Our Experience in Treatment Acute Surgical Diseases of the Abdominal Cavity in Patients with Situs Inversus Viscerum (Transposition of Internal Organs)

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Abstract

Situs viscerumtotalis is a fairly uncommon anomaly of the mirror-imaged arrangement of the peritoneal cavity organs with a frequency of distribution in the range from 1: 5000 to 1: 20 000. Such an arrangement of internal organs is found in one case per 10 million[2]. In the early embryonic stage, the internal organs are located along the midline of the body. Normally, in the course of their subsequent development, they grow and rotate to the right, and – exceptionally rarely – to the left, which leads to the reverse arrangement of internal organs, i.e., to their transposition. In the case of complete (total) transposition of internal organs, all of them are inverted. In the case of partial transposition, it involves inversion of all or some organs of one of the body cavities (heart, stomach, duodenum and caecum, spleen). Dextrocardia, a condition in which the cardiac apex is pointed to the right, was first described by Marco Severino, in 1643. Matthew Baillie first described situs inversus more than a century later.

Keywords: *Patient, abdominal, organ, internal, surgical.*

Introduction

In 1600, Fabricius reported the first known case of liver and spleen reversal in humans. Kuchenmeister in 1824 recognized situs inversus in a living person for the first time. In 1897, Wehsemeyer was recognized for being the first to demonstrate the transposition of internal organs with an x-ray. This unusual anatomy of internal organs causes difficulties in diagnosing and treating diseases.

Situs viscerum inversus is an autosomal recessive genetic condition. Although itdoes not form a pathology in itself, it may be associated with certain abnormalities, mainly cardiac, which can be potentially life-threatening[2]. In case of complete or partial inversion of internal organs (viscerum inversus totalis or partialis), the abdominal organs are located on the opposite side. That means that the liver is placed on the left, the heart on the right, the spleen on the right, etc. According to Russian and foreign researchers, there are too few data on surgical interventions, in particular laparoscopic ones, in such patients[1]. The cases of acute surgical pathologiesin patients with complete transposition of internal organs are extremely rare in the world science literature.

Acute appendicitis is the most common surgical disease that surgeons, therapists, gynecologists, and other medical specialists deal with on a daily basis[3].

For the first time, the vermiform appendix of the cecum was described and drawn by Leonardo da Vinci in 1472. The term 'appendicitis' was first proposed by American surgeon Reginald H. Fitz, in 1886, at the Convention of the American Medical Association. In 1725, the first appendectomy was performed by Claudius Amyand, in England. The first fully laparoscopic appendectomy was carried out by K. Semm in 1983. Acute appendicitis is the reason for about 7% of abdominal surgeries. The incidence of acute appendicitis in patients with situs inversus totalis is about 0.016-0.024%[4].

Among urgent surgical pathologies, perforation of gastric and duodenal ulcers is about 1.5%, and, according to various researchers, among patients with peptic ulcer, it occurs in 5-30% of cases.

The main diagnostic criteria for ulcer perforation are free gas in the abdominal cavity which is found during the plain radiography and an ulcer with signs of perforation detected during fibrogastroduodenoscopy (FGDs). However, the removed clinical picture of perforation (covered and atypical) occurs in almost 36% of cases. In this regard, diagnostic laparoscopy is of particular diagnostic significance, since it allows to verify the diagnosis, assess the prevalence of peritonitis and determine further treatment tactics. As it is known, the main method of treatment of patients with ulcer perforation is operative[4]. With that, this pathology combined with situs inversus totalis is much less common than other urgent surgical pathologies[5]. The first case of perforation of duodenal ulcers with dextroposition was described in 1986.

Based on data from foreign literature, we can conclude that the occurrence of surgical pathologies in patients with situs inversus totalis is extremely rare. According to many researchers, to date, about 60 cases of laparoscopic cholecystectomy, 7 cases of colorectal cancer, isolated cases of pancreatoduodenal resection, hemihepatectomy and angiographic interventions in patients with situs inversus totalis have been described in the world scientific literature[3].

In clinical practice, when examining patients with a mirror-imaged arrangement of internal organs, there is a high probability of anatomical disorientation, which can lead to incorrect diagnosing or treating the disease. In this regard, we decided to share our experience of diagnosis and treatment of acute surgical diseases of the abdominal cavity with complete transposition of internal organs.

