Laparoscopic Stoma Construction and Closure

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Indications

Laparoscopic stoma construction indications are the same as for open techniques. All patients have an indication for diversion of the fecal stream.

Contraindications

Patients with severe restrictive pulmonary disease for whom the carbon dioxide pneumoperitoneum may create intolerable acidosis
Bulky lesions that require large incisions for delivery of the specimen
Obesity (male more than female, because of the short fat mesentery commonly found in obese males)
Intraabdominal adhesions
Bleeding disorders
Pregnancy (the enlarged uterus can obstruct the view of the videolaparoscope)

Preoperative Preparation

It is essential to mark the stoma site (stoma nurse therapist interview if at all possible).

Educate the patient about stoma function and lifestyle modifications.
Colon preparation for elective procedures facilitates bowel grasping and evaluation with laparoscopic instruments when searching for a polyp or a tumor.

Pitfalls and Danger Points

Appropriate stoma location
Appropriate fascial opening to avoid outlet obstruction or prolapse and herniation
Injury to solid organs (spleen and liver) when dissecting the colon
Ureteral injury
Adequate orientation of the bowel (as mesentery must not be torsed)

Operative Strategy

It is essential to have a perfect location of a permanent stoma to avoid further complications. Mark the stoma site with a patient in standing (the belt and pants level is an important factor in males), sitting, and laying down position. The decisions for construction of a colostomy or ileostomy, as well as for loop or end, are also important. A loop stoma does not divert the stream completely as an end stoma, and the ileostomies are less well tolerated in elderly patients because of increase electrolytes imbalance. However, loop ileostomies are chosen over colostomies to protect a low anastomosis due to less major complications on its closure. Moreover, performing a loop colostomy places the marginal artery in danger during stoma closure, potentially devascularizing the distal colon and the anastomosis. The segment of intestine chosen for ostomy formation must reach to the skin without tension, and the mesentery must not be twisted during stoma formation.

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Documentation Basics

- Ileostomy or colostomy
- Loop or end
- Details of fixation (especially important for temporary stomas)

Operative Technique

Loop Ileostomy

Room and Trocar Placement (Fig. 64.1)

We recommend a modified Hassan technique. Grasp the fascia with Kocher clamps and make a 1 cm vertical incision in it. Enter the peritoneum bluntly with a Kelly or Tonsil clamp. Confirm entrance into the peritoneum and place stay sutures to secure the canula during the procedure. Produce pneumoperitoneum. The surgeon stands on the side opposite the stoma site. Next, place a 10–12 mm trocar placed at the stoma site, generally on a line between the umbilical scar and the superior anterior iliac spine going through rectus muscle (making sure to avoid the inferior epigastric vessels). Place an additional 5 mm port either on the right upper quadrant or suprapubic/right lower quadrant to facilitate the dissection if adhesions are encountered (Fig. 64.2).

Choosing a Loop of Terminal Ileum

Place the patient in Trendelenburg with the right side up (20–30° tilt) to displace the small bowel out of the pelvis.

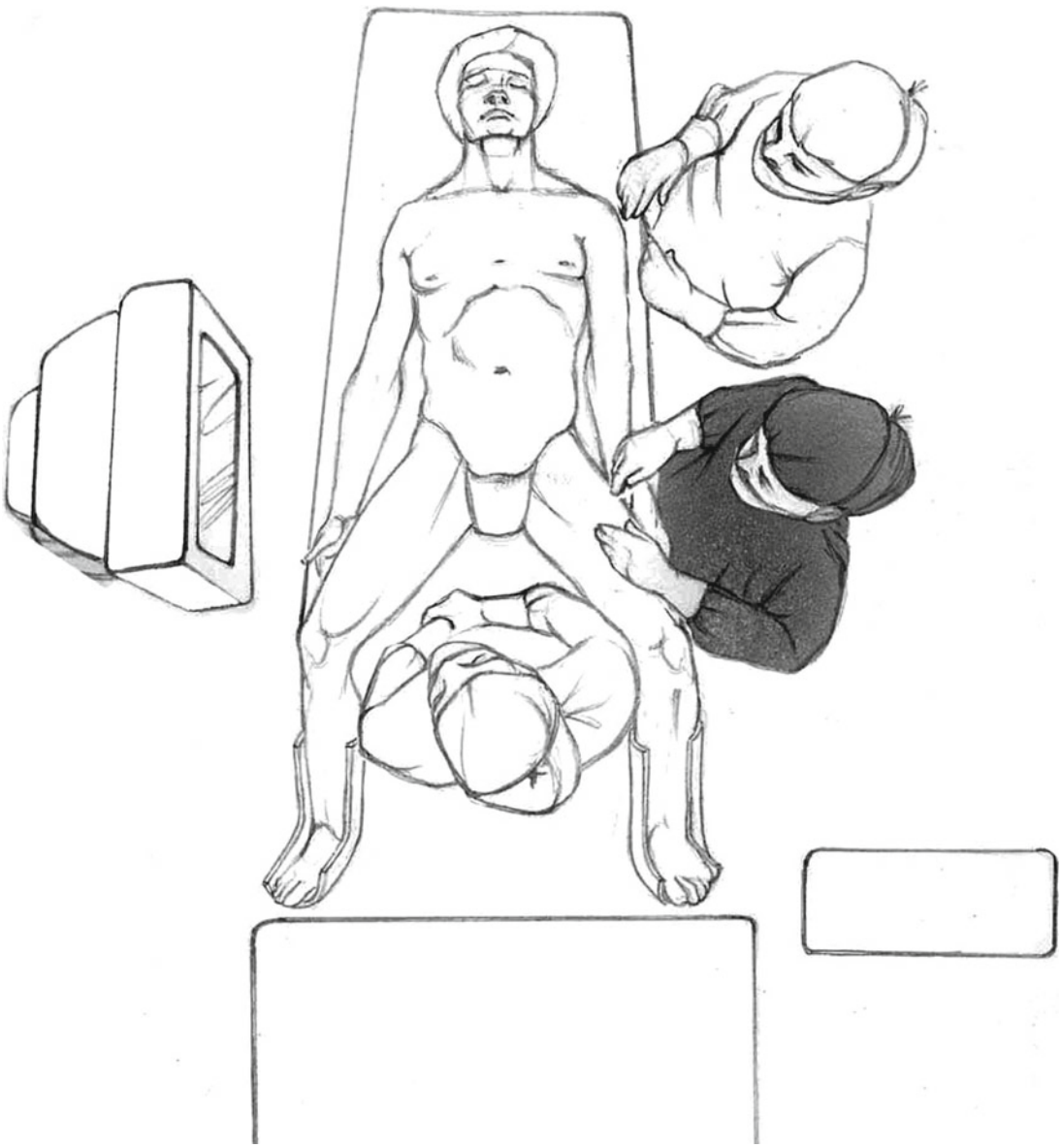


Fig. 64.1 From Scott-Conner EH, editor. Chassin's operative strategy in colon and rectal surgery. New York: Springer Science + Business Media; 2006, with permission

Use a 10 mm Babcock-type clamp to identify an appropriate loop of ileum 20 cm from the ileocecal valve. Lift this into the stoma site to verify that it is free of tension and not rotated. If the ileum does not reach easily toward the stoma site, mobilize the cecum and appendix by dissecting along the line of Toldt.

