

Endodontic Management of a Hypertaurodont Maxillary First Molar

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ABSTRACT

Aim: To discuss the diagnosis, treatment planning and endodontic treatment of a hypertaurodont maxillary first molar.

Summary: Taurodontism is a morphological variation of teeth characterized by elongated pulp chamber and loss of constriction at cemento-enamel junction due to the apical shift in the floor of the pulp chamber and the furcation area. The implications of this aberrant dental morphology for clinical dentistry need to be considered particularly with respect to cavity preparation, endodontic treatment and dental extractions.

Keywords: Endodontic management, enlarged pulp chamber, taurodontism.

INTRODUCTION

Taurodontism, a developmental disorder of teeth characterised by the change in tooth shape is caused due to the failure of Hertwig's epithelial sheath to invaginate at the



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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 cemento-enamel junction are its distinctive features.¹ 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.²

There are different theories regarding the etiology of taurodontism such as primitive pattern, mutation, specialized or retrograde character, atavistic feature, X-linked trait, familial or an autosomal dominant trait. Also, taurodontism have been reported in association with certain syndromes and some genetic defects such as Klinefelter's syndrome,³⁻⁵ Down's syndrome,⁶ trichodonto-Osseous syndromes,⁷ Orofacial digital syndrome or Mohr Syndrome,⁸ and Ectodermal dysplasia.^{9,10} It has also been reported to be associated with Dwarfism,¹¹ Cleft palate¹² and other dental anomalies such as hypodontia¹³ microdontia, dens invaginatus¹⁴ and amelogenesis imperfecta.¹⁵

Due to its unusual shape, such a tooth presents with difficulty in diagnosis, cavity preparation, endodontic treatment and extraction procedures. Thus, clinical procedures and treatment steps may need some modifications to ensure a successful treatment outcome. This paper reports bilateral taurodonts in maxillary first molars and discusses the diagnosis and endodontic management of a taurodont right maxillary first molar.

CASE REPORT

A 32 year old, systemically healthy, male patient reported to the postgraduate Endodontic clinic, with the chief complaint of pain in his maxillary right first molar (16). On intraoral examination the tooth was found to have normal shape of the crown with a mesio-occlusal carious lesion. The radiographic evaluation revealed the abnormal anatomy of the root. The pulp chamber was extended beyond the cervical area and the

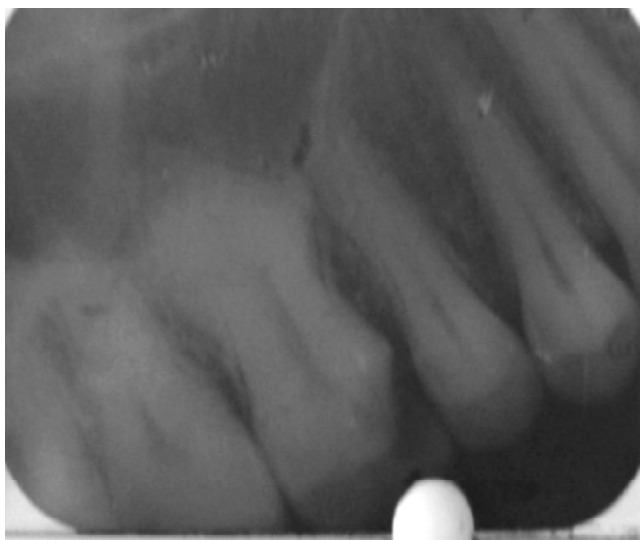


Figure 1: Pre-operative radiograph of the maxillary right first molar

bifurcation of the root was very apically placed (Fig. 1). Pulp sensibility tests using thermal and electrical stimulus presented a delayed response compared to baseline normal teeth. The radiographic findings were suggestive of taurodontism and tooth was diagnosed to be having chronic irreversible pulpitis. The radiograph of contralateral side showed similar root morphology for the maxillary left first molar (26) (Fig. 1 and 2).

