SCIENTIFIC PAPER

# Staged Second-Look Laparoscopy to Evaluate Ischemic Bowel

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## ABSTRACT

**Background and Objectives:** An open, second-look laparotomy often is required to assess ischemic bowel after extensive mesenteric lymphadenectomy to cytoreduce midgut carcinoids. Aggressive resection of tumor at the base of the mesentery may compromise the integrity of the blood supply to the involved segment of intestine. Long segments of bowel that initially appear ischemic are sometimes created. The surgeon is faced with the decision to perform a resection or to close the abdomen temporarily knowing that this patient will require a second-look laparotomy.

**Methods:** Segments of bowel showing signs of possible ischemia were preserved based on signs of perfusion. A side-side anastomosis was performed in the standard fashion. A Jackson Pratt drain was placed in an area adjacent to the anastomosis and brought out through the abdominal wall, and the incision was closed. Forty-eight hours later, a laparoscopic second-look operation was performed. A pneumoperitoneum was established using the drain tubing as the $CO_2$ inflation port. The drain was removed, and a 5-mm trocar was inserted into the abdomen via its tract. Segments of previously questionable dusky bowel and the anastomosis were inspected with a laparoscope.

**Results:** Our 3 second-look operations were completed in approximately 5 minutes, and the patients recovered without complication or prolonged hospital course. Our fourth patient progressed extremely well postoperatively and was able to avoid the planned second-look laparoscopy.

**Conclusions:** This technique provides an easy solution for the intraoperative finding of questionable blood supply in the intestines.

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DOI: 10.4293/108680809X12589998404443



**Key Words:** Midgut carcinoid, Laparotomy, Laparoscopy, Bowel ischemia.

## INTRODUCTION

Midgut carcinoids, especially those of the terminal ileum, have a strong tendency to metastasize to mesenteric lymph nodes. The boggy lymphatic disease associated with these neuroendocrine tumors (NETs) often encases the mesenteric vessels, thus creating bowel ischemia. Invasion of the root of the mesentery by these NETs can also engender bowel necrosis or perforation or lead to progressively worsening malabsorption. These tumors can also cause partial or complete bowel obstruction due to the kinking, shortening, and desmoplastic reaction present in the mesentery. To optimally cytoreduce these tumors, an extensive mesenteric lymphadenectomy is often required to relieve the encasement of the blood supply and relieve the partial or complete bowel obstruction. An aggressive resection of tumor at the base of the mesentery may compromise the integrity of the blood supply to the involved segment of intestine. The compromise of the arterial supply or venous drainage of a segment of bowel can occur as a consequence of overt trauma to the vessel, vessel spasm, vessel thrombosis, or a combination of all these factors.

Intraoperative management of a compromised bowel segment presents a major dilemma for the surgeon.[1,2] Traditionally, small intestine with a questionable blood supply would be removed; creating an anastomosis would only be done between 2 segments of intestine with an obviously sound blood supply.[3] In patients undergoing extensive mesenteric cytoreduction, long segments of bowel that initially appear somewhat ischemic are sometimes created; this condition is made worse by the length of surgical procedures that tediously dissect the root of the mesentery. These procedures can take hours and often result in bowel that appears congested or cyanotic, or both. The Doppler is used to evaluate arterial and venous flow; however, even after these evaluations, one can be faced with the decision to perform a resection or to close the abdomen temporarily, knowing that this patient will

require a second-look laparotomy.[4] We believe that to avoid postoperative short gut syndrome, an aggressive approach to maintaining bowel length is essential. Every effort should be made to retain segments of small bowel with questionable blood supply, especially in those cases representing recurrent tumor with repeat resections or cytoreduction.

A second-look operation often becomes mandatory to assess ischemic bowel.[5,6,7] In those cases, most surgeons temporarily close the abdomen with a wound vacuum device. The following day, the patient is re-explored, and final anastomoses are done in clearly viable bowel during the second-look operation. This time-tested approach is safe, but, open second-look laparotomies are time-consuming and create psychological, financial, and physical burdens for the patients and their families. Second-look procedures are also associated with increased rates of wound complications and may delay the patient's recovery.

## METHODS

The author has developed a simple, time-efficient approach to solving this dilemma. Four patients with midgut carcinoid underwent extensive mesenteric lymphadenectomy for boggy mesenteric lymph node metastasis at the root of the small bowel mesentery **(Figure 1)**. In each of these 4 patients, at the completion of the extensive lymph node dissection, a segment of intestine appeared to show signs of vascular compromise. All 4 patients had previous bowel/mesenteric resections at other institutions and were at risk for short gut syndrome if significant lengths of small bowel were resected. Thus, it was imperative to maintain the maximal length of bowel possible. We applied a simple novel approach in solving this difficult problem.

