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Conservative Management of Periapical Cementoblastoma: A Case Report

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As a rare ectomesenchymal neoplasm, benign cementoblastoma comprises less than 6% of all odontogenic tumors. The typical treatment plan involves surgical excision and extraction of the affected tooth. Limited evidence, however, suggests the conservative management of this condition as the best treatment. This article discusses the case of a 32-year-old man who had benign cementoblastoma and underwent conservative treatment. The diagnosis was established based on clinical and radiological features analyses. Root canal therapy was performed on the tooth, followed by enucleation, curettage, apicoectomy, and guided bone regeneration (GBR) 30 days later. After a year of follow-up, there was no recurrence, and the tooth was in healthy conditions. These findings demonstrated that the tooth affected by cementoblastoma can be saved. It was treated conservatively to preserve the patient's oral health and masticatory function.

Keywords: Apicoectomy; Cementoblastoma; Conservative Treatment; Endoodontic Therapy; Guided Bone Regeneration

Introduction

Cementoblastoma is a benign ectomesenchymal odontogenic tumor that preferentially affects the roots of mandibular molars or first premolars with no obvious gender preference. It is sometimes considered as the only true neoplasm of cemental origin, and is classified as an osteoblastoma [1, 2]. Clinically, cementoblastoma does not provoke any alterations in the adjacent mucosa except when it causes the bone expansion which is frequently accompanied by a wide range of symptoms that may or may not be associated with pain. Additionally, it has radiographic characteristics that are similar to hypercementosis, including a well-circumscribed mass fused to the afflicted root [1-4]. The amount of cementum on the root surface may increase or decrease, affecting both the apex and the entire tooth [5, 6]. Histologically, cementum-like deposits and cementoblast-like cells are frequently observed throughout the calcified matrix. Although the most frequent differential diagnosis is osteoblastoma, odontoma and osteoid osteoma should also be considered [1, 3, 4].

The gold-standard treatment of cementoblastoma cases consists of total curettage and surgical excision of the lesion followed by extraction of affected tooth structures. However, more conservative procedures like enucleation with preservation of the affected tooth have been documented in the literature [5, 7-12]. Even though recurrence is infrequent, it is possible if the lesion is not entirely eliminated. This case study aims to describe a cementoblastoma case without recurrence after a one-year follow-up in which the tumor-affected tooth was conservatively treated to protect the patient's oral health and masticatory function.

Case Presentation

The patient was a 32-year-old man who had been admitted to the School of Dentistry at Shahid Beheshti University of Medical Sciences. The patient's chief complaint was about restorative issues, and a thorough examination was requested. There was also no evidence of previous discomfort. The patient physical status classification through the guideline of The American

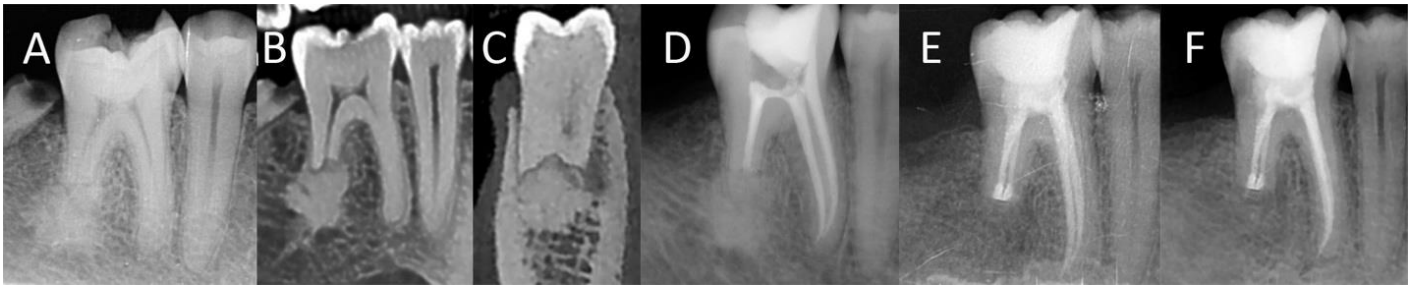

Figure 1. Radiographic evaluations; *A*) First periapical x-ray shows a well-circumscribed lesion that extends into the tooth's root; *B,C*) CBCT sagittal and coronal cuts show resorption of root and the tumor size; *D*) Periapical x-ray with distal angulation after the endodontic treatment; *E*) Periapical x-ray immediately after surgery, the tumor is enucleated, and the apical seal of distal canals was maintained using calcium silicate base cement; *F*) Follow-up periapical x-ray after a year reveals no recurrence

Society of Anesthesiologists (ASA) was ASA I. Tooth #30, the lower right first molar, was decayed, and pulpal sensibility tests revealed signs of reversible pulpitis which matched the symptoms. No expansion was detected in palpation of mucobuccal fold, and percussion test revealed the expected normal response. The probing depth around the tooth was. The lesion was found accidentally in radiographs.

