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ENUCLEATION OF INFLAMMATORY RADICULAR CYST ASSOCIATED WITH APICOECTOMY WITH RETROBTURAÇÃO: CASE REPORT

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INTRODUCTION

Radicular cysts account for about 60% of all odontogenic cystic lesions and are classified by the World Health Organization (WHO) as odontogenic cysts of inflammatory origin, as they result from epithelial proliferation from an inflammatory process, mainly due to pulp necrosis in teeth affected by caries (MARTIN; SPEIGHT, 2017).

Lopes and Siqueira (2020) state that the origin of root cysts always comes from a granuloma that has become epithelialized, although not all granulomas become root cysts. Maintaining the cause, infection within the root canal systems, can cause epithelial proliferation to increase, generating a root cyst, which is the result of a long-term endodontic infection.

This is a lesion that preferentially affects the anterior region of the maxilla and is usually asymptomatic, unless there is a secondary bacterial infection. Because of this, it is characterized as a radiographic finding in routine examinations, where it appears as a unilocular, radiolucent, rounded or oval image with well-defined boundaries surrounding the apex of a devitalized tooth. It is also possible to observe the loss of the hard lamina along the involved root, since the dimensions vary from 5 mm to several centimeters, and this is a factor taken into account when choosing the appropriate treatment (SILVA, 2018).

Currently, there are several treatment options for radicular cysts, such as: conservative treatments (through conventional endodontic treatment of the devitalized tooth, with or without apicoectomy), surgical treatments such as tooth extraction (followed by periapical curettage), marsupialization, decompression, and cystic enucleation. Each case must be thoroughly analyzed, and regardless of the technique chosen, the dental surgeon must be aware that the origin of the lesion is microbial, therefore, the treatment must be effective in eliminating these microorganisms (MENDONÇA, 2017).

In the presence of extensive cystic lesions, one of the recommended treatment methods is enucleation associated with root apicoectomy of the dental unit involved in the lesion, as well as retrofilling with a high-quality biocompatible material, with mineral trioxide aggregate (MTA) being the ideal material (DANTAS, 2014).

CASE REPORT

The patient E.A.R., leucoderma, 44 years old, female, attended the UNIUV Dental Clinic, referred to the Surgery II discipline for cystic enucleation surgery associated with apicoectomy of dental elements 21 and 22 with retrofilling. She reported no systemic changes, and blood coagulation tests, fasting blood glucose, and complete blood count showed no variation from normal.

During the anamnesis, the patient reported painful sensitivity in the left anterior upper teeth, with endodontic treatment reported in one of them, information confirmed by the periapical radiograph of the left lateral incisors and upper canine (Figure 1), which clearly showed the presence of endodontic treatment in tooth 22, in addition to evidencing a radiolucent, unilocular, circumscribed periapical lesion with a radiopaque halo involving the apex of the upper left central and lateral incisors, suggesting the presence of a radicular cyst.

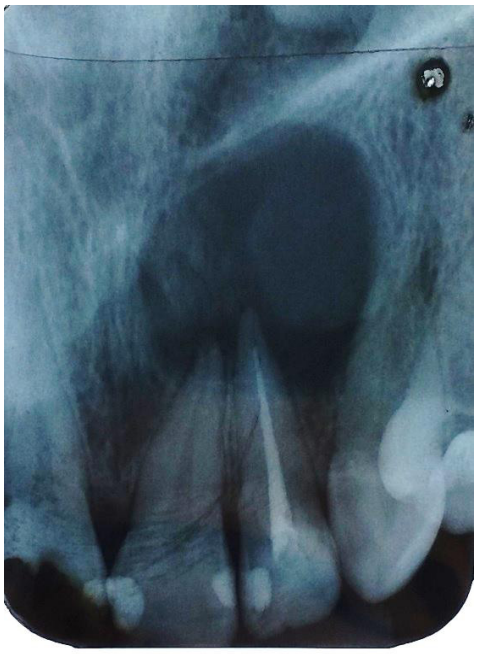

Fig. 1 – Initial x-ray of the case

Clinically, there was no swelling or fistula, and the crowns of teeth 21 and 22 had class III composite resin restorations on the mesial and distal surfaces of the respective teeth.

Given the clinical and radiographic findings, endodontic treatment and retreatment of teeth 21 and 22 was proposed. On April 18, 2017, endodontic opening of tooth 22 was performed for retreatment, as it had already undergone endodontic treatment that had not been performed at the UNIUV Dental Clinic, and 15 days later, tooth 21 was opened for initial treatment.