At the completion of the lymphadenectomy, the segments of bowel showing signs of possible ischemia were preserved, based on signs of perfusion determined by gross visual inspection and/or confirmed with Doppler examination, even if the Doppler signal was weak. A side-side anastomosis was performed in the standard fashion. A Jackson Pratt (JP) drain was then placed in an area adjacent to the anastomosis, and the drain was brought out through the abdominal wall in the same quadrant to minimize the length of the drain's path from the abdominal wall to the questionable anastomosis. The abdominal incision was then closed in the usual fashion. Postoperatively, the exudate from the JP drain was carefully inspected every few hours for evidence of intestinal perforation or anastomotic disruption. Forty-eight hours

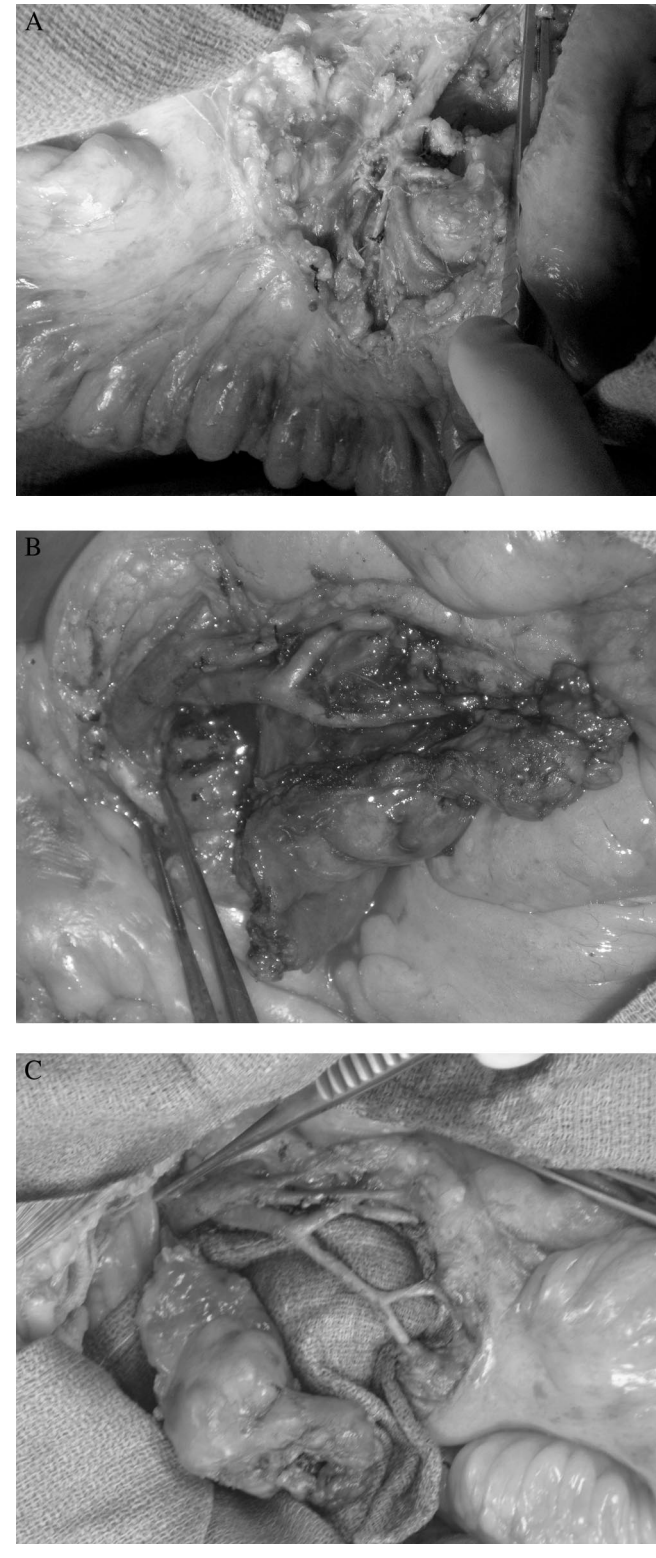


**Figure 1.** Extensive mesenteric lymphadenectomy.

after the primary operation, a second-look operation was performed. A pneumoperitoneum (10mm Hg) was established easily using the JP tubing as the $CO_2$ inflation port **(Figure 2)**. The JP tube was removed, and a 5-mm trocar was inserted into the abdomen via the tract of the JP drain. Segments of previously questionable dusky bowel and the anastomosis were inspected with a laparoscope **(Figure 3)**. In 3 cases, the intestine was grossly normal in appearance with good peristalsis and showed no evidence of ischemia or congestion.

