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Small, spontaneously ruptured gastrointestinal stromal tumor in the small intestine causing hemoperitoneum: A case report

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ABSTRACT

INTRODUCTION: Gastrointestinal stromal tumors (GISTs) are clinically asymptomatic until they reach a significant size; therefore, GISTs that are 2 cm or less are typically asymptomatic. Patients with symptomatic GISTs typically present with abdominal pain, gastrointestinal bleeding, or a palpable mass but rarely present with hemoperitoneum.
PRESENTATION OF CASE: A 72-year-old Japanese man presented to us with acute onset abdominal pain. Physical examination showed peritoneal irritation in the lower abdomen. Findings of abdominal computed tomography were suggestive of hemoperitoneum; therefore, urgent surgery was performed. Approximately 1500 ml of blood in the abdominal cavity was removed. A small, ruptured mass was found in the middle of the small intestine, and partial resection of the small intestine, including the mass, was performed. The resected tumor was 2 cm in size and exhibited an exophytic growth pattern. Immunohistochemical staining revealed that the tumor was positive for KIT and CD34; therefore, a final diagnosis of GIST was made. Treatment with imatinib at 400 mg per day was started from postoperative month 1. The patient is doing well without recurrence 5 months after surgery.
DISCUSSION: Even small GISTs in the small intestine can spontaneously rupture and cause hemoperitoneum. Moreover, when a patient presents with sudden abdominal pain and hemoperitoneum without an evident mass on imaging, clinicians should be aware of the possibility of bleeding from a small GIST in the small intestine.
CONCLUSION: We present an extremely rare case of a patient with a small, spontaneously ruptured GIST in the small intestine, resulting in hemoperitoneum.

1. Introduction

Gastrointestinal stromal tumors (GISTs) are the most common mesenchymal tumors of the gastrointestinal tract [1]. GISTs occur throughout the gastrointestinal tract, arising most commonly from the stomach (50%–60%) followed by the small intestine (30%–35%) [2]. Approximately two-thirds of GISTs in the small intestine are 5 cm or more in diameter at the time of diagnosis and rarely 2 cm or less [3]. The majority of GISTs are clinically asymptomatic until they reach a significant size; therefore, GISTs that are 2 cm or less are typically asymptomatic.

Symptomatic GISTs are generally associated with abdominal pain, gastrointestinal bleeding, or a palpable mass but rarely associated with hemoperitoneum [2]. Hemoperitoneum is a potentially life-threatening complication of GISTs caused by burst of the intratumoral blood vessel and rupture of the tumor capsule. Spontaneously ruptured GISTs have been reported to be generally over 5 cm [4]. Here we report an extremely rare case of a patient with a spontaneously ruptured GIST in the small intestine, only 2 cm in size, causing hemoperitoneum. The work has been reported in line with the SCARE criteria [5].

Abbreviations: CT, Computed tomography; GIST, Gastrointestinal stromal tumor.

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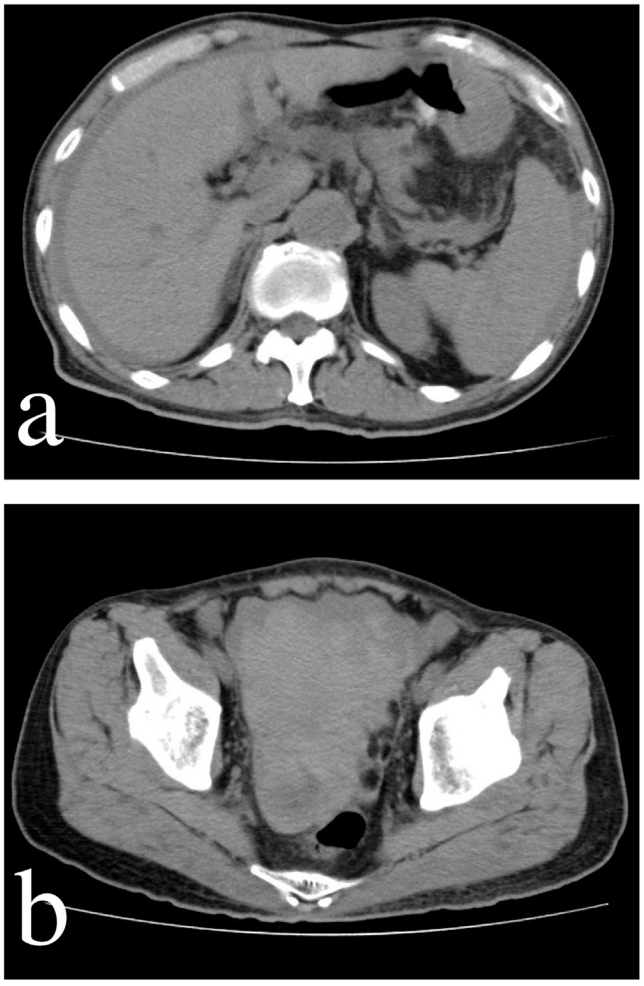

