Localized deficient root development associated with taurodontism: case report

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Abstract

Dentinal dysplasia type I (DDI) is a rare disturbance in dentin formation. This case report illustrates different radiographic features from other reported DDI cases in that only one quadrant (lower right posterior teeth) has the characteristic of DDI and both right and left upper molars exhibit taurodontism. This finding might be a variation of DDI. However, it is possible that this type of developmental defect could occur because of regionalized abnormalities in cellular function and proliferation as occurs in regional odontodysplasia. (Pediatr Dent 21:213-215, 1999)

Dentinal dysplasia (DD), a rare abnormality of dentin formation, occurs in approximately 1:100,000 prop ositi.[1,2] The condition is apparently inherited as an autosomal dominant trait. Ballschmiede[3] first described this anomaly in 1920 and called the condition "rootless teeth" because of the appearance of the root when multiple teeth exfoliated spontaneously in seven children of the same family. Rushton[4] in 1939, was the first person to use the term "dentinal dysplasia" (DD) in literature.

Shields et al.[5] classified heritable human dentin defects into types I and II. They described DDI involving primary and permanent dentition as teeth with crowns of normal shape, form, and consistency but with short roots, typically with sharp, conical, apical constriction. Total pulp obliteration is most common in primary teeth. Pre-eruptive pulpal obliteration in permanent teeth may result in a crescent-shaped pulp chamber remnant parallel to the cemento-enamel junction. Pulp stones are often present and obliteration of the pulp usually occurs. Periapical radiolucencies are frequently noted in noncarious teeth.[2,7,10,11] In 1975, Witkop[6] used the term radicular dentin dysplasia for dentin dysplasia type I (DDI) and coronal dentin dysplasia for type II (DDII). Type II dentinal dysplasia presents a very different clinical and radiographic picture. In type II, the primary teeth have amber translucent appearance. The permanent teeth are of normal colonation. Radiographically, the pulp chambers of the primary teeth are completely obliterated, while the pulp chambers of the permanent dentition are evident. These pulp chambers have been described as u-shaped. No multiple periapical radiographs have been reported to be associated with dentinal dysplasia, type II.[5]

Taurodontism, bull-like teeth, was first reported in 1913 by Sir Arthur Keith,[14] to describe molar teeth in which the body tends to enlarge at the expense of the roots. Modern man's teeth have pulp chambers that are relatively small, set low in the crown, and have a constriction of pulp chambers at approximately the cementoenamel junction, and are called cynodont. Taurodontism has diverse possible causes,[6] including failure of invagination of epithelial root sheath sufficiently early to form

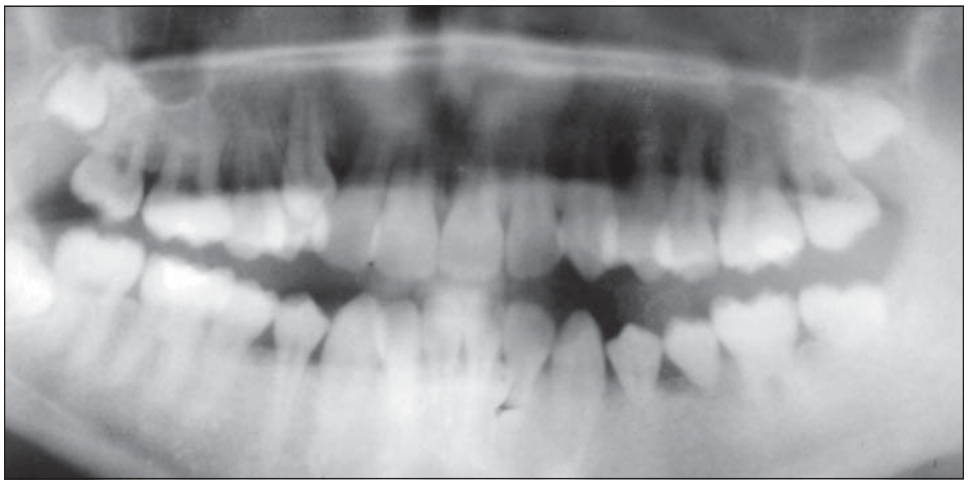

Fig 1. Panoramic radiograph shows short conical, mishappened roots of teeth number 18,19,20, and 21; teeth number 2, 3, 14, and 15 are classified as taurodontism.

