

Free Coronal Pulp Stones: Therapeutic Approach

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Abstract

Pulpal calcifications, also known as pulpal calcific degeneration, are small masses of calcified tissue that obliterate part or almost all of the endodontic network. The presence of these masses can further complicate endodontic treatment, necessitating adaptation of the therapeutic approach. These calcifications can take a variety of clinical forms, posing problems of diagnosis and management. The indication for endodontic treatment cannot be based solely on the presence of a pulp calculus, but on a diagnosis confirmed by a clinical and radiological examination showing the pulp condition of the tooth.

The aim of this article is to illustrate the difficulties and keys to successful endodontic treatment in the presence of pulp calcifications.

Keywords: dental radiography; endodontics; pulp stones

Introduction

Pulpal calcifications or also called pulpal calcium degenerations are small masses of calcified tissue that obliterates part or almost all of the endodontic network [1]. The exact cause of their formation remains unknown. Therefore, it is currently unclear whether their presence reflects a pathological manifestation or a normal physiological development of the dental pulp [2]. Thus, many factors predisposing to the development of pulpal calcification have been suggested, such as aging, caries, periodontal disease and orthodontic movements. On the other hand, some studies have tried to establish a relationship with other general diseases such as cardiovascular and renal diseases [3]. These masses of calcified tissue can be found at the level of the pulp chamber and/or at the level of the root canals, but the accessibility to the canal orifices which is an essential element for the success of any endodontic treatment can become more complicated by the presence of these pulpstones.

The aim of this article is to illustrate the difficulties and keys to successful endodontic treatment in the presence of pulp calcifications.

Case report

case report N°1

A 42-year-old patient in good general condition consulted following spontaneous pain related to the second left mandibular molar. The clinical examination reveals a Sista 2.3 carious lesion. The radiological examination shows the presence of calcification which obliterates almost all of the pulp chamber with a cleavage plane (clear X-ray line) between the calcified tissue and the healthy dental

tissue (Fig 1). After carious eviction and opening of the access cavity by connecting the projection of the pulp horns (Fig 2), the extent of the pulpstone is delimited by a hemorrhagic colorimetric demarcation between the dentin of the cameral walls and the calcified tissue center (Fig 3). Subsequently, this demarcation was widened using an ultrasonic diamond insert (ET18D) (Fig 4). Once released and mobilized, the calcified mass is completely removed by an endodontic excavator (Fig 5-7). After removal of the pulpstone, abundant irrigation with Naocl 5.25% was performed to better visualize the root canal entries (Fig 8) and from here endodontic treatment was continued as if of a normal tooth without particularities (Fig 9).



Figure 1: Retro alveolar radiograph showing acalcification occupying the entire cameral pulp with a clear X-ray cleavage plane that delimits the calcified mass (yellow arrow).



Figure 2: Carious eviction and delimitation of the access cavity which connects the projections of the 4 pulpal horns (Hemorrhagic demarcation delimiting the extent of the pulp stone).



Figure 3: Hemorrhagic demarcation was widened using an ultrasonic diamond insert (ET18D)



Figure 4: DiamondinsertET18D.

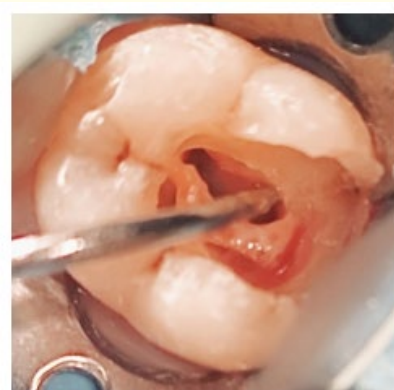


Figure 5: Mobilization of the pulp stone using an endodontic excavator.



Figure 6: Clinical view of the pulp stone after its removal from the pulp chamber one piece.

Case report N°2

A 57-year-old patient in good general condition presented with provoked pain related to the left mandibular first molar. Clinical examination revealed a Sista 2.3 carious lesion.

Radiological examination showed calcification obliterating almost the entire pulp chamber, with a cleavage plane (clear X-ray line) between calcified and healthy tooth tissue (Fig 1; Blue-colored arrow).

After making the access cavity by connecting the pulpal horn projection, the pulpstone extent is not delimited, attached to the dentin of the cameral walls (Fig 2). Using a diamond bur, the pulpstone is detached from the dentin walls (Fig 3-4).

Once freed and mobilized, the calcified mass was completely removed (Fig 4-5). After removal of the pulpstone, copious irrigation with 5.25% Naocl was performed to better visualize the root canal entrances (Fig 7), and from then on, endodontic treatment was continued as if it were a normal tooth with no special features (Fig 8-9-10).



