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Are Taurodonts still a Challenge in Current Advanced Era?

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ABSTRACT

Among several morpho-anatomical variations that possess a challenge to endodontists, taurodontism, a developmental abnormality occupies the centre stage owing to its difficulty in management. Taurodontism, although commonly seen in permanent dentition, is also prevalent in deciduous molars. This developmental disturbance though said to have occurred due to varied etiologies, unsuccessful invagination of Hertwig's epithelial root to its proper horizontal level is claimed to be the major cause. An extensive pulp chamber, apically positioned furcation, and lack of constriction at the cemento-enamel junction are the salient features of taurodontism. The vast and voluminous pulp chamber makes the canal instrumentation cumbersome, thereby demanding the clinician's attention. This case report emphasizes the utilization of advanced irrigant activation methods and hybrid obturation techniques with a bio-ceramic sealer to manage the taurodontism effectively.

Keywords: NIL

INTRODUCTION

Sir Arthur Keith in 1913 first coined the term 'Taurodontism' that traditionally originated from Latin terminology tauros, denoting 'bull' and Greek term odus, representing the 'tooth'. [1,2] Taurodontism is a developmental anomaly in which the body of the tooth is elongated and tooth roots are reduced in size. The teeth with the taurodontism presents usually with voluminous pulp chamber and apically displaced furcation in the case of multirooted teeth.[3] Occasionally, these furcal regions are located only a few millimeters above the root apex. The incidence of taurodontism may either be unilateral or bilateral or with the combination of teeth/quadrants. [4]

Feichtinger and Rosiwall et al., reported that a tooth is considered a taurodont only when the distance between the CEJ to the root furcation exceeds the occluso-cervical length. [5]

Though there is certain ambiguity associated with the etiology responsible, lack of invagination of hertwig's epithelial sheath diaphragm at proper horizontal level culminates in the tooth with an elongated body, shorter roots, normal dentin, and enlarged pulp.[6] Taurodontism also has been classified based on its severity, namely hypo-taurodontism (least pronounced), meso-taurodontism (moderate), and hyper-taurodontism (most severe). [7]

Taurodontism although commonly associated with several syndromes and anomalies, is now regarded as a morpho-anatomic variation occurring in the normal population. [8,9] Also, clinically, a taurodont appears to be normal and its identification is difficult as the roots and body of the tooth are located beneath the alveolar margin. [2,10] Endodontic therapy in taurodont teeth often has been described as intricate and arduous because it necessitates exceptional care in handling and recognizing the root canal numbers.

Recent articles concluded that endodontic management of such taurodonts must include heedful exploration of grooves between various orifices, especially with magnification, ultrasonic irrigation, and an altered obturating technique.[4] The current article reports the endodontic therapy done in hyper-taurodont maxillary first molar with bio-ceramic sealer and hybrid obturation techniques.

CASE REPORT:

A 45-year-old female patient reported to the post-graduate clinic, with the chief complaint of pain in her upper right back tooth region. The patient's medical history was not contributory.

Intraoral examination was made and the teeth were subjected to routine clinical tests and a diagnosis of symptomatic irreversible pulpitis with symptomatic apical periodontitis was made. To correlate the diagnosis radiographically, radiographic examination was also performed that revealed presence of caries with the involvement of pulp. An abnormality in tooth anatomy was observed and hence radiographs were repeated in two different angulations. A hyper-taurodontic tooth morphology was evident. The patient was advised for CBCT, but considering the patient's unwillingness, the treatment plan was made after obtaining the informed consent.

Treatment was commenced by administering a maxillary infiltration of 2% lignocaine with 1:80,000 adrenaline (Lignox 2%; Indoco Remedies Ltd., Mumbai). Under surgical operating microscope (Labomed with 2.5x prima DNT Microscope, USA) treatment procedure was initiated, the tooth was isolated using rubber dam (Hygiene – Coltene, Whale dent Ltd., USA). Caries was excavated with round bur and the gingival overgrowth was excised with soft tissue laser (Biolase I-Lase Soft Tissue Diode Laser Manufacturer: Biolase, USA), followed by pre-endodontic build-up. The coronal access was prepared using endo-access bur (MANI, INC, Japan), canals were then negotiated with 10 size K file (MANI, INC, Japan) and the working length was determined using an electronic apex locator (coltene canal pro). The operative procedures were then and there confirmed with periapical radiographs.

