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CHRONIC PERIODONTITIS IN PATIENTS WITH CHRONIC DUODENAL ULCER

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The purpose of the study was to access the pathogenetic mechanism of the development of a combination of duodenal ulcers and chronic periodontitis. In 90 % of these patients, chronic gastritis was associated with Helicobacter pylori. In the mucous membranes of the gingival papillae and the mucous membrane of the stomach, one can notice similar inflammatory processes and processes that distinguish them. Such differences were found in the development of dystrophic processes, disturbance of regenerative and development of dysregenerative processes in the form of dysplasia of various degrees of expression in the gastric mucosa compared to the mucous membrane of the gingival papillae. There was a difference in the proliferative activity of these two mucous membranes. Frequency D of varying degrees was unidirectional and depended on the severity of gastritis and had a particular connection with the development of periodontitis in this group of patients. Thus, chronic atrophic gastritis in patients with chronic duodenal ulcers associated with Helicobacter pylori is a common disease. The degree of gastritis had a special relationship with the development and severity of periodontitis in this group of patients.

Key words: chronic duodenal ulcer, chronic atrophic gastritis, chronic periodontitis, dysplasia of the gastric mucosa.

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ХРОНІЧНИЙ ПАРОДОНТИТ У ХВОРИХ НА ХРОНІЧНУ ВИРАЗКОВУ ХВОРОБУ ДВАНАДЦЯТИПАЛОЇ КИШКИ

Метою дослідження було вивчити патогенетичний механізм розвитку поєднання захворювань дуоденальної виразки та хронічного пародонтиту. У 90 % цих хворих хронічні гастрити були Helicobacter pylori-асоційовані. В слизових оболонок десневих сосочків і слизової оболонки шлунка можна відмітити як подібні запальні процеси так і процеси, що їх відрізняють. Такі відмінності є у розвитку дистрофічних процесів, порушенні регенераторних і розвитку дисрегенераторних процесів у вигляді дисплазії різних ступеней вираження в слизовій оболонці шлунка в порівнянні із слизовою оболонкою десневих сосочків. Є різниця і в проліферативній активності цих двох слизових оболонок. Частота Д різного ступеня має однонаправлений характер і залежить від ступеня вираження гастриту і має певний зв'язок із розвитком пародонтиту у цієї групи хворих. Таким чином, хронічний атрофічний гастрит у хворих на хронічну виразку дванадцятипалщї кишки, асоційований з Helicobacter pylori, є поширеним захворюванням, а ступінь вираження гастриту має певний зв'язок із розвитком і ступенем вираження пародонтиту у цієї групи хворих.

Ключові слова: хронічна виразка дванадцятипалої кишки, хронічний атрофічний гастрит, хронічний пародонтит, дисплазія слизової оболонки шлунка.

The study is a fragment of the research project "Determination of pathomorphological differential diagnostic markers of precancerous processes and tumours of the epithelial tissue of the stomach", state registration No. 0120U002028.

The digestive organs, starting from the oral cavity, along their entire length, function in close interconnection, carry out the complex process of processing food and, thereby, ensure the body's everyday life. Disruption of one of these parts of the digestive system causes pathological changes in the body [2]. This applies to diseases in the full extent of the organs of the oral cavity, esophagus, stomach and intestines. Duodenal ulcer continues to be the most challenging problem in gastroenterology and periodontitis in dentistry [12]. Periodontitis is a zone of the most common gum diseases and subsequently becomes the leading cause of tooth loss in adults. According to the World Federation of Dentists, dental caries and periodontal disease are among the most common conditions affecting 90 % of people worldwide [13]. Current epidemiological data indicate both the widespread prevalence of periodontal pathology in humans and the influence of numerous factors and concomitant diseases on the incidence of diseases [4, 6, 7].

It is known that changes in the oral mucosa, starting with chronic gingivitis, can be caused by a duodenal ulcer. A duodenal ulcer occurs 4–13 times more often than a stomach ulcer [3]. Duodenal ulcer without signs of gastritis and duodenitis is extremely rare. At the present stage, one of the main reasons for developing duodenal ulcers is the infectious factor Helicobacter pylori (Hp) [11].

The consequence of Helicobacter pylori gastritis is achlorhydria, which leads to the growth of bacterial flora in the stomach, transforms nitrates into nitrites and provides the generation of N-nitroso components known as carcinogens [10].

