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CHRONIC MESENTERIC ISCHEMIA IN PATIENTS WITH VISCEROPTOSIS

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Abstract

The study covered 205 patients with chronic colonic stasis, most of whom were representatives of the indigenous peoples – 163 (79.5%). In this group, Doppler ultrasonography of the superior mesenteric artery was done in 17 (27.4%) patients with compensated CCS, 25 (40.3%) patients with sub-compensated CCS and 20 (32.2%) patients with decompensated CCS. The group of 18 people (8.8%) without CCS served as a control set. The conservative therapy of the patients with visceroptosis, aimed at an improved microcirculation in the colon wall and alleviation of the chronic mesenteric ischemia syndrome, increased the treatment efficiency in 93.7% of the cases and postponed the radical surgery in 61.9% of the cases.

Keywords: chronic mesenteric ischemia, chronic colonic stasis, colonoptosis, visceroptosis.

In the literature, the chronic visceral circulation disorder is more often referred to as 'angina abdominalis', the term first suggested by Bacelli in 1903. Later in 1979, A. V. Pokrovsky suggested the term 'chronic mesenteric ischemia syndrome' (CMIS). Researcher believe that the mechanism behind the pains under this syndrome is identical to that of the exertional angina and is caused by the reduction in blood flow to the actively functioning abdominal cavity organs due to misperfusion in altered visceral arteries. Researchers studying visceroptosis described similar symptoms. The authors [2,6] note that the second most frequent symptom, after constipation, in patients with this pathology is the pain syndrome, varying in intensity and localization. The cause of the pain syndrome development in patients with visceroptosis has not been studied fully yet. It is probable that the pain syndrome with visceroptosis may be caused by chronic intestinal ischemia. Clinically, the comprehensive study of intestinal ischemia disease is extremely problematic, since it occur much less

frequently than other abdominal pathologies [1,3]. As it is so difficult to be diagnosed at the moment, the diagnosis is often too late to conduct a targeted conservative treatment of a patient [4,5].

MATERIAL AND METHODS OF RESEARCH

The study covered 205 patients undergoing in-patient and out-patient treatment for visceroptosis in the Republic's Hospital No. 1 – NCM in the period 1998-2009.

The age of the patients ranged from 18 to 70 years. Out of 205 (100%) of the patients, 187 (91.2%) patients fell under the most productive age – from 21 to 50 years. There were 23 (11.2%) men and 182 (88.8%) women. Ethnically, the patients broke down as follows: 163 (79.5%) patients represented the indigenous peoples (Yakuts, Evens, Evenkis), the remaining 42 (20.5%) patients – other ethnic groups (Russians, Belorussian, Ukrainians, Tatars, Armenians).

As for the stage of chronic colonic stasis (CCS), the patients made three groups: the first group – 51 (24.8%) patients with compensated CCS; the second – 62 (30.2%) patients with sub-compensated CCS; and the third – 74 (36.2%) patients with decompensated CCS. The control set listed 18 (8.8%) people without visceroptosis and CCS syndrome.

All the patients underwent the following examinations: irrigoscopy, rectoromanoscopy, Doppler ultrasonography of the superior mesenteric artery (SMA), selective angiography of mesenteric arteries, morphological exam of resected parts of the colon.

RESULTAS AND DISCUSSION

We believe that in most cases, due to deformation of the mesocolon, patients with visceroptosis develop intestinal ischemia caused by altered architectonics of the arteries and insufficient blood microcirculation in the superior mesenteric artery territory. This is proven by the fact that in most cases the pain syndrome in patients with visceroptosis is spasmodic – 140 observations (74.8%), and it is localized in the right half – 138 cases (73.8%) and in the lower abdomen – 104 cases (55.6%). Apparently, the severe spasmodic pain is caused by the ischemic nature of the pains and stimulation of periarterial nervous plexuses in respond to the insufficient supply of oxygen to the intestine.

For patients with chronic colonic stasis, Doppler ultrasonography of the superior mesenteric artery was done in 17 (27.4%) patients with compensated CCS, 25 (40.3%) patients with sub-compensated CCS and 20 (32.2%) patients with decompensated CCS. The group of 18 people (8.8%) without CCS served as a control set (Tab. 1).

In this category of patients, we consider it most informative to conduct examination of blood flow in the superior mesenteric artery only, since the

inferior mesenteric artery trunk is usually 2-4 mm in diameter, thus the ultrasound imaging is quite difficult. We also took into consideration the parameters of the peripheral resistance (Ri) and the pulse index (Pi) in the superior mesenteric artery territory, which we outline in all groups of the patients. The calculation of the resistance parameters is done by the ultrasound apparatus computer automatically.

Table 1
Blood flow velocity in the superior mesenteric artery in the studied groups (cm/sec)

	CCS compensation rate, n			Control set, n=18
	I group of compensation	II group of sub-compensation	III group of decompensation	
	n=17	n=25	n=20	
Blood flow velocity in clinostasis	89.5+4.1*	87.3+6.6*	86.3+7.6*	116+4.2
Blood flow velocity in orthostasis	60.8+11.8*	58.2+5*	55.9+4.5*	87.4+4.2

Note* - the parameters are statistically significant compared to the control set (p<0.05).

