Laparoscopic Ileocolic/Right Hemicolectomy for Crohn's Disease

8

Barry Salky

8.1 Introduction

Since the original paper describing Crohn's disease (CD) [1], complications requiring surgery continue to be seen. Laparoscopic surgery has had an impact in this disease, although at a much lower percentage than laparoscopic surgery for cancer. The many reasons include severe inflammatory disease with fistula and phlegmon, thickened mesentery, steroids and previous open surgery. However, over 20 years of treating this disease with laparoscopic surgery, we have developed a systematic approach in conjunction with newer energy devices, which has led to a high completion rate and low complication rate with laparoscopic surgery.

The indications for laparoscopic surgery are the same as for open surgery, including obstruction, abscess, fistula, cancer and perforation (rare). The most common indication is obstruction and the most common obstruction is fibrostenotic terminal ileal disease. Therefore, ileocolic resection is the procedure most commonly performed. As with open surgery, the goal is to remove the diseased segment with conservation of intestinal length and to restore intestinal continuity. The decision to perform a complementary diversion is beyond the scope of this chapter.

The preoperative evaluation of these patients is important for the detection of multiple segments or fistulas, all of which can affect the conversion to open surgery and extend operative times. Imaging techniques are changing, but CT with contrast and MR enterography are the mainstays. I always like to see a recent colonoscopy as well. Distal disease and/or incidental ileo-sigmoid fistulas are best known preoperatively. Fistulous disease, in and of itself, may not be an indication for laparoscopic surgery but neither is it a contraindication. Multiple fistulas are common in this disease and they can make both open and laparoscopic surgery problematic but their presence is not a contraindication to a laparoscopic approach. All abscesses large enough to be drained are approached by interventional radiology preoperatively but recurrence is not infrequent. These patients also can be approached laparoscopically, knowing that the rate of conversion to open surgery will be higher in this group.

An early prospective, randomised trial of uncomplicated ileocolic resection in CD showed a short-term advantage for laparoscopic resection over open surgery [2]. A 10-year follow-up of this paper confirmed long-term advantage as well [3]. Several other feasibility studies have also shown an advantage over open surgery [4–6]. Nevertheless, a large percentage of CD surgery is performed in an open fashion [7].

Since 2007, I have changed from laparoscopic-assisted ileocolic/right colon resection to completely laparoscopic surgery with intracorporeal anastomosis. The advantages of an intracorporeal anastomosis have been documented, including statistically significant reductions in morbidity, pain and length of stay [8].

8.2 Pre Operative Steps

The steps listed here are my own personal technique, developed over more than 20 years utilising laparoscopic surgery to treat CD. Standard mechanical bowel prep, antibiotic prophylaxis 1 h our before incision and mechanical thromboembolic prophylaxis are utilised.

8.2.1 Patient Positioning

The patient is placed supine with both arms at the patient's sides, secured in an atraumatic way. I tend to use some type of padding under the elbow to protect the nerves. If

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there is a known ileo-sigmoid fistula, then the patient is in a modified lithotomy position in order to have access to the rectum. Any fistula division from the sigmoid is checked for leak with intraoperative sigmoidoscopy. All patients have an oral gastric tube, which is removed before anesthesia reversal and a Foley catheter is inserted. The Foley is removed on post-op day 1, unless a bladder fistula was present, in which case it is removed on post-op day 4. The surgeon is on the patient's left, along with the assistant. The monitor is on the patient's right.

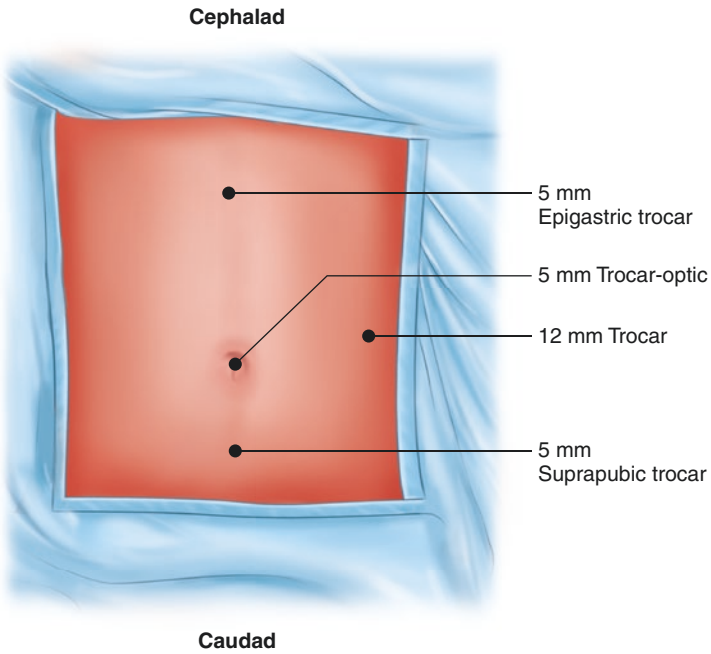
Figure 8.1

The surgeon operates out of the left lower quadrant and suprapubic ports

8.2.2 Trocar Positioning

If the patient has not had previous surgery and there is no palpable inflammatory mass, an infraumbilical 5-mm incision is made, through which a Veress needle is inserted. Alternatively, an optical trocar or open Hasson technique can be used. If the patient has had previous abdominal surgery, then I prefer an open Hasson entry in the left lower quadrant. Under no circumstance is the entry made in a previous scar. Pneumoperitoneum pressure is set at 13 mmHg and a 30° optic is preferred. There is a 5-mm port in the epigastrium, a 5-mm suprapubic port and a 12-mm port in the left lower quadrant. The surgeon operates out of the left lower quadrant and suprapubic ports (Fig. 8.1).

Figure 8.1



8.3 Operative Steps

- The area of the terminal ileum and caecum is retracted toward the right lower quadrant with an atraumatic grasper (Figs. 8.2 and 8.3). This will put the ileocolic vessels on stretch. The important landmarks to identify before dissection are the duodenum, vena cava and the ileocolic blood vessels. These can be seen even in obese patients.
- The mesentery is scored with monopolar electric energy (Fig. 8.4). (Ultrasonic energy can be used as an alternative.) This scoring will allow the energy source that is used to divide the major blood vessels to be placed directly on the blood vessel instead of on the

Figure 8.2

In situ image of short-segment Crohn's disease (CD) of the terminal ileum with creeping fat. A normal appendix is visible in the background, along with the normal caecum

peritoneum over the blood vessels. In my experience, there will be less bleeding during the division of the blood vessels by any energy device when the peritoneum is scored first. As this is not a cancer case, the dissection of the ileocolic vessels is higher on the vessels.

- I prefer a medial-to-lateral dissection. Figure 8.5 shows the initiation of the proper dissection plane, which is avascular. The right ureter is clearly seen at the tip of the 10-mm bipolar device. Over the years, I have found this device to be well suited for a blunt, medial-to-lateral dissection.

Figure 8.2

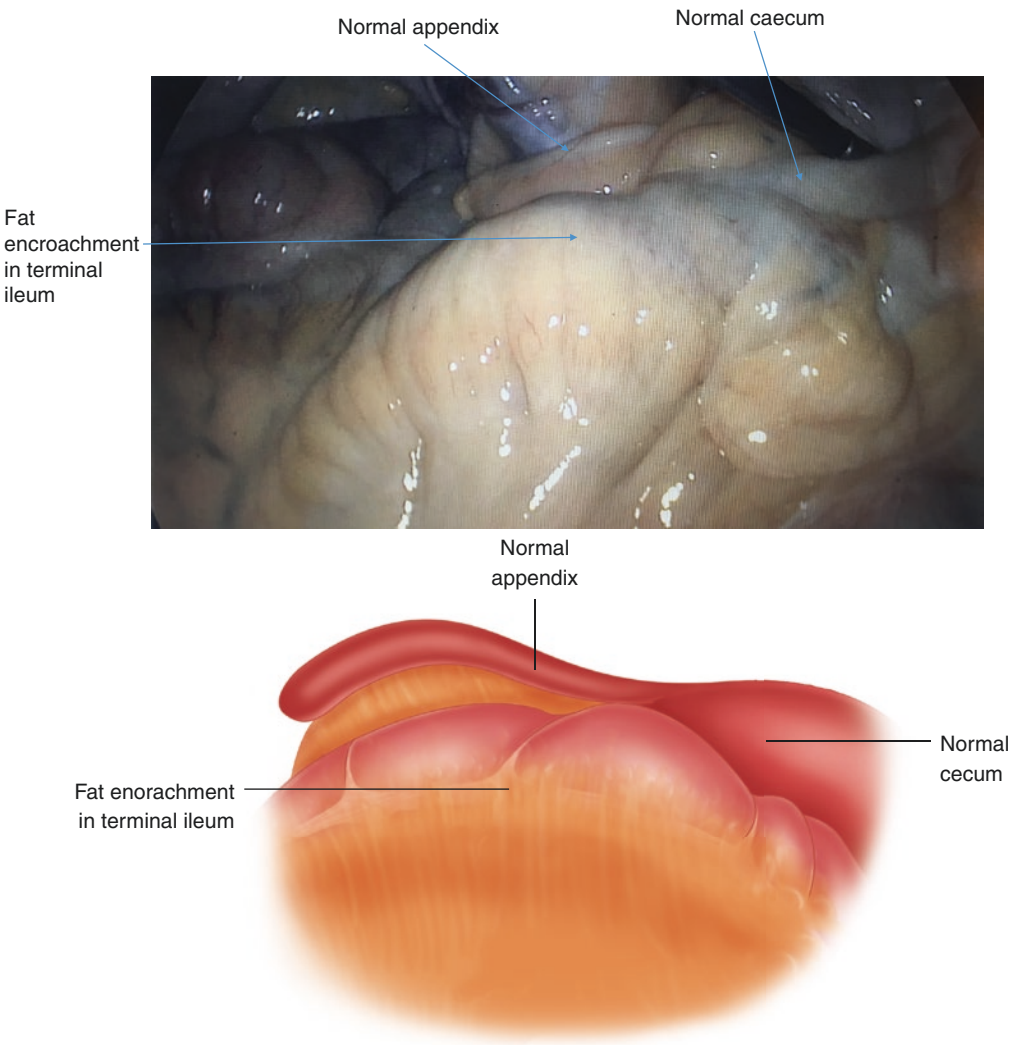


Figure 8.3

The terminal ileum/caecal area is retracted toward the right lower quadrant with an atraumatic grasper

