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A Review Of The Literature Based On Oro-Maxillo-Facial Modifications In Endocrine Diseases

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Abstract: *This study is a review of the literature based on oro-maxillo-facial modifications in patients with endocrine diseases.*
To carry out the study, 49 articles and specialized books were studied, these being included in the bibliographic references.
Oro-maxillo-facial morphological transformations following endocrine pathology represents a current oral health problem, with influences on the proper functioning of the whole body, requiring both an early diagnosis and a complex, multidisciplinary management: endocrine, psychological, pharmacological, physical, dental.
Key Word*: oral cavity, endocrine diseases, endocrine glands*

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I. Introduction

The endocrine glands influence the whole set of elements that compose the oral cavity: hard tissues (bones and teeth) and soft tissues (lips, tongue, gums). The important changes of the facial mass, from the embryo to adolescent, the special differentiation of some highly specialized organs, the existence of different genes for the evolution of each of these elements, make the secretory disorders of the endocrine glands, integrated in the regulation system to manifest precocious and sometimes be characterized through dento-maxillary anomalies, structural bone or dental lesions and various soft tissue disorders [1,2]. A variety of researches have shown that the action of the endocrine glands on the appearance and development of dental apparatus, has much greater expressiveness in terms of shape, structure, position and especially their eruption [3] .

The activity of the endocrine system begins in different times of postnatal odontogenesis, so its role is to adjust, within the genetic program, the growth and development of the body, and therefore of dental-maxillary apparatus as an integral part of it.

The current study of researches shows that dental development is strongly influenced by the activity of endocrine glands, but only in the stage of tooth eruption, and probably in morphodifferentiation, because the beginning of endocrine gland development largely coincides with cell differentiation of dental apparatus [4].

During embryogenesis of buccal-dental elements, the role of the endocrine glands is little known, being certain only the influence of the thyroid. In contrast, in genetic diseases with endocrine implications (Langdon-Down syndrome, Turner syndrome, Klinefeltter syndrome) oral and dental modifications are almost constant [5].

In postnatal period - also characterized by growth and differentiation phenomena - the effect of endocrine glands on the oral-dental elements is manifest, being important especially in terms of trophism but also in the following stages (maturity, climacterium, senescence).

Hormones act on a large number of organs, exerting a clear effect on each, and the total amount of these effects is integrated into the body's complete response. By accepting the concept of hormone receptor, it is considered that the oral-dental apparatus is included in the category of hormone-dependent tissues, as a result of long phyllo- and ontogenetic evolutions.

Excessive or deficient secretion of the endocrine glands, hormone transport and differentiated tissue receptivity are important factors that must be evaluated clinically and biologically, to determine with certainty the level of hormonal participation on inducing a dento-maxillary abnormality.

Objectives: We addressed this topic in this article, given the increased frequency of clinical cases with oral and dental modifications in endocrine pathology. The objectives pursued were:

- highlighting the modifications of shape, structure and volume of the oral cavity and especially the clinical features of endocrinopathic patients with oral and dental changes;

- awareness of the dentist about the existence and the clinical approach of patients with oral and endocrine pathology, in accordance with the latest findings in the field.

II. Material And Methods

In order to highlight the oro-dental modifications following an endocrine pathology, we conducted a review of the literature to obtain a synthetic and current perspective on the implications of endocrine disease in oro-dental sphere. In this regard, we studied a series of reviews and studies published between January 1990 and December 2020 published in the Medline and Pubmed platforms, using for search words such as "oral manifestations in endocrine diseases", "teeth and endocrine diseases", " gingival gum in endocrine diseases ". The result was a number of 49 articles referring to modifications on shape and volume of the oral cavity.

III. Result And Discussion

Form, structure and volume modifications of the oral cavity in endocrine diseases

1. Modifications of oral cavity

Malformations such as "ogive palate ", hypertrophic mandible, "rabbit mouth" or "wolf mouth" are common in most agenesis / dysgenesis with significant changes in karyotype (45, X; 45, X; 46, XX; 47 , XXY). It represents consequences of disorders interfered in the embryogenesis of facial mass and skull - disorders induced by the respective genetic defects [6].

2. Volume modifications of the oral cavity

The lower volume of the oral cavity can be explained by the insufficient growth of the skull bones and facial mass. It is characteristic on patients with insufficient secretion of somatotrophic hormone, occurring prenatally or in childhood, being known as pituitary dwarfism. The most affected is the mandible, resulting the appearance of the mandibular retrognathia [7,8,9,10,11].

An increase volume of the oral cavity is found on patients with excessive secretion of somatotrophic hormone, the consequence being the hypertrophy of the facial bones, especially the mandible. In acromegaly, the mandible elongation changes the dental occlusion, being the cause of many functional disorders [12,13,14] .

However, some studies report a uniform growth of facial bones, consistent with the rest of the body[15]. The mandible elongation changes the dental occlusion, the clinical cases presenting either a protraction or underbite, but also dental spacing- interdental spacing. This result influences the future prosthesis of the patient, the mobile prostheses must be constantly replaced and adapted to the prosthetic field[16].