Bringing the Ileostomy Out

After gently grasping of the chosen ileum, deflate the pneumoperitoneum. Create a 2 cm circular skin incision at the stoma site and bring the loop outside through this (Fig. 64.3). Use the loop of bowel to occlude the stoma site, allowing reinsufflation of the abdomen. Recheck for bleeding, bowel, and mesentery orientation (Fig. 64.4). The ostomy is mature using standard techniques.

Transverse Loop Colostomy

Room and Trocar Placement (Figs. 64.5 and 64.6)

Position the patient supine or in the modified lithotomy position, with both arms tucked.

The surgeon stands at the right side or between the legs if lithotomy position is used. Place the monitors on the right and left side at the level of the patient's shoulder.

Create pneumoperitoneum through a supraumbilical modified Hassan technique. Place two trocars: one on the left and one on the right upper quadrant. The transverse colon usually reaches the chosen stoma site on the abdominal wall; rarely the splenic or hepatic flexure will need to be dissected. Bring the greater omentum cephalad and detach it from the colon; usually an energy device is used to promote better homeostasis if extensive dissection needed to be done. Fashion a circular ostomy site in the desired position. Gently grasp the transverse colon with a Babcock and bring it to the surface through this incision. Check hemostasis and orientation as previously described. Mature the stoma in the standard fashion.

Sigmoid Loop Colostomy

Room and Trocar Placement (Figs. 64.7 and 64.8)

Position the patient supine or in the modified lithotomy position, with both arms tucked. The surgeon stands at the right side of the patient. Place the monitor on left side of the patient at the level of the patient's hip/knee. Place the patient in Trendelenburg position with left side up 30° to move the small bowel out of the pelvis and expose the sigmoid colon

Dissecting the Lateral Attachment of the Colon

In many cases the sigmoid colon must be mobilized from its lateral peritoneal attachment to achieve ideal stoma site location. In this case, place a 5 mm port in the left upper quadrant or suprapubic location. Use an energy device to dissect from the inferior lateral part of the sigmoid until the splenic flexure, if needed to assure a secure and traction-free colostomy. If the patient is in modified lithotomy position, the surgeon then can move in between the patient's legs to facilitate the splenic flexure dissection.

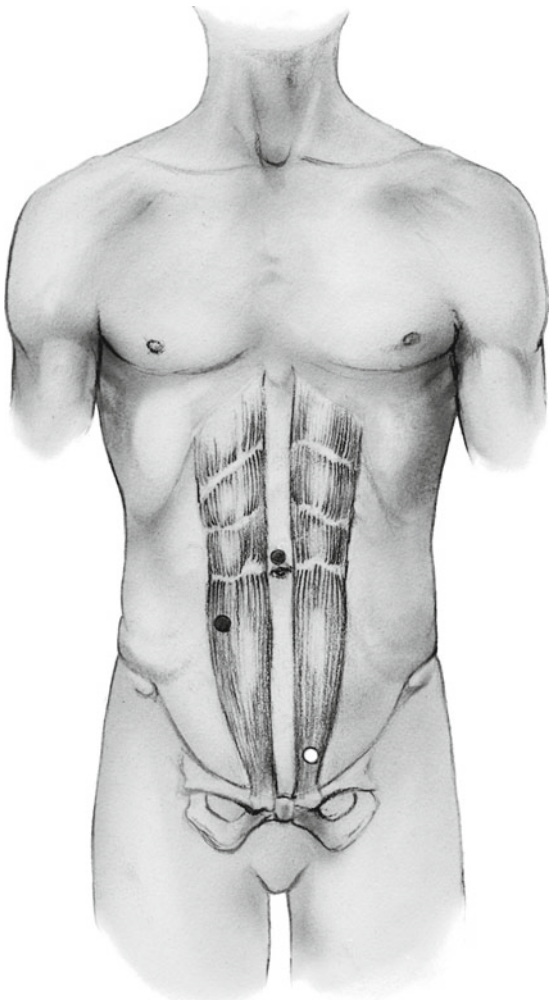


Fig. 64.2 From Scott-Conner EH, editor. Chassin's operative strategy in colon and rectal surgery. New York: Springer Science + Business Media; 2006, with permission

Exteriorizing the Sigmoid (Fig. 64.9)

After mobilizing the sigmoid colon, grasp the desired loop of sigmoid with a 10 mm Babcock clamp. Resect the skin circular stoma site, incising the fascia with at least a 2–3 cm cruciate extension. Deflate pneumoperitoneum and pull out the sigmoid colon. Reinsufflate the abdomen and confirm correct position of the stoma, hemostasis, and lack of traction or torsion on the mesentery. The construction and maturation of the stoma follows a standard fashion and can be totally diverting stapled (open proximal end and create a small vent on the distal end, taking care to double check proximal and distal orientation) or a simple loop colostomy.

