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Case Report

Application of Platelet-Rich Plasma After Surgical Removal of Compound Odontoma: Case Report

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Abstract

Odontomas are the most common benign odontogenic tumors. Odontomas are usually asymptomatic, diagnosed during routine examinations, related to delayed dental eruption. From this perspective, they can be diagnosed at any age, but with higher prevalence in the first and second decades of life. Odontomas may be complex or compound, depending on their histological nature. The compound odontoma presents several denticles in its composition, while the complex odontoma presents an amorphous mass composed of soft tissue and calcified tissue. The recommended treatment is surgical removal. The prognosis is favourable and recurrence is rare. The purpose of this article is to present a case of compound odontoma diagnosed in an adult patient with tooth loss of the upper incisors and canines (teeth 11, 12, 13, 21, 22 and 23). The lesion was diagnosed during initial diagnostic examinations for osseointegrated implant installation. In order to assist bone neoformation and alveolar bone repair, surgical excision of the lesion and subsequent application of platelet-rich plasma were performed.

Keywords: *Odontoma; Oral Surgery; Platelet-Rich Plasma; Bone Regeneration*

Introduction

Odontomas are the most commonly encountered benign odontogenic tumours in dental practice. They represent about 22% of all odontogenic tumours [1-8]. They present slow growth. They are formed by epithelial and mesenchymal cells and are classified as hamartomatous odontogenic lesions [1-5,7-12].

Odontomas can be classified as compound or complex, according to their histological nature. The compound odontoma presents several denticles in its composition, while the complex odontoma presents as an amorphous mass composed of calcified tissue in permeation to the soft tissue. Compound odontomas have a predilection for the anterior region of the maxilla. On the other hand, complex odontomas are frequently located in the posterior part of the mandible [1,3-5,7,9-14].

The lesions are asymptomatic. They are usually diagnosed during routine examinations, particularly related to delayed tooth eruption or missing permanent teeth and cystic lesions [1-5,9-12,14,15]. From this perspective, the diagnosis can occur at any age, although it is frequently made during the first and second decades of life [1-4,6,9-13,15-18]. There is no predilection for gender [16].

The etiology is still unknown. However, several intrinsic and extrinsic factors have been considered in its etiopathogenesis, such as trauma, local infection and genetic factors [1-5,10-12,14,15,19-21].

The recommended treatment is surgical removal and the prognosis is favourable [1,4-6,9-12,15,20]. However, depending on the size and location of the lesion, it is possible that the surgical removal of the odontoma may cause large bone defects. In these regions,

the use of biomaterials and grafts is recommended, with the purpose of avoiding the invagination of soft tissues and favouring the process of repair and bone neoformation [22,23]. Additionally, in edentulous areas, the installation of osseointegrated implants and implantoprosthetic rehabilitation is provided.

There are several biomaterials, with indications, techniques and peculiar characteristics. Autogenous biomaterials present superiority in relation to the others, as they are obtained from the patient himself. The technique of utilization of platelet-rich plasma was a precursor of the current technique of utilization of fibrin-rich plasma. Currently, its use has been suppressed by the application of fibrin-rich plasma. However, the technique of platelet-rich plasma use is still advantageous in several characteristics [24,25].

Purpose of the Study

The purpose of this article is to present a case of complex odontoma diagnosed in an adult patient with tooth loss of the upper incisors and canines (teeth 11, 12, 13, 21, 22 and 23). The lesion was diagnosed during initial diagnostic examinations for osseointegrated implant installation. In order to assist bone neoformation and alveolar bone repair, surgical excision of the lesion and subsequent application of platelet-rich plasma were performed.

Case Report

A Caucasian female patient, 36 years-old, attended in a private clinic for implantodontic rehabilitation.

Clinically, an edentulous area was observed due to the absence of teeth 11, 12, 13, 21, 22 and 23. The alveolar ridge showed normal mucosa coloring, healthy adjacent gingival tissue, as well as satisfactory oral hygiene.

During routine radiographic examination - panoramic and periapical radiographs (Figure 1 and 2, respectively) - radiopaque images were observed in the edentulous region of teeth 11, 12 and 13. The images of calcified structures resembled dental structures, leading to the diagnostic hypothesis of compound odontoma.

