

Laparoscopic Management of Obstructing Small Bowel GIST Tumor

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ABSTRACT

Background: Gastrointestinal stromal (GIST) tumors make < 1% of all gastrointestinal neoplasms and 20% of small bowel neoplasms. The most common acute presenting symptom of these tumors is gastrointestinal hemorrhage with obstruction being rare. We discuss our laparoscopic approach to 2 patients with small bowel GIST tumors that presented to our institution with obstruction of the small bowel.

Case Presentation: Two patients presented to the emergency department with signs and symptoms of small bowel obstruction. On workup, each was found to have a solid lesion either within or adjacent to the small bowel at the point of obstruction and both were emergently taken to the operating room. The pathologic diagnosis of small bowel GIST tumor was the same in both cases, but the pathophysiology of the obstructing tumors were different.

Results: Both patients underwent laparoscopic surgery with successful resection of the lesions. The details and crucial points of the laparoscopic approach to these tumors are described with specific attention to its appropriateness and safety in treating GIST tumors. Attention to particular details of the manipulation and management of the bowel in the face of obstruction and removal of the lesions is described.

Conclusion: The laparoscopic approach to GIST tumors of the small bowel, even in the face of emergent surgery, is a safe method.

Key Words: Laparoscopy, GIST tumor, Small bowel obstruction.

INTRODUCTION

Gastrointestinal stromal tumors, GIST tumors as they are referred to currently, make up 20% of small bowel neoplasms and < 1% of all gastrointestinal neoplasms (incidence, 10 to 20 per million population). They are identified by having a histologic appearance of spindle-cell mesenchymal neoplasm with the presence of surface markers CD 117.^{1,2} The majority (65%) of GIST tumors occur in the stomach, with 30% in the small bowel and the remaining seen in the colon and esophagus (5%).

GIST tumors are relatively rare lesions and usually present with vague abdominal complaints or other nonspecific clinical manifestation 69% of the time. They may be found incidentally at endoscopy or surgery for an unrelated reason or on imaging in 21% of cases, and the remaining 10% are found at autopsy.³ A small percentage may cause acute symptoms requiring urgent surgical intervention. The most common acute presenting symptom requiring surgical intervention in GIST tumors is GI bleeding with obstruction being much less common.^{4,5}

We will discuss 2 separate cases of GIST tumor of the small bowel in patients who presented with obstructive symptoms to our institution and were treated laparoscopically. Each tumor had a different method of obstruction, with one causing a volvulus and the other an intraluminal obstruction; however, both were successfully removed laparoscopically. We also discuss how our approach relates to the current literature regarding laparoscopic management of these lesions.

CASE REPORTS

Case One

A 59-y-old male presented with a 4-d history of abdominal pain, nausea, and vomiting with inability to keep down any food or liquids. The patient had a negative surgical history, was on no medications, and did admit to prior tobacco and crack cocaine use. He had no drug allergies. A physical examination was significant for mild distention and diffuse tenderness over the entire abdomen without guarding or rebound. The patient had active bowel sounds.

Flat and erect X-rays of the abdomen showed some mildly dilated loops of small bowel. CT scan demonstrated an

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Figure 1. Jejunal GIST.



Figure 2. Volvulized small bowel.

8-cm mass in the pelvis with dilated proximal small bowel consistent with small bowel obstruction. There was also noted a “compressed and twisting mesenteric course” consistent with possible volvulus.

The patient was brought to the operating room where he underwent laparoscopy and was noted to have an 8-cm pedunculated lesion in the distal jejunum with rotation of the bowel on its mesenteric root in a meso-axial manner (**Figure 1**).

