Large Periapical Cyst Regression by Endodontic Treatment

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Abstract

The periapical cyst is a frequently found maxillary lesion associated with the apex of a tooth presenting pulpal necrosis. Usually asymptomatic, the cysts grow slowly and may be discovered in routine radiograph examinations. This case report relates the regression of a large periapical cystic lesion by endodontic treatment and drug therapy. A 41 years old female patient, T.A.B., came to the Student Dental Clinic I of the UNIFAL-MG complaining about pain on apical palpation and vertical percussion on teeth 31 and 41, showing swelling around the mentolabial sulcus. Looking into the patient's dental records, it was noticed that an endodontic treatment had been performed on these two teeth presenting periapical cystic lesion four years earlier. A new radiograph showed that the endodontic treatment was deficient and that the lesion itself had expanded. The teeth 31 and 41 were retreated; a foraminal debridement was performed during the instrumentation along with three Calen/PMCC (SS White, Rio de Janeiro, RJ, Brazil) dressing changes with 30 days intervals between them. By applying puncture aspiration to the lesion, it was observed that the collected contents were yellowish, viscous and bloody, characterizing it as cystic fluid. Ninety days later, another periapical radiograph showed a nearly complete regression of the lesion; clinically the edema and symptoms have disappeared. The endodontic treatment was then concluded and the teeth restored. We concluded that, in some cases, it is possible to obtain clinical success in the regression of large periapical cysts by endodontic treatment without the need for surgical removal.

Key Words: Periapical cyst, Therapy, Surgery

Introduction

The radicular cyst is the most common inflammatory odontogenic cystic lesion of the jaws [1-4]. It usually originates as a sequel to inflammatory process, following chemical, physical or bacterial injury [2]. Is frequently associated to an inflammatory response of the organism against a long-term local aggression [4,5]. It is generally asymptomatic [4,6] but can result in a slow-growth, bone resorption and swelling in the affected region [6]. In general it is diagnosed either during routine radiographic examination or after acute pain and diagnosis is confirmatory only after surgical biopsy of this lesion [7-9]. Radiographically, the classic description of the lesion is a round or oval, well circumscribed, radiolucent image involving the apex of the necrotic tooth [1,4,5].

The treatment of radicular cysts includes conventional nonsurgical root canal therapy when the lesion is localized or surgical treatment such as enucleation, marsupialization or decompression when the lesion is large [10]. In some instances, nonsurgical treatment may be ineffective or difficult, and those cases may be treated by surgery [3,4,10,11]. The choice of treatment is often influenced by various factors like size, extension of the lesion, proximity to vital structures, systemic condition and compliance of the patient too [3,4].

The endodontic treatment creates conditions necessary for periapical repair, and according to reports it may be achieved by chemo-mechanical preparation and the use of intracanal medicaments [12-14]. The Calcium hydroxide ($Ca(OH)_2$) has been widely used in endodontics as an intracanal medicament to eliminate the remaining microorganisms after chemomechanical preparation [14,15]. The calcium hydroxide looms among other intracanal medicaments due to two of its properties: the antimicrobial nature and the induction of hard-tissue deposition [16], which promotes anti-sepsis of the root canal system and mineralized tissue formation in the apical region [17].

The aim of this work is to relate the regression of a large periapical cystic lesion with endodontic treatment and drug therapy only, i.e, without surgical removal in spite of a clinical indication.

Case Presentation

The treatment of the present case report followed the guidelines the American Association of Endodontists. However, it was necessary in the present case to make use of antibiotics, since the patient had signs of infection.

A 41 years old female patient, T.A.B, came to the Student Dental Clinic I of the UNIFALMG complaining about pain and showing an edema on the apical region of the lower central incisors. During the evaluation of the patient dental records it was observed that an endodontic treatment has been performed in 2008 on teeth 31 and 41, simultaneously, radiographs showed a periapical lesion measuring 1cm in its longest diameter.

A new extra-oral examination showed a volume increase in the mental region. The intra-oral examination showed tumefaction in the gingival sulcus, spongy consistency, normal mucosal color and smooth texture (*Figure 1*). Teeth 31, 32, 41 and 42 presented a small level of mobility, also teeth 31 and 41 presented sensibility to apical palpation and vertical percussion. The new periapical radiographic examination performed on the lower incisors has revealed that the endodontic treatment applied to teeth 41 was unsatisfactory, additionally, has revealed the presence of a

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radiolucent area larger than the one present in 2008 (2.0 cm in diameter) involving teeth 41 and 42 (*Figure 2*).

