Laparoscopic resection of a small-bowel gastrointestinal stromal tumor (GIST): a case report

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Gastrointestinal stromal tumor (GIST) of the small bowel is a relatively rare submucosal tumor that is often difficult to diagnose preoperatively. The only effective treatment is complete tumor resection. We describe a patient with a small-bowel GIST in whom laparoscopy was useful for diagnosis and treatment. The patient was a 65-year-old woman who underwent laparoscopic partial resection of the small intestine for a well-demarcated, solid mass arising in the ileum, measuring about 6 cm in diameter. The resected mass measured 5.5 cm in diameter and was immunohistopathologically positive for c-Kit and negative for CD34, with a Ki-67 labeling index of <1%. A moderate-risk GIST of the small bowel was diagnosed. The use of laparoscopy permitted extensive examination of the abdominal cavity through a small incision and allowed the lesion to be resected using a minimal number of skin incisions, placed at appropriate sites. As of 3 years after surgery, there is no evidence of recurrence.

Key words: small-bowel submucosal tumor, gastrointestinal stromal tumor (GIST), laparoscopic surgery

Introduction

The anatomic characteristics of small-bowel tumors with extraluminal growth often lead to difficulty in diagnosis and treatment. Gastrointestinal stromal tumor (GIST) is a mesenchymal tumor arising in the gastrointestinal tract or mesentery. Approximately 25% of GISTs occur in the small bowel.1,2 We describe our experience with a patient who had a small-bowel GIST that could be resected laparoscopically.

Case Report

The patient was a 65-year-old woman who was referred to our hospital because of an abdominal mass, detected on a gynecologic examination. The abdomen was flat, with no palpable tumor or tenderness. Blood tests showed no abnormalities. Contrast-enhanced computed tomography of the abdomen revealed a hypovascular mass contiguous with the intestinal wall in the pelvic cavity (Figure 1). A small-bowel series showed a submucosal tumor-like shadow defect (Figure 2). The lesion could not be identified on enteroscopy. A small-bowel submucosal tumor was diagnosed. The differential diagnosis included GIST, schwannoma, leiomyoma, desmoid tumor, and a solitary fibrous tumor. Laparoscopic surgery was performed. A 2-cm incision...
was made in the umbilicus, and a camera port (12 mm) was inserted. Laparoscopic examination showed a solid tumor with vascularity and extraluminal growth, located about 240 cm from the terminal ileum (Figure 3). There was no invasion of other organs or ascites. On the basis of the above findings, the tumor was initially considered a GIST. The umbilical incision was extended to 6 cm. A wound protector was used to remove the tumor from the body without contacting the abdominal wall, and the small intestine was partially resected. Macroscopically, the tumor was a flat smooth mass, 5.5 cm in diameter, which grew extraluminally (Figure 4). Histopathological examination showed spindle-shaped cells proliferating in a complex manner, with low cell density and no evidence of tumor necrosis. The number of mitotic figures was 1 to 3 per 50 high-power fields (HPF). On immunostaining (Figure 5), the mass was positive for c-Kit and negative for CD34 and α-SMA, with a Ki-67

Figure 2. Findings on enterography. A protruding lesion with a flat mucosal surface in the ileum. The lesion repelled gastrographin.

Figure 3. Laparoscopic findings. A tumor with extraluminal growth was located about 240 cm from the terminal ileum. After the lesion was resected in the abdominal cavity, the camera port incision was extended. The lesion was removed from the body after protecting the wound margins.

Figure 4. The surgically resected specimen, showing a submucosal tumor, 5.5 cm in diameter, with no ulcer or erosion on the mucosal surface.

Figure 5. Histopathological findings

A. Hematoxylin and eosin staining (×200), B. The tumor was positive for c-Kit (×200), showing a tumor with fascicular and trabecular proliferation of spindle-shaped cells.
labeling index of 1% or less. A moderate-risk GIST was diagnosed. The patient was uneventfully discharged on the seventh hospital day. As of 3 years after surgery, there has been no evidence of recurrence.