The proximal bowel was dilated, and decompressed bowel was noted distal to the stalk of the lesion, which was constricting the bowel at the site of obstruction (**Figure 2**). The

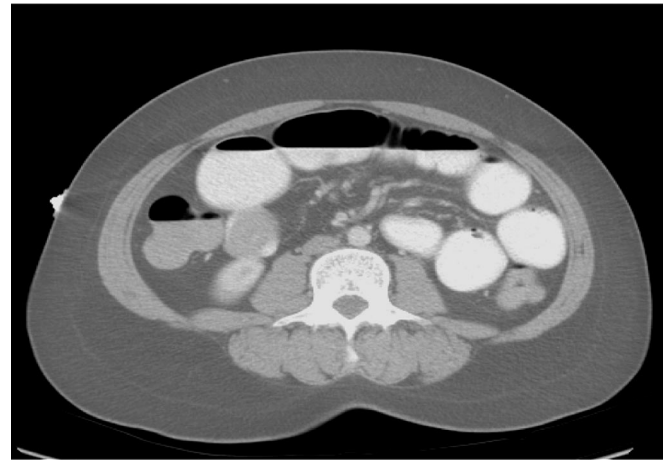


Figure 3. Mid abdominal mass.

bowel was untwisted, and the lesion was transected at its stalk across normal jejunum with an Endo GIA stapler. The specimen was brought out through the Hasson port site in a specimen bag.

Pathology showed a gastrointestinal stromal tumor, smooth muscle variety CD-117 positive cells consistent with GIST tumor with negative margins. The patient did well postoperatively, progressed to a regular diet, and was discharged on postoperative day 3.

Case 2

A 24-y-old female presented with a 1-wk history of left lower quadrant pain worsening over the preceding 2 d. The patient had nausea and vomiting with no bowel movements for 8 d. The patient’s past surgical history was positive for caesarean delivery, and her past medical history was positive for asthma, depression, seizures, and nephrolithiasis. She was on Dilantin, Prozac, Zantac, and Vistaric.

An abdominal examination showed mild distention, with diffuse tenderness to palpation; no rebound or guarding and positive bowel sounds were noted. Flat and erect X-rays of the abdomen showed some distended loops of small bowel. CT scan showed small bowel distention with some bowel wall thickening and an 8 × 2x6-cm bowel mass in the mid abdomen (**Figure 3**). A diagnosis of small bowel obstruction with possible intussusception was made, and the patient was scheduled for surgery.

The patient underwent laparoscopy, and the small bowel was run from the ileocecal valve proximally to the site of obstruction. At the mid jejunum, an umbilicated lesion was identified with dilated bowel proximally (**Figure 4**).

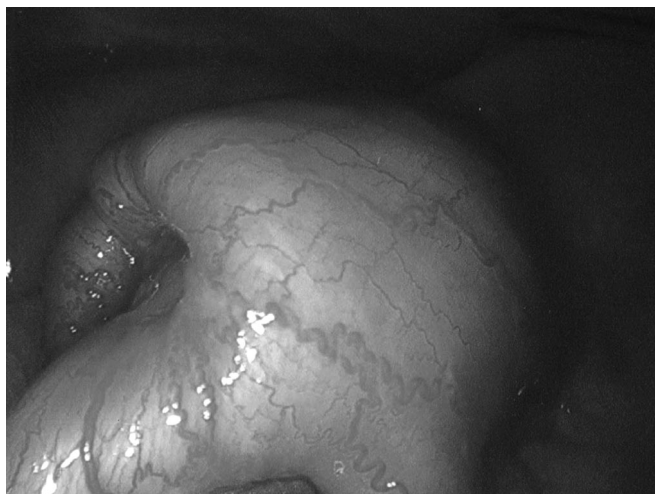


Figure 4. Mass causing dilation of bowel.

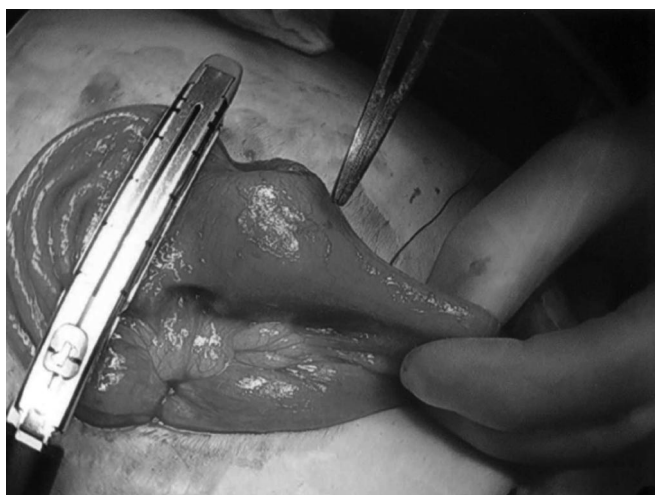


Figure 5. Resection of mass.

