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THE CONDITION OF THE SALIVARY GLANDS AND THE RATE OF SECRETION OF THE ORAL FLUID IN CHILDREN WITH CONNECTIVE TISSUE DISEASES

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Abstract:
Systemic connective tissue diseases are a group of diseases of autoimmune genesis, in which the most important structural component of almost all organs and tissues is affected. Often, along with systemic diseases of the connective tissue, one can find Sjogren's syndrome - damage to the lacrimal and salivary glands, characterized by the development of dry keratoconjunctiva and xerostomia. Disorders in the work of the salivary glands, in turn, can contribute to the development of multiple caries in the cervical region, abundant plaque on the teeth, inflammation of the oral mucosa and lips, a violation of the level of oral hygiene and the addition of a secondary infection. The aim of our study was to assess the impact of systemic connective tissue diseases on the work of the salivary glands and the subsequent development of diseases of the oral mucosa. We examined 100 children (79 girls, 21 boys) aged from 4 to 16 years with systemic diseases of the connective tissue, who were treated and examined at the Department of Pediatric Dentistry and Orthodontics of the I.M. Sechenov First Moscow State Medical University (Sechenov University. Children were divided into groups according to age, main diagnosis, nature of the course and degree of activity of the underlying disease. The duration of the disease and side effects of drug therapy (drug Itsenko-Cushing's syndrome) were also taken into account. For the examination, the collection of complaints and anamnesis, clinical examination with palpation of the parotid salivary glands and measurement of the rate of secretion of stimulated and unstimulated saliva were carried out. Some children also managed to undergo orthopanthosialography. As a result, it was found that children with systemic connective tissue diseases in all groups are characterized by a decrease in the rate of saliva secretion and prolonged xerostomia with the development of characteristic diseases in the oral cavity. Xerostomia was especially pronounced in the group of children with the maximum degree of activity of the underlying disease and the duration of the disease for more than two years. On examination and palpation, signs of inflammatory diseases of the salivary glands were also revealed, such as soreness of varying degrees, an increase in size and the release of a scanty secretion from the duct. It was not possible to identify the links between individual systemic diseases of the connective tissue and the severity of lesions of the salivary glands.

Keywords: *connective tissue diseases, salivary glands, saliva, xerostomia, rheumatic diseases*

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INTRODUCTION:

Systemic connective tissue diseases (SCTD) are a group of rheumatic diseases with an unknown etiology and complex autoimmune pathogenesis of development, in which connective tissue is affected, which is the most important structural and functional component of almost all organs and tissues. The multiple organ nature of clinical manifestations and the associated difficulties of early diagnosis, early disability of sick children, the likelihood of death with late therapy start determine the relevance of studying this topic [1,2,3].

Almost all clinicians distinguish keratoconjunctivitis dry and xerostomia in patients with systemic connective tissue diseases, i.e. the presence of Sjogren's syndrome (SS) and believe that although the clinical manifestations of SS differ in a clear minority of patients with SCTD (5%), subclinical and histological signs of inflammation of the salivary glands are found in almost 100% [4,5]. Many authors believe that in almost half of the patients with SCTD, secondary SS of varying severity was found and SS was observed in 30% of the patients with SCTD [6,7], while noted, the prevalence of the chronic form of the course of the underlying disease. The increase in the salivary glands in SS in most patients was insignificant (69.4%). Exacerbation of mumps was rare (30.5%) or not observed (58.3%), frequent exacerbation of mumps was observed in 11.1% [8,9]. Exacerbation of

chronic mumps in patients with SS + systemic scleroderma was accompanied by saliva retention. Sialographically, in SS, the picture of parenchymal parotitis of the initial stage is predominantly established. Xerostomia was mainly of the I degree - 57.4%, it was of a periodic nature, II degree - 16.6%, III degree - 9.2%, 16.6% had no xerostomia. According to [10], an increase in salivary glands in SS + systemic lupus erythematosus - 35%, in SS + systemic scleroderma - 64%, the authors believe that xerostomia depends on the stage of mumps. With SS in patients at the initial stage, sialographically revealed a picture of chronic parenchymal parotitis. In a clinically pronounced stage, a picture of interstitial parotitis is revealed. At later stages, aplasia and stenosis of the ducts are noted. A number of authors [11] believe that the main cause of xerostomia and painful conditions of the oral cavity in this group of patients is dysfunction of the salivary glands. There is an opinion [12] that a decrease in the rate of secretion and resistance to the deposition of proteins in the oral fluid, an increase in its viscosity in children with SCTD are a consequence of an increase in the content of free radicals in the blood, other tissues and organs, as well as an increase in free radical lipid peroxidation. As a result, more than usual part of lipids is oxidized by free radicals. The end product is not water, as in enzymatic lipid oxidation. As a consequence, the production of endogenous water is reduced. And hyposalivation develops, because, saliva is endogenous water.

