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Case Report

Omental Abscess after Laparoscopic Proximal Gastrectomy Successfully Treated with Percutaneous Drainage

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We report the case details of a 65-year-old Japanese man with an omental abscess that was discovered 43 days after he underwent a laparoscopic proximal gastrectomy for gastric cancer. His chief complaint was mild abdominal pain that had persisted for several days. The abscess was diagnosed as a rare postoperative complication. We hesitated to perform a reoperation given the invasiveness of general anesthesia and surgery, plus the possibility of postoperative adhesions and because the patient's general condition was stable and he had only mild abdominal pain. Percutaneous drainage using a 10.2-F catheter was performed with the patient under conscious sedation and computed tomography–fluoroscopy guidance, with no complications. After the procedure, the size of the abscess cavity was remarkably reduced, and 23 days later the catheter was withdrawn.

Key words: drainage, omental abscess, omental infarction, proximal gastrectomy

Omental abscesses are rare and may occur secondary to causes such as complications after surgeries (*e.g.*, appendectomy, cholecystectomy, or inguinal herniorrhaphy), the spread of inflammation from other sites (*e.g.*, appendicitis or cholecystitis), omental infarction, an abdominal foreign body, intestinal perforation, and hematogenous infection in an immunocompromised host [1-7]. As an uncommon complication after laparoscopic gastrectomy (LG), omental infarction with or without infection has been described [8-12]. The treatment strategy depends on the cause, but it commonly involves surgical intervention [1-9]. We report a case of an omental abscess that was successfully treated with the less-invasive percutaneous drainage approach.

Case Presentation

A 65-year-old Japanese man presented to our hospital 43 days after undergoing a laparoscopic proximal gastrectomy (LPG), with the chief complaint of mild abdominal pain that had persisted for several days. He had no diarrhea, constipation, nausea, or vomiting. He had undergone the LPG for gastric cancer (GC) on the cardiac part of the stomach (pT2N0M0 Stage IB) (Fig. 1A). He was slightly obese (body weight 80 kg, height 171 cm, and body mass index 27.5) and had no history of abdominal trauma or other abdominal surgeries. He had no history of diabetes mellitus.

At admission, his temperature was 36.9°C and other vital signs were normal at the clinical examination. Although the abdomen showed no guarding, a mass

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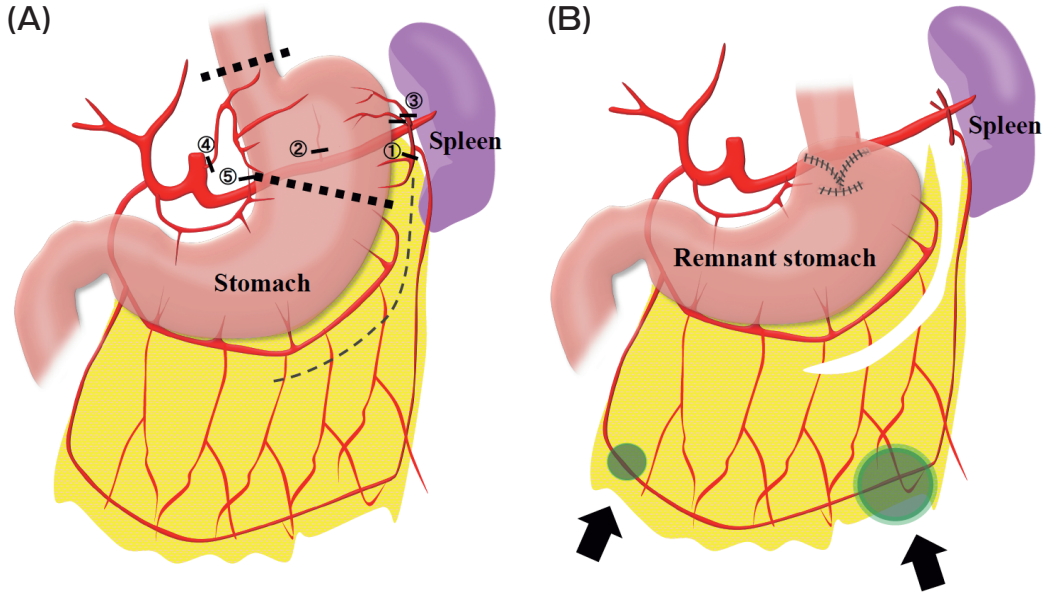