Figure 1: Retro alveolar radiograph showing a calcification occupying the entire cameral pulp with a clear X-ray cleavage plane that delimits the calcified mass (yellow arrow).



Figure 2: Clinical aspect of access cavity before pulpstone removal, pulpstone attached to vestibular and lingual surfaces.



Figure 3: Pulpstone release using a turbine-mounted diamond cutter.



Figure 4: Pulpstone free and mobilized with a probe.



Figure 5: Removal of the last pulpstone fragment.



Figure 6: Clinical view of the pulpstones after its removal from the pulp chamber in three pieces.



Figure 7: Clinical appearance after complete pulpstone release, abundant irrigation and Enlarged canal orifices.



Figure 8: Radiograph file in place.



Figure 9: Postoperative X-ray.



Figure 10: Definitive coronal filling with composite resin.

Discussion

A comparative study carried out in 2016 by Karimi Z, et al. attempted to investigate the prevalence of pulpal calcifications and study their impact on the quality of endodontic treatment [1]. It was shown that calcific degeneration appears to be a source of difficulty that needs to be taken into consideration to improve the quality of endodontic treatment.

The success of endodontic treatment depends on the correct design of the access cavity. This involves establishing a contour shape linking the projections of the pulp horns at occlusal level. An ordinary cavity is then created and deepened using long-neck tungsten carbide burs. The sensation of emptiness, long associated with entering the pulp chamber, does not occur in the presence of calcified hard tissue. The extent of the pulpstone is delimited by a colorimetric demarcation between the dentin of the canal walls and the central calcified tissue. This demarcation may be manifested by a hemorrhagic line of underlying pulp tissue when the tooth in question is vital, otherwise it is manifested by a line of necrotic pulp tissue debris. This line of separation is then extended using ultrasonic diamond inserts, under direct visual control (operating microscope / dental magnifying glass) to better distinguish dentin tissue from calcified tissue. Once the calcification has been completely circumscribed, the aim is to remove it in a single block, simply mobilize it with an endodontic excavator to detach it in a single block from the access cavity. The removal of this calcified mass reveals an intact, clean pulp floor and clearly distinguished canal entrances [4].

When pulpstone is attached to the wall or floor, it may need to be broken into pieces to remove it from the chamber. A diamond milling cutter/An ultrasonic diamond insert are therefore best suited to cutting pulpstone. Visual inspection is very important to avoid excessive decay.

Once the root canal entrances have been located, root canal penetration can begin. It is always important to remember that instrument fractures are more difficult to treat on mineralized teeth. Full canal catheterization should not be performed from the beginning, preferring instead a crown-down approach [5]. Manual K8 or K10 files, and sometimes even K6 files, are used to progress through the canal, but these instruments are very fragile and should be replaced regularly. After initial penetration, rotary pre-enlargement instruments can be used. It is important not to forget to pre-curve manual instruments over the last few millimetres, to enable them to bypass any mineralization present in the canal [6]. Advancing into the canal can sometimes become easier as the instrument progresses, since secondary dentinogenesis is more marked coronally than apically. However, if the instrument no longer seems to be advancing correctly, you should stop and try to feel how the instrument is engaged in the canal. If there is a sensation of resistance to withdrawal, then the canal is narrowed and you can continue as normal, opening the canal progressively. If, on the other hand, the instrument appears to be free in the canal, we are faced either with total apical calcification, which is very rare, or with an abutment, in which case we need to pre-curve the instrument further to find a zone where we can obtain this sensation of resistance to withdrawal [7]. Abundant irrigation with sodium hypochlorite should always be maintained, as the solvent action of NaOCl enables digestion of the organic substances involved in pulpstone adhesion. Manual filing helps to mobilize the pulpstone in a coronal direction, by establishing low-amplitude back-and-forth movements. The use of chelating agents facilitates progression within the canal by demineralizing the canal walls and eliminating the mineral phase of calcification adhesions [8]. It should also be remembered that, in the long term, cement deposits form at the apex, altering the position of the radiological apex in relation to the anatomical apex. Root canal preparation must therefore sometimes be carried out away from this radiological apex [4]. The EDTA helps chelate the calcium salts in the calcifications and in the dentin thus making it easier to bypass or remove the calcifications and shape the walls of the root canal. In multirooted teeth when the floor of the chamber has been covered with the preparation, it will tend to open up the entrances to the canals [9].

Conclusion

Pulpal calcifications are frequently encountered in dental practice, and can take a variety of clinical forms, posing diagnostic and management problems. The indication for endodontic treatment cannot be based on the presence of pulpitis alone, but rather on a diagnosis supported by a clinical and radiological examination of the pulpal condition of the tooth. A thorough understanding of these particularities, the choice of appropriate therapies and the use of optical aids are the keys to successful treatment of mineralized teeth.

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