Figure 1. *Figure 1 description.*

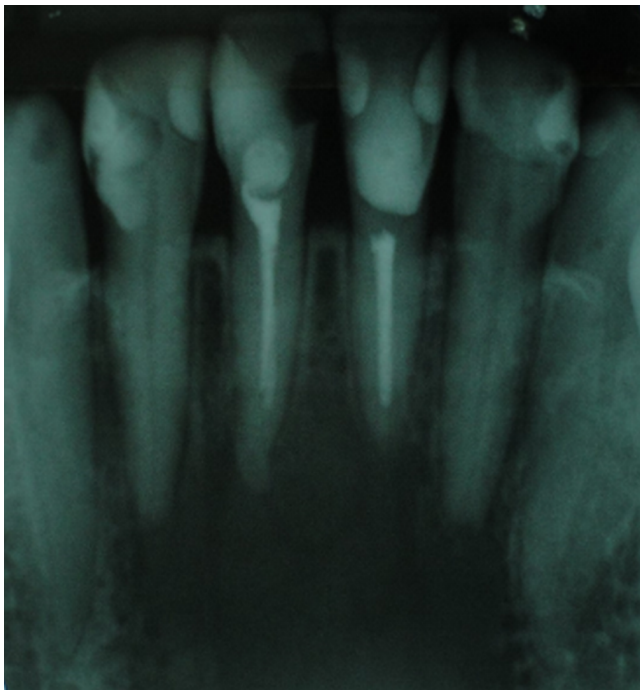

Figure 2. *Description of figure 2.*

Comparing both radiographs it was observed that the lesion involved only the teeth that had received endodontic treatment (31 and 41) whereas now, the lesion had apparently expanded to the adjacent ones (32 and 42). Nevertheless, when a pulpal sensibility test was performed, teeth 32 and 42 responded positively. In the light of such conditions, it was then suggested the diagnostic hypothesis of a periapical cyst, and the treatment chosen was the Endodontic Retreatment of the lower central incisors.

The utility table was previously set up, the access holes were drilled with a 1012 round bur (KG Sorensen, Cotia, SP, Brazil) compatible with the size of the pulp chamber. The starting point was above the cingulum with a 45º angle. Once the pulp chamber was reached, an intrapapillary anesthetic technique was applied to provide more comfort to the patient while the clamp was being positioned (211) for the dental dam isolation to be applied. The ampule used contained lidocaine 2.0% and vasoconstrictor adrenalin on a 1:100.000 proportion, after the isolation, outline and convenience forms were prepared using the 3080 bur (KG Sorensen, Cotia, SP, Brazil). Initially, the diagnosis radiographs were observed, and the length from the incisal edge to the bottom of the obturation was measured on each tooth.

After this process, a root canal desobturation was initiated. The access cavity was opened and the direct visualization of the gutta-percha was achieved. Eucalyptol solvent (Biodinamica, Ibiporã, Paraná, Brazil) was introduced, and initially performed with Gates 2 and Gates 3 burs (Dentsply Maillefer, Petrópolis, RJ, Brazil), targeting the removal of the gutta-percha and enlargement of cervical and middle third portions on the canals. Irrigation was done using 2.5% sodium hypochlorite (ASFER, São Caetano do Sul, SP, Brazil) followed by aspiration. Once again Eucalyptol (Biodinamica) was introduced in the canal orifices and, with a 20, 21 mm long K-file (Dentsply Maillefer), the desobturation of the apical portion was executed. The canals were irrigated instead of aspirated. For the removal of the filling materials attached to the walls a Hedstroen 25, 21 mm long file (Dentsply Maillefer, Petrópolis, RJ, Brazil) was used, applying brushing movements to the walls. The desobturation was finished with a 2.5% sodium hypochlorite (ASFER) irrigation and a radiograph without the presence of a file inside the canal in order to confirm the complete removal of the filling materials.

Afterwards, an odontometric radiograph was performed with a 15, 21 mm long K-file (Dentsply Maillefer). The distance between the tip of the file and radicular apex was measured to determine tooth length. A foraminal debridement was performed throughout the tooth with a 10, 25 mm K-file (Dentsply Maillefer). And at the correct working point, the apex floor was prepared with four files above the initial apical instrument. The final irrigation was carried out first with 2.5% sodium hypochlorite (ASFER), followed by aspiration, and subsequently with 17.0% EDTA-T (Fórmula e Acão, São Paulo, SP, Brazil) along with 3-minutes-long intracanal agitation with the master apical file (MAF), followed by aspiration, and, finally, one last 2.5% sodium hypochlorite (ASFER) and one final aspiration. The interior of the canals was then dried with sterile absorbent paper cone, followed by Calen PMCC (SS White) intracanal medication introduction, by a Lentulo drill (Dentsply Maillefer, Petrópolis, RJ, Brazil). Once the medication was introduced a sterile cotton pellet was placed inside the pulp chamber temporarily sealed with zinc oxide and Eugenol (Dentsply Maillefer, Petrópolis, RJ, Brazil).