Cleaning and shaping were performed with XP–Endo shaper (FKG Dentaire SA, Switzerland) along with copious irrigation of 5.25% sodium hypochlorite (Chloraxid 5.25 cerkamed, Poland) and passive ultrasonic activation (Eighteeth Medical Ultra X-Ultrasonic Activator, China) was performed for 10 minutes. The solution of 17% EDTA (Meta Biomed Md Cleanser 17% EDTA Solution, South Korea) was used as an irrigant to remove the smear layer and normal saline was used as the final irrigant. Intracanal dressing of Calcium hydroxide (Prime dental, India) was given and temporarily sealed using Cavit (3M ESPE, Germany).

On 2 weeks recall visit, the patient reported back with fractured restoration, and the intracanal medicament was removed. XP-Endo finisher (FKG Dentaire SA, Switzerland) was used for adaptive cleaning of root canal morphology to perform effective debridement and to remove debris. The same irrigation protocol as followed in the earlier visit was repeated. Then the tooth was dried with paper points and prepared for obturation. The apical plug was obturated with Biodentine (Septodont, India) using hand pluggers, followed by BioRoot-RCS (Septodont, India) sealer application with lentulo spiral (MANI, INC, Japan). It is then followed by backfilling with Thermo-plastizied GP (Super Endo, Beta Obturation Gun, Italy). The post-endodontic restoration was given with composite (Charisma smart Kulzer, Germany) and the patient was kept under observation. Clinically, when the patient was asymptomatic, an all-ceramic lithium disilicate full-coverage crown was placed.

DISCUSSION:

Though Taurodont form may not intrude into the operative procedures, the endodontic procedures are often considered to be more complex and difficult especially in hyper-taurodontism cases. Hyper-taurodontism primarily consists of cylindrical or prismatic forms of the pulp chamber, which approximates the root apex and further splits into two or more channels. [11]

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The lengthy and more rectangular pulp chamber might be a reason for its difficulty in locating the canal orifices and its subsequent instrumentation and obturation. Cautious investigation of grooves in between the orifices, with adequate magnification to locate additional canals, usage of ultrasonic irrigation, and advanced filling techniques are necessarily recommended to manage a taurodont. [12,13]

Since the pulp in the taurodont is so voluminous, to ensure complete debridement of the pulp tissue, 2.5% of the NaOCl is usually advocated. In this case, NaOCl of 5.25% with ultrasonic agitation is used under rubber dam isolation for the same reason.[14] A recent article also concluded that the performance of ultrasonic activation of NaOCl in dissolving the pulp tissue is highly considerable.[15] Preventing the apical percolation is achieved by condensing Biodentin firmly with the help of hand pluggers followed by backfilling with thermoplasticized GP. The reason for this hybrid obturation technique is to achieve a good apical seal and for better adaptation of the obturating material as per canal configuration.

Also, to ensure a good anatomic cleaning, XP endo finisher is employed in this case. This establishes a good mechanical debridement in areas that are inaccessible to reach with conventional rotary Ni-Ti. Also, in 2016, Azim et al and Alves et al., concluded after comparing XP endo finisher with the latest generation Ni-ti instruments that XPEF disrupted the biofilm better than the latter. [16,17]

The usage of bioactive root canal sealer BioRoot RCS could be solely attributed to its prolonged potential to release calcium ions and to its apatite deposition at the interface of root canal wall. [18]

The current case describes the execution of endodontic treatment of a hyper-taurodont maxillary first molar, with the help of ultrasonic activation of 5.25% sodium hypochlorite, using XP-endo finisher and with advanced thermoplasticised obturation after achieving an apical plug with Biodentin. Despite the lack of advanced diagnostic aid such as CBCT, success in the present case report could be attributed mainly because of the utilization of an operating microscope combined with the effective debridement and fluid impervious apical seal created by modified filling techniques.

To conclude, adequate emphasis should be given to advanced diagnostic aid like CBCT, and for improved treatment management techniques. Performing the endodontic therapy under magnification, with advanced cleaning and filling techniques to manage the taurodonts can undoubtedly yield great success.

CONFLICTS OF INTEREST:

The author denies any conflicts of interest.

