain in the lower anterior teeth. On clinical examination the teeth responded positive to percussion and radiological examination revealed extrusion of gutta percha with a periapical lesion..A preoperative cone beam computed tomographic examination of the patient was done to identify the accurate location and measurement of the lesion (Fig.1,2).

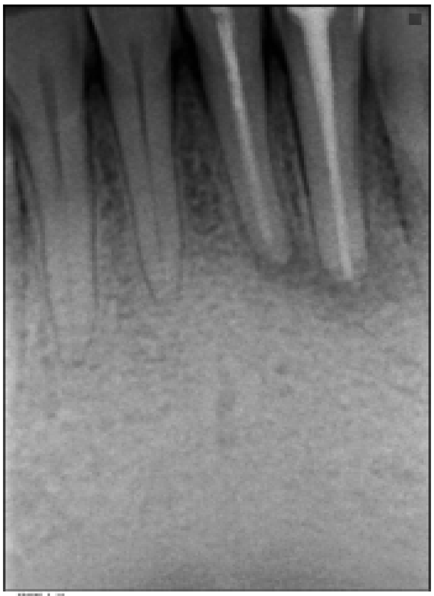

Fig. 1. Preoperative radiograph

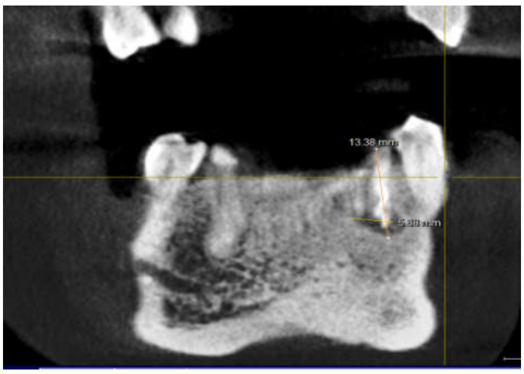

Fig. 2. Preoperative cone beam computed tomography showing 3.28 mm size of the lesion horizontally

Surgical procedure

Prophylactic administration of oral antimicrobials were prescribed to prevent systematic disease and also to prevent postoperative infection. The patient was anesthetized with 2% Lignocaine with 1:80,000 adrenaline. As haemostasis is of benefit at the surgical site, which is more easily achieved when a local anaesthetic containing a vasoconstrictor is used. Surgical procedures like flap design and elevation was done. Relieving incisions were made on sound bone i.e, a sulcular and mucogingival incisions were made with Surgical Blade (SM-64 and SM-67), Flap elevation was done using Elevator (DISC SHAPED ELEVATOR OR DISSECTOR). An assessment of the length of the root and its axis was done radiographically to remove bone from the desired site. Osteotomy was performed by using no-4 and 6 round carbide bur with Impact Micro-motor handpiece and curette(DISK SHAPED CURETTE-1.5mm) was used for periradicular curettage. The apicoectomy was simulated by cutting the apical 2 mm of the roots with a diamond fissure burr size 1.0 mm using sterile saline for cooling. The root-end cavities were prepared to a depth of 3 mm with a tungsten carbide fissure bur with a diameter of 0.8 mm, parallel to the canal, leaving a 3 mm deep root-end cavity free of gutta percha. Sterile saline in a syringe was used for cooling. Prepared root end cavity was dried with irrigator/drier and filled with material such as Biodentine. Adaptation of filling material was confirmed by using radiograph. Radiographic verification of the quality of the root end filling is appropriate before wound closure. The soft tissue flap was then re-apposed with sutures as optimum healing is being achieved with primary closure. After suturing, the tissues were compressed with damp gauze for 3–5 minutes the patient was then asked to follow post operative instructions such as to apply cold compresses with an ice pack for the first 4–6 hours after surgery, followed by mouthrinses to maintain a good oral hygiene. The patient was also prescribed antimicrobials for 5 days. Sutures were then removed after 4-7days post-operatively, i.e when reattachment of the periodontal fibres at the gingival margin had taken place. In addition, the healing progress was checked and recorded properly. After whole procedure, the patients were then recalled at 6 months-9 months-1year to assess the clinical and radiographic signs of healing by use of Cone Beam Computed Tomography (Fig.3-13).