Fig. 1. (a), (b) Abdominal computed tomography showing bilateral subphrenic fluid without free air (a) and high concentrations of fluid in the pelvis, which is suggestive of hemoperitoneum (b).

2. Presentation of case

A 72-year-old Japanese man presented to our hospital with sudden abdominal pain. His blood pressure was 108/72 mmHg, his pulse was 83 beats per minute, and his temperature was 37.0 °C. Physical examination showed slight abdominal distention and peritoneal irritation in the lower abdomen. The patient was a non-smoker and social drinker, and he had a past medical history of polycythemia vera and asthma. Laboratory data showed an increased white blood cell count of 24,900/μL, with 89% neutrophils, and a slightly increased C-reactive protein concentration of 1.9 mg/dL. Elevated blood urea nitrogen level of 36.2 mg/dL and creatinine level of 2.5 mg/dL were observed in addition to microcytic hypochromic anemia (hemoglobin, 10.0 g/dL).

Abdominal computed tomography (CT) revealed bilateral subphrenic fluid without free air and high concentrations of fluid in the pelvis, which was suggestive of hemoperitoneum (Fig. 1a and b). Urgent surgery was performed, although a definitive diagnosis was not made preoperatively. Laparoscopic exploration revealed hemorrhagic ascites in the entire abdominal cavity (Fig. 2). Major hemorrhages were suspected; therefore, laparoscopic surgery was converted to open abdominal surgery. Approximately 1500 ml of blood in the abdominal cavity was subsequently removed. A small, ruptured mass with a massive hematoma was found in the middle of the small intestine (Fig. 3a). Partial resection of the small intes-

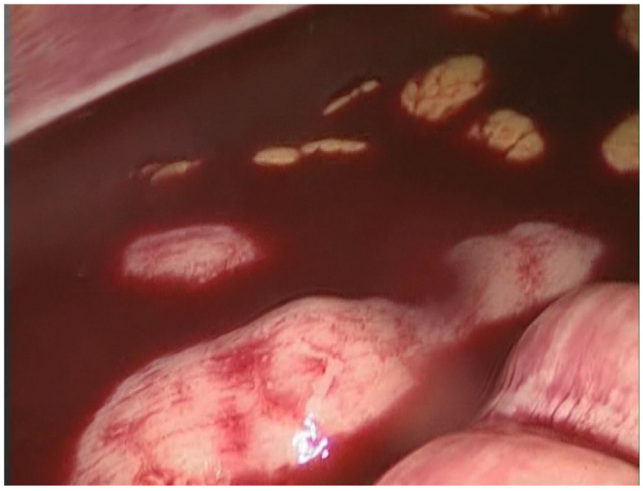

Fig. 2. Laparoscopic exploration revealing hemorrhagic ascites in the entire abdominal cavity.

