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INTERNAL RESORPTION IN THE CERVICAL AND MIDDLE THIRD OF THE LEFT UPPER INCISOR

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ABSTRACT

Patient, JTRM, Caucasian, female, 25 years old, without systemic problems, was referred to the private office of an endodontics specialist for treatment of tooth 21. Periapical radiographic examination showed the presence of internal root resorption in the cervical and middle third of the root canal, with well-defined boundaries, ovoid and apparent appearance without communication with the adjacent bone. A cone beam computed tomography scan was requested to analyze in greater detail the location and whether there was communication with the periodontium. After coronary opening and medium cervical preparation with ProDesign S #30.10 file, the apical-mechanical chemical preparation, as measured by the CRD, was performed with Kerr #50, #55 and #60 files, and then the irrigation protocol was carried out through the Easy Clean plastic file in reciprocating motion, with cycles of 3 x 20 s of 2.5% sodium hypochlorite, 3 x 20 s of 17% trisodium EDTA and again 3 x 20 s with sodium hypochlorite. The root canal was dried with 60-inch absorbent paper tips and the canal filling was performed by the modified hybrid Tagger

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technique (main cone of gutta-percha associated with BIO-C Sealer filling cement. It is concluded that early detection and a correct differential diagnosis are essential for the successful management of internal resorption. The goal of endodontic therapy is the removal of inflammatory tissue and three-dimensional shaping, cleaning and filling of the enlarged canal space, while also avoiding unnecessary dentin removal that could further weaken the remaining tooth structure.

Keywords: Endodontics, Tooth Resorption, Internal resorption.

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INTRODUCTION

Internal root resorption is an inflammatory condition that results in progressive destruction of intraradicular dentin and can reach the walls of the canal. It is usually asymptomatic and diagnosed after routine radiographic examination. Its main etiological factor is trauma. Root canal treatment is the best choice for cases of resorption, as it removes the granulation tissue, and blood supply of the clastic cells. Success depends on early diagnosis and treatment, proper planning, and filling (Silva, 2024).

Internal root resorption normally follows an asymptomatic and silent clinical course, it does not cause pain or necrosis, because the amount of mediators present to induce the resorption of mineralized tissues is not sufficient to cause discomfort to the patient. Due to its usually asymptomatic evolution, the diagnosis is made through routine radiographic examinations, which show a radiolucent, symmetrical, ovoid or rounded image, changing the original contour of the root canal (Laux et al., 2020). When internal root resorption is installed, spontaneous repair is extremely rare, so when internal root resorption is diagnosed, radical endodontic treatment is indicated for the purpose of removing the inflamed pulp tissue that nourishes the clastic cells. Internal root resorption is a rare occurrence in the permanent dentition, most often found in maxillary incisors and with a slight predilection for men. Trauma is considered the main etiological factor for the inflammatory process of resorption to be sustained, the vital tissue must be present at the peak of resorption. Teeth are usually asymptomatic and are occasionally detected during routine radiological examinations. Internal resorption is often confused with external resorption, and a careful differential diagnosis is required to proceed with appropriate therapy. The use of Cone Beam Computed Tomography (CBCT) is considered essential for a correct evaluation of the location, shape, and size of the dentin defect. Because the resorption defect is the result of an inflamed pulp and clastic precursor cells are predominantly recruited through the blood vessels, controlling the internal root resorption process is conceptually easy by disrupting the blood supply to the resorbent tissues with conventional root canal therapy (Gabor et al., 2012).

Internal root resorption consists of the destruction of parts of mineralized tooth structures, due to the result of the action of specialized cells, the osteoclasts, which occurs on the internal surface of the pulp cavity and does not usually generate observable symptoms, its diagnosis can happen late. Therefore, it can often occur unintentionally, through radiological exams indicated for other procedures. Thus, after the correct diagnosis,

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endodontic treatment is the viable alternative, in order to restore the normal condition to the affected dental element (Rodrigues et al., 2022).

When internal root resorption is installed, spontaneous repair is extremely rare, so when internal root resorption is diagnosed, radical endodontic treatment is indicated for the purpose of removing the inflamed pulp tissue that nourishes the clastic cells, dressing with calcium hydroxide cement and finally filling (Çallşkan & Pişkin, 1993). Having clear the complexity of the mechanisms that involve internal root resorption, the present article seeks to report the therapy used in the treatment of a permanent tooth affected by the pathology.