**Discussion**

We laparoscopically diagnosed and treated a GIST arising in the small bowel. The use of laparoscopy permitted extensive examination of the abdominal cavity, and allowed the lesion to be completely resected, using a minimal number of skin incisions.

Small-bowel GISTs most commonly arise in the upper jejunum and the lower ileum. Macroscopically, GISTs have a well-demarcated capsule, with a yellowish-white cut surface. Histologically, GISTs can be classified as spindle-cell type, epithelioid type, and mixed type. Spindle-cell type GISTs are most common.\(^3,4\) On immunostaining, more than 90% of GISTs are positive for c-Kit, and most show strongly positive, nearly homogenous staining.\(^5\) Mutations in exon 9 of the c-KIT gene are often found in the small intestine.\(^6,7\) The rate of positive staining for CD34 is about 70%. CD34 positivity is thus useful for the diagnosis of c-Kit-negative GISTs. In recent years, DOG-1 (discovered on GIST-1)\(^8\) immunostaining has been reported to be useful for the diagnosis of c-Kit-negative GISTs. In patients with GISTs negative for both c-Kit and CD34,\(^9\) DOG-1 has also been reported not to be almighty for the diagnosis of GISTs.\(^9,10\) PDGFRA gene mutations have been reported in 80% to 90% of all GISTs. Analysis of PDGFRA gene mutations may therefore be useful in patients with GISTs negative for both c-Kit and CD34.\(^11\)

Surgical resection is the treatment of choice for small-bowel GISTs. Lymph-node metastasis is rare, and lymph-node dissection is considered unnecessary.\(^12,13\) Laparoscopic surgery is indicated for the management of most small-bowel GISTs, with the exception of far-advanced disease associated with giant tumors or peritoneal dissemination. However, the tumor should not be directly grasped with a forceps or other devices because the intraoperative use of a forceps can damage the tumor capsule, potentially leading to bleeding and dissemination of tumor cells.

Clinically, GISTs accompanied by invasion and tumor-induced destruction of adjacent organs have a higher than 90% risk of recurrence and are therefore classified as malignant GISTs. Risk is classified on the basis of two factors, tumor diameter and cell proliferation activity. Tumors 5 cm or larger in diameter with 5 to 10 mitotic figures per 50 HPF and tumors 10 cm or more in diameter with more than 10 mitotic figures per 50 HPF are classified as high risk.\(^14-16\) Our patient had a 8-cm tumor with a Ki67 labeling index\(^17\) of 1% or less, indicating a moderate risk.

Postoperative adjuvant therapy with imatinib has been shown to prolong relapse-free survival,\(^18\) but is still in clinical trials, and its effectiveness and safety have yet to be established. Therefore, we did not use imatinib. In high-risk patients, observation by CT every 4 to 6 months or adjuvant chemotherapy is recommended. Adjuvant chemotherapy with imatinib was confirmed to be safe 3 years after surgery and has also been reported to improve relapse-free survival and overall survival.\(^18,19\) As of 3 years after surgery, our patient remains free of recurrence. However, close follow-up is considered mandatory because the patient was at moderate risk.

Enteroscopy and capsule endoscopy have been reported to be useful for the diagnosis of small intestinal tumors. However, a definitive diagnosis is often difficult to make before surgery in patients who have tumors with extraluminal growth, similar to our patient. Laparoscopy is beneficial for comprehensive diagnosis and treatment in such patients. As compared with open surgery, laparoscopic surgery for small intestinal tumors permits detailed examination of the entire abdominal cavity and enables appropriate incision sites to be determined, thereby allowing surgery to be completed with a minimal number of surgical wounds. Other advantages of laparoscopic surgery include earlier recovery and prompter return to social activities, minimal invasiveness, and a good aesthetic outcome.

We described our experience with a patient who had a small GIST that could be resected laparoscopically. Our findings indicate that laparoscopic surgery is useful for the diagnosis and treatment of small-bowel tumors that are difficult to definitively diagnose before surgery.

**References**


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