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Treatment by Par endodontic surgery of per apical injury involving three previous dental elements: Case report

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Abstract— *Endodontic practice is indicated as intervention for diagnosed teeth with pulp involvement, such as necrosis and irreversible pulpitis. The success of treatment is related to the professional's technical ability, to the understanding of pathological idiosyncrasies and elaboration of strategies covering diagnosis, treatment and prognosis to solve the case within each particularity, besides of the patient's biological principles and pulp and periradicular condition. It is undeniable that technological advances in endodontics, such as rotary, microscope and ultrasound contributed in an indispensable way to the increase of the success rates of the endodontic treatments, however the failure portion triggers the need for other procedures, such as retreatment and paraendodontic surgery. In this sense, paraendodontic surgery presents itself as an intervention for elements in which the root canal filling did not obtain a satisfactory result, being justified curettage of the lesion and removal of the apex of the dental element. Accordingly, The present study aimed to report the case of a patient who, in a routine consultation, presented in the radiographic examination a radiolucent area extended by elements 11, 21 and 22, 21 being endodontically treated three years ago. For the best visualization, diagnosis and planning, computed tomography was chosen to subsequent paraendodontic surgery. Follow-up of the case completed one year and four months with evidence of success, ensuring the efficiency of the surgery paraendodontic as an option to prevent dental organ extraction and rehabilitation through implants or prosthesis.*

Keywords— ***Endodontics. Paraendodontic Surgery.***

I. INTRODUCTION

Primary endodontic treatment has a considerable success rate,being enhanced by the association of electron microscopes and ultrasound tips, since they provide adequate field visualization and increase the effectiveness of chemical-mechanical preparation. However, this result can be influenced strongly due to dental anatomical complexity and the type of lesion (PAVELSKI et al.,2016).

Thus, in agreement with Kan et al. (2016), endodontic treatment may fail and result in the evolution of the injury. In addition, Pavelski et al., (2016) still reports that about 5% to 25% of dental elements categorized as cured can regress and present pathognomonic aspects, such as periapical radiolucency, as well as symptomatology.

Therefore, it is essential that a new treatment plan is developed. In this sense, Beck-broichsitter et al. (2018) states that the decision on the conduct in the face of the failure of primary endodontics presents itself as a common problem, considering endodontic re-approach through retreatment or paraendodontic surgery, in addition to extraction for subsequent rehabilitation mediated by implantology or dental prosthesis. However, the author still states that, in most cases, patients prefer to keep the dental element, opting for revisions endodontic or apical resection. Furthermore, this placement is in agreement with Kan et al. (2016) when confirming that retreatment and periapical surgical intervention are the most accepted choices.

Among the options, the practice of paraendodontic surgery has increased to solve problems arising from the failure of conventional endodontic therapy and also cases of obscure prognosis, such as when the removal of the causative agent is impossible or contraindicated (PAVELSKI et al., 2016). Therefore, this statement justifies the estimate by Martínez-cortés et al. (2017) in which about 5.5% of annual endodontic procedures involve paraendodontic surgery.

The success of this approach is multifactorial, depending on aspects such as previous periodontal

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treatment, use of microscope, absence of signs and symptoms, techniqueperformance, quality of initial filling and filling material (PAVELSKI et al., 2016; MARTÍNEZ-CORTÉS et al., 2017).

Following the perspective of an appropriate technique, there is no doubt that the planning is substantially supported by image examination. Koç et al. (2018) points out that periapical radiography, considered routine in many offices, provides effective information in the mesiodistal dimensions, however, it is inefficient for provide bucolingual references. Thus, the author cites tomography computerized as a suitable option for diagnosis and planning, as it allows the visualization of teeth and associated structures in different planes without overlapping and distortion.

Other conditions mentioned were the quality of the initial filling and the type of obturator material, due to the fact that, success is closely linked with the type filling material, the appropriate root sealing and the consequent protection of bacterial microorganisms. Thus, it is important that the choice of product for the filling has excellent properties, such as high sealing capacity over long term. Among the options, there was a consensus on the use of mineral trioxide aggregated (MTA) for being biocompatible, providing excellent sealing and presenting capacity tissue repair and antibacterial (SERRANO-GIMENEZ; SANCHEZ-TORRES; GAY-ESCODA, 2015; SILVA et al., 2016; PAVELSKI et al., 2016; MARTÍNEZ-CORTÉS et al., 2017).