The intracanal medication for these two teeth was changed every seven days, with an interval in May and a return in June, with weekly changes of calcium hydroxide P.A. (Biodinâmica, Ibiporã, Paraná, Brazil) and 2% chlorhexidine gel (Maquira, Maringá, Paraná, Brazil).

After the July vacation break, the tooth was opened for drainage due to the presence of purulent secretion via the canal and fistula. Medication replacement was resumed every seven days, but this time using Calen paste (SS White, Rio de Janeiro, Brazil).

On September 12, 2017, the root canals of the teeth involved in the lesion were filled using the lateral condensation technique to fill the canals with gutta-percha and Endofill® cement (Dentsply Maillefer, Ballaigues, Switzerland). The overflow of the filling material was purpos , as shown in Image 2, since the apicoectomy procedure would be performed the day after the filling.

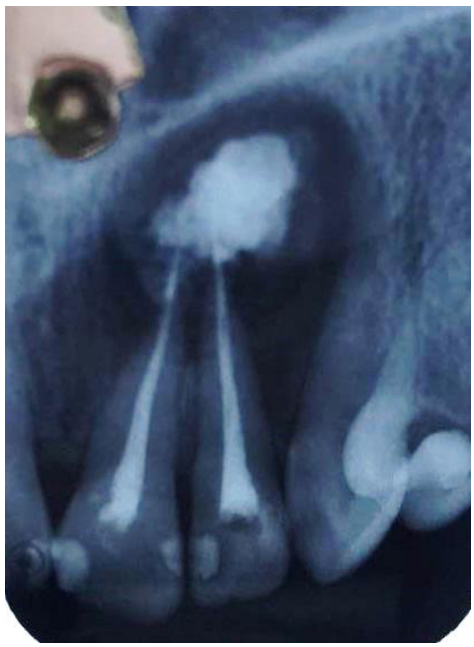

Image 2 - Root canal filling

Source: Author, 2019.

The day after the root canal filling via the pulp chamber, the cystic enucleation procedure was performed, followed by apicoectomy and retrofilling with MTA. Surgical planning was based on periapical ra-

diographs, panoramic radiographs (Image 3), and complementary blood tests.

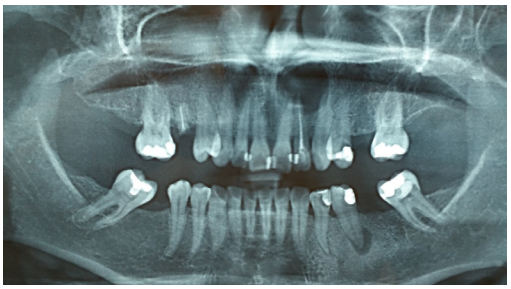

Image 3 – Panoramic radiograph

Source: Author, 2019.

The bilateral anterior superior alveolar nerve was then blocked intraorally with 4% articaine 1:100,000 and the nasopalatine nerve with 2% mepivacaine 1:100,000 (DFL, Rio de Janeiro, Brazil), followed by a modified Newmann-type total mucoperiosteal flap, with relaxants positioned distally from the right upper lateral incisor and the left upper first premolar, performed with No. 15 scalpel blades. The flap was detached starting in the papilla region, as shown in image 4, using Buser and Molt detachment instruments, adapted to the region. All manipulation was performed carefully, allowing constant blood irrigation and avoiding lacerations, which could affect the final healing process, leading to the appearance of a scar in the gum region. The detachment proceeded from the papillae region to the margins of the relaxing incisions, then continued toward the lesion, detaching the entire flap to a level above the lesion, which allowed for safe manipulation and provided excellent visualization of the site of cyst removal.

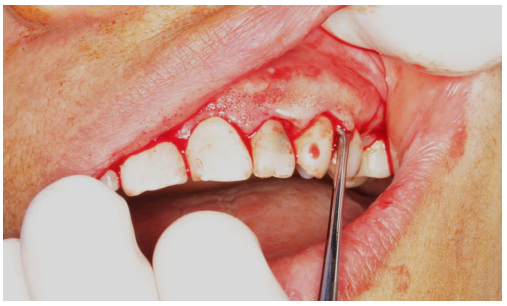

Image 4 – Beginning of flap detachment.

