

Intracanal pain remission in child with amelogenesis imperfecta. Case report*

Remissão de dor intracanal em criança com amelogênese imperfeita. Relato de caso

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ABSTRACT

BACKGROUND AND OBJECTIVES: Amelogenesis imperfecta is characterized by enamel structural defects, which may severely affect dental structure in both dentitions. When accompanied by severe decay, it may impair the pulp complex requiring endodontic treatment and in case of incomplete root formation treatment becomes more complex due to pulp volume and anatomic conditions. This study aimed at reporting a clinical case of patient with amelogenesis imperfecta and with multiple incomplete root formation as a consequence.

CASE REPORT:Female patient, 12 years old, leucodermic, with painful symptoms, who has looked for dental assistance. At intraoral clinical evaluation teeth presented with shape and size changes, yellowish color, covered by a thin enamel layer with roughened surface and absent in some areas, with anterior vestibular sulcus fistula and without edema. At radiographic evaluation, both dentitions were affected by the abnormality with delayed chronology of permanent teeth eruption. At the end of all evaluations, patient was diagnosed with amelogenesis imperfecta, and periodontal treatment was started, followed by endodontic treatment.

CONCLUSION: Amelogenesis treatment is complex, especially when in more advanced stages of dental structure destruction. However, it is possible to reestablish patient's functionality and esthetics with good planning and multidisciplinary approach.

Keywords: Amelogenesis imperfecta, Endodontic treatment, Incomplete root formation, Mineral trioxide aggregate, Pain.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A amelogênese imperfeita é caracterizada por defeitos estruturais do esmalte, os quais podem acometer gravemente a estrutura dentária, em ambas as dentições. Quando acometida por lesões cáries graves, pode comprometer o complexo pulpar, necessitando de tratamento endodôntico, e em se tratando de dentes com RI, o tratamento torna-se mais complexo, em virtude do volume pulpar e das condições anatômicas. O objetivo deste estudo foi relatar um caso clínico de paciente com AI e que teve como consequência múltiplos casos de RI.

RELATO DO CASO: Paciente do gênero feminino, 12 anos, leucoderma, com sintomas dolorosos procurou atendimento odontológico. Ao exame clínico intraoral, apresentava dentes com alteração de forma e tamanho, coloração amarelada, recobertos por uma fina camada de esmalte com superfície rugosa e em algumas áreas ausente, com fístula na região do sulco vestibular anterior e sem edema. Ao exame radiográfico ambas as dentições mostraram-se acometidas por anomalia, com retardo na cronologia de erupção dos dentes permanentes. Ao final de todos os exames, recebeu o diagnóstico de amelogênese imperfeita, dando início ao tratamento, que começou pelo tratamento periodontal, seguido pelo endodôntico.

CONCLUSÃO: O tratamento da amelogênese é complexo, principalmente quando em estágios mais avançados de destruição da estrutura dentária. Contudo é possível restabelecer a funcionalidade e a estética do paciente quando se faz um bom planejamento do caso, com interação multidisciplinar.

Descritores: Agregado trióxido mineral, Amelogênese imperfeita, Dor, Rizogênese incompleta, Tratamento endodôntico.

INTRODUCTION

In spite of oral health quality improvements seen in recent years, toothache is still a public health problem and is reported as major reason for individuals, including children, to look for dental assistance¹. Major pain causes are dental trauma and infectious diseases, being caries the most common². Other abnormalities, such as amelogenesis imperfecta (AI) may severely affect dental structure in both dentitions and, when affected by severe caries, it impairs pulpar complex preventing complete apical closing and characterizing a

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presentation of incomplete root formation (IRF)³. Endodontic treatment of ICF is complex due to teeth anatomic characteristics. Root canal is wide, with little thickness of dentinal walls, lack of constriction and apical divergence⁴.

During obturation process, the most important factor is apical constriction, since it limits control over the extension of filling materials. With this, root canal lacks an adequate retention factor to prevent filling material shift and leakage at apical level⁵.

Mineral trioxide aggregate (MTA), powder material made of tricalcium silicate particles, tricalcium oxide and silicate oxide, has been broadly indicated by the literature^{6,7}. It has low solubility, good biological action, stimulates cell repair and cell adhesion, has antimicrobial action, in addition to being hydrophilic with ability to become a colloidal gel crystallizing with expansion, favoring marginal sealing capacity, in addition to inducing the formation of an apical barrier of hard tissue in IRF teeth⁸. MTA adapts to canal shape as portions are gradually inserted in it⁹.

This study aimed at reporting a clinical case of patient with AI having as consequence multiple IRF.

