Case Report

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Variety of Endoscopic Techniques in the Treatment for Retroduodenal Perforation

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ABSTRACT The article presents a clinical observation of successful treatment for retroduodenal perforation (RDP) resulting from conducted retrograde endoscopic examination, papillotomy using a combined minimally invasive treatment method, which included bilioduodenal and pancreatic stenting, endoscopic vacuum therapy (EVT), transluminal drainage. The use of the EVT system together with endoscopic stenting of the biliary and pancreatic ducts made it possible to prevent the development of fatal retroperitoneal phlegmon by actively removing purulent discharge, necrotic tissues from the area of infection, reducing ductal hypertension, which contributed to the delimitation of the process. Transluminal drainage with multiple subsequent transluminal sanation demonstrated a good result in the form of adequate draining, the possibility of performing endoscopic sanitation of the lesion, and further complete regression of the delimited fluid cavity. The use of minimally invasive methods in the treatment for retroduodenal perforation made it possible to avoid the spread and generalization of purulent-septic fatal retroperitoneal complications, and to accelerate the process of successful treatment.

Keywords: choledocholithiasis, retroduodenal perforation, endoscopic vacuum therapy, EVT, pancreatic necrosis, transluminal drainage

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CT — computed tomography
EPST — endoscopic papillosphincterotomy
ERCG — endoscopic retrograde cholangiography
EVT — endoscopic vacuum therapy
IV — intravenous
RDP — retroduodenal perforation

RELEVANCE

The incidence of complications during endoscopic retrograde cholangiography (ERCG) with endoscopic papillosphincterotomy (EPST), with lithotripsy of common bile duct stones averages 10%, with a mortality rate of 1.0–1.5% [1, 2]. The most common complications are as follows: bleeding in the area of the major duodenal papilla (1.1–14.4%), acute post-manipulation pancreatitis (1.1–15.4%), acute cholangitis (up to 5%), and retroduodenal perforation (RDP) (0.3–2.4%) [1–5]. RDP is the most difficult complication for early diagnosis and treatment, and in 16–23% of cases leads to death due to sepsis and multiple organ failure [3–5].

Currently, there is no uniform approach to the timing and extent of surgical endoscopic intervention in the detection of RDP. Endoscopic methods include: retrograde nasobiliary drainage, biliary and duodenal stenting, clipping of the defect with endoclips, covering of the duodenal perforation site with fibrin glue [2–7]. One of the new intraluminal methods is the use of endoscopic vacuum therapy (EVT) with negative pressure [8]. This method helps not only accelerate healing by continuously removing infected discharge, but also reduce tissue edema by increasing local perfusion, which in turn helps form granulation tissue in the perforation site [8, 9]. This approach, according to world literature, is widely used in the treatment for esophageal perforation, esophageal anastomotic failure, or anastomotic insufficiency after rectal surgery [10]. However, not a single observation of the use of EVT in relation to retroduodenal perforation has yet been described.

The presented clinical observation demonstrates the possibility of successful use of minimally invasive technologies in patients with RDP.

Clinical observation

Female patient D., 37, was admitted to the surgical department on emergency indications with suspected choledocholithiasis 16 hours after the onset of the disease. The main complaint was the presence of pain in the right hypochondrium and epigastric region, which appeared after a diet violation (fatty food). History: open cholecystectomy (2012), and laparoscopic appendectomy (2013). On physical examination: blood pressure – 120/76 mm Hg, pulse rate – 88 beats per minute, rhythmic, of satisfactory filling. The tongue was moist, with a white coating at the root. On palpation, the abdomen was soft, painful in the right hypochondrium, not enlarged in volume, symptoms of peritoneal irritation were negative.

Laboratory blood tests revealed moderate hyperbilirubinemia (total bilirubin – 87.3 μmol/l).

X-ray examination of the chest and abdominal cavity revealed no pathology. Ultrasound examination of the abdominal cavity showed expansion of the common bile duct to 1.2 cm. Magnetic resonance cholangiopancreatography detected a spherical signal loss area with a diameter of 5 mm in the proximal third of the common bile duct; the diameter of the common bile duct was 6 mm.

Based on the patient's complaints and the results of instrumental examination, a preliminary diagnosis of "Cholelithiasis: choledocholithiasis. Mechanical jaundice" was established. Considering the persistence of pain syndrome despite performed therapy, the presence of a calculus in the common bile duct, as well as the persistence of the phenomenon of mechanical jaundice, indications were given for endoscopic lithoextraction from the biliary tract, the common bile duct.

