

IBS-like syndrome in ulcerous colitis

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Abstract

Ulcerative colitis (UC) and irritable bowel syndrome (IBS) are chronic gastrointestinal disorders, and symptoms similar to those of IBS are observed in each of the three patients with quiescent UC (the IBS-UC). The pathophysiology of the IBS-UC is not well understood.

An important characteristic of the IBS-UC and the UC is the change in motor function of the large intestine, which has not been adequately studied.

Aim: Evaluate the motor function of different parts of the colon with the IBS-UC and UC in the acute stage.

Material and methods of investigation: 36 patients aged 16 to 69 years (mean age 37.0 ± 10.1 years) with the IBS-UC (group 1) were examined. The second group consisted of 44 patients suffering from chronic total ulcerative colitis in the stage of exacerbation. The control group consisted of 39 patients with the IBS, proceeding against a background of diarrhea. Evaluation of histologic preparations of the IBS-UC and the UC was carried out on the Gebs score.

The registration of the electromyogram of the contractile activity of the colon right, left parts, and sigmoid intestine was performed with a 21-channel electroencephalograph (Nihon-Kohden, Neurofax, EEG 4400 series, Washington, DC).

Results and discussion: The IBS-UC is accompanied by an increase in the frequency of slow waves and spike activity, which was clinically manifested by increased intestinal transit in the presence of severe pain syndrome. The IBS-like syndrome in ulcerative colitis is characterized by diarrhea syndrome, meteorism, discomfort and abdominal pain, endoscopic remission of ulcerative colitis at normal values of the Mayo score, C-reactive protein level in the blood, mild lymphoplasmocytic infiltration of the mucosa's own membrane, and hypermotor dyskinesia of the colon marked by spastic (painful) activity. Spastic activity is caused by a spasm of smooth muscles of the circular muscle layer.

Conclusion: An increase in the frequency of slow waves in patients with IBS-UC by 10-12% or more in the sigmoid colon can, along with an increase in the autoimmune process, lead to the progression of the IBS-UC in the UC.

Introduction

Ulcerative colitis (UC) in accordance with the European Crohn's and Colitis Organisation (ECCO)-is a chronic inflammatory condition that causes continuous mucosal inflammation of the colon, usually without granulomas on biopsy. It affects the rectum and to a variable extent the colon in a continuous fashion, and is characterised by a relapsing and remitting course [1]. Irritable bowel syndrome (IBS) is a bowel disorder in which chronic abdominal pain is associated with irregularity in stool form and passage in the absence of any organic cause [2]. About 30% of patients with UC exhibited irritable IBS-like symptoms [3], which is more than twice as high as the prevalence in a normal population [4].

Due to the severity of the course, the frequency of complications and disability of the able-bodied population, it occupies one of the leading places in the structure of diseases of the digestive tract.

In Russia prevalence of UC ranges from 21 to 268 cases per 100 thousand of the population [5]. The highest annual incidence of ulcerative colitis is registered in Europe (24.3/100000) and in North America (19.2/100000) [6]. Ulcerative colitis is often complicated by intestinal bleeding, toxic dilatation and perforation of the large intestine; often develops colorectal cancer.

An important characteristic of the IBS-UC is a change in the motor function of the large intestine, which has not been adequately studied.

The aim is to evaluate the motor function of various parts of the colon with the IBS-UC.

Material and methods

The study included patients with chronic course of ulcerative colitis, male and female, as well as patients with IBS-like syndrome in UC, who had a reliable diagnosis of UC, confirmed endoscopically and histologically. Patients were excluded from the study if they did not have a seropositive result when determining the surface antigen to the hepatitis B virus, antibodies to hepatitis C virus, a positive response to HIV, a positive RW, a history of lymphoproliferative diseases or malignant tumors of any location, psychiatric disorders, and drug addiction.