CASE REPORT

Female patient, 12 years old, leukodermatous, who looked for dental assistance in the dental-pediatric clinic of the State University of Paraíba accompanied by the mother. Mother complained of daughter's teeth appearance, stating that they were yellowish, misshapen and with abnormal size, in addition to painful symptoms reported by the child. During history, no relevant data indicating some correlation with the clinical presentation were reported. In addition, the mother did not know whether some other family member had the same problem. At intraoral clinical evaluation, we have observed teeth with changes in shape

and size (upper anterior teeth crowns totally destroyed by caries, gingival hyperplasia and exposure of pulpar canal), yellowish color, covered by a thin layer of enamel with rough surface and absent in some areas (Figure 1) and presence of fistula in the anterior vestibular groove region with no edema.

At occlusion evaluation child had no proximal contact between teeth and anterior open bite was observed with severe loss of occlusion vertical dimension (OVD).

X-rays have revealed lack of dental enamel in some sites and a thin layer of tissue in others, presence of radiolucent area suggestive of extensive periapical injury, incomplete root formation and open apex. After pulpar vitality tests, pulpar necrosis was diagnosed. We could also observe by panoramic X-rays that both dentitions were affected by the abnormality, as well as that there was delay in eruption of permanent teeth (Figure 2).

In light of was observed, and based on history, clinical and radiographic evaluations, and in the absence of systemic changes which could justify enamel malformation, we have confirmed the diagnosis of the abnormality called

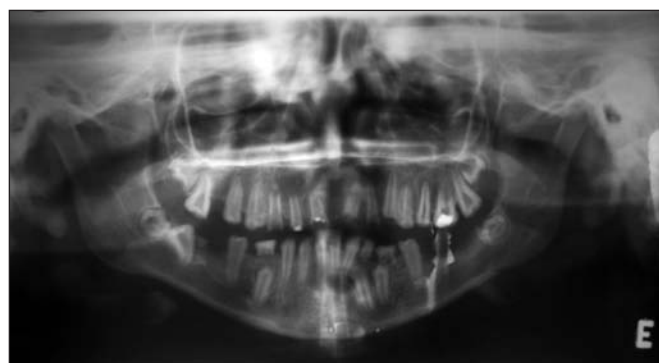


Figure 2. Panoramic X-rays showing lack of dental enamel or a thin layer of it and the confirmation that both dentitions were affected by the abnormality



Figure 1. Initial intraoral aspect



“hypoplastic-type amelogenesis imperfecta”¹⁰. Before starting endodontic treatment, clinical crown from canine to canine was increased so that the rubber drape could be adapted for absolute insulation, since the crown had been destroyed due to both enamel brittleness and the caries process (Figure 3).

All compromised teeth were chemically-mechanically prepared, which was made difficult by thin and brittle walls,



Figure 3. Increase of clinical crown

since larger tools would circulate freely preventing conventional canal conformation. The canal was cleaned with file 80 and abundant irrigation with 0.5% sodium hypochlorite. After preparation, root canal was dried with sterile absorbent paper, intracanal drug with tricresolformalin and temporary sealing with glass ionomer. In the second session, biomechanics, canal drying and filling with calcium hydroxide were performed, being these clinical procedures performed every 15 days for four months, due to bleeding when renewing calcium hydroxide, fact which has prevented the obturation of root canals in a shorter clinical time. Finally, obturation was performed with MTA apical patch, aiming at establishing effective apical sealing and tissue repair with posterior obturation by the lateral condensation technique using gutta-percha cone and endodontic cement – endofill (Figure 4). Preservation was carried out in 3 months, 6 months and 1 year, aiming at following up the treatment.



Figure 4. Radiographic control six month after

After adequate tissue healing, upper prosthesis was manufactured to recover lost DVO due to excessive coronary destruction. Added to this, oral hygiene guidance was constantly given to better control gingival inflammatory process.

Acute pain due to dentinal hypersensitivity, to gingivitis and pulpitis was controlled during treatment and at the end patient had no pain whatsoever, both during brushing and chewing as well as spontaneous pain. An important factor for the success of pain remission were oral hygiene guidance and patient's cooperation in the maintenance of periodontal health and caries prevention.

DISCUSSION

Toothache is a public health problem¹¹ due to its high prevalence and its social, psychological and economic consequences for individuals and the community, with quality of life impairment. So, family characteristics, such as parents perception of their oral health and of their children, oral hygiene and diet knowledge and habits are identified as indicators of oral health and, probably, of toothache^{12,13}. Among major causes of pain, caries has been the most strongly associated variable and although there has been signifi-

cant decrease in caries prevalence in Brazil in recent years in deciduous dentition, this decrease was lower than that on permanent dentition¹⁴. On the other hand, patients with teeth mineralization disorders, such as AI, in addition to negative cosmetic effects, very often report significantly higher levels of distress and are more sensitive and anxious to dental treatment-related pain¹⁵.