Below are 3 clinical cases of acute surgical pathologies with complete transposition of internal organs.

Case 1 and 2. In September and October 2019, patient A (23 years old) and patient B (21 years old), sought medical attention in the Department of Surgery of the TMA Multidisciplinary Clinic. Both patients complained of pain in the left iliac region, nausea, and fatigue. According to anamnesis, patient A. had been ill for the last three days, and experiencedpain of this nature for the first time. The patient A. also complained of aching pain in the right iliac region, followed by spreading to the left iliac region and area around the navel, nausea, expulsion of gastric contents, dry mouth and fatigue. At home, patient A took Mezyme and No-shpa medicines, which had a short-term positive effect. Subsequently, there was an increasing pain in the left iliac region. According to anamnesis, patient B had been ill for one day, and experienced pain of this nature for the first time. The patient B. also complained of aching pain in the epigastric region with subsequent spread to the left iliac region and around the navel. Among other symptoms, there was nausea, a single expulsion of gastric contents, dry mouth and fatigue. The patient B. did not seek medical attention in any medical institutions, andtook painkillers which had a temporary positive effect. Subsequently, there was an increasing pain in the left iliac region and around the navel.

According examination data, in both patients, abdomen participates in respiration, it is symmetrical, soft during palpation; in the left iliac region there is pain and local tension of the muscles of the anterior abdominal wall. The Kocher-Volkovich, Rovsing, Sitkovsky, Razdolsky, Obraztsov, Voskresensky, Bartomier-Michelson's signs results are positive. The Shchetkin-Blumberg sign's result is negative in all abdomen areas. Intestinal peristalsis noises are heard.

In the course of laboratory and instrumental research method, both patients underwent chest x-rays (Fig. 1).

Description of x-ray images: the chest is symmetrical. The edge shadows are not deformed, with a uniform structure. Soft tissue shadows without features. The pulmonary fields are fully pneumatized, without focal and infiltrative shadows. The roots of the lungs are poorly structured. The pulmonary pattern is not reinforced. Pleural sinuses are free. Heart: dextraposition is not enlarged, aorta without features.

On an abdominal MSCT scan, it was found: stomach, spleen, tail and body of the pancreas are located on the right side; liver, gall bladder, head of the pancreas, inferior vena cava – on the left. The shapes, sizes, and structure of organs have not been changed. The lymph nodes of the abdominal cavity and retroperitoneal space are not enlarged.

Both patients were diagnosed with acute appendicitis based on their anamnesis, physical examination, and instrumental data. Both patients underwent Laparoscopic appendectomy, using the RZ Medizintechnik, Germaniya device (Fig. 3).

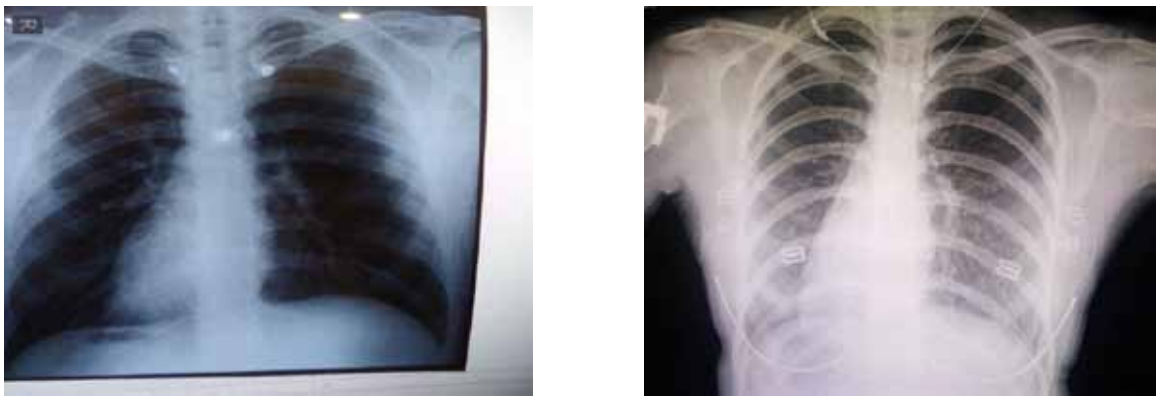

Fig. 1. Chest x-ray (patient A and B)

In order to clarify the diagnosis, an abdominal MSCT scan was performed, using a Siemens device (Fig. 2).