Fig.3. Incision Given

Fig.4. Flap Raised

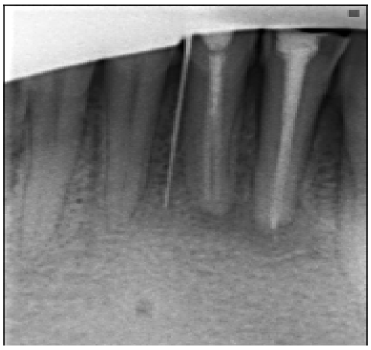

Fig. 5. Confirmation of the lesion for window preparation

Fig.6. Window preparation

Fig.7. Apicoectomy done

Fig.8. Retrograde filling materials placed follow placed

Fig.9. Bone graft placed

Fig. 10. Sutures given

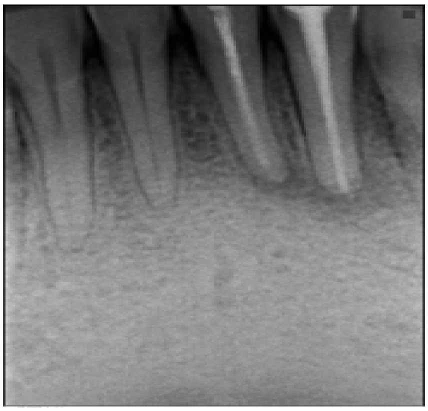

Fig. 11. 7 Days post operative up

Fig.12. 6months Follow Up

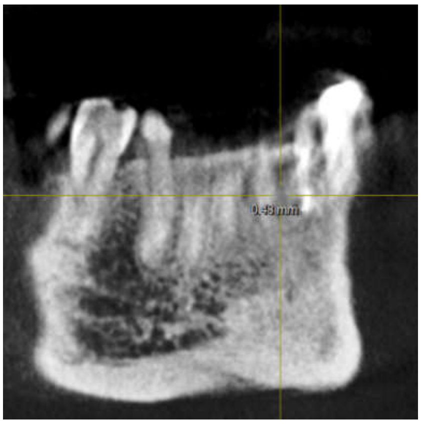

Fig.13. Up 12months follow up

DISCUSSION

In 2010, Septodont's research group developed a new material with active biosilicate technology composed of tricalcium silicate called Biodentine. It is a new class of dental material, which claims to conciliate high mechanical properties with excellent biocompatibility, as well as a bioactive behavior as mentioned in Septodont's literature. Researchers increased the physicochemical properties (short setting time, high mechanical strength.), which make Biodentine clinically easy to handle and compatible, not only with classical endodontic procedures but also for restorative clinical cases of dentine replacement (Jones, 2010). The primary clinical advantage of Biodentine is its fast setting (between 12 and 15 min). Another interesting feature of Biodentine is the product packaging in a capsule: Biodentine powder is mainly composed of tricalcium silicate, calcium carbonate and zirconium oxide as a radio-opacifier, while Biodentine liquid contains calcium chloride as the setting accelerator and water-reducing agent. The mixing is achieved by using a capsule mixing device and the ratio powder/liquid is set by the manufacturer. This allows the practitioner to achieve a reproducible material with optimum properties every time (Kim *et al.,* 2008). The primary clinical limitation of Biodentine is its low radiopacity. Despite the presence of an X-ray opacifier (zirconium oxide), the radiopacity compares unfavorably with MTA which contains bismuth oxide. This poor radiopacity makes the visualization of the retrograde obturation difficult when small amounts of material are used. With more substantial amounts, the material is more detectable. In addition, the risk of leaving some material in the bone cavity is enhanced. This drawback originated with the initial indication for Biodentine as a dentine substitute for coronal restoration. In the latter indication, the same radiopacity as dentin could be an advantage. On the contrary, the radiopacity is more important in case of retrofilling (Caron *et al.,* 2014). In addition a new imaging technique i.e, Cone-beam computed tomography (CBCT was used to assess the measurement of lesions at regular intervals. It is a new medical imaging technique that generates 3-D images at a lower cost and absorbed dose compared with conventional computed tomography (CT). This imaging technique is based on a cone-shaped X-ray beam centred on a 2-D detector that performs one rotation around the object, producing a series of 2-D images. These images are re-constructed in 3-D using a modification of the original cone-beam algorithm developer. CBCT imaging is a useful tool for diagnosing periapical lesions. CBCT images can be used to differentiate between apical granulomas and apical cysts by measuring the lesion's density. CBCT is a reliable pre-surgical tool for assessing a tooth's proximity to adjacent vital structures, allowing for accurate measurement of the size and extent of a lesion and the anatomy of the area (Alshehri, 2010).

Conclusion

Biodentine is a promising material which is suitable for surgical endodontics, demonstrating excellent biological properties and fast clinical setting time, but with poor radiopacity. Further studies are needed to explore thoroughly its clinical behavior on a long term basis.

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