After routine local anesthesia and rubber dam isolation, access cavity was prepared. The pulp was extirpated with the help of barbed broach and the chamber was irrigated with 2.5% sodium hypochlorite. The access cavity was a modified one due to the abnormal shape of the pulp chamber. The pulp



Figure 2: Radiograph of the contralateral maxillary first molar.

chamber was large and the floor of the chamber was not perceptible. Only the palatal canal was negotiable and working length radiograph was taken with a #15 file in the palatal canal and confirmed by an electronic apex locator (Root ZX; Morita, Japan). Following the working length determination, the palatal canal was instrumented upto size F1 of Protaper file system. Circumferential filing was done in rest of the pulp chamber. The mesiobuccal and the distobuccal canals seemed to be calcified on radiographic and clinical evaluation. After the completion of the instrumentation the canal were irrigated with 2.5% sodium hypochlorite and dried with paper points. A non-setting calcium hydroxide paste (Metapex, META) was given as intracanal medicament. On the subsequent visit after 7 days, sectional obturation of apical 3 mm was done with a 3 mm section of F1 gutta percha cone (Dentsply, Maillefer) and Endomethasone sealer. The rest of the pulp chamber was obturated using thermoplasticised gutta percha back fill technique using thermoplasticised gutta percha (BeeFill, VDW, Germany) and the access cavity was sealed with composite resin. The final radiograph was then taken to confirm the sealing of the pulp chamber and canal (Fig. 3). The patient was asymptomatic when he reported after 6 months and is still under active follow up.



Figure 3: Radiograph of the obturated maxillary right first molar

DISCUSSION

Taurodontism is a developmental anomaly caused due to the failure of the Hertwig's epithelial root sheath to invaginate at proper level leading to formation of teeth with short roots, elongated body and normal dentin.¹⁶ Once thought to be a distinctive characteristic of Krapina Neanderthals, it is now considered not to be a rare trait in modern man and occurs in about 2.5% of adult Caucasian population. It is most commonly affects the permanent mandibular molars; and has been reported in both maxillary and mandibular premolars, canines

and even incisors.¹⁷ The tooth has a normal clinical appearance. Based on the level of apical displacement of pulpal floor, a taurodont tooth was classified as hypotaurodont, mesotaurodont or hypertaurodont by Shaw. The tooth is hypotaurodont when there is moderate enlargement of pulp chamber, mesotaurodont when pulp is large, roots short but separate and hypertaurodont when there is single or cuneiform root.¹⁸ Later on, Shifman and Chanannel introduced a metric method for this classification. According to them, the ratio of distance between lowest point of pulp chamber to the apex of the longest root should be greater than or equal to 0.2 mm and the distance from highest point of the pulp chamber floor to cemento-enamel junction should be greater than 2.5 mm. A tooth is classified as hypotaurodont, if this range is 20-20.9%; mesodont, if it is 30-39%; and hypertaurodont, if it is 40-75%.¹⁹ Several authors have used paralleling cone technique along with superimposed 1x1 mm² grid on the IOPA to calculate the extent of taurodontism.²⁰ Based on Shaw's criterion, both the teeth in the present case were classified as hypertaurodont.

The endodontic treatment of a tooth with taurodontism is a challenge as it exhibits variation in the size of the pulp chamber, apically positioned orifices and shorter roots. The large and apically placed chamber causes difficulty in performing pulp sensibility test and location of canal orifices. Taking additional radiographs at different horizontal angulation can help in getting better view of the number of canals and roots. Now a day, CBCT serves as a useful diagnostic adjunct to highlight the morphology as well as intricacies of complex root canal system. Use of magnification, copious irrigation and adjuncts to chemomechanical debridement such as ultrasonic irrigation is helpful in cleaning the complex root canal system.²¹

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. A modified filling technique, which consists of combined lateral compaction in the apical region with vertical compaction of the elongated pulp chamber, has also been proposed.^{22,23}

CONCLUSION

Taurodontism, though seldom reported with various syndromes, is prevalent in systemically healthy population also. It is morphological variation that can be successfully treated if diagnosed and treated correctly and carefully. Restorative and endodontic treatment of such teeth requires vigilant preparation during cavity and endodontic access procedures. Moreover, it may sometime present along with a syndrome, which can be first diagnosed by the dentist, thus a thorough knowledge of the oro-systemic nexus is very important.

