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Case report

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Cecal Volvulus

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ABSTRACT Cecal volvulus (CV) is one of the rare forms of strangulated intestinal obstruction, which accounts for 20–40% of all colonic volvuluses and 1.0–1.5% of all cases of intestinal obstruction in adult patients, mainly females aged from 40 to 62 years old (female to male gender ratio 4:1).

One of the complications of cecal volvulus is a violation of the blood supply to the intestinal wall (23.8–44.2%), which leads to necrosis in 36.7% of cases, to perforation of the intestinal wall 23% of cases, and to the development of peritonitis in 41.6–43% of cases. If there is doubt about the viability of the ischemic intestine, the choice of the extent of surgical intervention was always determined in favor of its resection.

The emergence of laparoscopic technologies in the arsenal of modern surgery makes it possible to assess the viability of the organ in the dynamics of its conduction, to choose the optimal tactics for treating the patient in the delayed period, which in some cases helps refrain from unnecessary resection operations, to preserve the organ and achieve a favorable outcome in patients diagnosed with cecal volvulus.

Keywords: cecal volvulus, strangulated intestinal obstruction, mobile cecum syndrome

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ALV – artificial ventilation of the lungs
CT – computed tomography
CV – cecal volvulus
PDL – programmed dynamic laparoscopy

INTRODUCTION

Cecal volvulus, first described in 1837 by the Austrian pathologist Karl von Rokitansky, is a form of strangulation intestinal obstruction caused by rotation of the right colon around the mesenteric axis, leading to progressive dilation [1–4].

According to statistics, CV is the second most common cause of intestinal obstruction after sigmoid volvulus and the cause of 1.0–1.5% of all intestinal obstructions and 25–40% of all colon volvulus in adults [5, 6]. Conflicting data have been published on the prevalence of sigmoid volvulus

among males and females. Some authors (*Franck Katembo Sikakulya*, *Sonye Magugu Kiyaka*, *Robert Masereka et al*.) believe that this pathology is predominantly found in female patients aged 40 to 62 years (with a female to male sex ratio of 4:1), while in others this pattern is not observed [1, 7].

In the case of volvulus of the colon, intestinal obstruction develops, caused by mechanical block of the intestinal lumen due to its bending. Ischemia, necrosis and perforation develop gradually due to disruption of the blood supply to the intestinal wall due to mechanical occlusion of the mesenteric vessels [2, 4, 8, 9].

Clinical manifestations for this type of volvulus are not specific, and it is often difficult to differentiate them from other forms of colonic obstruction, so an accurate diagnosis is established intraoperatively in 60% of cases [7]. Abdominal radiography (69% sensitivity, 57% specificity of the method) and abdominal computed tomography (CT) (100% sensitivity, >90% specificity of the method) are the main instrumental methods in the diagnosis of cecal volvulus [6, 10, 11].

In addition, diagnostic methods such as ultrasound examination (US) of the abdominal cavity (48–63% effectiveness of the method), irrigoscopy (88% effectiveness of the method), video colonoscopy (<30% effectiveness of the method) are used [6,10]. The only effective treatment method for this category of patients is surgical intervention, the options of which are manual detorsion, cecopexy, cecostomy or resection of the ischemic section of the intestine [4, 8–11]. Early diagnosis and timely treatment prevent the development of necrosis (36.7%) and perforation of the intestinal wall (23%), peritonitis (41.6–43%), thereby reducing the high mortality rate (10–40%) [12].

We present a clinical observation of the treatment of a 28-year-old patient with mobile cecum syndrome complicated by CV, strangulative small intestinal obstruction with critical ischemia of the small intestinal wall.

Clinical observation

An ambulance team delivered a 28-year-old male patient with suspected acute pancreatitis. It is known from the anamnesis that the patient had been drinking alcohol for 7 days, after which he complained of pain in the upper abdomen, nausea, and repeated vomiting of bile. He denied chronic diseases and surgical interventions on the abdominal cavity.

On physical examination: blood pressure 120/76 mm Hg, heart rate 88 beats/min, rhythmic, satisfactory filling. The tongue is moist, with a white coating at the root. On palpation, the abdomen is soft, painful in the left hypochondrium and epigastric region, not enlarged in volume, symptoms of peritoneal irritation are negative.

