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SURGERY FOR OBESITY AND RELATED DISEASES

Case report

Splenic infarct as complication of sleeve gastrectomy

Andrew P. Dhanasopon, B.S.[a], Catherine E. Lewis, M.D.[b], Jessica M. Folek, M.D.[c], Erik P. Dutson, M.D.[c], Amir Mehran, M.D.[c,*]

[a]*University of California, Los Angeles, David Geffen School of Medicine, Los Angeles, California*

[b]*Department of Surgery, University of California, Los Angeles, David Geffen School of Medicine, Los Angeles, California*

[c]*Metabolic and Bariatric Surgery Program, Department of Surgery, University of California, Los Angeles, David Geffen School of Medicine, Los Angeles, California*

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Sleeve gastrectomy is a restrictive procedure for the treatment of super morbid obesity that is rapidly gaining interest [1]. The operation was first described in 1988 as the initial restrictive component of the duodenal switch procedure [2]. More recently, surgeons began performing laparoscopic sleeve gastrectomy (LSG) as the first step in a 2-stage procedure for high-risk or super-obese patients, with the second step performed 6–12 months later and consisting of either duodenal switch or gastric bypass [3,4]. With reports of an average excess weight loss of 48–83% at 1 year and significant improvement in co-morbidities, many have now begun to consider sleeve gastrectomy as a single-stage restrictive procedure [3,5].

The postoperative complications of LSG include staple line leakage, bleeding, sleeve stricture, delayed gastric emptying, gastric dilation, intra-abdominal abscess, trocar site hernia, trocar site infection, and splenic injury [6–8]. We report the first documented case of splenic infarct occurring as a complication of LSG.

Case report

A 59-year-old woman with super morbid obesity (152 kg, body mass index 54 kg/m^2), hypertension, hyperlipidemia, degenerative joint disease, gastroesophageal reflux disease, and hypothyroidism presented to our institution desiring weight loss surgery after exhausting the nonsurgical weight loss methods. Her past surgical history was remarkable only for open cholecystectomy. On completion of our program's requirements, the patient was scheduled for laparoscopic Roux-en-Y gastric bypass with possible conversion to LSG.

After placement of a 32F BioEnterics Intragastric Balloon (Allergan Medical, Irvine, CA), the abdomen was entered in the left upper quadrant using an optical 11-mm trocar (Applied Medical, Rancho Santa Margarita, CA). Large, dense adhesions were seen between the omentum and the anterior abdominal wall that did not appear to contain transverse colon or small bowel. These adhesions were divided using the Harmonic scalpel (Ethicon Endosurgery, Cincinnati, OH). Adhesions obscuring the right lobe of the liver and between the liver and the distal stomach remained but were too difficult to safely divide. The left gastrophrenic ligament was divided and the gastroesophageal junction delineated using the Harmonic scalpel. In anticipation of a difficult bypass procedure, the omentum was split using the Harmonic scalpel, and the transverse colon was lifted up and over. The ligament of Treitz was identified, and the small bowel was examined for approximately 70–80 cm. Several attempts were made to bring the loop of bowel up to the site of the anticipated gastric pouch at several different lengths; however, these were unsuccessful owing to the short small bowel mesentery and the bulkiness of the transverse colon and pericolonic fat. Because a tension-free antecolic gastrojejunal anastomosis could not be created, the decision was made to proceed with LSG.

The gastrocolic ligament was opened approximately 7–8 cm from the pylorus adjacent to the greater curve of the

*Reprint requests: Amir Mehran, M.D., F.A.C.S., Department of Surgery, University of California, Los Angeles, David Geffen School of Medicine, 10833 Le Conte Avenue, 72-236 CHS, Los Angeles, CA 90095-6904.

E-mail: amehran@mednet.ucla.edu

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stomach using the Harmonic scalpel. A green linear 60-mm stapler (Autosuture, Mansfield, MA) was used to initiate the gastric resection, followed by serial firings of green linear 60-mm staplers (Autosuture), using the 32F Intragastric Balloon as a guide. Suture-line reinforcement was performed using Seamguard Bioabsorbable Staple Line Reinforcement (Gore-Tex, Flagstaff, AZ). Next, the gastric remnant was freed from its attachments using a 10-mm LigaSure Atlas device (Valleylab, Boulder, CO). Approximately 80% toward the superior pole of the gastric remnant, the attachments were transected using a blue linear 60-mm stapler to better mobilize the superior pole. This area was quite adherent to the spleen, and considerable time was spent dissecting additional attachments using both the LigaSure and Harmonic scalpel. Once completely free, the gastric remnant was placed in a 15-mm EndoCatch bag (Covidien, Mansfield, MA) and removed. Finally, a leak test was performed by infusing methylene blue through the intragastric tube.