This mass corresponded to the abnormality on CT scan, and the remainder of the abdominal examination was negative. This segment of intestine containing the mass was brought out through the Hasson trocar site. The mass was resected with grossly negative margins, and a side-to-side anastomosis was created using the Endo GIA stapler (**Figure 5**).

The patient did well postoperatively, and was discharged on postoperative day 3. Pathological evaluation of the specimen showed a submucosal spindle cell tumor that was CD-117 positive and compatible with a gastrointestinal stromal tumor. All of the margins were negative for tumor.

DISCUSSION

Laparoscopic operative approach to obstructing small bowel tumors, as demonstrated in these 2 cases of GIST, is a feasible and legitimate operative technique that does not compromise oncologic standards.

In GIST tumors, GI bleeding is the more common acute presentation, with bowel obstruction being less common. The majority (65%) of GIST tumors are seen in the stomach, which probably accounts for this phenomenon as the stomach is a highly vascular organ not easily obstructed.

Obstruction can be the result of several different characteristics of these tumors: (1) continued growth of the lesion with direct occlusion of the bowel is a method of obstruction; (2) intussusception with the tumor acting as the lead point results in obstruction; or (3) a volvulus-like torsion of the bowel around the tumor, if its growth pattern is extraluminal, results in obstruction.

In our first case, the bowel was obstructed secondary to a twisting of the bowel and its mesentery around a central point. This method of obstruction has been described previously and acts just as a midgut volvulus.⁶ If left untreated, this method of obstruction can lead to ischemia as in midgut volvulus.

The second case of obstruction resulted from the more common cause of intraluminal growth, causing obstruction of the lumen or a combination of luminal obstruction with intussusception of the lesion. These cases are a relatively rare condition, with only a few being reported in the literature.⁷

Both cases had similar presenting symptoms, although there was no ability to distinguish the exact method of the obstruction. Both patients required surgical intervention, so precise differentiation of the specific mode of the obstruction was not necessary.

CT scan is recommended in such patients and does help differentiate the source of obstruction, which can help direct choices in management. The use of CT scan is a Class II recommendation by the EAST workshop group for management of small bowel obstruction.⁸

With the identification of a solid lesion at the obstructing site, this made operative planning and choice of approach more precise. It also helps eliminate the temptation to treat these patients nonsurgically with nasogastric suction and observation. CT again is encouraged when there is question regarding the source of obstruction.

Attempting to perform laparoscopy on patients with bowel obstruction can be a daunting task. The distended

bowel may not allow adequate distention of the abdominal cavity with resultant poor visualization. In both of our cases, the CT scan demonstrated solid lesions at the site of obstruction as identified by dilated bowel proximally and normal caliber bowel distally, indicating this as the probable source of the obstruction. This fact predicts a better opportunity to successfully identify the site of obstruction laparoscopically, in contrast to the much more common condition of adhesive bands where identification of the precise site of obstruction may be challenging.

Regarding the surgical approach, laparoscopy has been shown to be comparable to an open approach with regards to the ability to adequately and safely operate on GIST tumors. The advantages over open surgery with comparable lesions are shorter hospital stay, less blood loss, and less postoperative pain.⁹ In the laparoscopic approach to small bowel obstruction, there are several important points that need to be emphasized to improve chances of successfully completing the procedure laparoscopically.

First is timing of intervention; the presence of a mass made the option of close observation for 48 h in an attempt to allow the obstruction to resolve not viable. The earlier that surgical intervention is performed on patients with bowel obstruction, the quicker their problem resolves and the more likely that it can be performed laparoscopically. Success is more likely before the bowel becomes too severely distended.⁸

Secondly, once laparoscopy has been decided upon, the first important decision is the method of entry to the abdominal cavity. These patients often have distended bowel making safe entry much more difficult. These patients usually have had prior surgery so bowel or omentum adhered to the abdominal wall is likely; thus, the open or Hasson method is the method of choice.

