An Unusual Appearance of Cystic Gastro Intestinal Stromal Tumor of Small Intestine - A Case Report and Brief Review of Literature

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Case Report

ABSTRACT

Gastrointestinal stromal tumor (GIST), is considered as most common mesenchymal neoplasm of the GI tract. They can arise anywhere in the gastrointestinal (GI) tract, with the gastric GIST accounting for 50% to 60% of cases, the small intestinal GIST for 20% to 30%. It arises from the interstitial cells of Cajal, which are part of the muscle plexes of the intestine.Radiologically, they are best identified by Computed Tomography (CT) scan. Grossly, GIST is a solid tumorbut infrequently shows cystic degeneration. Immunohistochemistry(IHC) shows positivity for CD117 (C-Kit), CD34, and/or DOG-1. Radical resection is currently the preferred treatment for small intestinal GISTs.During the past decade, GISTs have presented as an important model in the emerging field of molecularly targeted therapies for solid tumors. Here we report a case mutifocal GIST with unusual gross appearance of cystic degeneration.

Keywords: Gatrointestinal; mesenchymal; CD117; degeneration.

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1. INTRODUCTION

Gastrointestinal stromal tumor (GIST), is considered as most common mesenchymal neoplasm of the GI tract. It was first described by Mazur and Clark (1983) and accounts for less than 1% of all GI tumors [1]. It stems from the interstitial cells of Cajal, which are part of the muscle plexes of the intestine [2]. Most GISTs are benign with a possibility of 20–30% for malignancy [3]. It commonly occurs in patients at the sixth decade of life. They can arise anywhere in the GI tract, with the gastric GIST accounting for 50% to 60% of cases, the small intestinal GIST for 20% to 30%, the colorectal GISTs for 5% to 10%, the esophageal GISTs for <5%, and the peritoneum and mesenteric GISTs for less than 1% [4].

It is a common belief that small intestinal GISTs have a worse prognosis than gastric GISTs and have higher risk of metastases and tumor-related death [5]. Location is described as third risk factor by widely used Armed Forces Institute of Pathology (AFIP) classification [6]. A study done by Giuliano, K. *et al* had 5,607 patients with GISTs, they demonstrated that small intestinal primaries exhibited aggressive features such as high pathological grade and large size [7]. Abdominal emergencies, including GI hemorrhage due to pressure necrosis and ulceration of the overlying mucosa, intestinal obstruction, or perforation are common complications in GISTs (mainly tumors larger than 4 cm). Perforations are more common for GISTs of the small bowel compared to other anatomical sites [8].

Here, we describe a case of two small intestinal mass resected from a patient who presented with intestinal perforation and was diagnosed as GIST on histopathology.

2. CASE PRESENTATION

A 75-year-old man came to the surgery out-patient department (OPD) complaining of 10 days of abdominal pain and distension. There was no prior history of fever, jaundice, bleeding, vomiting, or melena. Additionally, the patient has complained of loose stool (2-4 episodes per day) for 6 months, 1 month of appetite loss, and 1 month of weight loss. Twenty years ago, the patient was admitted to the hospital for a lower gastrointestinal (GI) bleed. There are no prior surgical procedures in the past. Patient has a history of type 2 diabetes, neuropathy, and high blood pressure. A hard lump was felt on the right upper quadrant of the abdomen during examination, and a slight abdominal distension was discovered on the left lower quadrant. CECT abdomen (Fig. 1) revealed a massive, well-defined intraperitoneal mass lesion with a core area of necrosis and loss of the fat plane in the right lumbar region. Significant mass effects were being caused by this mass lesion over the ascending colon. The left lumbar region likewise displayed a typical necrotic enhancing soft tissue lesion. It was classified as a malignant intra-peritoneal mass lesion based on the CECT findings.