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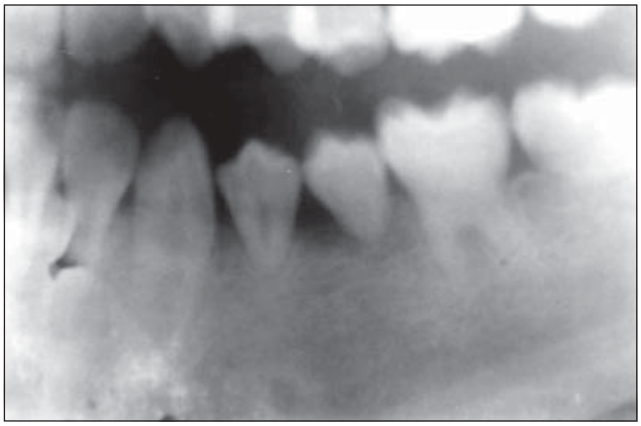

Fig 2. A close-up of the panoramic radiograph concentrating on the lower left quadrant depicts teeth number 18, 19, 20, and 21 having short, conical, and misshapen roots with partially obliterated pulp chambers. There was a radiolucency around the root of the tooth number 20.

the cynodont or as a variant of the pulp chamber form which may or may not arise as a result of abnormal dentin development. Taurodontism can appear either as an isolated trait or in combination with other anomalies such as hypodontia, amelogenesis imperfecta, Down's Syndrome, Klinefelter's Syndrome, or tricho-dento-osseous (TDO) syndrome.[15, 16, 17]

Case Report

A healthy 12.5 year old hispanic female was referred by her dental practitioner to New York University Department of Pediatric Dentistry for investigation of "blunt roots" in teeth 18, 19, 20, and 21 and for orthodontic treatment. Her weight and height were in the 95th percentile and her medical history was noncontributory. Oral examination revealed a permanent dentition of normal size and appearance. According to her previous dental records her primary teeth were of normal appearance and exfoliation times were normal.

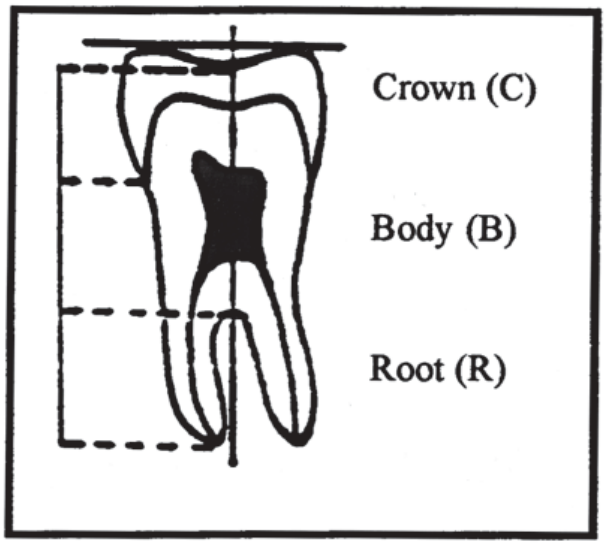

Fig 3. On the panoramic radiograph, measurements of crown and root lengths of the molars were determined by drawing lines through the deepest pit, the furcation, and the root apex parallel to an occlusal line joining the cusp tips. The crown-body (CB) length was determined along vertical axis drawn at right angles to the occlusal lines measured from the deepest pit to the furcation. Similarly, the root (R) length was determined along the same vertical axis from the furcation to the root apex.

Table 1. Crown-Body to Root Ratios (CB:R)

Tooth	CB:R	Classification
2	1.81	Mesodont
3	1.84	Mesodont
14	1.75	Mesodont
15	1.83	Mesodont

A panoramic dental radiograph (Figs 1 and 2) demonstrated a permanent dentition having short, conical, misshapen roots of teeth 18, 19, 20, and 21 with partially obliterated pulp chambers. Furthermore, a radiolucency around the root of tooth 20 was evident. The right cuspid, tooth 6, was impacted and tooth 17 was congenitally missing. There was evidence of pulp stones in the other molars, especially teeth 2, 3, 14, and 15, which are classified also as taurodontism (mesodont) by crown root ratio (Figs 3 and 4, Table 1). The remaining teeth appeared normal.