A routine upper gastrointestinal Gastrografin swallow study on the first postoperative day showed no evidence of leak or obstruction. The patient was, therefore, started on a bariatric clear diet, which she tolerated well. On the second postoperative day, the patient developed diffuse abdominal pain, with left upper quadrant rebound tenderness, a low-grade fever with a temperature of 99°F, and a slightly elevated white blood cell count of approximately 11,000 cells/mm^3. To rule out a possible leak that had not been detected during the upper gastrointestinal study, a computed tomography (CT) scan of the abdomen and pelvis was performed, with and without intravenous contrast. The scan showed a posterior splenic infarct that was not associated with any abnormality of the splenic artery or vein (Fig. 1).

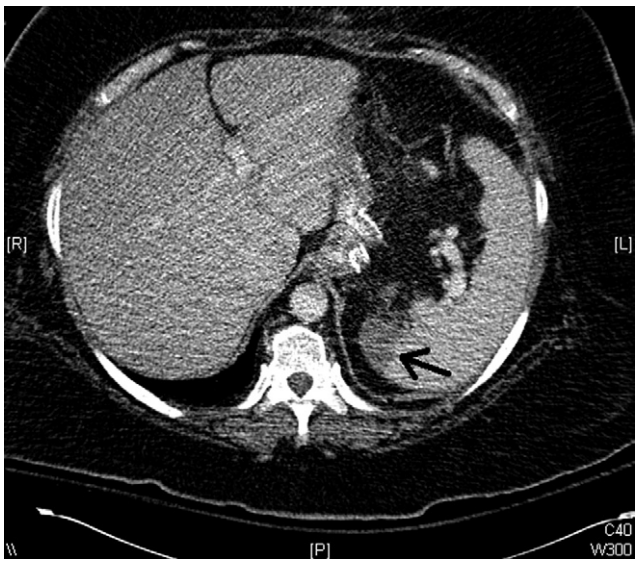

Fig. 1. CT scan of abdomen, with intravenous contrast, showing wedge-shaped infarct and posterior spleen (arrow).

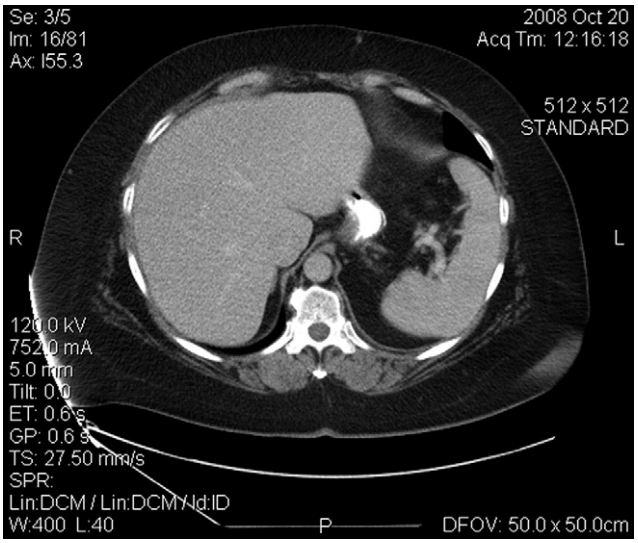

Fig. 2. CT scan showing resolution of previous splenic infarct.

The patient's postoperative abdominal pain was attributed to the splenic infarct, and she was, therefore, given conservative treatment, including analgesics and serial abdominal examinations. The patient's pain resolved, and she was discharged home on the fourth postoperative day. A follow-up CT scan 2 months later showed complete resolution of the splenic infarct (Fig. 2), and she has had no subsequent recurrence of abdominal pain. At her most recent follow-up visit, she had a total 5-month weight loss of 28 kg (body mass index 44 kg/m^2) and excess weight loss of 31%.

Discussion

LSG may be a safe alternative for patients who cannot undergo gastric bypass for a variety of technical reasons [7,9]. In the present case, the patient had several findings that made Roux-en-Y gastric bypass technically difficult, including a restrictive mid-abdominal band that did not allow optimal insufflation of the abdomen despite using 2 high-flow insufflators, a very short mesentery of her small intestine, large, dense adhesions between the omentum and the anterior abdominal wall, and a bulky transverse colon and pericolonic fat. Other alternatives to Roux-en-Y gastric bypass included retrocolic bypass and large pouch gastric bypass; however, we believed LSG was the best choice, given the high incidence of internal hernias with the retrocolic bypass (≤6%) [10] and the high degree of marginal ulcers with the large pouch gastric bypass (≤16%) [11].