After performing regular pre-operative tests, the patient was brought to an emergency OT. After being removed, both tumours were sent for histological analysis. One globular mass with a connected portion of small intestine measuring 19 cm in length had dimensions of 16x15x9 cm upon gross examination. A mass is present in the intestinal segment's wall, 3 cm from one end and 4 cm from the other. Hemorrhagic fluid is produced upon cutting, and a solid regi on of white with a cystic cavity is visible. The largest cyst cavity was 3.5 x 3 cm in size. The associated section of the small intestine measured 6 cm in length and was joined to another smaller mass that was 10.2 x 8.5 x 8 cm in size. The exterior was bowed (Fig. 2). A cut part of the smaller mass revealed hemorrhagic and cystic regions in a grey-white area. Slides stained with hematoxylin and eosin (H and E) revealed a submucosal tumour made up of fascicles and interlacing bundles of spindle cells. Cells feature a considerable quantity of eosinophilic cytoplasm and an oval to elongated vesicular to hyperchromatic nucle us with inconspicuous nucleoli. Also observed were mixed epitheloid cells with abundant cytoplasm. thin walled blood vessels, cystic degeneration with necrotic and hemorrhagic regions visible, 5–6 mitosis/ 10 hpf. Immunohistochemical examination of DOG1 revealed di cytoplasmic positivity (Fig. 3). For CD117 and SMA, there was amoderate to widespread level of positive. CD 34 expression was absent in tumour cells (Fig. 4). A final diagnosis of multifocal, mixed-type, high-grade small intestine GIST was made. Risk assessment received a high rating. Tumor was not present along the surgically removed margins. The patient is currently undergoing routine follow-up after an uneventful postoperative period.
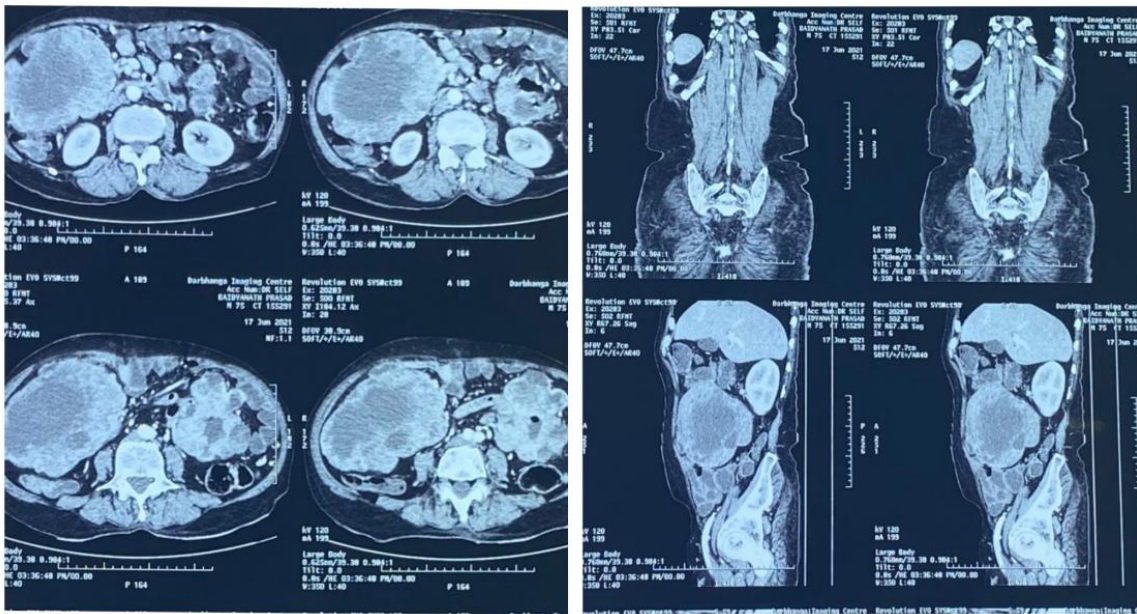
Fig. 1. large well-defined lobulated outline heterogeneous enhancing intraperitoneal mass lesion with central area of necrosisis noted in right lumbar region with loss of fat plane