We examined 35 patients aged 16 to 69 years (mean age 37.0 ± 10.1 years) with the IBS-UC (group 1). The IBS-UC in the patients under study proceeded with diarrhea, without raising the temperature

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and without extra intestinal manifestations. Endoscopic remission of ulcerative colitis was noted. The second group consisted of 44 patients suffering from chronic total ulcerative colitis in the stage of exacerbation. The control group consisted of 39 patients with IBS, on a background of diarrhea.

The Colon histological specimens were scored using the Gebs pathohistological index.

The registration of the electromyogram of the contractile activity of the left, right parts, and sigmoid colon was performed with a 21-channel electroencephalograph (Nihon-Kohden, Neurofax, EEG 4400 series, Washington, DC). The frequency and amplitude of slow waves and spikes (potentials of smooth muscle action) were evaluated with subsequent computer processing of the results. The frequency of spikes was calculated for one slow wave [7].

Statistical processing of the data was carried out using the Statistica-6 software package was carried out. All quantitative data, subject to a normal distribution, are represented in the form $M \pm m$. To process the data obtained, the Student's criterion (t) was applied with the subsequent determination of the level of reliability of the differences (p) and the χ^2 criterion. Differences between the mean values were considered reliable at $p < 0.05$.

Results and discussion

Clinically, diarrhea syndrome with a stool frequency of 2-3/day, flatulence, discomfort and abdominal pain was noted in patients with the IBS-like syndrome in the ulcerative colitis (IBS-UC). The index of clinical activity of patients with the IBS-UC averaged 1.7 ± 0.5 points, the level of C-reactive protein in the blood was 4.4 ± 0.5 mg/l.

Clinically, patients with ulcerative colitis reported having a stool with a frequency of less than 18 r/day with mucus and blood, flatulence, pain and a fever of up to 38.0 and higher. Extraintestinal manifestations were noted in the third of patients. The index of clinical activity of patients with UC was determined by Rakhmilevich [8] and averaged 7.4 ± 0.6 points, the C-reactive protein level in the blood was 5.4 ± 0.4 mg/l (Table 1).

The Mayo endoscopic score (Mayo ES) [9] (Table 2) in patients with the IBS-UC was 1.5 ± 0.5 points. Endoscopically, the granularity of the mucous membrane was minimal, the vascular pattern was slightly blurred, contact bleeding of the mucosa and its damage were absent. Morphologically, there was a moderate lymphoplasmocytic infiltration of the mucosa's own membrane. The Mayo ES in patients with UC was 6.8 ± 0.5 points. Endoscopically marked granularity of the mucous membrane, the vascular pattern was smeared, contact bleeding of the mucous membrane was expressed, mucus, fibrin, erosion was noted on the mucous membrane. Microscopically revealed infiltration of the own plate of the mucosa by plasma cells, eosinophils, lymphocytes, mast cells and neutrophils.

On the electromyogram (EMG) of the right parts of the colon of patients with the IBS-UC, the frequency-amplitude characteristics of slow waves were 11.8 ± 0.6 /min and 0.12 ± 0.0014 mV. The spike potentials were appeared in the part colon of all the patients observed; their frequency was 3.9 ± 0.2 , the amplitude -0.03 ± 0.002 mV (Figure 1). The motility study of the colon right parts of the UC patients showed that the frequency-amplitude characteristics of slow waves were 12.2 ± 0.9 /min and 0.14 ± 0.01 mV. The frequency of spikes was 3.7 ± 0.3 , amplitude -0.033 ± 0.007 mV. The results of the study showed that the slow-wave activity of the colon left parts of patients with the IBS-

Table 1. The scheme for calculating the Rakhmilevitz score in UC patients.

