

## The laparoscopic second look for ischemic bowel disease

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### Abstract

**Background:** Survival after acute vascular ischemia depends on a second look laparotomy to detect extending bowel compromise and to verify the integrity of the anastomosis. In a series of five consecutive patients with acute ischemic bowel disease, we used laparoscopic technique to determine if a formal laparotomy could be avoided.

**Methods:** following the resection of ischemic bowel in five consecutive patients, two laparoscopic trocars were inserted in the lower abdominal quadrants and covered by sterile gloves. Forty-eight to 72 h following the primary operation, the abdomen was inflated via a trocar and secondary assessment done by laparoscopy.

**Results:** In all patients, the integrity of the anastomosis and viability of the remaining bowel was accurately assessed by laparoscopy.

**Conclusions:** Using minimally invasive techniques, a second look laparotomy was avoided in 5 patients with ischemic bowel disease.

**Key words:** Ischemic bowel disease — Laparoscopic second look — Bowel disease

In order to avoid a formal second-look operation following massive resection of the bowel for ischemic infarction, we utilized laparoscopic techniques in five patients—three with acute arterial embolism and two with acute venous thromboses. At the primary operation, two 10/12-mm laparoscopic trocars were placed in the lower quadrants of the abdomen. Instead of performing a second formal laparotomy, the bowel was inspected laparoscopically. In the first patient, a laparotomy was done to confirm the laparoscopic findings as it was our first experience, but in the other cases, the diagnosis was entirely laparoscopic.

### Methods and case reports

#### Case 1

A 72-year-old man known to suffer from polycythemia vera was admitted with abdominal pain which was associated with vomiting and abdominal distension. X-ray of the abdomen showed a single distended loop of small bowel. The venous phase of the angiography revealed occlusion of a main branch of the superior mesenteric vein (SMV).

At laparotomy the small bowel was gangrenous 30 cm from the ligament of Trietz to 15 cm from the ileocecal valve. This was resected and the remaining small bowel was anastomosed. Finally, two 10/12-mm laparoscopic trocars covered with sterile gloves were inserted in the right and left lower quadrants of the abdomen. Seventy-two hours later, the abdominal cavity was inspected laparoscopically, revealing normal loops of small bowel. Using an endo-Babcock forceps the omentum was rolled out of the way, enabling full visualization of the intact anastomosis. However, due to our lack of experience with the technique, it was decided to perform a laparotomy in order to confirm the laparoscopic findings.

#### Case 2

An 85-year-old male known to suffer from chronic atrial fibrillation presented with abdominal pain. An angiogram revealed an embolus occluding the superior mesenteric artery (SMA) distal to the origin of the middle colic artery. At emergency laparotomy, an ischemic jejunum 95 cm distal to the ligament of Treitz extending to the transverse colon was resected, and an end-jejunum-to-side-transverse-colon sutured anastomosis was performed. Two 10/12-mm laparoscopic trocars were placed in the lower quadrants of the abdomen, fixed, and covered with sterile gloves. Seventy-two hours later, a laparoscopic second look was performed. The omentum, which was covering the anastomosis, was rolled away by an endoscopic grasper, enabling full visualization of the intact suture lines and the remaining viable bowel.

#### Case 3

A 73-year-old man was admitted with colicky abdominal pain and vomiting. Over the next 24 h the patient's condition deteriorated, and an operative exploration was performed. Gangrenous ischemic small bowel was resected 20 cm from the ligament of Treitz to 90 cm proximal to the cecum, and an end-to-end anastomosis was performed. Two 10/12-cm laparoscopic trocars were placed in the lower quadrants, and 48 h later, a laparoscopic second look was scheduled. A laparoscope was inserted via the left portal and an endo-Babcock forceps via the right trocar. With gentle manipula-

**Table 1.** Laparoscopic second-look findings

Patient	Age/sex	Predisposing factors	Angiography	Operation	Laparoscopic second look			Outcome
					Time	Findings	Procedure	
1	72 M	Polycythemia	SMV occlusion	Resection of small bowel—45 cm remaining	72 h	Normal	Laparotomy due to inexperience	Oral feeding
2	85 M	Atrial fibrillation	SMA embolus	Resection of 95 cm	72 h	Normal	None	Uneventful
3	73 M	Deteriorating abdominal signs	Not done	Resection of small bowel—110 cm remaining	48 h	Normal	None	Uneventful
4	62 M	Suspected familial coagulopathy	SMA occlusion	Embolectomy of SMA; attempted revascularization	48 h	Blood-stained, foul-smelling, ischemic loops	Resection of small bowel and Rt colon; third look—normal	On home parenteral nutrition
5	84 M	Atrial fibrillation	SMA occlusion	Embolectomy of SMA	48 h	Ischemic small bowel	Resection of small bowel 48 hours later; third look—normal	Died of cardiac arrest

tion, all the remaining bowel could be visualized; it was found to be viable, and the anastomosis was intact.