After 7 days, due to the consistency and the persistent presence of the edema in the area, a puncture aspiration was performed to the lesion and it was observed that the collected contents were yellowish, viscous and bloody, characterizing it as cystic fluid. Prior to the puncture, 1 g of Amoxicillin had been administered and a therapeutic dose of Amoxicillin 500 mg + Metronidazole 400 mg at eight-hour intervals for five days had been kept. Thirty days after the first session the edema on the mental region had already diminished (*Figure 3*). Radiographically, the lesion resisted without any significant alteration, thus a new intracanal bandage change

was carried out on teeth 41 and 31 and kept for another 30 days.

Figure 3. *Description of figure 3.*

Sixty days after starting the treatment Calen PMCC (SS White) intracanal medication was renewed again. On the ninetieth day after the start date of treatment, radiographs showed a nearly full regression of the lesion. An obturation of both teeth was then determined. The procedure began with the intrapapillary anesthetic technique and subsequent dental dam isolation, followed by the removal of the temporary sealing with a 1012 bur (KG Sorensen) to the exposure of the sterile cotton pellet which was then removed. The canal was cleaned, with the removal of the intracanal medication using the master apex file (MAF) and applying brushing movements against the walls of the canals, along with 2.5% sodium hypochlorite (ASFER) irrigation and aspiration, 17% EDTA-T irrigation and aspiration, and final 2.5% hypochlorite (ASFER) irrigation and aspiration. The interiors were dried with an absorbent paper cone using the master apex file (MAF) and the master cone (Dentsply, Petrópolis, RJ, Brazil) as reference, the master cone, in its turn, also having used the master apex file (MAF) as reference. Once disinfected the cone was dried in sterile gauze in preparation for the radiograph in order to confirm fitting.

After these steps, XF, FF, MF and M (Dentsply Maillefer) accessory cones were selected. The cement chosen was the AH Plus (Dentsply, Petrópolis, RJ, Brazil). A sterile glass plate was used for manipulating the cement, which was first introduced with a Lentulo drill (Dentsply Maillefer) and then with the master cone which in its turn was set in position. After that, a lateral condensation was started using a finger spreader (Dentsply, Petrópolis, RJ, Brazil) introducing it in the canals, twisting and then removing it, in order to create space for the accessory cones. When it was no longer possible to fit more accessory cones inside the canal, a new radiograph was made to verify the homogeneity of the active lateral condensation. Checking the radiograph, we concluded that the filling of gutta-percha coated in cement and introduced in the canals had been satisfactory. Excess gutta-percha on coronal end was cut off with a pair of scissors. Heated heat-carrier pluggers (Golgran, Sao Caetano do Sul, SP, Brazil) were used to remove excess gutta-percha from the pulp chamber. After the excess gutta-percha is substantially removed, the vertical condensation process started with cooler pluggers (Golgran), in order not to remove the cones from the root canal. Next, the pulp chamber was cleaned with a sterile cotton pellet soaked in alcohol to remove any remaining cement and gutta-percha, thus preventing the coronal end from suffering any darkening, and a final periapical radiograph was made (*Figure 4*). A sterile cotton pellet was placed inside the pulp chamber and the tooth was temporarily sealed with zinc oxide and Eugenol (Dentsply). The session was finished with the removal of the dental dam isolation, and a new medical appointment was scheduled to the patient after 7 days to perform restorative dentistry procedures.