Unlike chemical and physical carcinogens, HP is not a "complete" carcinogen and cannot cause stomach cancer without other etiological factors. But, in relation to other carcinogens, HP manifests itself

as a carcinogen [11]. HP also produces metaplasia of the gastric epithelium into the intestinal epithelium, which can then become malignant [14].

However, the pathogenetic essence of the intercurrent relationship between chronic periodontitis and duodenal ulcer disease has not been sufficiently studied.

The purpose of this study was to establish the pathogenetic mechanism of the development of a combination of diseases of duodenal ulcer and chronic periodontitis.

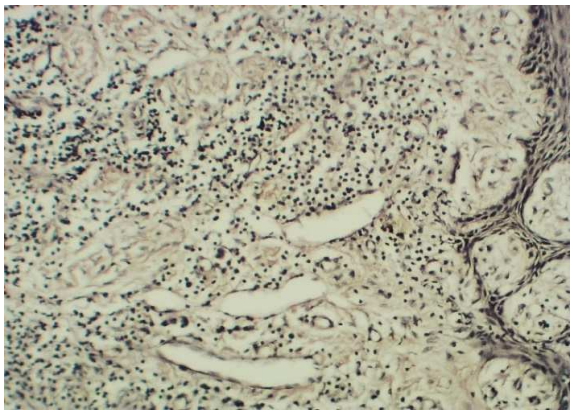
Materials and methods. The surgical material of the periodontium and gastric mucosa was investigated from patients with duodenal ulcer – 25. The fixation time in a 10 % neutral formalin solution was 48 hours. Using standard methods, the material was embedded in paraffin blocks, of which sections four μm thick were made and stained with hematoxylin and eosin, van Gieson [1]. Histological preparations were examined using Biorex 3 light microscope with digital microfilter with software adapted for these studies (serial No. 5604).

Sections were obtained from paraffin blocks of the periodontium and gastric mucosa, stained with hematoxylin-eosin, picrofuchsin, according to conventional schemes, and placed in polystyrene. Helicobacter pylori (HP) in the gastric mucosa was detected by a semi-quantitative method [11]. The character of dysplastic changes in the integumentary fossa epithelium and areas with intestinal metaplasia was revealed in the gastric mucosa. The results of immunohistochemical reactions were assessed by calculating the percentage of positive cells with different intensities, which were visually assessed. In each case, 800-1000 epithelial cells were analyzed. The proliferative potential (proliferation index) was determined by counting the number of Ki-67 expressing cells. With LI (label index) Ki-67 <10.0 % – low, MI Ki-67≥30.0 % - high proliferative activity.

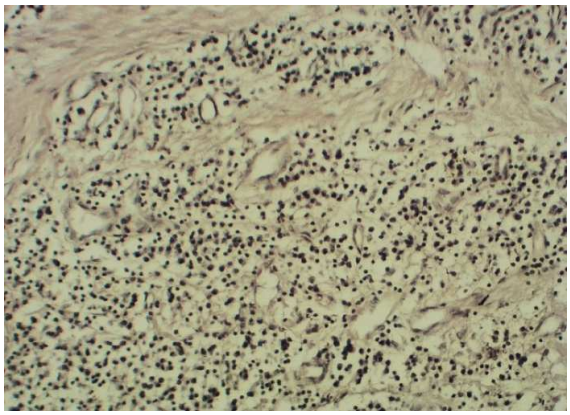
Statistical processing of the study results was carried out using the Microsoft Office Excel software and the Real Statistics 2019 extension.

Results of the study and their discussion. We studied the existence of an intercurrent relationship between chronic periodontitis and duodenal ulcer from the point of view of the generality of reactions of the immune system of the mucous membranes of the digestive tract to a constant antigenic factor.