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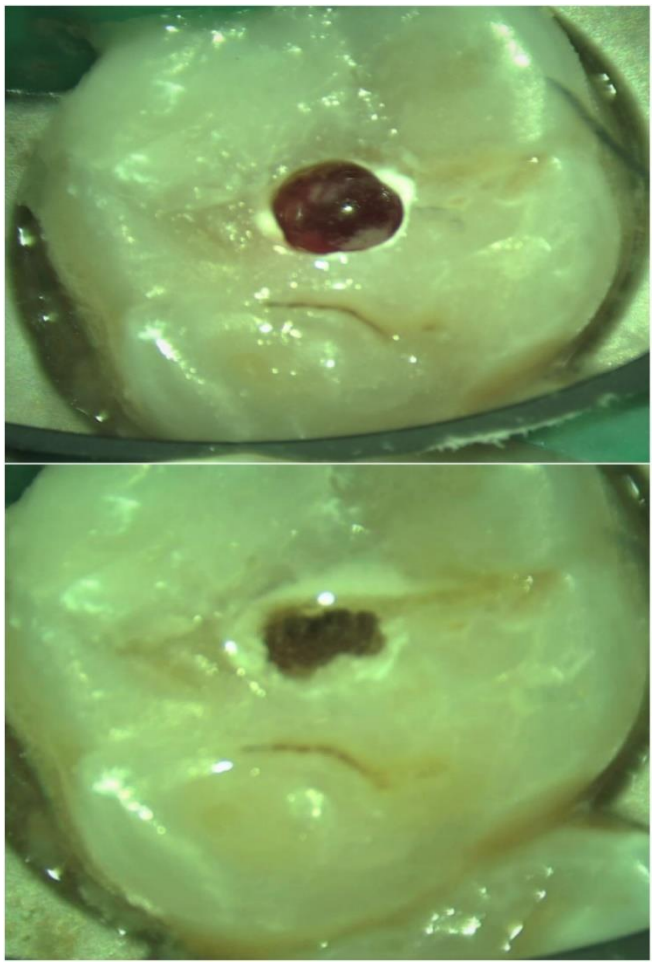
1.1 Pre-operative radiograph of hyper-taurodont maxillary first molar with mesio-occlusal cavity.

1.2 Pre-operative clinical picture of hyper-taurodont maxillary first molar with gingival overgrowth under rubber dam isolation.



2.1 Coronal access cavity prepared after performing pre-endodontic build up under magnification.

2.2 Irrigation with 5.25% NaOCl under magnification.

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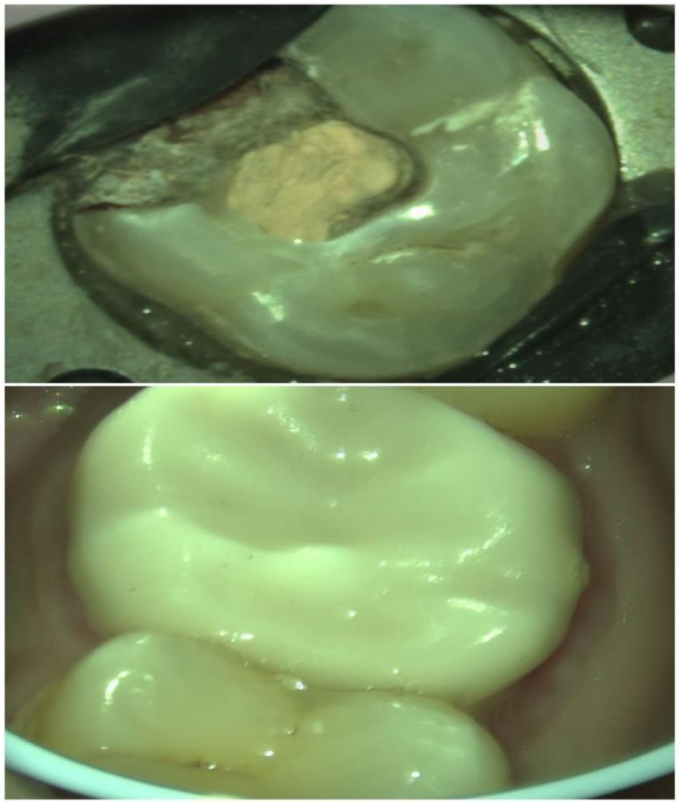

3.1 Biodentine apical plug followed by back filling with thermo-plasticized gutta percha.

3.2 Full coverage restoration with E-max lithium di silicate crown placed.

4.1 &4.2 Post-operative radiographs of hyper-taurodont maxillary molar in two different angulations (with paralleling device and mesial shift).

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