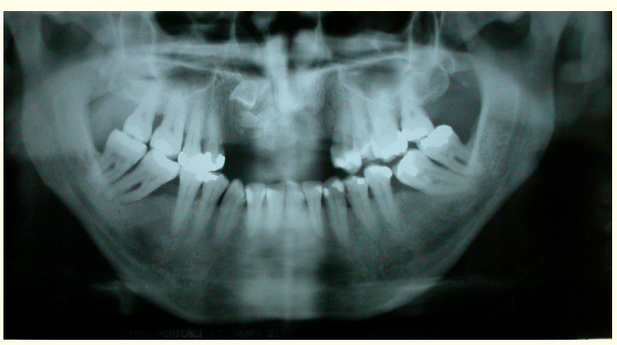

Figure 1: *Initial radiographic aspects (panoramic radiograph).*

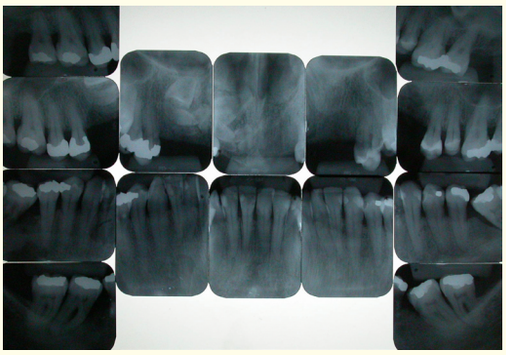

Figure 2: *Radiopaque images observed in the edentulous region of teeth 11, 12 and 13 (periapical radiograph).*

Based on this diagnostic hypothesis, surgical removal was recommended. However, due to the possible loss of bone tissue and reduction of alveolar thickness and height, the technique of grafting with platelet-rich plasma was suggested. After the necessary orientation about the procedure, the patient signed the consent form to perform the treatment.

Prior to the start of the surgical procedure, blood was collected from the patient in the right brachial vein (Figure 3). Five test tubes (with 15 ml each) containing citrate phosphate dextrose as anticoagulant were collected (Figure 4). The tubes were placed in a laboratory centrifuge (Centribio 80-2B™, Centrilab, Campinas, Brazil), under protocol of Marx., *et al*. (1998) [26] (Figure 5). Cell separation was performed by two-step centrifugation: 5,600 rpm and 2,400 rpm, subsequently. After centrifugation and separation of phases from the test tubes (collection of PRP by pipetting), 10% calcium gluconate was added in a petri dish to promote gel consistency, followed by mixing with freeze-dried bovine bone (Osseobond™, Dentoflex, São Paulo, Brazil). Two biomaterials were obtained: a gel composed of fibrin-rich plasma (Figure 6A) and another gel consisting of platelet-rich plasma associated with particulate bone (Figure 6B).