Intraoperative splenic injury has been reported as a complication of sleeve gastrectomy [6]. However, to our knowledge, this is the first documented case of a splenic infarct occurring during LSG. Splenic infarct is a known complication of laparoscopic Nissen fundoplication and occurs as a consequence of the division of the short gastric vessels (SGVs) [12]. The SGVs are also divided in a similar manner

during LSG [9,13], and we believe that the same mechanism that causes splenic infarct after laparoscopic Nissen fundoplication also caused splenic infarct in the present case. As described by Martínez et al. [14], the splenic vasculature has many variants. For example, the splenic artery can divide before reaching the hilus and result in branches that are in close proximity to the SGVs. In most cases, dividing a small branch has no major consequence because of the intrasplenic vascular anastomoses; however, if the branch is the main arterial supply to a splenic segment, its division can lead to infarction. Therefore, extensive division of the SGVs increases the likelihood of severing these splenic branches. Technical considerations for minimizing the risk of splenic infarct could include dividing the SGVs as close to the stomach as possible to decrease the likelihood of dividing a splenic branch [14] and careful dissection of the gastrophrenic ligaments at the angle of His and the left crus, over the gastroesophageal junction, and at the posterior aspect of the gastric fundus [9]. Additionally, we recommend using the small LigaSure device (5 mm instead of 10 mm) to further minimize the likelihood of injuring other vessels while dividing the SGVs.

The initial management of postoperative splenic infarction is conservative treatment (i.e., pain control and observation) [12]. The symptoms can persist for 2 days to 2 weeks until complete resolution [12]. For severe and persistent pain lasting several weeks, splenectomy may be beneficial. In a series by Nores et al. [15], 34% of patients with splenic infarction required splenectomy for persistent pain. Larger volumes of infarction lead to greater rates of splenic infarct complications such as abscess, cyst, rupture, or hemorrhage. The management of these complications remains controversial, ranging from observation to splenectomy [12]. In this case, the patient had rapid resolution of her abdominal pain and had an uncomplicated splenic infarct seen on her CT scan that allowed for conservative management. At 2 months postoperatively, the patient had no recurrence of abdominal pain, and her CT scan showed resolution of the splenic infarct without any complications.

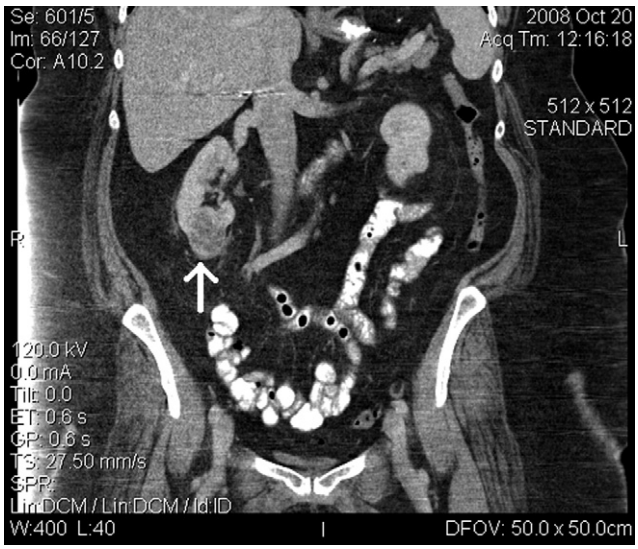

Fig. 3. CT scan showing hypodense mass in lower pole of right kidney (arrow).

CT is a valuable tool in the assessment of abdominal pain after sleeve gastrectomy and allows for the identification of a number of known complications, including anastomotic leak, hemorrhage, intra-abdominal abscess, and splenic injury. In the presented case, the CT scan also demonstrated the presence of a hypodense mass in the lower pole of the right kidney (Fig. 3). The follow-up of the mass during the month after discharge revealed it to be a renal cell carcinoma, which was subsequently removed by laparoscopic hand-assisted right nephrectomy.

Conclusion

Sleeve gastrectomy is gaining popularity as a primary or staged operation for weight reduction surgery in super obese patients. With this increase in frequency, splenic infarct should be considered as one of the possible causes of postoperative abdominal pain in patients undergoing sleeve gastrectomy. A CT scan of the abdomen will be helpful in this evaluation.

Disclosures

The authors claim no commercial associations that might be a conflict of interest in relation to this article.

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