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Apical sealing with MTA in a tooth with incomplete rhizogenesis and enamel hypoplasia

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Abstract

Introduction: In teeth with incomplete rhizogenesis, the canal is frustoconical and broad, and the foramen is absent. The disinfection and obturation protocol must be adapted to keep the treatment within the root limits. Mineral Trioxide Aggregate (MTA) performs an apexification by creating a hard tissue barrier with cement deposits, it is not toxic to periradicular tissues. Hypoplasia is a quantitative enamel defect caused by hereditary factors and/or physiological stress.

Clinical case: 12-year-old patient with generalized enamel hypoplasia, asymptomatic irreversible pulpitis, and normal periapical tissues as a diagnosis.

Treatment: Apexification with MTA.

Conclusion: MTA enables apexification, as it is biocompatible and does not cause inflammation in the periradicular tissues, forming an apical seal with hard tissue deposit.

Keywords: Incomplete rhizogenesis, MTA, enamel hypoplasia, apical sealing

Introduction

When pediatric patients with incomplete rhizogenesis, the root canal typically has a broad, frustoconical shape; and the foramen is still absent with a large diameter. The root completes its formation 3 to 4 years after the tooth erupts into the oral cavity. The disinfection and obturation protocol is modified to keep the endodontic treatment within the root limits^[1].

The choice of treatment depends on the pulp diagnosis and the stage of Patterson's root formation. In some cases, apexification using bioceramic materials such as MTA is performed to create an apical barrier. MTA has sealing capacity, is non-toxic, and biocompatible with periradicular tissues, induces hard tissue protection with cement deposit, and is moisture insoluble^[2, 3].

Hypoplasia is a quantitative defect in enamel deficiency, this is due to hereditary factors and/or physiological stress. Causing anatomical alterations, caries, demineralization, dental wear, hypersensitivity, and aesthetic problems^[4].

Clinical case

A 12-year-old male patient with a history of sensitivity had a sealant placed on the mandibular left second premolar. However, this exacerbated the discomfort, causing nocturnal pain. On clinical examination, the patient was found to have grade 1 generalized enamel hypoplasia (Figure 1).



Fig 1: Generalized enamel hypoplasia, grade 1

Cold sensitivity tests were positive with acute and intense pain, percussion and palpation tests were negative. Radiographically, the dental organ is in a Patterson stage 4 (Figure 2).



Fig 2. Initial X-ray

Pulp diagnosis: symptomatic irreversible pulpitis. Periapical diagnosis: normal periapical tissues. Treatment plan: Apexification with MTA.

In the first appointment, access is made (Figure 3), since the bleeding cannot be stopped and the intense red coloration of the pulp observed through magnification, we proceed with the removal of the pulp tissue, taking radiographic conductometry (Figure 4) and with an apical stop with the number 60 file.

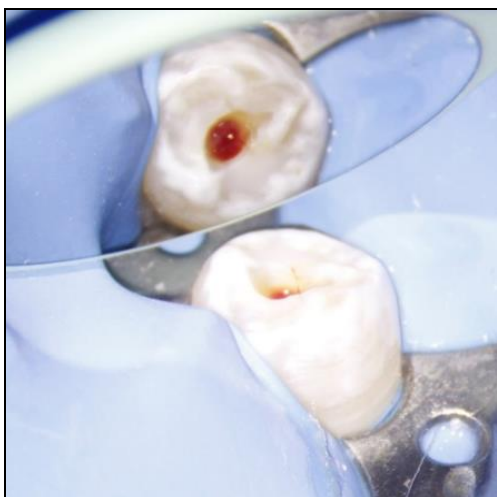


Fig 3: Endodontic access



Fig 4: X-ray conductometry

The canal is worked manually, trying not to touch too much the walls of the dental organ. An irrigation protocol is carried out with 5 cycles of ultrasonic activation of 2.25% sodium hypochlorite. The dental canal is dried with paper points and Gelfoam® is placed at the apical level to function as a barrier and thus prevent extrusion of the bioceramic material towards the periapical tissues. The MTA (MTA Angelus®) is placed with an MTA holder, condensers, and magnification (Figure 5), until forming a barrier of approximately 4mm in length (Figure 6).

