

## CASE REPORT

### Taurodontism in Permanent Molars: Report of two cases

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#### ABSTRACT

Taurodontism occurs in multirooted teeth and is a morphological change in the shape of a tooth. Characteristic floor Endodontic treatment of a taurodont requires special care in handling and identifying the number of root canals. And hence is considered to be challenging. The following report presents two cases of taurodontism of a maxillary left second molar and a mandibular left second molar.

**Key words:** Endodontic treatment, Molars, Root canal anatomy, Taurodont.

Received: 11 August 2018

Revised: 22 September 2018

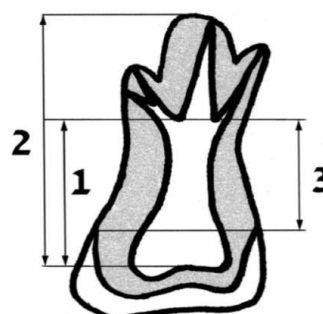
Accepted: 25 October 2018

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**This article may be cited as:** Deshpande NM, Kulkarni MU, Shah D, Desai N. Taurodontism in Permanent Molars: Report of two cases. J Adv Med Dent Sci Res 2018;6(10):131-133.

#### INTRODUCTION

Sir Arthur Keith coined the term taurodontism to describe the “bull-like” condition in teeth (from Latin tauro: “bull” and dont: “tooth” from Greek) in which the tall root trunk encloses a high pulp chamber and short roots.<sup>[1]</sup> Taurodontism is a morphologic variation in which the body of the tooth is enlarged at the expense of the root. Taurodont teeth have apically positioned furcation and large pulp chambers.<sup>[2]</sup> The possible etiology of taurodontism is thought to be due to failure of Hertwig’s epithelial sheath diaphragm to invaginate at the proper horizontal level, resulting in a tooth with short roots, elongated body, an enlarged pulp, and normal dentin.<sup>[3]</sup> Although earlier taurodontism was thought to be related to syndromes such as Down’s and Klinefelter’s, it is now thought to be an anatomic variation in a normal population.<sup>[4]</sup> Based on the severity of taurodontism, Shaw in 1928 classified this condition as hypotaurodontism, mesotaurodontism and hypertaurodontism based on the relative displacement of the floor of the pulp chamber. Shifman and Chananel<sup>[5]</sup> proposed a classification to calculate the degree of taurodontism as shown radiographically. This classification is widely used today (Fig 1).



**Figure 1:** Variable dimensions for establishing the taurodontism index: vertical height of the pulp chamber (V1), distance between the lowest point of the roof of the pulp chamber to the apex of the longest root (V2), and distance between the baseline connecting the two CEJ and the highest point in the floor of the 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 2.5 mm:  $(V1/V2) * 100 > 20$  and  $V3 > 2.5$  mm. Taurodontic index (TI) =  $V1/V2 * 100$ . Taurodontism is diagnosed in molars in which TI is above 20 and variable 3 exceeds 2.5 mm. Degrees of taurodontism were determined as: hypotaurodontism: TI 20–30, mesotaurodontism: TI 30–40, and hypertaurodontism: TI 40–75<sup>[5]</sup>.

#### CASE REPORT

##### Case 1:

A 32-year-old female patient, reported to the Department of Conservative Dentistry and Endodontics, with the chief complaint of pain in the upper left back region of the jaw since 14 days. Clinical examination revealed a metal

ceramic crown with 27. The tooth was in normal alignment with the adjacent teeth. The occlusion of the patient revealed a class I molar relationship. The tooth was tender on percussion testing, however there was no noted swelling and no sinus tract was seen. Periodontal examination revealed mobility, probing depth and gingival tone within the normal limits. On radiographic examination, pulp chamber extending beyond the cervical area reaching the middle third of the root (Fig 2,A). Three short roots were seen extending beyond the middle third till the apical end, indicating a mesiotaurodaunt according to Shifman and Chanannel.

Lidocaine 2%, with epinephrine 1:100,000 (Lidocadren; Teva, Jerusalem, Israel), was administered. Magnification loupes (Orascoptic, Madison, WI, U.S.A.) were used to facilitate visualization. The tooth was isolated and the access cavity was prepared through the metal ceramic

crown. The pulp was exposed and extirpated. The bleeding was controlled by instrumentation. 2.5 % sodium hypochlorite was used for irrigation. Three canal orifices were found: a wide palatal one (P), and two narrow orifices-a mesiobuccal (MB) and a distobuccal (DB). An electronic apex locator (Root ZX; Morita, Tokyo, Japan) was used to determine the initial working length and confirmed with a radiograph (Fig 2, B). Biomechanical preparation was carried out using ProTaper rotary instrumentation (Dentsply Maillefer, Ballaigues, Switzerland) using crown down technique. MB and DB canals were enlarged upto a size F2 and palatal canal was enlarged upto size F3. Obturation was carried out using single cone technique. The final post-operative radiograph confirmed a well-condensed filling consisting of three canals obturated to the predetermined length (Fig 2,C and D).

