CASE REPORT

Taurodontism

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SUMMARY

Taurodontism leads to constriction of the cemento-enamel junction, which results in vertically elongated pulp chambers, apical displacement of the pulpal floor, and bifurcation or trifurcation of the root. This trait can be seen in permanent and primary teeth, in a single tooth or in several molars in the same quadrant, and can be unilateral or bilateral. We report a rare case of a 26-year-old male patient presenting with taurodontism involving all the developed molars of all four quadrants, which was not associated with any other anomalies or syndromes.

BACKGROUND

Taurodontism can be defined as a change in tooth shape caused by the failure of 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 cemento-enamel junction (CEJ) are the characteristic features. Although permanent molar teeth are most commonly affected, this change can also be seen in both the permanent and deciduous dentition, unilaterally or bilaterally, and in any combination of teeth or quadrants.¹

CASE PRESENTATION

A 26-year-old man presented with pain in his left lower second molar. The tooth had been subjected to emergency pulpotomy by a general dentist because of irreversible pulpitis. The patient's medical history was unremarkable. Intraoral examination revealed a normal-shaped crown with temporary occlusal restoration (figure 1).

INVESTIGATIONS

Radiographic examination of the affected tooth revealed the presence of an ill-defined radiolucency in the mesial root suggestive of a periapical abscess. In addition, an abnormal tooth anatomy was seen. The radiographic findings revealed that there was enlargement of the crown at the expense of roots. Apical extension of the pulp chamber below the CEJ, along with apical displacement of bifurcation of roots was seen. Minimal constriction at the level of CEJ was also noted (figure 2).

An orthopantomograph revealed that all the permanent molars presented with enlarged pulp chambers with short roots such that the distance from the bifurcation of the roots to the CEJ was greater than the cervico-occlusal distance. Another interesting feature was the presence of multiple pulp stones occupying the pulp horns of all the permanent molars (figures 2 and 3).

DIFFERENTIAL DIAGNOSIS

- ▶ Pseudo-hypoparathyroidism
- ▶ Hypophosphatasia
- ▶ Hypophosphataemic vitamin D-resistant
- ▶ Dependent rickets

TREATMENT

In our case, patient was referred to the department of endodontics for pulpectomy in the affected tooth.

OUTCOME AND FOLLOW-UP

The prognosis for the current case was good.

DISCUSSION

In 1913, Keith coined the term 'taurodontism' to describe this unusual tooth form. Keith defined taurodontism as 'a tendency for the body of the tooth to enlarge at the expense of the roots. It is a tendency to assume the condition seen in the bulls.' The term's origin is from the Greek word tauros, which means 'bull', and the word odontos, which refers to 'tooth'. Keith termed the 'opposite condition' that is seen in the teeth of carnivora, where the body of the tooth is above the alveolar border: 'cynodontism' or doglike teeth.

Shaw, in 1928, classified subtypes of the condition as 'hypotaurodontism', 'mesotaurodontism' and 'hypertaurodontism' to more accurately define the degree to which this condition manifests. Witkop defined taurodontism thus: 'Taurodont teeth have pulp chambers in which the bifurcation or trifurcation is displaced apically, so that the chamber has a greater apico-occlusal height than in cynodont teeth and lacks a constriction at the level of the CEJ. The distance from the bifurcation or

Figure 1 Intraoral picture showing normal appearing crowns.

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Figure 2 Intraoral periapical radiographs showing enlarged pulp chambers with multiple pulp stones.

trifurcation of the roots to the CEJ is greater than the occlusal-cervical distance'.²

Hypotaurodontism is the moderate enlargement of the pulp chamber at the expense of the roots. In mesotaurodontism, pulp is quite large and the roots are short, but still separate.¹ Hypertaurodontism consists of prismatic or cylindrical forms where the pulp chamber nearly reaches the apex and then breaks up into two or four channels.¹

The incidence of taurodontism has been reported to be lower than 1% in modern man and 3% in primitives, Eskimos and American Indians. This retrograde or atavistic feature is because of its decrease in the incidence.³

Aetiology of taurodontism is diverse and is commonly attributed to the failure of invagination of the epithelial root sheath sufficiently early to form the cynodont. Autosomal transmission of the trait has also been observed.⁴

The possible causes of taurodontism have been enumerated by Mangion as follows:

- ▶ A specialised or retrograde character;
- ▶ A primitive pattern;
- ▶ A Mendelian recessive trait;
- ▶ An atavistic feature;
- ▶ A mutation resulting from odontoblastic deficiency during dentinogenesis of the roots.

