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Case Report Article

Treatment of external root resorption with Biodentine in a tooth with a periodontal pocket: a case report with 2-year follow-up

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Abstract

Introduction: External root resorption is characterized by the loss of mineral tissues in the dental root. This condition is difficult to diagnose, and if not identified early, it can lead to tooth extraction. The treatment consists of surgical access, removal of granulation tissues, and sealing the area with a biological material. **Objective:** This article reports on the treatment of ERR in the middle third of the root, associated with an 8 mm periodontal pocket using Biodentine, with a two-year follow-up. **Case report:** A 57-year-old woman attended complaining of discomfort in the palate. After a thorough medical history, clinical, radiographic, and tomographic evaluation, the final diagnosis was External Root Resorption. Concerned about preserving the tooth, it was suggested to fill the resorption with Biodentine and regular follow-ups. The patient agreed, and a tissue flap was raised in the palatal region, followed by sealing of the perforation with Biodentine and suturing. After 7 days, the sutures were removed, and during the six-month and two-year follow-ups, the tooth exhibited no mobility, good periodontal health, and maintained its function. **Conclusion:** The case demonstrated a reduction in the periodontal pocket (from 8 mm to 4 mm), maintenance of the tooth, and the effectiveness of Biodentine in treating ERR, even when exposed to the oral cavity.

Introduction

External root resorptions (ERR) are a clinical challenge with uncertain or unfavorable prognosis [7, 10, 14]. ERR occurs in regions of the root where there is no deposition of cementum, leading to the loss of dental structure [6, 7, 10]. In contrast, replacement ERR involves the loss of dentin structure with the deposition of a new bone matrix [7]. These events are typically consequences of pulp, periapical, and periodontal alterations [6, 10]. Among the factors that contribute to the development of ERR processes are orthodontic forces, cystic compressions, periapical inflammatory processes, trauma, dental attritions, and bruxism [8, 14, 18].

ERR are often asymptomatic and discovered incidentally [15]. When the patient presents with any symptoms, there is already periapical involvement or invasion has reached the healthy pulp tissues [5]. To assess the feasibility of treating a resorption, one must evaluate the extent of lesion progression and the condition of adjacent tissues [4]. Regardless of the technique employed, complete removal of the tissues promoting resorption is necessary [8]. To facilitate periodontal repair around the tooth, a biocompatible material that fills the resorbed area should be utilized [17].

Mineral Trioxide Aggregate (MTA) emerged as a material for sealing perforations but is now used in various endodontic treatments, such as in root resorptions or apicectomy procedures [20]. In the first generation, the composition consisted of fine particles of tricalcium silicate, tricalcium aluminate, tricalcium oxide, silicate oxide, and bismuth oxide [22]. In the second and third generations, there was a reduction in particle size, improved uniformity, and consistency, as well as the replacement of bismuth oxide, which can cause dental discoloration [2, 13]. Among the advantages of using MTA are a low tissue inflammatory response, alkaline pH, low solubility, antimicrobial activity, and radiopacity [21, 22]. As a disadvantage, MTA is challenging to manipulate, has a long setting time, the potential for internal discoloration, and lacks a specific solvent for its removal when needed [2, 16].

Biodentine is a material based on tricalcium silicate, zirconium oxide, calcium oxide, and calcium carbonate [3, 9]. It has the same indications as MTA but with less alteration in tooth color and greater bonding strength [2, 19]. Additionally, it exhibits excellent bioactivity, calcium ion release, and low cytotoxicity [1, 19]. The product is easy to manipulate, with a shorter setting time [11, 19].

Despite its excellent properties, there is still a lack of prospective studies demonstrating that the use of Biodentine in cases of ERR can be a viable alternative. Therefore, this case report presents the treatment of an ERR with sealing using Biodentine and a 2-year follow-up.

Case report

This study was approved by the ethics committee of UNA University Center (6.081.568). All procedures related to this case report were explained to the patient, including the risks and benefits of the treatment. The patient signed a consent form authorizing the proposed treatment.