Figure 8.3

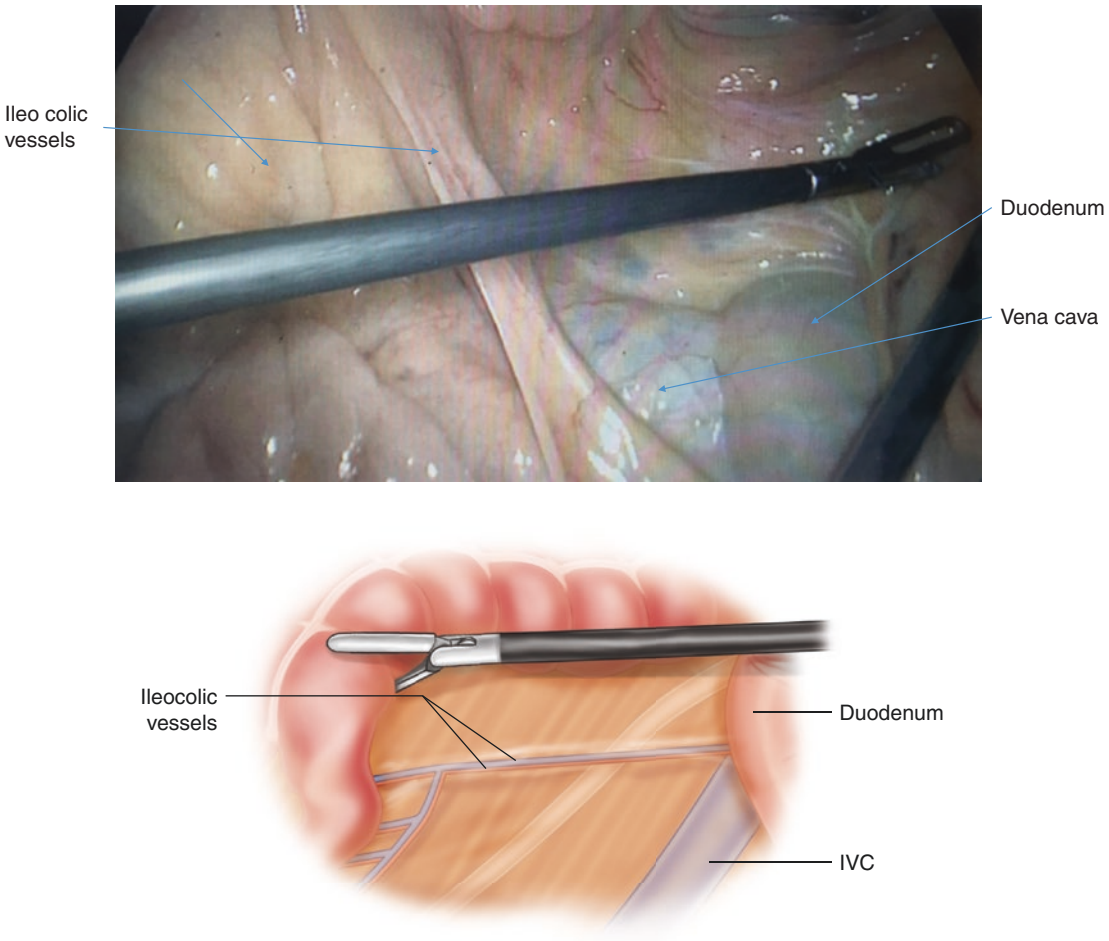

Ileo colic vessels
Duodenum
Vena cava
Ileocolic vessels
Duodenum
IVC

Figure 8.4

The mesentery is scored with monopolar electric energy

Figure 8.4

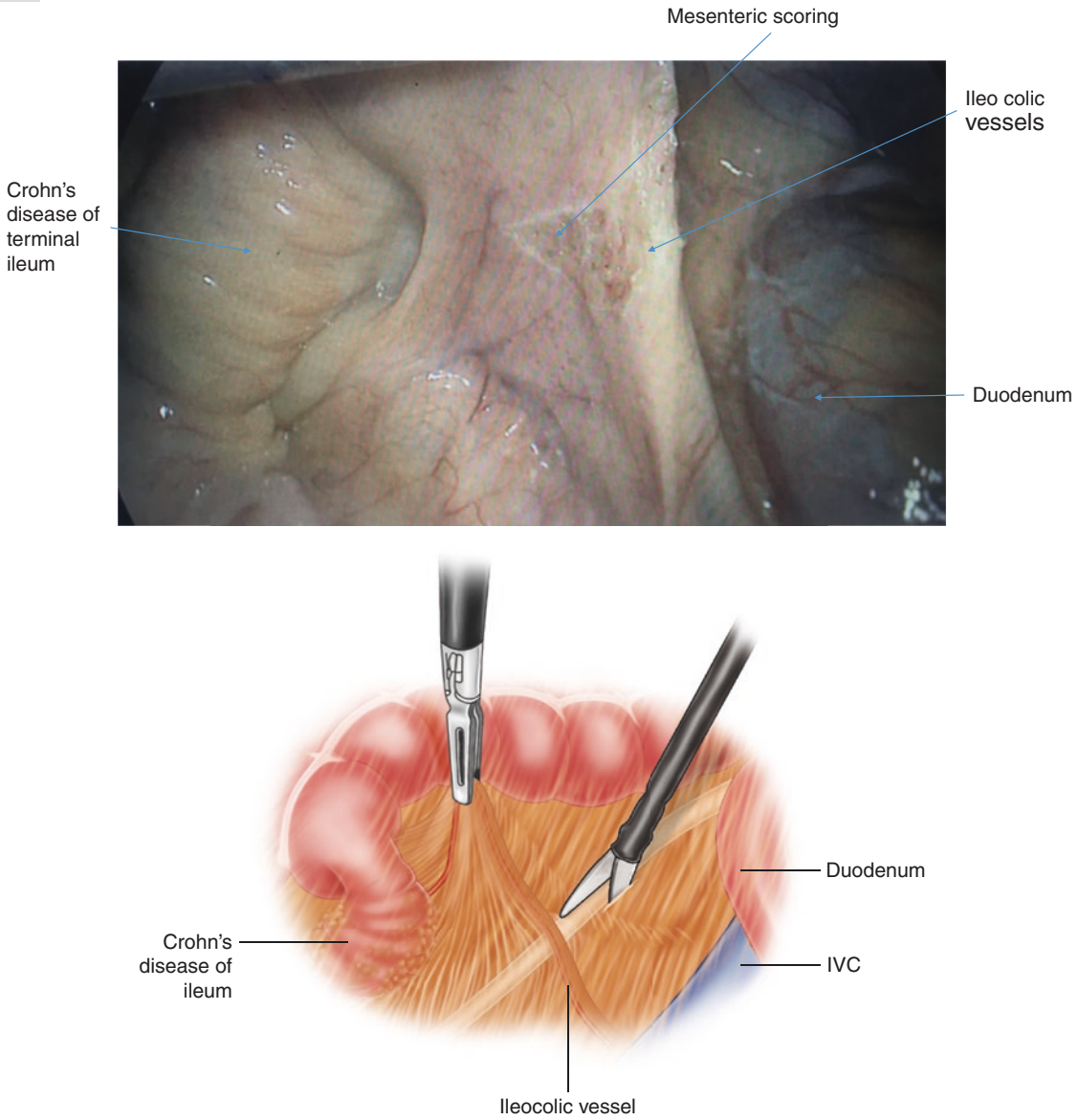
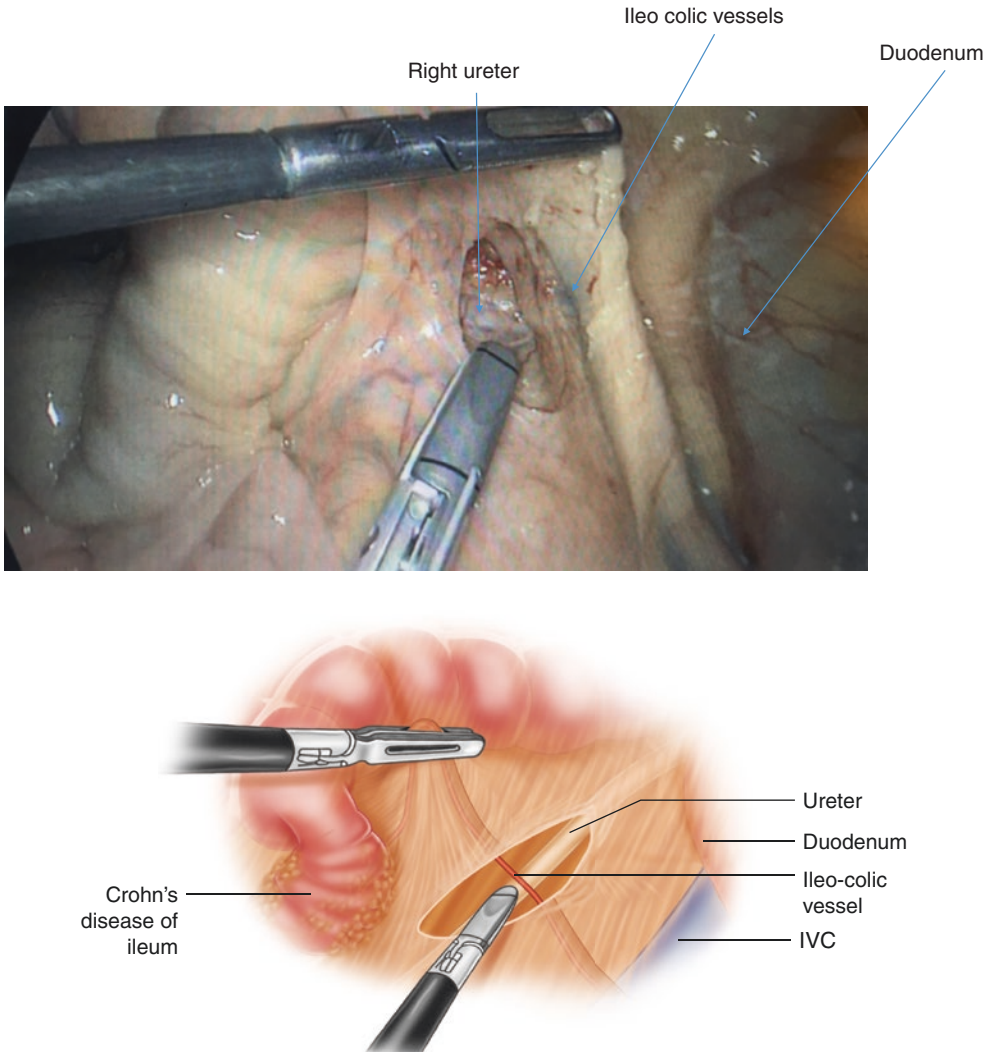

Mesenteric scoring
Ileo colic vessels
Crohn's disease of terminal ileum
Duodenum
Duodenum
Crohn's disease of ileum
IVC
Ileocolic vessel

Figure 8.5

Medial-to-lateral dissection is initiated. The right ureter is clearly seen at the tip of the bipolar device and the duodenum is seen to the right

Figure 8.5


Ileo colic vessels
Duodenum
Right ureter
Ureter
Duodenum
Ileo-colic vessel
IVC
Crohn's disease of ileum

- The ileocolic vessels are divided with the 10-mm bipolar device (Fig. 8.6). It is important to release the traction on the blood vessels during this manoeuvre, allowing a better seal with any energy device. I keep an endoloop open on the OR table just in case there is bleeding from the cut end of the vessels.
- The peritoneum over the ileal mesentery is also scored using monopolar electric energy (Fig. 8.7). Figure 8.8 clearly shows the proper medial-to-lateral plane of dissection. The retroperitoneal fascial plane is intact throughout. The ureter is deep to the fascia.
- An avascular window is developed beneath the ileum at the chosen transection site (Fig. 8.9). I prefer to do this with laparoscopic scissors. At no time is any energy applied when the dissection is next to the bowel wall.
- The 60-mm stapler is placed through the window and the ileum is transected intracorporeally (Fig. 8.10). The size of the stapling cartridge is determined by the thickness of

Figure 8.6

The ileocolic vessels are divided with the 10-mm bipolar device

the bowel wall, just as in open surgery. I try to place the stapler at right angles to the bowel wall and I transect with one stapler cartridge.