Source: author, 2019.

Image 5 shows the total detachment of the flap, already revealing the site of access to the lesion and clearly showing the rupture of the vestibular bone cortex.

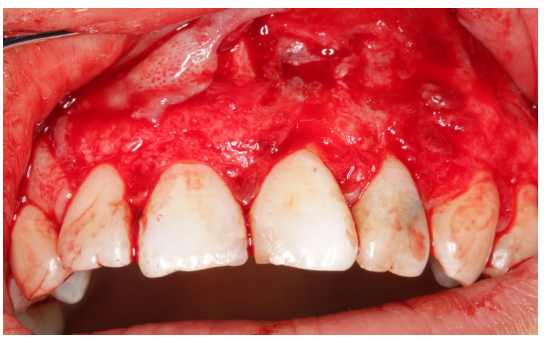

Image 5 – Total detachment of the flap

Source: author, 2019.

After the flap was completely detached, it became apparent that the lesion had already ruptured the vestibular cortical bone. Thus, it was not necessary to perform an osteotomy to access the lesion, and it was possible to proceed directly to curettage (image 6) with a Lucas curette and Molt retractor. This procedure began at the margins, with the aim of removing the entire cystic mass. However, the lesion ruptured due to strong adhesion to the bone and could only be removed in fragments, the largest of which were stored in a compatib-

le bottle containing 10% formalin and sent for histopathological examination. After the entire lesion was removed, the entire bone cavity was scraped with a Lucas curette to remove any remaining cystic cells adhering to the bone.

After curettage, the entire cavity created by the removal of the lesion was irrigated with saline to improve visibility and allow inspection to verify the presence of any remaining pathological tissue. Once the enucleation procedure was complete, the tooth apices were ready to undergo the apicoectomy procedure, as shown in image 7, with good access and visibility.

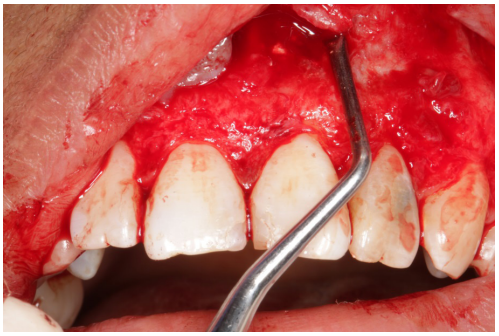

Image 6 – Curettage of the lesion

Source: author, 2019.

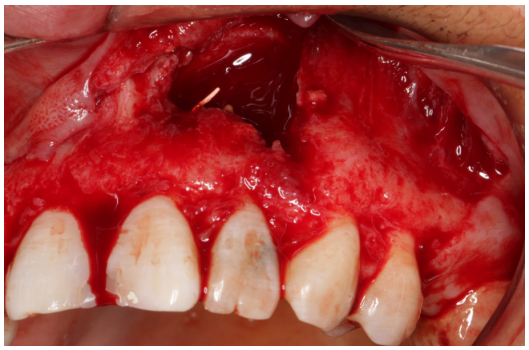

Image 7 – Bone socket after curettage.

Source: author, 2019.

Prior to the apicoectomy procedure, the edges of the bone socket were smoothed with a Zecrya drill, and then the apices of teeth 21 and 22 were amputated with an FG 702 carbide drill, in a perpendicular cut along the long axis of approximately 3 mm of the roots, under irrigation with saline solution. Preparation for retrofilling was performed with an ultrasonic tip that best suited the size of the tooth apices (8), using 2% chlorhexidine gel (Maquira, Maringá, Paraná, Brazil) as an auxiliary substance.

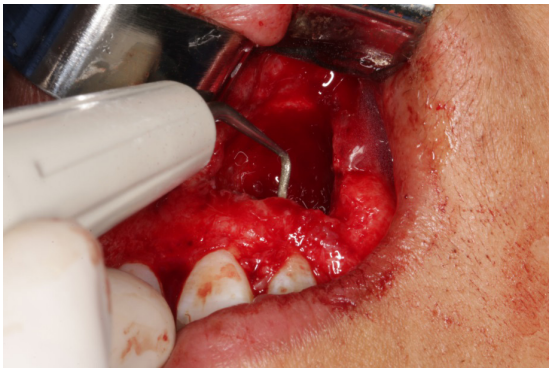

Image 8 – Preparation for retrofilling

Source: author, 2019.