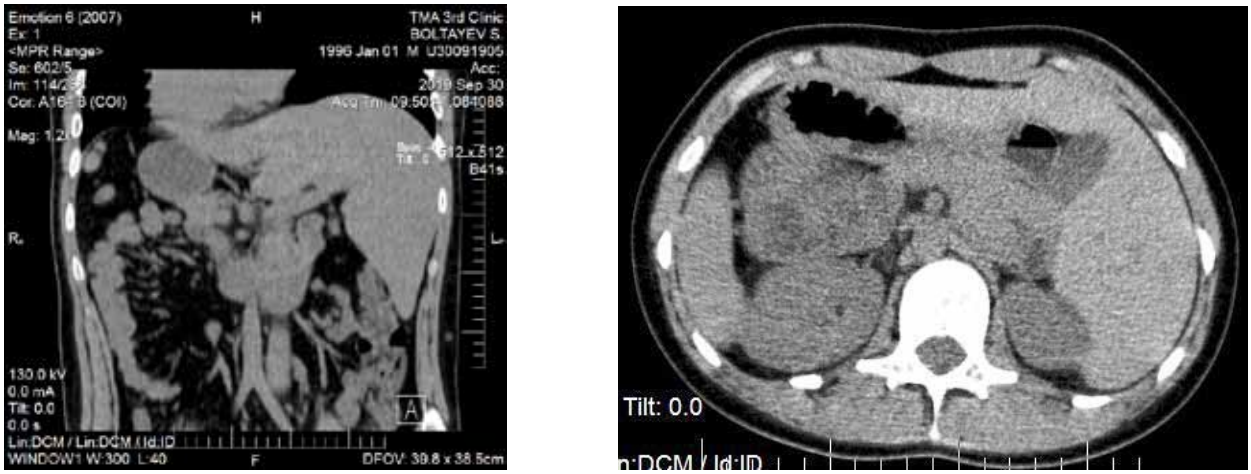

Fig. 2. Abdominal MSCT scan (patient A and B)

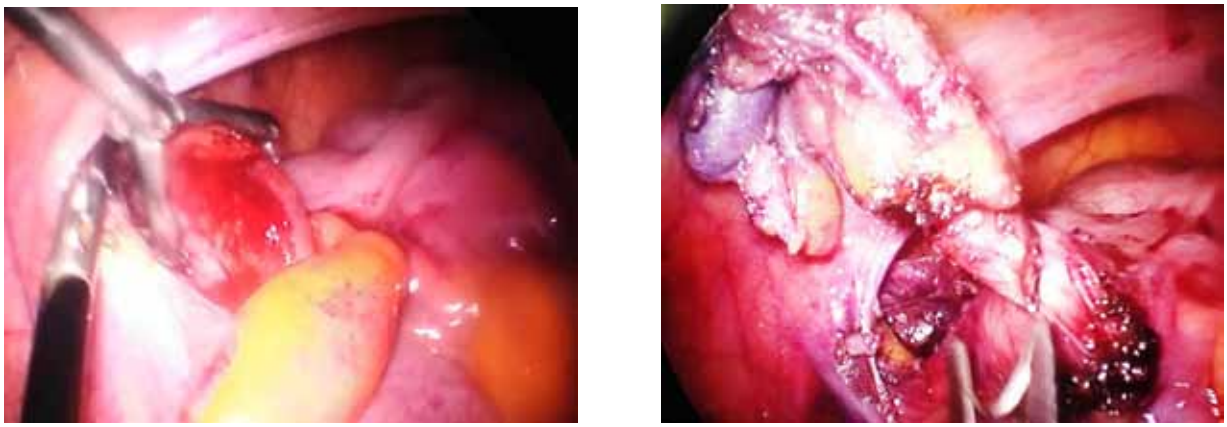

Fig. 3. Laparoscopic appendectomy (patient A and B)

The position of the surgeon and assistant, as well as the location of the trocars was opposite to the standard location for laparoscopic appendectomy (Fig. 4).

