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CASE REPORT

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Iatrogenic hepatic granuloma (suspected liver metastatic lesion on imaging) caused by liver retraction during laparoscopic gastrectomy: A case report

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Abstract

There are no previous reports of hepatic granuloma secondary to intraoperative liver retraction. Using softer hepatic retraction instruments and keeping hepatic retraction time to a minimum are vital in preventing postoperative liver damage.

KEYWORDS

hepatic granuloma, iatrogenic, laparoscopic gastrectomy, liver retraction

1 | INTRODUCTION

Hepatic granulomas are detected in 2%-10% of patients who undergo liver biopsy procedures.[1] Many cases of hepatic granuloma due to iatrogenic causes or systemic disease have been identified. Sometimes, image findings of hepatic granulomas are similar to those of hepatic neoplasm. For example, in patients with concurrent hepatic granulomas and gastrointestinal cancers, it is difficult for clinicians to distinguish between hepatic granulomas and malignant liver tumors by imaging alone.

There are few case reports of postoperative hepatic granuloma caused by surgical instruments. This report presents a case of liver granuloma caused by intraoperative liver retraction using the Nathanson liver retractor, with suspicion of liver metastasis.

2 | CASE HISTORY

A 49-year-old man was admitted to the Department of Gastroenterology of a referral hospital for epigastric discomfort. Endoscopic findings showed five depressed regions (type 0-IIc) in the stomach (Figure 1). The tumor locations were in the anterior wall of the angular region, in the posterior wall of the angular region, in the anterior wall of the antrum, in the posterior wall of the high body, and in the posterior wall of the midbody. Histopathology biopsy results diagnosed four of the depressed regions as Group 5, while one of the depressed regions was diagnosed as Group 4. The patient had multiple gastric cancers. He was admitted to our hospital for treatment. He had no known comorbidities. His past surgical history included an appendectomy. He had no anemia, and serum carcinoembryonic antigen (CEA)

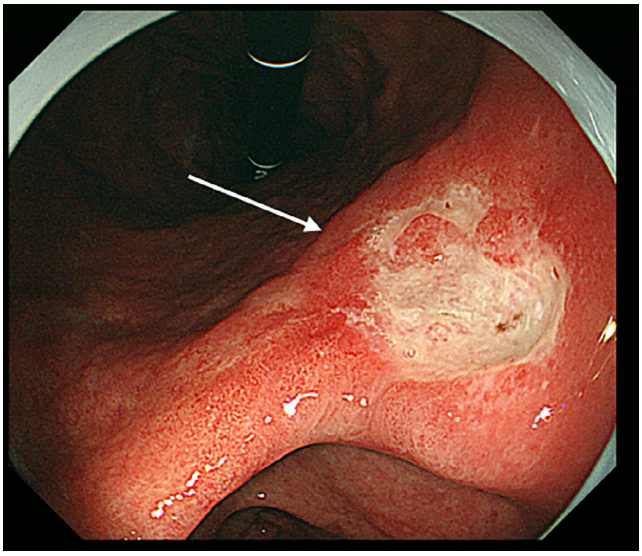

FIGURE 1 Upper gastrointestinal endoscopy findings. Five shallow depression regions (type 0-IIc) (white arrow) were identified in the stomach

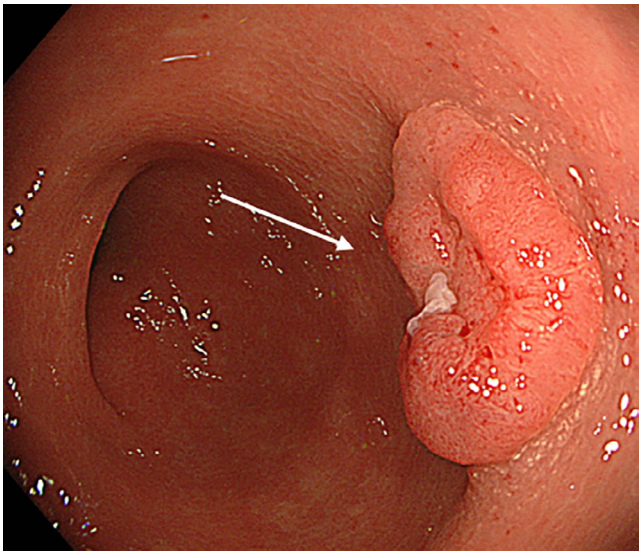

FIGURE 2 Under gastrointestinal endoscopy findings. Superficial elevated lesion with central depression (type 0-IIa + IIc) (white arrow) was located in the rectum Rb

