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Endodontic Management of Mesotaurodontic Maxillary First Molar – A Case Report

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ABSTRACT
Taurodontism can be defined as a change in tooth shape caused by the failure of the Hertwig's epithelial sheath diaphragm to invaginate at the proper horizontal level. An enlarged pulp chamber, apical displacement of the pulpal floor, and no constriction at the level of the cementoenamel junction are the characteristic features. Permanent molars are most commonly affected. Endodontic treatment of a taurodont tooth is challenging and requires special handling because of the proximity and apical displacement of the roots. Here, we report a case in which endodontic treatment of the maxillary right first molar with taurodontism was performed. In this case, the maxillary right second molar was also taurodont teeth.
KEY WORDS: *Endodontic treatment, enlarged pulp chamber, taurodontism.*

INTRODUCTION

Taurodontism, a developmental disorder of teeth characterized by the change in tooth shape, is caused due to the failure of Hertwig's epithelial sheath to invaginate at the proper horizontal level and is considered to be one of the most important abnormalities in tooth morphology. An enlarged pulp chamber, apical displacement of the pulpal floor, and no constriction at the level of the cementoenamel junction are its distinctive features. The term "taurodontism" which means bull-teeth was first coined by Sir Arthur Keith in 1913, because of its similarity to those of ruminants or cud chewing animals. He described the condition as a tendency for a tooth to enlarge at the expense of roots, unlike the carnivores which have "cynodonts" i.e. body of the teeth is above the alveolar border.[1]

Shaw (1928) further classified taurodont teeth according to their severity into hypo-, meso- and hypertaurodont forms, hypotaurodontism being the least pronounced form, mesotaurodontism the moderate form and hypertaurodontism being the most severe form in which the bifurcation or trifurcation occurs near the root apices.[2]

According to Hamner et al., it has been reported that many patients with the Klinefelter syndrome exhibit taurodontism, but it is not a constant

feature of this syndrome. Today, it is considered as an anatomic variant that could occur in a normal population. The prevalence of taurodontism is reported to range from 2.5% to 11.3% of the human population. This range is accounted for by variations in race and differences in diagnostic criteria.[2] The present article describes the management of mesotaurodontism by endodontic treatment in a right maxillary first molar.

CASE REPORT

A sixteen year old girl reported to department of Conservative dentistry and Endodontics, with chief complain of pain in upper right back region of jaw. The patient's medical history was non – contributory. Intraoral examination revealed a normal shaped crown with deep occlusal carious lesion. The tooth was not sensitive to percussion. The periodontal probing was within normal range (2-3mm).

The preoperative periapical radiograph suggested the following possibilities (Fig. 1 & 2):

- a deep occlusal carious lesion with endodontic involvement;
- elongated pulp chamber extending up to the trifurcation;
- three short roots with the trifurcation in the apical third; or
- a periapical radiolucency in relation to the mesio - buccal and palatal root apex.

The tooth 16 was anaesthetized using local anaesthesia, 2% lignocaine with 1:100000, adrenaline (Lignox; Indoco Remedies, Mumbai, India). Operating microscope (Global Surgicals Corporation, St Louis, MO, US) was used throughout the procedure to facilitate visualization. The tooth was isolated with rubberdam (Hygienic Dental Dam, Coltene Whaledent Germany) and the access cavity was prepared. The pulp was exposed and extirpated followed by massive bleeding, which was controlled by instrumentation. Three root canal orifices were located: two narrow orifices mesiobuccal and distobuccal and a wide palatal orifice. Instrumentation was carried out with balanced force technique. An electronic apex locator was used to determine the initial working length, which was confirmed radiographically (Fig. 3). The root canals were cleaned and shaped with Hyflex (Coltene Whaledent, Germany) rotary instruments. The buccal canals were instrumented up to 30 – 4% and palatal canal to 40 – 4% and radiograph was taken with master cone (Fig. 4). The canals were irrigated with 3% sodium hypochlorite using ultrasonics, 17% aqueous solution of EDTA, and 0.2% chlorhexidine gluconate. The canals were dried using sterile paper points and obturated using modified filling technique. It consisted of combined lateral compaction in the apical region with vertical compaction of the pulp chamber using (E & Q) with AH-Plus sealer (Dentsply, Germany). The rest of the pulp chamber was obturated using thermoplasticised gutta percha back fill technique, using thermoplasticised gutta percha (E & Q) and the access cavity was sealed with composite resin (Fig. 5). The final radiograph was then taken to confirm the sealing of the pulp chamber and canal (Fig. 6). The patient was asymptomatic when she reported after 6 months and is still under active follow up (Fig. 7).