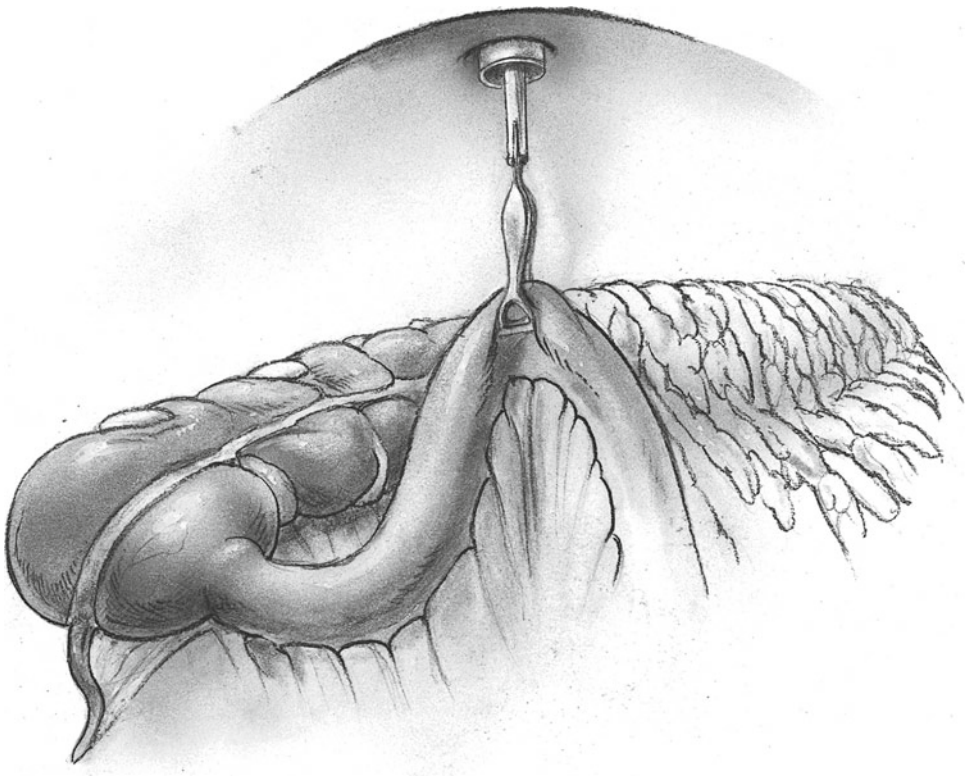


Fig. 64.3 From Scott-Conner EH, editor. Chassin's operative strategy in colon and rectal surgery. New York: Springer Science + Business Media; 2006, with permission

Sigmoid Colon Resection with End Colostomy (Hartmann's procedure)

Room and Trocar Placement

The room setup and trocar placement are the same as for sigmoid colostomy, described above. Position the patient supine or in the modified lithotomy position, with both arms tucked. The surgeon stands at the right side of the patient. Place the monitor on left side of the patient at the level of the patient's hip/knee. Place the patient in Trendelenburg position with left side up 30° to move the small bowel out of the pelvis and expose the sigmoid colon.

Establish pneumoperitoneum through the umbilicus using a modified Hassan's technique. Place the second port at the stoma site and the third port contralateral to the stoma site. In case of extensive adhesions, the contralateral port facilitates dissection of those adhesions.

Identification of the Ureter

The identification of the ureter can be facilitated by inserting ureteral stents or by beginning the incision of the peritoneum cephalad toward the origin of the inferior mesenteric artery. Sweep the vessels ventrally away from the preaortic hypogastric plexus (which is swept dorsally to prevent injury). Mobilize the sigmoid colon from lateral to medial and identify and protect the gonadal vessels and the ureter (Fig. 64.7).

Incision of the Mesocolon and Division of the Sigmoid Colon

Ensure that colon can be mobilized to the anterior abdominal wall and create a window in the mesentery. The division of the bowel can be done intracorporally with a linear endoscopic stapler, or, if the sigmoid colon is very mobile, the stapler can be used outside the cavity (Figs. 64.10 and 64.11).

After dividing the bowel, divide the mesentery with a vascular linear stapler or an energy device. The proximal bowel is matured and usual fashion, and the distal colon can be matured as a mucous fistula or the distal end can be stapled and left in the cavity, usually after resection of the diseased segment.

Exteriorization of the Proximal Sigmoid Colon

Pull the proximal segment through the ostomy site, resect if desired, and mature the stoma as previously described (Fig. 64.12).

Hartmann's Take Down

Room and Trocar Placement (Figs. 64.13 and 64.14)

Position the patient supine or in the modified lithotomy with both arms tucked. Use the same trocar positions as described for Hartmann's procedure. The surgeon stands at the right side of the patient. Place the monitor on left side, at the level of the patient's hip/knee. Place the patient in Trendelenburg

