

Large left paraduodenal hernia with intestinal ischemia: a case report and literature review

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Abstract

A left paraduodenal hernia is a rare type of internal hernia but the most common type of peritoneal recess hernia. Preoperative diagnosis of a left paraduodenal hernia is difficult because of its nonspecific clinical manifestations, and it is often confused with other causes of acute abdomen. Diagnosis is therefore often delayed, resulting in serious clinical outcomes. We herein report a case of a large paraduodenal hernia with small intestinal obstruction and ischemia without abdominal pain. The patient was successfully discharged after emergency hernia repair. This case reveals the importance of diagnosing a left paraduodenal hernia with or without abdominal pain, especially in patients with no history of abdominal surgery.

Keywords

Left paraduodenal hernia, intestinal obstruction, internal hernia, peritoneal recess hernia, preoperative diagnosis, acute abdomen

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Introduction

An internal hernia is a condition in which the abdominal organs or tissues leave their original position and enter another part of the abdomen through a weak defect or space in the abdominal cavity.¹ Internal hernias are relatively rare compared with other types of hernias. According to the literature, the incidence of internal hernias ranges from about 0.6% to 5.8%.² A

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Japanese study showed that only 13 (0.19%) of 8938 patients with gastric cancer undergoing surgical treatment were diagnosed with internal hernias.³ A para-duodenal hernia (PDH) is a rare type of congenital internal hernia. PDHs account for 53% of all internal hernias. Acquired holes are mainly the result of surgery and are often seen in patients undergoing certain weight loss operations, especially Roux-en-Y gastric bypass.⁴ However, PDHs with clinical symptoms are even less common, accounting for about 0.2% to 0.9% of all PDHs.⁵

A PDH is a congenital disease; however, most patients develop this type of hernia in adulthood. Although PDH was first described by Moynihan in 1906,⁴ the exact cause of the disease is not entirely clear. PDH is also classified as left PDH (LPDH) and right PDH (RPDH). Although both are PDHs, their anatomical basis, diagnoses, and treatments are quite different. An LPDH is the most common type of congenital internal hernia encountered in adults. It is a congenital disease caused by abnormal rotation and fixation of the midgut during embryonic development. The small intestine is embedded in the left mesocolon without blood vessels. Therefore, a more suitable name is congenital "mesocolic" hernia.⁶ Many LPDHs are asymptomatic throughout life. However, autopsies have revealed that about 2% of affected individuals have a fossa of Landzert.^{7,8} An RPDH is also a congenital disease. When the small intestine passes through the first part of the mesentery, a defect forms; this defect is called the fossa of Waldeyer in about 1% of cases and is also detected at autopsy.⁹ An RPDH is usually larger and more fixed than an LPDH and is associated with intestinal malrotation. In addition to LPDHs and RPDHs, a middle mesocolic hernia is an even rarer form of PDH. This is a hernia of the small intestine through the transverse mesocolon.¹⁰

According to the relative position of the recess and the ascending duodenum, middle mesocolic hernias are classified into two types: Landzert hernias and Waldeyer hernias. The incidence of LPDHs is higher than that of RPDHs by about 3:1,¹¹ and the incidence is higher in male than female patients.^{12,13} LPDHs often have no specific clinical manifestations and even no specific imaging manifestations. This often asymptomatic type of internal hernia is therefore difficult to diagnose, delaying the best treatment opportunity and leading to intestinal obstruction or even strangulated intestinal obstruction.

Case presentation

A 38-year-old man presented to the emergency department because of a 2-day history of continuous vomiting that had become aggravated during the past 4 hours. He had usually been in good health and had no history of abdominal surgery. He had experienced an intermittent fever that had peaked at 38.9°C. The patient vomited severely with a small amount of hematemesis, but no hematochezia was present. Routine blood and biochemical testing showed a white blood cell count of $13.4 \times 10^9/L$, neutrophil percentage of 91%, hemoglobin concentration of 69 g/L, procalcitonin concentration of 19.5 µg/L, C-reactive protein concentration of 262 mg/L, lactate concentration of 1.8 mmol/L, pH of 7.22, PO₂ of 82.2 mmHg, PCO₂ of 40.5 mmHg, and oxygen saturation of 95%. Curiously, the patient denied symptoms of abdominal pain. Physical examination revealed a soft abdomen with no tenderness or rebound pain. Large amounts of gastric juice and blood were drawn out after insertion of a gastric tube. An abdominal radiograph in the upright position showed that the dilated ring of the small intestine had gathered into clusters, and a gas-liquid plane could be seen in the small intestine. Abdominal

contrast-enhanced computed tomography (CT) showed a partial mesenteric volvulus and poor blood circulation in part of the small intestine. Formation of an intra-abdominal hernia was also suspected, with the presence of blood-dense fluid in the abdominal cavity. Three-dimensional CT reconstruction confirmed the location of the obstruction, the extent of intestinal ischemia, and the accumulation of fluid around the small intestine (Figure 1(a), (c)).

