

## THE ROLE OF COMPUTED TOMOGRAPHY IN THE DIAGNOSIS OF RARE PELVIC HERNIAS ON THE EXAMPLE OF STRANGULATED HERNIA OF THE OBTURATOR CANAL: REVIEW

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*Obturator hernia is a rare form of pelvic hernia that is more common in older women. The clinical diagnosis of hernia is difficult. This type of hernia cannot be visualized by a general examination, and it is also impossible to reveal it by palpation, that is why it is more often detected at the stage of complications and is accompanied by high mortality. This work presents observation of a strangulated hernia of the obturator canal in a 96-year-old patient diagnosed with computed tomography.*

**Keywords:** *computed tomography, obturator canal, strangulated hernia, laparoscopy, clinical case.*

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### BACKGROUND

Obturator hernia (OH) is a rare pelvic pathology, more commonly seen in older women. It is formed through the obturator foramen that contains vessels and nerve having the same name. Diagnosing a hernia is challenging due to the non-specificity of its symptoms. OH is not diagnosed during a general examination and is most often not palpable [1]. Given the rarity and complexity of the diagnosis of obturator canal hernia, as a rule, it is detected at the complications stage; it is accompanied by high mortality in 12%–70% of cases and induces postoperative complications in 11.6% of cases. Since E. Cubillo first detected OH using computed tomography (CT) in 1983 [2],

the method has become the basis for early and accurate diagnosis of the disease.

### CLINICAL CASE

#### Patient information

Patient V., 96 years old, was transported on July 07, 2019 by an ambulance team to the City Clinical Hospital No. 4 of the Moscow Health Department with complaints of nausea, repeated vomiting, and abdominal pain that acutely began 5 days before hospitalization, after an error in diet and stool retention for 2 days. She did not receive previous medical treatment.

*Her Past medical history* included chronic constipation, hypertensive disease, condition

after appendectomy (1997), and metallic osteosynthesis of the right femur (2015).

### Examination

The surgeon on duty examined the patient on entry and found that his condition was of moderate severity. The tongue was dry and covered with white fur. The abdomen was not distended, symmetrical, and participated in respiratory movements. On palpation, it was soft, with mild tenderness in the epigastrium. No symptoms or signs of peritoneal irritation were present. Active peristalsis was perceived and gas discharge was present. No abnormalities were found on rectal examination. A hernial protrusion of approximately  $1.5 \times 2 \times 1$  cm in size was found in the umbilical region, which was reducible into the abdominal cavity. The cough impulse was positive and the skin over the formation was of the normal color. Ortner's and Tinel's symptoms were negative. Urination was not impaired and the body temperature was normal.

The patient was hospitalized in the surgical department with a preliminary diagnosis of acute pancreatitis. General blood tests, a biochemical blood test, test of parameters of the acid-base state, abdominal and kidney ultrasound (US), plain abdominal and chest X-rays were prescribed.

General blood test at admission showed leukocytosis of  $22.4 \times 10^9/l$ , while the other indicators were normal. The biochemical blood test revealed an increase in serum creatinine to  $322 \mu\text{mol/L}$ , amylase to  $160 \text{ mmol/L}$ , total bilirubin to  $33.29 \text{ mmol/L}$ , and glucose to  $8.4 \text{ mmol/L}$ .

Abdominal US performed on July 07, 2019 revealed intestinal pneumatosis and dilated intestinal loops in all regions with pendular movements of contents. In addition, US signs of diffuse changes in the parenchyma of the liver and pancreas and cysts of the right kidney were present.

During the first 20 h from the moment of admission, the patient underwent a 4-fold plain radiography of the abdomen, which showed no signs of obstruction and free gas in the abdominal cavity.

According to the results of initial studies, the severity of the condition could be due to electrolyte disorders, partial adhesive intestinal obstruction, or mild acute edematous pancreatitis.