Therefore, in agreement with the indications for paraendodontic surgery and the principles that contribute to the study by Kan et al. (2016) which presents the rate of short and long term healing from 91% to 97%, the present study aims to report a case of unsuccessful conventional endodontic treatment solved by curettage and apicetomy of three anterior elements involved in periapical injury.

II. CASE REPORT

E.A.S female patient, 40 years old, sought the dentist for routine consultation and took the opportunity to report discomfort in the region of premaxilla. During the anamnesis, no systemic impairment was found that could interfere with dental treatment.

On the initial radiographic examination, an extensive lesion radiolucent circumscribed in the periapical region of the elements 11,21,22. While in clinical examination, patient did not report spontaneous pain, only swelling in the bottom region of the buccal groove of the elements involved. Patient reported pain during palpation, but remained asymptomatic in vertical percussion tests and horizontal, in addition, there was no mobility.

After analyzing the data from the clinical and radiographic examination, it was requesting a computed tomography (CT) scan from the patient. With the help of complementary examination (CT) the presence of filling material in the element was observed 21 revealing endodontic treatment, which, according to the patient's report, was performed three years ago (Fig. 1A, 1B, 1C and 1D).

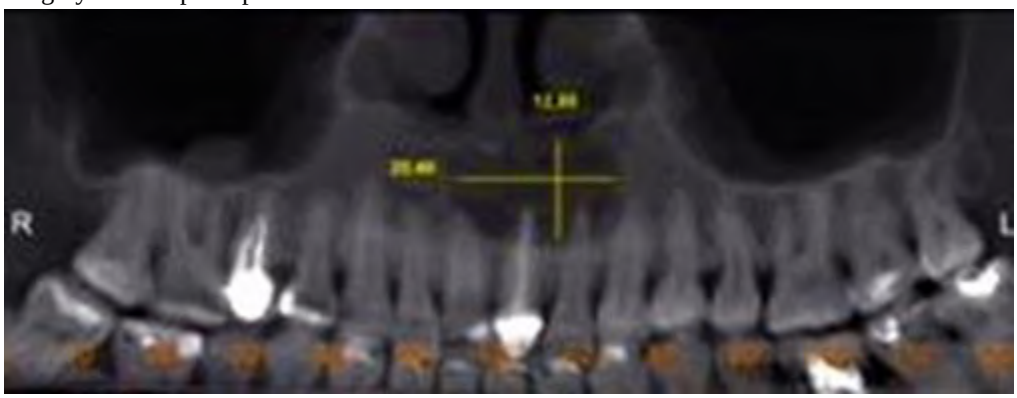

Fig.1A - Initial tomography showing an extensive lesion involving the elements 11, 21 and 22.

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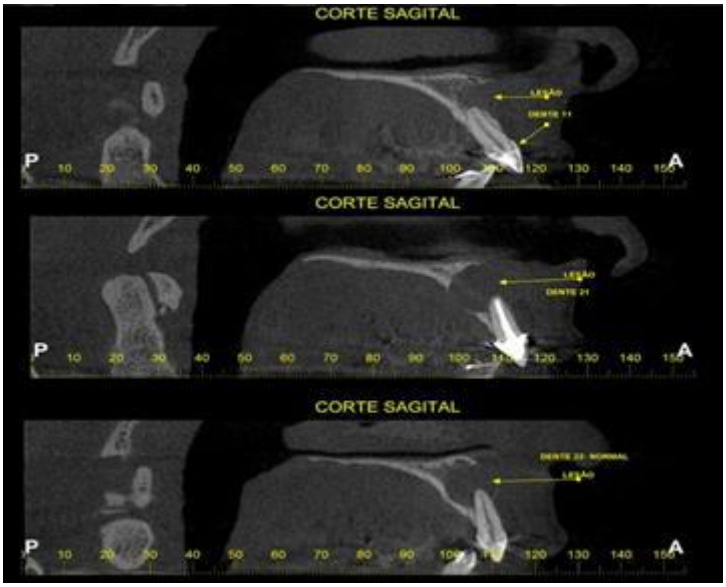

Fig.1B - Sagittal sections of teeth 11, 21 and 22.