Fig. 1 A, Schema showing the resected line of the stomach (*thick dotted lines*), the omentum (*thin dotted curved lines*), and arteries: ① to ⑤. The left half of the omentum was divided at approx. 3 cm from the right gastroepiploic artery to open the omental bursa. The ligations and ligated arteries were as follows: ① proximal to the left gastroepiploic artery, ② posterior gastric artery, ③ short gastric artery (SGA), ④ proximal to the left gastric artery, and ⑤ connection of the right to left gastric arteries; B, Schema showing the resected stomach, omentum, and arteries. The omental abscesses developed at the distal part of the omentum (*arrows*).

was palpated above the umbilicus, with local spontaneous pain and tenderness. Laboratory investigations showed a leukocyte count of $11.4\times10^3/\mu L$, 79.7% of which were neutrophils, and a C-reactive protein (CRP) concentration of 7.18 mg/dL.

Abdominal contrast-enhanced computed tomography (CT) images showed a thick encapsulated fluid collection containing a fat component (5.0×5.6×8.0 cm in diameter), increased attenuation of periadventitial adipose tissue slightly to the left of the midline (where the omental branches of the left gastroepiploic artery were located), and an ill-defined area of increased density on the right side, in the same slice as the above lesion (Fig. 2). He was diagnosed with liquefied necrosis of the omentum with infection (Fig. 1B).

Due to the formation of a mature abscess with a thick capsule, antibiotic administration alone did not appear to be sufficient, and drainage was deemed necessary. Although resection of the omentum was considered, there was some hesitance to perform a reoperation given the invasiveness of general anesthesia and surgery, plus the possibility of postoperative adhesions. The patient's general condition was stable, and he had only mild abdominal pain. Eventually, through a multidisciplinary discussion, percutaneous drainage was selected as the first-line treatment to control the patient's infection.

After local anesthesia with lidocaine was administered, an 18-gauge intravenous catheter (Surflo; Terumo Corp., Tokyo) was directed toward the abscess cavity under CT-fluoroscopic guidance (Aquilion; Canon Medical Systems, Otawara, Japan). Ultrasound (US)-guided drainage was initially considered, but because of the poor visibility due to the air in the colon in close proximity to the abscess, CT-guided drainage was performed for safety reasons. A 0.035-inch J-shaped guidewire (TSCF Wire; Cook Medical, Bloomington, IN, USA) was advanced through the needle into the abscess cavity. A 10.2-F catheter (Dawson-Muller catheter, Cook Medical) was placed into the cavity using the Seldinger technique (Fig. 3). No procedure-related complications occurred. Approximately 25 mL of greenish pus was aspirated via the catheter. A microbiological culture identified *Parvimonas micra* in the pus.

An antibiotic (meropenem, 1,500 mg/day) was intravenously administered for 10 days after the drainage procedure. Since multiple infected foci had been

observed in the omentum, in addition to the drainage lesions, a long-term antibiotic combination was also administered as described above. Both the clinical findings and laboratory test results improved (*e.g.*, the patient's CRP level decreased to 0.3 mg/dL), and the abscess shrank in size on CT images. The patient was discharged 15 days after the drainage had been performed, and the catheter was removed 23 days after the drainage. Four months later, no symptoms had recurred, and CT images showed that the abscess had remained shrunken (Fig. 4).

