Gastric gastrointestinal stromal tumor (GIST) is one of the most common mesenchymal tumors of the stomach, which may be asymptomatic or cause symptoms such as pain, gastrointestinal bleeding, and obstruction. Hemoperitoneum due to spontaneous rupture of the tumor is an extremely rare complication. We described a case of a 52-year-old man with a large pedunculated GIST causing loculated hematoma within the gastrocolic ligament. The patient visited our hospital due to a 3-week history of epigastric pain. A computed tomography scan revealed a 10.3 × 7.5 × 9.4 cm sized mass that was growing exophytically from the greater curvature of the stomach and was surrounded by loculated hematoma within the gastrocolic ligament. Laparotomy revealed a large stalked gastric mass surrounded by loculated hematoma within the gastrocolic ligament and blood fluid in the peritoneal cavity. Pathologic examination confirmed a GIST, of the high risk group.

**Index terms**
Gastrointestinal Stromal Tumor
Hematoma, Stomach

**INTRODUCTION**

Gastrointestinal stromal tumor (GIST) is one of the most common mesenchymal tumors of the gastrointestinal tract and most commonly located in the stomach (1). Bleeding and anemia are the common presentations of GISTs and larger tumors may also present with pain and obstruction (2, 3). However, GISTs rarely cause hemoperitoneum. In this article, we reported a case of a large pedunculated GIST causing loculated hematoma within the gastrocolic ligament.

**CASE REPORT**

A 52-year-old man presented with a 3-week history of abdominal distension and epigastric pain. At admission, the patient complained of aggravated squeezing epigastric pain and severe nausea. His vital signs were stable, but hemoglobin level decreased from 16.5 g/dL (5 days prior) to 12.0 g/dL, and C-reactive protein was elevated to 3.10 mg/dL. Complete blood count, electrolytes, liver function tests, and urinalysis were normal. He had no history of abdominal trauma or surgery, and no significant weight loss. On physical examination, he complained of tenderness in the epigastrium during palpation, but rebound tenderness was absent.

Computed tomography (CT) (LightSpeed16, GE Healthcare, Milwaukee, WI, USA) showed a large, well-defined heterogeneously enhancing mass containing central necrotic area of low attenuation in the mid abdomen (Fig. 1A). The mass measured 10.3 × 7.5 × 9.4 cm. The mass was surrounded by peritoneal hematoma within the gastrocolic ligament and small amount of hemoperitoneum was identified in the left inframesocolic space.
The mass was connected to the greater curvature of the stomach by a stalk that contains the vessels of gastric origin supplying the mass (Fig. 1B, C). The mass did not show extension to the mucosal layer of the stomach. These CT findings suggested a pedunculated, subepithelial tumor growing exophytically from the greater curvature of the stomach with a stalk, and loculated hematoma within the gastrocolic ligament with hemoperitoneum due to the ruptured mass.

The patient underwent diagnostic laparoscopy after radiological examination. Laparoscopy revealed a large mass surrounded by hematoma in the greater curvature side of the posterior wall of the stomach (Fig. 1D). The mass was hemorrhagic. The procedure was converted to an upper midline laparotomy for mass and hematoma removal. The patient had about 2 liters hemo-peritoneum and the abdomen was irrigated with saline. The mass showed adhesions with the adjacent omentum, and adhesiolysis following wedge resection of mass was conducted.

On macroscopic inspection, we found a round lobulated mass that was focally attached to the gastric wall with stalk. The mass measured 13 × 10 × 9 cm in size and had a stalk of 2 cm in length. The cut surface of the lobulated mass showed cystic spaces, hemorrhage, and gray parenchyma with myxoid change (Fig. 1E). On histological examination, the tumor was found to invade the muscularis propria of the stomach and the mass was composed of spindle-shaped cells. Up to 3 mitotic figures were counted in 50 high-power fields.

Immunohistochemistry showed that the tumor was c-KIT positive. The tumor was negative for CD34, desmin, and S100.

Fig. 1. A 52-year-old man with a large pedunculated gastric gastrointestinal stromal tumor causing loculated hematoma within the gastrocolic ligament.

A. The axial image of the contrast-enhanced abdominal CT scan reveals a heterogenous mass with a central area of low attenuation in the mid abdomen (arrow). There is peritumoral hematoma within the gastrocolic ligament (arrowhead) and loculated hemoperitoneum in the left inframesocolic space (asterisk).

B. The coronal image demonstrates a stalk between the greater curvature of the stomach and the mass, which indicates that the mass is growing exophytically from the greater curvature of the stomach and the stalk contains the arteries supplying the mass (arrow).

C. The sagittal image clearly demonstrates a stalk, which contains the gastric arteries (arrow).

D. Laparoscopy reveals a large, mass surrounded by hematoma (asterisk) in the greater curvature side of posterior wall of the stomach. The blood was oozing from the mass.

E. Macroscopic image of the surgical specimen after resection of the mass. The tip of the mass shows the stalk (asterisk) attached to gastric wall. The cut surface of the lobulated mass shows hemorrhage (arrows) and myxoid degeneration (square).
Overall assessment confirmed the diagnosis of GIST, of the high risk group.

**DISCUSSION**

GIST is one of the most common mesenchymal tumors of the gastrointestinal tract. The most common anatomical sites of origin are the stomach (40–60%), small intestine (30–40%), colon and rectum (5%) (1). Clinical presentation of gastric GIST depends on the tumor size and location. GIST is usually asymptomatic, as long as it is relatively small (2). Bleeding and anemia are the common presentations (42%), and larger tumors may also present with pain and obstruction (3, 4).