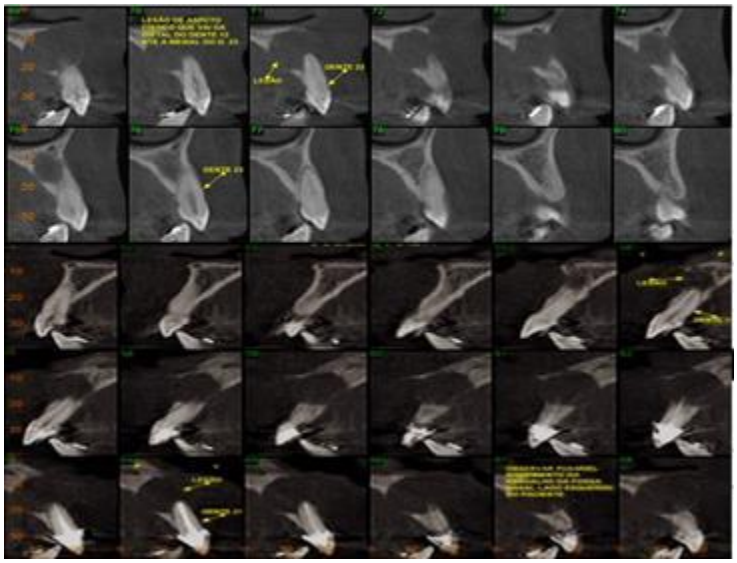

Fig.1C - Actual size cross sections of teeth 11, 21, 22 and 23,showing the limits of the injury.

Upon prior consent of the treatment plan, vitality test negative elements and with no impediment to systemic health the treatment of elements 11 and 22, retreatment of 21 and parendodontic surgery in the lesion region (11,21,22). With the help of a number 701 trunk-cone drill (JET Carbide -Dental Beavers -Canada), in high rotation and under abundant irrigation with serum physiological (LaboratórioFarmacêuticoArboreto Ltda. - Brazil), wear was in the buccal bone cortex, in the region of the elements involved in order to unite with the bone cortical rupture points affected by the lesion itself. A bone store was opened in order to remove the lesion entirely with the help from the back of the curettes. After removing all tissue involved in the lesion, the apicectomy was performed in the mesio-distal direction in order to form a 90º angle along the tooth axis (Fig 2A, 2B, 2C and 2D).

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Fig.2A - Vestibular bone cortex wear in the lesion region

Fig.2B –Apicetomy

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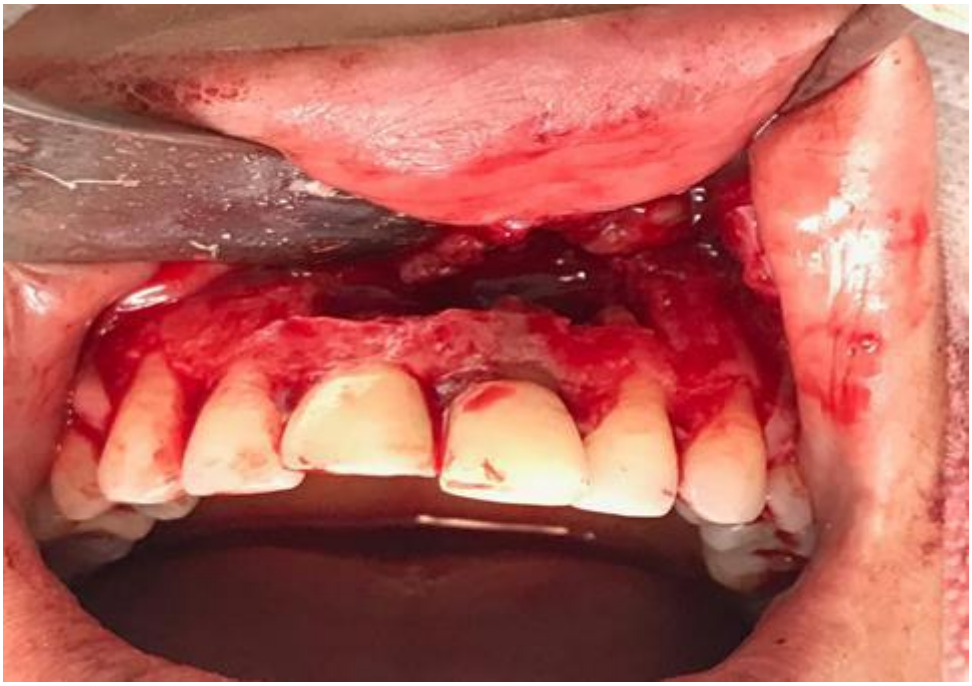

Fig.2C - Surgical store after curettage and apicetomy

Fig.2D - Immediate radiography after intervention

Throughout the apicectomy procedure, intense irrigation was maintained with saline to wash the surgical store, in an attempt to completely remove debris necrotic lesions, bone scraps and root apex that had just been removed. The surgical store was cleaned and filled with Bio-Oss bone (GeistlichBiogide), and covered with a bovine membrane (GenDerm-baumer) (Fig. 3).

