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A report of a successful endodontic treatment of a taurodontism tooth with pulp stones in the pulp chamber: case report

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Abstract

Introduction: Taurodontism is a rare dental developmental disorder characterized by an elongated pulp chamber and displaced furcation site, with a prevalence of 0.5-2.5%. The disorder can appear as a separate anomaly or as part of a syndrome, and its clinical appearance is similar to that of normal teeth.

Case report: In this study, we report a rare case of taurodontism with pulp stones in a patient's right mandibular first molar. Despite the challenges of treating this dental anomaly, successful root treatment was achieved.

Conclusion: Despite the challenges posed by taurodontism and pulp stones, successful root treatment can be achieved with careful planning and execution. Our case report highlights the importance of careful diagnosis and treatment of this rare dental anomaly. It serves as a valuable example for clinicians encountering similar cases.

Keywords: Taurodontism, pulp stones, Endodontics treatment, case report

Introduction

Taurodontism, also known as "bull-like teeth," is a rare dental developmental anomaly characterized by the apical displacement of the furcation and elongation of the pulp chamber.(1) The term "taurodontism" is derived from the Latin words "taurus" (cow) and "odus" (tooth), reflecting the resemblance of affected teeth to those of cattle.(2) This condition affects approximately 0.5-2.5% of the population and is more prevalent among individuals of European descent. Taurodontism can be associated with genetic factors, amelogenesis imperfecta, blood disorders, and various syndromes such as Klinefelter syndrome, Down syndrome, and hypophosphatasia.(3, 4). Clinically, the crowns of taurodontic teeth appear normal, but the roots are elongated, and the pulp chamber is enlarged. (2)This condition is most commonly observed in molars and is typically bilateral in about 50% of cases. Shaw's classification(5) divides taurodontism into three categories based on severity:

Hypotaurodontism: Mild form with minimal apical displacement of the furcation.

Mesotaurodontism: Moderate form with moderate apical displacement.

Hypertaurodontism: Severe form with significant apical displacement and an extensively enlarged pulp chamber.

Pulp stones, also known as pulp calculi, are calcified masses that form within the pulp tissue. They can develop in response to local and systemic irritations, including atherosclerosis, disrupted pulp blood flow, and interactions between epithelial remnants and pulp tissue.(6, 7) The prevalence of pulp stones ranges from 7.5% to 90%, and they can cause unexplained toothaches. Radiographically, pulp stones are identifiable when their diameter exceeds 200 micrometers (7, 8). In this study, we have reported a case of successful treatment of the root of the first molar on the right side of the mandible with hypertaurodontism disorder with coronal pulp stones.

Case report

A 9-year-old female patient with severe night toothache in the right lower first molar referred to the endodontics department of Baqiyatullah Dental School. followed by a sharp pain upon thermal stimulus, with lingering pain (often 30 seconds or longer after stimulus removal), spontaneity (unprovoked pain) and the frequency of referred pain increasing during the night. The percussion, palpation, and thermal vitality test were negative. This tooth was diagnosed with symptomatic irreversible pulpitis caused by deep decay was diagnosed. In the medical history, this person had no specific diseases. In the extra-oral examination, there was no swelling, and in the intra-oral examination, a crown with normal mesiodistal dimensions was observed with severe caries. In the radiographic examination, an abnormal anatomy of the root canal was identified. (Fig.1) Two-dimensional radiographic examination revealed:

The pulp chamber was extended to below the cervical area and according to the SHAW classification(5), it was hypertaurodontism. The tooth had two short roots in the apical third of the tooth. In the panoramic radiographic examination of the patient, the presence of bilateral taurodentism was observed in other teeth, even in deciduous teeth. (Fig. 2)

Before the treatment, the patient was informed that his clinical information and radiographic images may be reported in the journal. Therefore, the authors certify that they have obtained patient consent, and the patient was informed that his name and initials would not be published

In order to start the root treatment of lower right first molar, a 2% lidocaine carpool containing epinephrine 1.100000 (DAROPAKHSH, KARAJ, IRAN) was performed with the mandibular nerve block technique.

isolation was created with rubberdam, after removal of caries, access cavity was prepared with a sharp long shank fissure bur (Diatech, Heerbrugg, Switzerland). After preparing the access cavity, the pulp stones were removed with the help of an ultrasonic tip under the direct view of the microscope. to ensure the removal of pulp stone up to the floor of the pulp chamber and the exact number of canals, we ordered CBCT based on the radiology guideline of obtaining CBCT in teeth with abnormal anatomy. Canal irrigation was done with a diluted 2.5% sodium hypochlorite solution (DAROPAKHSH, KARAJ, IRAN) in saline. A microscope was used to better observe the orifice of the canals.