and carbohydrate antigen 19-9 (CA19-9) levels were not elevated. Endoscopic ultrasonography (EUS) revealed that one of the five gastric cancers had invaded the submucosal (SM) deep layer. Abdominal contrast-enhanced computed tomography (CT) showed that there were no swollen lymph nodes or distant metastases. He was scheduled for laparoscopic total gastrectomy (LTG) for multiple gastric cancers. However, a superficial elevated lesion with central depression (type 0-IIa + IIc) in the rectum Rb, 6 cm from the anal verge (Figure 2), was detected in preoperative colonoscopy (CS). EUS revealed that the tumor had not invaded the SM layer. Positron emission tomography (PET) demonstrated localized accumulation of fludeoxyglucose (FDG) (3.0 F) in the rectal tumor. Meanwhile, there were no FDG accumulations in the stomach. The patient then underwent endoscopic submucosal dissection (ESD) for rectal tumor prior to gastrectomy. Histopathologic examination of ESD indicated the presence of moderately differentiated adenocarcinoma. The depth of tumor invasion was SM 1800 μm, and vessel invasions were mild. Additional surgical treatment—super-low anterior resection (SLAR)—was needed for curative resection. He first underwent LTG with D2 lymph node dissection as simultaneous stomach and colon surgery would have been highly invasive. Histopathology identified five gastric cancers. One of them had invaded the muscular layer, while the others were intraepithelial carcinomas. No metastasis was observed in regional lymph nodes. Thus, the patient was diagnosed with advanced gastric cancer (pT2N0M0 pStageIB).[2] Total inoperative liver retraction time was 157 minutes.

Although postoperative laboratory results showed that liver enzyme levels were elevated (aspartate aminotransferase, AST [199 U/L]; alanine aminotransferase, ALT [261 U/L]), other postoperative clinical parameters were normal and the patient was discharged on postoperative day 11. Two weeks after discharge, he visited an outpatient clinic for a postoperative follow-up. An abdominal contrast-enhanced CT, performed due to his elevated serum CEA levels (5.4 ng/mL), revealed a low-density area with poor contrast uptake in segment III of the liver (Figure 3). The low-density area indicated poor contrast uptake in contrast-enhanced magnetic resonance imaging (MRI) and contrast-enhanced abdominal ultrasonography (US) (Figure 4A, B). Diffusion-weighted imaging showed decreasing diffusion ability. PET revealed an accumulation of FDG (3.0 F) in the low-density area of the liver (Figure 5). Therefore, recurrent gastric or colon cancer was suspected.

FIGURE 3 Postoperative abdominal contrast-enhanced CT findings. A lesion with a low-density area (white arrow) was observed in the left lobe of the liver

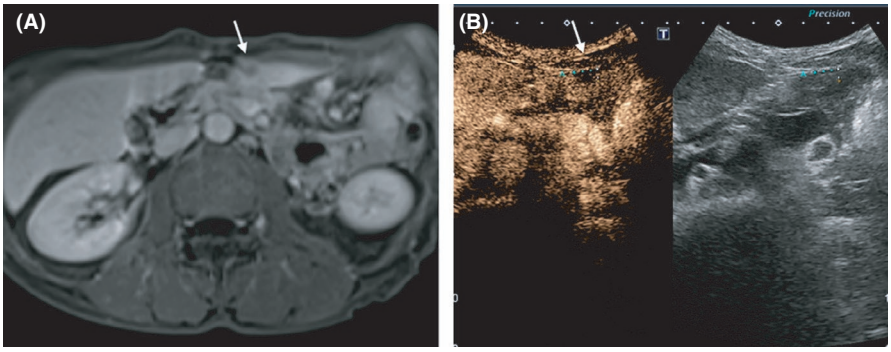

FIGURE 4 Postoperative abdominal contrast-enhanced MRI and US findings. A, A lesion with a low-signal area (white arrow) in the early and delay phase was observed in the left lobe of the liver in the MRI. B, A lesion with a low-echoic area (white arrow) in the delay phase was found in the left lobe of the liver in the US