Third is the choice of pressure for insufflation of the abdomen. The distended bowel makes it a challenge to see adequately, but over distention of the abdomen can have complications. Since these patients are usually dehydrated, and have elevation of the diaphragm from their distended bowel, the physiologic response of decreased venous return and increased peak airway pressure may be exaggerated. The abdominal pressure is often much higher than recorded set-limits.¹⁰

Fourth, once the pneumoperitoneum is established and the optic has been inserted into the abdominal cavity, the patient is placed in the position used for laparoscopic appendectomy, Trendelenburg and rotated to the left.

Three trocars are then placed per the surgeons' preference for appendectomy. We choose this approach because the first area to be addressed and identified is the ileocecal area where normal nondistended bowel should be present.

Fifth, a 45-degree angled scope is routinely used, because the angle of the scope allows visualization deep into the pelvis and lateral pelvic gutters as well as around adhesive bands so these areas can be adequately see and dissected. The scope can also be used to inspect solid organs for metastasis in oncologic surgery.

Sixth, dissection proceeds from the distal ileum, as identified by the antimesenteric fat (Vail of Jackson) back to the lesion and site of obstruction. This retrograde method is a safer approach since the surgeon is not manipulating distended and thickened bowel which is easier to tear or even puncture with instrumentation.

Seventh, numerous studies have documented the forces that are generated by the tips of laparoscopic graspers and the dangers involved. The pressure has been measured at the tips of graspers in excess of 650 kPa to 1500 kPa.¹¹ This force is comparable to a human bite, so handling and manipulation should be kept to a minimum. When "running" the bowel, it is advantageous to grasp the mesentery (**Figure 6**), instead of the bowel (**Figure 7**) directly as this helps avoid injury.

The disadvantage of this method is that the operating surgeon loses the tactile sensation of the bowel and the ability to palpate for the lesion. As in the cases presented here, this is not a crucial point, since the site of obstruction should be easily identified by the transition zone and the mass either being easily visualized or palpated at this site.

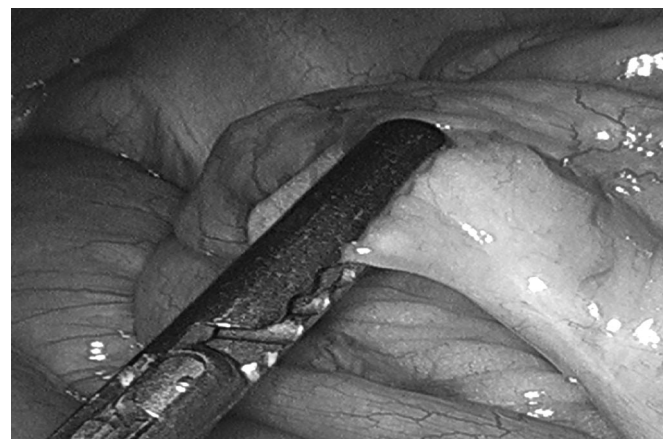


Figure 6. Mesenteric grasping.

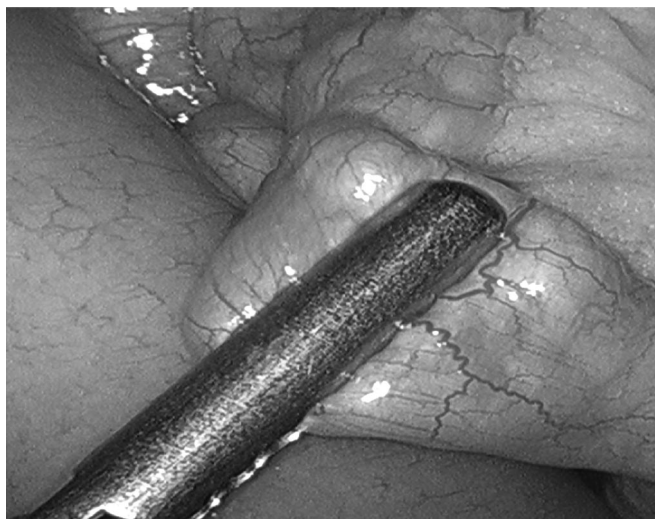


Figure 7. Direct grasping of bowel.