METHODOLOGY

To construct this case report, it was necessary to use a study that addressed how the case report should be written, what structure it should have, the best way to approach it so that the reported theme could be understood, what needs to compose this type of article and what should be the methodology used in this work. Based on this, the study used to obtain all these answers was the one carried out by Pereira et al (2018). In order to acquire as much information as possible, the following descriptors were used in order to obtain only research related to the theme: Endodontics; Tooth resorption; Internal resorption. In order to fill the content of the case report with tested and proven scientific foundations, searches were carried out in renowned databases that have reliable content: BVS/BIREME, PUBMED Central, DeCs, CAPES Journal Portal, Science Direct, PROSPERO, The Cochrane Library, LUMEN ET VIRTUS and Google Academy. In addition to using these sites to obtain course, master's, doctoral, and research completion papers, gray literature was used to complement it, enriching the case report with more information.

CASE REPORT

Patient, JTRM, Caucasian, female, 25 years old, without systemic problems, was referred to the private office of an endodontics specialist for treatment of tooth 21. Periapical radiographic examination showed the presence of internal root resorption in the cervical and middle third of the root canal, with well-defined boundaries, ovoid and apparent appearance without communication with the adjacent bone (Figure 1).

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Figure 1 - Internal root resorption in the cervical and middle third of the root canal.

A cone beam computed tomography scan was requested to analyze in more detail the location and whether there was communication with the periodontium (Figure 2). The images proved that there was no communication with the periodontium

Figure 2 - Initial cone beam tomography.

Initially, the patient and guardian agreed to the proposed treatment and the use of their data for scientific purposes, and a free and informed consent form was signed. A cone beam computed tomography scan was requested to establish a diagnosis.

Anesthesia was performed with 2% lidocaine 1:100,000 IU of epinephrine (Alpha-caine® - Nova DFL), and coronary opening was performed with a 1014 spherical drill, followed by root canal exploration in CAD-2 measurement with Kerr #15 file (Dentsply-Maillefer, Petrópolis, RJ, Brazil). The enlargement of the cervical third was performed with a ProDesign S #30.10 file (Easy Equipamentos Odontológicos, Belo Horizonte, MG, Brazil) at a length of CAD-4 at a speed of 750 rpm and torque of 3N in rotational motion, and the chemical-mechanical preparation of the tooth in CAD-2 with a WaveOne Gold #45.05 file (Dentsply/Maillefer, Ballaigues, Switzerland) in reciprocating motion. The Kerr #25 file

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(Dentsly-Maillefer, Petrópolis, RJ, Brazil) was chosen to perform electronic dentistry, using the apical locator (Novapex, Rishon Lezion, Israel), and then the actual length of the tooth (CRD) was obtained. The apical-mechanical chemical preparation, as measured by the CRD, was performed with Kerr #50, #55 and #60 files (Dentsply-Maillefer, Petrópolis, RJ, Brazil), respectively. After completing the chemical-mechanical preparation of the first session, the irrigation protocol was carried out using the Easy Clean plastic file (Easy Equipamentos Odontológicos, Belo Horizonte, MG, Brazil) in reciprocating motion, with cycles of 3 x 20 s of sodium hypochlorite at 2.5%, 3 x 20 s of trisodium EDTA (Biodinâmica, Ibiporã, PR, Brazil) at 17% and again 3 x 20 s with hypochlorite.

The pulp chamber and root canal were flooded with 2.5% sodium hypochlorite and a new irrigation protocol was carried out, using the XP-Endo Finisher file (FKG, La Chaux-de-Fonds, Switzerland) at the CRD. This was used for 20s to stir the irrigating solution at a speed of 600 rpm and torque of 1N. This cycle was repeated three times, with hypochlorite renewal in each cycle. During its rotation in the last cycle, there was a fracture of the file, which was easily removed with the aid of clinical forceps because it was in the most coronary portion of the tooth.

Once the irrigation protocol was completed, the cone test was performed. The second series gutta-percha cone size 60 (DentsplyMalleifer, Petrópolis, RJ, Brazil) was selected as the main cone, inserted and locked to the CRT. A periapical X-ray of the tooth was performed and it was found that the obturator cone locked in the CRT (Figure 3).