Intraoral periapical radiographs presented a well-defined radio-opacity around the apical third of the distal root of tooth #30 with a radiolucent rim and periapical bone sclerosis (Figure 1A).

Cone-beam computed tomography (CBCT) images represented the juncture of the mass and the dentin of the tooth (Figure 1B and 1C). In addition, the CBCT scan exam disclosed dental root resorption with no cortical bone.

A conservative treatment plan was considered because the patient refused to lose the tooth. Informed consent was obtained and root canal therapy was done as the first step of the treatment.

After using a rubber dam to isolate the tooth, an electronic apex locator (J Morita Inc, Tokyo, Japan) was used to determine the working length in the mesial canals. The working length in the distal canals had to be measured radiographically because the electronic apex locator could not estimate it. Mechanical preparation was performed using the crown-down approach with ProTaper Universal nickel-titanium (NiTi) rotary files (Dentsply Maillefer, Ballaigues, Switzerland). The final apical file was #25/.08 (ProTaper Universal F2). Each canal was irrigated with 2 mL 5.25% sodium hypochlorite activated by an ultrasonic device. The canals were dried with paper points and obturated with gutta-percha cones (Dentsply Maillefer) and AH-26 sealer (Dentsply De Trey, Konstanz, Germany) using the cold lateral condensation technique (Figure 1D). The patient was scheduled for a follow-up appointment one month after the initial root canal procedure, which was completed in a single visit. After a month, the tooth was scheduled for enucleation, curettage, and apicoectomy. Anesthesia was obtained by inferior-alveolar nerve block and supraperiosteal infiltration for buccal soft tissues adjacent to tooth #30 in order to remove the lesion. A triangular mucoperiosteal flap was created by making an intrasulcular incision from mesial papilla of tooth #28 to the distal papilla of tooth #30, followed by an angled releasing incision to increase access to the root, reduce bleeding, and prevent incising the lesion (Figure 2A). The buccal bone plate was osteotomized, then the lesion was completely excised with the apical third of the affected root, 2 mm above the tumor fusion point to the root. (Figure 2B).

Surgical curettage was used to remove any remaining root fragments and tumor residues. Retrograde obturation was carried out using Mineral trioxide aggregate (MTA) (A.G.M Dental MTA cement; Andishe Gostar Masud, Tehran, Iran) and bioceramic sealer (Endoseal TCS; Maruchi Co., Wonju, Korea) to ensure apical sealing [13]. In order to perform the guided bone regeneration technique (GBR), the bone defect was filled with mineralized bone xenograft (Bio-Oss spongiosa particles; Geistlich-Pharma, Wolhusen, Switzerland) and membrane (Bio-Gide; Geistlich-Pharma, Wolhusen, Switzerland) to hasten bone regeneration (Figure 2C and 2D).

For routine histopathologic analysis, the tissue specimen was immediately immersed in a 10% buffered formalin solution. After being fixed for 24 h with 10% ferric acid, the sample underwent decalcification. The material was processed and fixed in paraffin after 30 days, as per routine procedure. Hematoxylin and eosin were used to stain a section of tissue which has 5 mm thickness. Histopathological analysis supported the presence of compact lamellar bone with fragments of small Haversian canals. There was trabecular bone with loose fibro-fatty connective tissue and no evidence of malignancy (Figure 3A and 3B). Based on clinical, radiographic, and histopathological findings, cementoblastoma was determined to be the definitive diagnosis.

Follow-up visits were schechuled after one week, one month, six months and one year. No signs or symptoms (pain, periodontal lesions or functional problems) and no periapical lesions were found in the 12-month postoperative radiographic evaluation (Figure 1F).