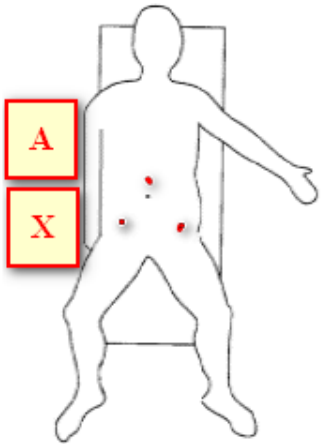

Fig. 4. Position of surgical team (X – surgeon; A-assistant) and location of trocars in laparosocpic appendectomy for patients with situs inversus viscerum

In both patients, surgical intervention proceeded without technical difficulties. For control purposes, a drainage was installed in a small pelvis. Postoperative diagnosis for both patients: *Main diagnosis:* acute phlegmonous appendicitis. *Related diagnosis:* aitus inversusviscerum. (histological study No. 3717-20 and No. 3717-35). The postoperative period proceeded without complications. On the 2nd day after the operation, after aabdominal ultrasonography (no free fluid was detected in the abdominal cavity and pelvis), the drainage tube was removed. Both patients were discharged on the 3rd day after the operation.

It can be concluded that performing laparoscopic appendectomy for patients with situs inversus totalis is not convenient in terms of ergonomics. It is also technically difficult.

Case 3. In September 2019, patient S applied to the Department of Surgery with complaints of pain in the epigastric region (in the left half of the abdomen), nausea, vomiting that did not bring relief, and fatigue. According to anamnesis, the patient denied ulcerative anamnesis. The aspect of the disease corresponded to a perforation of a stomach ulcer or duodenum: the 'knife-like' pain began in the epigastric region. During a local examination, the following data were found: the tongue is dry, with a white coating, the abdomen is not involved inrespiration, symmetrical, there is a surgical scar 10x0.5 cm in the right iliac region, consistent; during palpation, sharp pain in the epigastric region and in the left half, throughout the abdomen, the tension of the muscles of the anterior abdominal wall is determined, the Shchetkin-Blumberg sign result is positive in all abdomen parts.

Taking into consideration the previous appendectomy and identified situs inversus totalis in the patient, wehave performed the following instrumental research method:

Ultrasound impression: Total inversion of internal organs, free fluid in the abdominal cavity (Fig. 5).

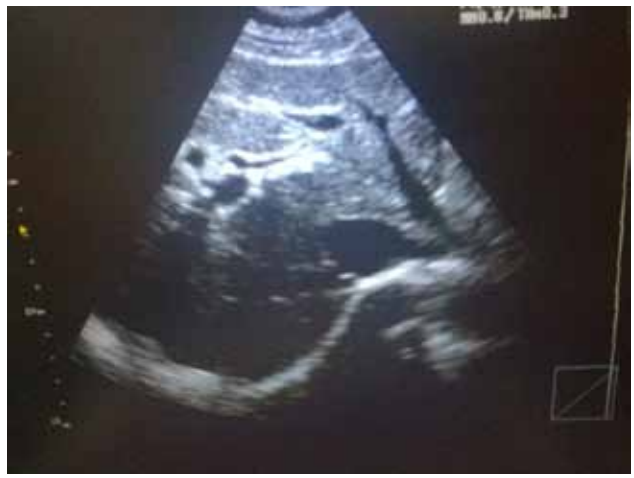

Fig. 5. Abdominal ultrasound (patient S)

Chest and abdominal x-ray: Cardiac dextroposition!!!Abdominal radiography shows a free gas under both domes of the diaphragm (Fig. 6).

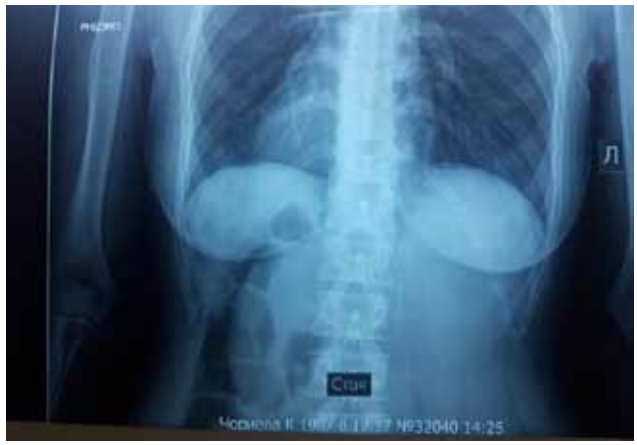

Fig. 6. X-ray of the chest and abdomen (patient S)

The patient underwent an emergency Laparoscopic repair of duodenal ulcer perforation and abdominal drainage (Fig. 7). Performing laparoscopic surgery was technically difficult, given the non-standard position of surgical team and location of trocars.

