

Taurodontism and Concomitant Hypodontia: Their Orthodontic Significance

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ABSTRACT

Background: Taurodontism is a morpho-anatomical change in the shape of the tooth that has been found in the dentition of modern races. It is characterized by enlargement of the pulp chamber, which may approximate the root apex, with the body of the tooth enlarged at the expense of the roots and apically displaced furcation areas. Taurodontism influences the choice of treatment modality. The high incidence of taurodontism in hypodontic patients presents a clinical challenge for general dental practitioners and orthodontists alike. The present case report highlights various orthodontic implications to be followed while treating taurodontism associated hypodontia.

Keywords: Taurodontism, Hypodontia, enlarged pulp chamber, apically displaced furcation area.

INTRODUCTION

Taurodontism is an anomaly of tooth shape with vertically enlarged pulp chamber, apical displacement of the bifurcation and trifurcation, shortened roots and no constriction at the level of the cemento-enamel junction. The first report of taurodontism in modern man's dentition was published in 1909 by Pickerill, who used the term "radicular dentinoma" to describe the condition.¹ These unusually shaped teeth having a cylindrical or prismatic form were described in remnants of prehistoric hominids in 1903 by de Terra, in 1907 by Gorjanovic-Kramberger and Adloff.² From the observations of above authors it is evident that this tooth form is something different from the modern human dentition but no attempt was made to name these queer teeth.

In 1913, Keith coined the term "taurodontism". He defined taurodontism as "a tendency for the body of the tooth to enlarge at the

expense, of the roots."³ The term's origin is from the Greek- tauros, which means "bull," and odontos, which refers to "tooth." Keith also 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 dog like teeth.

Taurodontism is a morpho-anatomical change in the shape of the tooth that has been found in the dentition of modern races. 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. The pulp chamber has a greater apico-occlusal height than in cynodont teeth and lack of constriction at the level of the cemento-enamel junction. The distance from the bifurcation or trifurcation of the roots to the cemento-enamel junction is greater than the occlusal-cervical distance." The bifurcation or trifurcation may be only a few millimeters above the apices of the roots.

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Shaw⁴ in 1928 classified subtypes of the condition as "hypotaurodontism," "mesotaurodontism," and "hypertaurodontism" to more accurately define the degree to which this condition manifest. **(Fig.1)** Though there are many classification systems to determine the severity of taurodontism, Shifman and Chanannel in 1978 proposed a new classification and is the widely used system till now.⁵

The term hypodontia is used to describe agenesis of one to six teeth (excluding the third molars), oligodontia the absence of more than six teeth (excluding the third molars), and anodontia representing complete absence of teeth.⁶ Hypodontia can be an isolated condition or part of a syndrome. In the primary dentition, the prevalence is between 0.5 and 0.9 per cent, while oligodontia is rare, with an estimated prevalence of 0.25 per cent.⁷ In the permanent dentition, the most commonly missing teeth are the third molars, followed by either the lower second premolars or upper lateral incisors.^{8,9}

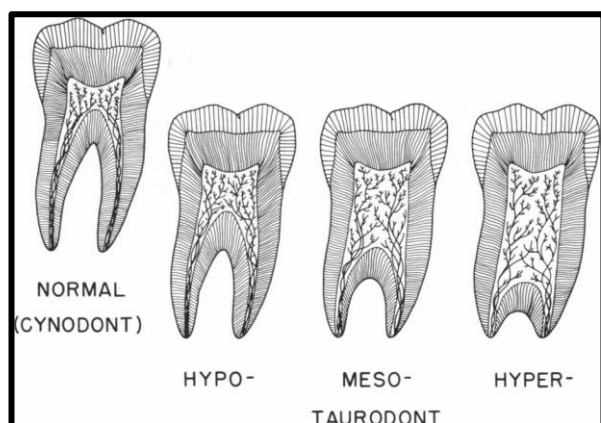


Fig 1: Diagrammatic representation of normal (cynodontic) tooth and three subclasses of taurodontic teeth as proposed by Shaw (1928)

