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TAURODONTISM-A REVIEW

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ABSTRACT

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. The characteristic feature of taurodontic teeth are an enlarged pulp chamber, apical displacement of the pulpal floor, and no constriction at the level of the cement-enamel junction.

KEYWORDS: Taurodontism, taurodont, hertwig's epithelial root sheath (HERS), enlarged pulp chamber.

INTRODUCTION

Taurodontism is a morpho-anatomical change in the shape of the tooth in which the body of the tooth is enlarged and the roots are reduced in size. It is characterized by enlargement of the pulp chamber, which may approximate of the root apex, with the body of the tooth enlarged at the expense of the roots and apically displaced furcation areas.[1]

Taurodontism was first described by Gorjanovic´-Kramberger (1908),[2] However the term "taurodontism" ('bull tooth') was coined from the Latin word "tauros", which means 'bull'and the Greek word "odus" , which means 'tooth'. Sir Arthur Keith in 1913 coined the term"taurodontism" and defined taurodontism as "a tendency for the body of the tooth to enlarge at the expense of the roots".[4] According to him, the taurodont molars are characterized by extension of the pulp chamber well below the level of alveolar crest and cemento-enamel junction.[3]

Witkop defined Taurodontism as " Teeth with large pulp chambers in which the bifurcation or trifurcation are displaced apically, so that the chamber has greater apico-occlusal height

than in normal teeth and lacks the constriction at the level of cemento-enamel junction (CEJ). The distance from the trifurcation or bifurcation of the root to the CEJ is greater than the occluso-cervical distance".[4]

ETIOLOGY

There are various theories concerning the etiology of taurodontism: a) a specialized or retrograde character; b) a primitive pattern; c) a Mendelian recessive; d) an atavistic feature and e) a mutation (Mangion, 1962; Hammer et al, 1964).

The pathogenesis of taurodontism includes

a) An unusual developmental pattern

b) A delay in calcification of the pulp chamber floor

c) An odontoblastic deficiency

d) An alteration in Hertwig's epithelial root sheath, with an apparent failure of the epithelial diaphragm to invaginate at the normal horizontal levels and

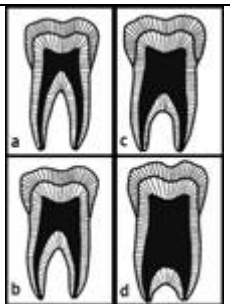
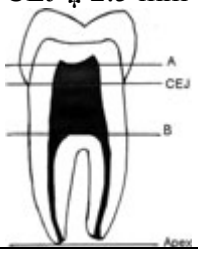
e) A delayed or incomplete union of the horizontal flaps of the epithelial diaphragm(Shafer, 1999).[5]

Taurodontism often occur with other anomalies although many isolated cases have been reported. It has been found to occur as a part Down's syndrome, and many other less common syndromes. Taurodontism has also been reported associated with Dwarfism, Cleftpalate and other dental anomalies such as hypodontia, microdontia and dens invaginatus, amelogenesis imperfecta, ectodermal dysplasia etc.[2] Taurodontism has also been reported to present with other rare syndromes such as Smith-Magenis syndrome, Williams syndrome, McCune-Albright syndrome and Van der Woude syndrome, Mohr syndrome, and Kline Felter's syndrome.[1]

CATEGORIZATION

Different categorization indices have been proposed in the literature and are listed below