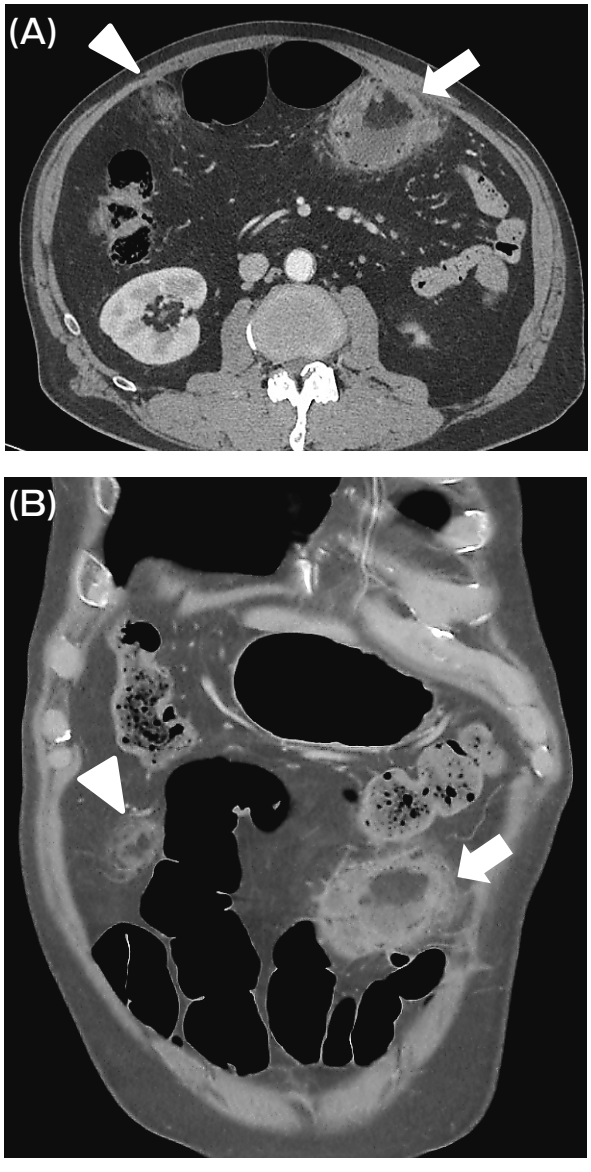

Fig. 2 Axial (A) and coronal (B) contrast-enhanced CT images before drainage showed a thick encapsulated fluid collection containing a fat component suggestive of an omental infarction with infection (*arrow*) and an ill-defined area of increased density on the right side in the same slice as the above lesion (*arrowhead*).

Discussion

The blood flow in the greater omentum is supplied by the right and left gastroepiploic arteries, and capillaries in the periphery form multiple-loop-like structures. The omentum is a tissue with a natural healing capacity for infection [13], and abscesses are rarely

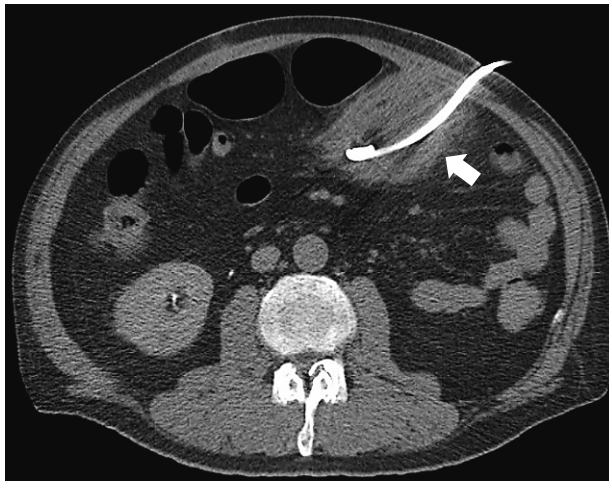

Fig. 3 Axial plain CT image immediately after the procedure shows the drainage catheter (*arrow*) successfully placed in the target omental abscess.

