Clinical Case Report

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Giant GIST of the stomach: a successful case of safe resection with preoperative simulation using three-dimensional CT angiography

Case report

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Abstract

Rationale: We report a very rare case of safely resectable giant gastrointestinal stromal tumor (GIST) with preoperative three-dimensional computed tomography (3D-CT) angiography in spite of no neoadjuvant treatment.

Patient's concern: A 71-year-old woman presented to our hospital with an abdominal giant tumor. As this giant tumor could not be accurately diagnosed by preoperative investigation, we had to perform her surgical treatment without neoadjuvant treatment. However, preoperative 3D-CT angiography clearly showed that the tumor was supplied by the right gastroepiploic artery (RGA). Based on the preoperative information, a surgical procedure was undertaken.

Diagnosis: Giant tumor of stomach with suspicion of GIST.

Interventions: Laparotomy guided by 3D-CT imaging including angiography.

Outcome: The giant tumor originated from the greater curvature of the distal stomach and was supplied by the RGA, as expected. The tumor was resected easily under the accurate preoperative anatomical information. The tumor measured 20 cm × 20 cm in size and weighed 2500 g (Fig. 2C and D). Histopathological examination showed evidence of growth of spindle-shaped cells and a low mitotic index (3 per 50 high-power field, Fig. 3B). Immunohistochemical examination showed positive immunoreactions for KIT, CD34, and DOG1 (Fig. 3C–E), but negative ones for SMA and S-100 protein (Fig. 3F and G). Consequently, we made a final diagnosis of an extra luminal GIST of the stomach. The post-operative course was uneventful, and so the patient was discharged on postoperative day 13.

Lessons: Making full use of an imaging procedure such as 3D-CT angiography is one of the effective tools for the surgical management of giant-size tumors including giant GISTs.

Abbreviations: 3D-CT = three-dimensional computed tomography, CA19-9 = carbohydrate antigen19-9, CEA = carcinoembryonic antigen, DOG1 = discovered on gist 1, EUS-FNA = endoscopic ultrasound-fine needle aspiration, GG = giant GIST, GI tract = gastrointestinal tract, GISTs = gastrointestinal stromal tumors, PDGFRA = platelet-derived growth factor receptor alpha, POD = postoperative day, RGA = right gastroepiploic artery, SMA = smooth muscle actin.

Keywords: 3D-CT, a giant GIST, angiography

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1. Introduction

Gastrointestinal stromal tumors (GISTs) are the most common mesenchymal neoplasms of the gastrointestinal (GI) tract.[1] GISTs account for 0.1% to 3% of all GI malignant tumors, and 60% to 70% of them originate from the stomach.[2,3] GISTs are known to develop from intestinal cells of Cajal due to mutation of KIT and platelet-derived growth factor receptor alpha (PDGFRA).[4,5] Diagnosis of gastric GISTs is often delayed, because these tumors cause no characteristic symptoms. Therefore, giant GISTs (GG) of the stomach, which are often more than 10 cm in diameter, are accidentally detected by delayed symptoms, such as abdominal pain, anemia due to digestive bleeding, or a palpable lump.[1] The optimum treatment for GISTs is surgical resection, and it is reported that neoadjuvant imatinib mesylate therapy for locally advanced GISTs contributes to long-term positive results.[6,7] However, sometimes precise preoperative diagnosis is difficult in the case of giant tumors including GG. Herein, we present a rare case of gastric GG safely resected with identification of the accurate anatomical findings predicted by three-dimensional computed