The severity of hyposalivation depends on the intensity of the enhancement of free-radical peroxidation in the body. The discrepancy between the authors, apparently, is the result of an incomplete study of hyposalivation and the state of the salivary glands, especially among the pediatric population. There is no data on the state of the salivary glands in patients with dermatomyositis, and there are also no observations of the lesion of the salivary glands, depending on the duration and course of the underlying disease. Few studies of the condition of the maxillofacial region in children with SCTD indicate that not only the underlying disease leads to the pathology of the salivary glands, but a powerful basic therapy of the underlying disease is also possible.

Aim: To assess the impact of systemic connective tissue diseases on the work of the salivary glands and the subsequent development of diseases of the oral mucosa.

MATERIAL AND METHODS:

We examined 100 children (79 girls, 21 boys) aged from 4 to 16 years old with diagnoses: systemic lupus erythematosus (SLE) - 35 children, juvenile scleroderma (JSS) - 35 children, juvenile dermatomyositis (JDM) - 30 children who were treated and examined at the University Children's Clinical Hospital of the Clinical Institute of Children's Health named after N.F. Filatov First Moscow State Medical University named after I.M. Sechenov. All surveyed were divided into three age groups: from 4 to 6 years old (I), from 7 to 11 years old (II), from 12 to 16 years old (III); three groups according to the nature of the course of the underlying disease: acute, subacute, chronic; two groups according to the degree of activity of the underlying disease: moderate-minimal (I-II degree), high (III degree); two groups according to the duration of the underlying disease: up to 2 years, over 2 years (Table 1).

Table 1. Distribution of sick children with SCTD depending on age, diagnosis, course and activity of the underlying disease

Age	Diagnosis	Degree of activity		All
		High	Moderate-minimum	
4-6 years (n=10)	SLE	-	2	2
	JSS	2	2	4
	JDM	1	3	4
7-11 years (n=38)	SLE	4	5	9
	JSS	2	11	13
	JDM	4	12	16

In addition, the duration of the disease and side effects of drug therapy (drug Itsenko-Cushing's syndrome) were taken into account. The degree of activity of the SCTD flow was assessed according to the gradation adopted by Nasonova V.A. [13]. With a moderately minimal (I-II degree) degree of activity of a systemic disease, there were: subfibrillation, skin lesions, moderate articular syndrome, muscle weakness, autonomic disorders, ESR 10-20 mm / h. With a high (III degree) degree of activity, there were lesions of internal organs, musculoskeletal system against the background of high general inflammatory and immunological laboratory parameters, carditis, lymphadenopathy, polyserositis, nephritis, ESR 30-60 mm / h, etc. The diagnosis and severity of the disease in the subjects were established on the basis of complaints, clinical and laboratory studies and the conclusion of a pediatrician. In each group, on the basis of complaints and clinical, laboratory and special research methods, changes in hard tissues of teeth, periodontium, oral mucosa, condition of the skin of the face, jaw bones, and salivary glands were studied.

The examination was carried out according to the generally accepted scheme: complaints, anamnesis, clinical examination.

To clarify the diagnosis of xerostomia, the rate of secretion of the oral fluid, freely flowing and stimulated by a 0.5% citric acid solution, was determined (according to the method of Rhodus N.L., Johnson D.K., 1990) [14]. Normal indicators corresponded to: unstimulated oral fluid 0.54 + 0.012 ml / min., Stimulated oral fluid 0.86 + 0.0013 ml / min. The decrease in these indicators corresponded to the presence of xerostomia. For an additional study of the parotid salivary glands in children with SCTD, we have developed a new technique (patent for invention No. 2135083, co-authors. Moskalenko G.N., Elizarova V.M., 1999) [15]. The diagnostic method was based on the use of a radiopaque substance "Omnipak" for the study of the parotid glands by the method of sialography and orthopantomosialography.

RESULTS:

When examining the salivary glands, the children complained of dry mouth, thirst, swelling of the parotid-masticatory region during the period of worsening of the underlying disease and soreness when eating.

In 67 children with SLE - 21 children, with JSS - 28, with JDM - 18, measured the rate of secretion of the oral fluid (Table 2).

Table 2. The rate of secretion of oral fluid in children with SCTD (ml / min.), depending on the age group and the degree of disease activity.