Once the site of obstruction is identified, the method of resection can be decided upon. Whether the resection is performed intracorporeally or extracorporeally and how the anastomosis will be created is dependent on the size of the lesion and surgeon's preference. There is a well-documented increased leak rate in bowel anastomosis done with a stapler when the bowel wall is thickened, so hand-sewn extracorporeal anastomosis may be safest in these instances.

It should be emphasized at this point that exophytic well-differentiated GIST lesions can have an appearance grossly like that of leiomyoma. In gynecologic laparoscopy, it is common to morcellate these lesions (leiomyomas) for removal from the abdomen once they have been dissected and freed. This practice of morcellation should be discouraged in small bowel tumors, because it is important to maintain the integrity of the capsule of the tumor to prevent peritoneal seeding. In cases of solid lesions of the small bowel with an appearance of leiomyoma, they should be assumed to be a GIST tumor with malignant potential and thus treated accordingly. The lesion should be ideally placed in a specimen sack prior to removal from the abdominal cavity or brought out through an extended incision with protection of the wound edges. Maintaining the integrity of the capsule is important and disruption with spillage of the tumor cells must be avoided. Though rare, there are case reports of GIST recurrence at port sites.¹²

The safety and appropriate use of laparoscopy in surgical resection of GIST tumors has been well documented; however, in an acute setting the experience of the sur-

geon is important in successfully completing an oncologically safe procedure.^{9,13,14,15}

Because of the nature of the tumor and the unlikely spread to lymphatics (<10%), it is not necessary to do a formal lymph node dissection. Complete resection with clear margins is adequate and avoiding rupture of the capsule of the lesion as stated above is important.

In cases where the tumor is large (>10cm) or invading surrounding structures, or both, the surgeon's experience and level of comfort with laparoscopy will play a big part in the decision as to whether to proceed with laparoscopy. Some groups have successfully removed large (10cm) GIST tumors from the stomach, but since these can be extremely challenging, it may be prudent to convert to an open procedure.¹⁶

The malignant potential of these lesions is well known, and the use of laparoscopy in resecting these tumors has been evaluated by several centers. Laparoscopy appears to offer similar long-term results for GIST tumors as that offered by conventional surgery.^{17,18} Most studies center around gastric GIST tumors, because they are the more common variety, but the approach to and biologic nature of GIST tumors in the small bowel is similar and results are equally good.

The surgical component of treatment for GIST tumors is only one aspect of comprehensive therapy for these patients. Patients should be referred to medical oncologists for evaluation and consideration for adjuvant treatment with Imatinib or other tyrosine kinase inhibiting agents after surgery, whether the resection is complete or not. Chemotherapy agents given preoperatively may be of benefit also in large tumors, but this is yet to be clearly proven.¹⁹

CONCLUSION

In cases of small bowel obstruction where there is no obvious cause, a CT scan is recommended, and when a solid lesion of the small bowel is identified, the possibility of a GIST tumor should be considered.

Laparoscopic surgical approach to bowel obstruction and cancer is appropriate, and short- and long-term results are similar to open surgery, with the laparoscopic group having shorter hospital stay, lower blood loss, and less pain medication requirements.

Manipulation of the lesion should be kept to a minimum with strict avoidance of rupture of the capsule. Wide resection of lymph nodal basins in GIST tumors is not

necessary and this makes the laparoscopic approach more feasible.

Possible complications can be loss of tactile sensation and injury to organs on entry. The force generated at the tips of laparoscopic graspers is significant, and their use increases the chance of tissue injury. Use of these instruments directly on the tumor should be kept to a minimum.

Obstruction from GIST tumors of the small bowel is a relatively rare occurrence, but should be considered in the differential diagnosis when other causes are not readily apparent and a solid lesion is demonstrated in the small bowel.

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