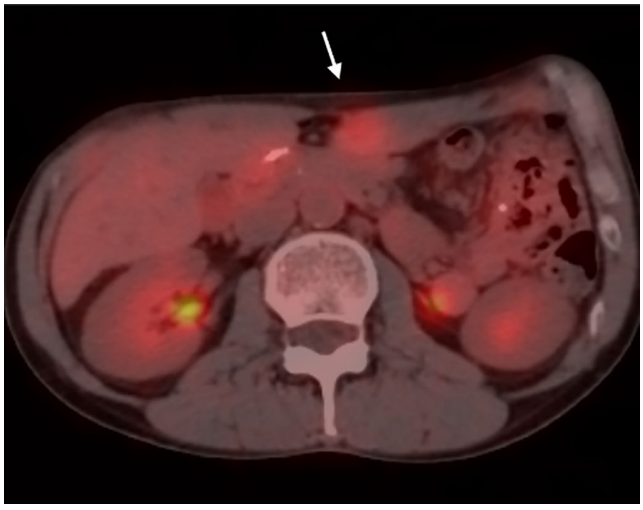

FIGURE 5 Postoperative PET findings. An accumulation of FDG (3.0 F) (white arrow) in the low-density area of the liver

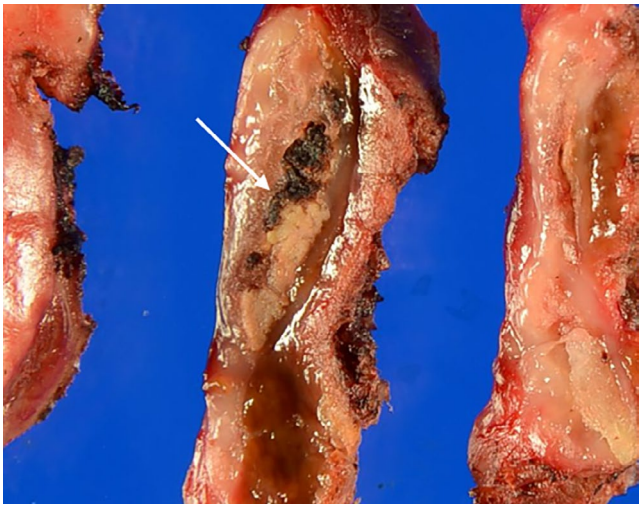

FIGURE 6 Macroscopic findings of the liver specimen. The hepatic lesion was identified as a white nodule (white arrow)

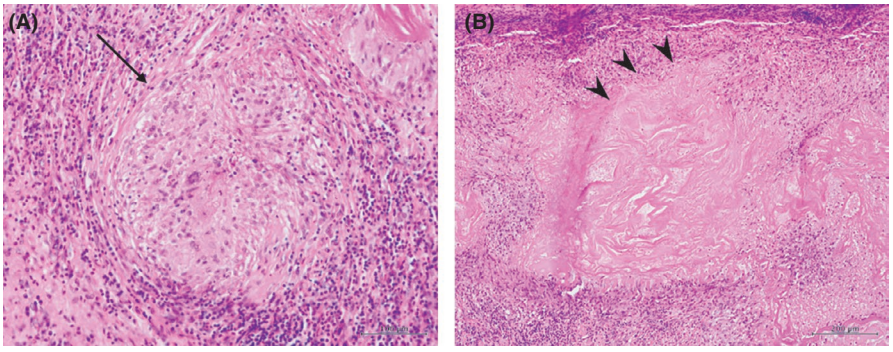

FIGURE 7 A and B, Histopathological findings. There were no malignancy components in the liver biopsy specimen. The hepatic lesion indicated epithelioid granuloma (black arrow) with coagulation necrosis (black arrowhead) in the center. (A, Hematoxylin-eosin stain, original magnification ×200; B, Hematoxylin-eosin stain, original magnification ×100)

Two months after gastrectomy, the patient underwent laparoscopic SLAR with D2 lymph node dissection and laparoscopic S3 partial hepatectomy. Histopathologically, there were no residual tumors in the rectum and no metastasis in the regional lymph nodes (pT1bN0M0 pStageI). Macroscopically, a liver specimen contained white nodule (Figure 6). The liver specimen showed no malignancy components but revealed an epithelioid granuloma with coagulation necrosis in the center (Figure 7A, B). The patient was diagnosed simultaneously with gastric cancer and colon cancer without metastasis. We hypothesize that granuloma formation was the result of intraoperative liver retraction using the Nathanson during laparoscopic gastrectomy (Figure 8). On his subsequent postoperative follow-up, postoperative serum CEA levels were decreased (4.1 ng/mL) and there has been no recurrence.