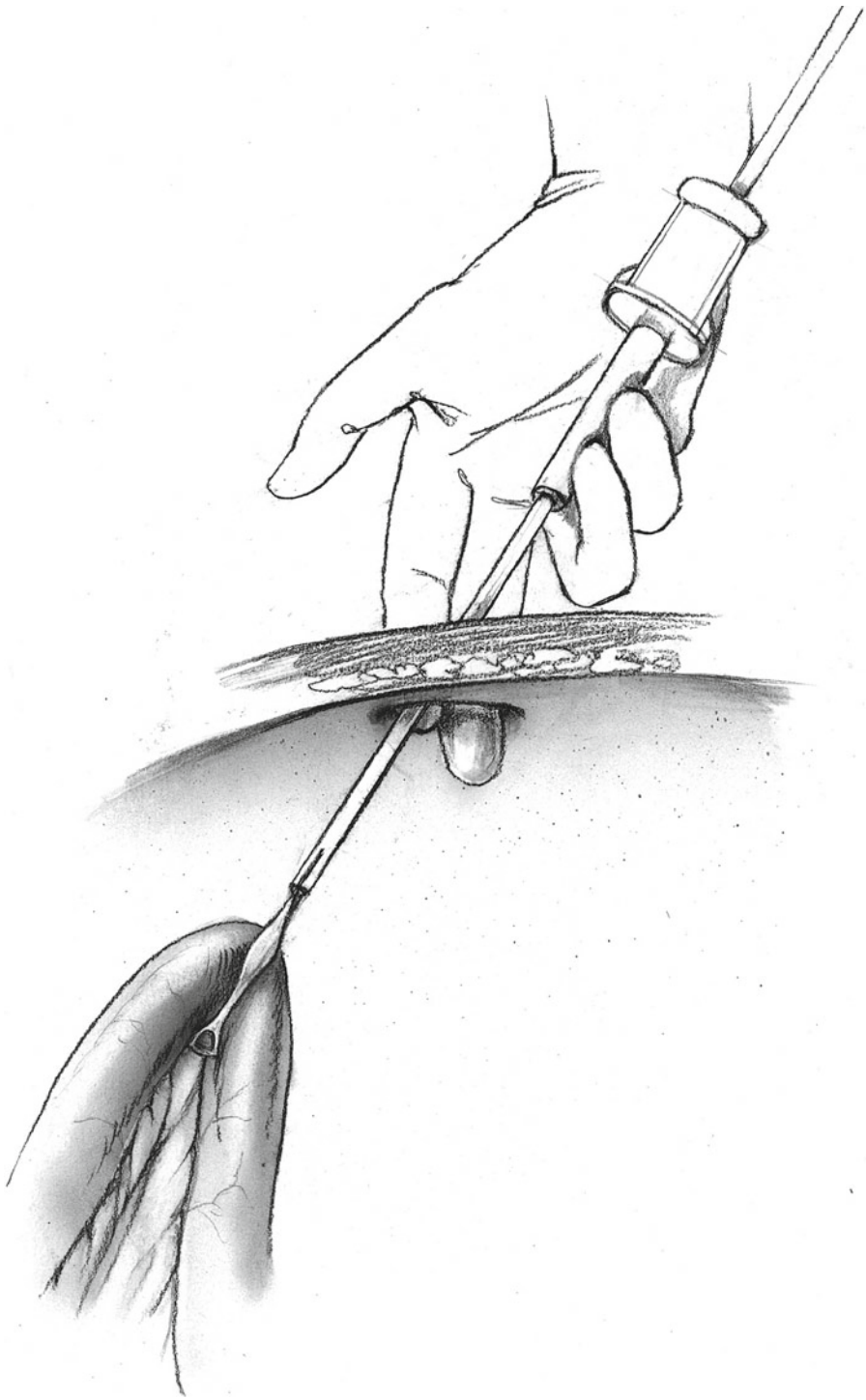


Fig. 64.4 From Scott-Conner EH, editor. Chassin's operative strategy in colon and rectal surgery. New York: Springer Science + Business Media; 2006, with permission

position with left side up 30° to move the small bowel and expose the sigmoid colon. The reverse position will be needed if splenic flexure mobilization is required.

Stoma Mobilization

Gently irrigate the rectum with a soft rubber catheter with warm saline solution. Mobilize the stoma in the usual fashion from outside the abdomen. Trim it as needed. Then create a purse string suture and place the anvil of a 29 cm circular stapler (29 cm) into the stoma. Next, return the proximal colon and the anvil to the peritoneal cavity. Create pneumoperitoneum through a site away from the old incision, usually through the right upper abdomen. Under direct visual guidance using sharp or energy device, lyse midline adhesions and place the supraumbilical trocar. Either completely close the stoma site or close it

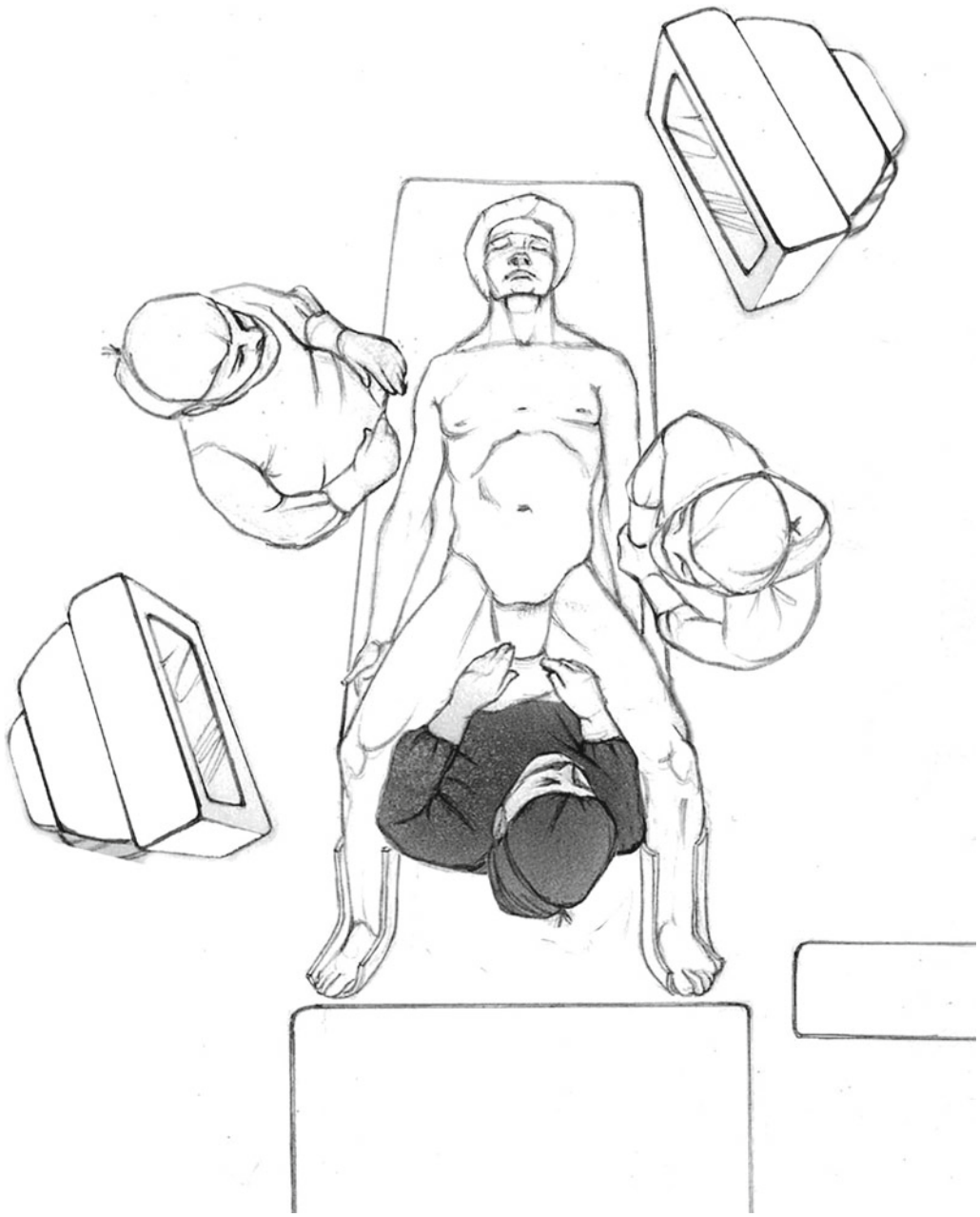


Fig. 64.5 From Scott-Conner EH, editor. Chassin's operative strategy in colon and rectal surgery. New York: Springer Science + Business Media; 2006, with permission

around a 5-mm trocar that can be removed without further closure at the end. Additional 5-mm trocars are usually placed in the right iliac fossa and right upper abdomen as previously noted.