#### Case 4

A 62-year-old male with a history of an undetermined blood coagulopathy was admitted suffering from abdominal pain. Angiography revealed occlusion of the origin of the superior mesenteric artery. At laparotomy, embolectomy was attempted, and as it failed, a left iliac artery to SMA Gore-Tex bypass graft was performed. Laparoscopy, via the previously placed trocars, 48 h later, showed blood-stained, foul-smelling fluid and loops of necrotic bowel. Massive resection of the small bowel and right colon with jejuno-colic anastomosis was performed. A laparoscopic third look was normal and the patient is doing well on home parenteral nutrition.

#### Case 5

An 84-year-old male was admitted with abdominal pain and atrial fibrillation. Angiography showed occlusion of the distant SMA. At laparotomy, there was ischemia of the mid-ileum, and an embolectomy of the SMA resulted in apparent improvement of the bowel viability. Two trocars were placed in the lower abdomen. Forty-eight hours later, a laparoscopic second look revealed a 10-cm segment of ischemic small bowel, which was resected. The trocars were left in place for a third look, revealing no further pathology. However, the patient died 3 weeks later from a coronary event.

### Discussion

Survival after acute ischemia of the intestines depends upon operative treatment as soon as possible after the onset of symptoms. The usual management is an urgent preoperative angiogram that may demonstrate either an embolus or thrombosis of the superior mesenteric artery, or acute thrombosis of the SMV. Embolectomy, thrombectomy, and thrombolysis have been attempted, but with limited success. However, when gangrene is apparent, resection of the gangrenous and ischemic bowel is performed. The extent of the resection is problematic as accurate identification of isch-

emic bowel that may undergo subsequent infarction is difficult. Various measures have been used in an attempt to detect this "subischemia." At the time of surgery, tissue oxygen electrodes applied to the serosa have been tried, as have doppler ultrasonography and laser doppler flowmetry [2]. In the postoperative period, leukocytosis, high serum phosphate levels, and base deficiency are ominous signs. Recently, an animal study has shown that fluorescein-assisted laparoscopy was as accurate as laparotomy in identifying loops of induced ischemic bowel [5].

The safest and most accepted procedure is to perform a mandatory second-look laparotomy after 12–72 h. This will define the integrity of the bowel anastomosis, any extension of vascular thrombosis, and the presence of more segments of ischemic bowel [7].

In order to avoid a second operation, we used laparoscopic minimal invasive techniques. At the end of surgery, in all of our cases, laparoscopic trocars were inserted, covered with sterile gloves, and left in place in the lower quadrants of the abdomen. As a second-look procedure 48–72 h later, the abdomen was inflated via one of the trocars and the remaining bowel and anastomosis were visualized by laparoscopy (Table 1).

Prior reports have shown laparoscopy to be feasible in the diagnosis of mesenteric venous thrombosis [9] and in emergencies [1]. Recently, second-look laparoscopy has been performed by inserting the trocars at the time of the second surgery [3] or via previously placed drains [8].

The safety of laparoscopy as a diagnostic and therapeutic procedure is well established. Insufflation, however, may have an adverse effect in those patients with ischemic bowel disease by decreasing the mesenteric artery flow. This has been shown to occur in dogs when the intraperitoneal pressure rises above 20 mmHg [6]. We took care to limit the pressure to 15 mmHg during the procedure.

Two questions may be of interest for other studies: First, should an omentectomy be performed in those cases in which a very limited bowel resection is done at the primary

procedure? This will greatly facilitate the laparoscopic visualization at the second look. Second, should the patient be taken to the operating theater or should the laparoscopic second look be performed under sedation in the intensive care unit [4]?

Further study is necessary to determine the future of laparoscopy as a diagnostic modality for the acute abdomen. These studies will decide its value as a primary diagnostic modality in ischemic bowel disease or, as in our cases, as a substitute for the second-look operation.

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