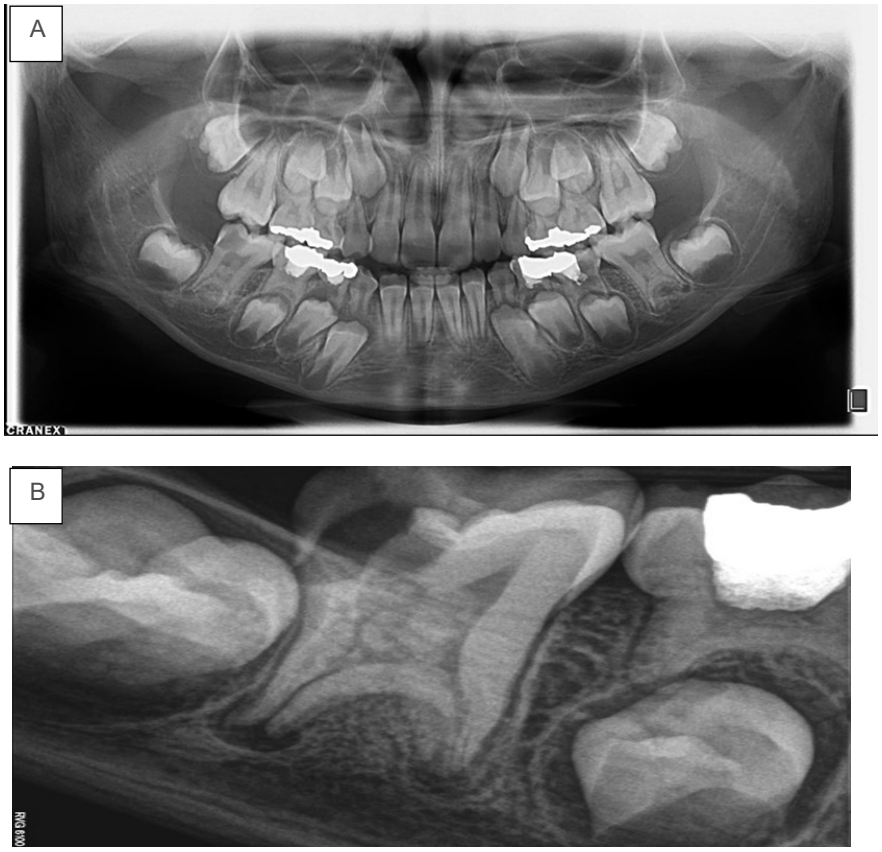

Figure 1: A) Panoramic view revealed an enlarged pulp chamber and pulp stones in bilateral molars, B) The intraoral radiograph shows deep occlusal caries, enlarged pulp chambers and apically shifted bifurcation and pulp stones, C) CBCT images cross-sectional view of Lower right molar

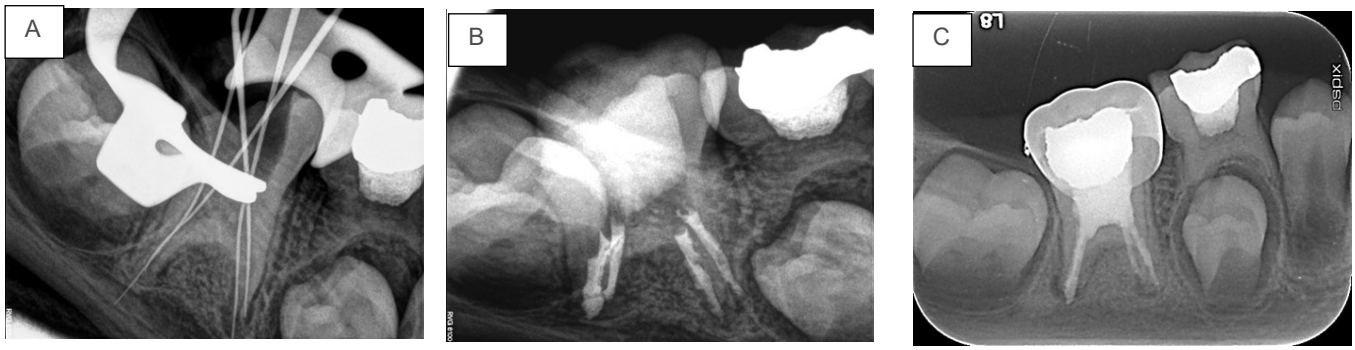

Figure 2: A) Radiograph with K-file confirming the root canals working length; B) Postoperative radiograph taken after cold ceramic and tooth temporization; (d) radiograph after obturation and ssc restoration.