Age	4-6 years		7-11 years		12-16 years	
Disease activity	Unstimulated	Stimulated	Unstimulated	Stimulated	Unstimulated	Stimulated
I-II Degree Moderate-minimum	0.48± 0.012 ml / min	0.75± 0.01 ml / min	0.51± 0.02 ml / min	0.8± 0.023 ml / min	0.37± 0.013 ml / min	0.62± 0.016 ml / min
III Degree High	0.3± 0.011 ml / min	0.5± 0.013 ml / min	0.38± 0.017 ml / min	0.61± 0.026 ml / min	0.27± 0.021 ml / min	0.47± 0.026 ml / min
Normal	Unstimulated oral fluid 0.54±0.012 ml / min Stimulated oral fluid 0.86±0.013 ml / min					

In the I age group: with I-II st. disease activity - the rate of secretion of unstimulated saliva - 0.48 ml / min, stimulated - 0.75 ml / min. At III stage of activity of the disease - the rate of secretion of unstimulated saliva - 0.3 ml / min, stimulated - 0.5 ml / min, which is 1.9-2.8 times lower than in I-II st. activity. In the II age group: at I-II st. disease activity - the rate of secretion of unstimulated saliva - 0.51 ml / min, stimulated - 0.82 ml / min. At III stage activity of the disease - the rate of secretion of unstimulated saliva - 0.38 ml / min, stimulated - 0.61, which is 1.2-1.3 times lower than in I-II st. disease activity.

In the III age group: at I-II st. disease activity - the rate of secretion of unstimulated saliva - 0.37 ml / min, stimulated - 0.62. At III stage disease activity - the rate of secretion of unstimulated saliva - 0.27 ml / min, stimulated - 0.47 ml / min, which is 2.6-3.2 times lower than in I-II st. disease activity.

Thus, a decrease in the rate of saliva secretion (xerostomia) is noted in children with SCTD, especially with the maximum activity of a systemic disease and its course for more than 2 years. Swelling of the parotid-masticatory region (obviously) was observed in 5 children with JSS, 2 with SLE, 1 with JDM. On palpation of the salivary gland, there was a sharp pain and scanty secretion from the parotid duct. In 22 children, palpation revealed an increase in the salivary glands, with slight pain (8 children) or no pain (14 children). Orthopantomosialography of the parotid salivary glands was performed in 12 children with SCTD during the period of remission of mumps. All patients had parenchymal mumps, 2 had a combination of sialodochitis and parenchymal mumps. Orthopantomosialography revealed: uneven filling of the parenchyma or instead of it a lot of cavities from 1 mm to 4 mm in diameter were determined, the ducts of the V, IV, III order (in 10 cases) and II order (in 2 cases) remained unfilled. The parotid duct is unevenly expanded in 5 cases. In 2 cases, there was a release of the contrast agent outside the parenchyma (see photo). It was not possible to trace the regularity of the lesion of the salivary glands inherent in a particular type of SCTD. The defeat of the parenchyma of the glands, detected by orthopantomosialography, does not depend on the duration of the disease, which makes it possible to assume the participation of a viral infection that initially affected the glands and caused autoimmune reactions.

DISCUSSION:

We compared the data obtained from the examination of dental hard tissues in children with SCTD with the data of Kuzmina N.N. [8], who examined children with severe forms of xerostomia and Sjogren's syndrome, and found some analogy. This and the complaints of dryness, presented by almost all children, was the reason for the study of the secretion of the oral fluid and salivary glands. The rate of secretion of oral fluid was determined in 67 children with SCTD. Compared with normal values in all age groups, with all forms of SCTD, the rate of release of stimulated and unstimulated oral fluid was reduced (xerostomia). Moreover, with III stage activity, these indicators were significantly reduced ($p>0.02$). But with an improvement in the general condition, the indicators changed upward, however, only in children

with a duration of up to 2 years, and in the group of children with a duration of the disease over 2 years, more persistent xerostomia was observed, especially with JSS. In a clinical study of the parotid salivary glands in 8 children, we observed swelling in the acute and subacute course of the underlying disease, in 22 children, an increase was noted on palpation. Parenchymal parotitis was found in 10 children during orthopantomosialography of 12 children with SCTD. Interstitial sialodenitis, characteristic of Sjogren's syndrome, according to Simonova M.V. [4], with the obligatory release of the contrast agent outside the parenchyma, we found only 2 children.

It was not possible to trace the regularity of the lesion of the salivary glands inherent in a certain type of SCTD; we did not reveal any dependence on the duration and activity of the course. Perhaps due to insufficient research (12 children), or, it is assumed that the initial participation of the virus in the destructive processes of the salivary glands, leading to autoimmune processes. Our studies have shown that a separate, deeper study of the salivary glands in children with SCTD is needed.

Thus, the presence of xerostomia and destructive changes in the parotid salivary glands in children with SCTD contributed to the development of multiple caries in the cervical region, the presence of abundant plaque on the teeth, inflammation of the oral mucosa and lips, and the addition of a secondary infection.

CONCLUSION:

Thus, the presence of xerostomia and destructive changes in the parotid salivary glands in children with SCTD contributed to the development of multiple caries in the cervical region, the presence of abundant plaque on the teeth, inflammatory phenomena of the oral and lip mucosa, and the addition of secondary infection.

Our study highlights the importance of studying the relationship between connective tissue diseases and the work of the salivary glands and requires further development of the stages of diagnosis and treatment of both impaired functions of the salivary glands and concomitant manifestations of the oral cavity.

Declaration of Competing Interest

There is no conflict of interest

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