Figure 3 – Adaptation of the gutta-percha cone.

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The root canal was dried with 60 absorbent paper tips (Dentsply-Malleifer, Petrópolis, RJ, Brazil) and the canal filling was performed by the modified Tagger's hybrid technique: 60 gutta-percha main cone associated with BIO-C Sealer filling cement (Angelus-Londrina) and accessory cones. For lateral condensation, a C #30 digital spacer (Dentsply-Malleifer, Ballaigues, Switzerland) was used at the actual working length (CRT) -2 in the apical direction, trying to press the main cone laterally. The spacer was then removed from the canal and an MX accessory cone, surrounded by the filling cement, was immediately inserted into the space left by the instrument. This maneuver was repeated until three accessory cones were inserted into the canal. The MC Spadden #60 compactor (Dentsply-Malleifer, Ballaigues, Switzerland) was selected, used with the aid of a contra-angle and a low-speed motor (KAVO, São Paulo, SP, Brazil). It was introduced into the canal at the length of the CRT-3 through a space created by the previous digital spacer, inserting 3 more accessory cones. After cutting the gutta percha cones, hydraulic compression was performed with heated Paiva condensers (Golgran, São Caetano do Sul, SP, Brazil). Once the endodontic filling was completed, the cavity was restored with Filtek Z250 resin (3M, St Paul, MN, USA) in A3 color and final periapical radiography (Figure 4).

Figure 4 - Final periapical radiograph.

CT scans were requested one year after root canal filling, demonstrating the success of endodontic therapy (Figure 5).

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Figure 5 - Tomography scan one year after root canal filling.

DISCUSSION

Internal root resorption is a rare insidious process that can lead to premature loss of the dental element, the endodontist dentist must be prepared for the correct management of this pathology, and must often use advanced diagnostic techniques such as computed tomography, always keeping an eye on new materials developed so that endodontic success is achieved. Care should be taken to distinguish internal resorption from other types of resorption so that appropriate treatment can be employed, as well as long-term clinical success.

Internal root resorption is characterized by the progressive loss of tooth substance that begins in the root canal wall as a result of clastic activity. Its evolution can lead to root drilling and compromise of the entire structure, in addition to increasing the difficulty of treatment. The diagnosis occurs mainly by routine radiographic finding or change in crown color. When accompanied by symptoms, it indicates a more advanced state and greater involvement of periodontal tissues. If left untreated, it can lead to fracture and loss of the tooth element (Jesus & Reis, 2024). Endodontic treatment will prevent the evolution of the destructive process from occurring, mechanical debridement is hampered by the irregularity of the resorptive cavity. A good auxiliary chemical solution should be used to remove granulation tissue, change intracanal medications for alkalinization of the medium, and death of dentinoclasts, and put an end to compact filling are essential for the prognosis to be considered good in the long term (Nery et al., 2012).

In conditions where there are suspected or confirmed inflammatory internal root resorptions associated with external root resorption, it is more effective to use cone beam computed tomography, as it helps to estimate the extent of the lesion and detect perforations of the neighboring periodontal ligament as well as the thickness of the dentin of the remaining root canal (Abdullah et al., 2017; Koehne et al., 2020). Tomography generates three-dimensional images and allows resorption to be observed even in the early stages and is now considered the gold standard for the evaluation of inflammatory internal

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root resorption, since two-dimensional radiographs cannot accurately identify them when it is in the cervical area (Koehne et al., 2020).