However, hemoperitoneum due to GIST rupture is a rare condition. The presence and extent of hemoperitoneum can be identified by CT, and it may appear as hyperdense ascites. The reason for the occurrence of hemoperitoneum from spontaneous rupture of GISTs is unclear. Hematoma formation within the tumor, and the resultant free hemorrhage by rupture of a weakened area in the tumor wall may be due to extensive intratumoral necrosis (3-5).

PubMed search of the English literature identified around 13 cases of ruptured gastric GISTs causing hemoperitoneum with imaging studies. These cases were summarized in Table 1, including patient characteristics such as age, sex, symptoms, imaging findings (size and growth pattern) and prognostic group. The mean size of the reviewed ruptured gastric GISTs causing hemoperitoneum was 7.8 cm (range, 1.3–11 cm). Also, most of the reviewed cases showed an exophytic growth pattern (12 of 13 cases). Especially, 5 cases showed an exophytic mass that was focally attached to the gastric wall with a pedunculated stalk. This case also showed an approximately 10 cm sized, large, pedunculated mass, growing exophytically from the greater curvature of the stomach. Larger tumors are possibly more vulnerable to rupture because of intratumoral necrosis. In addition, exophytic growth pattern with a pedunculated stalk might increase the risk of tumor rupture because the exophytic growing mass with a pedunculated stalk has higher mobility with increased risk for adjacent omental or mesenteric torsion or strangulation and complete obstruction of blood supply. In our case, the mass showed an island-like appearance, and the heterogeneously enhancing mass was surrounded by hematoma appearing as high attenuation fluid on CT examination.

Features that are associated with a poor prognosis include large tumor size, cell type (epithelioid versus spindle), cellularity, mitotic count, necrosis, and the presence of metastases (6-8). Tumor rupture (either spontaneous or iatrogenic) reportedly increases the risk of tumor recurrence due to peritoneal seeding (9, 10). In our case, the postoperative CT scan performed at 3 months after surgery showed no evidence of tumor recurrence. Regular patient follow-up was scheduled.

In conclusion, although hemoperitoneum due to spontaneous GIST rupture is a rare condition, GIST should be considered in the differential diagnosis of spontaneous intra-abdominal bleeding, especially if the mass shows an exophytic growth pattern and has a pedunculated stalk.

**Table 1. Summary of the 13 Cases of Ruptured Gastric GIST Causing Hemoperitoneum**

<table>
<thead>
<tr>
<th>Author</th>
<th>Age/Sex</th>
<th>Symptoms</th>
<th>Size (cm)</th>
<th>Growth Pattern</th>
<th>Prognostic Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Cho</td>
<td>71/F</td>
<td>Abdominal pain</td>
<td>6 × 8</td>
<td>Exophytic broad based</td>
<td>High risk</td>
</tr>
<tr>
<td>2 Cheon</td>
<td>38/M</td>
<td>Abdominal pain</td>
<td>10 × 9</td>
<td>Exophytic focally attached</td>
<td>Intermediate</td>
</tr>
<tr>
<td>3 Cegarra</td>
<td>83/F</td>
<td>Abdominal pain, anemia</td>
<td>7.5</td>
<td>Exophytic</td>
<td>High risk</td>
</tr>
<tr>
<td>4 Cegarra</td>
<td>79/F</td>
<td>Abdominal pain, anemia</td>
<td>11</td>
<td>Exophytic</td>
<td>Intermediate</td>
</tr>
<tr>
<td>5 Park</td>
<td>47/F</td>
<td>Abdominal pain, anemia</td>
<td>7</td>
<td>Exophytic broad based</td>
<td>High risk</td>
</tr>
<tr>
<td>6 Bucher</td>
<td>49/M</td>
<td>Abdominal pain, severe hypotension</td>
<td>10</td>
<td>Exophytic</td>
<td>High risk</td>
</tr>
<tr>
<td>7 Seya</td>
<td>60/M</td>
<td>Syncope, hematemesis</td>
<td>6</td>
<td>Exophytic</td>
<td>Intermediate</td>
</tr>
<tr>
<td>8 Bae</td>
<td>33/M</td>
<td>Syncope</td>
<td>4</td>
<td>Exophytic</td>
<td>Intermediate</td>
</tr>
<tr>
<td>9 Fiscon</td>
<td>68/M</td>
<td>Abdominal pain</td>
<td>10 × 7</td>
<td>Exophytic focally attached</td>
<td>High risk</td>
</tr>
<tr>
<td>10 Mohamed</td>
<td>40/M</td>
<td>Abdominal pain, minor trauma</td>
<td>10 × 9</td>
<td>Exophytic stalk</td>
<td>Intermediate</td>
</tr>
<tr>
<td>11 Benjamin</td>
<td>54/M</td>
<td>Abdominal pain, drop in Hb</td>
<td>1.3</td>
<td>Subepithelial mass</td>
<td>High risk</td>
</tr>
<tr>
<td>12 Yakan</td>
<td>51/M</td>
<td>Abdominal pain</td>
<td>6 × 5</td>
<td>Exophytic pedunculated</td>
<td>Intermediate</td>
</tr>
<tr>
<td>13 Tiffaney</td>
<td>17/M</td>
<td>Abdominal pain</td>
<td>11 × 8</td>
<td>Exophytic pedunculated, twisted</td>
<td>Intermediate</td>
</tr>
</tbody>
</table>

Note.—GIST = gastrointestinal stromal tumor
Spontaneous Rupture of Pedunculated Gastric GIST into the Gastrocolic Ligament

REFERENCES