CASE REPORT

A 24 years old male patient by name Chandrashekhar, visited the department with a chief complaint of spacings in between upper and lower front teeth. In the pre natal history, patient's mother was diagnosed with syphilis at the time of delivery. On intraoral examination, arches were v-shaped and symmetrical. Maxillary arch showed generalized spacings in upper anterior region, proclined anteriors, retained 65

(submerged), clinically missing 25, microdontia irt 15, paramolar irt 65 along with distolabial rotation of 24. The mandibular arch revealed retained 71, 75 and 81. Anterior overjet and overbite were 5mm respectively. Incisor relation is Class II div 1 and molar relation on both sides is end on and canine relation is class I on right side and class II on left side. Examination of orthopantomogram revealed retained teeth irt 65, 75. Congenitally missing 25, 35, 31, 41 and Taurodontism was seen in relation to molars. (Fig 2A-J)

DISCUSSION

Taurodontism was a frequent finding in early humans and is most commonly seen in Eskimos, possibly as a selective adaptation for cutting hide.¹⁰ Shaw⁴ reported the incidence to be as high as 30% in hybrids of Australoids and the Bush people of South Africa. Taurodontism has been found in Mongoloid and Negroid populations.¹¹ Although this anomaly is considered to be an atavistic feature by some researchers, taurodontism has been frequently reported in present day man with varying incidence rate ranging from 0.25% to 18%.¹² From the reports it is evident that the incidence of taurodontism in patients with oligodontia and hypodontia is considerably increased when compared to the frequency of non-syndrome isolated form. It is 29% in Dutch patients and 21.2% in Brazilian patients.¹³ Seow and Lai studied a sample of 66 hypodontia patients and found the prevalence of the condition to be 34.8%.¹⁴ Stenvik and Zachrisson found in their study sample almost one third of the mandibular first molars to be taurodont teeth.¹⁵ Taurodontism has been reported in many syndromes that also feature hypodontia. As many of these syndromes involve ectodermal defects, it is possible that hypodontia and taurodontism may both be manifestations of an ectodermal defect. In addition, taurodontism also is observed in some types of amelogenesis imperfecta, an aberration of ectodermal origin.¹⁶ In the present case report the association of taurodontism with hypodontia thus further supports the concept that taurodontism probably results from an alteration in Hertwig's epithelial root sheath which is an ectodermal derivative.¹⁷

Clinically the shorter and thinner roots of taurodont teeth are considerably more susceptible

to resorption when orthodontic forces are applied for their movement.¹⁸ In the present case it is