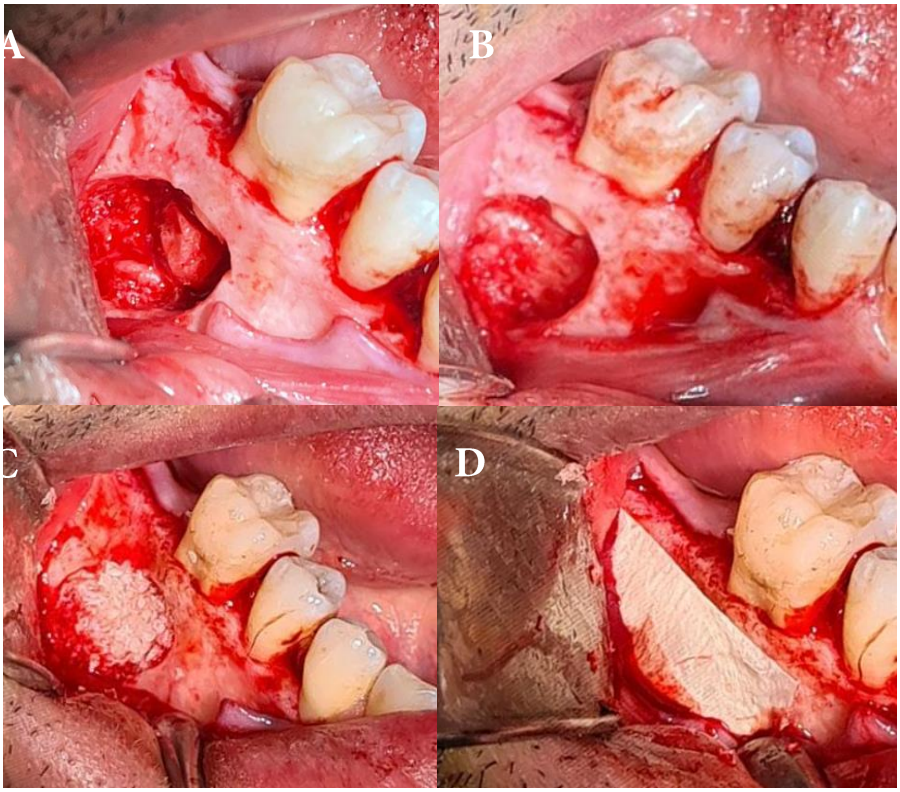

Figure 2. *A*) Surgical procedure carried out to remove the lesion via a mucoperiosteal flap; *B*) Lesion enucleation and apicoectomy distal root of tooth #30; *C*) Bone cavity filled with xenograft (particles size: 0.25-1 mm); *D*) Membrane placed over the affected area and its margins

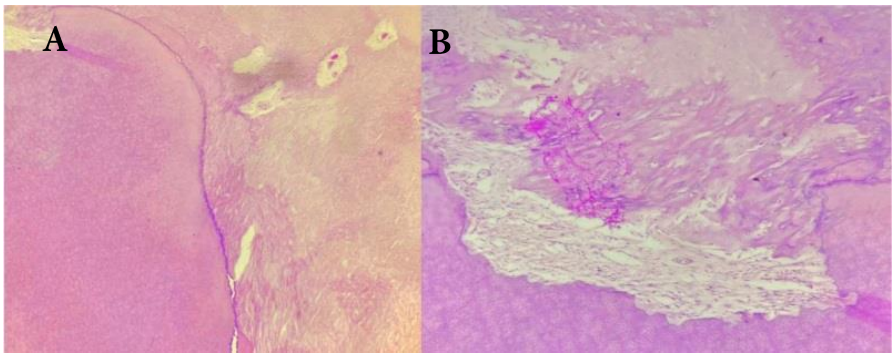

Figure 3. *A*) Histological view of the lesion showing cementum-like deposition and root resorption (40× magnification); *B*) In image with more details note basophilic tumor cells inside the tumor mass exhibiting different sizes and shapes (100× magnification)

Discussion

In the updated World Health Organization (WHO) classification of odontogenic tumors, cementoblastoma is still categorized as a benign neoplasm characterized by the growth of cementum-like tissue adherent to a tooth root [1]. It differs from the typical "cementoma," which is a reactive periapical process and is known as periapical fibrous dysplasia or periapical cemental dysplasia [14]. In addition, hypercementosis is defined as a non-neoplastic condition in which abnormal amounts of cement are successively deposited over normal radicular cement. Despite being two distinctive conditions, hypercementosis and cementoblastoma may be a diagnostic challenge when presented with atypical manifestation [2]. Another differential diagnosis is osteoblastoma, which is more common but does not fuse to the root [3, 4]. Additionally, in cases similar to this, focal sclerotic osteomyelitis needs to be ruled out [15].

As mentioned before, cementoblastoma is characterized by a slow-growing bony mass without any cortical bone destruction in the clinical evaluation. Pain is sometimes reported as a symptom of

this neoplasm [5]. In contrast to aggressive tumor, there have been no reported cases of cementoblastoma demonstrating paresthesia or anesthesia. [5]. The majority of published reports cover the age range of 8 and 30, and there is no overt gender bias [14]. The most frequent location is reported to be between the first premolar and the first molar (80% of cases) [14]. The affected teeth usually respond to typical pulpal tests. However, some teeth may not respond to pulpal examinations. This might be because of the tumor's growth at the root apex which interferes with normal neutral impulses and compresses the nerves and vessels [5].