The patient's peritoneal effusion was mainly present in the pelvic and intestinal interspace. To determine the characteristics of the peritoneal effusion and whether surgical intervention was needed, we performed

an ultrasound-guided abdominal puncture under conditions of maximal patient safety. Bloody peritoneal effusion was drawn out from the abdomen. Considering that the patient was in good physical condition and had no history of abdominal surgery or trauma, our differential diagnoses were an internal hernia, mesenteric thrombosis, and gastrointestinal ulcer bleeding. After completion of relevant preoperative preparations, we decided to perform exploratory laparotomy instead of laparoscopic surgery because of the unpredictability and complexity of the patient's condition.

About 1 hour after CT and abdominal puncture, the operation began. A large

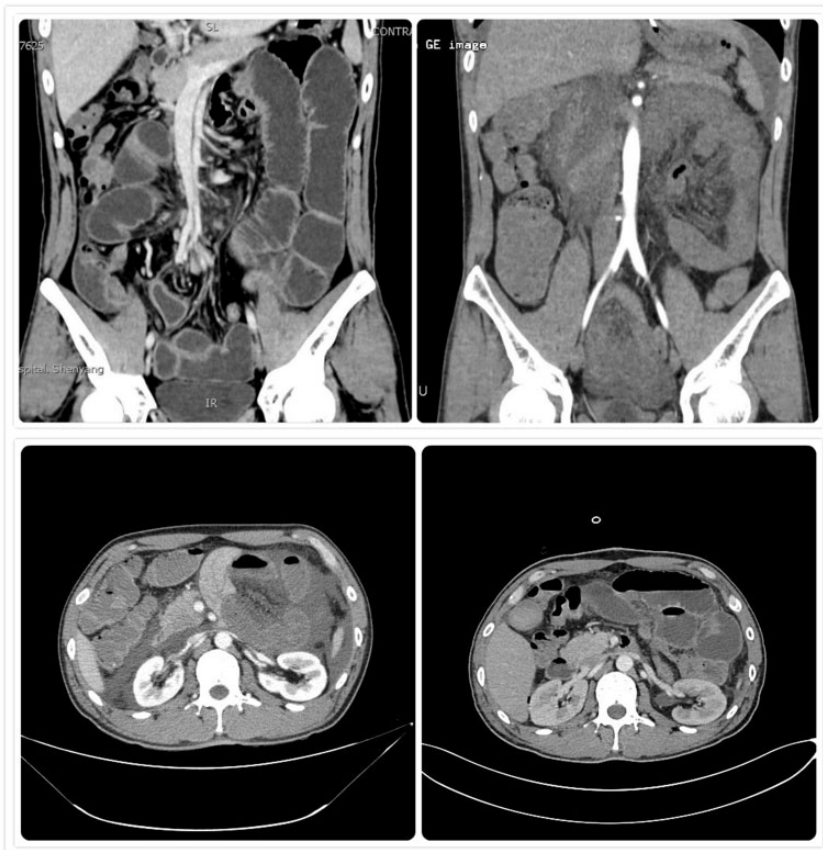


Figure 1. Computed tomography (CT) findings. (a, c) Preoperative CT and three-dimensional CT reconstruction. (b, d) Postoperative CT and three-dimensional CT reconstruction.

hernia sac was found from the peritoneal opening on the left side of the ligament of Treitz. The neck of the hernia sac was opened, revealing the dilated small intestinal ring. A large amount of bloody exudate was present in the hernia sac and between the intestines of the internal hernia. A large duodenal recess hernia was observed between the duodenum, transverse mesocolon, and descending mesocolon (Figure 2). A large number of small intestinal herniations could be seen in the neck of the hernia sac with a diameter of about 6 cm. The neck of the hernia sac was released, the tension was reduced, and the herniated small intestine was removed, revealing ischemic changes in the intestinal wall (Figure 3). After relieving the compression of the hernia sac, the blood flow of the small intestine improved. Fortunately, the patient did not require small bowel resection. The lateral peritoneum of the descending colon was dissociated, the splenic flexure of the colon was completely



Figure 3. Ischemic state of the small intestine during the operation.