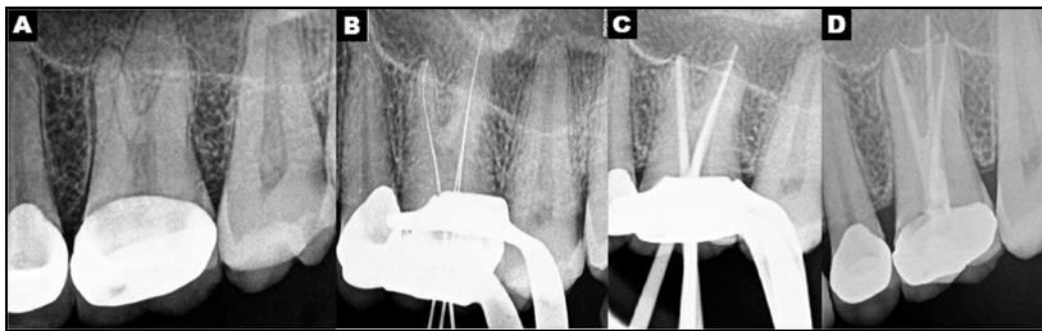
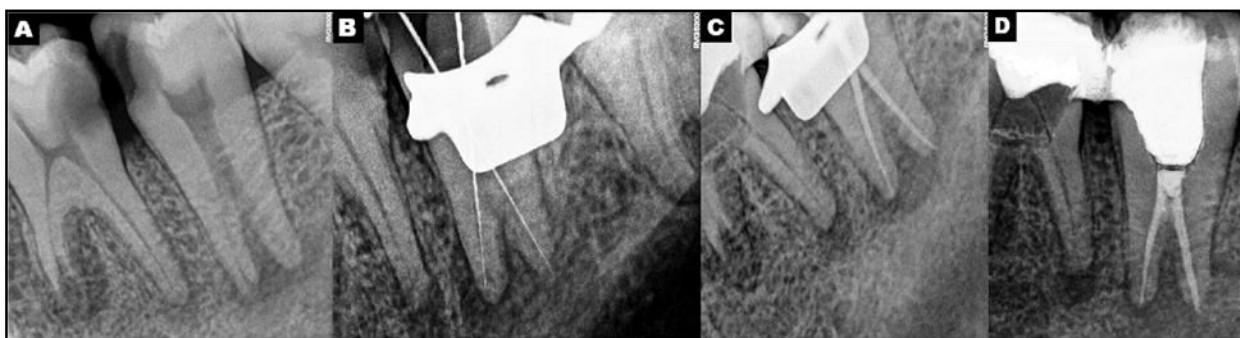


Figure 2: (A) Pre-operative radiograph, (B) Working length, (C) Master cone, (D) Post-operative radiograph.

### Case 2:

A 32-year-old male patient reported to the Department of Conservative Dentistry and Endodontics, with a chief complaint of pain in the lower left back region of the jaw since 15 days. His medical history was non-contributory. Clinical examination revealed deep proximal caries with the tooth 37. No swelling or sinus was seen associated with the same tooth. There was no pain on percussion or palpation. Vitality tests like EPT and cold test were done, both of which showed lingering pain for more than 30 seconds after removal of stimulus. Tooth 20 had sharp, lingering pain to cold testing with ice-stick, no pain to percussion and palpation. Periodontal examination revealed no mobility, normal periodontal probing depth and normal gingival anatomy. Radiographic findings revealed radiolucency in the coronal portion in the proximal region involving enamel, dentin and reaching pulp suggestive of deep caries (Fig 3,A). Radiograph also revealed characteristics consistent with taurodontism including an oversized pulp chamber and two short roots with 37. The pulp chamber extending beyond the cervical area reaching the furcation was also seen suggestive of a hypertaurodont according to Shifman and Chanannel. No periapical radiolucency was seen associated with the apex of tooth 37. Crestal bone levels were seen to be within the normal limits. A final diagnosis of chronic irreversible pulpitis was given for the tooth 37. An inferior alveolar nerve block was administered using 2% lidocaine (1:100,000 epinephrine) to anesthetize tooth 37 and rubber dam isolation was done. All the subsequent procedures were performed using endodontic loupes. Proximal caries were excavated with a high-speed round bur. An access cavity was made, and pulp tissues were removed in the pulp chamber with copious irrigation with 2.5% sodium hypochlorite solution. Two canals (mesial and distal) were located and negotiated. Apical patency was determined with a size 10 K-file (DentsplyMaillefer, Ballaigues, Switzerland). The working length was established 1 mm short of the apical foramen, confirmed with a radiograph (Fig3,B) and biomechanical preparation was done using rotary ProTaper instruments (DentsplyMaillefer, Ballaigues, Switzerland) SX ,S1,S2 and F1 at the working length. Calcium hydroxide intracanal dressing was placed into the root canals for two weeks. After two weeks, calcium hydroxide intracanal dressing was removed using H-files alongwith copious irrigation using 2.5% sodium hypochlorite solution and 17% Ethylenediamine tetracetic acid (EDTA), using normal saline as the final rinse . Root canals were then obturated with Protaper gutta percha (Dentsply Maillefer, Ballaigues, Switzerland) and AH plus root canal sealer (Dentsply De Trey, Konstanz, Germany) (Fig 3,C and D). On the same day, a composite post-obturation restoration (3M ESPE, Filtek Z250, USA) was done.



