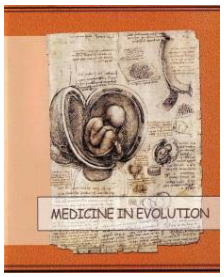
Non-syndromic relative generalized microdontia



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Abstract

The dental anomalies of volume occur during the stages of morphological differentiation or during the organic matrix apposition and include micro and macrodontia. Relative generalized microdontia is characterized by the disproportion between the normal-sized teeth and the overdeveloped jaws, as a result of crossed inheritance. This case report describes the treatment approach using fixed orthodontic appliances and the evolution in the case of a young male patient diagnosed with spacing (diastemata and tremata), Class I malocclusion and deep bite. The treatment objectives were to obtain a good static and dynamic occlusion and optimal esthetics. At the end of the treatment all the functions of the dento-maxillary system were improved, with adequate intra and inter-arch relationships. When localized in the anterior region, microdontia affects the aesthetic function and, consequently, the patient's psychosocial behavior, which often dictates his treatment choice – orthodontic, restorative or multidisciplinary treatment.

Keywords: non-syndromic, Angle Class I malocclusion, relative generalized microdontia, orthodontics.

INTRODUCTION

The dental anomalies of volume occur during the stages of morphological differentiation or during the organic matrix apposition. This type of anomalies includes microdontia and macrodontia. Microdontia can be isolated or generalized. It can also be classified as relative microdontia, when the sum of the upper incisors is within normal limits (28-35 mm), as a result of crossed heredity and absolute microdontia, when the sum of the upper incisors is less than 28 mm, associated with tremata, diastemata and deep bite.

These anomalies can be found in cases with normal general development (being the expression of a disorder during the morphogenesis of the dental system) or can appear as symptoms in certain genetic syndromes (e.g. Gorlin–Chaudhry-Moss, Williams, Turner, Patau, Hallermann-Streiff).

Boyle [1] stated that the teeth in general microdontia are small and characterized by short crowns, frequently without interproximal contacts.

Shafer, Hine, and Levy [2] classified microdontia into three categories: localized microdontia, when it affects a single tooth, relative generalized microdontia (associated with wide jaws) and true generalized microdontia (when all the teeth are affected). Very few cases of true generalized microdontia were reported in the literature, in healthy subjects, except from its occurrence in some cases of pituitary dwarfism and Fanconi's anemia [2].

The etiology of microdontia is linked to hereditary, genetic, epigenetic and environmental factors [3].

Aim and objectives

The aim of this paper was to highlight the orthodontic therapeutic approach using fixed orthodontic appliances in a case of relative generalized microdontia, in order to improve the functions of the dento-maxillary system.

CASE REPORT

I. Anamnesis

The patient had normal stature, weight and height, without any growth or development related disorders. No abnormalities were found when examining the head, hair, eyes, limbs, hands, skin and nails of the patient. Intellectual capacity, social skills and scholar performance were also normal. The personal medical history was unremarkable. The family medical history showed no significant signs of dento-maxillary anomalies.

II. Clinical examination data

The extraoral examination showed a brachycephalic skull, a slightly convex profile, no visible facial asymmetry and no TMJ disorders (Figure 1).

a) b)

Figure 1. Extraoral clinical exam: a) frontal view; b) lateral view

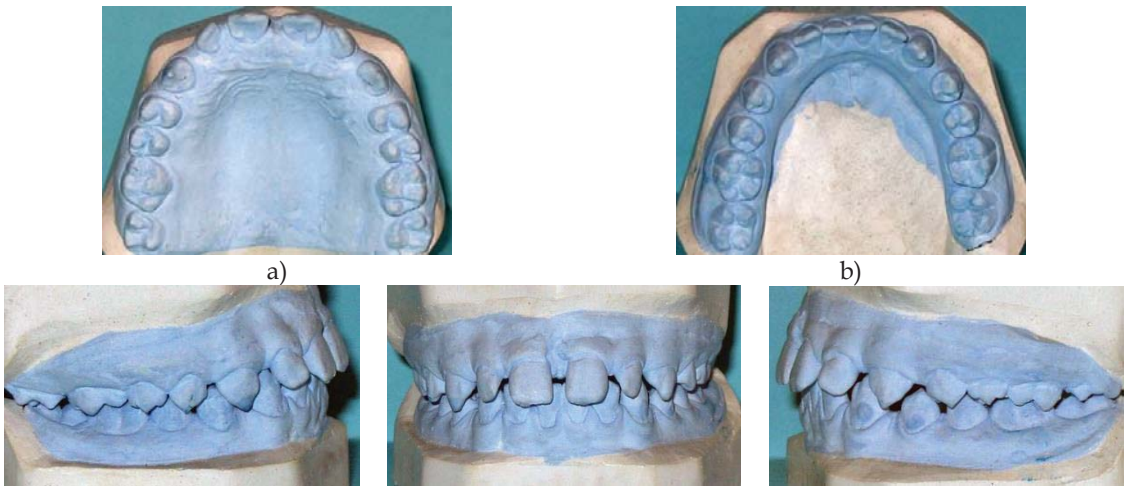
The intraoral examination (Figure 2) showed no signs of pathological lesions, with healthy soft tissues and the teeth had relatively normal shape and size. The jaws were wide and overdeveloped and spacing (tremata and diastemata) was observed in both arches. Class I malocclusion with neutral canine and molar relationships and anterior deep bite were also noticed.