## RESULTS

All 3 second-look operations were completed in approximately 5 minutes, and all 3 patients recovered without complication or prolonged hospital course. The fourth patient progressed extremely well postoperatively, and

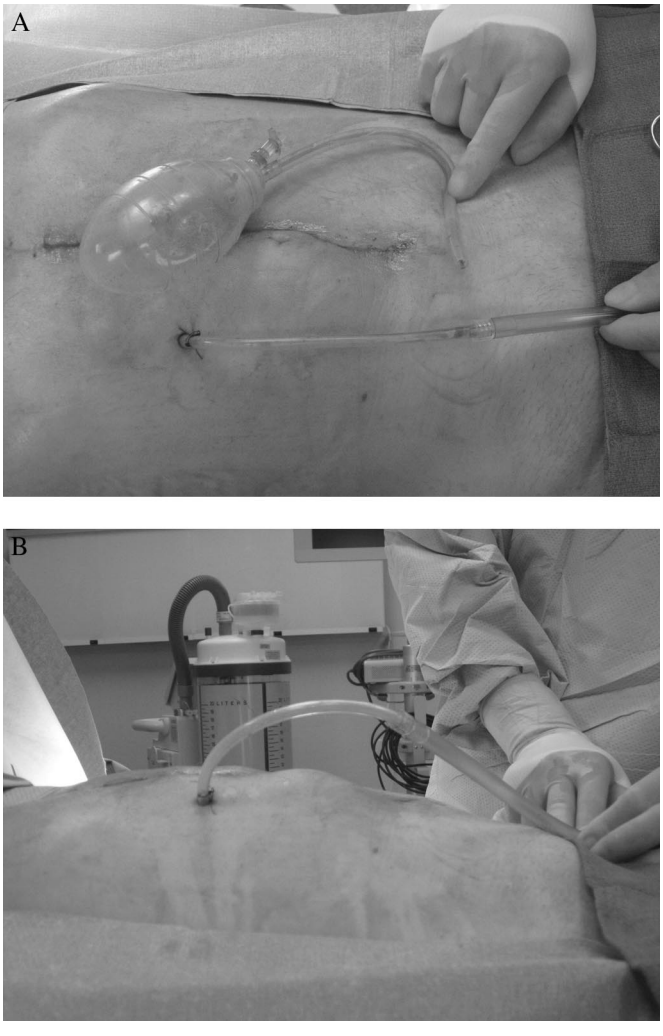


**Figure 2.** Jackson Pratt exit near anastomosis site.

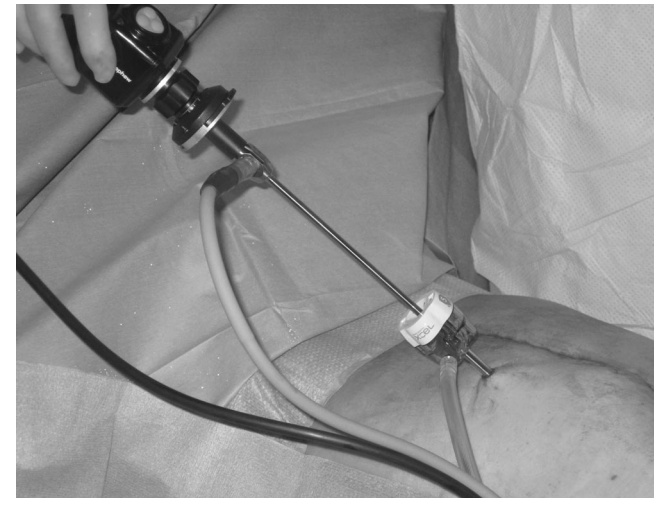

**Figure 3.** Laparoscope and trocar inserted via Jackson Pratt tract.

the planned second-look laparoscopy was deferred. By postoperative day 3, the patient tolerated oral intake and regained bowel function with bowel movement. Drainage from the JP drain remained serous and showed no evidence of bowel perforation or anastomotic disruption. The planned second-look operation was deemed unnecessary, and the JP drain was removed uneventfully. The patient was discharged to home without a prolonged hospital stay.

## DISCUSSION

We have developed an easy technique that can be used to deal with intraoperative findings of questionable ischemic bowel. This technique has been used at our institution with success. Leaving a JP drain in place can assist health care providers in detecting signs of ischemic perforation at the earliest possible time and provides easy access for the surgeon to conduct a confirmatory second-look operation as indicated in a rapid and safe fashion with minimum trauma to the patient. This approach, which has allowed us to save some small intestine length in patients who are otherwise at high risk of suffering from short gut syndrome, is easy, safe, and does not delay patient recovery. This technique avoids subjecting patients with advanced cancer to 2 major open abdominal surgeries in a short period of time. Even a limited open second-look procedure presents major physical stress in patients who in addition to their extensive mesenteric resections also commonly undergo extensive liver cytoreduction.

## CONCLUSIONS

In summary, this technique provides an easy solution for the intraoperative finding of questionable blood supply to any intraabdominal organs. This approach can be considered in any other surgical setting, such as bariatric, trauma, or any intraabdominal procedure when intestinal or any other intraabdominal organ ischemia has been encountered.

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