Internal tooth resorption is a rare, asymptomatic situation resulting from pulp dystrophy that leads to the destruction of hard tissues by osteoclasts, which constitute large multinucleated cells that promote bone resorption in mineralized tissues. Normally, the pulp region and the root surface are protected from clastic activity. However, in situations of damage to the protective tissue, it can trigger the displacement of odontoblasts and cementoblasts, making the mineralized tissue susceptible to the action of the clasts (Alane, 2018). Usually, the processes of root resorption are asymptomatic, which delays the early recognition of the dysfunction only through the anamnesis performed on the patient. Thus, identification also depends on referral to radiographic imaging exams, especially periapical radiography. In addition, to make the differential diagnosis between the classification of internal and external root resorption, a computed tomography exam can be requested, in which internal root resorption is expressed through an ovoid expansion in a pulp region (Câmelo et al., 2019). Thus, given that this condition does not usually generate observable symptoms, its diagnosis can happen late. Therefore, its diagnosis can often occur unintentionally, through radiological exams indicated for other procedures. Thus, after the correct diagnosis of internal root resorption, endodontic treatment is the viable alternative, in order to reestablish the normal condition of the affected dental element (Rodrigues et al., 2022). The management of internal inflammatory root resorption is an endodontic challenge for the professional, accurate diagnosis and early treatment are of fundamental importance for a successful clinical outcome (Giordano et al., 2020). Endodontics becomes particularly challenging for the practitioner due to the defect created by root resorption. Cone beam computed tomography presented better results for diagnosis, due to greater accuracy and information. The use of instruments that enhance chemical substances is indicated for disinfection of the canal. Currently calcium silicate-based materials have been created and have been recommended for the filling of channels with internal resorption due to their higher bond strength, smaller particle size and creation of voids (gaps) between the filling.

Regarding the mechanical preparation, manual instruments were chosen, due to their satisfactory modeling and cleaning, and the radiographic image was of a straight and wide canal. The reverse magnification technique (apex crown without pressure) was chosen together with the use of sodium hypochlorite solution at 2.5%. The choice of the percentage of sodium hypochlorite at 2.5% happened because the instrumentation time was greater

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than 30 minutes, which is equal to the dissolution capacity of the organic tissue of sodium hypochlorite at 5%, thus removing more than 90% of the existing pulp tissue (Del Carpio-Perochena, 2001). To promote the cleaning of the concavity region, sodium hypochlorite is the auxiliary chemical substance chosen, due to its properties of penetrating inaccessible areas of the resorption cavity and promoting the dissolution of organic matter. The dissolving capacity of organic matter depends on 3 factors, the amount of organic matter in sodium hypochlorite, intensity and irrigating flow, and contact surface between the organic matter and the irrigating solution. For this reason, it is recommended to carry out abundant irrigation to obtain the maximum effect. Irrigation can be enhanced by the use of ultrasound devices, resulting in a physicochemical synergistic effect. And in cases of internal inflammatory root resorption, it can control bleeding and cause tissue necrosis and solubilize pulp remains (Abi-Rached, 2010).

Endodontic treatment will prevent the evolution of the destructive process from occurring, mechanical debridement is hampered by the irregularity of the resorptive cavity. A good auxiliary chemical solution should be employed to remove granulation tissue, change intracanal medications for alkalinization of the medium, and death of dentinoclasts, and put an end to compact filling are essential for the prognosis to be considered good in the long term (Sierra-Lorenzo et al., 2013). Radiographic images are the most accessible auxiliary devices for the diagnosis of internal inflammatory root resorption, however, they have some important limitations, such as the two-dimensional image overlay. According to Ramos (2024), for long-term endodontic success to be possible in a clinical case of internal root resorption, there are determining factors and these are related to the correct diagnosis, treatment employed, use of auxiliary chemical substance, temporary restorative that keeps the canal inert, endodontic cement chosen for canal filling and condensation technique employed. Internal inflammatory root resorption is a relatively rare pathological condition, with asymptomatic and silent clinical evolution, considered a challenge in the dental routine. The management used for a successful therapy of a permanent tooth affected by internal resorption. Bioceramics are hydrophilic materials that have the ability to generate hydroxyapatite, responsible for the formation of a chemical bond between the filling material and the tooth walls. This process is responsible for eliminating the presence of all the space between the dentin walls and the sealing cement, which results in a better sealing of channel 21 and has presented extremely useful properties for its use in endodontics such as easy handling, dimensional stability, high pH and put, and consequently high

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antimicrobial power, good flow capacity and, consequently, high antimicrobial power. in addition to greater root resistance when filling.

CONCLUSION

Root canal treatment remains the only treatment of choice for teeth diagnosed with internal resorption. Early detection and a correct differential diagnosis are essential for the successful management of internal resorption. The goal of endodontic therapy is the removal of inflammatory tissue and three-dimensional shaping, cleaning and filling of the enlarged canal space, while also avoiding unnecessary dentin removal that could further weaken the remaining tooth structure.

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