Gastrointestinal Stromal Tumor of the Omentum and Mesentery Mimicking Peritoneal Carcinomatosis: a case report

Tzu-Hsien Yang1, Jen-I Hwang2,4,5, Siu-Wan Hung2, Ren-Cing Wang3, Tain Lee2,4, Yeu-Sheng Tyau1,4

Department of Diagnostic Radiology1, Chung-Shan Medical University Hospital
Department of Radiology2, Pathology3, Taichung Veterans General Hospital
School of Medicine4, Chung-Shan Medical University
School of Medicine5, National Yang-Ming University

The radiologic features of gastrointestinal stromal tumors (GISTs) of the omentum and mesentery have infrequently been reported in the literature. They are characterized as well-circumscribed, large masses containing areas of hemorrhage, necrosis or cystic degeneration. We present a case of GIST of the omentum and mesentery with atypical imaging findings mimicking mesenteric carcinomatosis. The rarity of ascites and dilated vascular architecture demonstrated on computed tomography of GISTs may be the radiological diagnostic clues.

Key words: Computed tomography (CT); Gastrointestinal stromal tumor; Omentum; Mesentery; Peritoneal carcinomatosis

Gastrointestinal stromal tumors (GISTs) account for most primary mesenchymal tumors of the gastrointestinal tract [1]. These tumors were formerly characterized as leiomyomas, leiomyoblastomas, and leiomyosarcomas because they were believed to originate from the smooth muscle layers of the gastrointestinal wall. Recently, however, immunoreactivity for c-kit (CD117, a tyrosine kinase growth factor receptor) has differentiated GISTs from true leiomyomas, leiomyosarcomas, neurofibromas, and schwannomas [2]. They occur most frequently in the stomach (60%), but also can occur in the small bowel (30%) or elsewhere, including the colon and rectum (5%) and esophagus (<5%) [1]. In addition, a GIST may appear as a primary tumor of the omentum, mesentery, or retroperitoneum, but the incidence is rare [3, 4]. A number of studies of GISTs have been published in the radiology literature, but few case reports are available on the imaging appearances of the primary GISTs in the omentum and mesentery [5-8].

Herein, we demonstrate a case of unusual imaging findings of a GIST in the omentum and mesentery with diffuse peritoneal seeding that mimicked mesenteric carcinomatosis and review the literatures.

CASE REPORT

A 52-year-old female came to our emergency room with progressive conscious disturbance and bilateral hands tremor. She was relatively well but had had hypertension for 20 years. In our emergency room, laboratory investigations revealed elevated serum level of ammonia. Hepatitis markers and liver function test were unremarkable. No sign of liver cirrhosis could be identified. Drug screen test was also negative. Computed tomography of the brain
revealed no organic lesion. However, the physical examination showed a big, firm, nontender right pelvic mass. The patient reported no abdominal pain, nausea, vomiting, change in bowel habits, or weight loss. Abdominal ultrasound showed a solid mass with heterogeneous echogenicity over the right adnexa about 6 cm in greatest dimension. Computed tomography of the abdomen revealed isoenhanced infiltrative or confluent nodular lesions over the mesentery, omentum, and pelvic region (Fig. 1a). Most of the soft tissue mass occupied the right pelvic cavity (Fig. 1b). No ascites or calcification within the tumor masses was present. The preoperative impression was mesenteric carcinomatosis of gynecologic origin was impressed preoperatively. In addition, hepatic encephalopathy was suspected.

**Operative finding**

The patient underwent laparotomy with the preoperative diagnosis of mesenteric carcinomatosis associated with gynecologic origin. Laparotomy disclosed diffuse tumor seeding over the parietal and visceral peritoneum, including subphrenic spaces, bilateral paracolic gutters, mesentery and omentum. The omentum was nearly replaced by grape-like rounded tumor masses of different sizes. The pelvic cavity was also filled with tumors and thus it was not possible to identify the uterus and adnexa. Due to extensive tumor spreading and the easy bloody ooze of the tumor surface, only partial omentectomy was done and a piece of an omentum cake specimen was excised.