A 57-year-old patient, female, sought private dental care, reporting a complaint of gingival deformity and mild discomfort on the palate. During the anamnesis, she also mentioned a history of dental discoloration due to tetracycline use and that, for this reason, she underwent cosmetic treatment with porcelain crowns on teeth ten years ago. During the clinical examination, cracks were observed in the porcelain of upper central incisors, with no history of trauma, suggesting teeth grinding disorder. Edema of the palate gum area around upper left canine was noted, with a periodontal pocket of 8mm and without purulent exudate. Radiographically, the tooth had satisfactory endodontic treatment, with no periapical lesion, but with a wide radiolucent area in the middle third of the root, raising suspicion of external root resorption (figure 1).

Figure 1 – Initial radiography taken on the first visit showing suspected middle third root resorption

After a Cone-Beam Computed Tomography (CBCT), the diagnosis of resorption was confirmed, affecting the middle and cervical thirds in the palatal portion of the root, with bone loss following the extent of the lesion (figure 2). After discussing with the patient the possibility of tooth preservation, the proposed treatment was a surgical approach involving curettage of the inflammatory tissue and filling the resorbed root area with reparative sealer Biodentine.

The medication prescription for the procedure included 2 tablets of 4 mg dexamethasone, to be taken 2 hours before the procedure; 500 mg amoxicillin every 8 hours for 7 days, starting one day before surgery; and 400 mg ibuprofen every 8 hours for 3 days. The surgical approach began with infiltrative anesthesia using 2% Mepivacaine with 1:100 000 epinephrine (DFL, RJ, Brazil), an incision with an internal bevel using a 15C scalpel (Medix, PR, Brazil), and the detachment of the palatal mucosa to create an envelope flap, providing access to the lesion. Subsequently, curettage of the resorption area was done with Lucas curettes (85/86) to remove all granulation tissue. Next, sterile saline solution was used for irrigation, and a sterile gauze compress was used to dry the operative area. Succeeding bleeding control, the resorption cavity was filled with Biodentine. The material was manipulated according to the manufacturer's recommendations. After the initial setting of the material, the flap was repositioned, and a simple suture was made using 4.0 mononylon threaded needle (Technew, RJ, Brazil). Following the suture, a final X-ray was taken to confirm the lesion filling (figure 3a).