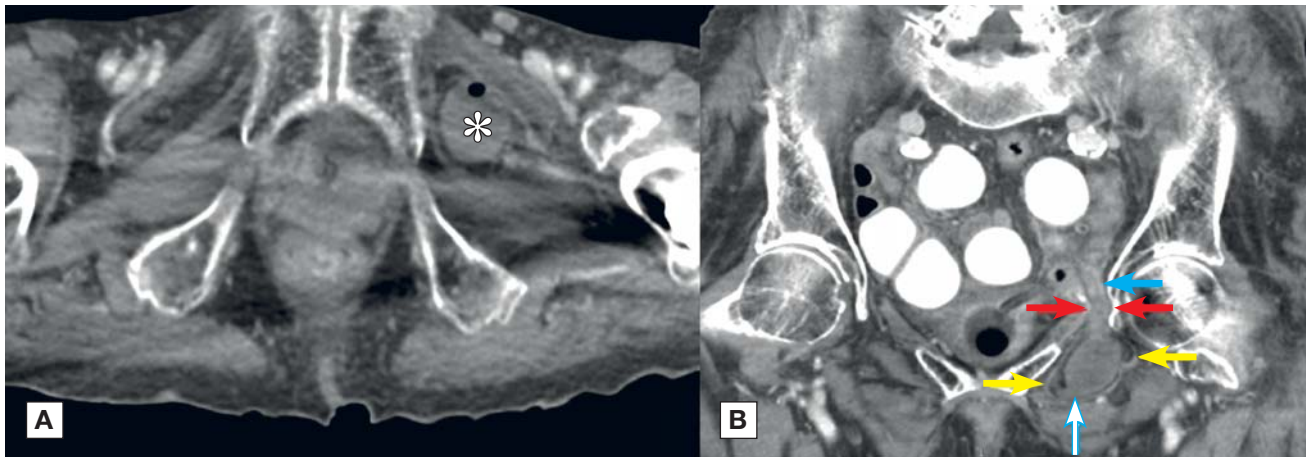
Since the second US performed after 25 h from the moment of admission showed a preservation of the pneumatosis and dilatation of the loops of the small intestine, abdominal and pelvic CT with contrast enhancement was prescribed for the patient to identify the genesis of these changes.

A CT scan was performed for the patient 27 h after admission to the hospital and 1 h after ingestion of water with a water-soluble non-ionic contrast agent in a volume of 1.5 liters. The images showed signs of small bowel obstruction with dilatation of the loops of the small intestine up to a maximum of 36 mm, up to the level of the left obturator foramen. The ileum loop penetrated through the deep (pelvic) foramen into the obturator canal with the formation of a drop-shaped hernial sac up to  $27 \times 23 \times 47$  mm in size, containing a loop of intestine of up to 40 mm long with fluid contents and gas in its lumen, on the medial surface of the thigh, under the adductor muscles (Fig. 1). A lumen of the small intestine was present, which had collapsed distal from the hernia. After contrast enhancement, a decrease in the vascularization of the intestinal wall in the hernial sac due to ischemia was noted. Based on the CT results, we concluded on a small bowel obstruction due to an incarcerated left-sided OH with signs of ischemia of the small intestinal loop in the hernial sac.

### Surgical intervention

According to emergency indications, the patient underwent a laparoscopic hernia repair of

**Fig. 1.** Computed tomography of the abdominal cavity and true pelvis with oral and intravenous bolus contrast enhancement in the venous phase of contrasting.

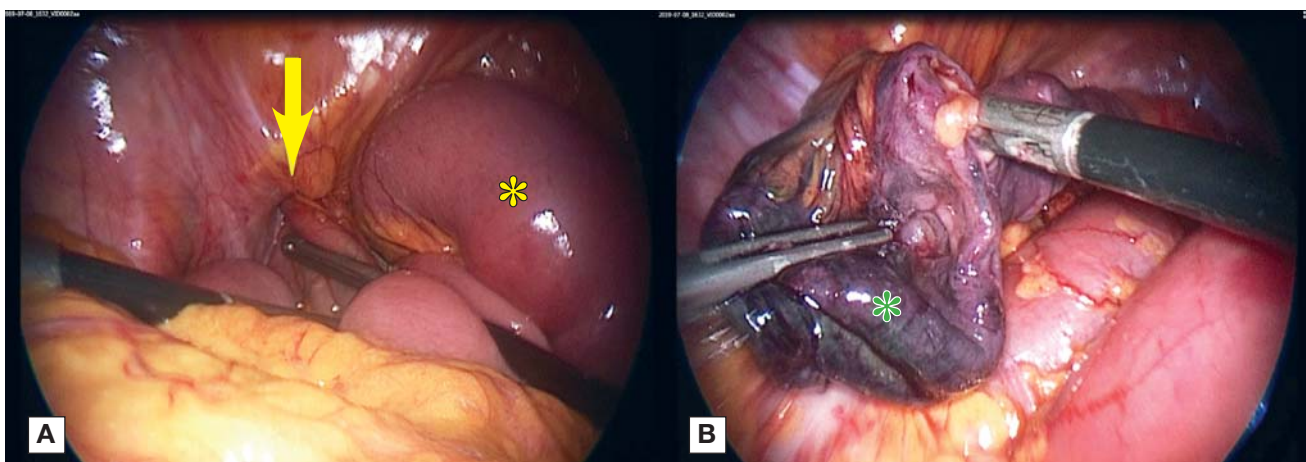


**Note.** A — axial view: hernial sac (asterisk) containing a loop of the small intestine with liquid contents and a gas bubble; B — frontal view: proximal to the obturator hernia, extended loops of the small intestine, filled with a contrast agent, are visualized. Hernia orifices (red arrows). The outer borders of the hernial sac (yellow arrows). The difference in vascularization of the wall between the unchanged gut at the entrance to the obturator canal (blue arrow) and the necrotic loop in the hernial sac (blue hollow arrow).

the left-sided OH, hernioplasty of the left obturator canal with local tissues, resection of the small intestine with a side-to-side anastomosis, and sanitation and drainage of the abdominal cavity. A fixed loop of the small intestine was determined intraoperatively, in the area of the left obturator canal. The adducting part was dilated to 3.5 cm, which was peristaltically sluggish and the efferent loop was collapsed. The parietal peritoneum in this area was hyperemic.