The group of the patients with compensated CCS demonstrated increased peripheral resistance of vessels with the body position changing from horizontal to vertical from 0.84+0.07 to 0.88+0.06; in the group of the patients with sub-compensated CCS – from 0.77+0.1 to 0.81+0.09, respectively. The visceroptosis patients with decompensated CCS showed increased peripheral resistance with the position changing from 0.73+0.09 to 0.80+0.08. In the control set, peripheral resistance decreased when changing the body position from horizontal to vertical – from 0.84+0.04 to 0.80+0.03 cm/sec.

The results obtained indicated that in patients with visceroptosis, with the change of the position, blood flow faces the peripheral resistance of tissues, whereas in healthy people it is less.

The pulse index (Pi) values in the patients with compensated CCS increased – from 2.33+1.09 to 2.48+1.09. The same figures were obtained for the sub-compensation stage – from 2.45+0.80 to 2.59+0.87.

In the patients with decompensated CCS, the pulse resistance increased from 2.74+0.99 to 3.16+1.03. In the control set, with the change from

clinostasis to orthostasis, the pulse index decreased from 2.29 ± 0.99 to 2.14 ± 0.96 .

Thus, measuring of blood flow velocity in the SMA territory show that patients with visceroptosis have blood flow velocity in clinostasis almost twice as high as in orthostasis. The higher the degree of colonic stasis is, the lower is blood flow velocity. At the same time, the figures for peripheral resistance and pulse index increase in the vertical position. It proves that in patients with visceroptosis in the vertical position, blood flow in the SMA faces resistance, resulting in lower speed of microcirculation in walls of certain segments or the entire colon. Constant low blood flow velocity and high peripheral resistance in the SMA territory leads to chronic mesenteric ischemia, which is clinically manifested by pain syndrome, especially with intensified peristalsis.

With total colonoptosis, the angiography images revealed 4 (15.3%) cases of severe deformation of the superior mesenteric artery with pathological angulation in the ileocecal area. Five (19.2%) patients showed double barrels in the splenic flexure at an acute angle with the expanded collateral network in this segment of the colon. Two (7.7%) cases revealed an elongated sigmoid colon with altered architectonics of the mesocolon.

The histological studies of the resected sections of the colon showed that visceroptosis causes reactive morphological changes in the colon mucosa and submucosa, most often manifested in hypertrophy and hypersecretion of crypts of Lieberkühn, edema and leukocyte infiltration of submucosa. The extreme manifestation of these changes is the cystic transformation of the crypts and submucosa fibrosis. Similar changes are also seen in patients with intestinal ischemia, as fibrous tissue is less sensitive to hypoxia. The result of chronic intestinal ischemia is the death of most ganglia and neurons in submucosal nerve plexuses.

We have improved the previously developed diagnostic algorithm of patients with visceroptosis (A.V. Tobokhov, 2003) by adding ultrasound exam of blood flow velocity in the SMA, which is necessary to select the method of conservative therapy. For patients with CCS in the compensation stage, the surgical correction of CCS can be recommended in the presence of severe abdominal pain. Such patients are prescribed resection of the left flank of the colon with double-sided colonopexia, which can, according to our data, reliably normalize the evacuation function of the colon and to alleviate pain.

The patients with compensated CCS without severe pain syndrome were recommended conservative therapy, including vascular therapy. The conservative therapy was done in 53 (28.3%) patients out of 187 (100%) examined patients; including 32 (17.1%) patients with compensated CCS (Group 1) and 21 (11.2%) patients with sub-compensated CCS (Group 2 группа), who received conservative therapy with vascular therapy courses. The vascular therapy was aimed at improving hemorheology.

After the treatment provided, spasmodic pains stopped in Group 1 patients. Stool retention decreased in 17 (53.1%) patients from 3-5 days to 1-2 days, with regular stool establishing in 13 (40.6 %) of them. In 2 (1.1%) cases the patients had the same complaints.

In Group 2, the conservative therapy improved the condition of 13 (61.9+10.5%) patients. Their stool retention decreased from 10 to 3-5 days, the pains stopped. Constipation up to 10 days remained in 8 (38.0+10.5%) patients, their pains did not stop or just changed the location. These patients underwent surgery.

Before the conservative therapy with vasoactive agents, blood flow velocity in the superior mesenteric artery was measured with the use of an applicable technique.

For Group 1, after the conservative therapy, blood flow velocity in the SMA made 103.8±3.5 cm/sec in clinostasis and 71.7±7.9 cm/sec in orthostasis.

For Group 2 with sub-compensated CCS, blood flow velocity in the SMA at the body position change from horizontal to vertical decreased insignificantly, in comparison to the values before the therapy. After the comprehensive treatment, blood flow velocity in the SMA was 98.8±2.4 cm/sec in clinostasis and 73.4±9.6 cm/sec in orthostasis.