Mobilization of the Splenic Flexure

Mobilize the splenic flexure and take down the transverse colon to ensure adequate length and free tension anastomosis. The use of an energy device is recommended as it provides excellent hemostasis. This mobilization proceeds as described earlier (see Chap. 52).

Dissecting the Rectal Stump

Dissect the rectal stump free of adhesions or any small bowel loops to ensure a safe stapled anastomosis. If it is difficult to find the stump, use a rigid sigmoidoscopy to guide the dissection as well as following any nonabsorbable sutures left on the stump from previous surgery (Fig. 64.15). The rectal stump is then circumferentially mobilized for 3–5 cm from the surrounding pelvic tissues. Any residual sigmoid colon should be resected to ensure anastomosis of the descending colon to the rectum when dealing with diverticular disease. A preoperative contrast enema is useful in this regard.

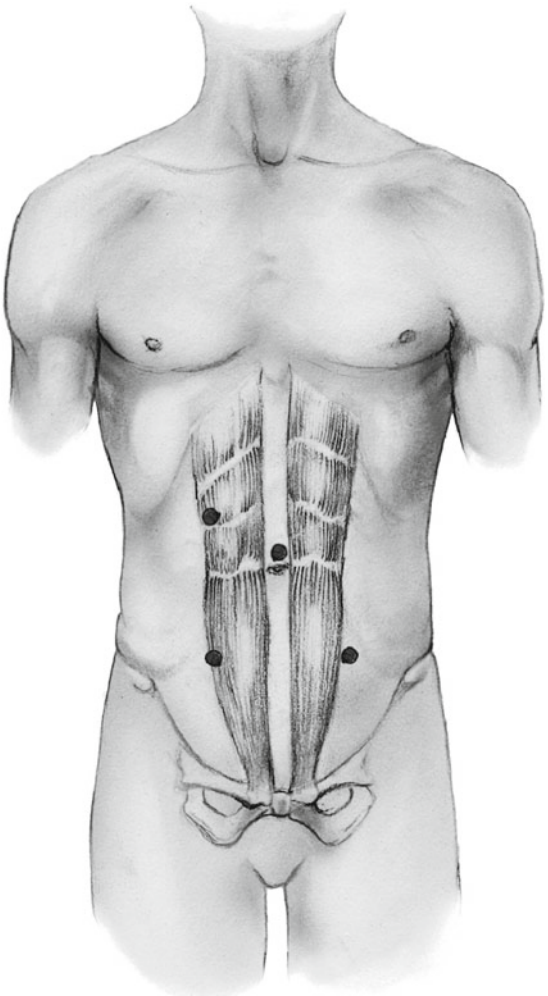


Fig. 64.6 From Scott-Conner EH, editor. Chassin's operative strategy in colon and rectal surgery. New York: Springer Science + Business Media; 2006, with permission

Performing the Anastomosis

Before proceeding with the anastomosis, make sure that the descending colon can be brought down to the ideal place of anastomosis without tension. Then insert a 29-cm circular stapler through the rectum and pass the spike through the stump. Engage the anvil. Double check for lack of tension and appropriate orientation (lack of rotation). The anastomosis is better viewed from the lateral port site. See Chap. 52 for further details.

Testing the Anastomosis

After firing the stapler and retracting it gently from the rectum, gently occlude the proximal bowel and check the anastomosis with insufflation of the rectum with air and submersion of the anastomosis under warm saline (bubble test). Inspect the stapler donuts for completeness. If using a rigid or flexible sigmoidoscope, direct visualization of the anastomosis can be done.

Postoperative Care

Whenever an ostomy is created, apply a transparent ostomy pouch in the operating room to permit direct visualization of the quality of the mucosa of the stoma during the postoperative period. Dark or very edematous mucosa needs to be evaluated further. To ensure the viability of the stoma three techniques can be used: (1) direct vision with a anoscope, (2) gently insert the blunt end of a glass blood drawing tube (with the stopper removed) and shine a light through this to inspect the mucosa below the fascia, and (3) use the same glass tube and insert a bronchoscope into the tube to evaluate the mucosa above and below the fascia. If there is any doubt as to the viability of the mucosa below the fascial layer, revise the stoma.

Complications

Stoma Site Complications

- Edema
- Infection
- Bleeding
- Stenosis
- Necrosis
- Parastomal hernia
- Prolapse
- Skin dermatitis from intestinal content leakage

General Complications

- Wound infection
- Port site bleeding
- Anastomosis dehiscence
- Obstruction
- Ileus
- Hernia