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Fig.3 - Grafting with Bio-Oss xenogenousboné

The suture was performed with simple stitches in the incision areas relaxing and interdental in the region of gingival papillae (Fig. 4). Periapical radiography was performed right after the procedure was completed and a prescription for anti-inflammatory for three days (Nimesulide 100 mg) and antibiotic for seven days (Amoxicillin 500 mg). The suture was removed seven days after surgery and proservation was performed for one year and four months (Fig. 5A, 5B, 5C,).

Fig.4 - Simple stitch suture in the relaxing and interdental incisions in the gingival papillae

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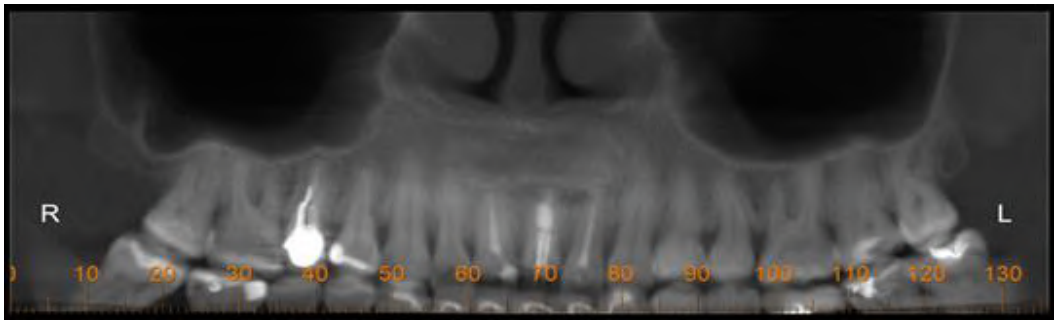

Fig.5A - Panoramic reconstruction of the maxilla after ten months.