Author(s)/year	Criteria	Categories
Shaw 1928	External morphological criteria (based on the relative amount of apical displacement of the pulp chamber floor)	**Hypotaurodont**: moderate enlargement of the pulp chamber at the expense of the roots **Mesotaurodont**: pulp is quite large and the roots short but still separate

	 a) cynodont b) hypotaurodont c) mesotaurodont d) hypertaurodont	**Hypertaurodont**: prismatic or cylindrical forms where the pulp chamber nearly reaches the apex and then breaks up into 2 or 4 channels Single or pyramidal root (cuneiform): usually in the lower second molar where the pulp extends throughout the root without cervical constriction and exits via a single wide apical foramen
Keene 1966	'Taurodont Index' (related the height of the pulp chamber to the length of the longest root)	Cynodont: index value of 0–24.9% Hypo-T: index value of 25–49.9% Meso-T: index value of 50–74.9% Hyper-T: index value of 75–100%
Shifman & Chananel 1978	Point A: lowest point at the occlusal end of the pulp chamber Point B: highest point at the apical end of the chamber (distance from A to B)/(distance from A to the apex of the longest root) ‡0.2 Distance from B to CEJ ‡ 2.5 mm 	Hypo-T:20–20.9% Meso-T:30–39.9% Hyper-T: 40–75%

ANATOMICAL CHARACTERISTICS

In taurodontism, the pulp chamber is extremely large and elongated with much greater apicoocclusal height than normal and, thus, extends apically below the CEJ. The CEJ constriction is less marked than that of the normal tooth, giving the taurodont a rectangular shape. Also, the furcation is displaced apically, resulting in shorter roots whilst enlarging the body of the tooth.

CLINICAL/ RADIOGRAPHIC FEATURES

Taurodontism is seen more commonly in permanent dentitions and is found to be a rare occurrence in primary dentitions. The second permanent molar is most commonly involved.

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 recognized clinically. Therefore, the diagnosis of taurodontism is usually a subjective determination made from diagnostic radiographs.

The radiographic characteristics of taurodont tooth are: extension of the rectangular pulp chamber into the elongated body of the tooth, shortened roots and root canals, location of furcation (near the root apices), 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.[2]

DIAGNOSIS

The external features have been primarily used for the diagnosis of taurodontism. However, it should be noted that gross external characteristics are not sufficient to generate diagnosis. In many cases, precise biometric methods are essential in diagnosis of taurodontism. Tulensalo et al. (1989) examined a simple method of assessing taurodontism using orthopantomograms by measuring the distance between the baseline (connecting the mesial and distal points of the CEJ and the highest point of the floor of the pulp chamber. They concluded that this technique is reliable in epidemiologic investigations for assessing taurodontism in a developing dentition.

DIFFERENTIAL DIAGNOSIS

In certain metabolic conditions including pseudo-hypoparthyroidism, hypophosphatasia, and hypophosphatemic vitamin D-resistant and dependent rickets, the pulp chamber may be enlarged but the teeth are of relatively normal form. Another differential diagnosis is in the early stages of dentinogenesis imperfecta, where the appearance may resemble the large pulp chambers found in taurodontism. Moreover, the developing molars may appear similar to taurodonts; however, an identification of wide apical foramina and incompletely formed roots helps in the differential diagnosis.[2]

CLINICAL CONSIDERATIONS

The clinical implication of taurodontism has potentially increased risk of pulp exposure because of decay anddental procedures. Taurodontism may complicate orthodontic and/or prosthetic treatment planning. Taurodontism, although not very common has to be emphasized due to its influence on various dental treatments.

Endodontic considerations*:* A taurodont tooth shows wide variation in the size and shape of the pulp chamber, varying degrees of obliteration and canal configuration, apically positioned canal orifices, and the potential for additional root canal systems. Recent diagnostic imaging modalities such as CBCT and spiral computerized tomography are useful in making a confirmatory diagnosis of the multiple morphologic abnormalities such as taurodontism, dens invaginatus, and pyramidal cusps of the premolars and dens evaginatus. During endodontic treatment taurodontism presents a challenge in negotiation, instrumentation and obturation.Because the pulp of a taurodont is usually 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. Moreover, as adequate instrumentation of the irregular root canal system cannot be anticipated, Widerman & Serene (1971) suggested that additional efforts should be made by irrigating the canals with 2.5% sodium hypochlorite in order to dissolve as much necrotic material as possible. Application of final ultrasonic irrigation may ensure that no pulp tissue remains. 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. A modified filling technique, which consists of combined lateral compaction in the apical region with vertical compaction of the elongatedpulp chamber, has been proposed.