With technical difficulties, the incarcerated loop was brought into the abdominal cavity. On examination, necrosis of the incarcerated part of the small intestine, extending up to 3–4 cm, with perforation was determined. The condition was regarded as an incarcerated hernia of the obturator canal with necrosis of the small intestine fragment. A necrotic loop of the small intestine was removed through an incision in the left mesogastrium (Fig. 2). Resection of a

**Fig. 2.** Photograph during the laparoscopic surgery



**Note.** A — the internal foramen of the obturator canal with an incarcerated loop of the intestine (yellow arrow) and the extended loops of the small intestine proximal to the obturator hernia (yellow asterisk); B — a loop of the small intestine incarcerated in the hernial sac, with signs of necrosis after removing it into the abdominal cavity (green asterisk).

non-viable site was performed with the application of a single-row continuous side-to-side anastomosis. The hernial sac was partially isolated and necrotic; the base was sutured with a purse string suture. The hernial sac was dissected and sent for histological examination. The postoperative period was uneventful and the patient was discharged on day 14 after the surgery in a satisfactory condition.

## DISCUSSION

OH is called the “hernia of a small elderly woman” because of its high prevalence in elderly emaciated women, which is fully consistent with our case. Arno de Ronsil in 1724 described for the first time this condition and Henry Ombre in 1857 for the first time performed the surgical treatment of this pathology [3].

The obturator foramen is formed by the branches of the ischiadic and the pubic bones. The deep (pelvic) foramen of the obturator canal faces the prevesical tissue plane of the true pelvis. The external foramen of the obturator canal is located at the upper edge of the external obturator muscle. It is covered with the pectineal muscle, which has to be dissected when accessing the obturator canal. The length of the obturator canal is 2–3 cm; the vessels and the nerve bearing same name pass through it. Researchers have suggested that OH is preceded by invagination of the preperitoneal fat through the pelvic foramen of the obturator canal, with the formation of a fat plug [4]. From this moment, the formation of a true hernia starts; a small dimple is formed into the peritoneal hernia sac, which may contain a loop of the intestine. Incarceration of this loop with ischemia leads to intestinal obstruction with the appearance of typical clinical symptoms [5].

According to various sources, the incidence varies in the range of 0.07%–1.6% of all hernias [6, 7]. Regarding gender, OH is 9

times more common in women due to a wider pelvis and a larger transverse diameter of the obturator foramen. Right-sided OHs are more common because the left obturator foramen is partially covered with the sigmoid colon. Bilateral hernia is registered in 6% of cases [8]. Debilitation is caused by a decrease in the preperitoneal fat and the fat body that covers the obturator canal, which increases the risk of developing OH. Other risk factors for this hernia include chronic obstructive pulmonary disease, chronic constipation, ascites, and other causes leading to increased intra-abdominal pressure [9].

Acute intestinal obstruction is the most common manifestation of OH and it is noted in almost 90% of patients; the average duration of development of a full-scaled clinical presentation is approximately 4–6 days [8]. The onset of clinical symptoms is usually typical of any intestinal obstruction and includes pain and bloating, vomiting, and lack of defecation. A loop of the small intestine is usually contained in a hernial sac in OH. Parietal incarceration of the antimesenteric margin of such a loop (Richter type) occurs in 41%–100% of cases and causes partial or complete intestinal obstruction [10]. Other rare contents of OH include the colon, appendix, omentum, bladder, or reproductive organs (uterus or ovaries) [11].

One of the clinical symptoms of OH is the Howship–Romberg sign characterized by pain in the medial part of the thigh, aggravated by rotation of the thigh inwards due to compression of the obturator nerve in the obturator canal. This sign is considered pathognomonic for OH, but occurs only in 15%–50% of cases [3, 11, 12]. Therefore, the absence of this symptom does not rule out the diagnosis of OH. The symptom is considered as false positive in the presence of conditions affecting the ipsilateral hip joint, such as osteoarthritis. Another symptom registered in OH is the Hannington-

Kiff sign characterized by the absence of a femoral adductor reflex in the presence of a patella reflex on the hernial side. Although the Hannington–Kiff sign is more specific than the previous one, it is less common [8, 13]. Given the non-specificity of these symptoms, the lack of visual confirmation of the presence of a hernial protrusion during examination, and the rare possibility to find it by palpation, the early diagnosis of OH can be extremely difficult.