This anomaly either can appear as an isolated trait or may be associated with certain disease such as hypophosphatasia or alterations of the sex chromosome such as Klinefelter's syndrome, Down's syndrome, X-chromosome aneuploid syndrome with

ectodermal defects, Mohr's syndrome, tricho-dento-osseous syndrome and Maroteaux-Lamy syndrome.³

Clinically, a taurodont appears as a normal tooth. In fact, because the body and roots of a taurodont tooth lie below the alveolar margin, its distinguishing features cannot be recognised clinically. Therefore, the diagnosis of taurodontism is usually a subjective determination made from diagnostic radiographs.¹

The most frequently affected teeth are the molars. The distance between the baseline connecting the two CEJ and the highest point in the floor of the pulp chamber are used in determining taurodont teeth. Taurodontism is diagnosed in molars when this distance exceeds 2.5 mm.

The radiographic characteristics of taurodont tooth are the extension of the rectangular pulp chamber into the elongated body of the tooth, shortened roots and root canals and location of furcation despite a normal crown size. It should be noted that taurodontism may be masked by wear-induced secondary dentine deposition, so caution should be employed in interpreting an expression of taurodontism in heavily worn molars.¹ Differential diagnosis is in the early stages of dentinogenesis imperfecta, where the appearance may resemble the large pulp chambers found in taurodontism.¹ Moreover, the developing molars may appear similar to taurodents; however, an identification of wide apical foramina and incompletely formed roots helps in the differential diagnosis.¹

The most important aspect of this dental anomaly is in view of difficulties encountered in performing endodontic treatment. Owing to the complexity of the root canal anatomy and the proximity of the buccal orifices, complete filling of the root canal system in taurodontism is challenging. A modified filling technique has been proposed, which consists of combined lateral compaction in the apical region with vertical compaction of the elongated pulp chamber, using the system B device (EIE/Analytic Technology, San Diego, California, USA).¹ The extraction of a taurodont tooth is complicated because of the dilation of roots in the apical third. In contrast, it is also believed that because of its large body, little surface area of a taurodont tooth is embedded in the alveolus. This feature would make extraction less difficult as long as the roots are not widely divergent.⁵

To conclude, importance should be given to the value of diagnostic radiographs for early detection of taurodents and rendering preventive care to such teeth.⁴ Further studies should be directed towards the possibilities that general disturbance affecting the dental tissue may play a role in aetiology of the taurodontism of modern man.³

Figure 3 An orthopantomogram showing minimal constriction at cemento enamel junction (CEJ) in all permanent molars, short roots and increased distance from the bifurcation/trifurcation to CEJ as compared with cervico-occlusal distance.

Learning points

- ▶ Pulp therapy for taurodontism is a challenging task.
- ▶ Increased haemorrhage during access opening may be mistaken for perforation.
- ▶ Since the roots are short and pulpal floor is placed apically, care should be taken to prevent perforation.
- ▶ Conventional obturating materials like zinc oxide eugenol in such a bulk may take longer time to resorb which may delay the natural exfoliation of the tooth in the case of primary dentition.
- ▶ In the case of permanent dentition, because the pulp is voluminous, in order to ensure complete removal of the necrotic pulp, 2.5% sodium hypochlorite has been suggested initially as an irrigant to digest pulp tissue.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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 Jasper M, Witkop C. Taurodontism, an isolated trait associated with syndromes and X-chromosomal aneuploidy. *Am J Hum Genet* 1980;32:396–413.
- 3 Bhat S, Sargod S, Mohammed SV. Taurodontism in deciduous molars—a case report. *J Indian Soc Pedo Prev Dent* 2004;22:193–6.
- 4 Ashwin R, Arathi R. Taurodontism of deciduous and permanent molars: report of two cases. *J Indian Soc Pedod Prev Dent* 2006;1:42–4 .
- 5 Bharti R, Chandra A, Tikku AP, *et al*. Taurodontism an endodontic challenge—a case report. *J Oral Sci* 2009;51:471–4.

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