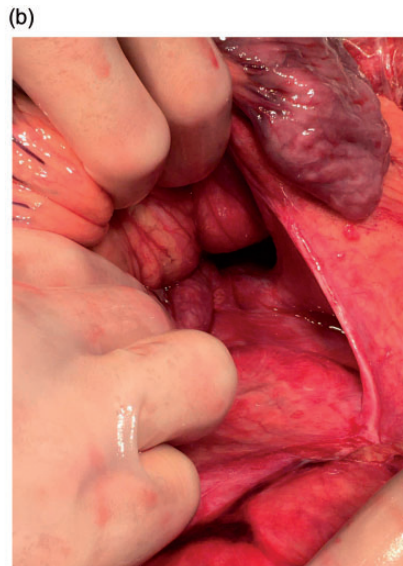
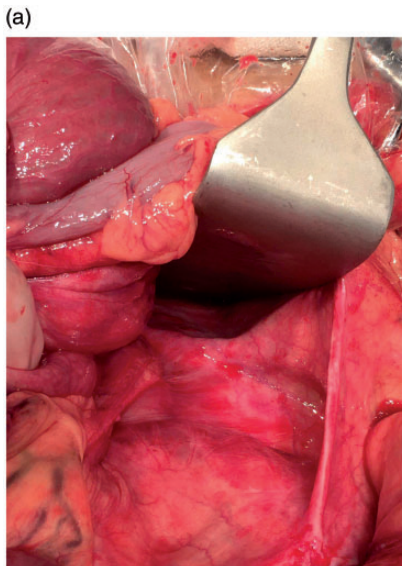


Figure 2. Intraoperative findings. (a, b) The large hernia sac and neck of the paraduodenal hernia could be seen during the operation.

dissociated, the inferior mesenteric vein and left colonic vein were exposed, the excess hernia sac was completely removed, and the duodenal recess was closed (Figure 4).

Anal exhaust began on postoperative day 2, and the patient began a liquid diet on day 3. On postoperative day 5, all routine blood parameters had returned to normal levels, the hemoglobin concentration had significantly increased, and abdominal CT showed that the blood circulation of the small intestine was good and that no obstruction was present (Figure 1(b), (d)). The patient was discharged on postoperative day 5. Routine follow-up examinations at 3 and 6 months postoperatively showed that the patient was in good condition and had developed no complications.

Discussion

PDHs often occur between the ages of 40 and 60 years. The incidence is higher in men

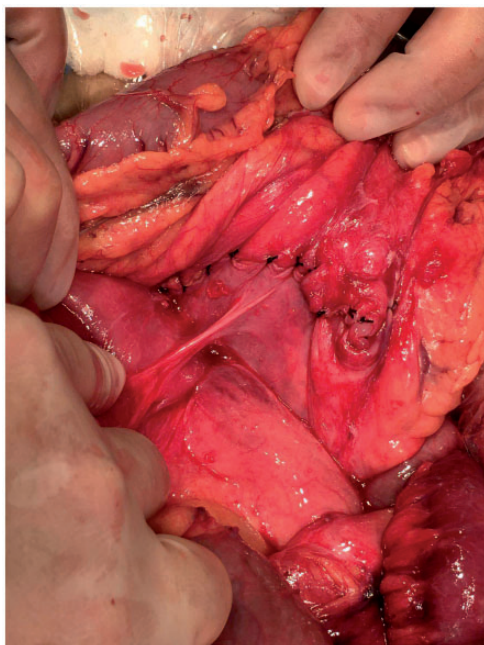


Figure 4. Removal and closure of the hernia sac.

than in women.⁴ Most patients with PDHs develop abdominal pain and distention, and some also experience dyspepsia. When the intra-abdominal pressure increases, the abdominal organs, especially the small intestine, may enter the duodenal recess. Considering the location of the duodenal recess, the jejunum is the most common herniating viscus.¹⁴ The contents of the hernia are usually the stomach and small intestine and sometimes the colon,^{15,16} increasing the difficulty of clinical diagnosis and complicating the differential diagnosis. In the absence of a history of surgery, external hernia, and intra-abdominal inflammatory disease, and if abdominal pain or intestinal obstruction occurs repeatedly and no other causes are found, the possibility of a PDH should be considered, especially when the inferior mesenteric vein moves forward.¹⁷ In the published literature, including case reports, the mortality rate associated with intestinal strangulation in patients with a symptomatic LPDH ranges from 20% to 50%.¹⁸ However, regardless of whether symptoms of intestinal obstruction are present, patients diagnosed with an LPDH should undergo surgical treatment as soon as possible to avoid a poor clinical outcome.¹⁹ Some previously reported cases of large LPDHs are listed in Table 1. In all of these cases, the hernial sac diameter was >5 cm.