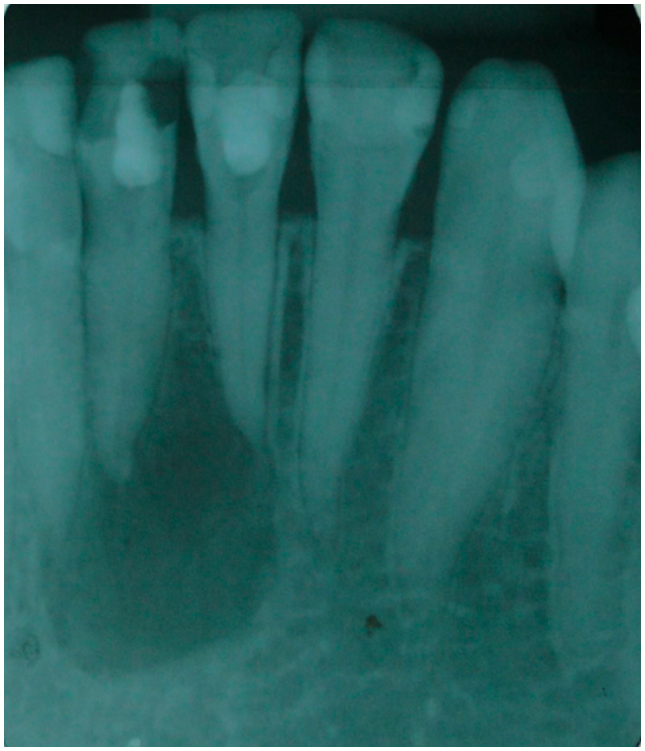

Figure 4. *Description of figure 4.*

After 7 days the patient returned and the treatment of teeth 41 and 31 was finalized. The procedure began with intrapapillary anesthesia, rubber dam isolation, temporary restoration removal with a 1012 bur (KG Sorensen) and cotton pellet removal. The cavity was coated with CIV (Vidrion F SS White, Rio de Janeiro, RJ, Brazil) followed by A2 composite resin (3M ESPE, Sumaré, SP, Brazil) restoration.

Discussion

Until the 1960s, endodontists, pathologists and oral and maxillofacial surgeons considered that apical cysts would not respond to root canal treatment by itself and that surgery was always required, however, this concept has changed [17]. Large cyst-like apical periodontitis lesions demonstrated to regress to smaller sizes and even to be completed after non-surgical endodontic therapy [5,8,11,18-20]. From this line of thought, it is justified the choice to take such therapeutic approach in this study.

According to some authors if the endodontic infection is eliminated, the immune system is able to promote lesion repair [5,9]. However, periapical lesions that do not heal after adequate endodontic treatment or have an unusual

radiographic image should be submitted to surgical excision and the surgical specimen should be sent for histopathological analysis [1,19]. Persistent periapical radiolucency after endodontic procedures may decrease, remain unchanged, or increase over time. Clinicians should consider factors including the quality of the current root canal treatment and the patient's symptoms before intervention [21].

Conservative approach of treatment of any lesion is always preferable to surgery [8,9,18] as the most periapical lesions are the result of an inflammatory response to bacterial infection within the root canal, i.e., intracanal infection [22,23]. It is possible to achieve success in conservative treatment following the endodontic protocol correctly, through neutralization and removal of the toxic necrotic contents from the root canal system, employment of intracanal medication and sealing of the canals through obturation [8,9,16,13]. The control of root canal infection and periapical exudation has pivotal importance in nonsurgical management of large cyst-like periapical lesions [18,19]. In addition, the use of intracanal medication dressing after chemomechanical preparation provides supplementary antisepsis associated at stimulation of periapical repair [18].

The use of intracanal medication helps postoperative control, since the mechanical preparation by itself does not reach all the lateral and accessory root canal systems, or dentinal tubules [14,18]. In such a case, calcium hydroxide as intracanal medication is chosen for reasons such as: its bacteriostatic properties, due to its high pH, being biocompatible, favoring apical repair, and the fact that its presence inside the root canal is accepted for relatively long periods (over 30 days).

The antimicrobial effect of $Ca(OH)_2$ results from the release of hydroxyl ions when it comes into contact with aqueous fluids. The addition of vehicles or other agents might contribute to the antimicrobial effect of Ca(OH) [15]. The association of camphorated paramonochlorophenol in a residual quantity in a calcium hydroxide based paste (0.04 g of CPMC to 2.5 g of calcium hydroxide) with polyethylene glycol 400 as vehicle allows release of calcium ions for a longer period [14]. Induction of hard-tissue formation apically is dependent on the presence of the calcium hydroxide dressing for longer periods [1,14].

The elimination of the bacteria from the root canal is the most important factor for the successful treatment of periapical lesions [13,19]. Differential diagnosis, endodontic infection control, apical foramen enlargement and filling of the cystic cavity with a calcium hydroxide paste were proved important procedures for successful nonsurgical endodontic treatment of periapical cysts [5,8,22]. Some lesions, however, may not be amenable to conservative treatment and may require surgical treatment for total elimination of the pathologically involved tissues and attenuation of the periapical reaction [8,19]. Its success is usually evaluated by means of clinical and radiographic follow-up. Intraoral radiographic images are the most used method for evaluating periapical bone repair [9,13,20,24].

The ultimate goal of endodontic therapy should be to return the involved teeth to a state of health and function without surgical intervention [9]. Therefore, an extensive periapical lesion with the clinical and radiographic features of an apical cyst may respond to nonsurgical treatment involving biomechanical preparation, followed by lesion decompression by intracanal aspiration, associated with long-term renewal of aqueous calcium hydroxide paste and conventional obturation, [5,8,9,17,18] similar to present study.

Conclusion

We concluded that in some cases it is possible to obtain clinical success in the regression of large periapical cystic lesions by endodontic treatment, without surgical removal.

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