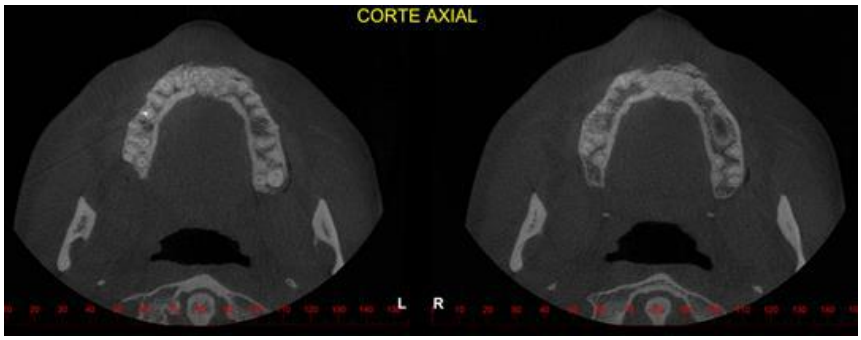

Fig.5B - Axial cut of the maxilla after ten months

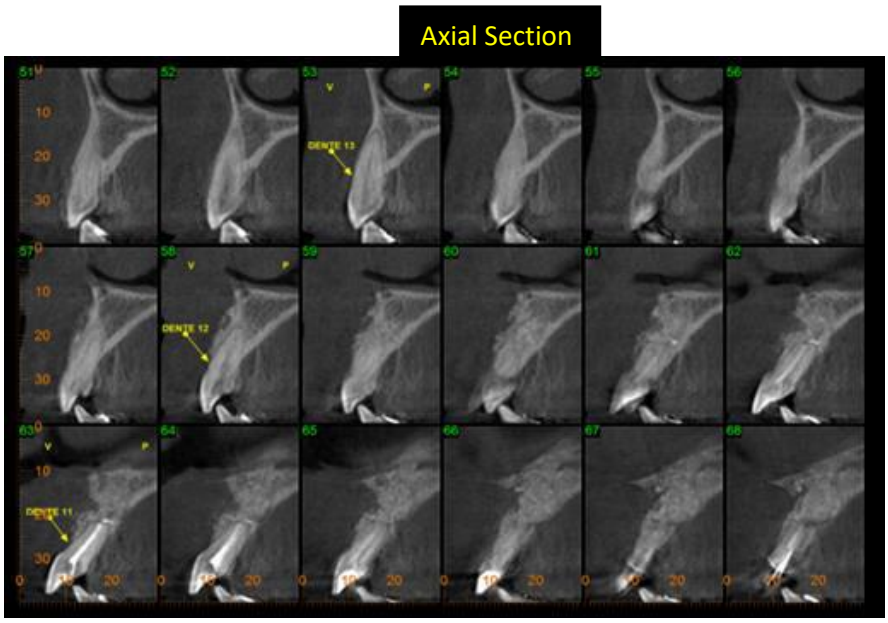

Fig.5C - Actual size cross sections of elements 13, 12 and 11 after ten months

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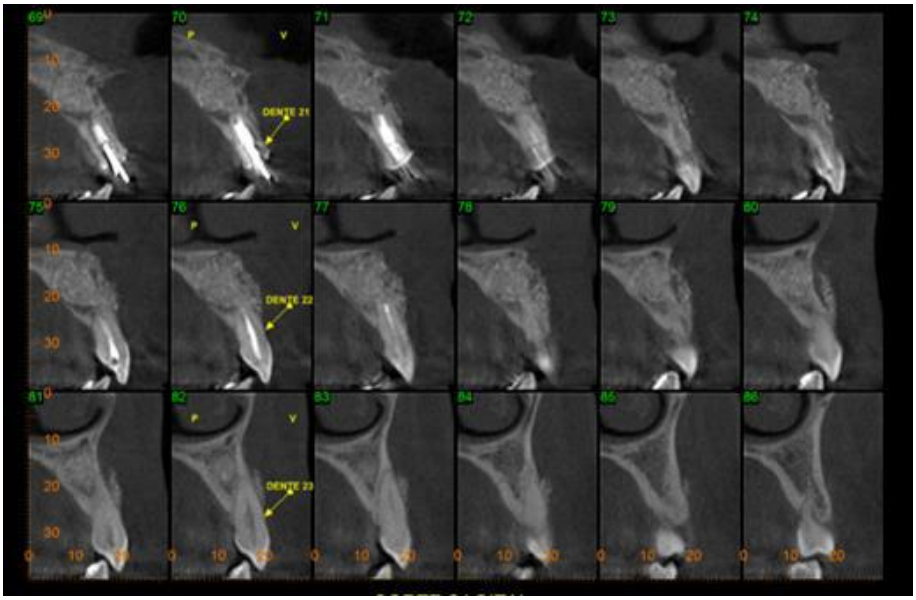