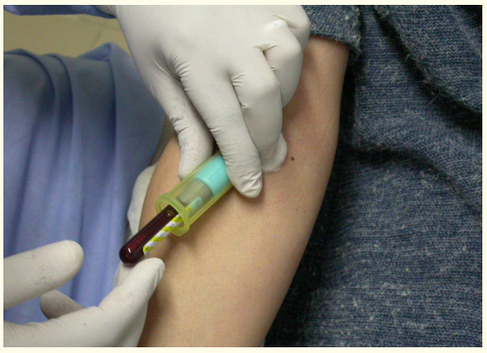

Figure 3: *Blood collected from the patient in the right brachial vein.*

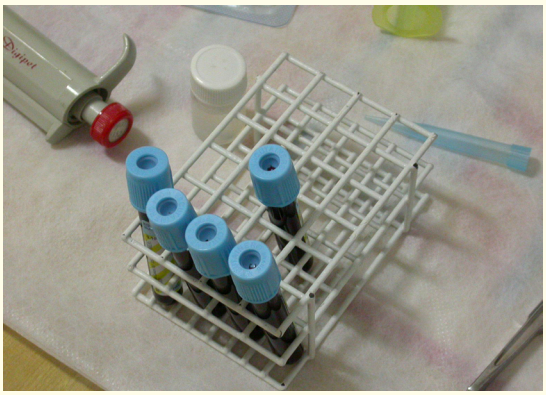

Figure 4: *Test tubes with blood collected.*

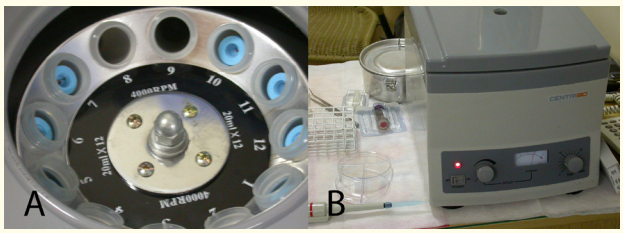

Figure 5: *Test tubes placed in a laboratory centrifuge (A). Centrifugação (B).*

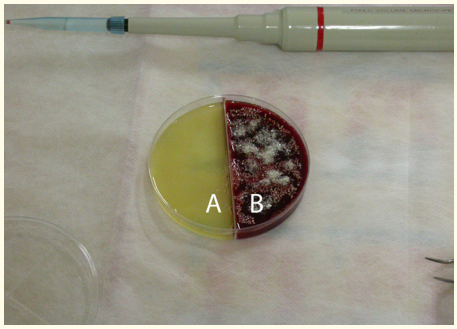

Figure 6: *Obtaining autogenous biomaterials in gels: fibrin-rich plasma (A); platelet-rich plasma associated with particulate bone (B).*

Simultaneously to the process of manufacturing the biomaterials, we proceeded to the surgical stage. Under local anesthesia (Figure 7), a primary incision was made on the crest of the edentulous ridge, between teeth 14 and 24, and two relaxing incisions, exposing the region by folding the mucoperiosteal flap (Figure 8). The cortical bone was slightly eroded with a diamond bur, highlighting the lesions (Figure 9). The lesions were removed and the bone cavity enucleated and carefully washed with saline solution (Figure 10). PRP was inserted into the bone cavity (Figure 11) and covered with PRF, used as membrane (Figure 12). The flap was put back in its original position and sutured (Figure 13). Analgesic, anti-inflammatory and antibiotic drugs were administered to the patient.