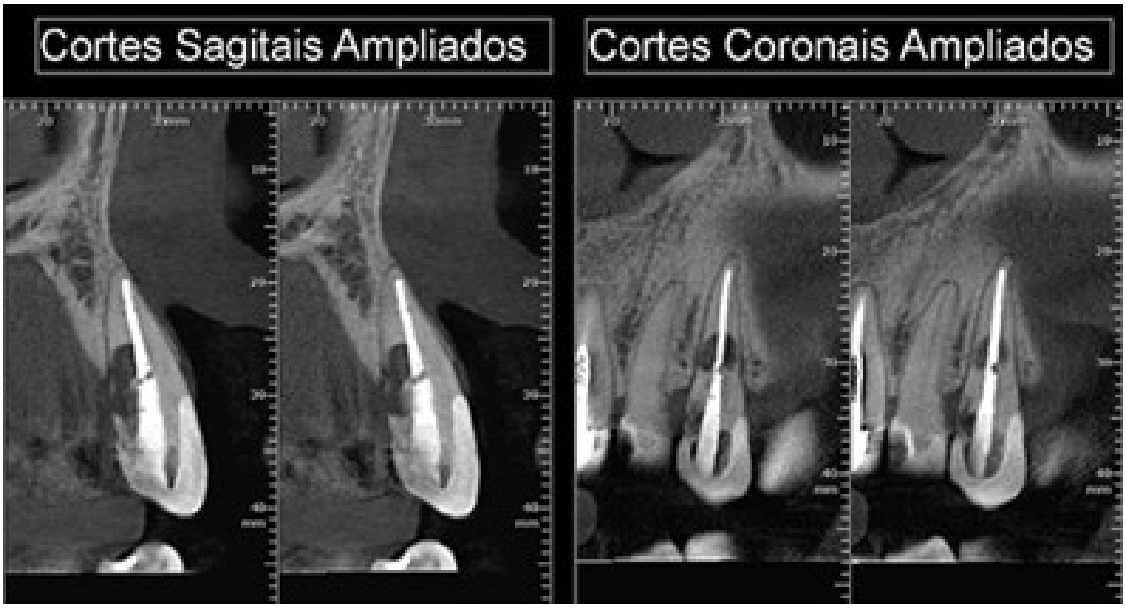

Figure 2 – Initial Cone-Beam Computed Tomography (CBCT) with OP300 Instrumentarium®. Bone loss is noted following the extent of the lesion invaginating into the root canal

Patient returned for suture removal after 7 days, and good tissue healing of the gum was observed. Within 6 months, the patient returned to radiographic follow-up (figure 3b) and was advised to undergo annual monitoring of the procedure. Two years after the procedure, a new CBCT was requested, which allowed for the observation of bone remodeling and the maintenance of the filling material in position (figures 4a and 4b). Clinically, the preservation of papillae (figure 5a) and a palatal periodontal pocket of 4 mm (figure 5b) were observed, suggesting periodontal attachment to the filling material due to the reduction in this area.

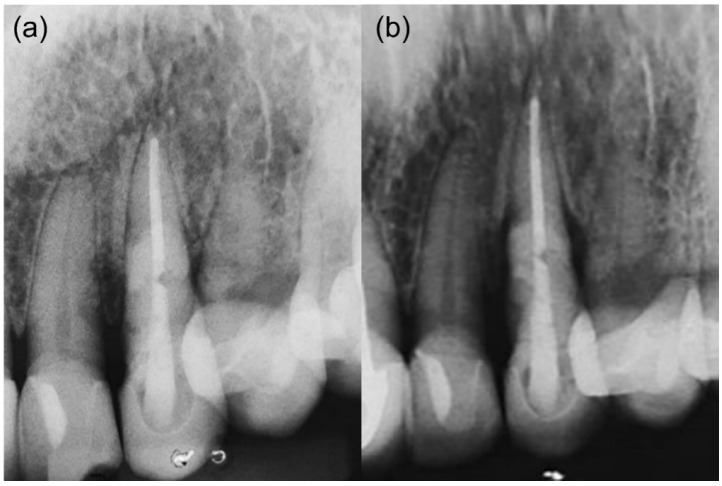

Figure 3 – a) Radiography after the procedure demonstrates complete filling with Biodentine in the external root resorption (ERR); b) 6-month follow-up radiography shows a small bony resorption around the tooth without mobility

Figure 4 – Comparison of (a) initial CBTC and (b) 2-year follow-up. Palatal bone loss is noted, with the tooth showing no mobility and no resorption of Biodentine, even when exposed to the oral cavity

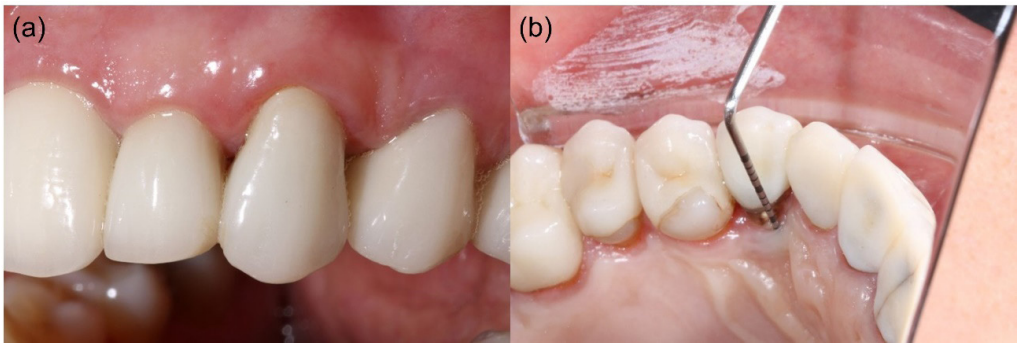

Figure 5 – Clinical photography showing (a) preserved gingival papillae and (b) 4 mm periodontal pocket with 2-year follow-up

