

Reaction of the Pulp Tissue: Co-occurrence of Pulp Stone and Internal Resorption

Reação do Tecido Pulpar: Ocorrência Simultânea de Nódulo Pulpar e Reabsorção Interna

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RESUMO

A reabsorção interna é um achado raro em dentes permanentes que sofreram trauma. Sua etiologia é desconhecida, porém trauma ou inflamação têm sido considerados como causas prováveis. No presente relato, descrevemos um caso de reabsorção interna inflamatória associada com calcificação pulpar no primeiro molar inferior direito de uma paciente de 25 anos. A paciente não recordava qualquer instância de trauma que pudesse explicar a ocorrência desses fenômenos. O tratamento endodôntico tradicional foi efetivo na resolução dos sintomas. O diagnóstico diferencial exclui a possibilidade de reabsorção cervical invasiva.

PALAVRAS-CHAVE:

Polpa dentária. Calcificação da polpa dentária. Reabsorção de dente.

INTRODUCTION

Internal resorption is a rare finding in permanent traumatized teeth, and its etiology is still uncertain (WEDENBERG; ZETTERQVIST, 1987). Trauma has been pointed as a likely cause; infection has also been cited as an explanation for this phenomenon (SCHRODER; GRANATH, 1971; ANDREASEN, 1981). Regardless of the etiology, prompt endodontic treatment is required if internal resorption is suspected (HERRIN; LUDINGTON, 1990; EIDELMAN et al., 1997).

Andreasen (1981) has described two types of internal resorption: internal inflammatory resorption and internal replacement resorption. Internal inflammatory resorption, which is usually asymptomatic, is characterized by transformation of normal pulp tissue into granulomatous tissue. A typical X-ray finding is a radiolucent widening of the crown or root (NE et al. 1999). On the other hand, internal replacement resorption involves metaplasia of pulp tissue into bone-like tissue, forming a pulp stone (DEVA et al., 2006) or leading to calcific metamorphosis (SMITH, 1982; AMIR et al., 2001). This bone-like tissue appears on X-rays as a radiopaque area.

The reports in the literature usually refer to the occurrence of internal inflammatory resorption (WARNER et al., 1947;

KAUFMAN et al., 1977; HERRIN; LUDINGTON, 1990; EIDELMAN et al., 1997). In the present report, we describe an unusual case in which both internal resorption and a pulp stone were observed.

CASE REPORT

A 25-year old female patient presented with spontaneous pain in the lower right first molar. She reported having used paracetamol with some remission of symptoms. Her medical history was non-contributory.

No carious lesions or cavities were found on clinical examination. Occlusal fissures were sound. Slightly enlarged lymph nodes were observed on palpation of the right submandibular region. There were no signs of cracks on the tooth surface and the gingival tissue was clinically sound. A slight pink discoloration was observed in the crown. Radiographic examination revealed a calcified pulp chamber and a well-defined coronal radiolucent area close to the pulp chamber (Figure 1), leading to a diagnosis of internal resorption with irreversible pulpitis.

Immediate endodontic treatment was performed. A rubber dam (Madeitex, São José dos Campos, Brazil) was placed over the tooth and the entire roof of the pulp chamber was removed under local anes-

thesia (Novocol 100/ SSWhite, Rio de Janeiro, Brazil). This procedure caused intense hemorrhage, controlled by removal of the disorganized pulp tissue and irrigation with 1% sodium hypochlorite. Inside the chamber, the calcified tissue resulting from pulp degeneration was observed to be a pulp stone of irregular, granular aspect, which was removed with an excavator and fixed in 10% formaldehyde. A temporary dressing of pure calcium paste, consisted of a mixture of distilled water and calcium hydroxide powder, was applied (Biodinâmica, Ibioporã, Brazil) to the remaining radicular pulp tissue, in contact with the areas of dentinal resorption. The crown was sealed with intermediate restorative material (IRM, Caulk/Dentisply, Rio de Janeiro, Brazil).

