



Numerical abnormalities of permanent dentition – a case report

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Abstract

Tooth number abnormalities may occur under the influence of genetic or environmental factors which intervene in the tooth formation stages (induction and proliferation), most commonly the permanent dentition being affected. The result is the appearance of dental anomalies with numerical deficiency (hypodontia, anodontia), or with dental excess (hyperodontia, over-teeth). In this paper we report a case of a 15-year-old boy with associated abnormalities of permanent dentition: mesiodens and palatal impacted cuspid at the maxillary dental arch and incisor anodontia at the mandibular dental arch. Orthodontic treatment aimed at resolving maxillary dental crowding, obtaining dental alignment, a stable and functional occlusal relationship and a satisfactory smile for the patient.

Keywords: numerical dental abnormalities, surgical and orthodontic treatment

Introduction

The dento-maxillary system, from an anatomical point of view, is a set of morphologically harmonized tissues and organs for the purpose of performing the functions of mastication, swallowing, phonation, respiration and physiognomy [1].

Growth and development of craniofacial dimensions are known to be strongly integrated and broadly conserved [2]. Somatic growth of any individual is linear, while craniofacial growth is three-dimensional and occurs in growth pits, in which dental eruption plays an important role. Certain elements of the tooth-jaw apparatus are genetically determined, such as: shape of the jaws, shape and size of the teeth, the age and chronology of tooth eruption. The formation and development of the teeth are also subject to genetic determinism. Due to the infinite number of genetic possibilities, no individual is identical to another (except possible monozygotic twins); this normal variability, however, can be diverted by different environmental factors [3,4]. These factors can disrupt the eruption pattern of both temporary

and permanent teeth, and can cause developmental abnormalities: number, size and shape of teeth, structure of dental tissues, etc., being considered isolated dental abnormalities [5].

Isolated dental abnormalities may be [6]:

- Numeric anomalies: the stage of formation of the dental blade (of induction and proliferation)
 - with numerical dental deficiency: anodontia, hypodontia
 - with numerical dental excess: hyperodontia (supernumerary teeth)
- Morphological anomalies: the stage of morpho-differentiation
 - dental size abnormalities : macro- or microdontia
 - dental shape abnormalities: dental crown, root or crown-root
- Structural anomalies: formation of the organic matrix and mineralization
 - genetic disorders
 - acquired disorders
- Eruption anomalies
- Position abnormalities
- Dental staining: intrinsic, extrinsic or mixed discoloration

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Numeric dental anomalies occur during the initiation period of dental blades and may be with deficiency or excess. The phenomena that appear may follow a hereditary pattern, they may be the consequence of hyperactivity or insufficient induction of the dental blade [7]. Other causes are ectodermal dysplasia, local inflammation or infections and changes in dental evolution (phylogenesis) [8].

There are over 80 syndromes that include hypodontia. Non-syndromic familial hypodontia may be inherited as an autosomal dominant [9-11], autosomal recessive [12,13] or sex-linked trait [14,15]. The prevalence of supernumerary teeth is between 0.3% to 0.8% in primary dentition and 1.5% to 3.5% in permanent dentition [16,17].

Numeric dental abnormalities may cause physiognomic issues, tooth impaction, displacement or rotations of adjacent teeth, pathological root resorption of teeth in the normal series, dental malpositions or malocclusion [18-20].

Mesiodens can significantly alter both occlusion and appearance by altering the eruption path and the position of the permanent incisors [21,22]. The clinical complications of mesiodens are as follows:

1. Impaction and displacement of maxillary central incisor;
2. Tooth retention or delayed eruption of permanent incisors;
3. Inclination or axial rotation of erupted permanent incisors;
4. Diastema;
5. Eruption within the nasal cavity;
6. Intraoral infection, pulpitis of mesiodens;

7. Root anomaly;
8. Root resorption of adjacent teeth;
9. Cyst formation and bone destruction [23,24]

Early diagnosis and surgical treatment of patients with mesiodens is important to prevent all these complications .

Supernumerary teeth and hydodontia are commonly observed as an isolated developmental dental anomalies.. While the familial tendency of supernumerary teeth has been documented, its genetic causality has not yet been determined [25,26].

The aim of this paper is to present a clinical case with multiple dental abnormalities: a supernumerary tooth on the left maxillary side, which displaces the maxillary central incisor, a palatal impaction of a cuspid, on right maxillary side and anodontia of one mandibular incisor. The clinical case contains important information, especially for resident doctors and young orthodontists, concerning the association of isolated anomalies, treatment and outcomes.

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A 15-year-old boy and his mother came into our office worried about the eruption of two superimposed teeth in the anterior area of the upper jaw, on the left side.

No cases of dento-maxillary anomalies were reported in his family.

The extraoral examination exhibits the lower third of the face slightly decreased, a gentle asymmetry with the left side of the face less developed and a pronounced convex profile (Figure 1).



Figure 1. The facial aspect of the patient.