- The colon is also divided with a 60-mm stapling device (Fig. 8.11). Usually, two cartridges are required to divide the ascending colon. Figure 8.12 shows a properly placed staple line across the colon. Notice that there are no "dog ears," and because the ascending colon blood supply has not been dissected, its vascularity is intact.
- It is important to line up the base of the mesentery in proper position to prevent a twisted anastomosis (Fig. 8.13).
- Once the base of the mesentery is in proper position, the ileum and ascending colon are aligned (Fig. 8.14). I prefer an isoperistaltic anastomosis.
- An enterotomy is made in the ileum by using the monopolar cutting current with the hook electrode (Fig. 8.15). It is important to confirm that the incision is into the lumen, otherwise a false passage with the stapling device is possible. The exact same incision is made into the colon.

Figure 8.6

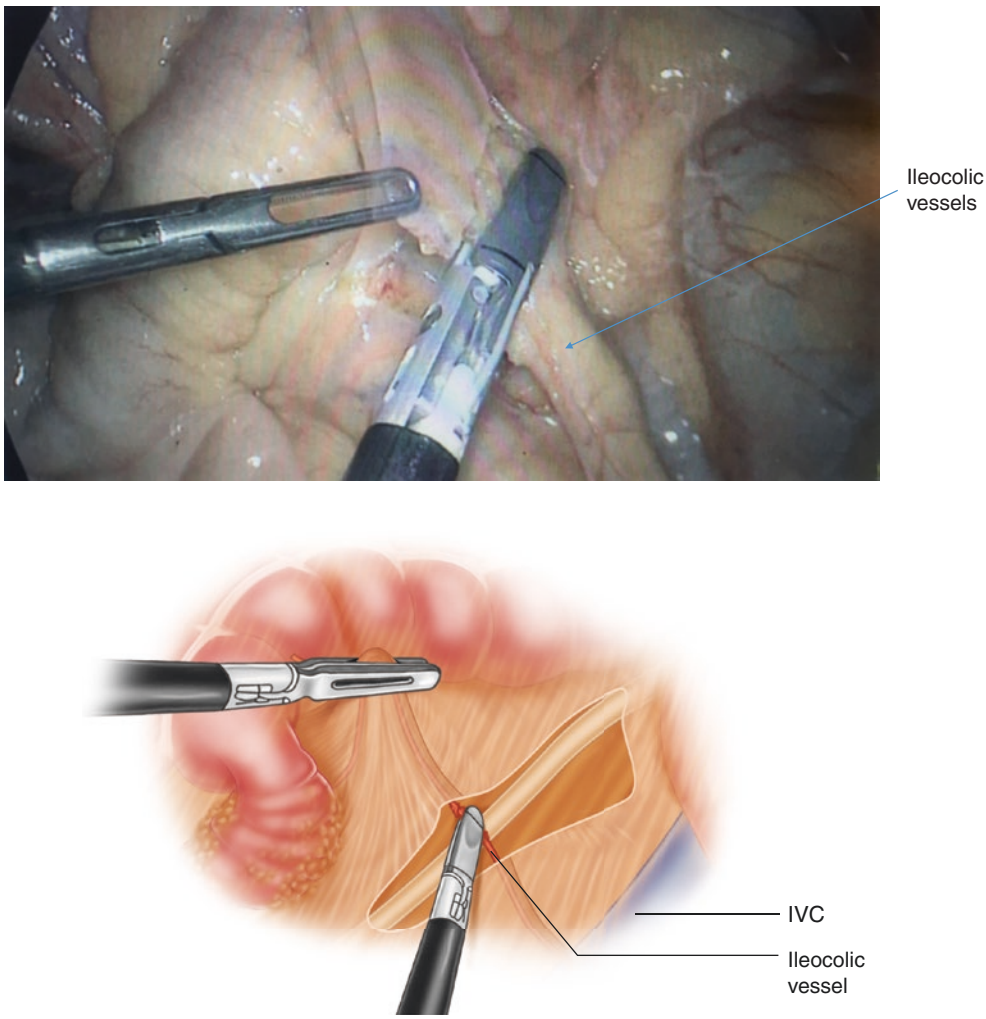


Figure 8.7

The peritoneum over the ileal mesentery is also scored using monopolar electric energy. The cut end of the ileocolic vessels are seen at the lower right

Figure 8.7

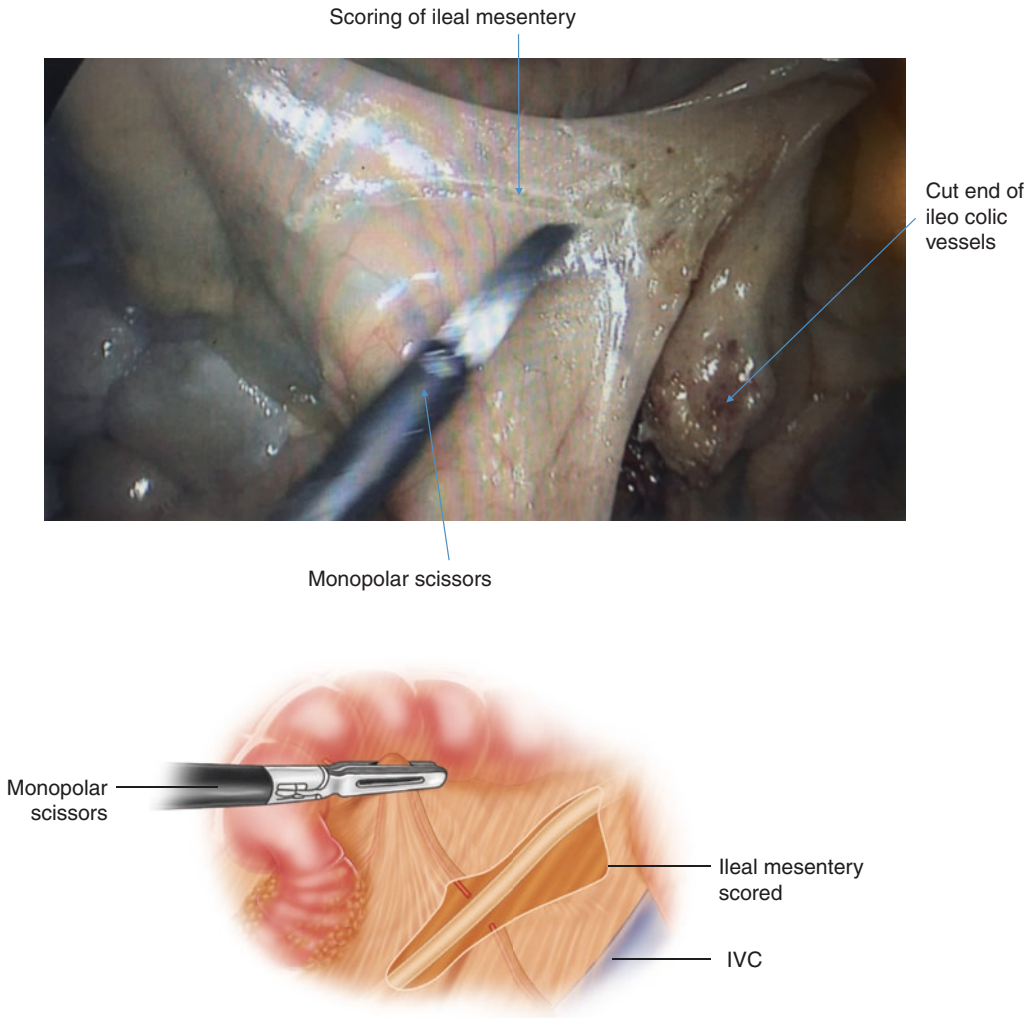
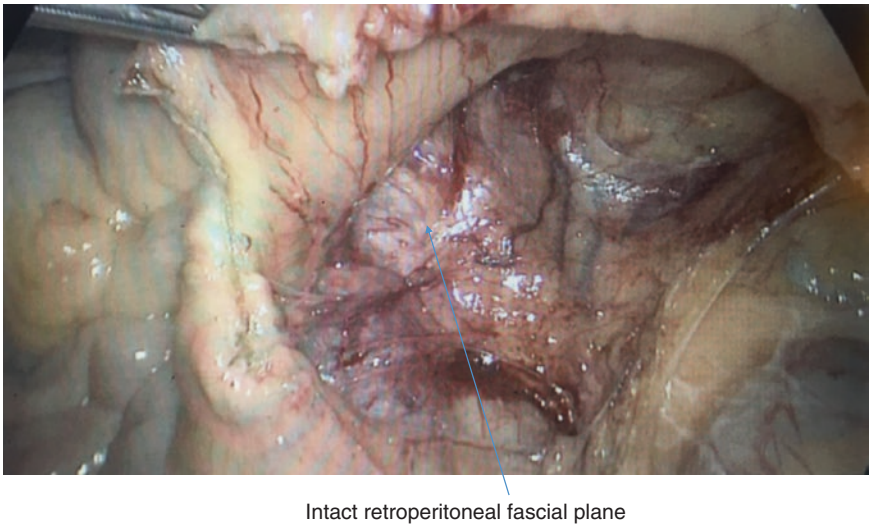

Scoring of ileal mesentery
Cut end of ileo colic vessels
Monopolar scissors
Monopolar scissors
Ileal mesentery scored
IVC

Figure 8.8

The proper medial-to-lateral plane of dissection. The retroperitoneal fascial plane is intact throughout. The ureter is deep to the fascia