The pulp stone was examined using electron microscopy. Tissue was mounted on an aluminum stub and coated with gold, using the sputter technique. The sample was evaluated under a JEOL JSM 5800 microscope (Jeol Ltd., Akishima, Japan). Microscopic analysis of the calcified tissue revealed intercalated resorption lacunae (Figure 2) with amorphous aggregates and structures standing on different planes (Figure 3). Depression and elevation zones were observed in parts of the extracted pulp stone (Figures 4, 5). Sheet-like structures

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Figure 1 - Pre-treatment X-ray showing the presence of a pulp stone (larger circle) and a radiolucent area (smaller circle) indicating internal resorption in the walls of the pulp chamber.



Figure 2 - SEM examination of the pulp stone (magnification: 850X). A reticle of mineralized tissue can be seen next to the resorbed areas.

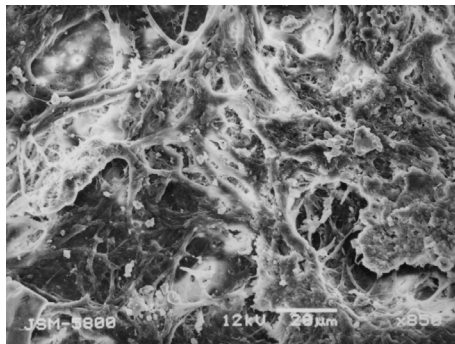
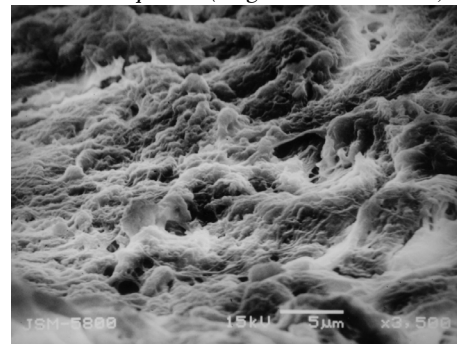


Figure 3 - Aspects of structural changes observed in the pulp stone. Amorphous aggregates and structures (circle) are observed on different planes (magnification: 3500X).



were also observed and interpreted to be odontoblast-like cells.

The patient returned a week later. She reported remission of painful symptoms. A rubber dam was placed and the calcium hydroxide paste was eliminated by abundant irrigation with 1% sodium hypochlorite. During this second visit, the absence of bleeding allowed a more clear view of what appeared to be resorbed areas with multiple perforations. Small perforations were also observed in several points of the lingual wall. The arrow in Figure 6 shows the resorption area identified as a radiolucent area in Figure 1. The canals were prepared according to the step-back technique with irrigation with 1% sodium hypochlorite. They were then dried and filled with gutta percha and N-Rickert cement (Fórmula & Ação, São Paulo, Brazil).

After the endodontic treatment was completed, the occlusal relations and the dental remains were analyzed. Despite the finding of microperforations on the lingual wall, the cusps were not severely undermined. Thus, prosthetic intervention was considered to be unnecessary and conservative restorative treatment was performed. The resorption areas and the crown were filled with type II glass ionomer cement (Ketac-Fill/ Espe, Seefeld, Germany) using a centrix syringe (DFL, Shelton, USA). After the material had set, the rubber dam was removed and occlusion was adjusted. A postoperative X-ray showed an acceptable filling of the root canals (Figure 7).

DISCUSSION

The present clinical case was diagnosed as internal inflammatory resorption associated with a pulp stone. The diagnosis

Figure 4. SEM showing depression and elevation zones in parts of the pulp stone (magnification: 500X).

