Taurodontism in premolars and supernumerary teeth – report of an unusual association.

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Abstract
Taurodontism is a tooth anomaly characterized by an enlarged pulp chamber and an apical displacement of the pulpal floor. It’s more prevalent in molar teeth, with few cases reported in premolars. Objective: To describe bilateral taurodontism in lower premolars associated with supernumerary teeth in a young patient. Case report: 10-year old female patient evaluated in a routine appointment. Clinical examination revealed amelogenesis imperfecta in all first molars and lower left central incisor, fluorosis in upper central incisors and multiple carious lesions. Panoramic and periapical X-rays revealed bilateral taurodontic first lower premolars and bilateral supernumerary teeth between the roots of first and second lower premolars. Conclusion: Clinical examination of a pediatric patient must always be complemented by a panoramic X-ray. In specific cases other imagiologic exams should be realized. Early diagnose of these situations has particular importance since many developmental disturbances have their more visible manifestations in childhood.

Key Words: Taurodontism; supernumerary teeth; radiology

Introduction
Taurodontism is a developmental disturbance of a tooth that lacks constriction at the level of the cement-enamel-junction (CEJ) and is characterized by vertically elongated pulp chambers, apical displacement of the pulpal floor and bifurcation or trifurcations of the roots (1-4). The pulp chamber, in these teeth, is very wide in the crown-root dimension, without changing the external morphology (5) or the intra-osseous part of the tooth.

The etiology of taurodontism is unclear (6). The possible causes of taurodontism have been enumerated by Mangion as follows: 1) specialized or retrograde character, 2) primitive pattern, 3) a Mendelian recessive trait, 4) an atavistic feature, and 5) a mutation resulting from odontoblastic deficiency during dentinogenesis of the roots (1).

According to Hamner et al., taurodontism is caused by the failure of Hertwig’s epithelial sheath diaphragm to invaginate the proper horizontal level (5, 7, 8).

Taurodontism is more prevalent in molar teeth, with few cases reported in premolars (3, 9). The main radiologic characteristics we can find in taurodontic teeth are: 1) a lower cervical constriction (can make teeth appear almost rectangular), 2) a broad, prism-shaped root with cervical and apical thickening, 3) a dilated bifurcated and slightly concave root, and 4) enlargement of the pulp chamber with root bifurcation (10). The pulp chamber is wider than usual, fact that can be seen without any doubt in radiographs.

In 1928, Shaw classified taurodontism into hypo-, meso- and hypertaurodontism (10, 11). In 1978, Shifman and Chanannel created an index to calculate the degree of Taurodontism. According to them, a tooth is considered as taurodont if the distance from the lowest point of roof of the pulp chamber (A) to the highest point of the floor (B), divided by the distance from A to the root apex (C) is equal to or greater than 0,2mm, and when the distance from B to the CEJ (D) is greater than 2,5mm (11, 12) (Fig.1).
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Supernumerary teeth are extra teeth or toothlike structures (13) that exceed the normal dental formula (14) or the presence of teeth additional to the normal series in the dental arches.

The etiology of supernumerary teeth is thought to be multifactorial, with involvement of environmental and genetic factors (6, 15, 16). Many authors have tried to explain the phenomena. Gardiner suggested three possible mechanisms, including an abnormal proliferation of the dental lamina, an additional follicle, and an extension of the dental lamina after the deciduous as well as permanent follicles (post-permanent type) (17).

This condition is a relatively common tooth anomaly, reported ranging from 0,1 to 3,8% in Caucasians and males being more affected than females (15), which can occur as an isolated change or as part of syndromic manifestation (13). These teeth are more frequent in the permanent dentition (6, 18) and can be found in any location both in the maxilla and in the mandible, being more frequently present at the maxilla (90 to 95%), particularly in the pre-maxilla region. The occurrence of supernumerary teeth may be single or multiple, unilateral or bilateral, erupted or unerupted, eumorphic or dismorphic, in both jaws. One supernumerary tooth is displayed in 76–86 per cent and two teeth in 12–23 per cent of hyperdontia (13).

Non syndromic supernumerary teeth are not commonly associated with other developmental problems in the oral cavity, and in most of cases are asymptomatic (19), apart from local obstruction to erupting adjacent teeth and an increased risk for dentigerous cyst formation (13). Other possible consequences include disturbed tooth eruption, tooth rotation, bodily displacement, crowding, spacing or diastemata of normal teeth (13).

Among supernumeraries, supernumerary premolars are special in terms of their late development and recurrence. The mechanism of post-permanent supernumerary teeth is possible owing to the fact that supernumerary premolar root development is considerably delayed for 7–10 years (17).

The association between taurodontism and supernumerary teeth is more frequently found in boys and these teeth are generally located in the maxillary anterior region (13).

Case Report

A 10-year-old female patient went to Catholic University Dentistry Clinic, Viseu, Portugal for a dental checkup. Medical history revealed a head injury at two years of age and a bronchopneumonia. Her mother declared a very painful pregnancy, with administration of many drugs. The
patient was submitted to a general anesthesia surgical intervention for extraction of all deciduous teeth.