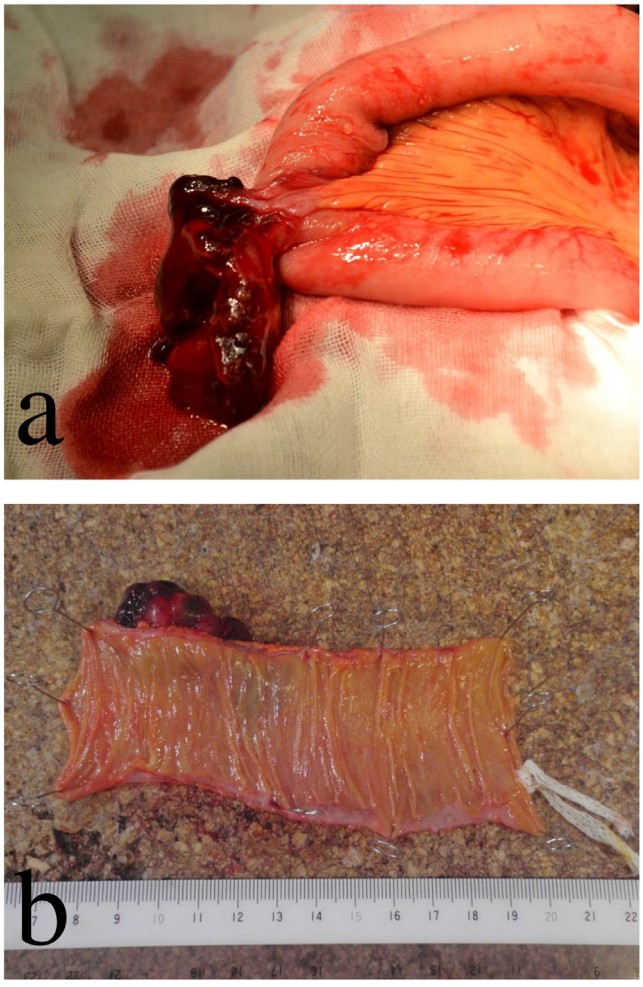

Fig. 3. (a) A small ruptured mass is observed in the middle of the small intestine. In the figure, a massive hematoma attached to the mass is already removed. (b) The tumor grows exophytically, and the mucosal side of the resected small intestine is clear.

tine, including the mass, was performed, and functional end-to-end anastomosis of the small intestine was performed.

The resected tumor was 2 cm in size. The tumor grew exophytically, and the mucosal side of the resected small intestine was clear (Fig. 3b). Hematoxylin–eosin staining revealed a bundle-like growth of the spindle-shaped tumor cells with acidophilic cytoplasm and enlarged nuclei with increased chromatin (Fig. 4a). Hemorrhage within the tumor was noted (Fig. 4b), and the mitotic count was 3 per 50 high-power fields. The tumor cells grew externally from the proper muscle layer of the small intestine. Resection margins were free of the tumor cells, and immunohistochemical staining revealed that the tumor was positive for KIT and CD34 and negative for desmin and S-100 proteins (Fig. 4c and d). The MIB-1 labelling index of the tumor cells was 3%. Based on these findings, a final diagnosis of GIST in the small intestine was made. Because macroscopic tumor rupture was identified, this case was classified into the high-risk category according to the modified Fletcher's classification [6]. Tumor genotyping with sequencing for mutations in KIT gene (exon 9 and 11) disclosed a heterozygous mutation of 1721del25insC (N567T.Y568_Q575del) at exon 11. The patient had an uneventful postoperative course and was discharged from the hospital on postoperative day 12. Treatment with imatinib at 400 mg per day was started from postoperative month 1. The patient is doing well without recurrence 5 months after surgery.

3. Discussion

The small intestine is the second most common primary site for GISTs [2]. Previous reports showed that the median tumor size of GISTs in the small intestine was 7 cm at the time of diagnosis, and a size of 2 cm or less is rare [3]. Small GISTs generally do not produce any symptoms and rarely progress or metastasize [1]. In this study, we report an extremely rare case of a patient with a spontaneously ruptured GIST in the small intestine, only 2 cm in size, causing hemoperitoneum. Table 1 shows 13 cases of spontaneously ruptured GISTs in the small intestine causing hemoperitoneum previously reported in the English literature, including this report [7–18]. Nine of the 13 patients (69.2%) were male, with a median age of 54 years (range, 28–87 years). Except for the undescribed cases, all tumors exhibited an exophytic growth pattern. Twelve of the 13 patients (92.3%) were without concurrent peritoneal dissemination. Nine of the 13 tumor sizes (69.2%) were 10 cm or more, and our case is the smallest. Our case demonstrates that GISTs in the small intestine can spontaneously rupture and cause hemoperitoneum even if they are small.