Retroobturation was performed with white[Angelus®] MTA (Angelus, Londrina, Paraná, Brazil) (Image 9), in a ratio of one sachet to one drop of distilled water, on a sterile glass plate. The material was inserted into the root cavity with a Bernabé No. 1 plugger, then condensed with the same pluggers of different sizes. After verifying complete insertion and condensation of the material in the retrograde preparation, the bone socket was again irrigated with saline to remove any debris.

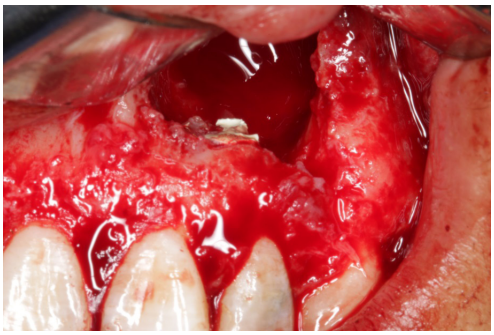

Image 9 – filling with MTA.

Source: author, 2019.

After completing the apicoectomy procedure and inspecting the remaining cavity, we waited for a blood clot to form for filling, which formed quickly, filling the bone socket, as shown in image 10, allowing the suturing procedure to begin.

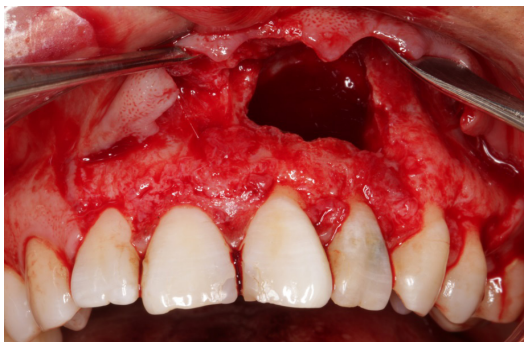

Image 10 – Final appearance of the bone socket.

Source: author, 2019.

Suturing began with simple stitches in the angle regions of the relaxing incisions, with the aim of stabilizing the flap. Intrapapillary stitches were then made from the distal end of element 11 to the distal end of element 24, ending with complementary simple stitches in the relaxing incisions. With all the stitches well stabilized and no pressure ischemia, the suture was completed without any complications (image 11).

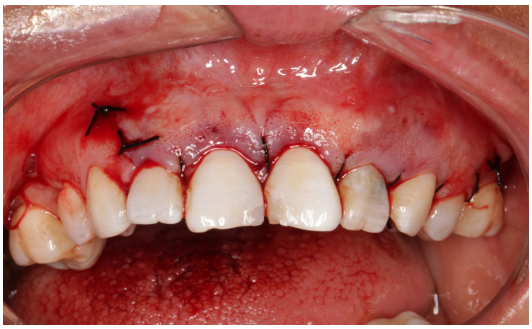

Image 11 – Suture

Source: author, 2019.

After the surgical procedure was completed, the patient was instructed on all postoperative care and to return in seven days for the removal of the stitches. The following medications were prescribed as postoperative medication: Clavulin® 500mg every 8 hours for a period of 7 days, Metronidazole 250mg also for a period of 7 days every 8 hours, Paracetamol 750mg at 8-hour intervals for 3 days, Ibuprofen 600mg for 4 days every 8 hours, and 0.12% chlorhexidine digluconate mouthwash for 7 days, with mouthwashes performed twice a day.

At the follow-up appointment 7 days after the surgical procedure, the patient reported no episodes of severe pain, only mild discomfort in the region, and the intraoral examination confirmed excellent healing, with slight redness in the regions where the incisions were made to create the flap, indicating that the healing process was still ongoing (Image 12). In addition to the intraoral examination, a periapical radiograph (Image 13) of the upper left central incisor and upper left lateral incisor was taken to

check the condition of the apicectomized apices, which were as expected.

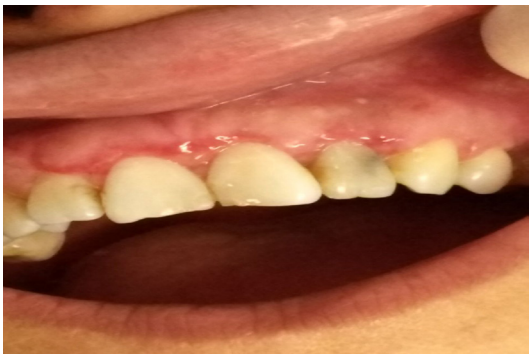

Image 12 – Postoperative 7 days.