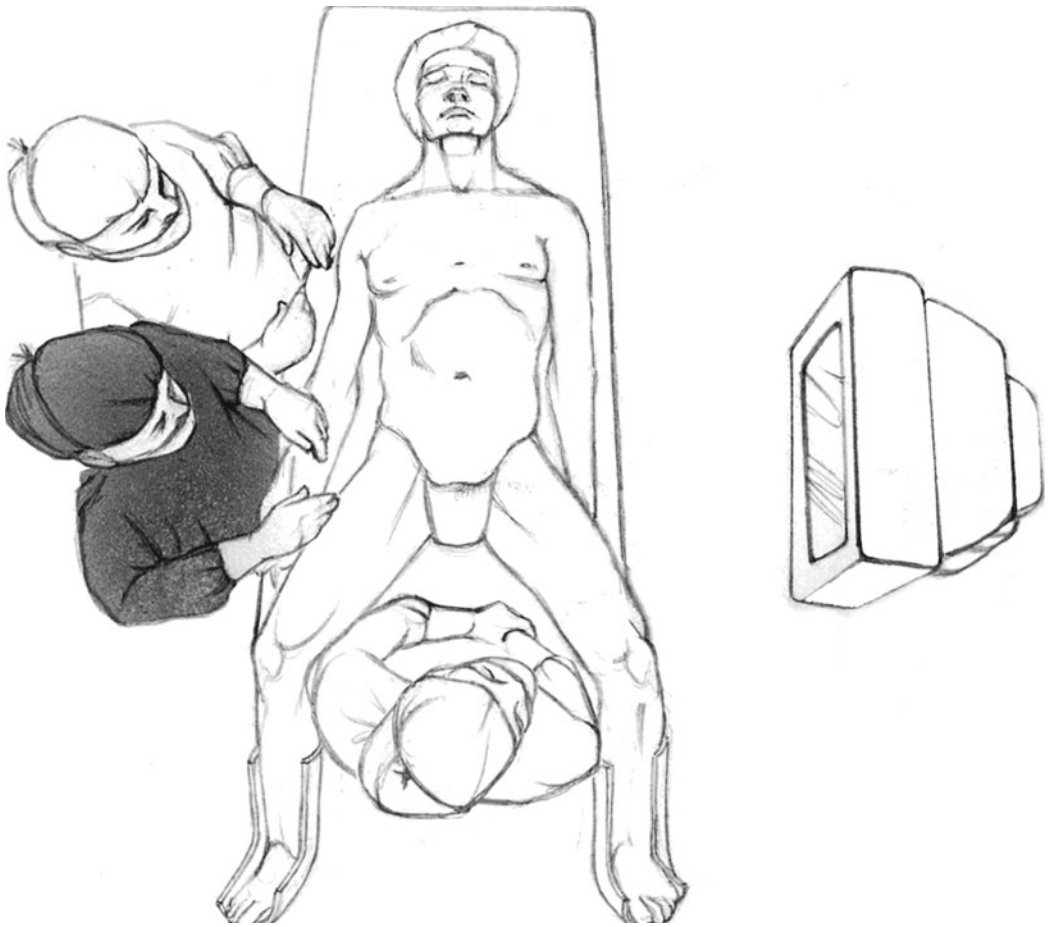
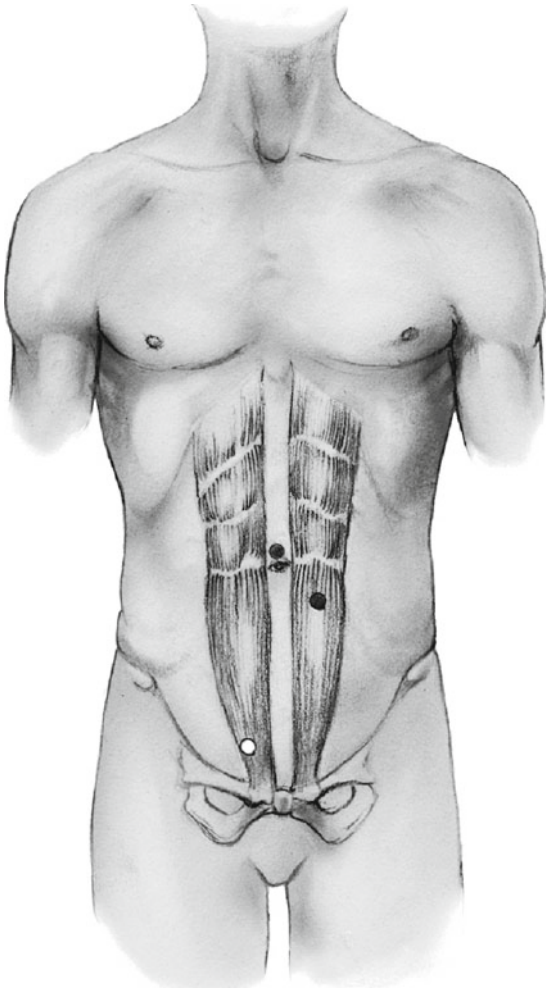


Fig. 64.7 From Scott-Conner EH, editor. Chassin's operative strategy in colon and rectal surgery. New York: Springer Science + Business Media; 2006, with permission



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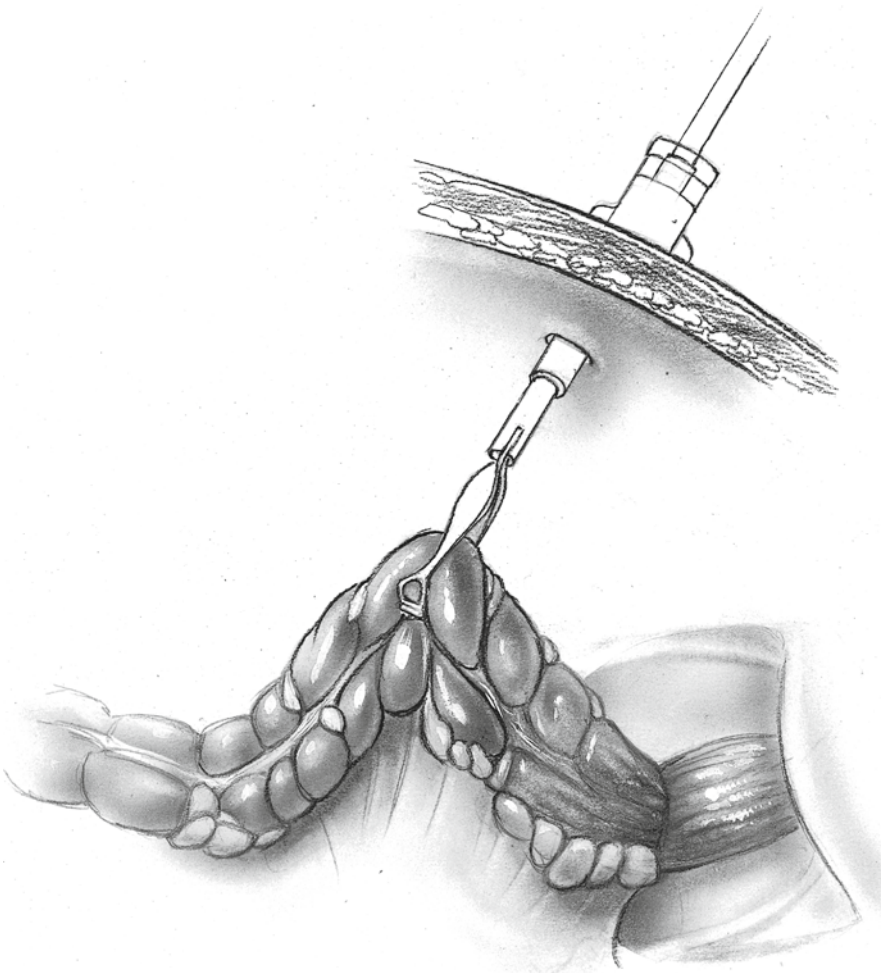