**Pathologic finding**

The specimen, resected from the omentum, measured 17 cm in greatest dimension. On cross section, it was found to be entirely filled with numerous variable-sized nodules, which were grayish white in color and soft in consistency. Microscopically, the tumor was characterized by a proliferation of epithelioid cells arranged in an interlacing fascicular pattern. Nuclei of tumor cells were moderately pleomorphic and their cytoplasm were abundant and slightly eosinophilic, some of them with vacuolation (Fig. 2a). Mitotic counts were about two per 50 high-power fields. Immunohistochemical stains showed reactivity for CD117 (Fig. 2b), CD34, and vimentin. The pathological diagnosis was

---

**Figure 1.**

*a.* Axial contrast-enhanced computed tomography of the abdomen shows variable-sized and confluent nodular lesions scattered over the mesentery (white arrowheads). One mass over the lateral aspect of the left psoas muscle in the mesentery shows iso-attenuation in comparison with the attenuation of the muscular architecture (white arrow). Dilated vascular structures (black arrowheads) correspond to the hypervascular nature of the masses in the mesentery. *b.* The majority of the masses occupied the right pelvis cavity (white arrows) and it was difficult to separate the masses from the uterus. Dilated vascular structure is also demonstrated (small black arrows).
After partial omentectomy, the patient received palliative chemotherapy with imatinib (Gleevec) followed by computed tomography examination every 4 months. After imatinib (Gleevec) treatment for the patient, the clinical condition stabilized and the follow-up CT scans showed shrinkage of the tumor masses (Fig. 3a, 3b).

**Figure 2.** a. Photomicrograph of histologic specimen (hematoxylin-eosin stain, original magnification 100×) shows a proliferation of epithelioid cells arranged in an interlacing fascicular pattern. Nuclei of tumor cells were moderately pleomorphic and their cytoplasm were abundant and slightly eosinophilic, some of them with vacuolation. b. Photomicrograph of histologic specimen (CD117 immunohistochemical stain, original magnification 100×) shows diffuse and strong staining for CD117.

**Figure 3.** a. Follow-up computed tomography 8 mo after the patient received palliative chemotherapy with imatinib (Gleevec). The masses over the mesentery have dramatically shrunk in size. The mass over the lateral aspect of the left psoas muscle in the mesentery (white arrow) also demonstrates cystic change (in comparison with Fig.1a white arrow). b. The uterus is easily depicted (white arrow) and no dilated vascular structure can be identified.
Gastrointestinal Stromal Tumor mimicking carcinomatosis

DISCUSSION

A GIST is defined as a mesenchymal tumor of the gastrointestinal tract and is characterized by an anomalous receptor for a growth factor with tyrosine-kinase activity (c-kit) [9]. This anomaly causes a permanent activation of the receptor and uncontrolled cell growth. Immunoreactivity for c-kit may distinguish it from typical leiomyomas, leiomyosarcomas, and schwannomas [2].

Despite new immunohistochemical and ultrastructural studies, there is still some phenotypic overlap between GISTs and true smooth muscle tumors, which probably implies a common origin for both tumors from mesenchymal stem cells. In addition, CD117 is expressed by interstitial cells of Cajal (GI pacemaker cell). The origin of GISTs from these cells has also been proposed by several authors [9, 10].

Primarily, GISTs involve the gastrointestinal tract; however, they may also occur as primary tumors outside of the gastrointestinal tract, especially in the omentum and mesentery [3, 4]. Among the ten reported cases of primary GISTs of the mesentery by Miettinen et al. [3], seven were of the spindle cell type, whereas three belonged to the epithelioid cell type. Our case demonstrated epithelioid cell type on histopathologic study. Kim et al. reported 8 cases of GISTs in the omentum and mesentery [5]. In their study, primary GISTs in the omentum and mesentery were characterized as well-circumscribed, large masses containing areas of hemorrhage, necrosis or cystic degeneration. The peripheral solid portions of the tumors were enhanced after the administration of IV contrast materials. The determination of tumor origin may be difficult unless the tumor contains an ulcer, a cavity, or air. Kim et al. believed that cavitation and gas can militate against the diagnosis of a GIST in an extraintestinal mass [5, 8]. No cavity or air content of the masses could be identified in our case.

