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EC GASTROENTEROLOGY AND DIGESTIVE SYSTEM

Mini Review

Gastro, Stomatology and Microbiome

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Abstract

Gastroenterologists must look up from our area of work and consider stomatological conditions, as they cause numerous gastrointestinal pathological processes and vice versa.

In this work we address the intimate relationships that exist between the oral and intestinal microbiome and how both influence one on the other, the other on one.

Clinical data are presented, so as not to forget to investigate and visualize them, in order to determine the strategies to follow, both from the point of view of the traditional laboratory and of omics studies.

Oraloma is considered, as well as gastrointestinal conditions, related, between the two most important microbiota, the intestinal and the oral.

Finally, we evaluate what can serve to improve both microbiota, for the benefit of the health of patients.

Keywords: *Oral Microbiota (OM); Dysbiosis (D); Oral dysbiosis (OD); Microbiome (M)*

Introduction

The oral cavity is an autonomous functional and biological unit, a characteristic ecosystem. There are numerous microorganisms in the bio-films and the rest of the mouth, which translate different processes. After several days after birth, the oral microbiota (OM) is consolidated, with streptococci being the first inhabitants. Inadequate diet, some medications and other factors can affect its homeostasis and generate alterations in the oral cavity and even further away from it [1]. It contains bacteria, viruses, fungi and archaea. The largest components being bacteria (more than 700 species), determined by 16S rRNA sequencing: *Firmicutes, Fusobacteria, Bacteroidetes, Actinobacteria, Proteobacteria, Spirochaetes* and *Synergistetes*; although the number of fungi is not negligible, since they are observed in around 9 to 23 species. The importance of the OM lies in the fact that it is the second largest and most diverse microbiome (M). And transcendent for the existence of systemic and oral health [2,3]. Exogenous and endogenous causes affect the development of the OM, causing it to preserve its dynamic balance [4].

Gastrointestinal conditions and stomatology: Gastrointestinal conditions in which stomatological processes appear are: Crohn's disease (0.5 to 8%), ulcerative colitis, celiac disease, gastroesophageal reflux, malabsorption conditions related to haematopoiesis, digestive malignancies; maxillary metastases; Jaundice; Gardner syndrome and Peutz-Jeghers syndrome [5].

Crohn's disease: Oral lesions (small sites of inflammation or granulomas) are observed. The patient may present swelling of the lips, gums and oral tissues. If these data are current, it is likely that they exist in the anus and esophagus [6].

Ulcerative colitis: Oral lesions of ulcerative colitis, defined as pyostomatitis vegetans, are rare. They are more common in men, and can occur in any decade. Almost always, they appear together. They are scattered, linear pustules on the erythematous mucosa. Of diverse pathogenicity. They respect the back of the tongue. Chronic lesions may become granular, fissured, or polypoid. There may be ulcers and pustules [7].

Celiac disease: Generally, tooth enamel damage, defects and recurrent aphthous ulcers appear. If these clinical data appear, it is worth carrying out immunological studies [8].

Gastric reflux diseases: The oral manifestation produced by gastroesophageal reflux disease (GERD), as well as hiatal hernia, is the erosion of tooth enamel; which does not always happen. When beta blockers or tranquilizers are ingested, there is more erosion. Thus, when severe reflux disease is of long duration [9].

Digestive malignancies: It has been suggested that dysbiosis (D) of the oral cavity can lead to digestive malignancies. There are significant differences between OM and patients with malignant digestive neoplasms. *Fusobacterium nucleatum* and *Porphyromonas gingivalis* are likely to be associated with colorectal cancers. Even though more studies are required to confirm this situation [10].

Malabsorption related to haematopoiesis: Examples are iron malabsorption leading to iron deficiency anemia and vitamin B12 malabsorption in pernicious anemia. The oral mucosa, it is frequently involved, and may present with unique clinical appearances. It may be the first appearance of systemic diseases, so gastroenterologists must be attentive to it.

Maxillary metastases: Even though the oral cavity is an infrequent victim of metastasis, it is the jaw where they occur most frequently. Cynically, there is usually pain, swelling and paresthesia. It is quite a challenge, which necessarily requires the use of a biopsy [11].

Jaundice, Peutz-Jeghers syndrome and Garner syndrome: Oral lesions are usually multifocal increases in the mucosa, linear, nodular, polypoid or diffuse, with a predilection for the labial and buccal area and in the mucobuccal folds. In jaundice, xerostomia, bad breath, gingival processes, peri-oral eruptions, small hemorrhages and mucosal jaundice appear [12]. Peutz-Jeghers syndrome is associated with hamartomatous polyposis, mainly of the small intestine, while in Garner Syndrome, oral conditions usually support early diagnosis.

Pancreatic cancer: Men with a history of gum disease had a 63% risk of developing pancreatic cancer. Through meta-analysis, it is noted that periodontitis and edentulism seem to be associated with pancreatic cancer [13].

Oral alterations resulting from gastrointestinal conditions: Numerous gastrointestinal pathologies can generate oral alterations, whether of an infectious, inflammatory, genetic or other nature. As examples we have inflammatory bowel disease (IBD), gastro-esophageal reflux and celiac disease. Ulcerations, muco-gingivitis, lip and facial swelling, pyostomatitis vegetans, dental anomalies and dysgeusia appear in them. It is striking that in IBD there may be edema of the face and mouth, with aphthous stomatitis and glossitis [14].