The intraoral clinical examination shows:

- mixed dentition with persistence of temporary maxillary right canine (5.3), without physiological mobility,
- a supernumerary tooth interposed between the overlapping crowns of the maxillary left central incisor (2.1) and maxillary left lateral incisor (2.2),
- infrabuccal position of 2.1,
- palatal inclination of 2.2,
- mesio-buccal-rotation of maxillary left canine (2.3),
- absence of one mandibular incisor,
- deep and untreated cavity lesion at mandibular left first molar (3.6),
- dental Class II / 2 Angle , with overbite $\frac{1}{2}$,
- 4 mm deviation of the upper midline to the left,
- scissor bite between maxillary right first premolar (1.4) and mandibular right first premolar (4.4)
- slight dental crowding at the mandibular arch (Figure 2).



Figure 2. The intraoral views of the dental arches before treatment, with overlapping crowns of 2.1, mesiodens and 2.2.

The orthopantomography evidences:

- the presence of maxillary right canine (1.3) in palatal position, with the crown superimposed on the root of maxillary right lateral incisor (1.2) and partial root resorption of 5.3

- overlapping roots of 2.1, 2.2 and the supernumerary tooth (mesiodens)
- anodontia of a mandibular incisor
- the presence of wisdom teeth, in the stage of crown mineralization, with lack of space for eruption of the mandibular ones (Figure 3).



Figure 3. The orthopantomography of the patient before orthodontic treatment.

The morphological diagnosis is therefore: numerical dental abnormalities on both arches - maxillary mesiodens and anodontia of one mandibular incisor, impaction of maxillary right canine, anterior dental crowding of the maxillary arch and malocclusion class II/2 Angle. All functions of the dento-maxillary system were affected, especially the physiognomy. The etiology was difficult to specify.

The method of treatment was surgical-orthodontic and it consists of the following phases:

- In the surgical phase of the treatment we removed supernumerary tooth, the temporary canine and maxillary first left premolar (2.4). Also, we surgically exposed 1.3, impacted in palatal position (Figure 4);

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Figure 4. Intraoral aspect, after extraction of supernumerary tooth.

• In the second phase, the fixed orthodontic appliance SWT was applied for:

- dental alignment and occlusal leveling
- distalization of 2.3 (in the place of 2.4, with segmented archwire)
- distalization of 2.2 (with NiTi coil spring between maxillary right central incisor (1.1) and maxillary left lateral incisor (2.2))
- getting space for alignment of 1.3, palatally positioned and 2.1, buccally positioned, maxillary dental alignment,
- reduction and correction of overbite,
- therapeutic class I at the canine level, functional occlusion

After 20 months from the beginning of the treatment, the patient requested the removal of the fixed appliance, being very satisfied with the maxillary dental alignment and his smile (Figures 5, 6).



Figure 5. The intraoral aspects of the arches after 20 months of the orthodontic treatment.



Figure 6. Patient's smile at the end of the treatment.

Discussion

There are situations, reported in the literature, in which a person may present simultaneously several types of isolated dental anomalies like supernumerary teeth, anodontia, changes in shape or size, dental impaction, discoloration or structural abnormalities [9,25]. We chose to present this case due to the association on the same

patient of three isolated dental abnormalities- mesiodens, anodontia and tooth impaction.

The mesiodens erupted on the upper arch, over the left lateral incisor, blocked the eruption of the central incisor; the left central incisor erupted later buccally, overlapping the mesiodens. The maxillary alveolar bone, forced to sustain three superimposed teeth, diminished in the buccal area,

causing a large appearance of the anatomical crown of tooth 2.1.

Numeric anomaly of supernumerary tooth may be associated with varied manifestations of hypodontia in opposing arch. Anodontia of a lower incisor manifests itself as lack of alveolar ridge development. As a result, the vertical dimension of the lower face is reduced and the mandible is retruded [19,20].

Likewise, in our case, the absence of one mandibular incisor determined the shortening of the mandible in the anterior area, due to the absence of a growth center. This led to a retruded mandible, a convex profile, and a false correspondence of the midline after treatment.

In general, dentofacial changes are prominent in individuals with oligodontia, and these are related rather to dental and functional compensation than to a specific underlying pattern of growth [26].

Numerical dental abnormalities of permanent dentition, due to dental excess or dental deficiency, frequently result in dental malpositions, whose severity is higher as the dental and facial aesthetics are affected. In these cases the treatment most often involves an interdisciplinary approach: orthodontic, surgical, periodontal and prosthodontic [27,28]. The malposition of the maxillary right cuspid determined its impaction and need for surgical exposure and mechanic strain.

Other orthodontic treatment methods were discussed with the patient and his mother. Among them was the extraction of mesiodens and 2.1, alignment of 2.2 and 2.3 and reshaping of dental crowns, with 2.2 “transformed” into 2.1 by a ceramic crown, 2.3 and 2.4 remodel to resemble 2.2 and 2.3, respectively. This plan was refused, as well as orthodontic treatment on the lower dental arch, due to financial reasons.

In conclusion, we may say that stable and functional occlusion and a satisfactory smile for the patient were our treatment goals and they were accomplished. Other treatment plans are possible, but our method is valid and accessible, especially for resident doctors and young orthodontists.

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