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Case Report Article

Type IIIb *dens in dente* endodontic retreatment: a case report

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Abstract

Introduction: Dens in dente is a developmental anomaly characterized by dental tissues invagination that varies from a slight increase of the cingulum´s fossa to a deep groove that can extend up to the dental apex. **Objectives** The aim of this study was to report a dens in dente endodontic retreatment case with the presence of fistula and periapical lesion. **Case report:** Non-surgical retreatment was performed from the removal of the filling endodontic material, use of Calcium Hydroxide as intracanal medication changed every two months for a one year and a half period, and later, apical closure with MTA and endodontic filling of the remaining thirds with thermoplastic gutta-percha. **Results:** Postoperative follow-ups were performed for a 4 years period where a reduction of the periapical lesion diameter and disappearance of the fistula were observed. **Conclusion:** These results demonstrate that the present non-surgical dens in dente endodontic retreatment protocol could be considered a viable option for success.

Introduction

Dens in dente (DID) is a consequence of the anomalous development of the tooth during its morpho-differentiation. It is described as an alteration caused by the invagination of the enamel

organ´s internal epithelium into the dental papilla before calcification is complete, being that, at a specific moment of the dental development, an incompletely developed amelodentinal structure of controversial etiology, is formed within the pulp [11, 14, 21, 29, 30].

The DID has been related to external forces in the dental bud during development, such as other nearby buds, infection, trauma, focal growth acceleration and tooth bud's delay [7]. It may also be associated with genetic disorders such as Nance-Horan, Ekman-Westborg-Julin and Williams syndromes [16, 24].

There is a consensus that the higher prevalence of DID occurs in permanent maxillary lateral incisors [6, 17, 28], while maxillary central incisors are the second most affected and mandibular teeth are rarely involved [1, 21].

Teeth affected by DID, clinically can present in several ways: crowns with a larger mesio-distal dimension at the cervical third when compared to the incisal third; dilated crowns with prominent cingulum; bifid cingulum; some with a conical crown, and may still present with normal appearance being detected only by radiographic means [12, 13, 18, 29, 30].

The diagnosis of DID is based on clinical examination of crown changes and radiographs. Radiographically, affected teeth have radiolucent "pockets" below the cingulum and incisal edges. These "pockets" may or may not be surrounded by a border of radiopaque enamel and may be restricted to the crown or with pulpal involvement [11] a small tooth within the affected tooth justifying the denomination *dens in dente*.

The complex internal anatomy of the tooth affected by this anomaly makes the treatment challenging. This challenge may be even greater if it is a retreatment [7]. Conventional periapical radiography is the main used tool to evaluate this complex morphology [3] but it provides a two-dimensional image of actually three-dimensional structures. In 2009, cone beam tomography provided a more detailed 3D image of the various morphologies and their locations, allowing the clinician to more accurately diagnose the class of invagination that the tooth presents, as well as to determine the feasibility of any endodontic treatment [11].

The most commonly used classification of DID is the system described by Oehlers in 1957 [27], since it is a simple nomenclature and ease to apply system [28]. The author divides these lesions into 3 types:

- Class I: It is a partial invagination that is confined to the tooth´s crown. These lesions involve dentin and enamel but do not extend over the cementum-enamel junction (CEJ) or compromise the pulp.
- Class II: It is a partial invagination that extends beyond the tooth´s crown into the root, over the CEJ. These lesions may or may not involve the pulp but remain within the root´s anatomy. There is no communication with the periodontal ligament.
- Class IIIa: It is a complete invagination that extends through the root. It communicates with the periodontal ligament through a second foramen on the lateral side of the tooth. Usually, there is no involvement of the pulp itself, but it causes a significant anatomical malformation.
- Class IIIb: It is a complete invagination that extends through the root communicating with the periodontal ligament at the apical foramen. Again, there is often no direct involvement of the pulp anatomy, but the lesion causes a significant disruption of the dental anatomy [11].

The DID increases the risk of caries, pulp pathology, periodontal inflammation, internal reabsorption of the involved tooth [16]. Since bacteria present in the oral cavity can enter and travel through this site of deformation, it becomes a risk factor for plaque accumulation [10, 11]. With this, the treatment of DID includes different clinical procedures.