In Group 1, 30 (93.7%) patients who underwent a one-year conservative therapy demonstrated improved blood flow in orthostasis. Two (1.1%) patients had a negative result. They still had abdominal pains and retention of stool. Their blood flow velocity figures did not improve with the body position change. The patients were offered a surgery. The group with sub-compensated CCS demonstrated improvements in 13 (61.9%) patients, while 8 (38.0%) patients did not benefit from the conservative therapy and they were offered a surgery, as well.

In total, 174 (93%) patients out of 187 (100%) patients with visceroptosis under the study had surgeries. The right-sided colonopexia was done in 26 (14.9%), and the double-sided one – in 113 (65.0%) patients. In 2 (7.7%) cases out of 26 (14.9%) patients, the right-sided colonopexia was supplemented with resection of the transverse colon, and in 4 (15.3%) cases – with resection of the sigmoid colon. In 83 (47.7%) cases, there was used resection of the left flank of the colon along with the double-sided colonopexia. In 35 (20.1%) cases there was used subtotal resection of the colon. The indication for surgery in patients with compensated CCS was severe pain syndrome.

Thirty-four (100%) of the patients who underwent surgery were examined with Doppler ultrasonography of the SMA. The surgery improved the condition of the patients: in 6 (17%) patients with compensated CCS accompanied by pain syndrome, pains stopped completely, stool became regular or every two days. In the group of the patients with sub-compensated CCS, in 11 (32.3%) patients, spasmodic pains also reduced significantly, 7

(20.5%) patients got everyday stool, in 4 (11.7%) patients, retention of stool decreased from 5-6 to 2-3 days, pains were alleviated. In the group with decompensated CCS, 17 (50%) patients showed a positive effect in the form of reduced abdominal pains and setting of regular stool. In 8 (23.5%) patients, stool became regular, in 3 (8.8%) patients long constipations reduced to 3-5 days, in 5 (14.7%) cases, constipations reduced to 2-3 days.

In patients with compensated CCS, after the surgery, we observed the following changes in blood flow velocity in the SMA in clinostasis and orthostasis: in clinostasis – 93.5 ± 5.9 cm/sec, in orthostasis – 91.5 ± 6.7 cm/sec. In patients with sub-compensated CCS: in clinostasis – 89.5 ± 12.5 cm/sec, and in orthostasis – 79.3 ± 12.2 cm/sec. In patients with decompensated CCS, blood flow parameters were 87.8 ± 9.8 cm/sec in clinostasis and 73.4 ± 18.0 cm/sec in orthostasis.

After the surgery, in patients with compensated and sub-compensated CCS, the figures for peripheral resistance decreased at changing the body position from clinostasis to orthostasis. In patients with sub-compensated CCS, they made 0.85 ± 0.1 in clinostasis and 0.82 ± 0.11 in orthostasis, respectively. In patients with decompensated CCS, they made 0.81 ± 0.09 in clinostasis and 0.79 ± 0.09 in orthostasis.

Two (5.8%) patients showed an unsatisfactory result: widespread pain remained in one patient, with constipation decreased from 12 days to 6-8 days, and in the second patient constipation decreased slightly from 10 days to 8 days, but the pain stopped.

Thus, surgical treatment improved the condition of patients with visceroptosis. It reduced or eliminated the pain syndrome, decreased the stool retention. We believe that this is due to the removal of non-functioning segments of the colon, fixing flanks, separation of adhesions - all this leads to unfolding of the transverse colon mesentery, restoring the normal architectonics of the superior mesenteric artery branches.

CONCLUSION

Therefore, in patients with visceroptosis, Doppler ultrasonography shows decreased blood flow velocity in the superior mesenteric artery territory by 32.0% in orthostasis, compared with the blood flow velocity in clinostasis, whereas peripheral resistance increases due to severe flexure, deformations of the colon due to its deviations causing chronic ischemia of the colon. Because of the small diameter of the inferior mesenteric artery, a reliable assessment of blood flow with the use of ultrasound examination is impossible.

The morphological picture of the colon wall in patients with visceroptosis in sub-compensated and decompensated stages of chronic colonic stasis is similar to the changes in patients with chronic mesenteric ischemia syndrome. Against the background of progressing chronic intestinal ischemia,

there occurs the destruction of ganglia, with healthy tissues being substituted by fibrous tissues in 82.3% of cases.

Introduction of Doppler ultrasonography into the visceroptosis diagnostic algorithm reveals hemodynamic disorders in the superior mesenteric artery territory in patients with visceroptosis in 100% of cases.

The conservative therapy of patients with visceroptosis, aimed at improving microcirculation in the colon wall and alleviating chronic mesenteric ischemia syndrome, improved the effectiveness of treatment in 93.7% cases and postponed radical surgery in 61.9% cases.

The further development of methods to study microcirculation in the colon wall would improve the results of treating these patients.

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