Fig.5D - Actual size cross sections of elements 21, 22 and 23 after ten months

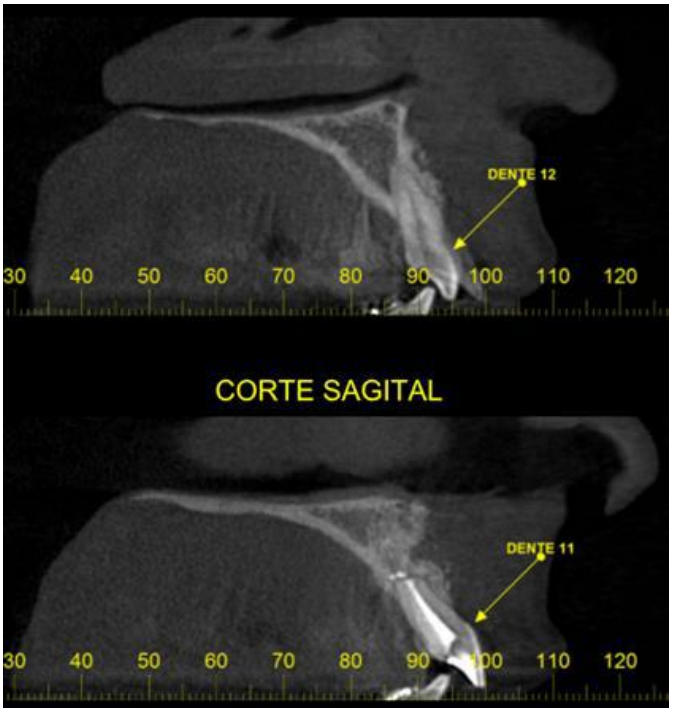

Fig.5E - Sagittal section showing elements 12 and 11 after ten months

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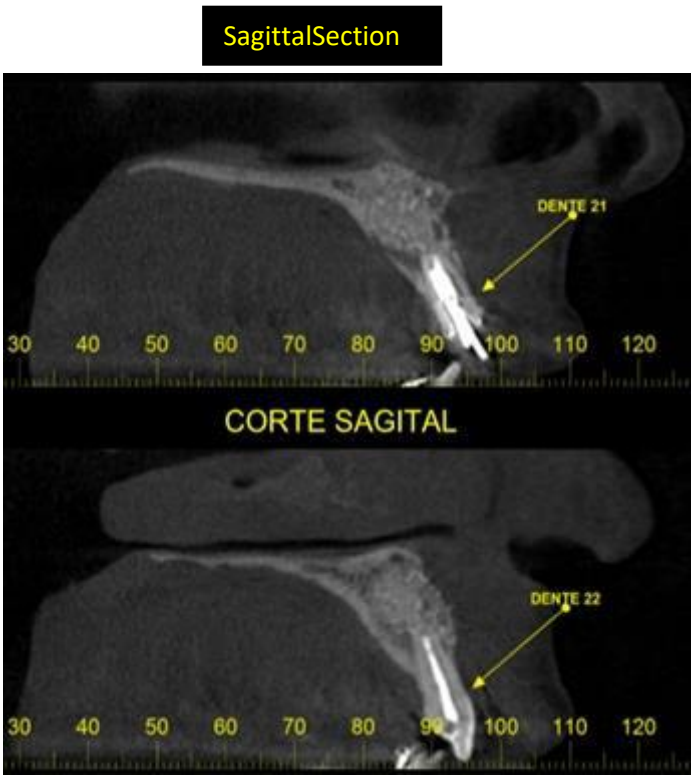

Fig.5F - Sagittal section of elements 21 and 22 after ten months

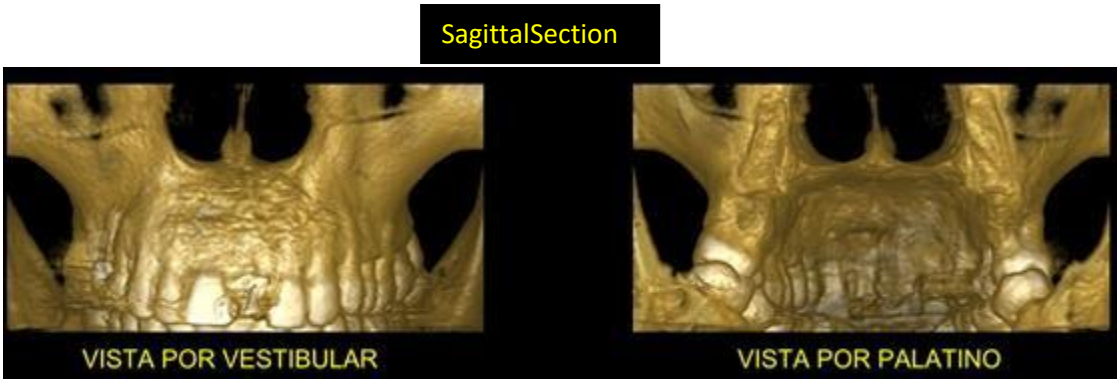

Fig.5G - 3D reconstruction of the buccal and palatal view after ten months

The satisfactory results were evidenced by the tomography.However, in order to guarantee this deduction, new exams were requested one year and four months after paraendodontic surgery. (Fig 6A, 6B, 6C,6D)

Figure 6A - Panoramic reconstruction of the maxilla for one year and four months

Fig.6B - Axial maxillary section during one year and four months

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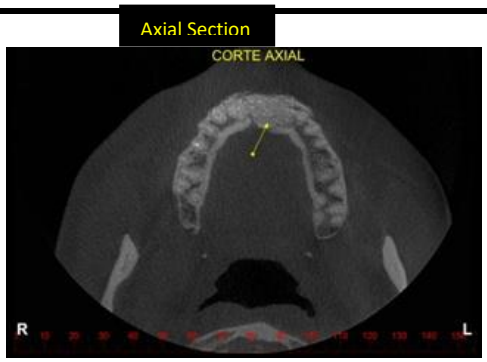


Fig.6C - Actual size cross sections of elements 11, 21 and 22 in preservation of one year and four months