In the present study, resected tumor histologically showed an intratumoral hemorrhage. Hemoperitoneum is thought to be caused by hematoma formation due to intratumoral hemorrhage, followed by increased intratumoral pressure and subsequent rupture of the tumor capsule [12,18]. The histological findings of our case are compatible with this theory, although the mechanisms behind intratumoral hemorrhage are uncertain. Because of their high vascularity, ruptured GISTs can be associated with massive hemoperitoneum. In fact, as shown in Table 1, the amount of hemoperitoneum is generally 1000 ml or more in ruptured GISTs; furthermore, hemorrhagic shock can occur. Hemoperitoneum can lead to sudden abdominal pain and unstable circulatory dynamics; therefore, prompt diagnosis and intervention are imperative. Owing to its convenience and diagnostic ability regardless of the skill of the operator, CT may be a useful modality for the diagnosis of hemoperitoneum. When large, ruptured GISTs cause hemoperitoneum, contrast-enhanced CT can show a heterogeneously enhanced mass with hemoperitoneum [19]; however, when the tumor size is small, only hemoperitoneum is likely to be found, as in our case. When a patient presenting with sudden

Table 1
Characteristics of spontaneously ruptured GISTs in the small intestine causing hemoperitoneum.

Case	Author	Age	Gender	Diagnosis modality	Size	Mitotic count	Growth pattern	Amount of hemoperitoneum	Hemorrhagic shock	Concurrent PD	Treatment	Recurrence	Outcome
1	Dubenec	48	M	CT	15 cm	2/50 HPFs	Exophytic	1200 ml	No	No	PR	–	8 days, alive
2	Ajduk	60	F	Laparotomy	7.5 cm	15/50 HPFs	Exophytic	–	No	No	PR	–	12 days, alive
3	Cegarra-Navarro	76	M	CT, US	9 cm	<5/50 HPFs	Exophytic	–	Yes	No	PR	No	31 months, alive
4	Hisaraki	87	F	CT	13 cm	–	Exophytic	–	No	No	PR	No	16 months, alive
5	Wang	51	M	CT, US	10 cm	–	–	1600 ml	Yes	No	PR	–	17 days, alive
6	Worley	39	M	Laparotomy	16 cm	>5/50 HPFs	Exophytic	500 ml	No	No	PR + IM	–	–
7	Iusco	76	M	Laparotomy	20 cm	>5/50 HPFs	Exophytic	–	Yes	No	PR + IM	No	6 months, alive
8	Mahmoud	87	M	CT	10 cm	–	Exophytic	–	No	No	PR	No	13 months, alive
9	Varras	28	F	US	13 cm	>5/50 HPFs	Exophytic	1000 ml	No	No	PR + IM	No	36 months, alive
10	Nannini	45	F	Laparotomy	12 cm	2/50 HPFs	–	–	–	Yes	PR + IM	No	13 months, alive
11	Attaallah	46	M	CT	8 cm	–	Exophytic	1000 ml	No	No	PR + IM	–	25 days, alive
12	Lai	54	M	Laparotomy	20 cm	–	–	–	–	No	PR	Yes[a]	146 months, alive
13	Our case	72	M	CT	2 cm	3/50 HPFs	Exophytic	1500 ml	No	No	PR + IM	No	5 months, alive

GIST: gastrointestinal stromal tumor; PD: peritoneal dissemination; CT: computed tomography; US: ultrasonography; HPF: high-power field; PR: partial resection of the small intestine; IM: imatinib.
[a] After recurrence, debulking surgery was performed and imatinib, nilotinib, and sunitinib were administered.