In periodontitis conditions, the marginal gum's epithelium is subject to balloon dystrophy and necrosis; it is poorly regenerated and replaced by the epithelium of the oral cavity. Mucoid and fibrinous swelling develops in the gums' connective tissue, and vasculitis appears. Inflammation develops and is apparent in the alveolar region. As a result of inflammation of the gums, the periodontal joint, and then the circular ligament of the tooth is destroyed, and the periodontal pocket is formed. During the period of exacerbation of the disease, the depth of the pocket increases and the degree of periodontitis is determined by its degree. The outer wall of the pocket and its bottom are formed by granulation tissue covered and permeated with strands of stratified squamous epithelium (fig. 1 A). In this case, the epithelium reaches the apex of the tooth.



a



b

Fig. 1. Chronic periodontitis. A – Formation of granulations and fibrous tissue. B –Paradont is inflammatory infiltrated with lymphohistiocytic elements. The formation of granulations and fibrous tissue occurs. Stratified squamous epithelium. Microimage. Stain: van Gieson. Lens: 10: Ocular lens:15.

The granulation tissue contains many neutrophils, plasma cells, macrophages and lymphocytes (fig. 1B.). Pus (alveolar pyorrhea) is discharged from the pocket, especially during an exacerbation. Osteoporosis develops in the alveolar processes of the jaws.

With periodontitis, cement resorption is observed in the tooth tissue with the formation of cement and cement-dentin niches. At the same time, a neoplasm of cement and bone beams occurs, that is, hypercementosis. In the pulp of the tooth, reactive configurations develop – dystrophy and atrophy.

In our work, we, to a certain extent, confirm the existence of a pathogenetic relationship between peptic ulcer disease and lesions of the oral mucosa in the form of chronic periodontitis of varying severity. In the cases we observed, the substrates of peptic ulcer disease are local tissue necrosis of the mucous membrane of the pyloric section of the stomach and destructive changes in the interdental papillae of the gums resulting from chronic inflammation. At the same time, of course, the systemic nature of the disease is traced.

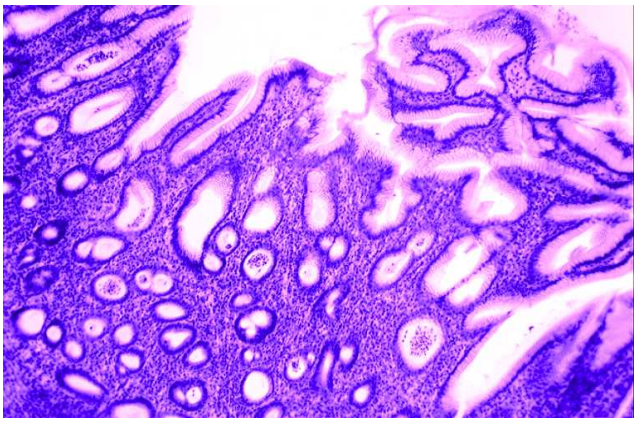


Fig. 2. Severe atrophic gastritis. The presence of intestinal epithelium through columnar cells and intestinal crypts. In the thickness of the mucous membrane of various sizes, the hand is lined with a flat cylindrical epithelium and mucus in the middle. The thickness of the membrane is inflammatory infiltrated with lymph-histiocytic elements. Microimage. Stain: hematoxylin and eosin. Lens: 15: Ocular lens:10.

Various forms of chronic gastritis were found in the mucous membrane of the topographic and anatomical parts of the stomach, 90% of which were Helicobacter pylori (HP) - associated. There is a different volume of distribution of forms of chronic gastritis in all departments.

Only moderately expressed, pronounced atrophic (fig.2), and atrophic-hyperplastic gastritis was found in the pyloric region, while its pronounced forms dominated (table 1).

A relationship was found between the incidence and spread of epithelial dysplasia in a particular part of the stomach and the nature of the identified inflammatory changes in the mucous membrane (table 1).

Table 1

The frequency of detection and spread of dysplasia of the epithelium of the gastric mucosa with different forms of chronic gastritis in patients with chronic duodenal ulcer in percents (%) (M±m)

Form of chronic gastritis	F/S	Degree of detection of dysplasia		
		I	II	III
Superficial gastritis and glandular proliferative gastritis with foci of hypertrophic glandular proliferative gastritis.	F	60.5±13.9	6.7±2.1	-
	S	2.0±0.5	0.08±0.08	-
Initial atrophic gastritis with foci of moderate and severe chronic atrophic gastritis.	F	100	85.3±15.3	-
	S	7.7±1.7	2.6±0.7	-
Moderately pronounced atrophic gastritis and moderately pronounced atrophic-hyperplastic gastritis.	F	100	93.8±6.2	5.9±5.9
	S	16.6±1.7	4.6±0.5	0.1±0.05
Moderately pronounced atrophic gastritis and moderately pronounced atrophic-hyperplastic gastritis with foci of pronounced atrophic gastritis and pronounced atrophic-hyperplastic gastritis	F	100	100	49.0±12.4
	S	22.3±2.6	7.2±1.05	0.4±0.1
Severe atrophic gastritis and severe atrophic-hyperplastic gastritis.	F	100	100	65.0±10.9
	S	28.0±1.6	10.5±1.1	0.9±0.2