3. Modifications of dental alveoli

Due to jaws hypertrophy, in acromegaly, the volume of the alveolar cavities is high and the content of the teeth, whose volume remains unchanged, compromised, discordance which has results the fact that the teeth are moving easily, and by rupture of the alveolo-dental ligaments,spontaneous edentation occurs[13].

4. Tooth modifications

In endocrinopathies the following are affected: the speed of teeth appearance, their volume, implantation, resistance and trophism [17] . The speed of teeth appearance - both at first and second dentition, is delayed and are irregular in myxedema - the formation of dental buds, their development and speed of eruption are under the strict control of thyroid hormones. In congenital myxedema, at birth, the buds of the first dentition are not formed, they appear late, delay the eruption of the teeth and change the order of their appearance [18,19].

A) The volume of the teeth

In idiopathic pituitary dwarfism, the teeth are small (microdontia) in harmony with generalized microsomia. Trophic and growth disorders of myxedema, Turner syndrome, Klinefelter syndrome or other gonadal dysgenesis produce inequalities on tooth size, making micro-, macro- and normodontia coexist [20,21,22,23,24] .

B) Vicious implantation of teeth

Causes of tooth malposition:

- insufficient development of the jaws, especially of the mandible;
- the teeth are normal size, they approach each other, they crowd, they rotate or they come in transposition - the aspect of the pituitary dwarfism;
- jaws hypertrophy, especially of the mandible, but with normal volume of the teeth, increases the spaces between the teeth,becoming separated by tremes and diastema and seem sparse - characteristic aspect of acromegaly [25,26] .

5. Gum modifications

Gums hypertrophy in acromegaly accompanies hyperplasia and hypertrophy of soft structures. They appear horny, fluttering like a sponge around the package and bulging in the spaces between the teeth [27].

In myxedema, the gums are thick, pale and appear swollen, due to the mucous edema that infiltrates them, having low resistance to infectious factors [28] .

Gum hypotrophy - thin, pale and retractable gums are common in endocrine diseases in which important metabolic disorders occur: hypothyroidism, pituitary cachexia, diabetes, Addison's disease [29,30] .

6.Tongue modifications - macroglossia

The volume of the tongue is increased in acromegaly and hypothyroidism. In acromegaly, macroglossia is the result of cellular hyperplasia and hypertrophy of all organ structures: muscles, mucosa, glands [31] .

In hypothyroidism - macroglossia is the expression of mucosal edema, infiltration, stretches the mucosal surface and erases the papillary relief [32].

Macroglossia are noted by dental impressions that leave marks on the edges of the tongue. Macroglossia, both in acromegaly and in myxedema, causes by limiting movements, disorders in word articulation, mastication, food bowl formation and swallowing and is a determining factor in the edentulous process [33,34] .

7. Lips volume modifications

In acromegaly - the lips become thick, fleshy, sometimes overturned, with well-defined and thickened edges [13] .

In hypothyroidism, mucosal edema fills the lips, their marginal lysis is erased and rounded, their surface is stretched, the color is pale or cyanotic [35,36].

8. Pigmentary modifications of the oral cavity - hyperpigmentation of the mucosa - the presence of brown spots or bruises of various sizes - characterizes Addison's disease[37].

9. Bone density modifications

Hormones play an important role in regulating bone density, and gonadal hormones influence women the most. In women, bone absorption and reabsorption are influenced by the onset of menopause, estrogen deficiency, which changes the rate of bone loss. In men, testosterone is considered to be a crucial importance for regulating bone mineral density, with estrogen having an important role at a later age in establishing maximum bone mass, therefore maintaining bone mineral density [38].

Sex steroids play an important role in bone growth and reaching the peak of bone mass. They are, at least in part, responsible for the differences (in terms of female or male gender) of the skeleton in bone growth that occur during adolescence. Skeleton gender differences are attributed to the stimulatory action of androgens on periosteal bone formation in men, compared to an inhibitory action of estrogen in women [39,40,41,42] .

Androgen deficiency due to prepubertal hypogonadism is associated with decreased bone mineral density at puberty, while administration of testosterone before closure of growth cartilage leads to bone mass increases [43,44] .

In addition to steroid sex hormones, several studies show that other hormones are negatively regulated by estrogen, such as growth hormone (GH) and insulin-like growth factor1 (IGF1) [45,46].

IGF1 levels are higher in men than women during early puberty [47].

and on mice lacking the GH receptor (GHR), IGF1, or both, showing a delay in bone growth [48] .

Estrogen deficiency is a major pathogenic factor in menopause-associated bone loss and the development of osteoporosis ion postmenopausal women. After menopause, bone resorption increases by 90%, while bone formation increases by only 45% [49] .

IV. Conclusion

The activity of the endocrine system begins in different times of postnatal odontogenesis, having the role of regulating in the genetic program, the growth and development of the organism and therefore of the dento-maxillary apparatus as an integral part of it.

Oral modifications are sometimes suggestive for the diagnosis of an endocrine disorder.

The correct diagnosis and effective therapeutic solution will be the result of multidisciplinary team work (pediatrician, endocrinologist, dentist).

A patient with endocrine disease, well stabilized from a medical point of view has no contraindications for dental treatment

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