Parameter	Value	Points
Number of defecations in the last week <18	<18	0
	18-35	1
	36-60	2
	>60	3
Blood loss per week	No: stool with blood 0-1	0
	A little: <30%	2
	Many: >30%	4
Overall health for a week	0-3 (good)	0
	4-10 (satisfactory)	1
	11-17 (poor)	2
	18-21 (very bad) 0	3
Abdominal pain for a week	0-3 (no)	0
	4-10 (weak)	1
	11-17 (moderate)	2
	18-21 (expressed in 0)	3
Temperature	<38	0
	>38	3
Extraintestinal manifestations	None	0
	Iridocyclitis (uveitis)	3
	Nodal erythema	3
	Arthritis	3
Laboratory data	SOE <50 mm/h and Hb > 100 g/l	0
	SOE >50 mm/h	1
	SOE >100 mm/h	2
	Hb <100 g/l	4

Table 2. Assessment of clinical disease activity of ulcerative colitis with the Mayo score.

Parameter	Characteristic	Points
Mucosal granulation	Absent	0
	Presented	2
Vascular pattern	Clear	0
	Neutral	1
	Absent	2
Sensitivity of the mucosa	No	0
	Contact bleeding	2
	Spontaneous bleeding	4
Damage to the mucosa (mucus, fibrin, pus, erosion, ulcers)	No	0
	Weak	2
	Expressed	4

UC was close to that in patients with UC in the absence of expressed endoscopic manifestations of the UC.

Electromyographically, the frequency-amplitude characteristics of slow waves of the colon left parts of patients with the IBS-UC were 9.8 ± 0.4 /min and 0.12 ± 0.01 mV. The spike potentials were observed in all the patients observed. Their frequency was 4.0 ± 0.8 , amplitude -0.03 ± 0.004 mV (Figure 2).

Electromyographically, the frequency-amplitude characteristics of slow waves of the colon left parts of the patients with UC were 10.4 ± 0.5 /min and 0.11 ± 0.03 mV. The spike potentials were observed in all the patients observed; their frequency was 3.6 ± 0.7 , amplitude -0.025 ± 0.004 mV.

The results of the study showed that the slow wave activity of the colon left parts of patients with the IBS-UC was lower than in UC, and the spike activity, on the contrary, was greater, which indicated a predominance of pain syndrome in patients with the IBS-UC with

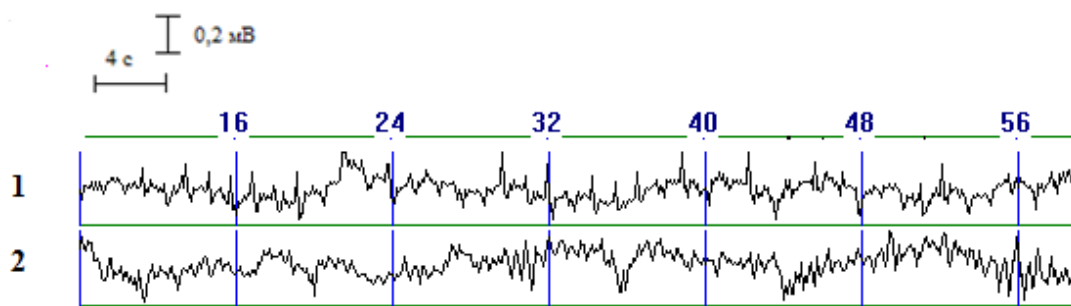


Figure 1. Electromyogram of the right (1), left (2) parts of the colon of patients with the IBS-like syndrome in the ulcerative colitis. Scale for all fragments horizontal 4 s, vertical - 0.2 mV.