To establish and confirm a clinically suspected diagnosis, various methods of imaging hernia and intestinal obstruction are used. The studies include classic radiographs of the abdomen, including those with oral administration of contrast agents, herniography, US, CT, and magnetic resonance imaging [7], although CT has the highest sensitivity and specificity [14]. However, despite the increased diagnostic accuracy of the above methods, postoperative complications and mortality in OH remain at a high level, which is associated with a long time interval between incarceration of the hernia and the manifestation of the full-scaled clinical presentation of intestinal obstruction, as well as the late prescription of the most sensitive methods of abdominal imaging [3].

After the OH diagnosis is confirmed, surgical treatment is recommended to be performed immediately to reduce the risks of postoperative complications and mortality. The only treatment for OH is surgery. There are many types of surgical approaches, including inguinal, retropubic, and transperitoneal, as well as their combination [15]. In an emergency setting, the abdominal approach in the form of a median laparotomy is most preferable, since it allows a revision of the abdominal cavity, in order to identify the cause of the intestinal obstruction, expose adequately the obstructive ring, reveal an ischemic loop of the intestine and if necessary, to perform its resection. Cases of intraoperative difficulty in assessing the viability of an incarcerated loop

in OH have been described, which required intraoperative fluorescence angiography with indocyanine to detect ischemic changes that could have been avoided in case of preoperative CT with contrast enhancement [12]. The closure of a hernial defect can be performed with a simple restoration of the peritoneum (peritonization) due to surrounding tissues such as aponeurosis, periosteum, muscles, costal cartilage, greater omentum, round ligament and fundus of the uterus, ovary, bladder wall, or mesh hernioplasty [6, 14, 15]. Despite surgical recovery, the relapse rate of OH is about 10% [15].

The least traumatic laparoscopic surgery can be performed for patients with an already clinically established diagnosis, confirmed by abdominal imaging methods [16]. An asymptomatic OH is often detected during laparoscopic surgery for inguinal hernias. However, in some cases, even a laparoscopic examination does not reveal the presence of OH and in this situation, CT is the most valuable diagnostic method [1].

In our case, there was a typical late development of a full-scale clinical presentation of obstruction and the patient was hospitalized only on the day 5 from the onset of the disease. The persistence of periodic defecation during this period and the mild severity of the remaining symptoms indicated only partial intestinal obstruction. Abdominal radiography did not confirm the presence of dilatation of the loops of the small intestine due to the absence of gas-liquid levels in them (Kloiber's cups). In addition, only an increase in the clinical presentation and the preservation of the dilatation of the small intestine loops according to the US required a CT to identify the cause of these changes. By CT, the final diagnosis of OH was established and after intravenous contrasting, the degree of ischemic changes in the wall of the incarcerated loop of the small intestine was determined.

## CONCLUSION

The presented rare clinical case reflects the complexity of diagnosing an incarcerated hernia of the obturator canal in an elderly female patient with a high surgical risk. The low efficiency of the clinical examination, plain radiography, and ultrasound examination of the abdomen in this pathology can lead to late diagnosis, leading to high mortality. Abdominal and pelvic CT scans with contrast enhancement in our case enabled to timely determine the incarcerated hernia of the obturator canal and to assess the degree of ischemic changes in the small intestine loop in the hernial sac. The case reveals the importance of CT with contrast enhancement in determining the etiologies of acute intestinal obstruction. CT enabled to identify the hernia, determine its location, the size of the hernial orifice, the nature of the hernial sac contents, identify signs of ischemia, and to assess the condition of adjacent tissues. In this clinical case, abdominal CT with contrast enhancement and mandatory capture of the true pelvis to the level of the perineum should be performed in order to rule out incarcerated pelvic hernias, includ-

ing in such rare localizations as in the obturator foramen. The emergency laparoscopic surgery, performed due to the CT results, with resection of the necrotic loop of the small intestine was crucial in reducing the risk of postoperative complications and an adverse outcome of the disease.

## Informed consent

Written voluntary informed consent was obtained from the patient to publish this clinical case.

## CONTRIBUTION OF AUTHORS

A.A. Egorov processed the patient information and wrote the manuscript; N.S. Donchenko collected and processed the patient information; B.K. Laypanov collected and processed the patient information; E.G. Koshelev developed the concept and study design; G.Yu. Belyaev performed edited the manuscript; O.O. Kurzantseva was responsible for assembling all the parts of the manuscript; M.V. Melikhova approved the final version of the manuscript.

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