The treatment options for DID depend on the severity of the invagination and the class to which they belong, and no treatment method can be absolutely proposed. The treatment for the class III is the most complex, requiring specialized techniques with often use of bioactive materials, being the prognosis many times questionable [7, 8, 10, 26, 29, 30, 31].

The aim of the present study was to describe an endodontic retreatment case of type IIIb DID on a permanent maxillary central incisor, with a 4 years clinical and radiographic follow-up.

Case report

Patient D.V.F.G., 11 years old, female, presented to the office complaining about the presence of fistula with a sporadic appearance in the upper incisors region after orthodontic treatment began on August 9th, 2010. At clinical examination, the clinical crown of the tooth 21 was darkened and bulkier than the homologous central incisor (figure 1), presenting

pulp chamber sealing with restorative glass ionomer (figure 2). At radiographic examination, an area of periapical bone rarefaction and presence of developmental anomaly characterized as type IIIb DID was evident (figure 3).

On August 15th, 2011, endodontic filling materials were removed from the canals by the crown-down technique with K-files #80- #40 (Dentsply-Maillefer Ballaigues, Suíça) with orange peel oil solvent for the coronary and middle thirds, and 5.25% sodium hypochlorite (Biodinâmica, São Paulo, Brasil) for the apical third. There was great difficulty in the removal of the gutta-percha filling material, so for this purpose, three sessions were necessary with the use of DF Vasconcellos microscope (Valença, Rio de Janeiro, Brasil) microscope at 16x magnification. It was not possible to completely remove the gutta-percha, because the filling material was beyond the canal, possible due to an apical resorption. In this way, Calcium Hydroxide (Biodinâmica, São Paulo, Brasil) as intracanal medication was carried in propylene glycol in proportion 1:1 with K-files #25 (Dentsply-Maillefer Ballaigues, Suíça) and Schilder pluggers #2, #3, #4. Intracanal medication was exchanged every two months until February 7th, 2013, when the canal was filled as follows: the apical third of all canals were filled with MTA (Angelus, Londrina, Paraná) and the middle and cervical thirds with injected thermoplastic gutta-percha (figure 4). The patient was referred to a restorative dentist, where restoration of composite resin was performed filling the pulp chamber, thus finalizing the case. Follow-up radiographs were performed over a 4 year period - 2014 (figure 5), 2015 (figure 6), 2016 (figure 7) – where it was possible to identify clinical and radiographic success.

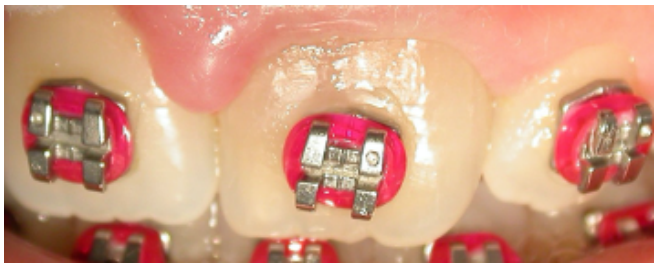

Figure 1 – Initial clinical aspect of the buccal surface of the tooth

Figure 2 – Initial clinical appearance of the palatal surface. Presence of glass ionomer

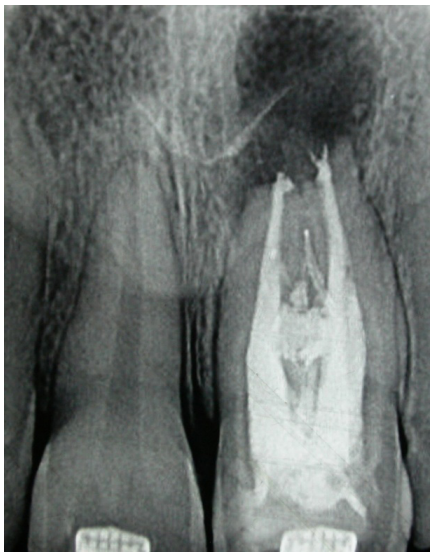

Figure 3 – Initial radiographic appearance. Presence of extensive periapical lesion

Figure 4 – Radiographic aspect after final obturation

Figure 5 – Control radiograph 2014

Figure 6 – Control radiograph 2015

Figure 7 – Control radiograph 2016

Discussion

DID is a developmental anomaly resulting from the invagination of the enamel organ in the dental papilla and whose prevalence can vary from 0.04 to 12% [9, 22]. The most frequently occurring forms are the milder (types I and II according to Oehlers), whereas the severe form (type IIIa and IIIb according to Oehlers) occurs more rarely [22].