Fig. 2. Gross Images: a) One resected specimen - large bulky mass with part of small intestine. Cut surface shows fish-flesh appearance with hemorrhage and cystic degeneration. b) Other resected specimen - mass with external surface showing bosselations with part of small intestine
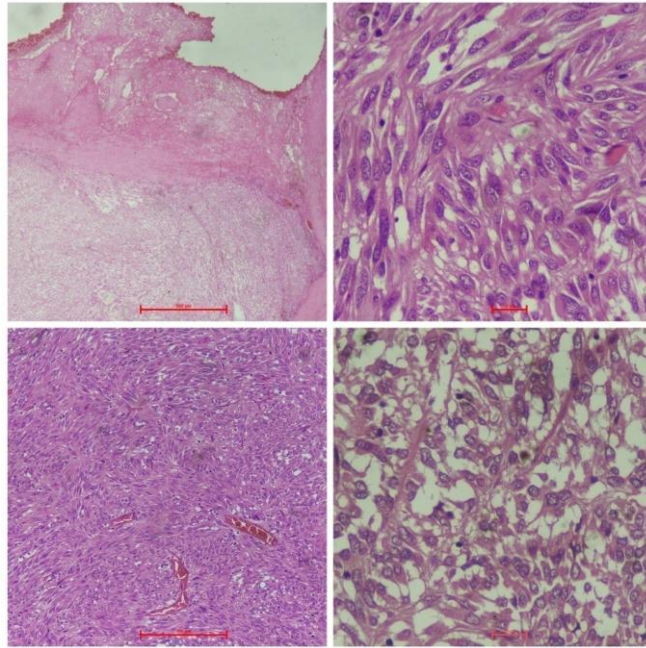
Fig. 3. Photomicrograph (H&E): a) Photomicrograph (H&E), b) Short fascicles of spindle cell with eosinophilic cytoplasm and paranuclear vacuoles (400x), c) Spindle cells arranged in fascicles and interlacing bundles. Cells have oval to elongated vesicular to hyperchromatic nucleus with inconspicuous nucleoli and cytoplasm in moderate amount. Occasional mitosis, thin walled blood vessels seen. (100x), d) Mildly pleomorphic epitheloid cells with abundant cytoplasm (400x)
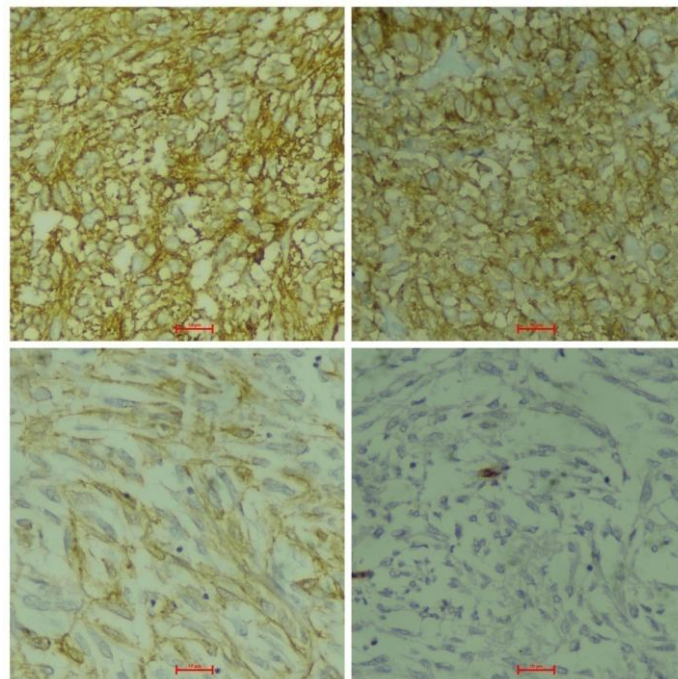

Fig. 4. Photomicrograph (IHC): a and b) A & B. Tumor cells shows strong and diffuse membranous and cytoplasmic positivity for DOG1 (400x), c) Tumor cells shows moderate and diffuse cytoplasmic positivity for SMA (400x), d) Tumor cells are negative for CD34. (400x)

3. DISCUSSION

Tumors known as GISTs have variable biological activity. GISTs and three syndromes are connected:

- The Carney triad syndrome, which consists of pulmonary chondromas, para-gangliomas, and gastric GISTs.
- The GIST and paraganglioma-containing Carney-Stratakis syndrome.
- Neurofibromatosis type 1 (NF1), which mostly affects the small intestine and includes multifocal GIST [9].

Preoperative fine needle aspiration is not recommended due to the risk of tumour rupture and intraperitoneal seeding. No diagnostic procedure, including computer tomography, ultrasound, barium examination, angiography, and magnetic resonance imaging, can be used to diagnose a patient with a certainty of 100 percent [3,10]. However, some recent studies with reported accuracy of 89 percent have demonstrated the significance of endoscopic ultrasonography assisted small needle aspiration. [11].