Figure 8.8


Intact retroperitoneal fascial plane

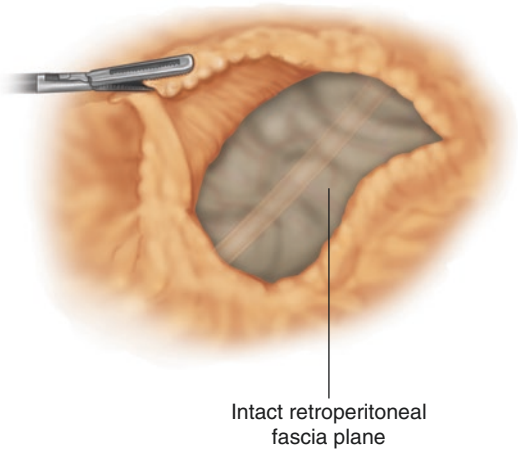

Intact retroperitoneal
fascia plane

Figure 8.9

An avascular window is developed beneath the ileum at the chosen transection site, using laparoscopic scissors

Figure 8.9

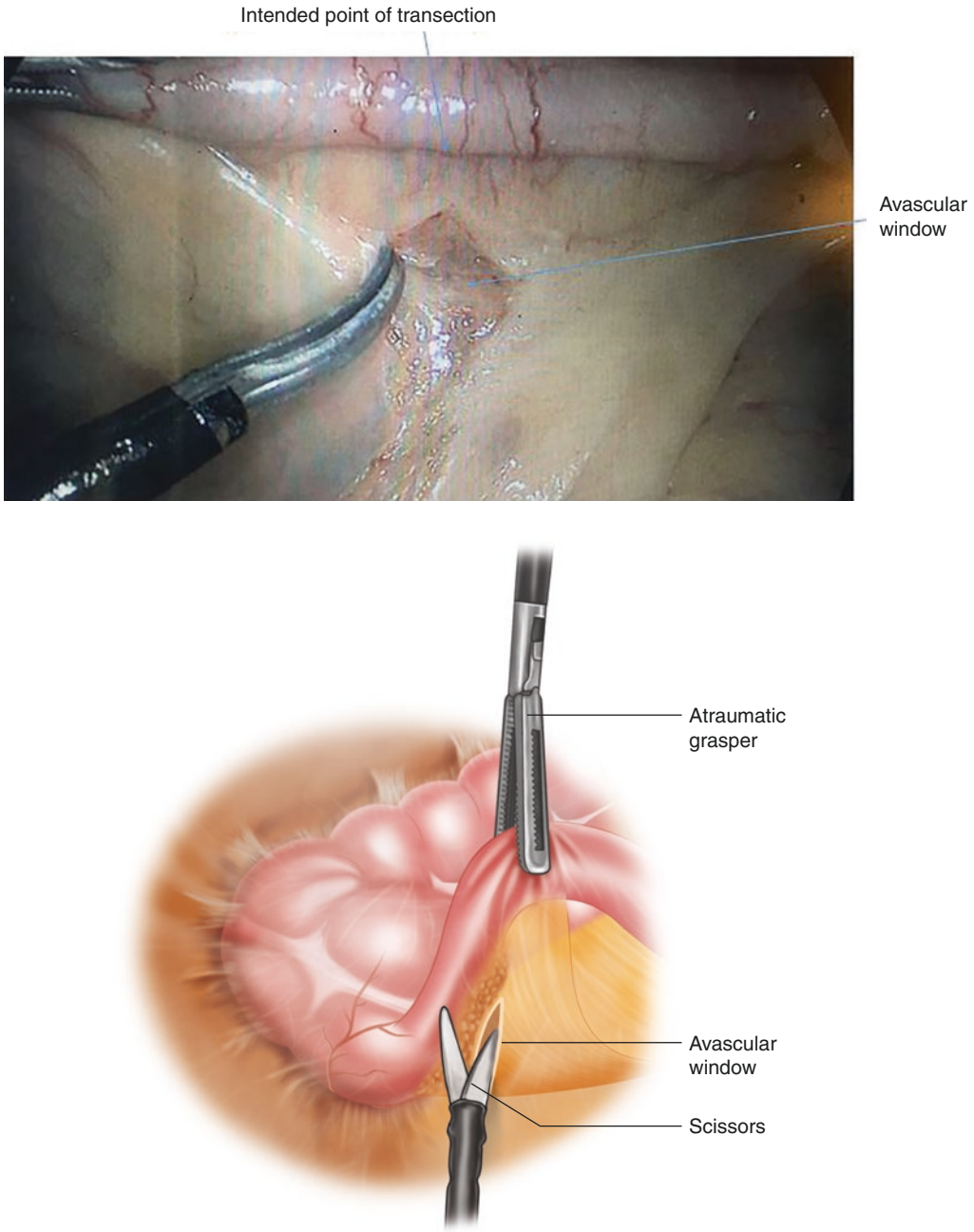

Intended point of transection
Avascular window
Atraumatic grasper
Avascular window
Scissors

Figure 8.10

The 60-mm stapler is placed through the window and the ileum is transected intracorporeally