Fourteen hours after hospitalization, under intravenous sedation, endoscopic retrograde cholangiography (ERCG) was performed, during which the dilated extrahepatic bile ducts were contrasted (segmental ducts with a diameter of 2 mm, lobar - 3 mm, common hepatic and bile ducts - 14 mm), the contours were smooth, clear, the lumen of the common bile duct in the distal third was non-homogeneous due to small filling defects. The stump of the cystic duct was up to 7 mm in diameter, the lumen was non-homogeneous due to a filling defect of a round shape up to 4-5 mm in diameter. Next, a typical endoscopic papillosphincterotomy (EPST) was performed (incision up to 12 mm without signs of bleeding), removal of stones using a Dormia basket from the common bile duct. During the control X-ray examination after EPST, no special features were revealed.

After surgery, the patient was transferred to the surgical department in a stable condition.

Four hours after the intervention, the patient noted moderate pain in the right hypochondrium, which progressively increased over time. On physical examination: hyperthermia up to 37.9°C, skin of

physiological color, blood pressure – 130/90 mmHg, pulse – 96 beats per minute, rhythmic, of satisfactory filling. The tongue was dry, with a white coating at the root. On palpation, the abdomen was sharply painful in the upper sections, not enlarged in volume, symmetrical, symptoms of peritoneal irritation were negative. An emergency laboratory and instrumental examination was performed. Laboratory tests revealed relative leukocytosis (9.10x109/l), hyperamylasemia (415.14 U/l). During ultrasound examination of the abdominal cavity, the common bile duct was dilated to 1.1–1.4 cm, in its lumen along the upper wall, a linear structure of medium echogenicity up to 0.1 cm long was determined. Pancreas: contours were clear, smooth, sizes were within normal limits, echostructure was heterogeneous due to a linear fluid zone along the lower surface of the gland. A 2.0 cm wide fluid zone with gas was visualized in the omental bursa. In the area of the head of the gland and the duodenum, there were linear fluid zones with a total size of up to 1.8 cm (Fig. 1).

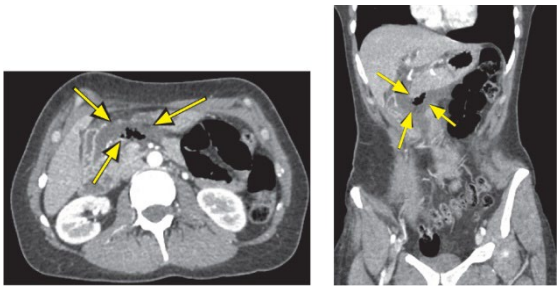

Fig. 1. Computed tomography of the abdominal cavity with intravenous contrast. Arrows indicate the boundaries of the fluid accumulation with gas inclusions

According to computed tomography (CT) with intravenous contrast, 8 hours after surgery, the pancreas was not enlarged in size, the structure of its tissue in the head and body area was non-uniform due to small hypodense zones without clear contours with gas inclusions. In the area of the body and tail of the pancreas, the peripancreatic fatty tissue was of increased density with fluid accumulations. In the projection of the omental bursa, a liquid zone with gas inclusions was determined (Fig. 1).

The clinical and instrumental picture did not allow us to exclude perforation of the hollow organ. Indications for emergency esophagogastroduodenoscopy under intravenous anesthesia were established, during which a moderate amount of turbid discharge was detected in the lumen of the duodenum, along the posteromedial wall of the vertical portion of the duodenum, the EPST zone was up to 10 mm with the application of light thin fibrin. Next, selective catheterization of the common bile duct was performed with a catheter, the extrahepatic ducts were contrasted - no leaks were detected (Fig. 2). The situation was assessed as covered RDP. In order to seal the bile ducts and the lumen of the duodenum, endoscopic bilioduodenal and pancreatoduodenal stenting (Fig. 3), installation of a vacuum transnasal aspiration system into the lumen of the vertical portion of the duodenum were performed (Fig. 4).

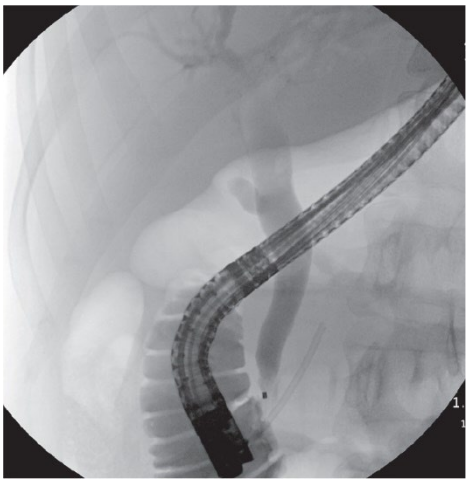

Fig. 2. Endoscopic retrograde cholangiography — no signs of perforation were detected