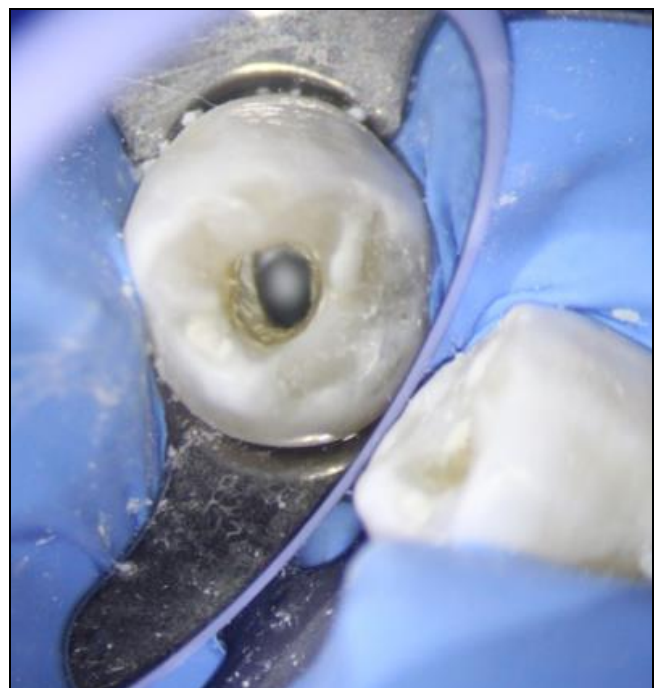


Fig 5: Use of magnification for MTA placement



Fig 6: MTA condensation

A semi-moist paper point is brought into the canal to help set the material and prevent shrinkage. A provisional glass ionomer restoration is placed, and a final radiograph of the apical seal is taken (Figure 7).



Fig 7: Final X-ray of MTA placement

At the second appointment, three days later, we made sure that the patient was asymptomatic on percussion and palpation tests. The glass ionomer and the paper point are removed to finish sealing the canal with the thermoplastified gutta-percha technique (SybronEndo Elements free). A provisional restoration (Cention® N) is placed to keep it under observation and a final radiograph is taken (Figure 8).



Fig 8: Final X-ray

Results

Radiographic control was carried out at 6 months (Figure 9), 1 year (Figure 10) and a year and a half. During this time the patient has been asymptomatic to percussion and palpation test.

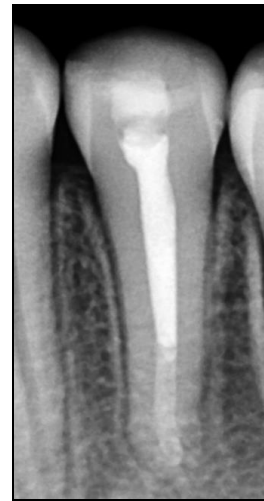


Fig 9: Radiographic control at 6 months



Fig 10: Radiographic control at 1 year

After 6 months, the formation of hard tissue can be observed radiographically due to the radiopacity of the apical area. After a year and a half (Figure 11) an increase in root formation and apical sealing is observed radiographically, the provisional restoration was changed to a LuxaCore Z® restoration to prevent leakage, while the patient undergoes orthodontic treatment.



Fig 11: Radiographic control at one and a half years

Discussion

Although the most common causes for endodontic treatment in teeth with incomplete rhizogenesis are caries and trauma, we cannot ignore enamel hypoplasia since, due to the alterations it causes in the dental organ, it can generate pulp pathology. This condition affects 10% of the population in Mexico, being more prevalent in the male sex; and as localization in premolars and mandibular canines ^[4].

MTA as an apical sealant has a 94.6% success rate. Induces repair and regeneration in periapical tissues and dental organs. Compared to the placement of calcium hydroxide dressings, the MTA offers an apical seal in a reduced number of visits and therefore less probability of contamination by microorganisms between appointments ^[5].

Conclusion

Incomplete root development requires a modified treatment approach, and the treatment plan should vary according to the stage of development. Apexification using MTA provides a favorable outcome by creating an apical sealing barrier, promoting tissue regeneration, and reducing the risk of leakage and contamination compared to calcium hydroxide dressings.

Conflict of Interest

Not available

Financial Support

Not available

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