Figure 8.10

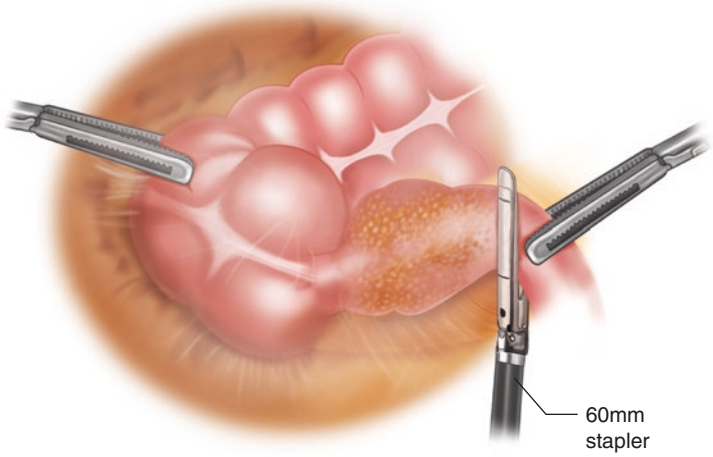


Figure 8.11

The colon is also divided with a 60-mm stapling device

Figure 8.11

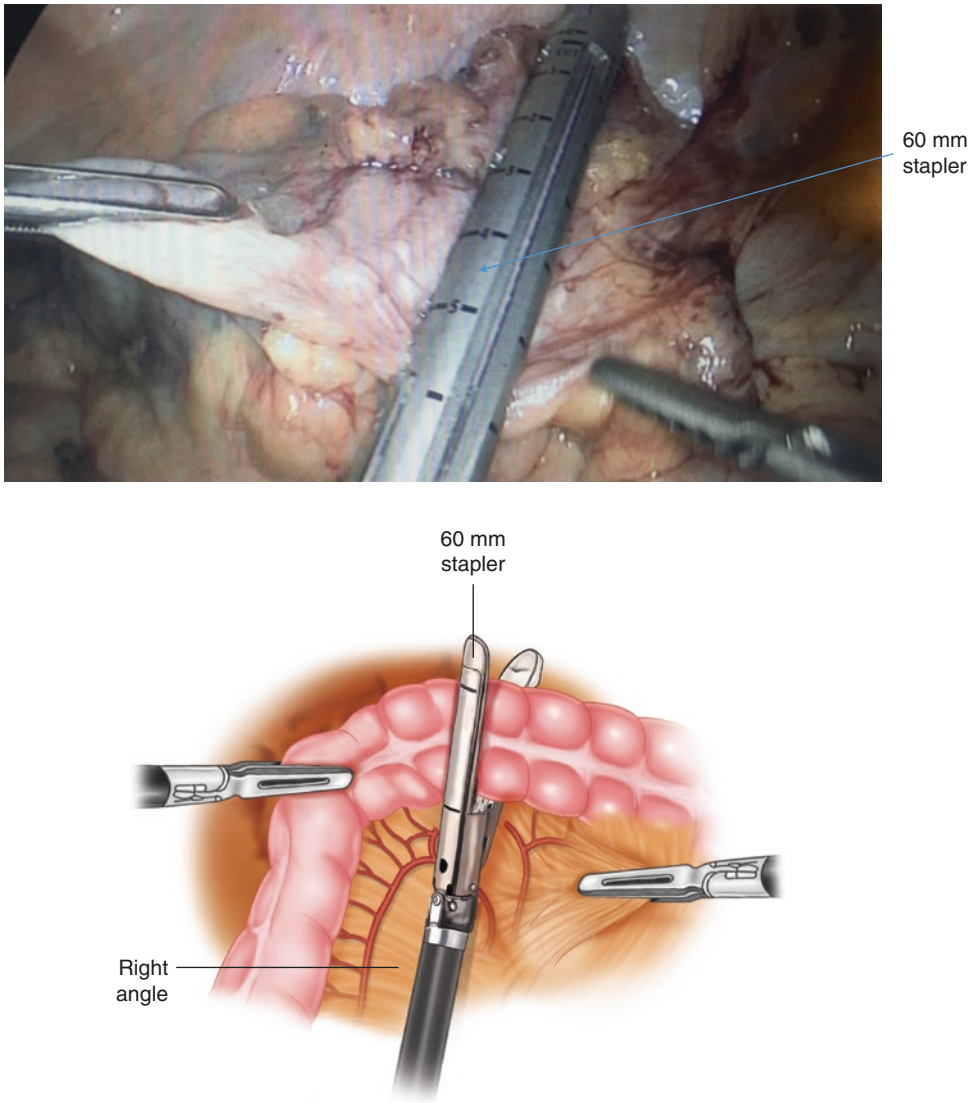


Figure 8.12

A properly placed staple line across the colon

Figure 8.12

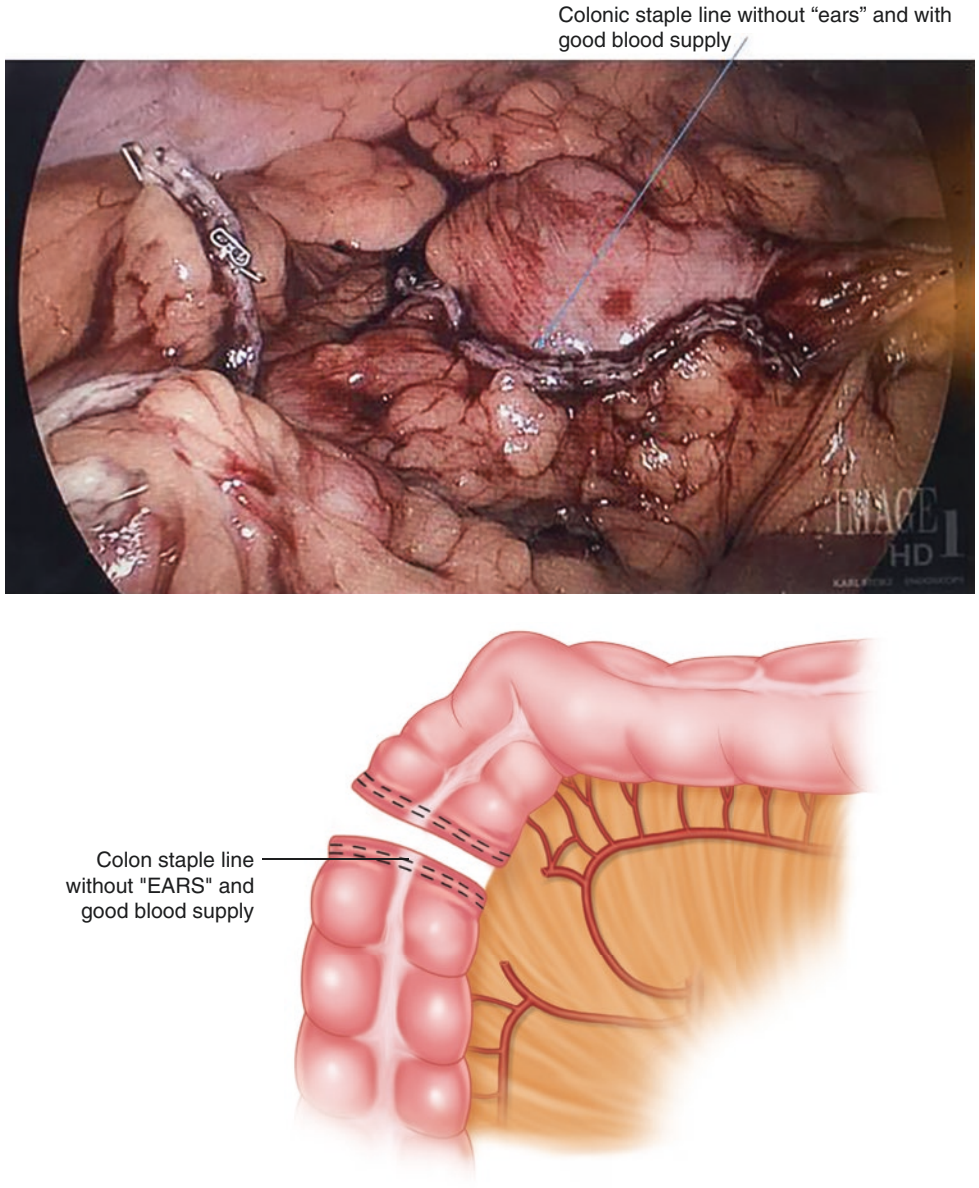

Colonic staple line without “ears” and with good blood supply
Colon staple line without "EARS" and good blood supply

Figure 8.13

It is important to line up the base of the mesentery. The base of the ileal mesentery is to the left and the ascending colon mesentery is to the right

Figure 8.13

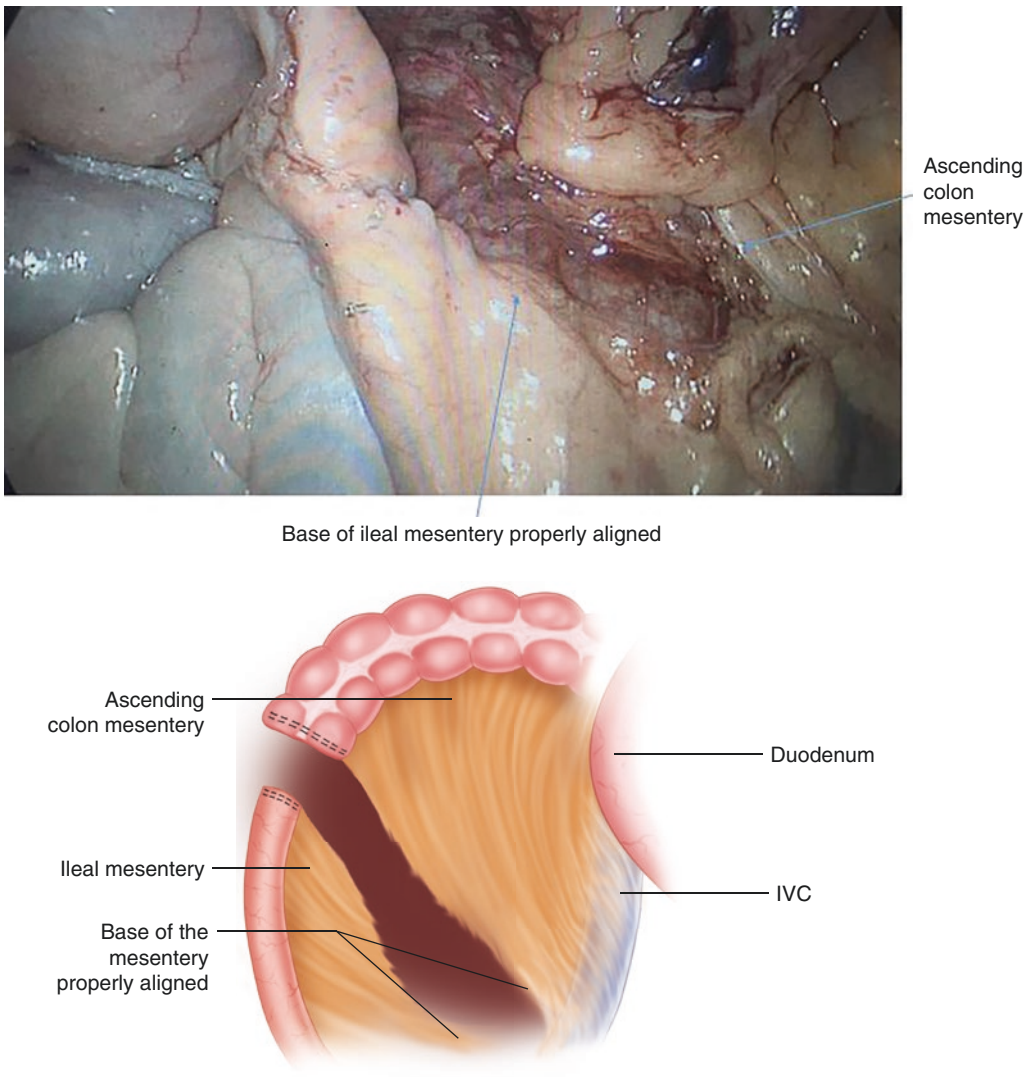

Ascending colon mesentery
Base of ileal mesentery properly aligned
Ascending colon mesentery
Duodenum
Ileal mesentery
IVC
Base of the mesentery properly aligned

Figure 8.14

Once the base of the mesentery is in proper position, the ileum and ascending colon are aligned. Notice the excellent vascularity of the two ends of the bowel

Figure 8.14

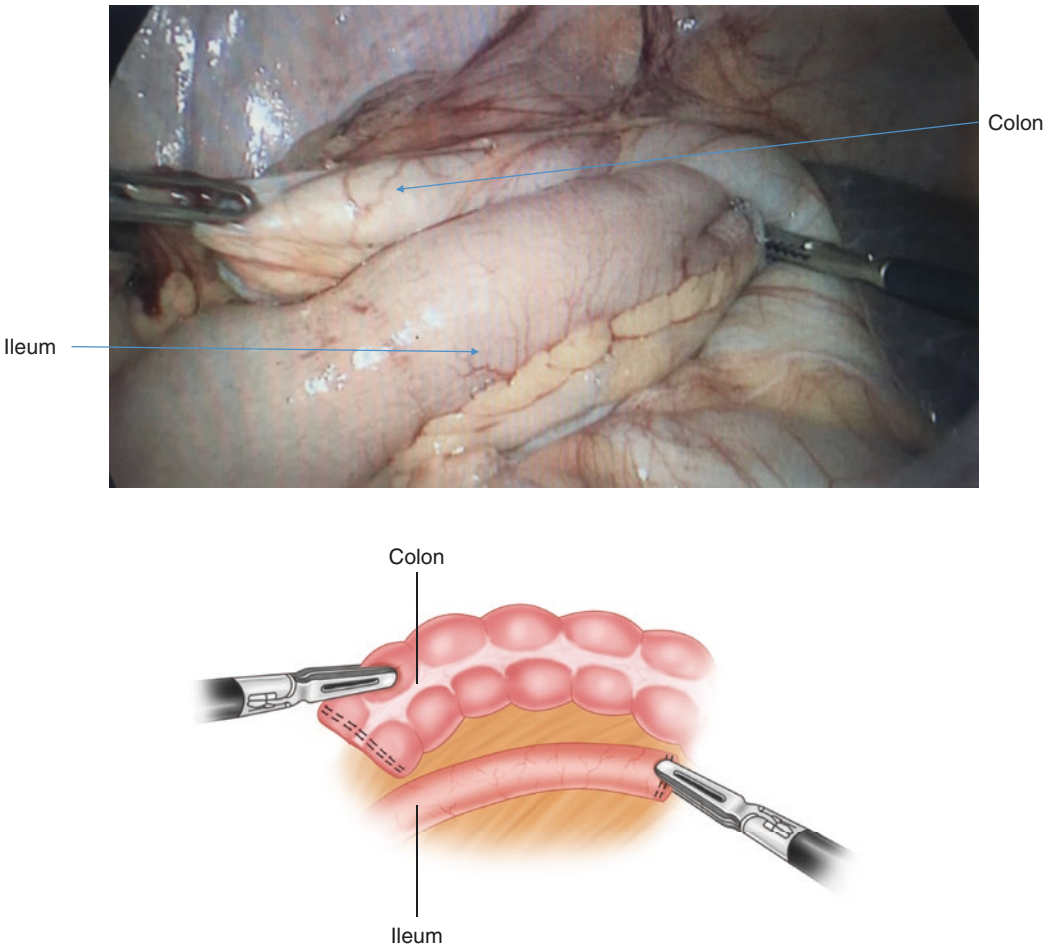
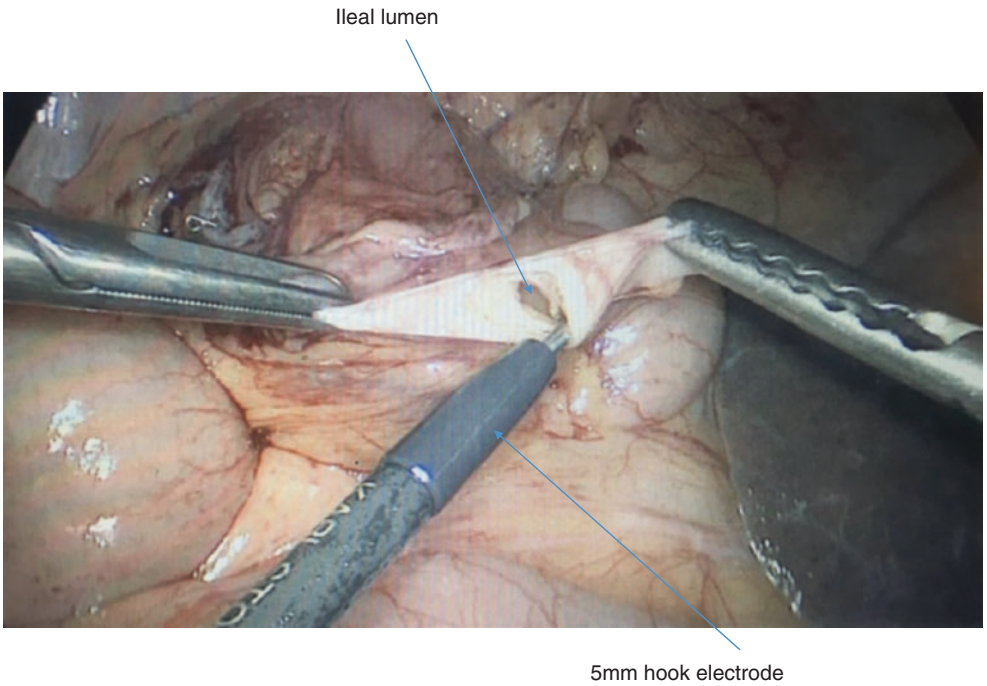
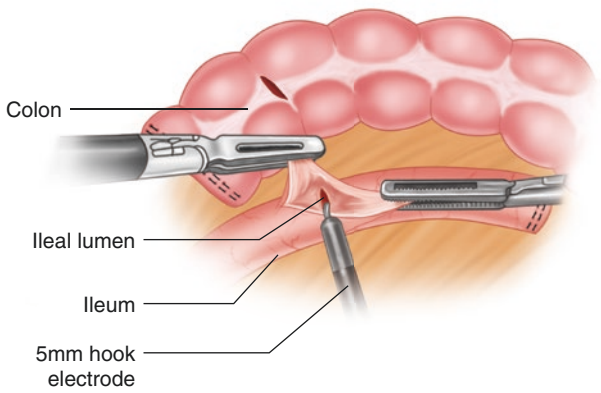