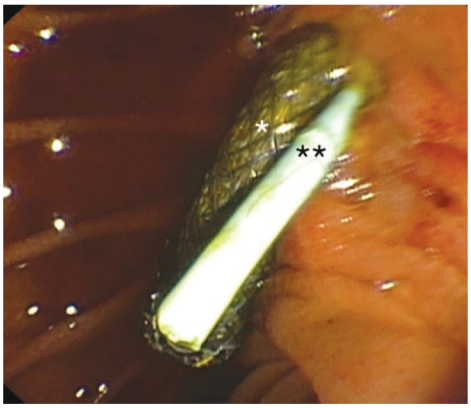

Fig. 3. Double endoprosthesis. Endophotography of the installed bilioduodenal (*) and pancreatoduodenal (**) stents in the lumen of the duodenum

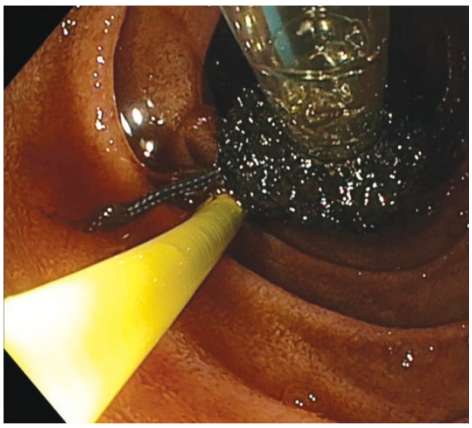

Fig. 4. Endoscopic installation of a system for vacuum transnasal aspiration into the lumen of the vertical portion of the duodenum

Due to the severity of the patient's condition, she was transferred to the intensive care unit, where she received antibacterial (Ceftriaxone 2 g/day intravenously (IV), Metronidazole 1500 mg/day IV), infusion-spasmolytic, antisecretory (Octreotide 900 mcg/day subcutaneously), and symptomatic therapy. The postoperative period was complicated by large-focal pancreatic necrosis and bilateral hydrothorax.

According to CT data, on the 4th day after surgery, delimitation of the fluid accumulation in the omental bursa was detected. Body temperature was 36.5°C, white blood cell count was 7.45×10^9/l. Considering the absence of purulent discharge in the vacuum system, clinically positive dynamics of the patient's condition, the system was removed on the 5th day after installation without subsequent replacement. On the 6th day after surgery, the patient was transferred to the department.

On the 10th day after retrograde cholangiopancreatography, CT showed an increase in the volume of the delimited fluid accumulation of the omental bursa to 160 cm^3. The pancreaticoduodenal stent has migrated and is not detected in the Wirsung duct. (Fig. 5).

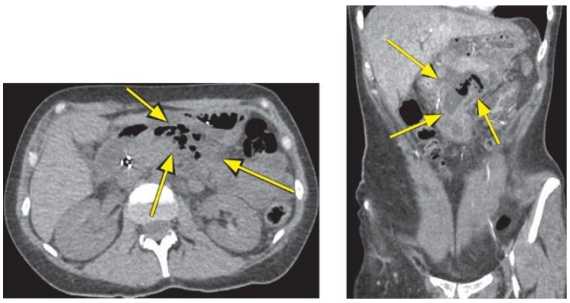

Fig. 5. Computed tomography of the abdominal cavity with intravenous contrast. Arrows indicate the boundaries of the fluid accumulation with gas inclusions. Biliary duodenal stent

On the 12th day after surgery, endoscopic ultrasonography revealed a voluminous non-homogeneous fluid accumulation in the omental bursa area measuring approximately 6.9×4.1 cm. Body temperature was 37.3°C, white blood cell count was 10.36×10^9/l.

Considering the tight adhesion of the last fluid accumulation to the posterior wall of the stomach, a decision was made to perform its endoscopic internal drainage. Under endoscopic ultrasound guidance, a cystotome was used to form an anastomosis between the delimited fluid zone and the stomach. Under visual control, a self-expanding coated nitinol stent with a diameter of 14 mm and a length of 30 mm was installed into the lumen of the fluid accumulation along the string. During aspiration, the flow of purulent contents was noted.