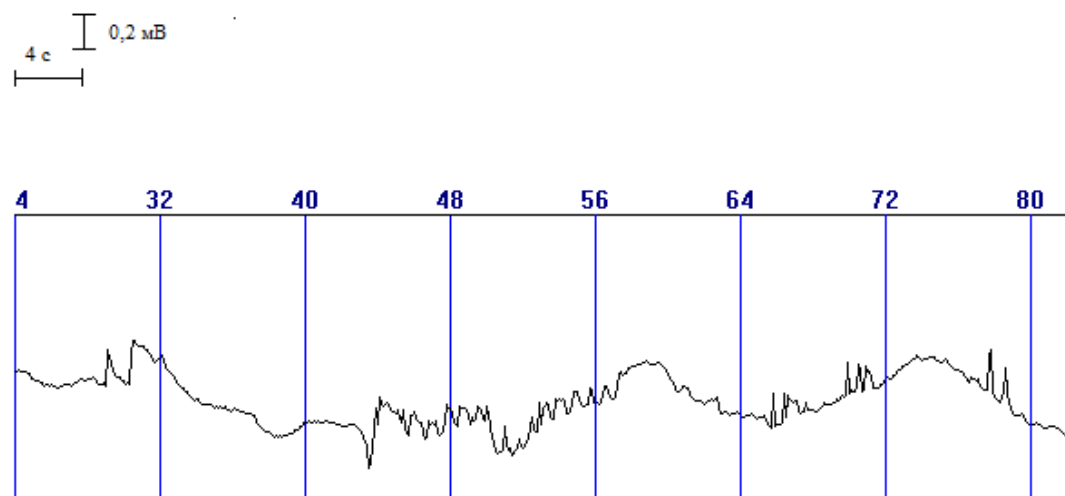


Figure 2. Electromyogram of the sigmoid colon of patients with the IBS-like syndrome in the ulcerative colitis. Scale horizontal 4 s, vertical - 0,2 mV.

localization in the left parts of the colon. Increased spike activity is due to increased contractile activity of the circulatory muscular gut layer.

Electromyographically in the sigmoid colon of patients with the IBS-UC, the frequency-amplitude characteristics of slow waves were $9.2 \pm 0.5/\text{min}$ and $0.13 \pm 0.011 \text{ mV}$. Spike potentials were noted in all patients. The frequency of spikes was 4.2 ± 0.4 , amplitude $-0.05 \pm 0.006 \text{ mV}$ (Figure 1).

The electromyogram of the sigmoid colon of the UC patients revealed the following differences in the studied parameters: the frequency-amplitude characteristics of the slow waves were $10.2 \pm 0.5/\text{min}$ and $0.13 \pm 0.012 \text{ mV}$. Spike potentials were noted in all patients. Their frequency was 2.3 ± 0.3 , amplitude $-0.04 \pm 0.005 \text{ mV}$ (Figure 3). The expressed spike activity of the muscle layer in the IBS-UC is due to the spastic activity of the circular muscular layer of the sigmoid colon with the development of pain syndrome.

Results of electromyography of the colon in patients with IBS and concomitant diarrhea (control group) are shown in Table 3. In IBS with diarrhea, there is less pronounced spike activity in all three parts of the intestine, which corresponds to a less severe pain syndrome with simultaneous acceleration of intestinal transit.

Amplitudes of slow waves of the sigmoid colon of patients of groups 1 and 2 were almost the same, indicating a comparable excitability of the smooth muscles of the sigmoid colon of the both groups.

An increase in the frequency of spikes in patients with the IBS-UC caused the presence of pain syndrome. An increase in the frequency

Table 3. Electromyogram in IBS with diarrhea, frequency, /min, amplitude, mV. * $p < 0.05$.

		Right	left	sigmoid
Slow waves	Frequency	11.8 ± 0.8	$12.5 \pm 0.8^*$	$7.7 \pm 0.6^*$
	Amplitude	0.14 ± 0.02	0.16 ± 0.007	0.11 ± 0.002
Spikes	Frequency	1.5 ± 0.02	1.4 ± 0.3	$2.8 \pm 0.3^*$
	Amplitude	0.07 ± 0.001	0.08 ± 0.0012	0.02 ± 0.001

and amplitude of slow waves accelerated an intestinal transit in patients with ulcerative colitis.