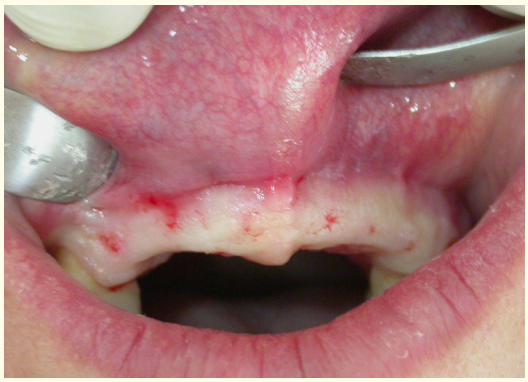

Figure 7: *Previously anaesthetised region.*

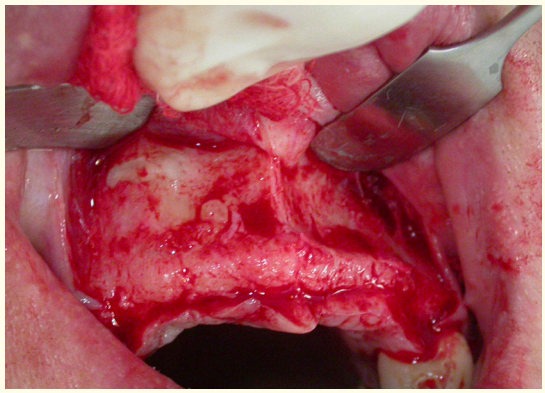

Figure 8: *Mucoperiosteal flap detached and exposure of the region.*

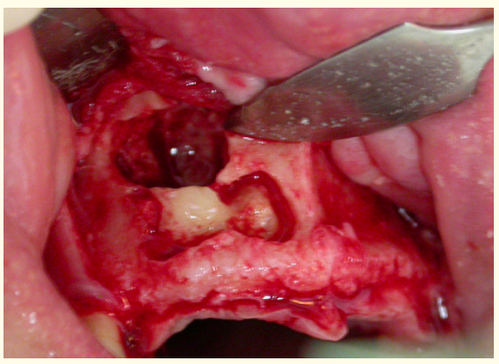

Figure 9: *Cortical bone slightly eroded, showing the lesions.*

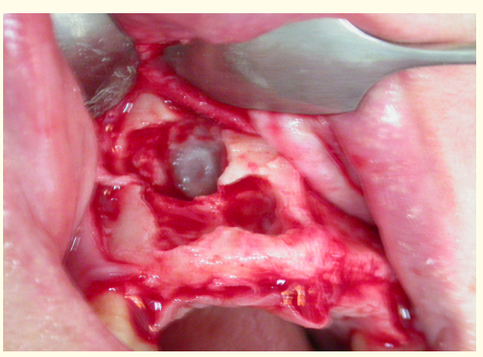

Figure 10: *Bone cavity after removal of the lesions.*

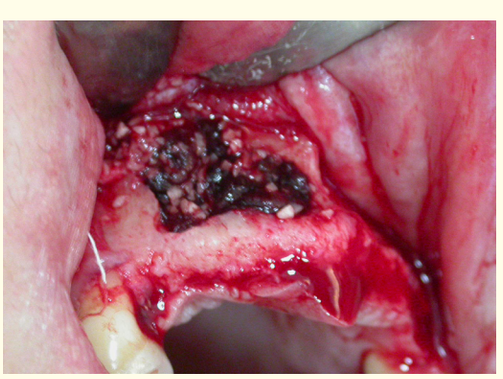

Figure 11: *Platelet-rich plasma inserted into the bone cavity.*

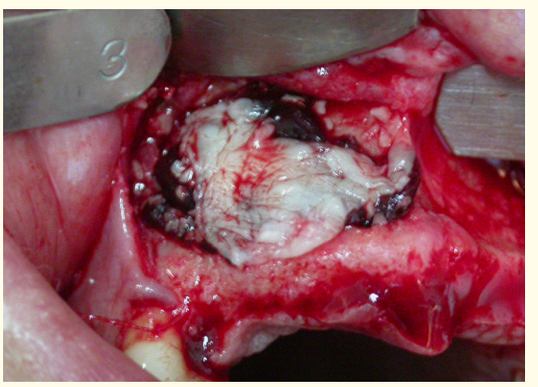

Figure 12: *Fibrin-rich plasma covering the region.*

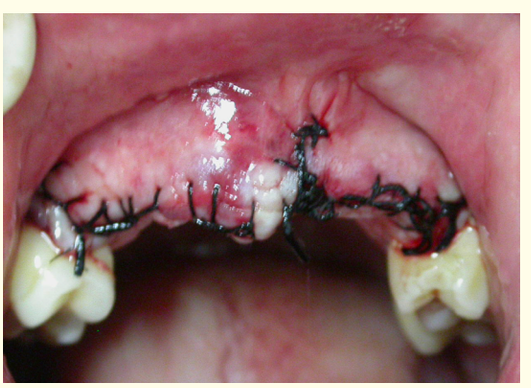

Figure 13: *Flap sutured: frontal view.*

The removed lesions (Figure 14) were fixed in 10% formalin and sent to the Laboratory of Surgical Pathology of the School of Dentistry of the University of São Paulo. Histological sections showed dental structures with areas of mineralization, with presence of enamel, primary dentin and cementum (Figure 15). The final diagnosis was compound odontoma.

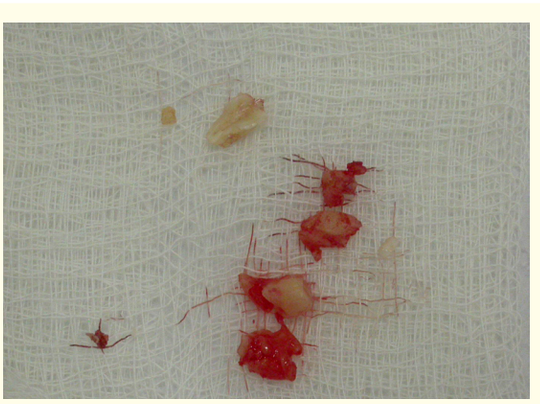

Figure 14: *Fragments of the lesion removed.*

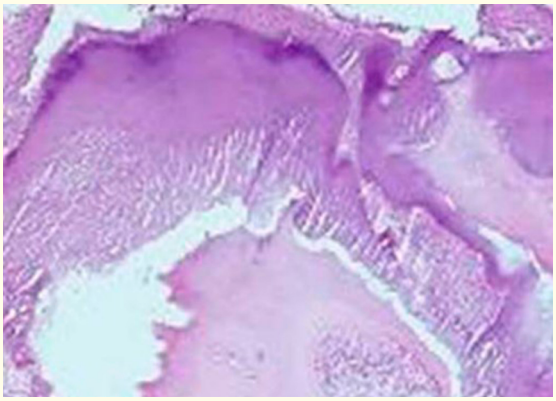

Figure 15: *Histopathological aspects (magnification: 40X).*

After 15 days, the remaining sutures were removed and no complaints or complications were reported. The patient was advised to wait 6 months and referred for future osseointegrated implant installation and implantoprosthetic rehabilitation.