GISTs are well-circumscribed tumours that typically develop in the GI tract's muscularis propria. The median tumour size for high-risk GIST is 8.9 cm. Tumor sizes can vary. [12] The cut surfaces of these tumours are fleshy pink or tan-white, and they may include necrosis, necrotic cystic alterations, or hemorrhagic foci.

GISTs are divided into extremely low risk, low risk, intermediate risk, and high risk groups based on the National Institutes of Health (NIH) GIST consensus criteria, as shown in Table 1 [13]. Joensuu has suggested altering the NIH risk assessment, as illustrated in Table 2. The Joensuu classification is frequently utilised right now. This version includes information on tumour size, mitotic index, initial tumour site, and tumour rupture [14].

After the identification of KIT (CD11), GISTs were recognised as a separate entity in 1998. They develop as a result of an oncogenic KIT tyrosine kinase mutation [15].

KIT and PDGFRA mutations cause expressed proteins in GISTs to have constitutive oncogenic signalling in the absence of their ligands. Apoptosis, metabolism, protein translation, and cell cycle are all affected by the unchecked kinase activity [16]. Mutations in the KIT and PDGFRA proteins are antagonistic.

Table 1. National Institute Health gastrointestinal stromal tumor consensus criteria

Risk category	Tumor size (Cm)	Mitotic count per 50 HPF
Very low risk	< 2	< 5
Low risk	2-5	< 5
Intermediate risk	< 5	6–10
	5-10	< 5
High Risk	>5	> 5
	> 10	Any mitotic rate
	Any size	> 10

Table 2. Joensuu criteria for gastrointestinal stromal tumor risk assessment

Risk category	Tumor size (Cm)	Mitotic count per 50 HPF	Primary tumor Site
Very low risk	< 2	≤5	Any
Low risk	2.1-5	≤ 5	Any
Intermediate risk	2.1-5	> 5	Gastric
	< 5	6–10	Any
	5.1-10	≤5	Gastric
High Risk	Any	Any	Tumor Rupture
	> 10	Any	Any
	Any	> 10	Any
	>5	> 5	Any
	2.1-5	> 5	Non gastric
	5.1-10	≤5	Non gastric

KIT and PDGFRA gene mutations in GISTs typically affect the intracellular or extracellular portions of the juxtamembrane or the cytoplasmic kinase domain. About 70% and 10%, respectively, of KIT mutations are juxtamembrane and are located in exons 11 and 9 [3,15].

Pathologists and physicians now have a solid understanding of GISTs. Since the seminal work by Hirota and colleagues in 1998 implicating KIT mutations in the pathogenesis of GISTs and the follow-up study by Heinrich and colleagues in 2003 revealing activating mutations in platelet-derived growth factor receptor, our understanding of the biology of these tumours has significantly increased (PDGFRA) [17,18]. The therapeutic landscape of this hitherto treatment-refractory tumour has transformed as a result of the identification of these tyrosine kinase receptor mutations in GISTs and the fortunate administration of the TKI imatinib mesylate. For imatinib-resistant GIST, the TKI sunitinib has been approved since 2006, and clinical trials for additional TKIs as well as other treatments are under underway. The treatment of GIST is now regarded as the gold standard for solid tumour molecular targeted therapy [19].

The current standard of care for small intestinal GISTs is radical resection. Borderline status and complete resection without tumour overflow or rupture are used to determine whether radical resection was sufficient. For malignant tumours that cannot be surgically removed, tumour downstaging therapy is regarded as a unique approach. A crucial strategy for treating advanced GISTs now includes the use of imatinib in conjunction with surgical resection [20].

4. CONCLUSION

A life-threatening haemorrhage and spontaneous perforation are uncommon early presentations of small intestinal GIST, which is an uncommon tumour.

The morphology of GIST varies. In this example, the tumour was multifocal and exhibited cystic degeneration. The foundation for diagnostic and histological analysis for grading and risk assessment is immunohistochemistry. For high risk GIST, long-term follow-up and further treatment are required.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

CONSENT

As per international standard or university standard, patient's consent has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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