**Figure 3:** (A) Pre-operative radiograph, (B) Working length, (C) Master cone, (D) Post-operative radiograph.

## DISCUSSION

Taurodontism may be frequently associated with other anomalies and syndromes.<sup>[4]</sup> However, in the present report both the individuals were health with no known diseases. A wide prevalence has been reported in such cases in different populations and has been found to range between 5.67% and 60% of subjects.<sup>[6,7]</sup>

Taurodontism presents a challenge during negotiation, instrumentation and obturation in root canal therapy, when considered from an endodontists perspective. This may be due to complexity of the root canal anatomy and proximity of buccal orifices. A modified obturation technique that is combined lateral compaction in the apical region with vertical compaction of the elongated pulp chamber may be considered in such cases.

Endodontic treatment of such teeth has been described as complex and difficult. According to Durret al.<sup>[8]</sup> aberrant morphology could hamper the location of the orifices, thus creating difficulty for the operator during instrumentation and obturation. Cohen and Taintor<sup>[9]</sup> presented 5 cases out of which two required endodontic therapy which was complicated and difficult to complete. According to a case presented by Hayashi et al.<sup>[10]</sup> only three out of five canals were located and could be obturated in a tooth having taurodontism. Success was mostly attributed to the use of magnification, such as the use of magnification loupes or endodontic microscope as reported in the present cases. In addition to this the use of high-end diagnostic imaging modalities such as spiral computerized tomography or cone beam computed tomography would help the operator to assess the number of canals confirmatory diagnosis of the multiple taurodontism or dens invaginatus.

## CONCLUSION

Teeth with taurodontism show wide variations in the size and shape of pulp chambers, with varying degrees of obliteration and canal complexity, low canal orifices, and the possibility of additional root canal systems. Thus, careful attention should be given for exploring canal complexities. Use of magnification aids, ultrasonic irrigation; and a modified filling technique should be used for treatment of such teeth. Taurodontism is an endodontic challenge and with the use of advanced diagnostic aids like Cone Beam Computed Tomography, a better understanding of the varied root canal anatomy, management of such complicated cases may be possible.

## REFERENCES

1. Hamner JE, Witkop CJ, Metro PS. Taurodontism. Report of a case. *Oral Surg Oral Med Oral Pathol*1964;18:409–18.
2. Contemporary terminology for endodontics. Glossary. American Association of Endodontists, 1998.
3. Hamner JE, Witkop CJ, Metro PS. Taurodontism. Report of a case. *Oral Surg Oral Med Oral Pathol*1964;18:409–18.
4. Regezi JA, Scuibba JJ. Oral pathology: clinical pathologic correlations. WB Saunders Company, 1999:458.
5. Shifman A, Chanannel I. Prevalence of taurodontism found in radiographic examination of 1200 young adult Israeli patients. *CommunityDent Oral Epidemiol* 1978;6:200–3.
6. Darwazeh AM, Hamasha AA, Pillai K. Prevalence of taurodontism in Jordanian dental patients. *DentomaxillofacRadiol.* 1998;27:163–5.
7. Rao A, Arathi R. Taurodontism of deciduous and permanent molars: report of two cases. *J Indian Soc Pedod Prev Dent.* 2006;24:42-4.
8. Durr DP, Campos CA, Ayers CS. Clinical significance of taurodontism. *J Am Dent Assoc* 1980;100:378–81.
9. Cohen DM, Taintor JF. Bilateral taurodontism. *Quintessence Int* 1980;9:9–16.
10. Hayashi Y. Endodontic treatment in taurodontism. *J Endodon* 1994;20:357–8.

**Source of support:** Nil

**Conflict of interest:** None declared

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