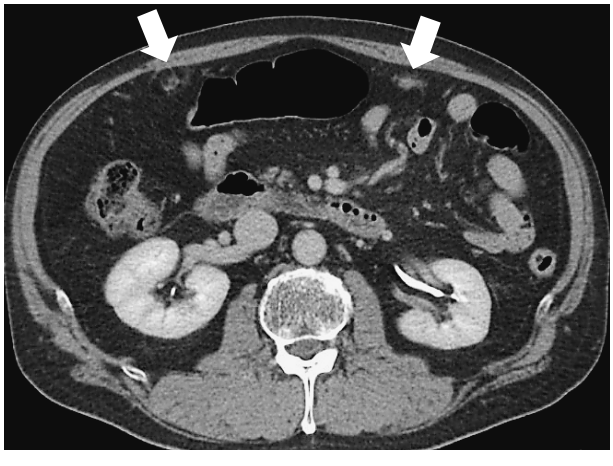

Fig. 4 Axial contrast-enhanced CT image taken 4 months after the drainage demonstrating that the abscess had shrunk in size (*arrows*).

idiopathic in origin [14]. Secondary causes of omental abscesses include foreign bodies (*e.g.*, sutures not retrieved intraoperatively [1] or gallstones dropped into the abdominal cavity during a cholecystectomy [2, 3]), disturbance of blood flow (*e.g.*, omental infarction with or without torsion [4]), intestinal perforation (*e.g.*, fish-bone [5], subclinical perforation [6]), and hematogenous infection in an immunocompromised host [7]). In our patient's case, the cause of the omental abscess was suspected to be an omental infarction with infection caused by the instability of blood supply and flow in the omentum, due to the preservation of the main left omental branches and the transection of the left gastroepiploic artery (GEA) and short gastric artery (SGA) during his LPG, since the abscess was multifocal and developed after the surgery, but not directly at the site of the surgery.

In recent years, the greater omentum has been partially divided during surgery for GC, leaving the distal omentum attached to the transverse colon, because an omentectomy is not always necessary during an LG, particularly for early GC. The possibility of omental metastasis and direct invasion are very low in patients with early GC. In addition, complete resection of the greater omentum is technically difficult in the restricted space. Some omental branches of the gastroepiploic arteries are cut while the omentum is partially divided. As an LG is currently commonly performed, the incidence of omental infarction with or without infection following a partial omentectomy has increased [8-12]. Resection of the left omental vessels has been cited as a risk for omental infarction [10, 11], and the residual volume and the abundance of the blood supply for the remnant omentum are important factors that affect the incidence of omental infarction [11].

In a retrospective analysis of 390 laparoscopic-assisted gastrectomy (LAG) cases of patients who underwent a partial omentectomy, omental infarction occurred at a rate of 1.4% in the subtotal gastrectomy (sTG) cases, but it occurred in 16.7% of the total gastrectomy (TG) cases [10]. The differences in vascular transection at the greater curvature of the stomach between the sTG and TG procedures are that the SGA is preserved in sTG and not preserved in TG. We thus speculate that the SGA transection influenced the present patient's omental infarction. Although he underwent an LPG, we suspect that the instability of the blood supply and flow at the omentum due to the transection of the SGA and the separation of the omental branches from the right GEA with the division of the left half of the omentum caused the omental infarction.

The authors of another study suggested a possibility of damage to the omental branch during vascularization at the time of a TG [10]. We concur with this viewpoint and emphasize the importance of preserving the vital vessels, such as the omental branch, during splenic hilar vascularization in order to avoid injury.

Percutaneous drainage is the gold standard for the treatment of common postoperative abscesses, with a success rate of 80-100% [15]. Intra-abdominal abscess and anastomotic leakage are the most common complications after gastrectomy [16]. According to previous reports, conservative treatment is recommended for image-diagnosable omental infarctions with no complications such as infection, whereas omental resection is performed in almost all cases of omental abscesses after gastrectomy [8, 9]. Surgical treatment has the advantage of providing a definitive pathological diagnosis. Although resection of the greater omentum was also considered in our patient's case, we selected percutaneous drainage and antibiotic therapy as less-invasive therapies after a multidisciplinary discussion, which resulted in the successful control of the patient's infection.

The use of LPGs is expected to increase in the future, even in advanced GC, as guidelines change [17]. Compared to percutaneous drainage, open intervention for postsurgical intra-abdominal infections is associated with increased mortality [18], and percutaneous drainage may thus be a feasible option for an omental abscess.

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