Variable dimensions for establishing taurodontism index: Vertical height of pulp chamber V1, distance between lowest point of the roof of pulp chamber to the apex of the longest root V2, and distance between baseline connecting the two CEJ and highest point in the floor of pulp chamber V3. Establishing a condition of taurodontism is made when V1 is divided by V2 and multiplied by 100 if above 20, and V3 exceeds 2.5mm: $V1/V2 \times 100 > 20$ and $V3 > 2.5$. Taurodontism is diagnosed in molars in which TI is above 20 and variable 3 exceeds 2.5 mm. Degree of taurodontism were determined as: hypotaurodontism: TI 20-30, mesotaurodontism: TI 30-40, and hypertaurodontism: TI 40-75.[5] In this case TI equaled 32 and variable 3 equaled 6mm, clearly indicating mesotaurodontism .

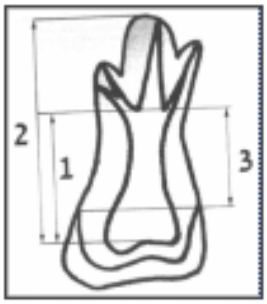

Figure 1- Preoperative radiograph

Figure 2- Preoperative radiograph

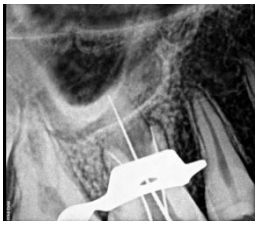

Figure 3- Working length determination radiograph

Figure 4- Master Cone radiograph

Figure 5- E & Q

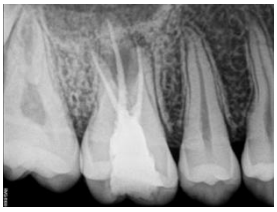

Figure 6- Post obturation radiograph

Figure 7- 6 months follow – up radiograph

DISCUSSION

The term taurodontism comes from the Latin term tauros, which means 'bull' and the Greek term odus, which means 'tooth' or 'bull tooth' (Keith 1913, Terezhalmy et al. 2001). It was first described by Gorjanovic´-Kramberger.[6]

Its distinguishing features cannot be recognized clinically.[3] Clinically the taurodont crown has normal form, structure, color and texture; so can only be diagnosed by radiographs. Taurodontism is predominantly found in molars but also has been seen in premolars, mandibular canines and incisors.[10] The diagnosis of taurodontism is usually a subjective determination made from diagnostic radiographs. The radiographic characteristics of taurodont tooth are (i) extension of the rectangular pulp chamber into the elongated body of the tooth, (ii) shortened roots and root canals, and (iii) location of furcation near the root apices, despite a normal crown size.[3]

Taurodontism is frequently associated with other anomalies and syndromes.[8] These include Klinefelter syndrome, ectodermal alterations, Down syndrome, Mohr syndrome, Wolf Hirschhorn syndrome, Lowe syndrome, Tricho-dento-osseous syndrome, Williams syndrome, and Seckel syndrome, McCune-Albright syndrome and Vander Woude but it is not a constant feature of these syndromes.[4,7] However, identification of patients with multiple taurodontic teeth could lead to early recognition of a systemic disorder and

improve quality of life. In this case, the patient was a healthy female with a negative medical history.

From an Endodontist's view, taurodontism presents a challenge during negotiation, instrumentation and obturation in root canal therapy. Because of the complexity of the root canal anatomy and proximity of buccal orifices, complete filling of the root canal system in taurodont teeth is challenging.[5]

The present case is a mesotaurodont tooth. Apically positioned canal orifices, varying canal configurations, and wide variations in the size of pulp chamber may be observed in the taurodont teeth, and because of this, the endodontic treatment of this case was a challenge.

Access to pulp chamber was easy because of the large pulp chamber. However, Durr et al. suggested that its unique appearance may hamper the location of the canal orifices and therefore create difficulty in instrumentation.[9] In the present case, negotiation of the orifices was complicated owing to apically positioned canal orifices. Careful exploration of the grooves between all orifices was carried out under magnification using operating microscope. The use of operative microscope magnified the vision of field and proved very useful in locating the orifice.

Nickel–titanium rotary instruments have become an important adjunct in endodontic therapy. Despite the existence of one ever-present risk factor – dental anatomy – shaping outcomes with these instruments are mostly predictable. Current evidence indicates that wider apical preparations are feasible and that probably improved irrigation efficacy and obturation quality. Sectional sealing of apical part and backfill with thermoplasticised gutta-percha ensures a three dimensional obturation of the canals and also prevents apical extension of the material. The patient was reviewed after six months and was found to be asymptomatic.

CONCLUSION

The successful treatment of the taurodontic patient in the present study can be mainly attributed to the use of magnification, which made even rotary instrumentation in such complex anatomy accessible and convenient. Endodontic treatment of a taurodont tooth is challenging as it requires special care in handling and identifying canals. While performing root canal treatment on such teeth, one would encounter variations in pulp space morphology, canal configuration, accessory canals and even obliterated canals. With advancement in diagnostic imaging, enhanced magnification aids like loupes & surgical operating microscopes, advanced apex locator, rotary endodontics, newer irrigation regimen and obturation systems, treatment of such challenging cases can be more predictable and rewarding to both patient and endodontist.

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