Another endodontic challenge related to taurodonts is intentional replantation. The extraction of a taurodont tooth is usually complicated because of a dilated apical third. In contrast, it has also been hypothesized that because of its large body, littlesurface 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. Finally, it should be noted that in cases of hypertaurodont (where the pulp chamber nearly reaches the apex and then breaks up into two or four channels) vital pulpotomy instead of routine pulpectomy may be considered as the treatment of choice.[2]

Pedodontic consideration

Pulp therapy for taurodonts is a challenging treatment, with increased incidence of haemorrhage during access opening which 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 bulk may take longer time to resorb which may delay the natural exfoliation of the tooth. In such cases combination of calcium hydroxide can act as a wonderful material due to its resorption rate. Endoflas as an

obturating material can be used, which is a combination of zinc oxide eugenol, iodoform, calcium hydroxide and barium sulphate. This material has added advantage of faster rate of resorption due to presence of calcium hydroxide and iodoform.[5]

Surgical considerations: The extraction of a taurodont tooth is usually complicated because of shift in the furcation to apical third. In contrast, it has also been hypothesized that the large body with little surface areaof a taurodont tooth is embedded in the alveolus. This feature would make extraction less difficult as long asthe roots are not widely divergent. It is reported that extraction of such teeth may not be a problem unless theroots are not widely divergent. However, some authors believe that hypertaurodonts may pose some problem during extraction because of apical shift of furcation and also due to difficulty in placement of forceps beaks. This problem can be resolved by proper usage of surgical tooth elevators.

Prosthetic considerations: For the prosthetic treatment of a taurodont tooth, it has been recommended that post placement be avoided for tooth reconstruction. Because less surface area of the tooth is embedded in the alveolus, a taurodont tooth may not have as much stability as a cynodont when used as an abutment foreither prosthetic or orthodonticpurposes. The lack of a cervical constriction would deprive the tooth of the buttressing effect against excessive loading of the crown.[1]

Periodontal considerations: From a periodontal view taurodont teeth may, in specific cases, offer favourable prognosis. Where periodontal pocketing or gingival recession occurs, the chances of furcation involvement are considerably less than those in normal teeth because taurodont teeth have to demonstrate significant periodontal destruction before furcation involvement occurs.

CONCLUSION

Though taurodontic teeth were presumed to be classical characteristic of Neanderthal man, they still present as a morphologic entity in modern man.This review attempts to address etiology, anatomic, radiographic features its association with other syndromes and clinical considerations in treatment of such teeth.It is very important for a general dental practitioner to be familiar with taurodontism not only with regards toclinical complications but also its management. Taurodontism also provides a valuable clue in detecting itsassociation with many syndromes and other systemic conditions.[1]

REFERENCES

1. Manjunatha BS, Kovvuru SK. Taurodontism –A Review on its etiology, prevalence anclinical considerations. J ClinExp Dent. 2010; 2(4): 187-90.
2. Jafarzadeh H, Azarpazhooh A, Mayhall JT Taurodontism: a review of the condition and endodontic treatment challenges. IntEndod J., 2008; 41: 375-388.
3. T.Saini, Dip ABOMR, C.A.Wilson-TAURODONT MOLARS- REVIEW OF LITERATURE AND RADIOLOGICAL FEATURES- The Saudi Dental Journal, 1990; 2(2).
4. Joshy.V.R, Maji Jose, Rajeesh Mohammed-TAURODONTISM OF MULTIPLE TEETH-A CASE REPORT. Oral and maxillofacial pathology journal(OMPJ), 2011; 2(1) jan-jun, ISSN 0976-1225.
5. ParimalaTyagi, Shilpy Gupta- Bilateral taurodontism in Deciduous Molars: A case Report-people's journal of scientific Research.