In superficial gastritis and glandular hypertrophic gastritis, the development of dysplasia was not observed. Still, they were detected when these forms of chronic gastritis were combined with foci of chronic atrophic and hypertrophic glandular-proliferative gastritis, were localized in the latter's zone, and were limited. The Ki-67 marker detected proliferating cells of the entire pool of dividing cells (fig. 3A and 3B). The frequency of detecting and spreading dysplasias was significantly lower than in other forms of chronic gastritis ($p < 0.01$).

With the latter, a significant difference in the frequency of detection of mild and moderate dysplasia of the epithelium was not revealed. Still, its spread significantly increased with the progression of gastritis.

The development of severe dysplasia of the epithelium of the gastric mucosa was observed only with initial atrophic gastritis and initial atrophic-hyperpsy gastritis, as well as in more pronounced forms of chronic gastritis. Still, in the last frequencies of detection and distribution, it was significantly higher fig. 4.

In the pyloric section of the stomach, pronounced atrophic (31.3±8.7 %) and trophic-hyperplastic (46.3±9.2 %), gastritis prevailed, characterized by a high frequency of detection and spread of D (dysplasia).

In comparison with various pathomorphological descriptions, we assess the results of our research. We prefer to consider this problem from the standpoint of the role of the infectious factor Helicobacter pylori in the pathogenesis of peptic ulcer disease (Hp) [8, 9]. Based on this position, it should be recognized that Hp is largely burdensome and chronicles the development of this pathological process. In other words,

the initial cause of duodenal mucosa ulcers may be dysfunctions of various regulatory systems, leading to a decrease in the integumentary and glandular epithelium's barrier properties, creating favourable conditions for the manifestation of the pathogenicity of virulent strains of HP.

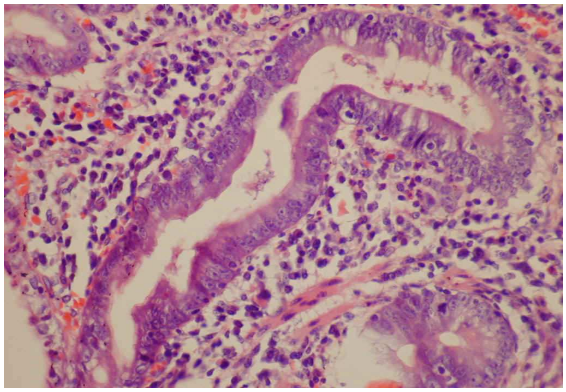


Fig. 3A. The proliferation of the integumentary fossa epithelium with mild dysplasia in chronic gastritis. Hematoxylin-eosin staining. Microimage. Stain: hematoxylin and eosin. Lens: 10: Ocular lens:40.

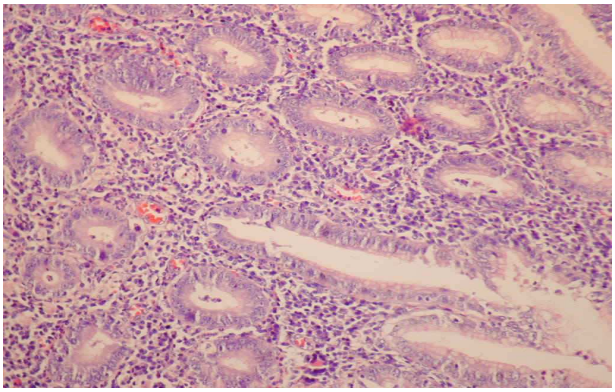


Fig. 3B. Chronic gastritis with high activity, pronounced proliferation and dysplasia of the epithelium of the gastric fossa. Microimage. Stain: hematoxylin and eosin. Lens: 10: Ocular lens:10.