Source: author, 2019.

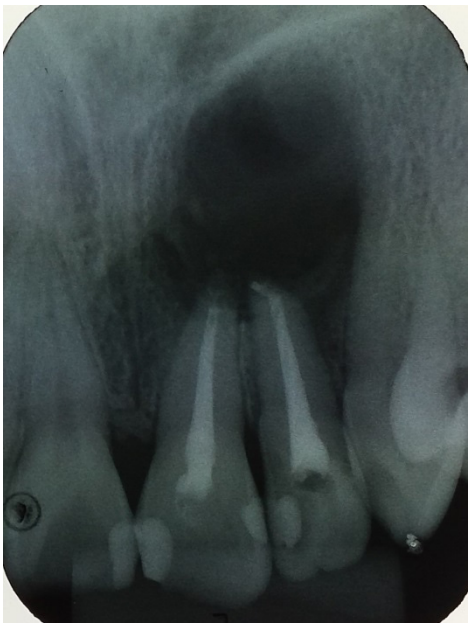

Image 13 – Periapical 7 days after apicoectomy.

Source: author, 2019.

After confirming optimal healing and patient care, follow-up appointments were scheduled for approximately 40 days later and then every 6 months thereafter.

Forty days after surgery, during the intraoral examination, excellent healing of the gingival tissue was noted, with no scarring in the incision areas and no other manifestations in the soft tissue, as shown in Image 14.

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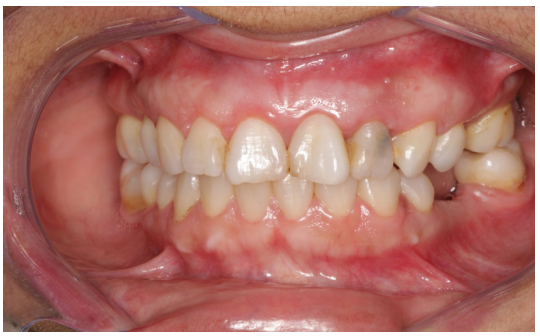

Image 14 – Postoperative 40 days

Source: author, 2019.

The periapical radiograph taken 40 days later (Image 15) shows expected behavior, considering that bone formation takes longer to become evident in radiographs.

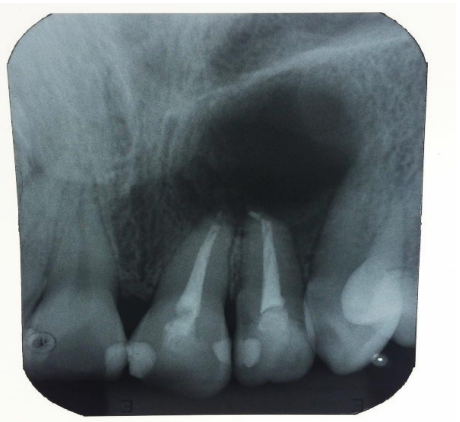

Image 15 – Periapical 40 days after apicoectomy.

Source: author, 2019

The periapical radiograph six months after the enucleation and apicoectomy procedure (Image 16) showed a considerable reduction in the radiolucent aspect of the bone socket, evidencing that the new bone formation assumed a pattern of direction from the periphery to the center, with a considerable reduction in the bone defect. During this same period, the patient reported sensitivity to vertical percussion in the apicoectomized elements, so it was decided to leave them in infraocclusion, since there was still no bone support in the periapical region.

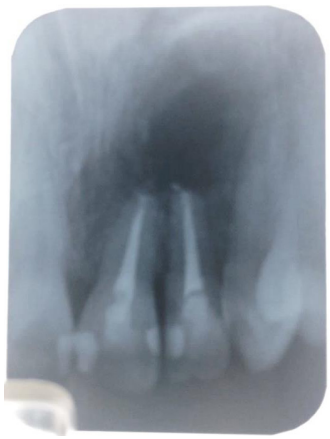

Image 16 – Periapical 6 months after apicoectomy

Source: author, 2019.