REFERENCES

1. Jafarzadeh H, Azarpazhooh A, Mayhall JT. Taurodontism: a review of the condition and endodontic treatment challenges. *Int Endod J* 2008; 41: 375-88.
2. Keith A. Problems relating to the teeth of the earlier form of pre historic man. *Ray Soc Med Sect Odont Proc* 1913; 6: 103-24.
3. Bhat SS, Sargod S, Mohammed SV. Taurodontism in deciduous molars- A case report. *J Indian Soc Pedod Prev Dent* 2004; 22: 193-6.
4. Keeler C. Taurodont malar and shovel incisors in Klinefelter's Syndrome. *J Hered* 1973; 64: 234-6.
5. Gardner DG, Girgis SS. Taurodontism, shovel shaped incisors and the Klinefelter's Syndrome. *J Can Dent Assoc* 1978; 44: 372-3.
6. Jaspers MT. Taurodontism in Down's syndrome. *Oral surg Oral med Oral Pathol*. 1981; 51: 632-6.
7. Alpoz AR, Eronat C. Taurodontism in children associated with trisomy 21 syndrome. *J Clin Pediatr Dent* 1997; 22: 137-9.
8. Lichtenstein JR, Warson RJ, Jorgenson R, Dorst JP, McKusick VA. The Tricho- Dento-Osseous Syndrome. *Am J Hum Genet* 1972; 24: 569-82.
9. Crawford PJ, Alfred HJ, Clarke A. Clinical and radiographic dental findings in X- linked hypohydrotic ectodermal dysplasia. *J med Genet*. 1991; 28: 181-5.
10. Stenvick A, Zachrisson BU, Svaton B. Taurodontism. *Oral Surg Oral Med Oral Pathol* 1972; 33: 841-5.
11. Gardner DG, Girgis SS. Taurodontism, short roots and external resorption associated with short stature and a small head. *Oral Surg Oral Med Oral Pathol* 1977; 44: 271-3.
12. Laatikainen T, Ranta R. Taurodontism in twins with cleft lip and/or palate. *Eur J Oral Sci* 1996; 104: 82-6.
13. Schalk - van der Weide Y, Steen WH, Bosman F. Taurodontism and length of teeth in patients with oligodontia. *J Oral Rehabil* 1993; 20: 401-12.
14. Calvano Kuchler E, De Andrade Risso P, De Castro Costa M, Modesto A, Vieira AR. Assessing the proposed association between tooth agenesis and taurodontism in 975 paediatric subjects. *Int J Paed Dent* 2008; 18: 231- 4.
15. Elzay RP, Chamberlain DH. Differential diagnosis of enlarged dental pulp chambers: a case report of amelogenesis imperfectum with taurodontism. *J Dent Child* 1986; 53: 388-90.
16. Bhaskar SN. *Orban's oral histology and embryology*. 11th ed, CV Mosby, St Louis. 2001; pp. 41-4.
17. Barker BCW. Taurodontism: the incidence and possible significance of the trait. *Aust Dent J* 1976; 21: 272-6.
18. Shaw JC. Taurodont teeth in South African races. *J Anat* 1928; 62: 476-98.
19. Shifman A, Chanannel I. Prevalence of taurodontism found in radiographic dental examination of 1200 young adult Israeli patients. *Comm Dent Oral Epidemiol* 1978; 6: 200-3.
20. Bains R, Jethwani GS, Loomba K, Loomba A, Dubey OP, Bains VK. Taurodontism-case report of a morphoanatomical variant. *ENDO (Lond Engl)* 2010; 4: 301-8.
21. Widerman FH, Serene TP. Endodontic therapy involving a taurodont tooth. *Oral Surg* 1971; 32: 618-20.
22. Tseis I, Shifman A, Kaufman AY. Taurodontism: an endodontic challenge. Report of a case. *J Endod* 2003; 29: 353-55.
23. Prakash R, Vishnu C, Suma B, Velmurugan N, Kandaswamy D. Endodontic management of taurodontic teeth. *Indian J Dent Res* 2005; 16: 177-81.