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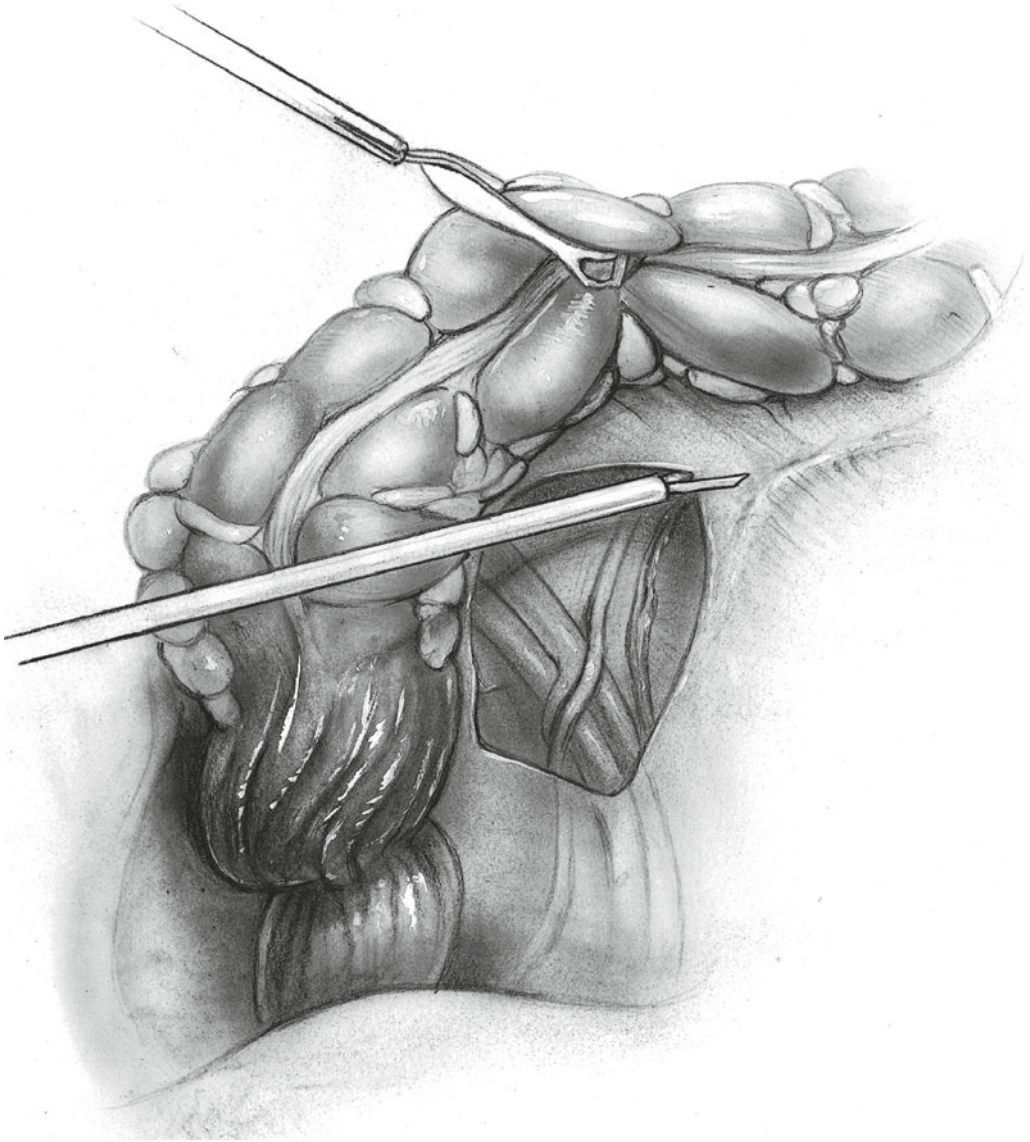

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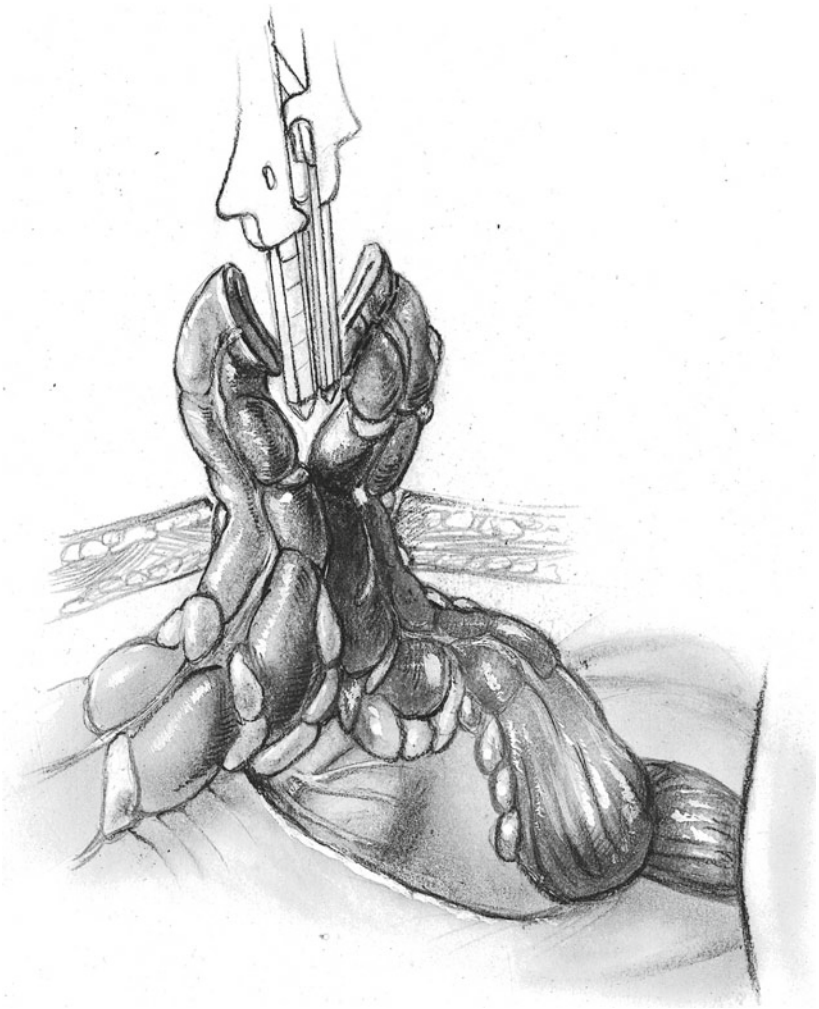

