"TAURODONTISM" AN ENDODONTIC ENIGMA: A CASE REPORT

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ABSTRACT

The aim to publish this case report is to emphasize the clinical challenges involved in endodontic treatment of rare dental anomaly like Taurodontism.

Endodontic management of a taurodont tooth has been described as complex and challenging. Present case is an attempt to emphasize the challenges an Endodontist encounters while treating Taurodontism affecting the molars of permanent dentition. An enlarged pulp chamber, apical displacement of the pulpal floor, and no constriction at the level of the cementoenamel junction are the characteristic features. Negotiation of the orifices was extremely complicated owing to complex proximity and location of orifices. Low canal orifices and the potential for additional root canal system created difficulty in instrumentation and filling. Treatment required careful exploration of the grooves between all orifices under operating microscope. Canal cleaning and shaping was performed using Protaper rotary instruments and 2.5% sodium hypochlorite ultrasonic irrigation and obturated using a modified filling technique.

Key Words: *Taurodontism, Endodontic treatment, protaper.*

INTRODUCTION

Taurodontism has been recognized as a clinical entity for almost a century. It is a developmental disturbance of a tooth that lacks constriction at the level of the cementoenamel junction (CEJ) and is characterized by vertically elongated pulp chambers, apical displacement of the pulpal floor and bifurcation or trifurcations of the roots.[1] The bifurcation or trifurcation may appear to be only a few millimeters above the apices of the roots.

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The etiology of taurodontism is unclear. It is assumed to be caused by the failure of Hertwig's epithelial diaphragm to invaginate at a suitable horizontal level, resulting in a tooth with short roots, elongated body, an enlarged pulp, and normal dentin.[2] Taurodontism has been graded according to its severity: least pronounced (hypotaurodontism), moderate (mesotaurodontism), and most severe (hypertaurodontism). Shifman and channel also included an index to calculate the degree of taurodontism (Fig 1).[2]

Taurodontism more frequently affects permanent dentition than deciduous and may be seen unilaterally or bilaterally, mostly involving molars or premolars. In majority of cases a single tooth is affected. It usually manifests as an isolated anomaly. However, in a comprehensive review, several syndromes and abnormalities are associated with the condition.[3] Many of these disorders have oral manifestations, which can be detected on dental radiographs as alterations in the morphology or chemical composition of the teeth; thus, dentists may be the first to detect them.[4] Because of high variability in prevalence of 0.1% to 48% and its association with various syndromes in modern dentition[3], there is a

critical need for its true diagnosis and managementof such teeth. It is suggested that its morphology might hamper the location of orifices and could create difficulties in effective instrumentation and obturation of the teeth requiring endodontic treatment.[5] This paper highlights important considerations in the endodontic treatment of such teeth and successful completion of endodontic treatment in mesotaurodontic teeth.

CASE REPORT

A 34-year-old male patient was referred to the Department of Conservative Dentistry and Endodontics at M.S. Ramaiah Dental College and Hospital with severe pain in the left maxillary first molar. The patient complained of continuous pain at night, which was localized to the tooth. The medical history of the patient was noncontributory. On clinical examination, (Fig 2), a dislodged temporary restoration was seen in the suspected tooth. The tooth was tender to vertical percussion. There was no observable swelling or sinus tract. The tooth did not respond to heat and cold tests and showed delayed response to the electric pulp testing.

Radiographic examination of the affected tooth revealed an abnormal tooth anatomy (Fig 3). The radiographic findings were:

- The elongated pulp chamber extended beyond the cervical area reaching the furcation.
- Three short roots were seen at the apical third.
- PDL widening was observed.

From these radiographic findings and taurodontism index by Shifman and channel, the tooth was diagnosed asmesotaurodont with chronic irreversible pulpitis andchronic apical periodontitis.

Endodontic management of the maxillary left first molar;

The tooth was anaesthetized. Access cavity was prepared under rubber dam isolation. All the procedures were carried out under surgical operating microscope to facilitate effective visualization. The pulp was extirpated and a single large canal orifice was initially negotiated (Figure 4). The access cavity was modified and remaining pulp tissue was extirpated. The pulp was voluminous and to ensure complete removal, 2.5% sodium hypochlorite was initially used as an irrigant to soften the pulp. Once the pulp was extirpated, further irrigation was done with normal saline. The pulp chamber was found to be huge and the floor of the chamber could not be visualized. The elongated pulp chamber posed a challenge to trace canal orifice. Under magnification 5×, one common pathway in the coronal two-thirds of the canal system was located, but in the apical third, three different pathways were negotiable: a wide palatal orifice (P) and two narrow orifices – a mesiobuccal (MB) and a distobuccal (DB). 8, 10, and 15 files were used to scout canals. The SX of the Protaper rotary (DentsplyMaillefer) was used to enlarge the orifice of the canal and create a straight line access.

An electronic apex locater (SybronEndo's Elements Diagnostic Unit and Apex Locater) was used to determine the initial working length. During root canal preparation, a tiny fourth canal orifice (MB2) was suspected between the mesiobuccal and the palatal canal. Under magnification 8×, a groove between the MB1 and palatal canals was located.The MB2 canal was found along the mesial groove. The working length (WL) was confirmed by using apex locater and radiograph (Fig 5).

Canals were prepared using a ProTaper instruments (DentsplyMaillefer) using torque control endodontic handpiece as per the manufacturer's recommendation (X smart rotational speed 250 r.p.m.). Shaping files S1, S2 were used up to working length in a "brush-action". MB1, MB2, and DB canals were finished up to finishing file F1 and palatal canal after the gauging the apical diameterwas finished up to F2 in a "nonbrushing" manner to working length and immediately withdrawn. Canals were irrigated with 2.5% NaOCl after each instrument, delivered by means of a gauge 27 needle, allowing for adequate back flow. RC prep (Premier) lubricant was used throughout the procedure. Respective master cone were selected (Fig 6).