The radiographic image after one year (Image 17) showed an evolution in bone formation, following the same pattern, from the periphery to the center of the bone socket, and this time the radiographic image shows a division of the central radiolucent image, with the appearance of a radiopaque band, like a septum. Another aspect that became clear in this radiograph is a more advanced formation of the periodontal ligament space at the apex of element 21, showing that the periradicular tissues are healing as expected. Regarding the percussion sensitivity reported six months ago, the patient showed positive progress in relation to tooth 21, but tooth 22 still showed sensitivity to the vertical test, and according to the radiographic image, bone formation was not yet complete in the region of the tooth that responded to painful stimuli.

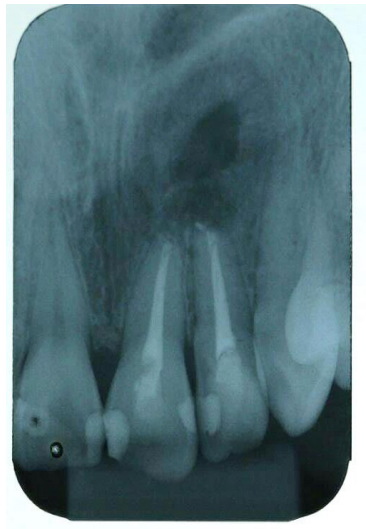

Image 17 – Periapical 1 year after apicoectomy

Source: author, 2019.

A year and a half after the enucleation surgery and apicoectomy procedure, the reduction of the bone defect demonstrated by periapical radiography, as shown in image 19, showed that there was an attenuation in the rate of bone neoformation, and the bone defect was reduced, but not as significantly as in previous months. Regarding the recovery of the periodontal ligament space, complete formation around the apex of element 21 was clear and more advanced than in other periods around the apex of 22. All radiographic indications during this follow-up period pointed to a successful progno-

sis, and during the vertical percussion test, the patient already reported feeling a milder painful stimulus compared to previous periods in relation to tooth 22.

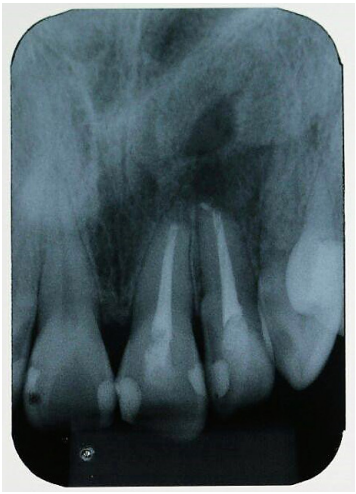

Image 19– Periapical 1.5 years after apicoectomy

Source: author, 2019

DISCUSSION

Of all odontogenic cysts, the radicular cyst is the most relevant to the dental surgeon due to its high prevalence rates in the jaws and, consequently, being the most treated. Originating from the proliferation of epithelial remnants of the periodontal ligament in response to the process of pulp necrosis, the radicular cyst is most often considered a radiographic finding due to its asymptomatic nature. However, in cases of secondary infection, pain, exudation, and increased volume may be present (MENDONÇA et al, 2018; TIJOE et al, 2015). The patient in the present study presented painful symptoms in the left anterosuperior region and the presence of exudate where the radicular cyst was located, which had already ruptured the vestibular bone cortex, reinforcing the literature that the lesion had probably been developing for a long time to reach such proportions and was still suffering from a secondary infection.

There is a predilection for the anterior region of the maxilla, as well as in subjects aged between 30 and 60 years (DANTAS, 2014; TIJOE et al, 2015). The patient reported had a lesion involving the apices of elements 21 and 22, and was 44 years old.

The initial treatment for radicular cysts is always conventional, as it is impossible to determine radiographically whether it is a true radicular cyst or not. However, when conventional treatment is not effective, the surgical technique is indicated, whether it be marsupialization, enucleation, or a combination of both. In cases of large lesions, marsupialization followed by enucleation is always the most indicated, provided that rigorous follow-up is possible (PAVELSKI, 2016; DIWAN, 2015). According to the literature, the initial treatment proposed was conventional, but since it was ineffective, it was decided to perform enucleation surgery associated with apicoectomy with retrofilling of elements 21 and 22. Marsupialization was not an option for treatment because the patient lived in another municipality, which could make follow-up difficult.

Dantas (2015) indicates total mucoperiosteal flap with a Newmann-type incision, intrasulcular and modified by a relaxing incision, as the type of flap used for surgical access in the case presented.