The patient was examined in the emergency department. Laboratory blood tests revealed leukocytosis up to 11.2×10^{9}/l, increased alpha-amylase levels up to 266.0 U/l (normal 25.00–115.00 U/l). US of the abdominal cavity revealed an increase in the size of the head (up to 34 mm), body (up to 20 mm) and tail (up to 39 mm) of the pancreas, and its heterogeneity. An abdominal X-ray revealed: single pneumatized loops of the small intestine in the mesogastrium without horizontal fluid levels in the lumen, up to 2.8 cm in diameter, as well as gas and contents throughout the colon with a diameter of 5.6 cm.

Based on the patient's complaints and the results of laboratory and instrumental studies, a preliminary diagnosis was made: "Acute pancreatitis". No indications for emergency surgery were identified. The patient was hospitalized in the surgical department, where he received infusion (NaCl 0.9% -500.0, *S. Papaverini* 4.0, *S. Cerucalii* 4.0 + Sterofundin 500.0 + *S. Glucosae* 5% 500.0, *S.* KCl 4% 40.0, *S. Novocaini* 0.5% 40.0, Insulin 5 U x 2 times a day intravenously), antispasmodic (*S. Papaverini* 2.0 x 3 times a day intramuscularly, *S. Platyphyllini* 1.0 x 3 times a day intramuscularly), with positive dynamics: the pain syndrome regressed. On the 4th day of hospitalization, the alpha-amylase level in the peripheral blood decreased to 52.0 U/l.

On the 6th day of hospitalization, the patient noted a deterioration in his general condition: severe cramping abdominal pain, nausea, vomiting, no stool or gases discharge for two days. Physical examination revealed blood pressure of 130/90 mm Hg, heart rate of 96 beats/min, rhythmic, of satisfactory volume. The tongue was dry with a white coating at the root. On palpation, the abdomen was soft, painful in all areas,

greatly enlarged, symmetrical, and symptoms of peritoneal irritation were negative. *Per rectum:* the sphincter was tonic, the ampulla of the rectum was empty, there were traces of mucus on the glove.

An emergency instrumental examination was performed. A plain radiography of the abdominal cavity on the left under the diaphragm revealed a section of the colon dilated to 13.0 cm, and dilation of the small intestinal loops to 5.0–6.0 cm was noted (Fig. 1). Additionally, a CT scan of the abdominal cavity with intravenous contrast was performed, according to which a section of the colon in the left upper quadrant was also found to be significantly pneumatized to 13.3 cm with a single fluid level in the lumen, a diffuse increase in the density of the mesentery of the colon was revealed, and no contrast defects in the mesenteric vessels were found.

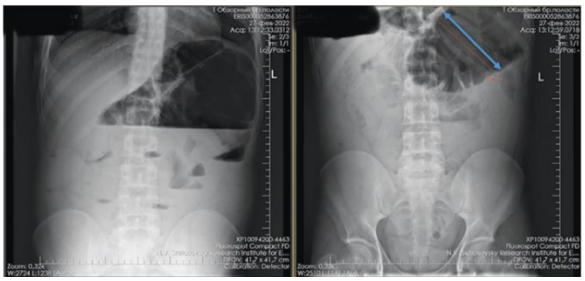

Fig. 1. Plain radiography of the abdominal organs on the 6th day of hospitalization

The patient's condition and examination data were assessed as sigmoid volvulus. Indications for emergency colonoscopy were established, during which the endoscope was advanced to the proximal part of the transverse colon; no data on sigmoid volvulus were obtained. Based on the clinical picture, the diagnosis was: "Strangulation intestinal obstruction"; indications for emergency surgical intervention are determined.