Figure 8.15

An enterotomy is made in the ileum by using the monopolar cutting current with the hook electrode; incision into the lumen is confirmed

Figure 8.15


Ileal lumen
5mm hook electrode


Colon
Ileal lumen
Ileum
5mm hook electrode

- The two ends of the linear stapling device are inserted into each of the enterotomies (Fig. 8.16). In general, it is easier to put the end of the stapler into the bowel that is closer to the surgeon (the ileum). The assistant holds the bowel onto the stapler while the other end is manipulated into the colon lumen. Once inserted all the way, the stapler is closed, activated and removed from the body. To prevent wound contamination, I extract the stapler into the 12-mm port and remove the port and the stapler at the same time. I have an assistant put a finger into the 12-mm port site while the sleeve is washed thoroughly with saline and then reinserted into the abdomen.
- Before I remove the 12-mm port and the stapler, I have an assistant grasp the distal cut staple line and elevate it (Fig. 8.17). This is an important manoeuvre to prevent any intestinal contents from going into the abdominal cavity while I am cleaning the 12-mm port. Between the elevation of the staple line and the pneumoperitoneum pressure, contamination is distinctly rare.
- This is also the time to check for bleeding from the suture line. If bleeding occurs, I prefer to control it with bipolar electric energy.
- Intracorporeal suturing skills are important. I begin toward myself and sew away from myself (Fig. 8.18).

Figure 8.16

The two ends of the stapling device are inserted into each of the enterotomies

Notice the assistant's grasper elevating the staple line away from the surgeon. This configuration allows the placement of the sutures at right angles to the bowel wall (as in open surgery). I prefer 2-0 Vicryl® for the inner layer and 3-0 Prolene® for the outer layer. I was trained in two-layer closure, but some surgeons prefer one-layer closure. Figure 8.19 shows a close-up view of the suturing of the full-thickness first layer. The manipulation of the suture material is not difficult laparoscopically. A precise closure is important, as in open surgery.

- The corner of the suture line is tucked by grasping it with the needle holder (Fig. 8.20). To facilitate this maneuver, the assistant's grasper is moved away from the corner. Simultaneously tucking the corner and pulling the suture can invert the corner. Figure 8.21 shows the completed first layer of the anastomosis.
- The second layer (seromuscular) (Fig. 8.22) is started at or below the start of the previous Vicryl® suture (full-thickness). I use 3-0 Prolene® for this layer, as this type of monofilament thread pulls very easily through the tissues, allowing the surgeon to make three passes of suture before pulling it through.
- Figure 8.23 shows the completed intracorporeal, isoperistaltic, ileocolic anastomosis.

Figure 8.16

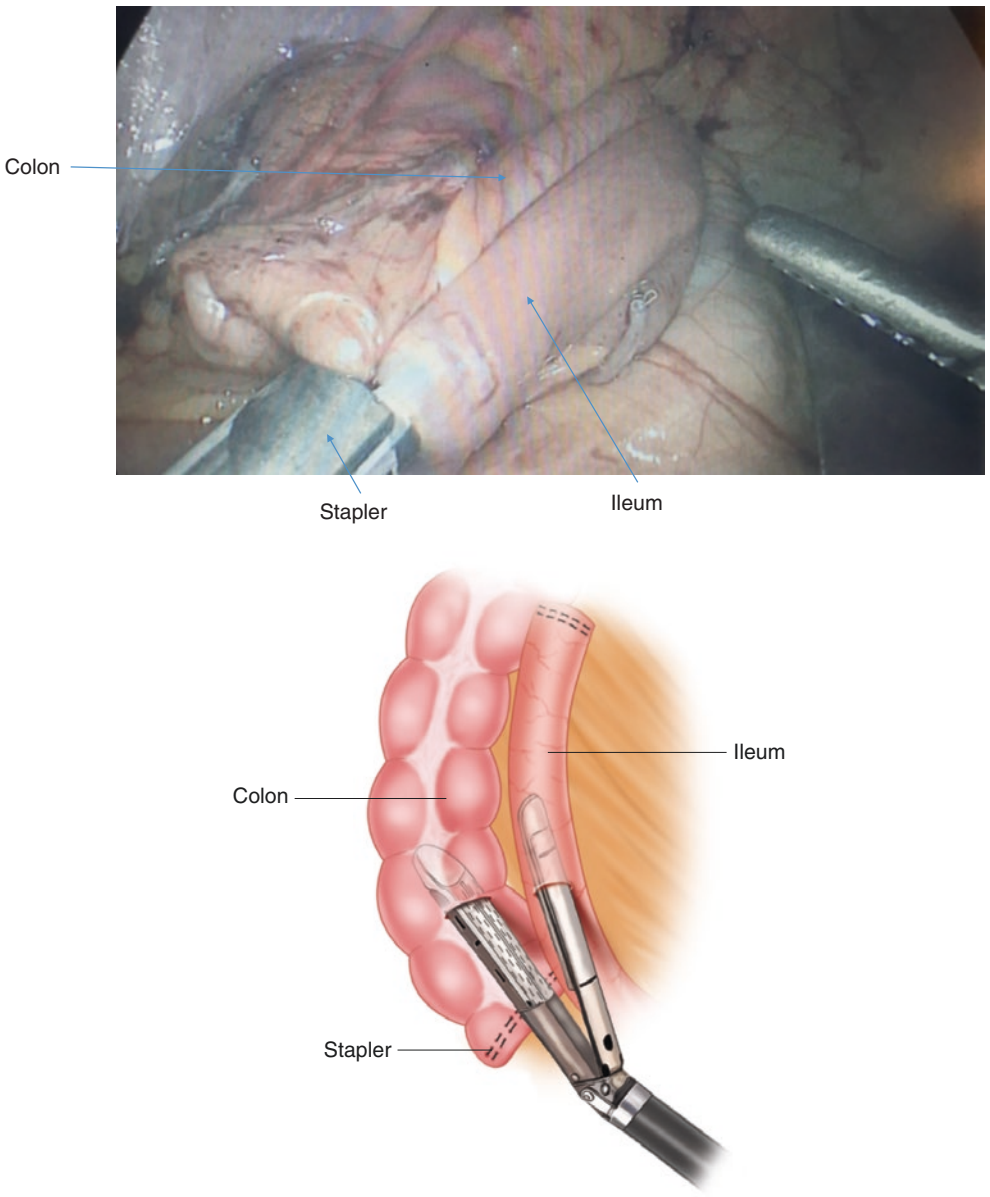


Figure 8.17

Before I remove the 12-mm port and the stapler, the assistant grasps the distal cut staple line and elevates it