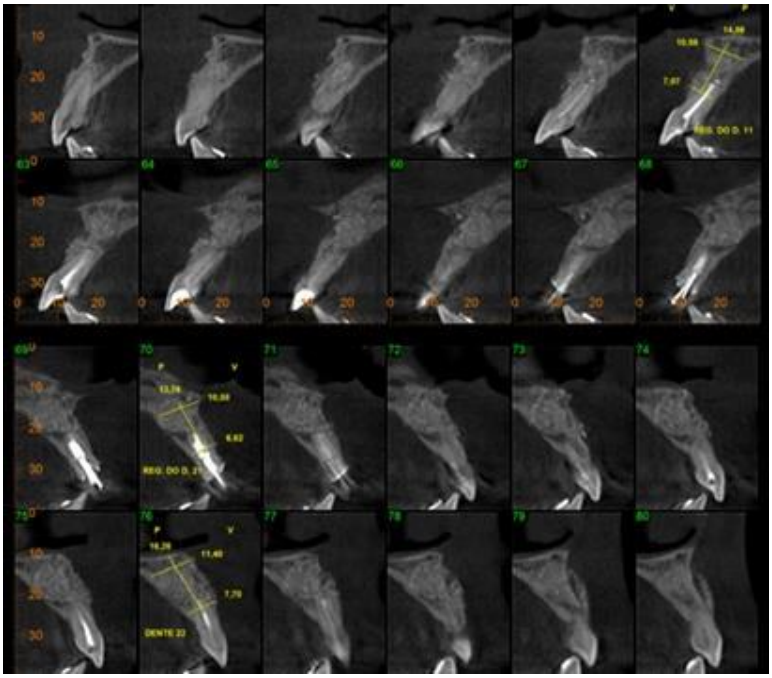
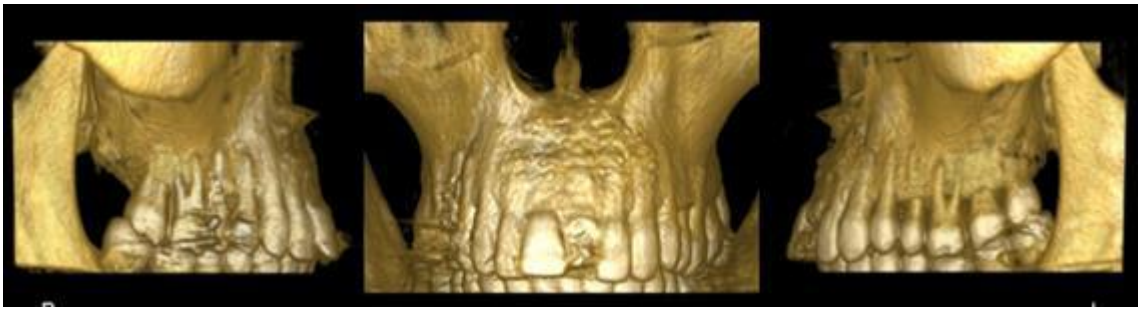


Fig.6D - 3D reconstruction of the maxilla in one year and four years months



III. DISCUSSION

Endodontic treatment, according to Babić et al. (2019), is an attempt solve cases of pathologically altered pulps while maintaining the function of the dental element. Following the premises of the European Society of Endodontics and American Association of Endodontists, the procedure includes cleaning, shaping, disinfection and sealing of root canals. More specifically, Moreti et al. (2019) reports that mechanical preparation is done by pulp removal and remodeling of the flue, while the chemical preparation is responsible for disinfecting the root system, making it imperative for proper filling and consequent adequate sealing in order to contribute to tissue repair and prevent the contamination by microorganisms and / or endotoxins.

However, Pavelski et al. (2016) reinforces that the fact that the endodontist does not having knowledge about the histology of the periapical lesion generates chances of failure. In addition, aspects such as resistant microorganisms, accumulation of crystals of endogenous

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cholesterol in the periapical region, insufficient fillings or overfilling, root perforations and even reactions to the filling material can be frequent causes of conventional endodontic failure (BABIć et al., 2019).

This is proven statistically by some authors, such as Beck-broichsitter et al. (2018) who claimed that 14% to 58% of filled teeth cause problems, while Pavelski et al. (2016) stated that endodontic success varies around 65% to 90%, showing a discrepancy in the results of Chércoles-ruiz, Sánchez-torres and Gay-escoda (2017) who attributed 42.1% to 86% of well-resolved cases in therapy primary endodontic. However, even if the indices show values with different intervals, all results confirm the possibility of re-approach endodontic treatment for unsuccessful cases.

After finding a failure, the therapeutic approaches to be considered involve non-surgical retreatment, paraendodontic surgery or extraction dentistry (BABIć et al., 2019). Thus, it is of vital importance to analyze the cases and have the correct knowledge about the benefits and contraindications of each procedure.

The non-surgical re-approach would be the retreatment of the roots previously fillings that remained symptomatic or that had periapical lesions,the success rates indicated by the authors Chércoles-ruiz, Sánchez-torres and Gay-escoda (2017) point out 84.1% to 88.6% after 4 to 10 years. However, in the presence of periapical injuries or in cases of perforations, it is difficult to obtain a dry conduit, this would make the prognosis unclear, since one of the requirements for filling is the absence of fluids in the root canals. Thus, the surgical approach would allow removal of the periapical lesion and decrease inflammatory exudate (PAVELSKI et al., 2016).