CT is an effective diagnostic technique for LPDHs. Contrast-enhanced CT can be used to determine if the blood supply of the small intestine is obstructed. If necessary, the surrounding anatomical structure can be distinguished by three-dimensional CT reconstruction technology.²⁰ Imaging and surgical scholars have determined that the five imaging features of LPDHs are as follows¹⁴: (1) an encapsulated cluster of small bowel in the left upper quadrant with engorgement of the mesenteric vessels, (2) small bowel loops behind the pancreas and/or transverse colon or stomach, (3)

Table 1. Previously reported cases of large left paraduodenal hernias.

Case	Authors	Age (years)	Sex	Size of hernia sac (cm)	Laparoscopy completed	Length of stay (days)
1	Cundy et al. ²⁹	55	M	6	No	6
2	Jeong et al. ²⁴	52	M	5	Yes	5
3	Jeong et al. ²⁴	58	F	6	Yes	5
4	Palanivelu et al. ²⁰	44	M	7	Yes	5
5	Palanivelu et al. ²⁰	49	M	8	Yes	2
6	Palanivelu et al. ²⁰	54	F	9	Yes	2
7	Nam et al. ³⁰	12	F	5	Yes	5
8	Fukanaga et al. ³¹	51	M	5	Yes	9
9	Coakley et al. ³²	25	M	6	No	3
10	Parmar et al. ³³	38	M	8	Yes	3
11	Uematsu et al. ³⁴	44	M	5	Yes	28
12	Hussein et al. ³⁵	59	M	5	Yes	3
13	Uchiyama et al. ³⁶	80	F	5	Yes	3

M, male; F, female.

anterior displacement of the inferior mesenteric vein, (4) small bowel loops between the stomach and pancreas, and (5) convergence of mesenteric vessels toward the neck of the hernia near the ligament of Treitz. The surgical treatment of PDHs can be roughly divided into three techniques: eliminating the defect of the hernia sac to achieve a normal anatomical structure, closing or reducing the hernia sac, and excising the hernia sac. The surgeon's main task is to reduce the gap of the hernia and repair the defect of the mesentery. The neck of the hernia sac is closely associated with the submesenteric vessels and the left colonic artery; therefore, injury should be avoided during the repair process.^{7,21} However, the integrity of the collateral vessels must be preserved to ensure a good intestinal blood supply.²²

Because the inferior mesenteric vein is located at the anterior and medial edge of the mesentery, which is also a sign of PDH, the forward movement of the inferior mesenteric vein should be considered during the operation.¹⁷ Displacement and squeezing of the mesenteric vein may contribute to abdominal pain. A randomized controlled

study showed that laparoscopic surgery is more likely to lead to an internal hernia than is laparotomy.²³ The choice of laparoscopy or laparotomy is still controversial. However, the literature shows that laparoscopic treatment of a PDH can shorten the hospital stay, promote early eating, and reduce the incidence of perioperative complications.^{24,25} Nevertheless, if the blood supply of the small intestine is suspected to be impaired or necrotic, a safer operation should be chosen. Whether and where to place the mesh is still controversial.^{20,26}

Conclusion

Preoperative diagnosis of PDHs is difficult, and delayed diagnosis can have fatal consequences for patients; more than half of patients with a PDH may develop intestinal obstruction. A retrospective analysis showed that the mortality rate of PDHs is >20%.^{20,27} The most common mechanism of intestinal obstruction is contraction of the hernia sac orifice. The hernia repair technique should be chosen based on the intraoperative conditions, including the size of the hernia sac, the location of

the submesenteric vessels, and the presence of intestinal obstruction. In addition, the timing of surgery is very important and can even determine the prognosis. Laparoscopic surgery is considered to be a diagnostic and therapeutic method. However, laparoscopy also has a risk of iatrogenic injury, including rupture of the small intestine due to incarcerated intestinal dilatation, abdominal congestion, and massive exudation.^{12,28}

In summary, the incidence and preoperative diagnosis rate of LPDH are low, and the timing of the operation is very important. We hope that through this case report, the possibility of this disease will be considered in patients who develop intestinal obstruction without a history of surgery.

Declaration of conflicting interest

The authors declare that there is no conflict of interest.

Ethics

The study was approved by the ethics committee of The First Hospital of China Medical University. The patient provided written informed consent to publish his data.

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