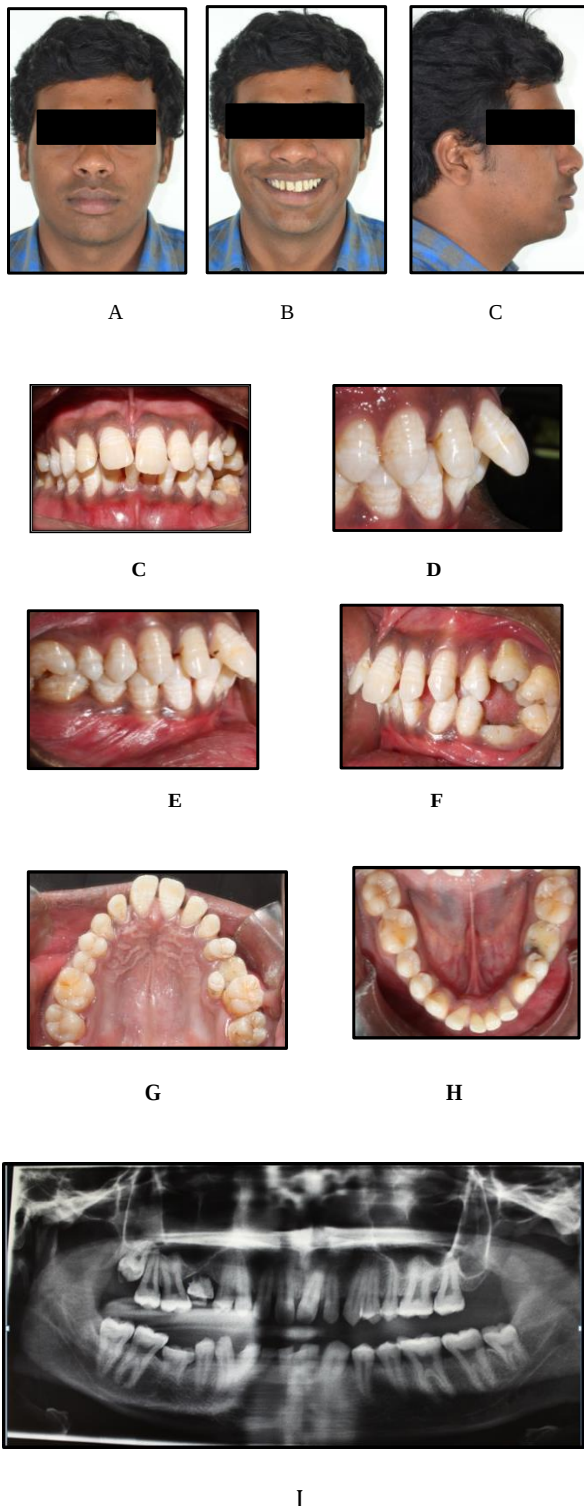


Fig 2 A: Pre-treatment extra-oral frontal view at rest B. at smile C. Profile View. D. Pre-treatment Intra oral photographs with Frontal Occlusion D.Overjet and overbite E. right occlusion. F.left occlusion G.Maxillary arch. H.Mandibular arch I. OPG.



Fig 2J: lateral cephalogram.

better to limit the orthodontic teeth movement to only leveling and aligning and opt for future prosthetic rehabilitation with fixed prosthesis. In case of taurodontia associated hypodontia where the treatment of choice is fixed prosthetic construction supported by taurodont teeth we should also take into account the teeth's long-term stability, the reason being that these teeth are of poor support when used as abutments. Their smaller root surface makes them become unstable when additional force is applied. In fixed prosthesis therapy it is reasonable to suggest that a taurodontic molar may not be considered an adequate abutment tooth since its smaller surface area may be less resistant to lateral displacing forces compared to cynodont teeth. When the treatment plan involves closing of spaces using the available teeth, for patients with hypodontia and taurodontism of molars, it is advisable that you should choose spontaneously closing gaps. This is possible with early extraction (8-9 years olds) of primary molar teeth. Permanent molars are mesialized naturally and the residual gaps remain within 1 to 2 mm. Thus the shorter distance significantly reduces the risk of root resorption in orthodontic movement of molars until all gaps are closed.

Several clinical complications may result from the abnormal morphology of a taurodontic tooth. In endodontic therapy, the extensive length of the pulp chamber may create difficulties in location of root canals and subsequent problems in cleaning and obturation. These difficulties are compounded by the presence of pulp stones and unusual apical root canal systems which often accompany taurodontism.¹⁹ By the same reasoning, it may be suggested that exodontia of taurodontic molars should be easier compared to cynodont teeth; however, difficulties have been reported.²⁰ It has been suggested that taurodontism may actually be advantageous from a periodontal aspect. This is due to the more apical location of the furcation which is thus less susceptible to periodontal disease.

CONCLUSION

Taurodontism influences the choice of treatment modality. The high incidence of taurodontism in hypodontic patients presents a clinical challenge for general dental practitioners and orthodontists alike. To successfully manage hypodontia associated taurodontia the orthodontist should be able to identify taurodont teeth and correctly include them in the treatment plan.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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