The apicoectomy procedure consists of an essential phase for the removal of most secondary endodontic structures, as well as infected content not removed by canal instrumentation (ANGERAME et al, 2018). Resection of the root apex should be performed perpendicular to the long axis of the

tooth in order to avoid further exposure of the dentinal tubules. Generally, removal of 3 mm from the root tip allows apical deltas and lateral canals to be eliminated (ARX, 2010). Failure to remove at least 3 mm of the root apex may represent a risk factor for possible failure, as approximately 98% of apical branches and 93% of lateral canals are eliminated with this amount of resection (KIM; KRATCHMAN, 2006). In the present case, the apicoectomy was performed according to the literature, with success confirmed by the regression of the lesion observed radiographically.

The success of a retrofilling begins with the preparation of the cavity to receive the sealing material. In this regard, ultrasonic tips stand out in relation to drills, as they allow for a more conservative cavity preparation parallel to the root canal, enabling more efficient debridement, especially in isthmus areas (PEREIRA, 2013). The preparation performed by ultrasonic tips should consist of a class 1 cavity 3 mm deep, following the direction of the canal, in addition to involving possible isthmuses and accessory canals (ARX, 2010; KIM; KRATCHMAN, 2006). Retro-preparation was performed with a P1T ultrasonic tip (Helse, Santa Rosa de Viterbo, São Paulo, Brazil).

Angelus® MTA was chosen for retrofilling the apicoectomized elements due to its biocompatible characteristics, non-toxicity, ease of handling, impermeability, and ability to induce tissue repair. as it is not an inert material, periodontal fibroblasts show binding with MTA, thus increasing the chances of restoring periapical tissues (BARTOLS, et al, 2017; CHANG, et al, 2017).

Parirokh and Torabinejad (2010) report data on cement formation between 2 and 5 weeks in 23% of cases after periapical surgery in dogs, using MTA as a retrofilling material, with this percentage increasing to 80% in the period between 10 and 18 weeks. Bartols et al. (2017) analyzed four human teeth treated with Angelus® MTA, all of which presented radiographically healed roots and histologically restored periapical tissues, showing recent cement formation and signs of newly formed periodontal ligament in contact with the MTA. These studies reinforce the importance of choosing MTA as the retrofilling material.

Radiographic and clinical follow-up of this case was established every 6 months, and in this first follow-up period there was a considerable reduction in the radiolucent aspect corresponding to the bone socket after enucleation. This constant rate of bone neoformation in this region was maintained until the 1-year follow-up, when it was also possible to see more clearly the contour of the periodontal ligament space already involving the apex of element 21 almost completely. At the 1.5-year follow-up, it was found that the bone neoformation process had slowed down, showing little progress over the 6-month period, but bone formation in the apical region of elements 21 and 22 was notable, as was the recovery of the periodontal ligament space in the region of the two apices. Perjuci (2018) reported research with 20 patients who underwent a procedure similar to the case described, where a gradual reduction in bone defects was observed in all cases, with density increasing gradually, with the most significant increase reported in the first 6 months compared to the subsequent ones.

With the exception of bone tissue and the liver, the rupture of any other tissue results in repair rather than regeneration. Once the cyst is enucleated, a phase of inflamma-

tion begins, in which the clot will serve as biological support for the initial migration and proliferation of inflammatory cells, and subsequently bone, through growth factors such as tumor necrosis factor-alpha (TNF--α), platelet-derived growth factor, and interleukin-1. Subsequently, the proliferative phase begins with angiogenesis of vessels to the center of the blood clot, transforming it into granulation tissue. During the remodeling phase, bone tissue must mineralize its matrix by providing osteogenic cells that are in the periosteum and endosteum in close contact with the bone defect, with the initial point of the regeneration process being located at this loc ly (RÚBIO; MOMBRÚ, 2015).

Consistent bone repair depends on an adequate vascular supply, in which the blood clot is immobilized and there is a solid base for bone deposition. In the first few weeks, the angiogenic and osteogenic cells of the surrounding bone walls and periosteum transform the clot into granulation tissue, right in the center of the bone defect, with the entire process being stimulated by stem cells, cytokines, and growth factors (ETTL et al, 2011). Osteoprogenitor cells near the bone walls proliferate more rapidly than those in the capillaries at the center of the granulation tissue and receive a greater blood supply, thus differentiating into osteoblasts more quickly and allowing for faster bone matrix deposition (GARTNER; HIATT, 2007). This could explain the bone growth pattern in the present case, where the entire process developed from the periphery to the center of the bone defect.

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