Generally, the most affected teeth are the permanent maxillary lateral incisors, followed by maxillary central incisors, premolars, and canines [20, 21] and in most cases, the occurrence is bilateral but not necessarily symmetrical [22]. The posterior teeth and the deciduous teeth, although little affected, can also present this anomaly [9].

Clinically the DID may not be evident, being diagnosed only when patients seek a professional to treat a symptomatic pulpitis, acute periapical abscess, presence of fistula or changes in clinical crown shape when they are submitted to radiographic examinations [10, 11, 19].

The present study reports a unilateral pathology in a maxillary central incisor with a class IIIb DID that, according to study, had the anomaly detected after the patient noticed a fistula and it was necessary to use radiographic means to establish the diagnosis. However, the tooth´s crown was bulkier than its homolog, which is also consistent with the literature, which states that the morphology of the DID crown is unusual and may be dilated, barrel-shaped, or shell-shaped [28].

Each DID configuration requires a different approach. Type IIIb is considered the most challenging clinical condition due to its extremely complex anatomy. In these cases, non-surgical treatment is always the first option, but surgical treatments may be necessary to complement non-surgical intervention [15, 19]. In the present reported clinical case, we opted for non-surgical retreatment and clinical and radiographic follow-up control over a period of four years. This protocol may be justified by the fact that studies have demonstrated that non-surgical endodontic retreatment has a high success rate [20]. In addition, surgical treatment has been pointed out as being a more invasive approach, inadvisable as the first treatment option [19].

Despite the constant search for techniques or instruments capable of preparing all the irregularities of the root canal system´s walls, none of the available systems on the market are able to completely touch all areas of the canal, being able to remain 14% of areas not reached during treatment and an even higher percentage for retreatment (15%) [23, 25].

In view of these situations, it is recommended not only abundant irrigation with 5.25% sodium hypochlorite simultaneously with the instruments, but also the use of coadjuvant methods, such as Calcium Hydroxide in Propylene Glycol, to reduce bacterial counts, as well as greater disinfection of these untouched areas of the root canal system [19]. In the present case and knowing the complexity of a retreatment, Calcium Hydroxide was carried in Propylene Glycol and kept inside the canals for one year and six months with exchanges made every two months. Such choice is due to a number of positive properties that Calcium Hydroxide has, such as stimulating the formation of mineralized tissue, strong bactericidal action, denaturation and hydrolysis of proteins and especially render the pH of the medium highly alkaline [18].

Considered a gold standard for sealing, the MTA was chosen to fill the apical third of the canals due to its properties such as, high sealing capacity of communication between the root canal system and the external surface of the tooth, even in the presence of blood and moisture, besides bactericidal properties, biocompatibility, radiopacity, induce the formation of cement and hard tissue when placed adjacent to the periradicular tissues and when they come in contact with tissue fluids, release Calcium Hydroxide that interacts with phosphates in the tissue fluids, forming hydroxyapatite [2, 4, 5]. Such properties may justify the repair of the lesion and involution of the signs and symptoms presented by the patient.

In view of the above and according to the obtained results, it is possible to conclude that, although the cases of DID present numerous challenges, if the endodontic retreatment is carried out properly and with reference to the biological principles, the long-term prognosis can be positive, and consequently can be considered as a viable and successful therapeutic option.

Conclusion

Type IIIb DID, especially in combination with an endodontic retreatment, as observed in this case, is a challenge. The result of this work confirms the possibility of success after endodontic retreatment, avoiding surgical intervention or loss of the tooth when this alteration of development occurs. The dentist should keep in mind that if we obtained a correct diagnosis and planning and, if necessary, we count on a multidisciplinary action we will be providing the best form of treatment for our patient.

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