Canals were obturated using modified filling technique. It consisted of combined lateral compaction in the apical region with vertical compaction of the pulp chamber using a System B device (Elements *Obturation* Unit from Sybron Endo) with AH-Plus sealer (Dentsply. Germany). Following obturation we could appreciate the distinct orifice proximity and location clearly (Fig 7).

Kalzinol (Dentsply, Germany) was used as a temporary filling and a final radiograph was taken (Fig 8). The radiograph showed four distinct short roots with an elongated pulp chamber.

Access filling was done using Ceram X Nano Resin composite. The tooth was restored with a metal ceramic crown.

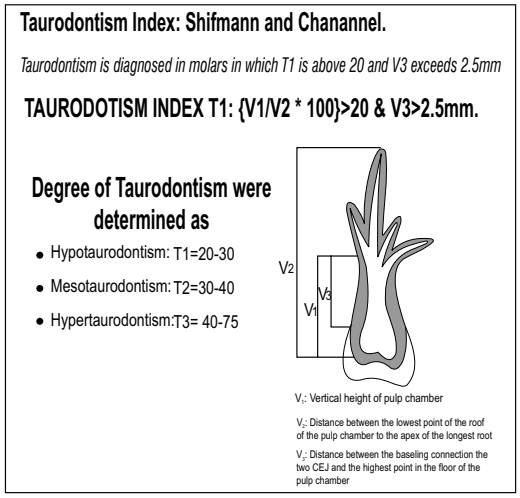

Fig 1: Taurodontism Index

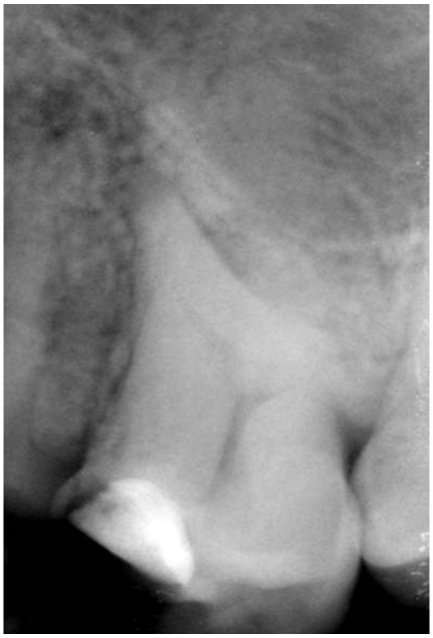

Fig 2: Pre Operative Radiograph

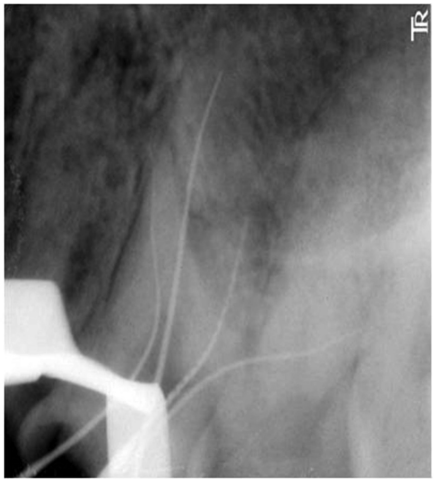

Fig 3: Working Length Radiograph

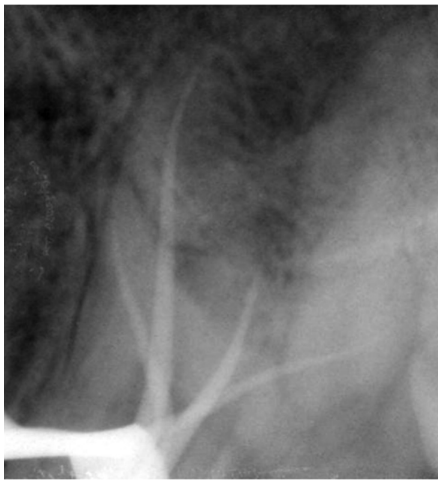

Fig 4: Master Cone Radiograph

Fig 5: Post Operative Radiograph

DISCUSSION

The term "taurodontism" is derived from the Latin term *tauros*, which means "bull" and the Greek term *odus*, which means "tooth" or "bull tooth". It was first described by Gorjanovic´-Kramberger (1908); however, the term taurodontism was first coined by Sir Arthur Keith (1913) to describe a molar tooth resembling those of ungulates, particularly bulls.[3]

Its distinguishing features cannot be recognized clinically.[4,6] The diagnosis of taurodontism is usually a subjective determination made from diagnostic radiographs.[7] 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.[4,6]

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.[2,3,8] Pretreatment radiographs gave little information about the canal system. 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.[5] 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 surgical operating microscope. The use of operative microscope magnified the vision of field and proved very useful in locating the orifice.[9] Because of the voluminous pulp in taurodont teeth, 2.5% sodium hypochlorite has been proposed as a suitable irrigant in order to ensure a complete removal of the pulpal remnants.[1,10] Owing to the proximity of the buccal orifices and difficulty in accessing them, instrumentation and complete obturation of the canal system was challenging. 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.[11] In the present case, canal instrumentation was done with Pro Taper rotary instruments, as ProTaper was suggested to better suit the curved and constricted canals than wide, immature ones.[11,12] Rotary instrumentation made obturation more convenient. Obturation was achieved using modified filling technique. The patient was reviewed after three 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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