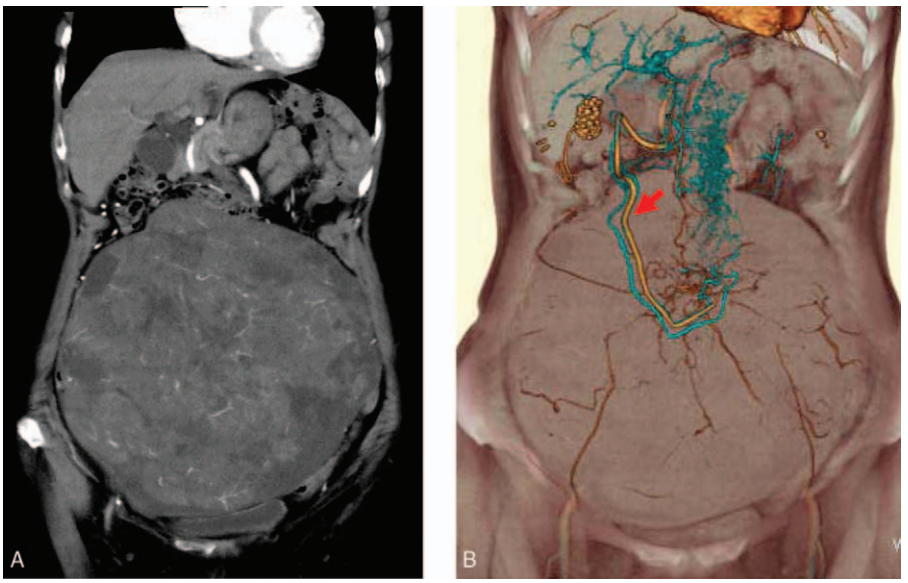

Figure 1. Highlights of preoperative images. (A) Coronal contrast-enhanced CT images. CT image showed occupation of the abdominal cavity by a giant tumor enhanced heterogeneously. (B) Coronal 3D-CT angiography. Our images showed that giant tumor was situated at the greater curvature of the stomach and nourished by the RGA (red arrow). 3D-CT = three-dimensional computed tomography, RGA = right gastroepiploic artery.

tomography (3D-CT) angiography in a patient without neo-adjuvant imatinib mesylate treatment.

2. Case report

A-71-year-old female, who had a tumor detected by her local doctor, was referred to our hospital with the symptoms of general fatigue and vomiting for over a month. On physical examination, a hard lump was palpable in the upper abdomen. Laboratory investigation showed no anemia. Also, tumor markers were only slightly increased (CEA, 5.5 ng/mL; CA-19–9, 37.2 U/mL). Abdominal ultrasonography revealed a vascular-rich tumor in the abdominal space. Upper GI endoscopy did not detect the tumor or any mucosal abnormality, and endoscopic ultrasound-

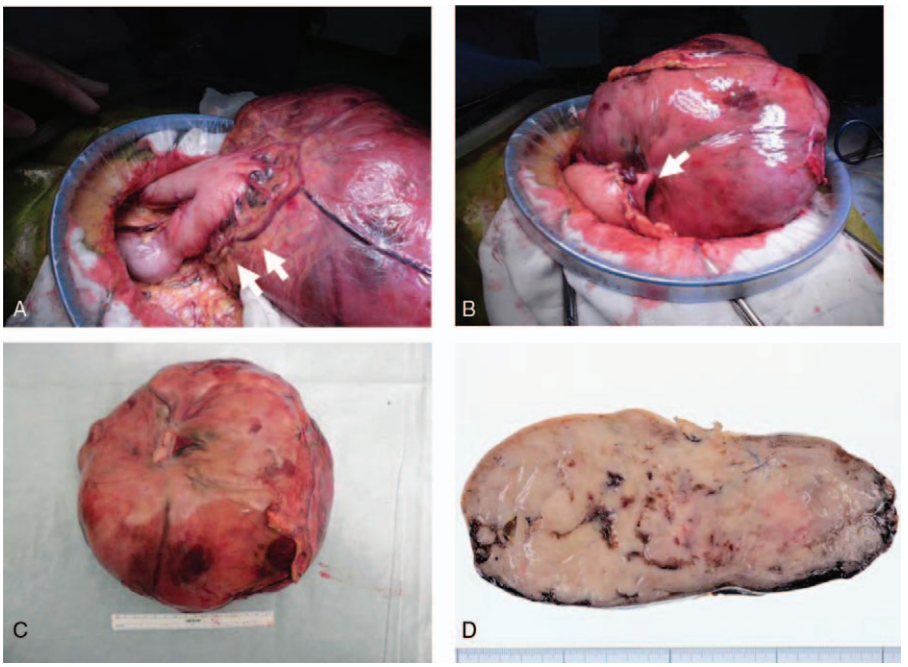

Figure 2. Highlights of intraoperative and postoperative images. (A) The giant tumor was supplied by the RGA (white arrow) as shown by 3D-CT. (B) The tumor originated from the gastric submucosa. The white arrow indicates the region of origin of the giant tumor. (C) The tumor measured 20 × 20 cm in size and weighed 2500 g. (D) The cut surface of the resected specimen disclosed a whitish-yellow hemorrhagic solid mass. 3D-CT = three-dimensional computed tomography, RGA = right gastroepiploic artery.