The lesion is typically observed on radiographs as a solitary radio-opacity confluent with the root(s) of the involved tooth. A thin radiolucent rim may surround the lesion, giving it a "sunburst" or "root trunk" appearance [5].

Three dimensional imaging techniques are not always necessary for the pre-operative evaluations, but in this case, CBCT was utilized because it can help with determination of the lesion's size and extension, surgical plan, and assessment of the tumor's connection with the tooth and mandibular anatomical structures such the mandibular foramen [6, 16].

Cementoblastoma is characterized by numerous ovoid entities that usually merge together and resemble cementum in histological examination. The maturity of the lesion typically determines the amount of calcification [14]. At the edges of lesions and in regions with an active growth pattern, deposits resembling unmineralized cementum are frequently observed. Particularly in regions where cementum-like material is being actively deposited, plump tumoral cells may display hyperchromatism and pleomorphism. Even in the regions of strong tumoral hypercellularity, the mitotic figures are rare which indicates the limited developmental potential of tumor. Reabsorption, loss of hard tissue, and obliteration of the periodontal ligament may be visible on the affected tooth [3, 7, 17].

In this case, the data mentioned above helped to identify a localized benign tumor. The preferred treatment plan regularly involves total curettage after surgical excision of the lesion and any affected dental structures. Although recurrences are uncommon, Brannon *et al.* stated that recurrence is more common when curettage is performed without the extraction of the involved tooth or teeth and enumerated the expansion of cortical bone and/ or perforation of the cortex are the clinical signs of recurrence [7]. Chrcanovic *et al.* reported an 11.8% recurrence rate of cementoblastoma, which may not be related to the location of the lesion or the preservation of teeth [18].

Because of the high recurrence rate of cementoblastoma, surgical excision of the cemental mass and a portion of the root, as well as apicoectomy, is recommended after root canal therapy. Additionally, in some cases, root amputation in addition to endodontic therapy may be effective [8, 12]. The literature has also demonstrated that using the aforementioned treatment to save the tooth ultimately results in extraction of the endodontically treated tooth [19, 20]. Despite the fact that the current findings imply that the preservation of the implicated teeth has no effect on the recurrence rate, it is impossible to establish whether this is the case in reality.

The majority of the lesions received the same treatment (excision) which made it difficult to determine the best therapeutic approach. Quadri *et al.* performed an apicoectomy six month after endodontic treatment of the affected tooth. Clinical radiographs after 6 and 10 months revealed periapical healing without any symptoms or signs. These findings confirmed that the treatment of cementoblastoma might be more conservative, allowing the damaged teeth to be saved [21]. Root canal therapy and apicoectomy were found to be effective in saving the tooth in this case.

The root canal was sealed with retrofilling material after the conduction of apicoectomy and retro-preparation, in order to prevent bacterial leakage [22]. A number of materials and techniques have been marketed for the retrofilling of root canals including mineral trioxide aggregate (MTA), calcium-enriched mixture (CEM) cement, Biodentine, and other calcium silicate base cements [14, 23]. Due to its essential qualities like biocompatibility, non-toxicity, osteoinduction, and cementogenesis, MTA has unquestionably shown to be the gold standard retrofilling material for apical sealing in numerous *in-vitro* and *in-vivo* studies. As an added benefit, it provides excellent marginal adaptation, maintains a high pH over a long period of time, and induces a favorable tissue response [13, 24-26].

In terms of GBR, it is the most widely used therapeutic strategy for the correction of alveolar bone defects resulting from periodontal or periradicular lesions [27, 28]. The main principle of GBR is the application of a membrane to prevent non-osteogenic tissues from interfering with bone regeneration [29]. Currently, GBR implies the use of different types of membrane in conjunction with different bone-filling materials. Numerous factors, such as the size and shape of the bone defect, have a significant impact on the choice of material [27]. In this case, the use of xenograft bone material eliminated the need for the donor site and stopped further morbidity.

Moreover, unlike what is frequently reported in the literature, no relapse was found after a year. However, following a 66-month follow-up, Brennon *et al.* found a 3% recurrence rate, highlighting the necessity for long-term monitoring [30].

Conclusion

This case report demonstrates that a tooth affected by cementoblastoma can be salvaged by the conservative treatment that preserves the patient's oral function. The condition must be carefully examined in order to make a delicate diagnosis. To confirm the lower risk of recurrence, additional follow-up periods are needed. Therefore, it can be concluded that cases that meet the study's criteria should be handled cautiously.

Conflict of Interest: 'None declared'.

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