



Endodontic treatment of teeth that undertook calcific pulp metamorphosis

Tratamento endodôntico de dentes que sofreram metamorfose cálcica da polpa

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ABSTRACT

The pulp-dentin complex is primarily responsible for the color of teeth. Increasing the thickness of the dentin and decreasing or eliminating the pulp tissue implies changing the tooth color. Calcific Metamorphosis of the Pulp, partial or total calcification of the root canal, replaced by sclerotic dentin is often perceived by darkening of the tooth followed by aseptic pulp necrosis. Endodontic treatment in these cases becomes very difficult due to atresia or even total calcification of the pulp space, requiring the use of specific techniques, knowledge and mastery of internal dental anatomy. In this article we present a clinical case in which we performed the root canal of a tooth that suffered Calcific Pulp Metamorphosis, employing an ultrasonic insert in the modeling of the canal.

Keywords: Anatomy, Endodontics, Dental pulp.

1 INTRODUCTION

When trauma occurs, the tooth can remain structurally sound in the hard tissues and the pulp can remain healthy or evolve to aseptic pulp necrosis if the vascular and nerve bundle is severely and permanently compromised. However, injury to this vascular and nerve bundle can be partial or transient.¹

Pulp cells can be subjected to temporary hypoxia, temporary loss of nutrients, and reduce their metabolism to the minimum necessary for cell survival. This occurs mainly in trauma characterized as subluxation (in 45.8% of cases) and concussion (in 31.6% of cases). Concussion can be defined as an aggression to the supporting periodontal tissues, without abnormal mobility or tooth displacement, but with a marked response to percussion. Subdislocation represents an aggression to the supporting periodontal tissues, with abnormal mobility, but without displacement of the tooth in the alveolus^{2,3}.



Calcific Metamorphosis of the Pulp represents a tissue response to trauma characterized by the deposition of mineralized tissue in the root canal space⁴.

Calcific degeneration of the pulp occurs within the intercellular fibers of the pulp connective tissue. Over time these fibers are replaced by adipose tissue where calcifications later occur⁵.

The endodontic treatment of teeth with Calcific Pulp Metamorphosis is complex and requires specific equipment and instruments to approach these canals⁶.

The use of magnification has become an important aid during endodontic treatment performed in this type of canal due to the possibility of better visualization of this very small field, reducing the risk of accidents such as deviations and perforations⁷.

In cases of calcified canals, magnification allows one to observe details such as development lines, dentin tone, and the oxygen bubbles formed by the sodium hypochlorite when it comes into contact with the remaining pulpal tissues, allowing one to locate the root canal⁸.

Also important is the use of ultrasonic inserts, both to aid in access and to help eliminate adhered pulpal nodules on the floor or wall of the root canal.⁹

The use of gel chelating agents is highly advisable in these cases, for their lubricating effect, besides sequestering mineral ions from the mineralized tissue¹⁰.

Another complement that helps us access obliterated canals is the use of fluorescence, a water-soluble yellow substance that when exposed to light produces a green fluorescent color. Although its use is limited mainly to Ophthalmology.¹¹

A variety of applications for the use of ultrasound in dentistry and reported the biological effects produced by the ultrasonic wave inside the root canal system, highlighting the phenomenon of cavitation that occurs when the osmotic pressure exerted on a liquid is greater than the hydraulic pressure that this liquid exerts on the wall of the container that contains it, with the formation of bubbles inside and subsequent implosion, forming transitional cavities that, when ruptured, produce impact waves on the surface of the container in which the liquid is contained. In passive ultrasonic activation of the root canal, the phenomenon of cavitation produces the displacement of irrigating liquid with high impact on the wall, promoting the removal of the *smear layer* and reaching areas where manual instruments cannot reach.¹²

2 CLINICAL CASE

On 12/14/2000, the patient M.J.S., female, 65 years old, attended the Endo Clinic - Root Canal Treatment on the recommendation of a colleague who was unable to perform endodontic

treatment on tooth 41. The radiographic examination showed that the canal was suffering from a Calcific Pulp Metamorphosis, besides presenting a periapical radiolucent image suggestive of injury (Figure 1).

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Figura 1: Radiografia de diagnóstico



After anesthetizing the patient with Prilocaine/Epinephrine, the tooth was isolated, the operative field was antisepticed with iodized alcohol, and with the help of microscopic magnification the temporary cement was removed and the technical opening was performed. On examining the tooth with the operating microscope it was noted that the canal was totally obstructed by sclerosed dentin. Figure 2.

Figura 2: Visão do canal radicular obstruído.



Using a Trinks TU 12 ultrasonic insert, with a power of 20%, we advanced in the root canal, checking radiographically with a manual instrument type k, every 2 mm advanced, after which we continued in the root canal, avoiding deviations. Figures 3 and 4.

Figuras 3 e 4: Exploração do canal radicular



Following exploration with the ultrasonic insert over the entire working length, shaping of the root canal was performed with a Primary, NiTi WFile (TDKaFILES) reciprocating instrument. Cleaning was enhanced with a PUI (Passive Ultrasonic Instrumentation) using a Helse F1 insert (Irrisonic) with 20 seconds using 6% NaOCl, 20 seconds with 17% EDTA and 20 seconds with 6% NaOCl following the Van der Sloius technique.¹²

The canal was dried with an absorbent paper point and obturated with a Primary gutta-percha cone (TDKa) and AHPlus paste (Dentsply Sirona). Figure 5.

Figura 5: Canal obturado.



Prosevation consultations were held on 6/14/2021 (Figure 6) and 6/15/2022 (Figure 7).



3 DISCUSSION

The deposition of mineralized tissue on the root canal walls is a physiological process of aging or defense of the vital pulp, which ultimately determines pulp atrophy through the reduction of its original volume, altering even its contour^{14,15}. For this reason this progressive reduction of the pulp space is the clearest morphological alteration during the aging process.¹⁶

However, this continuous deposition of dentin does not occur symmetrically. In posterior teeth, for example, it occurs with more emphasis on the roof and floor of the pulp chamber than



on the buccal and lingual proximal walls. In maxillary anterior teeth, the greatest dentin deposition occurs in the palatal wall of the pulp chamber due to masticatory effort. Thus, the pulp chamber experiences a much greater reduction in the occluso-radicular direction than in the horizontal direction¹⁷.

Traumatic injuries can also lead to an acceleration in the formation of mineralized tissue in the pulp cavity, producing a radiographic image of closure of the entire root canal lumen. It

is a consensus in the literature that the main cause of root canal obliteration is trauma, and this obliteration has been explained as being the response of a vital pulp to this injury^{18,19}.

It is a fact that the complexity of endodontic treatment increases with patient age. The deposition of dentin throughout life with consequent shrinkage of the pulp spaces makes the procedures more technically complex²⁰.

The pulpal spaces tend to be smaller or may even disappear radiographically. Factors such as pulpal nodules and diffuse calcifications alter the anatomy of the root canal system.²¹

After removal of the entire chamber ceiling, the difficult location of the root canal orifice can be helped with ultrasonic inserts which also contribute to the displacement of calcified deposits blocking the entrance and the root canal space²².

4 CONCLUSIONS

The darkening of structurally healthy teeth in their mineralized tissues represents a strong indicator of Calcic Pulp Matamorphosis. Any endodontic clinical management of these teeth should be preceded by thorough clinical and radiographic evaluation. Treatment should be based on specific knowledge and techniques.



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