fine needle aspiration (EUS-FNA) failed due to the discontinuous long distance between the stomach wall and tumor. Hence, precise diagnosis and neoadjuvant treatments were difficult. However, our 3D-CT clearly revealed that this giant tumor was being supplied by the right gastroepiploic artery (RGA; Fig. 1A and B). Hence, we planned to perform the operation guided by the preoperative findings obtained by the 3D-CT imaging.

During the surgery, a giant tumor covered with the greater omentum was found in the abdominal cavity. The tumor had mobility without any adhesion to or invasion of adjacent organs. Also, no peritoneal dissemination or metastasis to the liver was observed. Predictably, the RGA was found as the dominant artery supplying the tumor (Fig. 2A and B). The tumor was resected relatively easily based on the accurate preoperative anatomical information. The tumor measured 20 × 20 cm in size and weighed 2500 g (Fig. 2C and D). Macroscopically, the surface was smooth. Histopathological examination showed evidence of the growth of spindle-shaped cells (Fig. 3A) and a low mitotic index (3 per 50 high-power fields, Fig. 3B). The Miettinen classification indicated intermediate risk. Immunohistochemical examination showed KIT, CD34, and DOG1 (discovered on gist 1) markers to be positive (Fig. 3C–E). However, immunoreactions for SMA (smooth muscle actin) and S-100 protein were negative (Fig. 3F and G). Therefore, we finally made a diagnosis of extra luminal GG. The patient was discharged on postoperative day 13 without any complications. Also, at 7 months after the operation no recurrence of the tumor was observed.

3. Discussion

One of the clinical problems of gastric GISTs is that a precise preoperative diagnosis is difficult because of its asymptomatic nature. Consequently, these gastric GISTs have a tendency to reach considerable size. In the present case, the tumor size was 20 × 20 cm. The management of gastric GG is slightly complex. Recently, a clinical trial using neoadjuvant imatinib mesylate therapy for advanced GISTs was conducted.[7] However, as shown in our case, precise diagnosis for adaptation of neoadjuvant imatinib mesylate therapy is sometimes very difficult. Moreover, some complications of imatinib mesylate, such as GI or intra-abdominal bleeding, should be considered carefully.[8] In these cases, immediate surgical treatment is required without preoperative chemotherapy that aims to shrink the tumor.

One of the problems of GG is that identification of the primary site of the tumor is difficult. It has been reported that 60% to 70% of GISTs arise at the fundus or greater curvature of the gastric body.[2] In the present case, 3D-CT angiography clearly showed that the tumor was located at the greater curvature of the stomach