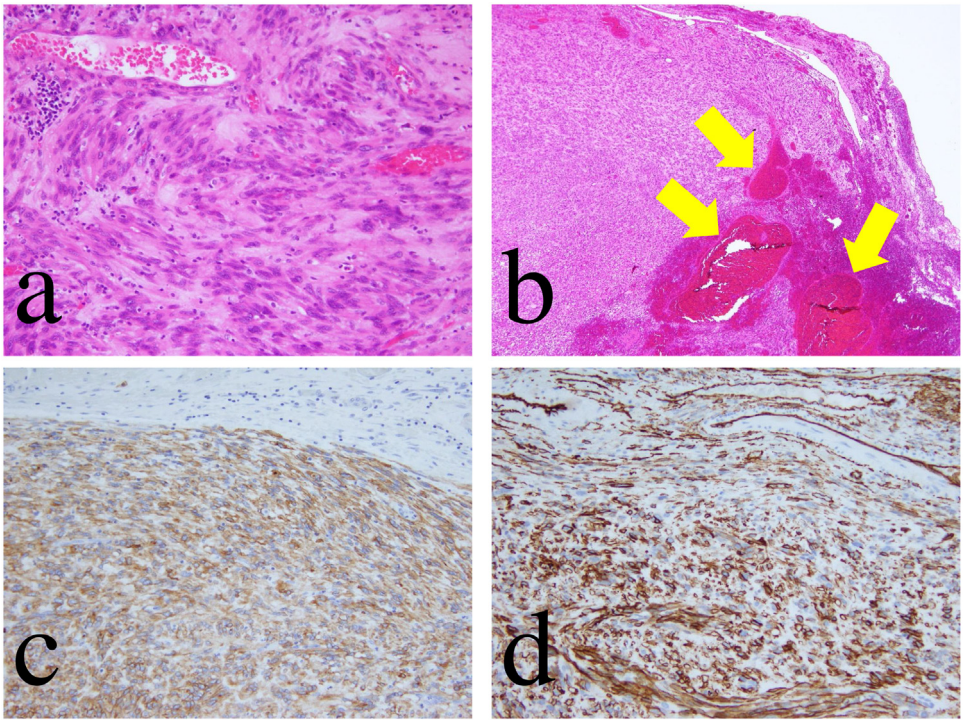

Fig. 4. (a) Hematoxylin–eosin staining reveals a bundle-like growth of the spindle-shaped tumor cells with acidophilic cytoplasm and enlarged nuclei with increased chromatin. (b) An intratumoral hemorrhage is noted (arrows). (c), (d) Immunohistochemical staining showing that the tumor is positive for KIT (c) and CD34 (d).

abdominal pain has concurrent hemoperitoneum without an evident mass on imaging, clinicians should be alerted to the possibility of bleeding from a small GIST in the small intestine.

Tumor rupture is a significant risk factor of recurrence [6]; therefore, our case is considered a high-risk GIST patient, although the tumor was small and the mitotic count was low. Adjuvant imatinib for high-risk GIST patients who have undergone surgery is helpful for improving both recurrence-free survival and overall survival [20]. As shown in Table 1, surgery followed by imatinib administration can improve survival for spontaneously ruptured GISTs in the small intestine causing hemoperitoneum. GISTs with KIT exon 11 mutations are highly sensitive to imatinib [20]. Moreover, KIT exon 11 mutations that involve codons 557–558 indicate a poor prognosis [21]. In the present study, a KIT exon 11 mutation that did not involve codons 557–558 was observed. Therefore, the patient is likely to have a favorable prognosis.

Small, spontaneously ruptured GISTs in the small intestine causing hemoperitoneum are relatively rare; therefore, the number of patients treated in a single institution limits the amount of insight that can be gleaned about the description of this rare tumor. The accumulation of prospective evidence from multiple case reports and institutions is needed to clarify the clinicopathological features and adequate treatment strategies.

4. Conclusion

We reported an extremely rare case of a patient with a small, spontaneously ruptured GIST in the small intestine causing hemoperitoneum. Learning points of this case report are 1) it is important to consider the possibility of spontaneous rupture with resultant hemoperitoneum of even small GISTs in the small intestine and 2) when a patient presents with sudden abdominal pain and hemoperitoneum without an evident mass on imaging, one should consider a potential bleeding from a small GIST in the small intestine.

Conflicts of interest

None.

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Ethical approval

This study was approved by the Ethics Committee of our institution (approval number: 17-5).

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author contribution

SF designed the study and drafted the manuscript. SF and YF performed the operation. TW and YO performed the histopathological examination. KI, KK, HI, MT, MY, and MI participated in the manuscript revision process. All authors read and approved the final manuscript.

Registration of research studies

Not applicable.

Guarantor

The guarantor of this manuscript is Shuichi Fukuda, corresponding author.

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