Although metastatic tumors to the mesentery and greater omentum are not uncommon, primary mesenteric tumors are exceedingly rare. The radiological differential diagnosis of a typical GIST in the omentum and mesentery should include other mesenteric masses such as leiomyosarcomas, nerve sheath tumors, intra-abdominal desmoid tumors, and inflammatory pseudotumors [6]. The common mesenteric and omental cystic masses should also be included in the differential diagnosis when there is severe central necrosis or cystic degeneration of the gastrointestinal stromal tumor [11]. These masses are lymphangiomas, enteric duplication cysts, and mesothelial cysts. These benign cystic masses usually have a thin wall and lack of solid enhancing components, which can help discriminating them from GISTs on CT scan.

In the atypical imaging presentation of the case, the radiological differential diagnosis should include metastatic peritoneal carcinomatosis and peritoneal tuberculosis. Ascites was present in 74% and was the most common CT finding of peritoneal carcinomatosis [12]. Ascites was also present in all cases of peritoneal tuberculosis and peritoneal carcinomatosis in the series of Rodriguez et al. [13]. In contrast, the rarity of ascites of GISTs has been described in previous reports [14], and was present in our case. Absence of ascites may be a diagnostic clue to differentiate GISTs from peritoneal tuberculosis and peritoneal carcinomatosis. Other conditions mimicking peritoneal carcinomatosis should also be included in the differential diagnosis and these include primary mesenteric mesothelioma [15], peritoneal lymphomatosis [16], or sclerosing mesenteritis [17].

The hypervascular nature of GISTs has been described in previous reports [18]. Even if there is severe central necrosis or cystic degeneration, the peripheral solid portions of the tumors are enhanced after the administration of IV contrast materials. Dilated vascular architecture demonstrated on computed tomography is probably another radiological diagnostic clue for GISTs and it is seldom observed in peritoneal carcinomatosis.

There has recently been an advance in medical
treatment of unresectable or metastatic GISTs. The recent availability of the c-kit tyrosine kinase inhibitor (STI-571, imatinib [Gleevec], Novartis) has revolutionized the treatment of GISTs [19, 20]. Cystic changes and decreased tumor size in intra-abdominal extrahepatic metastases from GISTs treated with imatinib have been described [21]. These metastases are likely to become smaller in size and resemble ascites, but may persist indefinitely on the follow-up CT scans. Prior to the treatment in our case, the attenuation CT values of the metastatic lesions ranged from 72H to 84H. After the treatment, the metastatic lesions became smaller and the corresponding attenuation values ranged from 34H to 46H. The sequential changes in the GISTs in our case are compatible with those found in previous reports.

In conclusion, we present the case of a GIST occurring in the omentum and mesentery with atypical imaging findings mimicking mesenteric carcinomatosis. The image appearance made it difficult to make an accurate diagnosis before pathological proof. However, the rarity of ascites and dilated feeding arteries or drained veins demonstrated on computed tomography of GISTs may be the radiological diagnostic clues to differentiate these tumors from peritoneal carcinomatosis.

REFERENCES

大網膜及腸繫膜胃腸道間質性腫瘤類似腹腔癌症
廣泛侵犯：病例報告

楊子賢¹ 黃振義²,⁴ 熊小澐² 王任卿³ 李 茜²,⁴ 田雨生¹,⁴

中山醫學大學附設醫院 醫學影像部¹
台中榮民總醫院 放射線部² 病理部³
中山醫學大學 醫學院⁴
國立陽明大學 醫學院⁵

原發性大網膜及腸繫膜胃腸道間質性腫瘤的影像學表現較少在文獻中被描述，其影像學的
表現是以清楚界限、巨大的的腫瘤合併中心囊狀變化或出血為特徵。我們提出的這個大網膜及
腸繫膜胃腸道間質性腫瘤病例中，有著不典型的影像表現，類似腹腔癌症廣泛侵犯，其在電腦
斷層影像檢查中可見擴張的血管構造以及缺少腹水可做為影像診斷上的線索。

關鍵詞：電腦斷層：胃：腸道間質性腫瘤：大網膜及腸繫膜：腹腔癌症廣泛侵犯