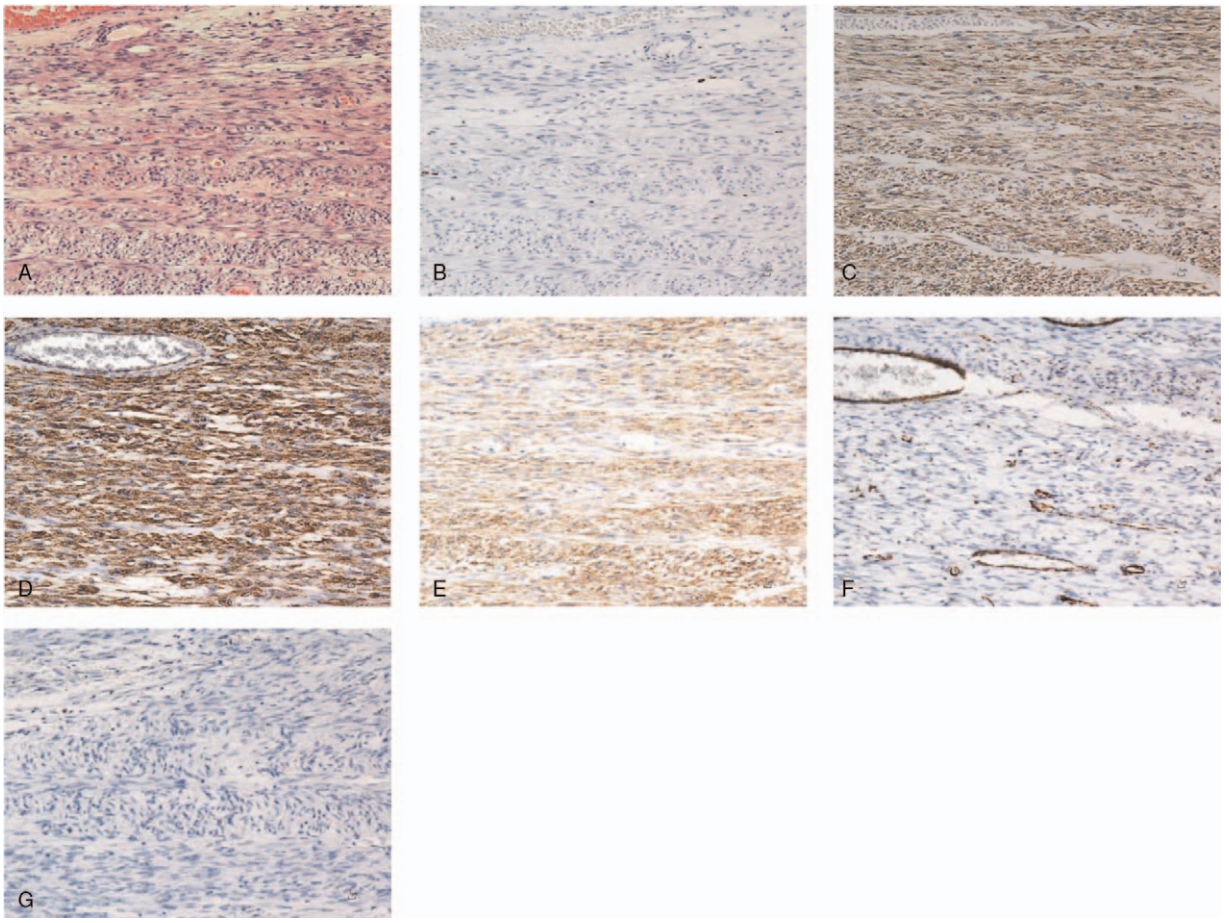

Figure 3. Highlights of light microscopic images. (A) Hematoxylin-eosin staining showed evidence of growth of spindle-shaped tumor cells. (B) The mitotic count was 3 per 50 high-power fields. (C–G) Immunohistochemical staining was positive for KIT (C), CD-34 (D), and DOG1 (E) but negative for SMA (F) and S-100 protein (G). Scale bar: 10 μm. DOG1 = discovered on gist 1, SMA = smooth muscle actin.

and was nourished by the RGA. Therefore, we thought that a diagnosis of a GIST of the stomach could be made preoperatively, instead of one of a tumor in some other abdominal soft tissue. Furthermore, we achieved a safe operation based on the preoperative imaging findings.

Several clinical trials concluded that adjuvant imatinib mesylate therapy is useful for the management of advanced GISTs.[8] In fact, it was reported that adjuvant imatinib mesylate therapy improves the recurrence-free survival of primary GI stromal tumors, especially those over 10 cm.[9] Also, in the case of high-risk GISTs, adjuvant imatinib therapy improves recurrence-free survival.[10] Probably, in the present case, adjuvant imatinib therapy should be used in consideration of the tumor size.

In conclusion, making full use of an imaging procedure such as 3D-CT angiography is one of the effective tools for the management of giant-size tumors including GGs.

4. Authors' contributions

KM, SK, YS, and MI performed the patients' care including operation.TK diagnosed a GG pathologically. KM and KT designed and drafted the manuscript. SL and KU reviewed and revised the manuscript.

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