The patient originally presented with a Class II Division I malocclusion, bilateral posterior crossbite, deep overjet, and mild crowding in both dental arches. She had orthodontic treatment by her private practitioner in 1991. Treatment consisted of a fully banded edgewise appliance with the understanding that additional root resorption in the affected teeth or any other teeth could result in their loss and or discontinuation of orthodontic treatment.

Discussion

Shields et al.[5,7] classified hereditary dentinal dysplasia into types I and II in 1973. In type II, the permanent dentition has brown-gray coloration and, in addition to pulp stones, it has thistle-tube deformity of the pulp cavity. Typical of this type, the root length appears normal. In type I, as in this case report, the permanent and primary dentitions are of normal color and shape. The teeth have short or missing roots, typically with sharp, conical, apical construction. Pulp obliteration may also be found in cases of pulp obliteration with periapical disease. The preferred treatment is surgery, while calcified canals without symptoms or periapical lesions are best left untreated.[22]

In this case report, the patient was in permanent dentition with normal size and shape. As illustrated in the panoramic radiograph (Figs 1, 2), only the teeth in the mandibular left posterior region had short roots (teeth 19, 20, and 21), tooth 18 was rootless, and tooth 20 had periapical radiolucency. As to the disposition of this particular tooth, unfortunately, the child did not wish to return for re-evaluation. Pulp stones were present in the remaining posterior molars (teeth 2, 3, 14, 15, 30, and 31). Pulp stones are calcified bodies with an organic matrix. Pulp stones occur most frequently in the coronal pulp.[23] Teeth 2, 3, 14, and 15 were diagnosed as taurodontism (mesodont). These characteristics conform to the description of DDI that the teeth have short or missing roots involving pulp obliteration and periapical radiolucencies in noncarious teeth.

According to Witkop,[6] taurodontism is probably not an intrinsic defect in dentin formation but more likely an anomaly arising from a failure of sufficient invagination of epithelial root sheath. It has a variant pulp chamber which may or may not

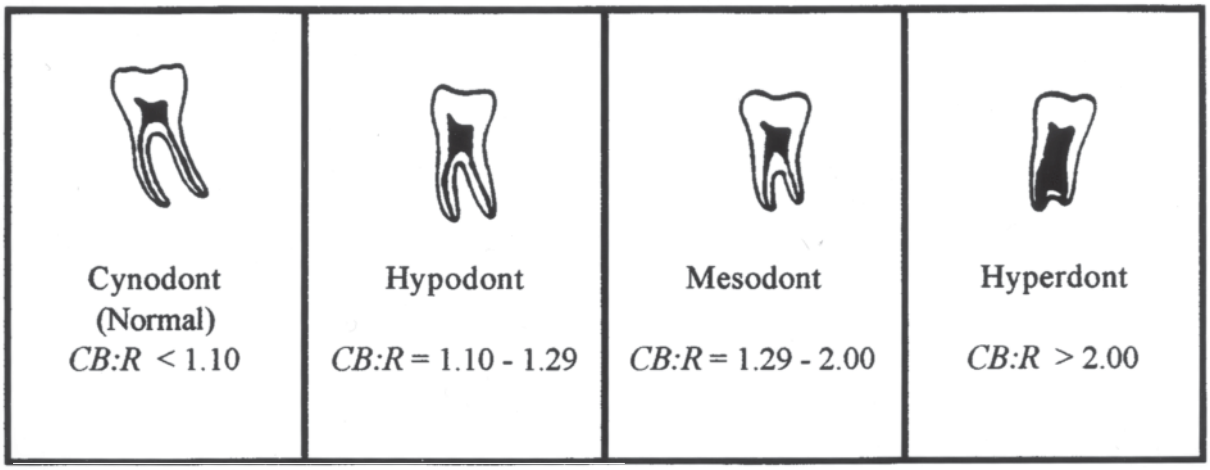

Fig 4. Diagrammatic representation of the three classes of taurodontism.

arise as a result of abnormal dentin development. In this case, teeth 2, 3, 14, and 15 were diagnosed as taurodontism (mesodont). It might be postulated that abnormal dentin formation in DDI caused different teeth morphology as teeth 2, 3, 14, and 15 developing towards taurodontism, teeth 19, 20, and 20 having short roots, and tooth 18 being rootless.

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