Oral microbiome: Currently we have rapid sequencing of the entire metagenome, metabarcoding of 16S ribosomal RNA and metatranscriptomics. Which has served to detect numerous new microorganisms, not all but most of them. These same procedures discover new routes for diagnosis and therapeutics, based on microbiomes [15]. Both oral and intestinal M are present in the development of IBD, with a reduction in diversity and beneficial bacterial species having been detected. Oral microorganisms being present, such as in periodontitis [16].

Gastrointestinal diseases and oraloma: Oraloma is the interactions between oral microorganisms and the host. The oral ones are more than 1000 species of bacteria, fungi, viruses, archaea and protozoa [17]. A complication rate of 10% has been detected in IBD, 6.9 in GERD, and 9.5% in celiac disease. Referring that periodontitis like IBD are complex chronic diseases, which have an aberrant host immune response and a deregulated microbiota [18]. Finally, the relationship between *Helicobacter pylori* as an oral component and its effect on the stomach is extremely interesting. Chen J. and his group [19], detected *H. pylori* positivity in patients with atrophic gastritis (77.78%), of which the difference was significantly greater than in the superficial gastritis group and in the group of gastric and duodenal ulcer. Clinical correlation has been detected between *H. pylori* infection in the oral cavity and erosive oral lichen planus [20].

Oral dysbiosis: In order to show the incidence of oral dysbiosis (OD) in digestive processes, salivary, finding: increase in *Streptococcus* and *Enterobacteriaceae*. *Prevotella* and *Neisseriaceae*, like *Haemophilus*, decreased. While in Crohn's Disease the *Veillonellaceae* increased and the *Lachnospiraceae* decreased. D is most common in the intestine, mouth, urogenital area and skin, although it occurs anywhere in the body. Generally, the impairment of symbiosis generates D, which occurs due to several factors, and includes the presence of pathogens, which modulates the M. In the mouth-intestinal connection, periodontitis is undoubtedly the main generator of the problem [22].

Resilience: It is determined as the adaptation of a living being to disturbing agents and is related to mental health and physical functioning. Dental pathologies occur due to alteration of the metabolic and functional interrelationships between the dental biofilm and that of the host. Biomarkers can be detected through omics studies. Probiotics and prebiotics could improve M resilience and determine new therapies for disease prevention [23].

Mouth-brain axis: Tran VTA and associates [24] point out that the mouth-brain axis (Mouth-gut-brain axis) may contribute to the presence of Alzheimer's disease. To do this, they determined the decrease in neurodegenerative microgliosis, through the inhibition of lipopolysaccharides and succinate dehydrogenase, in a medium conditioned by bacteria. Likewise, the inter-organic microbial network is identified as a significant regulator of physiology and pathological processes. It has been shown that there is a microbial presence from mouth to intestine and vice versa, which indicates the existence of the mouth-brain axis [25].

Short chain fatty acids: SCFA make up two-thirds of the anion composition of the colon, especially as acetate, butyrate and propionate. They are closely linked to the nutrition of the colonic mucosa and the absorption of water and sodium. Enemas of these acids are beginning to be used in ulcerative colitis, with good results. Determining that it is due to oxidation in colonocytes. They are indicated in numerous digestive disorders [26]. Anaerobic bacteria produce butyrate and have a protective defense in the intestine and in underlying diseases (metabolic, nervous system diseases and osteoporosis). Butyrate producing bacteria exist in the mouth. Its initial presence and the continuity of periodontitis are decisive [27].

Short chain fatty acids are present in the composition of the OM, oral health and chronic inflammation. They are part, *in situ*, of its normal metabolism, even when they increase in D. A positive effect has been observed in systemic inflammation, the reduction of some types of cancer and the improvement of metabolic processes [28].

Oral microbiota transplant: Even though the success that has been obtained in some gastrointestinal conditions requires evaluating the procedure in oral diseases, no case has yet been performed in humans, especially in 16 dogs, with periodontitis and good results [29]. Oral microbiota transplantation remains promising as a new therapy for the management of caries and periodontitis [30].

Biotics: Functional foods that, in addition to nutrients, provide the body with components that contribute to curing diseases, or reducing the risk of developing them.

Probiotics have a protective role in *Candida* spp. Oral infection and especially colonization. By inhibiting the growth of pathogenic microorganisms, through competition for receptor sites, as well as production of metabolites. *Lactobacillus* stops the progression of chronic periodontitis by inhibiting the secretory activity of Th17 lymphocytes. They improve gingivitis by strengthening the gums and finally, in orthodontics, they reduce the amount of *Streptococcus mutans* in saliva [31].

Biotics can produce health risks during prolonged use in conditions that allow their possible passage into the body during the development of a secondary infection. They should be restricted in bloody diarrhea, immunosuppressive medication or radiotherapy [32].

Conclusion:

- Gastrointestinal diseases usually generate oral disorders, as well as oral diseases gastrointestinal diseases (back and forth phenomenon).
- We must not forget the routine exploration of the oral cavity, in search of pathologies that guide digestive processes.
- The biotics that help in the treatment must be those tested in oral or digestive pathology.
- We will soon see oral microbiota transplants carried out in severe caries and periodontitis.

Conflicts of Interest

The authors declare that do not have affiliation or participation in organizations with financial interests.

Ethical Approval

This report does not contain any study with human or animal subjects carried out by the authors.

Informed Consent

The authors obtained informed written consent from the patients, in order to develop this article.

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