Figure 8.17

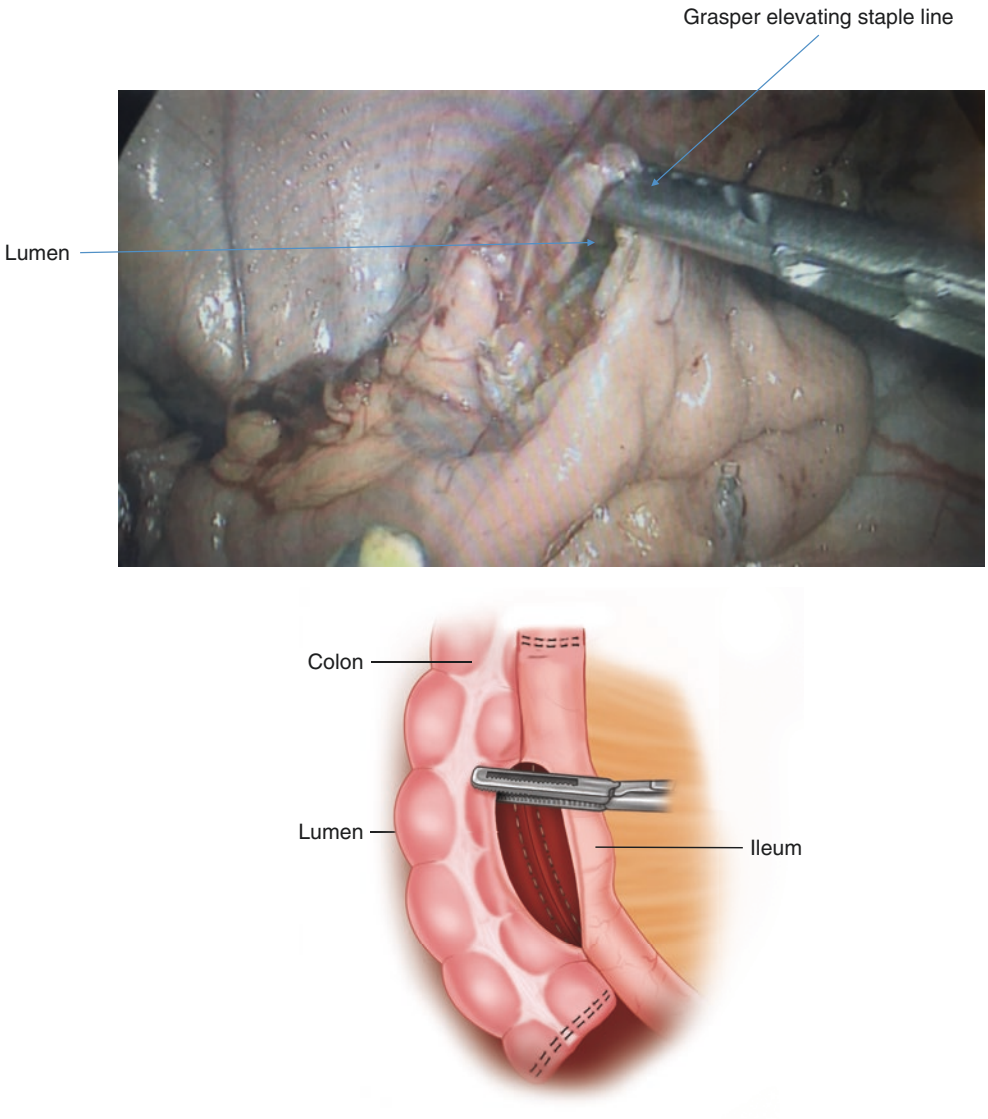
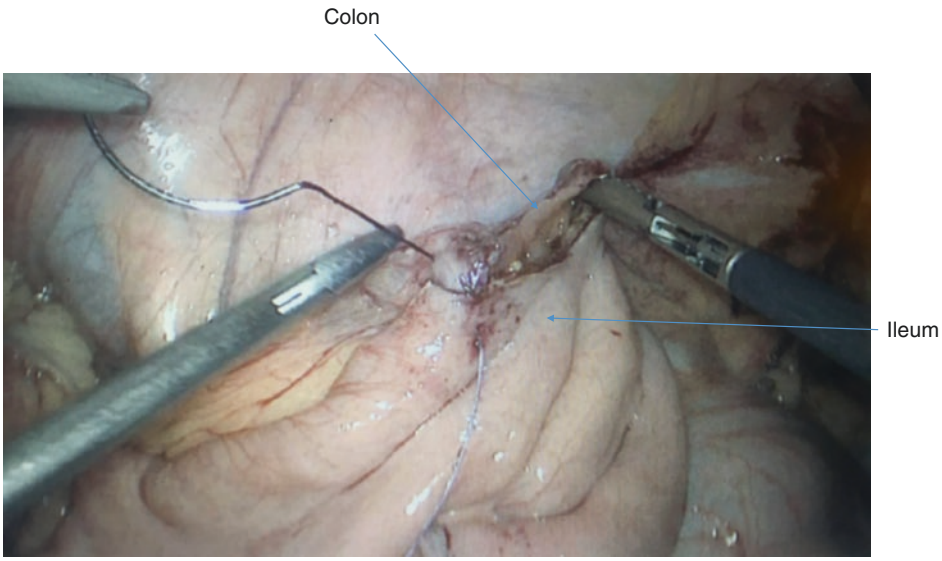


Figure 8.18

Intracorporeal suturing. The assistant's grasper elevates the staple line away from the surgeon, allowing placement of the sutures at right angles to the bowel wall

Figure 8.18



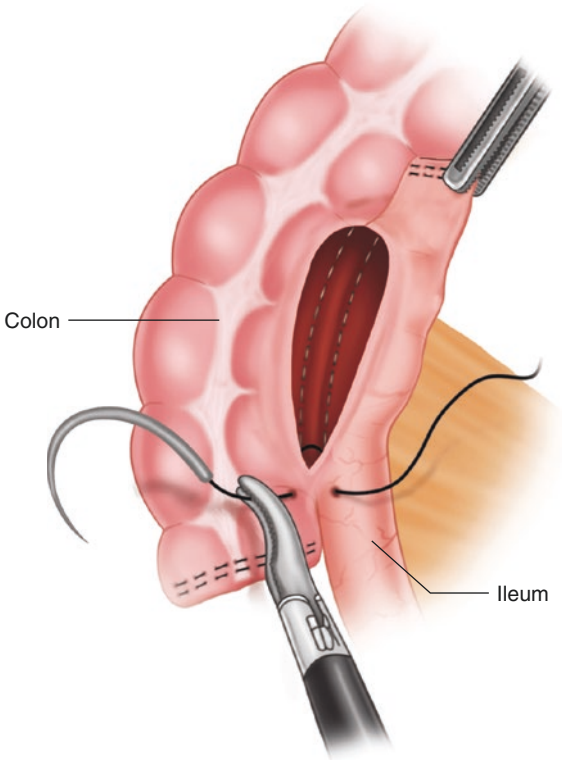


Figure 8.19

Close-up view of the suturing of the full-thickness first layer

Figure 8.19

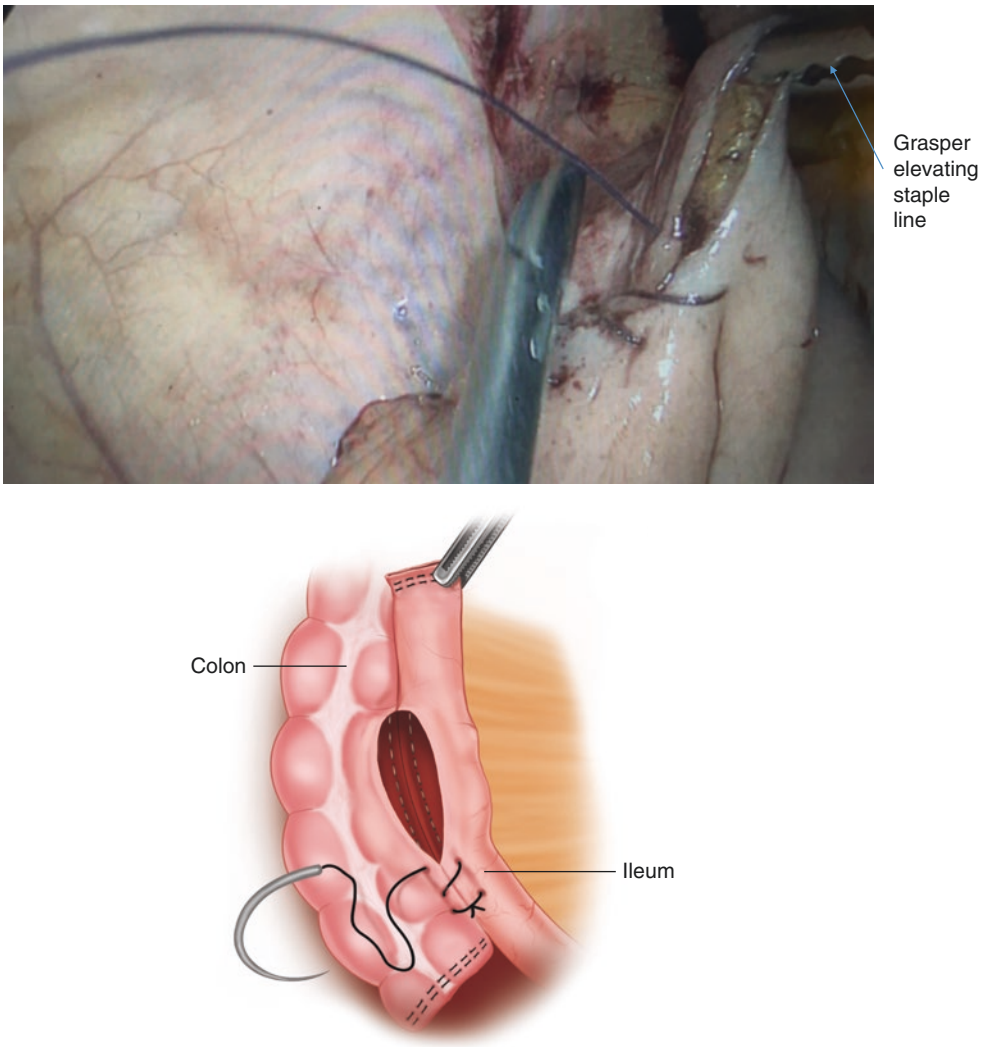
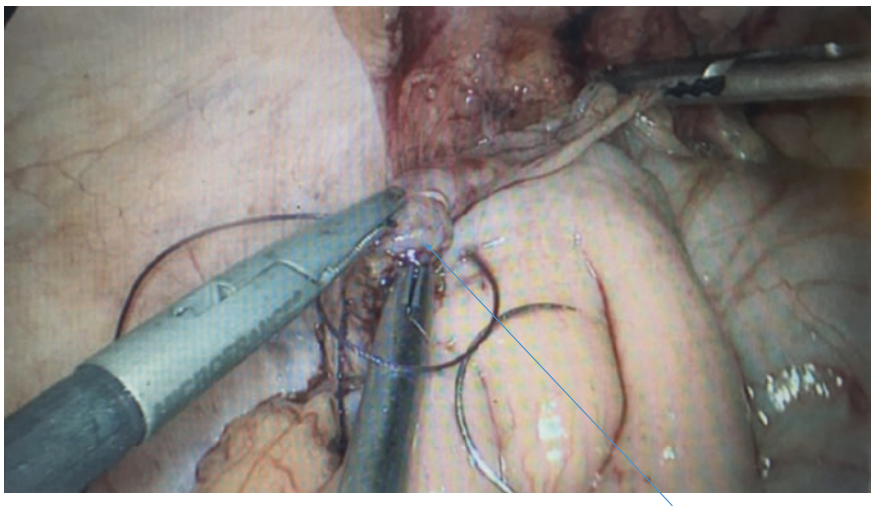


Figure 8.20

The corner of the suture line is tucked by grasping it with the needle holder

Figure 8.20



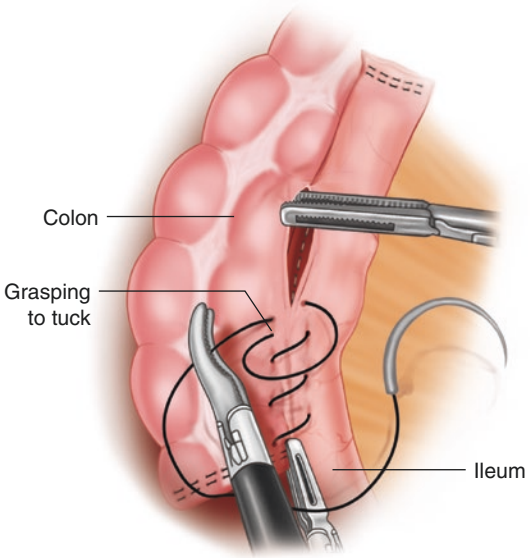
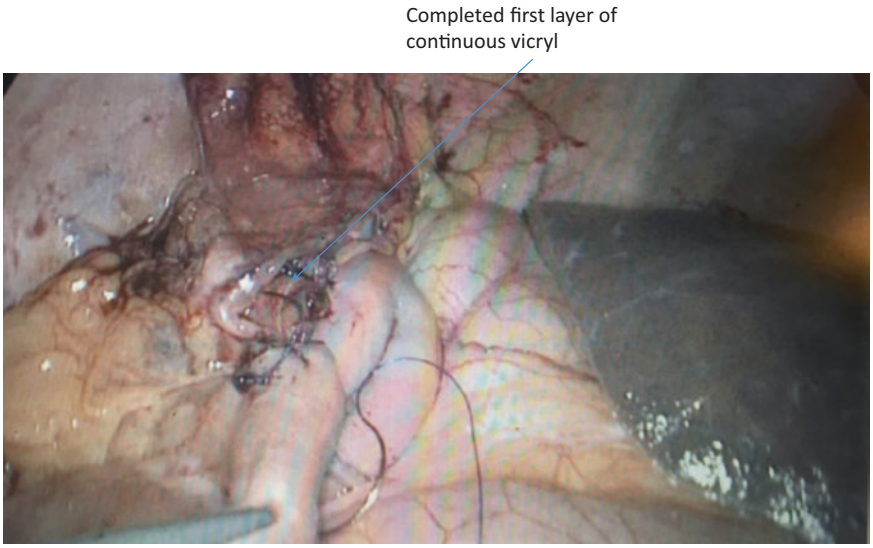