Discussion

The probable cause of this ERR condition was bruxism [8, 14, 18]. It is not possible to definitively establish whether these disorders were indeed the factor triggering the clinical condition because the patient did not have previous documentation demonstrating the onset of the pathological process. Unlike the usual cases, this patient exhibited signs and symptoms related to the inflammatory process, whereas most cases reported in the literature are discovered asymptomatically [15]. When there is any clinically noticeable sign perceived by the patient, the periodontium already presents symptoms associated with the ERR condition [5].

Patients with bruxism apply excessive forces to the teeth that can trigger an inflammatory process and consequently activate clastic cells, leading to an increased incidence of ERR cases [8, 14, 18]. Cementoblasts are the cells that line the root surface, followed by collagen fibers and alveolar bone [8, 10]. These cells play a protective role for the root, and if, for some reason, they are missed, the resorption process can start to develop [8]. Resorptions are initiated through chemical mediators stimulating clastic cells and maintaining resorptions. The main mediators include interleukins (IL-1), tumor necrosis factor (TNF), and prostaglandins (PGE2) [8].

In treatments where there is a loss of dental structure and a need to restore favorable conditions for tooth maintenance and oral health, the materials employed must exhibit specific characteristics [11, 16]. Among these requirements are biocompatibility, adhesion, dimensional stability, antimicrobial action, and ease of manipulation [1-3, 9, 19, 21, 22]. These characteristics are present in bioceramic sealers that are indicated for such use [2, 11, 19].

MTA has been used for a long time in the treatment of perforations and dental resorptions. Biodentine is a biologically active material with improvements in physical properties and ease of manipulation [11, 23]. Biodentine penetrates open dentinal tubules, intertwining with dentin, enhancing mechanical properties [11]. Furthermore, Biodentine offers easier handling, a shorter setting time, and less tooth discoloration. It induces the formation of mineralized tissue, exhibits antimicrobial activity, and provides better sealing between the material and dental structure [3, 5, 11]. The reduced setting time, between 9 and 12 minutes, was the decisive factor in choosing Biodentine in this case to prevent the "wash-out" effect, where bleeding from the surgical area displaces the material that has not yet set [11, 12].

The adversity encountered in this case report is that the resorbed region was in an area exposed to the oral cavity, which could unfavorably impact in prognosis [7, 10, 14]. However, considering that the tooth was in an esthetic area, there was preservation of the vestibular bone, the previously endodontic treatment was satisfactory, and the patient was aware of the difficulties and risks involved, it was collectively decided to proceed with this approach.

Even with the evident palatal bone loss in the follow-up CBCT after two years, when compared to the initial CBCT, the tooth still exhibits periodontal stability. This is attributed to the preservation of the vestibular bone. In addition, the reduction of the periodontal pocket from 8mm to 4mm suggests that there was adhesion of periodontal fibers to the Biodentine [5].

It is important to emphasize that the prognosis depends on the planning, choice of surgical technique, materials used, and clinical experience of the professional performing the treatment [8, 10, 14]. Additionally, obtaining the patient's informed consent, with an understanding of the risks of possible complications that may occur during and after treatment, is a fundamental requirement prior to any interventions in ERR.

Conclusion

This case report aimed to demonstrate the management of ERR with Biodentine. With a two-year follow-up, it was observed that there was a reduction in the periodontal pocket and maintenance of the tooth fulfilling its functional and aesthetic role. These results should be assessed with caution, as the treatment and prognosis of ERR are individual and must be evaluated on a case-by-case basis.

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