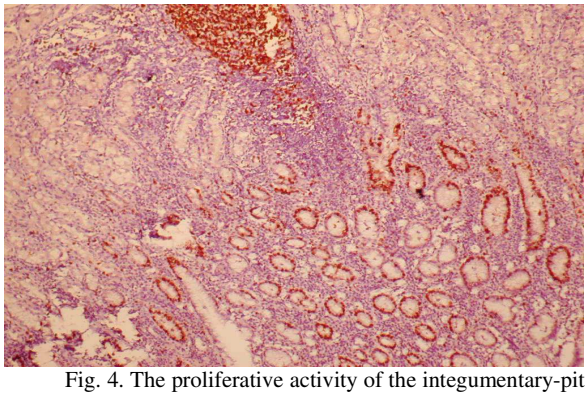


Fig. 4. The proliferative activity of the integumentary-pit epithelium is high in the focus of its weak dysplasia and in the centre of the lymphoid follicle and inflammatory infiltrate cells scattered in the stroma. Marker Ki-67. Microimage. Stain: hematoxylin and eosin. Lens: 10: Ocular lens:10.

An illustrative example of the specificity of effector structures is the integumentary epithelium, which provides the barrier functions of these two types of mucous membranes in different ways. Indifferently not only as of the first barrier for the penetration of foreign substances and microorganisms into the body's internal environment but also prevents the impregnation of liquid into the external environment from the underlying connective tissue due to the layer of keratocytes, which are closely interconnected. In this matter, we share the opinion of Sherstyuk O.O. that the barrier function of the integumentary epithelium of the gums is passive in comparison with that of the gastric mucosa [9].

The integumentary epithelium of the gastric mucosa, which is a continuous secretory field, serves to protect against gastric juice's aggressive properties, a product of the secretory activity of the gastric glands.

The interdental papillae of the human gums do not contain any glandular structures. Their hydration is carried out due to the secretory activity of the salivary glands. But this does not exhaust the question of the similarities and differences between these two types of mucous membranes [9].

Summarizing our study of the mucous membranes of the gastric papillae and the gastric mucosa, we can note similar inflammatory processes in these two zones of the digestive tract, causing destructive changes and processes that distinguish the response to chronic inflammation of the gastric mucosa from the epithelium. Such differences are in the development of dystrophic processes, disturbance of regenerative and development of dysregenerative processes in the form of dysplasia of various degrees of expression in the gastric mucosa compared to the mucous membrane of the gingival papillae. There is a difference in the proliferative activity of these two mucous membranes. But the cellular immune response of these parts of the mucous membrane to the infectious factor Hp has common manifestations in the form of areas infiltrated by the lymphohistiocytic elements [5, 15], which demonstrates the connection between inflammatory processes in these parts of the digestive system. The formation of granulations and fibrous tissue occurs.

Conclusions

1. Among the common diseases of the digestive tract in dentistry is chronic periodontitis, and in gastroenterology – chronic duodenal ulcer. Combining these diseases aggravates the patient's condition, which creates difficulties in his diagnosis and treatment.

2. According to the data of a histopathological study in patients with periodontitis and duodenal ulcer, an analogy of the pathogenesis of their development was established.

3. The local manifestation of the reaction of the immune system in the gum papillae in chronic periodontitis, intercurrent duodenal ulcer, is quite identical to that which occurs in duodenal ulcer.

4. In the gastric mucosa with duodenal ulcer, changes corresponding to pronounced atrophic or atrophic-hyperplastic gastritis associated with HP were found in 90 % of cases. This confirms the point of view that pronounced atrophic or atrophic-hyperplastic gastritis is Helicobacter pylori-associated.

5. The frequency of dysplasia of the epithelium of the gastric mucosa of the first stage in chronic duodenal ulcer was 60.5±13.9 g<0.001. The frequency of second-stage dysplasia 6.7±2.1 g<0.001 was found only in superficial and glandular-proliferative gastritis. Dysplasia of the third degree (D-III) 5.9±5.9 g<0.001 was found in moderate atrophic gastritis. Frequency D of varying degrees is unidirectional and depends on the severity of gastritis and has a certain connection with the development of periodontitis in this group of patients.

Prospects for further research. The complexity of the problem of periodontitis in combination with a duodenal ulcer requires further diagnostic solutions.

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