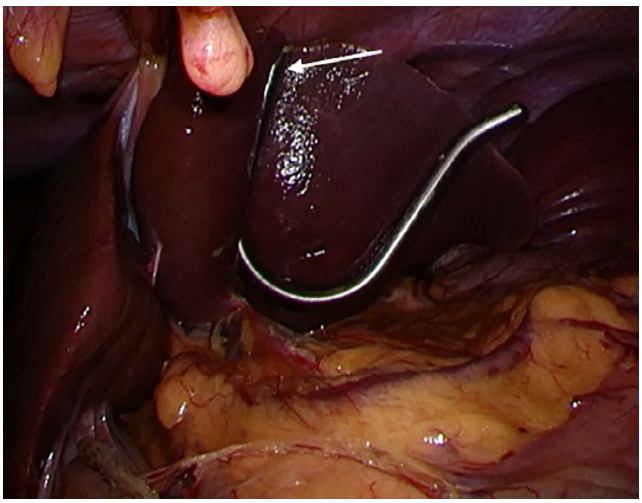

FIGURE 8 Intraoperative liver findings. Observed parenchymal discoloration in the lateral segment of the liver after retraction by the Nathanson liver retractor (white arrow)

3 | DISCUSSION

It has been reported that hepatic granulomas occur in 3.63% of liver biopsies.[3] Various causes of hepatic granulomas have already been identified and include sarcoidosis, drug-induced, bacterial infections, viral infections, fungal infections, neoplastic disease, and primary biliary cholangitis (PBC).[4] The causal drugs include 5-ASA compounds, nonsteroidal anti-inflammatory drugs, interferon α, and glibenclamide.[5] The reported prevalence of the aforementioned etiologies of hepatic granulomas varies across different studies. One study reported that infection with hepatitis C virus (HCV) was the most prevalent causal agent.[6] On the other hand, another study reported that PBC and sarcoidosis were the most frequent etiologies for hepatic granulomas.[7]

Hepatic granulomas have nonspecific symptoms and image findings. It is also difficult to accurately diagnose the cause of hepatic granulomas due to the great diversity of etiologies. In a previous report, about 10%-15% of cases had unidentified etiologies despite exhaustive examination and follow-up.[6] These were diagnosed as idiopathic hepatic granulomas. Furthermore, it is difficult to identify the etiology by histology alone. Hence, obtaining detailed past medical history and associated comorbidities is important. In our case, preoperative diagnosis was extremely difficult due to clinical course and image findings. The patient has no HCV infection and was not on any perioperative medication of causal drugs. In addition, he tested negative for PBC on histopathological examination. Postoperative imaging findings were indicative of possible malignancy.

Postoperative iatrogenic hepatic granulomas are extremely rare, and few cases have been reported—for example, those caused by surgical staples/clipping materials, silk suture, and gauze.[8-10] Preoperative diagnosis of hepatic granuloma is difficult. There are no reports of preoperatively diagnosed cases.

Granuloma formation is associated with contact between persistent antigens or irritants and host tissue or with resolution of a hepatic parasitic infection. The hypothesized cause of granuloma formation in our case was hepatic ischemia caused by liver retraction using the Nathanson liver retractor during laparoscopic gastrectomy; this suggested elevated postoperative liver enzymes.

Various risk factors have been reported for liver enzyme elevation after laparoscopic surgery. Recently, mechanical liver retraction by Nathanson liver retractor was reported as a cause of postoperative liver enzyme elevation.[11-13] Shinohara et al reported that postoperative liver enzyme levels were significantly higher when using the Nathanson liver retractor than when using the Penrose drain for liver retraction during laparoscopic gastrectomy.[11] In addition, Goel et al showed that using the Nathanson liver retractor causes greater degree of liver dysfunction than when using the liver suspension tape or V-shaped liver suspension technique with the silicone Penrose drain.[12] Another study reported that the silicon disk method provides a better surgical field during laparoscopic gastrectomy without damaging the liver.[14] In addition, Kitajima et al reported that either reducing the duration of use of the liver retractor, moving its position, or releasing it intermittently can prevent postoperative liver dysfunction.[13] It is important to perform liver retraction cautiously using softer materials or to move the liver retractor position before discoloration of the liver parenchyma occurs.