Nine hours later, due to the deterioration of the patient's condition, diagnostic video laparoscopy was performed under combined anesthesia. During revision of the abdominal organs, a small amount of hemorrhagic effusion, pneumatization of the small intestinal loops up to 6.0 cm, and pronounced expansion of the colon loops over 13.0 cm were noted in the visible areas. A full revision was impossible due to the lack of free space in the abdominal cavity, and a decision was made to convert the access to a midline laparotomy. During laparotomy an expanded cecum was found, the size of which reached 13.0 cm in diameter, having a single elongated mesentery with a section of the small intestine and forming a clockwise 360-degree volvulus around its axis (Fig. 2, 3).

Fig. 2. Intraoperative photo. Loops of the small intestine dilated to 6.0 cm (*) are revealed, as well as significantly pneumatized cecum (**), reaching 13 cm in diameter

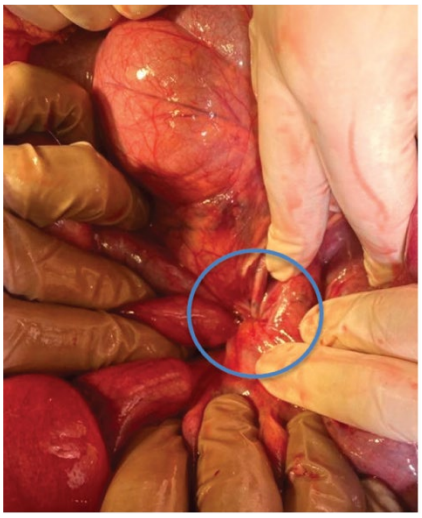

Fig. 3. The site of complete twist of the cecum together with the terminal ileum around their common mesentery

In the area of the volvulus, due to acute ischemia, signs of impaired blood circulation in the small intestinal loop were noted: its diameter was 6.0 cm, edematous, purple-red in color, and no clear peristalsis was observed.

The cause of intestinal obstruction was eliminated by manual detorsion. Additionally, nasointestinal intubation with a double-lumen probe was performed

to decompress the intestine (Fig. 4). Upon detailed examination of the small intestine over a distance of 100 cm from the ileocecal junction, the above-mentioned changes persisted without dynamics, and no clear demarcation line was found. The viability of the intestine remained questionable. In addition, it was noted that there was a secondarily changed gangrenous appendix, which was removed (typical appendectomy). The cecum was fixed to the parietal peritoneum with separate nodal serous-muscular sutures. Given the presence of critical ischemia, the absence of a visible formed demarcation line and convincing data for necrotic changes in the small intestinal loop, a decision was made to perform programmed dynamic laparoscopy (PDL) in 8 hours in order to assess the viability of the affected area in dynamics. The patient was transferred to the intensive care unit and put on a ventilation machine where intravenous infusion and enteral therapy were continued.

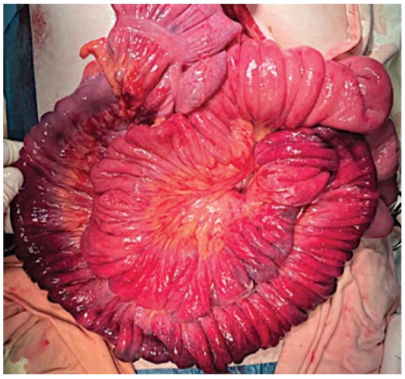

Fig. 4. The view of the surgical field after performing the stage of manual detorsion followed by intestinal decompression using a nasointestinal tube

After 8 hours, dynamic laparoscopy did not reveal any significant dynamics in the condition of the ischemic area: over a 70 cm long area, the small intestinal loop reached 4.0 cm in diameter, the intestinal wall was moderately hyperemic along the mesenteric edge, remained purple along the antimesenteric edge, no obvious peristalsis was observed, but no areas of necrosis were detected (Fig. 5). A decision was made to perform repeated programmed diagnostic laparoscopy in another 12 hours. When performing PDL, positive dynamics were noted: the color of the intestinal wall acquired a bright red color, the diameter of the small intestinal loops decreased to 3.0 cm, sluggish peristalsis was observed along its entire length, which indicated a gradual normalization of its condition, reversible ischemia. The intestine was recognized as viable.