On the 15th, 16th, 18th day after the primary surgical intervention, endoscopic sanitation of the delimited fluid accumulation was performed through the formed anastomosis. During the first two sanitation procedures, with the stent shifting laterally, 100 ml of viscous purulent discharge entering the gastric lumen was observed. During the last endoscopic sanitation, no contents coming from the destruction zone were observed, the cavity was in a collapsed state. Against

the background of the treatment, positive dynamics were noted in the form of complete regression of pain syndrome, normalization of laboratory parameters (Hb 102 g/l, WBC 7.88×10^9/l, alpha-amylase 45.60 U/l), no episodes of hyperthermia were observed.

On the 19th day, CT showed clear positive dynamics in the form of a significant regression in the size of the formation (Fig. 6).

On the 20th day, endoscopic removal of the transluminal stent was performed (Fig. 7). The patient was discharged in satisfactory condition on the 21st day after ERCG, EPST, choledocholithoextraction, RDP, with a recommendation to remove the bilioduodenal stent in 2 months on a planned basis, which was done (Fig. 7)

Fig. 6. Computed tomography of the abdominal cavity with intravenous contrast on the 19th day after the primary surgical intervention. 1. Lumen of the stomach. 2. Pancreas. 3. Transluminal stent. The arrow indicates the area of destruction

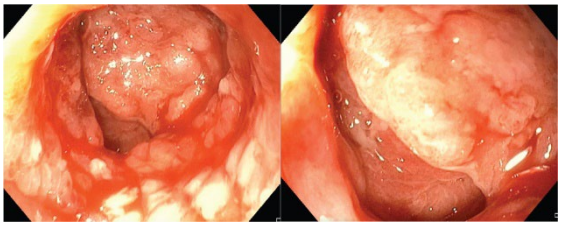
Fig. 7. Endoscopy photo of the destruction zone after removal of the transluminal stent

DISCUSSION

To select the type of treatment, it is necessary to take into account the type of perforation, the time of its detection, and the clinical course.

In the presented observation, RDP belonged to type 3 according to the S. Kim classification (2011) [11]. This caused the impossibility of its visualization during endoscopic examination. Early detection of RDP in the postoperative period was due to the early manifestation of the clinical picture, timely laboratory and instrumental examination, which showed increased inflammation markers; fluid zones in the area of the head of the pancreas, duodenum and omental bursa with gas inclusions were visualized and identified.

An important factor in the early detection of perforation is a physical examination of the patient during his complete recovery after sedation [4]. The first symptoms and signs that may suggest RDP are severe pain in the upper abdomen without signs of intestinal paresis (84.7%), leukocytosis (76.9%), subfebrile temperature (53.8%), vomiting (38.5%), nausea (23.1%), and tachycardia (20.4%) [3, 4, 12]. Characteristic symptoms of RDP, such as subcutaneous emphysema (53.7%), dynamic intestinal obstruction (20.3%), phlegmon of the hepatoduodenal ligament (4.8%), duodenal fistula of the retroperitoneal space (4.7%), appear already in the later stages of the disease (usually on the 3rd–4th day) [3, 5, 7, 12].

In the observation we described, in addition to RDP, the postoperative period was also complicated by post-manipulation acute pancreatitis with an outcome in large-focal pancreatic necrosis, which also affected the severity of the patient's condition.

Considering the size of the perforation, the early stage of detection, and the severity of the patient's condition, we resorted to a combined minimally invasive treatment method, which included bilioduodenal and pancreatoduodenal stenting, EVT, and transluminal drainage.

Perforations smaller than 10 mm without an extensive extraluminal infected cavity can be eliminated by intraluminal placement of a cylindrical sponge system. In this case, the clearance in the defect area decreases, and EVT provides simultaneous drainage and closure of the defect.

EVT together with endoscopic stenting of the biliary and pancreatic ducts made it possible to prevent the development of fatal retroperitoneal phlegmon by actively removing purulent discharge, necrotic tissue from the area of infection, reducing ductal hypertension, which contributed to the delimitation of the process.

After removal of the EVT system, we observed no positive dynamics in reducing the size of the delimited fluid accumulation in the omental bursa, which caused discomfort to the patient. Considering its tight adhesion to the posterior surface of the stomach, endoscopic cystogastrostomy was performed with multiple subsequent transluminal sanation, which is more typical for the treatment of pancreatic pseudocysts, and is extremely rarely used for internal drainage of fluid accumulations. However, in our observation, this method demonstrated a good result in the form of adequate drainage, the possibility of endoscopic sanitation of the lesion and, subsequently, complete regression of the delimited fluid cavity.

CONCLUSION

Timely diagnosis of retroduodenal perforation and the use of a complex of endoscopic techniques make it possible to avoid the spread and generalization of purulent-septic fatal retroperitoneal complications and to speed up the process of successful treatment.

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