Discussion

Usually odontomas are diagnosed during routine examinations. Delayed tooth eruption or absent teeth, as observed in the present report, are the main clinical factors related to the presence of odontomas [1-5,9-12,14,15,27,28]. This case presented absence of teeth 11, 12, 13, 21, 22 and 23, but only the teeth on the right side of the maxilla (teeth 11, 12 and 13) could be associated with the compound odontoma. Odontomas can cause impaction, malocclusion and volume increase [1,3,5,13,14]. In the present report, the odontoma interfered with the patient's dentition and occlusion, causing occlusal and aesthetic alterations, which will require future implant installation and implantoprosthetic rehabilitation.

The recommended treatment is surgical removal. More conservative procedures and, when possible, avoiding the loss of the adjacent tooth should be the conduct of choice [1-5,9-12,15,28]. However, in large bone defects caused by surgical removal of odontomas, bone grafts may be necessary for ridge reconstruction, preparing the region for future installation of osseointegrated implants and implant-prosthetic rehabilitation [12,13].

Platelets play a fundamental role in hemostasis processes and in the coagulation cascade. Platelets are released from the bone marrow when the endothelium is injured, undergoing morphological changes and originating clot formation. During this phase, fibrinogen polymerises to form a fibrin network. Platelets then release the content of intracellular granules that contain several growth factors - not related to hemostasis - but associated to the processes of tissue regeneration, angiogenesis and immune response [24]. Platelet-derived growth factors (PDGF), transforming growth fator-beta (TGF-β), epidermal growth factors (EGF) and vascular endothelial growth factors (VEGF) are the main growth factors released by platelets [26,29-36].

Indications for platelet-rich plasma application include bone augmentation surgeries; post-extraction management; periodontal and perimplant bone defects; temporomandibular joint disorders; regenerative endodontics; alveolar fissures; dental transplants; and dental implants. Additionally, in the field of Oral and Maxillofacial Pathology, platelet-rich plasma application has been employed in cases of medication-related osteonecrosis of the jaw (MRONJ) or osteoradionecreosis; in bone cavities arising from osteolytic lesions such as cysts and benign tumours of the jaws, oronasal fistula [22-24,29-35,37,38]. The use of platelet-rich plasma after bone excision and resection in the treatment of ameloblastomas and central odontogenic fibroma was reported, showing bone consolidation and satisfactory results [36,39]. Segmental resection of the mandible caused by squamous cell carcinoma, followed by reconstruction with pre-moulded titanium plates, autogenous cortical bone plates, particulate cancellous bone and platelet-rich plasma has also been reported, showing satisfactory results [25].

In general, platelet-rich plasma improves hard and soft tissue regeneration. Several benefits were presented when employed in the preservation of the post-extraction alveolar bone, among them better healing of soft tissues; greater bone regeneration; greater osteoblastic activity; less painful symptomatology reported by the patient in the post-surgical period. In the prevention or when alveolar osteitis is already installed, the effectiveness of platelet-rich plasma has been reported, presenting a faster bone coverage and less inflammatory process. In surgeries of bone augmentation and gain, it was verified the bone gain as much in thickness as in bone height; greater bone increase and greater angiogenesis in maxillary sinus lift surgeries; greater bone gain adjacent to osseointegrated implants. In the treatment of periodontal intraosseous defects, guided tissue regeneration with platelet-rich plasma has been considered the gold standard. Better results have been reported, such as greater horizontal bone gain in grade II furcation defects; better

clinical results in clinical insertion level and probing depth when associated with scaling and root planing procedures; reduction of painful symptomatology [23,24,33,34,38].

Currently, a time of transition is being observed: platelet-rich plasma seems to be in disuse, while fibrin-rich plasma is being more widely used [22,31]. In the present report, considering the several benefits achieved with the use of platelet-rich plasma and the knowledge and technology from that time, a more conservative procedure was chosen, using a synthesized biomaterial obtained from the patient herself. A similar case was treated by Lakshmi., *et al.* (2016) [40] in surgical removal of odontoma with 63 denticles and used fibrin-rich plasma, with the permanence of the involved tooth 11, in a 9-year-old child.

Conclusion

Odontomas can cause great loss of bone tissue after surgical removal. Considering the preservation and maintenance of remaining bone tissue and the opportunity of bone neoformation, the use of biomaterials is indicated. Among the autogenous biomaterials, the application of platelet-rich plasma presented satisfactory results in the process of bone regeneration.

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