We did not find any previous reports on hepatic granuloma caused by intraoperative liver retraction using the Nathanson liver retractor, and to the best of our knowledge, this is the first reported case.

4 | CONCLUSIONS

Liver retraction is essential for laparoscopic gastrectomy. Using softer hepatic retraction instruments and keeping hepatic retraction time to a minimum are vital to prevent postoperative liver dysfunction. If a retractor is needed because of the patient's situs surgeons should be aware of that also in the postoperative follow-up. A lesion arising in a typical place in Segment 2/3 should be evaluated keeping in mind the use of the retraction device in the past with a suspicion of a granulomatous lesion as result of retraction.

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CONFLICT OF INTEREST

We declare no conflicts of interest for this article.

AUTHORS' CONTRIBUTIONS

YY, YS, and KT: performed the operation. YY, YS, and KT: managed the perioperative course. TB, YY, YS, and KT: wrote the manuscript. All the authors read and approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Not applicable.

CONSENT FOR PUBLICATION

The patient consented to the reporting of this case in a scientific publication.

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REFERENCES

1. Lamps LW. Hepatic granulomas: a review with emphasis on infectious causes. *Arch Pathol Lab Med*. 2015;139:867-875.
2. Japanese classification of gastric carcinoma: 3rd English edition. *Gastric Cancer*. 2011;14:101-112.
3. The Cancer of the Liver Italian Program (CLIP) investigators. A new prognostic system for hepatocellular carcinoma: a retrospective study of 435 patients. *Hepatology*. 1998;28:751-755.
4. Lagana SM, Moreira RK, Lefkowitch JH. Hepatic granulomas: pathogenesis and differential diagnosis. *Clin Liver Dis*. 2010;14:605-617.
5. Rajan A, Kar P. Hepatic granulomatosis. *J Assoc Physicians India*. 2003;51:289-296.
6. Gaya D, Thorburn D, Oien K, Morris AJ, Stanley AJ. Hepatic granulomas: a 10 year single centre experience. *J Clin Pathol*. 2003;56:850-853.
7. Drebber U, Kasper HU, Ratering J, et al. Hepatic granulomas: histological and molecular pathological approach to differential diagnosis–a study of 442 cases. *Liver Int*. 2008;28:828-834.
8. Ezaki T, Okamura T, Yoshida Y, et al. Foreign-body granuloma mimicking an extrahepatically growing liver tumor: report of a case. *Surg Today*. 1994;24:829-832.
9. Nihon-Yanagi Y, Ishiwatari T, Otsuka Y, et al. A case of postoperative hepatic granuloma presumptively caused by surgical staples/clipping materials. *Diagn Pathol*. 2015;10:90.
10. Matsuura S, Sasaki K, Kawasaki H, Abe H, Nagai H, Yoshimi F. Silk suture granuloma with false-positive findings on PET/CT accompanied by peritoneal metastasis after colon cancer surgery. *Int J Surg Case Rep*. 2016;28:22-25.
11. Shinohara T, Kanaya S, Yoshimura F, et al. A protective technique for retraction of the liver during laparoscopic gastrectomy for gastric adenocarcinoma: using a Penrose drain. *J Gastrointest Surg*. 2011;15:1043-1048.
12. Goel R, Shabbir A, Tai CM, et al. Randomized controlled trial comparing three methods of liver retraction in laparoscopic Roux-en-Y gastric bypass. *Surg Endosc*. 2013;27:679-684.
13. Kitajima T, Shinohara H, Haruta S, Momose K, Ueno M, Udagawa H. Prevention of transient liver damage after laparoscopic gastrectomy via modification of the liver retraction technique using the Nathanson liver retractor. *Asian J Endosc Surg*. 2015;8:413-418.
14. Shibao K, Higure A, Yamaguchi K. Disk suspension method: a novel and safe technique for the retraction of the liver during laparoscopic surgery (with video). *Surg Endosc*. 2011;25:2733-2737.

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