AI is a dental enamel change affecting both deciduous and permanent dentition, with several clinical variations in terms of severity¹⁶. It is present in the absence of systemic characteristics, having several phenotypic variations which affect dental enamel. Clinically, enamel is hypoplastic (thin layer of enamel) hypomineralized (subdivided in hypomaturation and hypocalcification), or with combined phenotype¹⁰.

This is a case of a child with clinical aspects characteristic of generalized AI. This is an autosomal, recessive and rare disease, characterized by mild gingival hyperplasia and dental abnormalities, including generalized hypoplastic AI, intrapulpar calcifications and delayed dental eruption. A similar case was described by Martelli-Junior et al.¹⁷ where four patients of the same family had the same abnormality and one patient had intellectual deficit.

AI diagnosis is slightly complex, because it presents a set of problems, such as rampant caries, impairment of vertical occlusion dimension, eruption abnormalities, dental sensitivity, in addition to psychosocial problems¹⁸. So, the treatment depends on type and severity of the disorder, on factors as age, socioeconomic level and oral health of the patient at planning moment.

Among treatment options there are multiple dental extractions, cosmetic restorations, steel or compound resin crowns, splints to reestablish vertical dimension, control of dentinal sensitivity and oral hygiene guidance, being the multiprofessional approach a critical factor for the success of the treatment¹⁹.

When teeth are affected by caries impairing pulpar complex before total root formation, we have a still more complex process, considering that these, by themselves, are brittle structures due to anatomic peculiarities. Factors such as less pulpar cavity volume, loss of dental structure, little thickness of root walls, wide open apices, brittle root walls and diverging to periapical tissues, give brittleness to teeth with incomplete root formation (IRF). And when necrotized, the treatment is apexification, which is induction of apical closing to produce favorable conditions for conventional obturation of the root canal²⁰. Apexification assures complete and functional healing of involved tooth or teeth²¹, by preventing or decreasing extrusion of the material to periodontal tissues, decreasing inflammatory process persistence²².

For a long time, preferred drug was calcium hydroxide, for having high success rates, in spite of the risk of reinfection and tooth fracture. With the introduction of MTA as apical sealer, for its capacity of inducing the formation of mineralized tissue, of attaching well and being used in wet environment or in the presence of blood, it was possible

to treat IRF teeth with apical plug and treatment conclusion in a short period of time²³. MTA has several clinical applications due to its adequate physical properties, good sealing capacity and biocompatibility²⁴.

According to Witherspoon et al.²⁵, success rate for apexification procedures with calcium hydroxide is 79 to 96%, while with MTA it is 81 to 100%. So, the apical barrier with MTA is an effective procedure for the apexification process²⁶, due to its inherent properties. On the other hand, Torabinejad et al.²⁷ have reported antimicrobial properties of MTA for 5 out of 9 facultative bacteria more commonly found in infected root canals, however with no effect on strictly anaerobic bacteria. Annamalai & Mungara²⁸ have also reported 100% clinical and radiological success rate with MTA in the 12th month of follow-up, while root extremity closing was observed in 86.6% of cases with root growth in just 30% of cases.

In our case, the combination of calcium hydroxide was used as intracanal drug for 15 days to obtain a dry and infection-free canal. In line with Bondanezi et al.²⁹, who state that calcium hydroxide apical barrier improves the quality of filling and sealing of canals of IRF teeth obturated with mineral trioxide aggregate. The use of calcium hydroxide in the short term does not negatively affect tooth resistance³⁰.

In our case, X-rays after six months of treatment has shown significant decrease in periapical lesions, being in agreement with studies of Annamalai & Mungara²⁸ and Sarris et al.³¹. However, the latter suggest broader clinical trials to evaluate long term success. In our case, apical barrier had 5 mm for being, according to some authors, stronger than that of 2 mm^{32,33}.

To induce apexification, MTA acts converting tricalcium oxide into calcium hydroxide when in contact with tissue fluids²⁸. Calcium hydroxide is then dissociated in calcium and hydroxyl ions. This separation increases pH and releases calcium ions. The latter reacts with tissue carbon dioxide, forming calcium carbonate as calcite crystals. On the other hand, fibronectin is associated to such crystals, providing cell adhesion and subsequent differentiation which results in mineralized tissue barrier. Released calcium also plays important role in decreasing inflammation and differentiating and mineralizing pulpar cells. In this process, gingival fibroblasts induce bone repair and cementogenesis³⁴.

MTA for apexification has advantages as compared to calcium hydroxide since its attachment is immediate. So, soon after placement, the canal may be definitely obturated with endodontic cement and gutta-percha cones, decreasing treatment time³⁵.

CONCLUSION

According to our results, one may state that amelogenesis is treatable, especially when treated in a multidisciplinary way. MTA as apical barrier has shown to be a clinically effective procedure during apexification.

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