Length determination was done with initial files with the help of Apex Locator (MORITA ROOT ZX, JAPAN).(9) The length of the canals was MB:18, DB:18, ML:18, DL: 18 mm respectively. Reference points for recording the length of operation for each canal, the cusp was also its own name.

The initial radiograph verified an open apex on mesial and distal canals.

RCs were prepared with E-flex gold rotary files (Eighteeth Medical Technology, Changzhou, China) using the crown-down technique. During shaping and cleaning, the operators used 2.5% sodium hypochlorite. Each canal was finished with E-flex gold rotary file size 25/04. During the cleaning and shaping, the operators used the endodontic handpiece E-connect S (Eighteeth Medical Technology, Changzhou, China) at a rotation of 350rpm and torque 2.5Ncm, introducing the instrument passively into the RC and 2 ml of 5.25% sodium hypochlorite activated with an ultrasonic device Ultra X (Eighteeth Medical Technology, Changzhou, China) for 30 seconds in each canal. In addition, 17% EDTA (Dentonics, North Carolina, USA) was used several times during procedure to remove smear layer. The drying was performed with sterile paper points.

After preparation, COLD CERAMIC (C.C) (SJM.CO, IRAN) was mixed in aseptic conditions according to the manufacturer's instructions with the appropriate ratio of powder and normal saline, until it becomes a paste consistency. A plugger number 40 (Maillefer, Dentsply, Switzerland) was used to fill the canal. An appropriate amount of C.C was placed in the orifice of the canals by the MTA carrier (Maillefer, Dentsply, Switzerland) and according to the length, it was compacted in the canal by a plugger until the canal was completely filled. In order to control the C.C length, radiographs were prepared from the patient. After confirming the quantity and density of cold ceramic, a piece of wet cotton was placed in the pulp chamber and the tooth crown was temporarily restored with CAVIT (3MESPE, Seefeld, Germany). After 48 hours, warm obturation of the RCs with vertical gutta-percha condensation using Fast Fill (Eighteeth Medical Technology, Changzhou, China). The final Radiograph were taken after completing the obturation of the canals. Then a piece of Teflon tape (10) was placed on the pulp chamber below the temporary restoration optical glass ionomer (GC, JAPAN) and referred to the pediatric department for crown restoration with SSC. In the 3-month and 6-month follow-up, the tooth had no clinical or radiographic symptoms.

Discussion

taurodontism is a dental anomaly characterized by an enlarged pulp chamber, apically located furcation, and shortened roots.(11) This condition can make root canal treatment challenging due to the unique anatomy of the affected teeth, particularly in molars. The difficulties include locating and accessing the narrow and closely positioned canals, as well as cleaning and shaping the canals due to their shortness and apical branching.(12) Taurodontism is thought to result from failure of Hertwig's sheath to retract at the appropriate time. (1)

The most common tooth involved is the molar. (11) Taurodontism is diagnosed when the distance between CEJ and pulp chamber floor is more than 2.5 mm.(13)

The mesiobuccal and distobuccal canals are usually narrower and closer to each other, which

makes it difficult to find them, and due to the shortness of the canals and the branching in the apical third, cleaning the canals is time-consuming and difficult.(12, 14) Moreover, in this case, we had another challenge that was an open apex roots. It was not possible to make an entire seal apically in immature root canals. Calcium silicat based materials has many important characteristics including biocompatibility, marginal adaption, having control during obturation and less cytotoxicity than other materials which has been suggested to use as an apical plug at the end of immature roots with and open apices.(15, 16) . HAYASHI reported a successful complex endodontic treatment in which a mandibular molar with taurodontism had five canals, of which only three canals were cleaning and shaping. Among the most important syndromes and disorders that can be related to taurodontism are Down syndrome, Kleinfelter, cleft lip and palate, and amelogenesis imperfecta, which fortunately, in this study, no relationship with the mentioned syndromes was observed.(13, 17)

In the studies, it was shown that the highest prevalence of pulp stones is in the first and second permanent molars(8). With age, the formation of pulp stones increases.(7) Although there is a possibility of a high prevalence of pulp stones in diseases related to tissue calcification, but after examination and blood tests, no specific disease was observed in this case.

Conclusion

In general, today, taurodentism is only considered as a form disorder that normally does not require root treatment, but in the case of pulp involvement, root treatment will be difficult, and if the treatment is done correctly and accurately, root treatment can be successful.

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