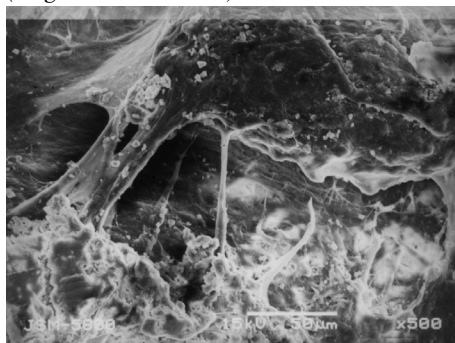


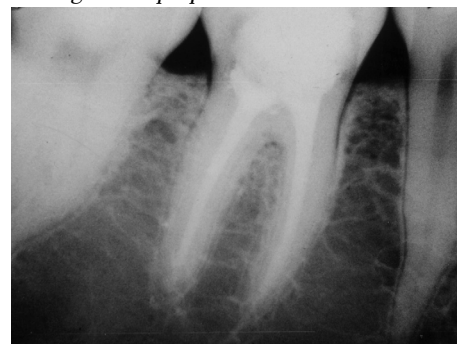
Figure 5. Greater magnification (1000X) of Figure 4, highlighting depression zones and resorbed surfaces. The sheet-like structures could be interpreted as odontoblast-like cells. The arrow indicates an area of resorbed dentine.



Figure 6. Removal of the pulp roof and pulp stone revealed an irregular pulp floor. The arrow and rectangle show resorption points in the mesial wall of the pulp chamber, corresponding to the radiolucent area shown in Figure 1.



Figure 7. Post-treatment X-ray showing the final endodontic fill as well as the complete sealing of the pulp chamber.



of internal resorption was based mainly on a slight pink discoloration of the crown, X-ray findings showing a rather irregular radiolucent area located in the crown of the tooth, and on the absence of detectable caries and of external cavitation of the enamel. The origin of the internal resorption, however, remains unknown. The patient presented pain at the tolerance level, as described by Eidelman et al. (1997).

Another diagnostic possibility that must be considered in this case is invasive cervical resorption. As described by Heithersay (1999), invasive cervical resorption is an uncommon type of external root resorption which has in several cases been misdiagnosed as internal resorption. As in internal resorption, in invasive cervical resorption there is no external evidence of the resorption process, and

diagnosis depends on radiographic examination. It is usually painless, but pulpitis-like symptoms will occur if pulpal infection supervenes. In advanced stages, the pulp may be invaded by resorbing tissue without microorganisms and replaced with bonelike material containing irregular channels and spaces. In the present case, this diagnosis was ruled out because several major features of invasive cervical resorption were not observed, such as the presence of a thin radiopaque line demarcating the root canal from the radiolucency. In addition, the microscopic features of the pulp stone are different from those described by Heithersay (1999).

There are several reports in the literature describing the occurrence of pulp stones (AMIR et al., 2001; DEVA et al., 2006; PAREKH et al., 2006). The irregular shape and granular appearance of the stone observed in this report are in agreement with the description made by Kaufman et al. (1977). However, rather than craters, we observed granules and sheet-like structures, as described by Al-Nazhan & Spangberg (1995). Warner et al. (1947) have also observed pulp stones in the inflamed pulp. The present clinical case illustrates an unusual finding in which two pulp conditions (pulp stone and internal resorption) occurred in sequence in the same tooth. First, a pulp stone was formed in the pulp chamber; later, an internal resorption process began, possibly due to pulpal inflammation, involving not only the pulp chamber, but, as suggested by the microscopic findings, the pulp stone itself (Figures 2, 4, 5).

In the present case, after a meticulous evaluation of occlusal relations, no significant functional weakening of the cusps was observed. Therefore, the customary indication for prosthetic treatment was not followed, and the internal defects and pulp chamber were sealed with glass ionomer cement, given its ability to adhere to the dentinal walls (CHIVIAN, 1987; CRONALARSSON et al., 1991). Other treatment options would be gold or ceramic onlay to restore the occlusal tooth structure.

In conclusion, an unusual co-occurrence of internal resorption and pulp stone was described in the present case. The presence of pain before the complete destruction of dentin allowed endodontic treatment to be performed fairly early, contributing to the successful conservative treatment.

ABSTRACT

Internal resorption is a rare finding in permanent traumatized teeth. The etiology of internal resorption is unknown, but trauma or inflammation have been suggested as probable causes. In the present report, we describe a case of internal inflammatory resorption associated with a pulp stone in the lower right first molar of a 25-year old female. The patient was unable to recall any instances of trauma that could explain the occurrence of these phenomena. She was successfully treated with conservative endodontic treatment. Differential diagnosis ruled out the possibility of invasive cervical resorption.

KEYWORDS

Dental pulp. Dental pulp calcification. Tooth resorption.

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