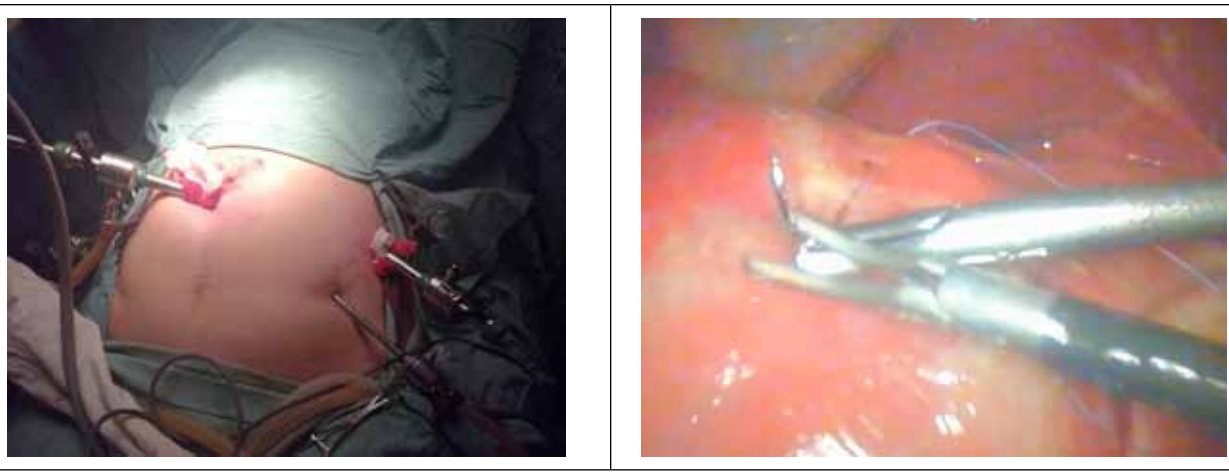

Fig. 7. Laparoscopic repair of duodenal ulcer perforation (patient S.)

The surgery lasted 1 hour and 20 minutes, and was completed with no complications. During the revision in the subhepatic region, the presence of dried serous-fibrinous fluid is found. With the further revision, no free fluid was detected in the suprahepatic region, in the right and left lateral channels, in the pelvis and in the interstitial spaces. On the anterior wall of the duodenum there is a perforating hole measuring 0.5x0.5 cm, with the infiltrative torus around it, up to 1 cm. The perforation is repaired with two-row interrupted sutures. Postoperative diagnosis: Primary diagnosis: duodenal peptic ulcer. Complication: duodenal ulcer perforation. Local serous-fibrinous peritonitis. The postoperative period proceeded without complications. On the 3rd day after the surgery, nasogastric tube was removed, on the 4th day after the surgery, drainage of the abdominal cavity was removed, after the control abdominal ultrasound. On the 5th day after the operation, the patient was discharged from the hospital in satisfactory condition.

Careful collection of anamnesis and performing all necessary diagnostic method (x-ray, ultrasound) makes it possible to timely and correct diagnosis and choice of treatment tactics.

Conclusion

The presence of a complete inversion of internal organs in patients with acute surgical diseases of the abdominal cavity does not form a contraindication to laparoscopic surgery. However, such arrangement of organs can create some inconvenience for surgeons. Due to this, correct installation of laparoscopic ports and rational positions of the operating team members seem to be necessary. The high probability of iatrogenic injuries during manipulations in the abdominal cavity requires increased attention from the surgeon. The operation should be performed by a team with significant experience in endovideosurgery.

Ethical Clearance: No ethical approval is needed.

Source of Funding: Self

Conflict of Interest: Nil

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