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Pathophysiological aspects of the oral cavity diseases in children against the background of gastroesophageal reflux disease

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Abstract

Gastroesophageal reflux disease is one of the most common, potentially dangerous gastroenterological diseases and according to the Ministry of Health of Ukraine, diseases of the gastrointestinal tract occupy one of the first places in the structure of childhood somatic pathology and tend to increase. It should be noted that for the most part, clinical manifestations of the gastroduodenal disease, which include gastroesophageal reflux disease, in children who are not always able to characterize their condition, are nonspecific, and therefore are diagnosed untimely. It is known that gastroesophageal reflux disease is characterized by a variety of clinical manifestations, including extra-extravascular, among which dental are some of the most common. Taking into account the fact that the oral cavity is an integral part of the gastrointestinal tract, the presence of gastroesophageal reflux with gastric contents rudely disturbs the existing acid-base balance and the composition of the microbiocenosis of the oral cavity in children. In particular, 82.35% of pediatric patients who suffered from gastroesophageal reflux disease had erosion of the hard dental tissues.

The authors conducted deep meta-analysis of the main pathogenetic mechanisms of oral manifestations of gastroesophageal reflux disease in children.

Key words: children, gastroesophageal reflux disease, oral cavity diseases.

Gastroesophageal reflux disease (GERD) is one of the most common, potentially dangerous gastroenterological diseases, which, according to the World Health Organization (WHO), is considered to be the disease of the 21st century. If in the 90s of the last century symptoms of GERD were encountered in 20-40% of the globe, at the beginning of the 21st century, this disease affected 40-60%, in addition, a clear tendency to rejuvenate this pathology is seen [1]. In particular, according to the Ministry of Health of Ukraine, diseases of the gastrointestinal tract (GIT) occupy one of the first places in the structure of childhood somatic pathology and tend to increase. According to the WHO definition, GERD is a disease caused by a motor-evacuation dysfunction of the gastroesophageal zone and is characterized by a spontaneous rejection of the gastric or duodenal contents in the esophagus, which leads to the affection of its distal part with the development of inflammatory and erosive-ulcerative lesions [2, 3, 4]. Traditionally, there are 2 forms of gastroesophageal reflux (GER) [5]:

a) physiological, which occurs in healthy people of all ages, usually after eating, but not more than 50 times a day and lasting not more than 20 seconds and does not lead to reflux esophagitis.

b) pathological, it is a basis for the formation of GERD and occurs at any time of the day, it is not associated with eating, is characterized by high frequency and leads to the affection of the mucous membrane of the esophagus.

It is known that GERD is characterized by a variety of clinical manifestations, including extra-extravascular, among which dental are some of the most common. In particular, the result of the study was the fact that 82.35% of pediatric patients who suffered from GERD had erosion of the hard dental tissues [6]. Of 668 (57.98%) temporary and 484 (42.02%) permanent teeth, the erosion was found in 248 (21.52%) and 171 (14.84%) respectively. In addition, children with GERD had caries with frequency from 20 to 88% with a tendency to increase the frequency with age.

It should be noted that for the most part, clinical manifestations of the gastroduodenal disease, which include GERD, in children who are not always able to characterize their condition, are nonspecific, and therefore are diagnosed untimely.

In children, GER often occurs due to the immaturity of the lower gastroesophageal sphincter. It has to be noted that the secretory function of the stomach in the ontogenesis of the child's development has certain physiological changes. It is in childhood that acid dependence is associated not so much with hyperacidity, but with a cytoprotective dysfunction of the stomach [7].

As it was noted, GERD is characterized by a variety of clinical manifestations, including asymptomatic and non-esophageal manifestations, including broncho-pulmonary, dental, cardiological, laryngoscopic ones [8]. This generates interest in this pathology of doctors of various specialties, and especially dentists [9]. The most characteristic symptoms of GERD are heartburn, a feeling of a lump in the throat and regurgitation (belching, sour belching) that occur at least once a week. However, complaints of heartburn are not characteristic of children and usually are not revealed when questioned. It should be noted that along with acid reflux in GERD, alkaline reflux is observed in the contents of the duodenum, which includes bile acids, pancreatic enzymes and lysolecithin [10].