a) b) c)

Figure 2. Intraoral clinical exam: a) lateral view (right side); b) frontal view; c) lateral view (left side)

III. Paraclinical investigations

On the orthopantomography we observed inadequate root parallelism. The cephalometric examination revealed a normodivergent skeletal Class I pattern. The analysis of the study models corroborated the results of the clinical examination (Figure 3).



a) b)

c) d) e)

Figure 3. Study models: a) upper arch; b) lower arch; c) lateral view (right side); d) frontal view; e) lateral view (left side)

IV. Diagnosis

Based on the clinical and the complementary exams, the patient was diagnosed with relative generalized microdontia in the permanent dentition, the patient having no other relevant general clinical sings. The most plausible etiological factor involved in this case was the crossed inheritance, the child having relatively normal-sized teeth and overdeveloped jaws.

V. Treatment and evolution

Treatment objectives

The treatment aimed to maintain the bilateral molar and canine Class I relationships, to obtain an optimal alignment of the upper and lower midlines and to close the interproximal spaces, in order to achieve a good static and dynamic occlusion.

Treatment stages

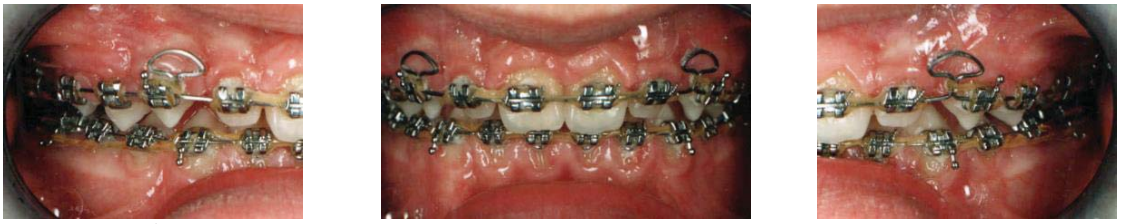
The straight-wire technique was used, with a Roth prescription of GAC brackets with a slot size of 0.022-inch (Figure 4). In the alignment phase we used 0.012-0.016-inch x 0.022-

inch NiTi arch wires and in the correction and finishing phase we used Sentalloy and stainless-steel arch wires. Bilateral mushroom loops were used for space closure in the upper arch (Figure 5).

At the end of the treatment all the functions of the dento-maxillary system were improved, with good intra and inter-arch relationships (Figure 6).

a) b) c)

Figure 4. Interim treatment stage: a) lateral view (right side); b) frontal view; c) lateral view (left side)



a) b) c)

Figure 5. Interim treatment stage: a) lateral view (right side); b) frontal view; c) lateral view (left side).

Figure 6. Final result

DISCUSSIONS

The factors implicated in the complex etiology of relative generalized microdontia are still debated. Microdontia has a direct and strong impact on esthetics and tooth alignment, thereby it interferes with the development of normal dental arch relationships and sometimes generates malocclusions [4].

Studies found that this type of anomaly is often located in the maxilla, rather than in the mandible and the most affected teeth were the canines, not the lateral incisors, as it was previously known [5].

Most often, teenagers and adults with microdontia, demand a perfect smile in a short time, therefore an increasing number of patients affected by this anomaly choose dental restorations, either direct ones (resin-based composite systems) or indirect ones (all ceramic or metal-ceramic crowns and porcelain laminate veneers with a high color stability and abrasion resistance) [6,7]. Furthermore, their superior surface properties, form and individual characterization of color makes this treatment option extremely attractive, yet expensive [8].

An excellent treatment strategy for the esthetic restauration of the anterior teeth affected by microdontia is the direct resin-based composite bonding, which is a conservative technique, where the composite can be placed directly on the teeth, most of the times without any loss of dental tissue. Therefore, the selection of a restorative technique, such as free-hand, full direct or semi-direct (e.g. using a silicone guide), should be considered in order to

preserve the natural tooth structure, but it also depends on the particularities of each individual case, as well as on the experience of the practitioner [9,10].

CONCLUSIONS

Depending on the amplitude and on the region in which it occurs, microdontia disturbs the dento-alveolar and occlusal balances. When localized in the anterior region, it affects the aesthetic function and, consequently, the patient's psychosocial behavior, which often dictates his treatment choice – orthodontic, restorative or multidisciplinary treatment.

Declaration of patient consent

Through his legal representative, the patient consented for his clinical data and his images to be reported under anonymity for scientific research and medical purposes.

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