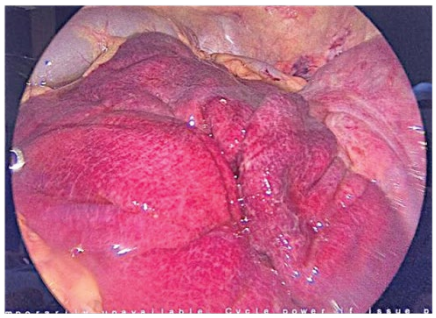

Fig. 5. Intraoperative photo of programmed dynamic laparoscopy 8 hours after elimination of cecal volvulus

In the intensive care unit, intravenous infusion-transfusion therapy, enteral decompression and infusion of electrolyte solution were continued, the patient was extubated and on the 3rd day after laparotomy, after stabilization of the condition, he was transferred to the surgical department, where he was activated. The postoperative period was uneventful.

On the 4th day after the surgery, postoperative intestinal paresis resolved, the nasointestinal tube was removed. He was discharged in a satisfactory condition on the 8th day after the surgery.

DISCUSSION

Retrospectively analyzing the clinical and instrumental picture of the patient, it can be assumed that the pain syndrome upon admission was due to short-term ischemia caused by incomplete volvulus of the cecum, which was not confirmed by instrumental examination.

Today, accurate preoperative diagnosis of sigmoid colon volvulus is difficult due to its rare detection and non-specific course. In the above-described clinical example, X-ray and CT data corresponded to sigmoid colon volvulus, but subsequent colonoscopy did not confirm the diagnosis. Laparoscopy made it possible to confirm the diagnosis, but did not allow for the full scope of treatment.

Currently, minimally invasive technologies prevail in surgical treatment. However, after laparotomy, relaparotomy remains the generally accepted repeated access to the abdominal cavity for the purpose of full revision, enteral intubation and thorough sanitation. Each relaparotomy increases the risk of developing purulent-septic complications (suppuration of the laparotomy wound) (15.4%), early adhesive obstruction (14.7%), intra-abdominal bleeding (11.9%), abdominal abscess formation (0.8%), pancreatic necrosis (0.8%), septic shock, combined multiple organ failure [3, 11, 13, 14].

Also, the duration of intestinal paresis (more than 72 hours after surgery), the probability of eventration (10.8%) and the formation of postoperative ventral hernias (12.4%) increase significantly [3, 13, 14]. Mortality after relaparotomy, according to a number of authors (G. Zaverny, A.I. Guzeyev), reaches up to 55% [15, 16].

An alternative method of programmed relaparotomy is PDL, the advantage of which is minimal tissue trauma, relatively short duration of surgery (the average duration of dynamic laparoscopy is 25±17.8 minutes), reduced duration of narcotic analgesics (0.75±0.3 days versus 2.18±0.2 days), reduced postoperative complications (1.9%), shorter duration of postoperative intestinal paresis (2.13±0.3 days versus 3.11±0.4 days), the fastest activation (1.4±0.2 days versus 2.38±0.5 days) and reduced duration of inpatient treatment (11.8±1.5 days) [15, 17, 18].

The main feature of the presented observation is not only the performance of an organ-preserving operation (detorsion of the cecum with subsequent cecopexy) in case of impaired blood supply and questionable viability of the intestinal section, but also the performance of programmed relaparotomy instead of traditional relaparotomy 12 hours after laparotomy access. During laparoscopy, the viability of the intestine also remained questionable. And only during repeated relaparoscopic surgery, positive dynamics and restoration of blood supply to the ischemic intestine were noted. This tactic allowed avoiding a futile resection operation and two repeated laparotomies.

CONCLUSION

Volvulus of the cecum is an acute surgical condition, usually requiring emergency surgical intervention. The timely made diagnosis and treatment of patients with strangulation intestinal obstruction allows avoiding complications such as necrosis, perforation and widespread fecal peritonitis. In the presence of critical ischemia or a section of the intestine of questionable viability, the absence of convincing data for necrosis, it is possible to perform diagnostic video laparoscopy in the dynamics of observation in order to assess the viability of the organ (intestine), even after laparotomy access, to choose the optimal tactics for treating the patient in the delayed period, which in turn makes it possible to preserve a viable organ, as well as prevent postoperative complications.

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