For Beck-broichsitter et al. (2018), extraction is a definitive solution for an endodontically compromised tooth, however in the face of morphological changes and functional problems caused by the absence of a dental element, this action must be compensated for the use of implants or prosthesis. The implant is highlighted as the best option, as it has rates ranging from 91.8% to 100% survival from the first to the tenth grade. However, it has considerable rates of postoperative complications, requiring additional treatments, since more than 50% of patients are affected by mucositis and 28% to 56% by peri-implantitis (CHÉRCOLES-RUIZ; SÁNCHEZ-TORRES; GAY-ESCODA, 2017).

Elaborated in Germany, paraendodontic surgery has become an option increasingly frequent to resolve pathological complications associated with conventional endodontic treatment (MARTÍNEZ-CORTÉS et al., 2017; PAVELSKI et al., 2016). The modalities include periapical curettage, apicetomy with retrograde filling, apicetomy with instrumentation and root canal filling via retrograde and filling simultaneously with surgical intervention (MORETI et al., 2019).

According to Lopes and Siqueira (2011), paraendodontic surgery can be considered invasive, but conservative, due to the fact that in situations singular is the best option to maintain the dental organ. The success rate is by Chércoles-ruiz, Sánchez-torres and Gay-escoda (2017) ranging from 59.1% to 93% between the first and the tenth year. The predictability of the case is associated with the pre-condition operative, as the prognosis is dependent on the patient's systemic condition, periodontal support and the amount of bone resorption, the presence of inflammation and edema, painful symptoms and mainly by the type of filling material used to promote sealing and prevent bacterial influx (MORETI et al.,2019; PAVELSKI et al., 2016).

In harmony with the idea of Moreti et al. (2019) on the fact of the success of paraendodontic surgery is dependent on perfect filling, Silva et al. (2016) states that for this the cement must be biocompatible, resistant to masticatory forces and biomineralization inducer. In view of this, Martínez-cortés et al. (2017) evaluated the capabilities of an intermediate restorative material (MRI) based on zinc oxide and eugenol, aggregated mineral trioxide (MTA) and endosequence BC classified as bioceramic. It was observed that the MTA, in its fresh state, presented almost zero cytotoxicity, whereas in Endosequence this characteristic was not found, unlike the MRI that exposed a high cytotoxic index, which can be attributed to its composition.

In general, MTA is currently considered a gold standard, due to the fact to be a physical and biological barrier for the apicetomized element, as it is highly biocompatible, besides promoting biomineralization, inducing the regeneration of periradicular tissues, and a good root seal (SILVA et al., 2016; PAVELSKI et al., 2016; SERRANO-GIMENEZ; SANCHEZ-TORRES; GAY-ESCODA, 2015).

Another aspect of paraendodontic surgery is vestibular bone wear necessary to access the lesion, which makes the use of a graft indispensable. Hirsch, Kohli and Kim (2016) suggest that compensation should be made, preferably, by bone autologous, but include alloplastic or xenografted materials as good regenerative options. An example of xenogenous material is Bio-oss, which in compliance with the literature review conducted by Moreira et al. (2019), presents characteristics that suggest

long-term stability, such as properties osteoconductive and bone recovery in atrophied places.

As a guarantee of a satisfactory result, in addition to good planning, it is regular monitoring is necessary in order to analyze the healing process, taking follow-up with satisfactory results for one year as a positive indication (SCHLOSS et al., 2017).Following this perspective, Schloss et al. (2017) also pointed out that

computed tomography is the most suitable alternative to obtain diagnosis and planning, due to the fact of providing three-dimensional information. Furthermore, by recognize the importance of postoperative follow-up, the author followed the healing of 51 teeth after endodontic surgery through periapical films and conical beam tomography, concluding that the tomographic image provided an more accurate of injuries and healing.

IV. CONCLUSION

The reported case had a satisfactory outcome with paraendodonticsurgery,because the one and a half year preservation confirmed the success of the procedure. It is essential to list that this result was supported by the preoperative evaluation through the use of cone beam computed tomography for diagnosis, planning and monitoring, in addition to the effective filling of the conduits. Furthermore, it is concluded that such intervention is a viable alternative for teeth endodontically condemned, as it allows the dental element to be kept in mouth, avoiding tooth extraction and the use of implants or prostheses.

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