An increase in the frequency of slow waves in patients with the IBS-UC by 10-12% or more in the sigmoid colon can lead along with other clinical syndromes under investigation to the progression of the IBS-UC in the UC. This slow-wave dynamic, as well as an increase in the spike activity of smooth muscle cells of the intestine at different stages of the UC, is largely due to the state of its ganglion apparatus of the intermuscular neural plexus, which is characterized by the development of the maternal ganglionitis.

Effective abdominal motility involves a complex picture of stimulatory and inhibitory neuromuscular signals arising in the enteric nervous system (ENS) of the colon [9].

On the basis of the conducted study in the colon right parts of patients with the IBS-UC, against the background of normal slow wave activity, there was a marked increase in spike activity, which was clinically manifested by pain syndrome.

In the colon right parts of patients with the IBS-UC there is an increase in the frequency of slow wave and spike activity, which

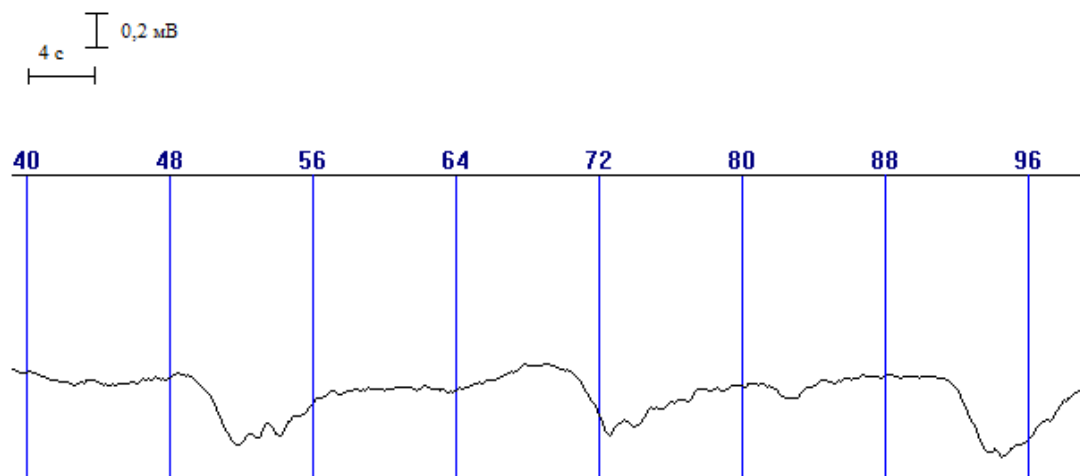


Figure 3. Electromyogram of the sigmoid colon of patients with the ulcerative colitis. Scale horizontal 4 s, vertical - 0,2 mV.

was clinically manifested as increased intestinal transit against the background of pain syndrome.

When analyzing the EMG of the sigmoid colon, high-frequency and moderate-amplitude slow wave activity and high-frequency low-amplitude spike activity was noted, which were clinically manifested as diarrheal syndrome on the background of pronounced pain sensations.

Conclusion

The IBS-like syndrome in ulcerative colitis is characterized by diarrhea syndrome, flatulence, discomfort and abdominal pain, endoscopic remission of ulcerative colitis at the Mayo score of 1.5 ± 0.5 points, level of C-reactive protein in the blood 4.4 ± 0.5 mg/l, moderate lymphoplasmocytic infiltration of the mucous membrane, and hypermotor dyskinesia of the large intestine with marked spastic (painful) activity.

Recent studies have shown that the inflammation observed in different stages of the UC changes the physiological properties of the ENS neurons, including the excitability of neurons on the afferent end of the peristaltic reflex, strengthens the synaptic stimulus and weakens the inhibitory neuromuscular transmission [9]. In addition, the relationship of these changes to the violation of the motor activity of the colon is established, the latter remaining for a long time after a decrease in the severity of damage to the intestinal mucosa. This neuroplasticity may contribute to motor disruption and the transformation of the IBS-UC into the UC.

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