Figure 8.21

This is the completed first layer of the anastomosis

Figure 8.21


Completed first layer of
continuous vicryl

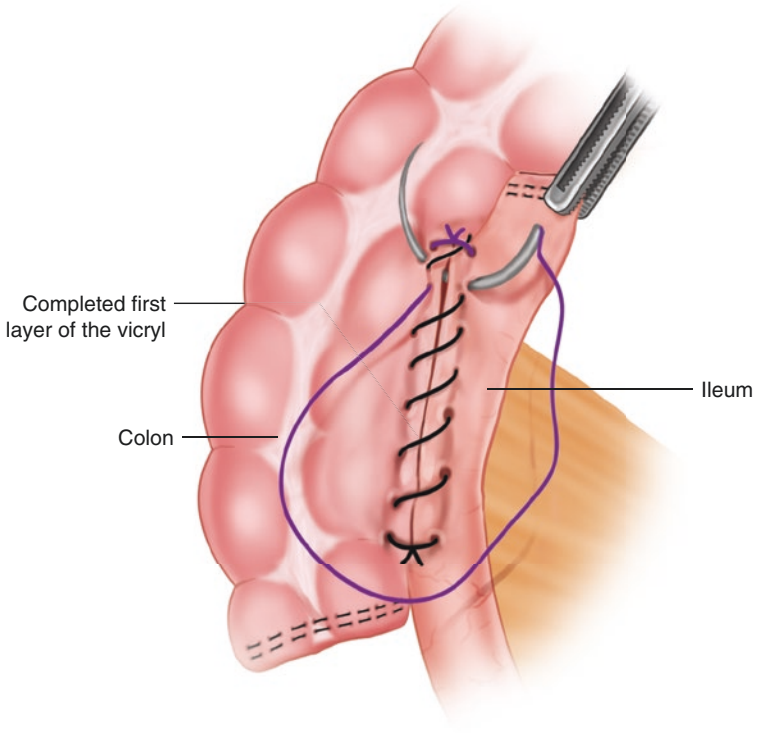
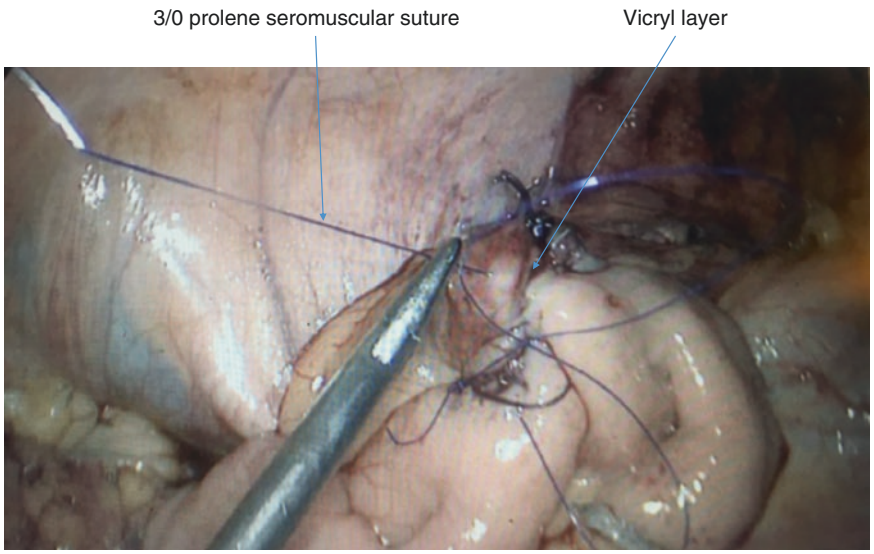

Completed first
layer of the vicryl
Ileum
Colon

Figure 8.22

The second layer (seromuscular) is started at or below the start of the previous Vicryl® suture. Using Prolene® for this layer allows the surgeon to make three passes before pulling the suture through

Figure 8.22


3/0 prolene seromuscular suture
Vicryl layer

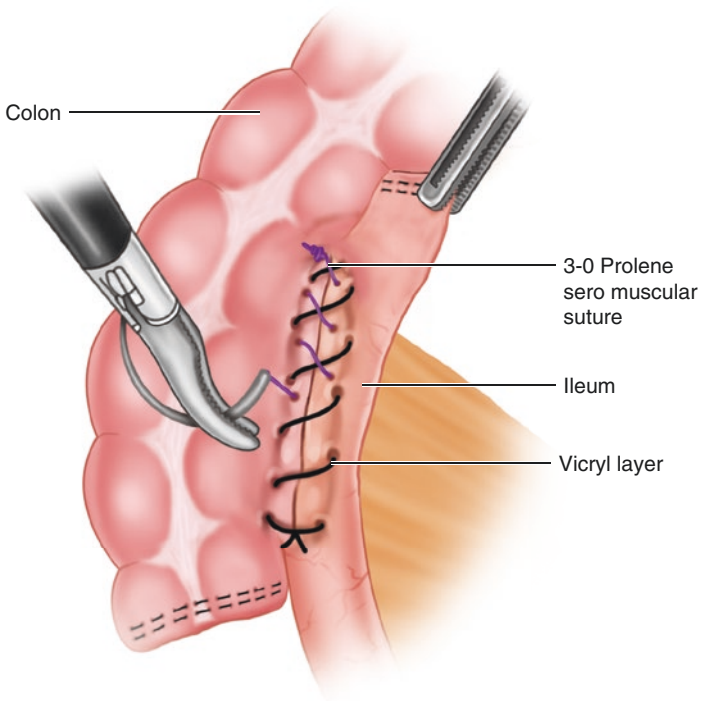
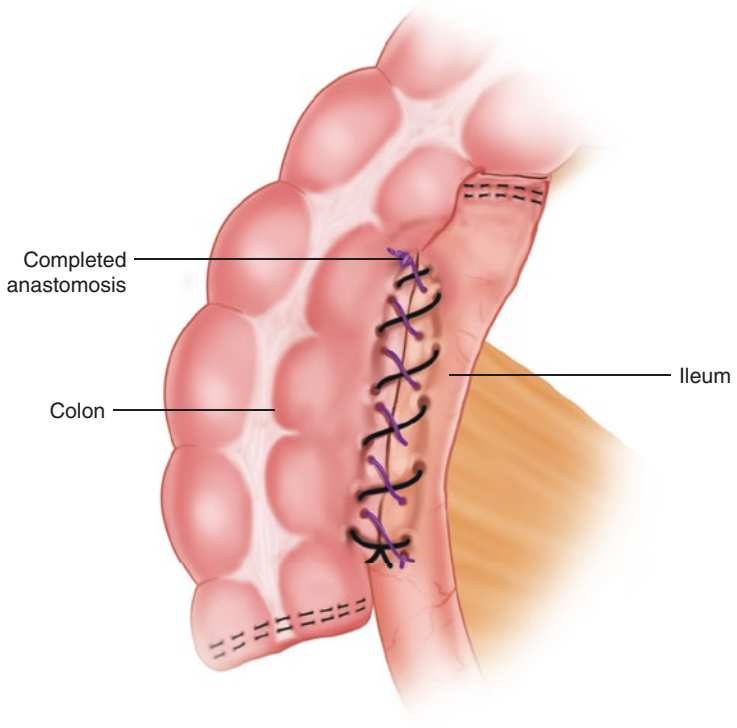

Colon
3-0 Prolene
sero muscular
suture
Ileum
Vicryl layer

Figure 8.23

Completed intracorporeal, isoperistaltic, ileocolic anastomosis

Figure 8.23


Completed anastomosis


Completed anastomosis
Colon
Ileum

8.4 Results

Laparoscopic surgery for CD can be technically challenging when the disease has been present for a long time, when fistulas and phlegmons are present, and when the patient has had previous open surgery. If the surgeon has enough experience and technical expertise, however, the vast majority of these patients can still enjoy the benefits of a laparoscopic approach. Table 8.1 lists the demographics CD patients that I have operated on since 1993. Of the 446 patients, 234 had a primary iliocolic resection (IC), 89 a secondary IC resection, 24 a tertiary IC resection, 8 a fourth time IC resection and 16 a full right hemicolectomy. Completion rate was 98%. All conversions were secondary to a markedly thickened mesentery. In 2007, I changed from laparoscopic-assisted resections with external anastomosis to intracorporeal anastomosis, as illustrated in this chapter. An intracorporeal anastomosis allows the extraction site to be placed anywhere and data show that a Pfannenstiel incision is associated with less ventral hernia formation and less postoperative narcotic use. The incision size was smaller in the intracorporeal group, as the specimens can be extracted on end as opposed to a loop. This was confirmed by my own series, published in 2007, looking at 100 consecutive patients and comparing narcotic use and morbidity [8]. The intracorporeal group had statistically less morbidity (including leaks and obstructions) than the assisted group. The only issue is technical. Suturing and knot-tying skills should be part of the armamentarium of the colon and rectal surgeon.

8.5 Complications

The leak rate with ileocolic or right hemicolectomy overall is 1.7%. This number has been reduced to 0.9% since switching to an intracorporeal anastomosis. Intestinal obstruction continues to be a problem, with an overall rate of 4% and a reoperation rate of 2% for obstruction. The wound infection rate is 1.5%, which is much less than for traditional, open surgery. There have been no deaths in this personal series [8].

Table 8.1 Crohn's disease resection patients

Patients	446
Procedures	485
Age	16–70 years (mean 37)
Sex	233 females; 213 males
Previous surgery	181
Steroids/biologics	401

8.6 Summary

Laparoscopic surgery for CD has made a significant impact on patients requiring intervention. lleocolic and right hemicolectomy are the most common surgeries performed. An evolution from laparoscopic-assisted to totally laparoscopic surgery has occurred from 2007. Length of stay and overall morbidity have also decreased over time. A technical skill base to include intracorporeal anastomosis is important.

References

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