An extraoral examination did not reveal any relevant findings. Intraoral examination revealed all permanent teeth erupted, the presence of carious lesions in the first molars and in premolars, ectopic eruption of the superior right canine, amelogenesis imperfecta in all first molars and lower left central incisor, and fluorosis in the upper central incisors.

Panoramic image (Fig. 2) showed wide and elongated pulp chambers at both first lower premolars, bilateral supernumerary teeth between the roots of first and second lower premolars and incomplete apical formation in the upper and lower first molars. Periapical X-rays (Figs. 3 and 4) showed biradicular premolars, with an apical displacement of the pulp floor. Supernumerary teeth are shown with more detail, demonstrating that the germen of the right side (Fig.3) is much more developed than the one in the left side (Fig. 4). Taurodontism index was applied, with a high score, confirming the diagnostic of taurodontism. Both premolars were classified as hypertaurodontic (Table 1). As part of the dental treatment plan, caries were eliminated and pits and fissures sealants were applied. Surgery of the supernumerary teeth are planned, along with orthodontic treatment.

Table 1: Results achieved by Shifman and Channanel index.

<table>
<thead>
<tr>
<th>Tooth</th>
<th>AB</th>
<th>AC</th>
<th>BD</th>
<th>IT</th>
<th>Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower left first premolar</td>
<td>7mm</td>
<td>14mm</td>
<td>6mm</td>
<td>50%</td>
<td>Hypertaurodontism</td>
</tr>
<tr>
<td>Lower right first premolar</td>
<td>8mm</td>
<td>15mm</td>
<td>5mm</td>
<td>53%</td>
<td>Hypertaurodontism</td>
</tr>
</tbody>
</table>

Figure 2: Orthopantomography revealing bilateral taurodontism of first lower premolars, and bilateral supernumerary teeth between the roots of first and second lower premolars.
Discussion

This report of a young patient with taurodontic and supernumerary teeth highlights the importance of an integrated evaluation, with contributions of clinical and radiological examination.

Taurodontism is a dental abnormality, which has some clinical implications in areas such as prosthetics, oral surgery, orthodontics, periodontics and endodontics. In order to achieve the best treatment of these teeth and prevent complications we must do a correct radiographic diagnosis (5).

According to Barthi et al, the occurrence of taurodontism in these days is considered as an anatomic variant that occurs in a normal population. The prevalence of taurodontism is reported to range from 2.5% to 11.3% of the human population, but is accounted for variations in race and differences in diagnosis criteria (1).

In Europe many studies have been conducted to determine the prevalence of taurodontism in the general population, but none of those studies was made in Portugal. Sáez et. al, after a study based on the Spanish population, considered that this anomaly occurs in 1:100000 of the population (5). In the Netherlands, 9.9% of the normal population presents this anomaly (12).

We know that permanent teeth are more affected than deciduous ones, and molars are more prone to this condition than premolars (9, 20). This pathology may be unilateral or bilateral (9), and multiple teeth affected by taurodontism is reported in only a few cases (6, 20).

In a study conducted in the Turkish population, no mandibular premolars were reported to have taurodontism (in 372 cases), in both genres (4), what proves the rarity of this clinical condition. In another study by Madeira et al, in 3449 lower premolars, were found 7 taurodont first premolars and 4 taurodont second premolars (10). Other authors examined 5324 premolars, concluding that 4.79% were taurodontic and that males were more affected than females (21).

In this case report, we have two lower first taurodontic premolars (left and right), in a female patient. Our data suggest rarity in what concerns both the affected teeth, and the sex of the patient.

The incidence of supernumerary teeth among the general population is approximately 1 in 110 children in which maxillary midline supernumeraries (mesiodens) are the most commonly found (46.9%), followed by premolars (24.1%) and fourth molars or distal molars (18%) (14). The same author declares that the degree of prevalence of premolars supernumerary teeth in general population ranges between 0.09% and 0.29% corresponding to 8.9% of supernumerary teeth (14).

Peker et al, determined that the rate of supernumerary teeth was higher in males (59.5%) than in females (40.5%) and were
more frequent in the maxilla (53.4%) than in the mandible (46.6%)(19). Other investigators have concluded that supernumerary teeth appear with a higher frequency in men than in women, with a 2:1 ratio (14).

Single supernumeraries occur in 76-86% of cases, double supernumeraries in 12-23% of cases, and multiple supernumeraries in less than 1% of cases (22).

Yusof in his study found that when non-syndromal or multiple supernumeraries teeth are present (<5), the most common site affected is the mandibular premolar region, followed by the molar and the anterior regions, respectively (22). Solares and Romero found that 74% of supernumerary teeth are located in the mandibular premolar region (17, 22).

Among supernumeraries, supernumerary premolars are special in terms of their late developmental and recurrence, which make treatment procedures variable and complicated (17).

Conclusion

This case shows a rare association of two dental anomalies, taurodontism and supernumerary teeth. Taurodontic premolars are quite rare, and may interfere with endodontic treatments, surgery acts and operatory dentistry.

The authors would like to highlight the importance of radiographic examination in the early diagnosis of taurodontic teeth. If dentists don’t analyze carefully radiologic data, this condition may not be proper diagnosed. Radiologic findings are considered fundamental in correct planning of these cases, as well with rendering preventive care to these teeth.

References