At present, the issue of the oral cavity diseases against the background of the pathology of internal organs is paid a lot of attention [11]. Taking into account the fact that the oral cavity is an integral part of the gastrointestinal tract, the presence of gastroesophageal reflux (GER) with gastric contents rudely disturbs the existing acid-base balance and the composition of the microbiocenosis of the oral cavity in children. Taking into account the fact that saliva is one of the most important elements responsible for homeostasis, both oral and gastrointestinal, the change in its composition as a result of GER causes affection of the soft and hard tissues of the oral cavity, both in adults and in children. The factor of pathological changes in the oral cavity in diseases of the gastrointestinal tract is the hydrochloric acid [12], which leads to a decrease in the pH of the saliva, resulting in focal demineralization of the teeth with the appearance of erosion of the hard tissues and the formation of caries [13]. For the first time, pathological changes in the mouth of patients with hernia of the esophagus were described by G. Howden in 1971 [12]. It is known that the saliva is included in the system of pre-epithelial protection of the antireflux barrier and plays a protective role in the action of HCl on the tissues of the oral cavity and the esophagus mucosa [12]. Normally, the barrier described above is greatly enhanced by the organic and inorganic components of the saliva (K^+ , Ca^{2+} , Na^+ , PO_4^{3-} , Mucin, Nemucin proteins) [12]. It has to be noted that the composition and properties of the saliva in patients with GERD is altered. Changing the composition of the saliva, reducing its neutralizing properties as to HCl [14] leads to affection of the soft and hard tissues of the oral cavity [15, 16, 17]. In the case of GERD, the pH value is shifted to the acid side, due to heartburn, vomiting, acid secretion, which reduces the saturation of the saliva with Ca^{2+} and leads to dissolution of the enamel [12].

According to the literature, all changes in the oral cavity in GERD can be conventionally divided into lesions of the soft tissues (red rim of the lips, the tongue, and the periodontal tissue) and hard dental tissues, as well as changes in the composition of the oral

fluid [18]. In addition, there are data in the literature on the association between the manifestations of GERD in the oral cavity with weakened salivation and swallowing function [19]. Typical dental symptoms of GERD are: exfoliative cheilitis, anorexia, burning sensation of the tongue, furring of 2/3 of the back of the tongue, desquamative glossitis, rapid formation of a dental tartar, caries, gingivitis, and periodontitis. In one study, the disease of the mucous membrane of the mouth, lips, and the tongue was observed in 46% of children aged 8-15 years with GERD of varying degrees of severity (20). Features of the tongue mucosa in children with GERD included "geographic" tongue, desquamation changes, abundant plaque of white color, which does not have a clear localization. In addition, the tongue has a pronounced foldiness, hypertrophied papillae, teeth prints on the lateral surfaces of the tongue. In children with chronic gastroduodenitis without motor disorders the plaque spread uniformly throughout the surface of the tongue, the foldiness was rarely found (20). Quite often, pain in the tongue, bright mucus and tightness of the tongue cause doctors to erroneously exclude B12 and folio deficient states [21].

The saliva is the main regulator of the total number of microorganisms in the oral cavity. Changes in its physical and chemical properties as a result of GERD may contribute to dysbiosis [1]. The microflora of the oral cavity is fairly well studied. The direct participation of nonpathogenic, conditionally pathogenic and pathogenic bacteria, viruses, fungi, protozoa in the development of the oral cavity diseases has been proved. The significance of *H. pylori* infection in the development and progression of the periodontal disease is still discussed. There are opposing views, both on the protector's role and on the adverse effects of this microorganism on the tissues of the oral cavity [22, 23].

It should be noted that there is an adverse effect of dental pathology on the gastrointestinal tract, and therefore on the course of GERD. Several studies have shown that the treatment of dental pathology has a positive effect on the course of reflux esophagitis, which may be due to the normalization of microbiocenosis in the oral cavity and the reduction of the negative effects of pathogenic microorganisms, as well as the products of their life on the motor function of the upper GIT parts [24]. The before mentioned suggests that patients with GERD should undergo examination and treatment not only by the gastroenterologist, but also by the dentist.

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