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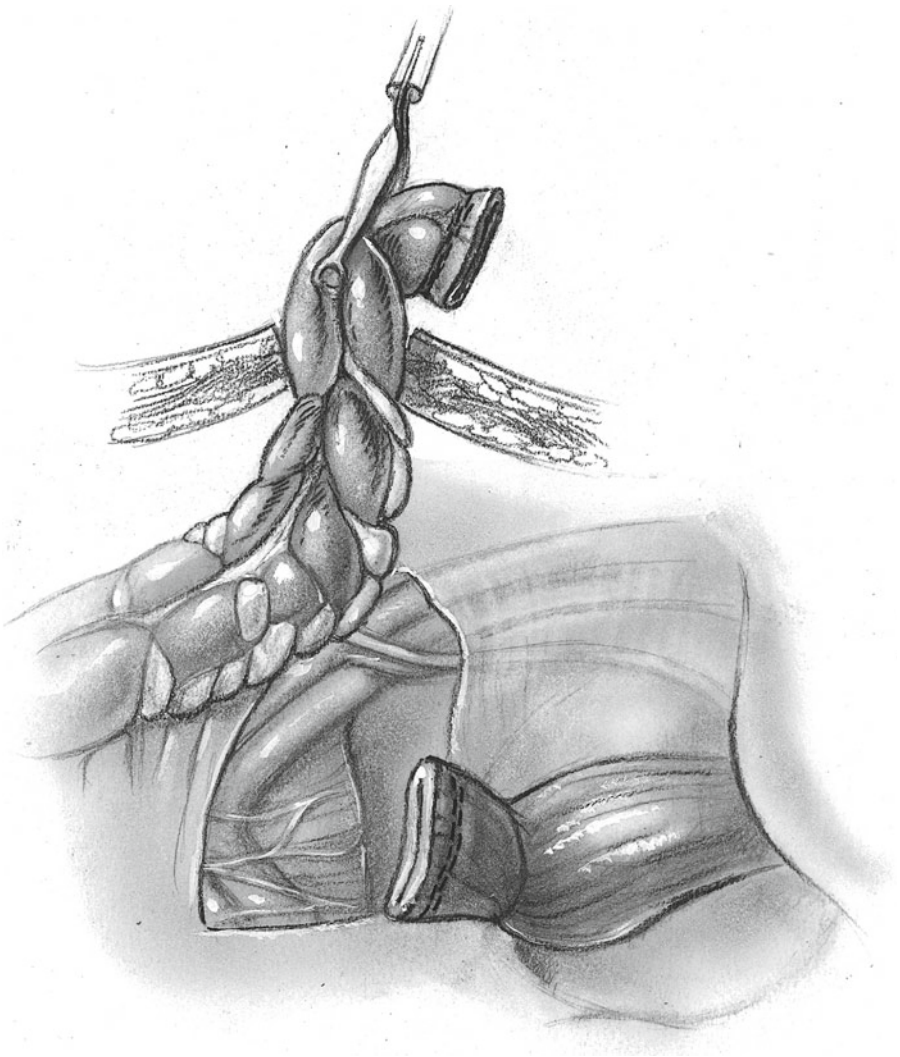

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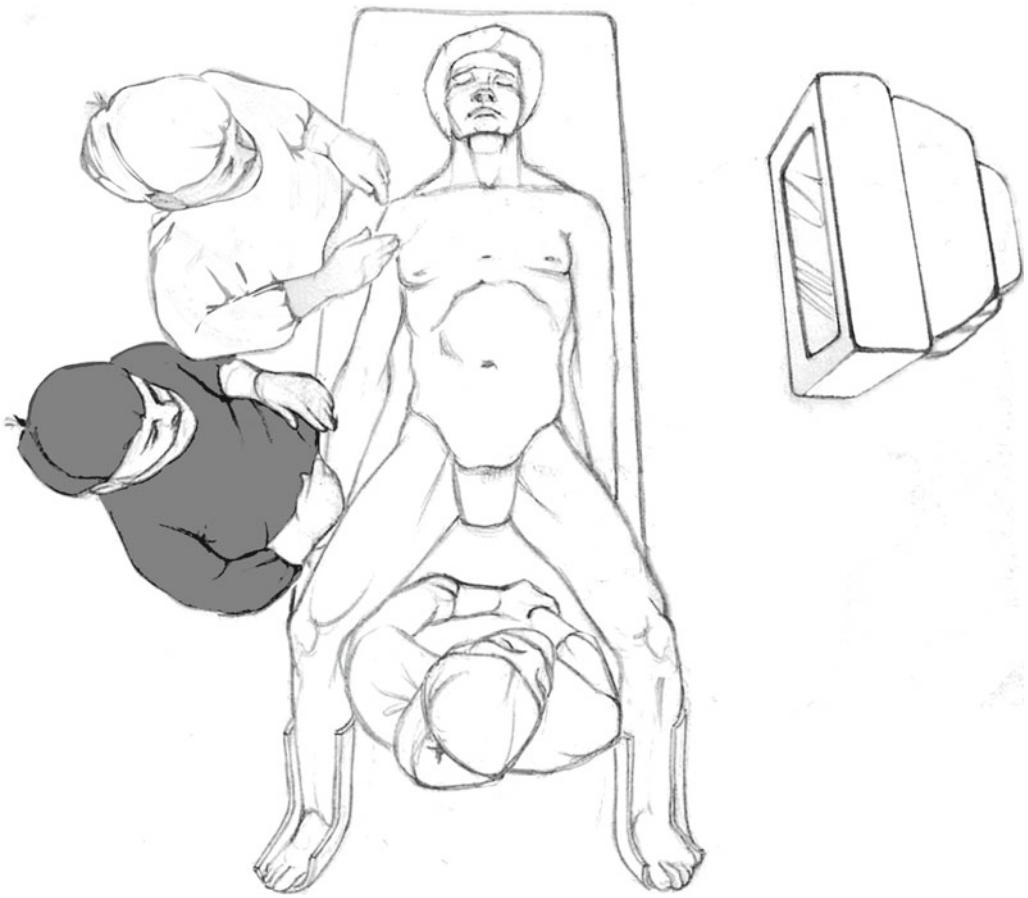

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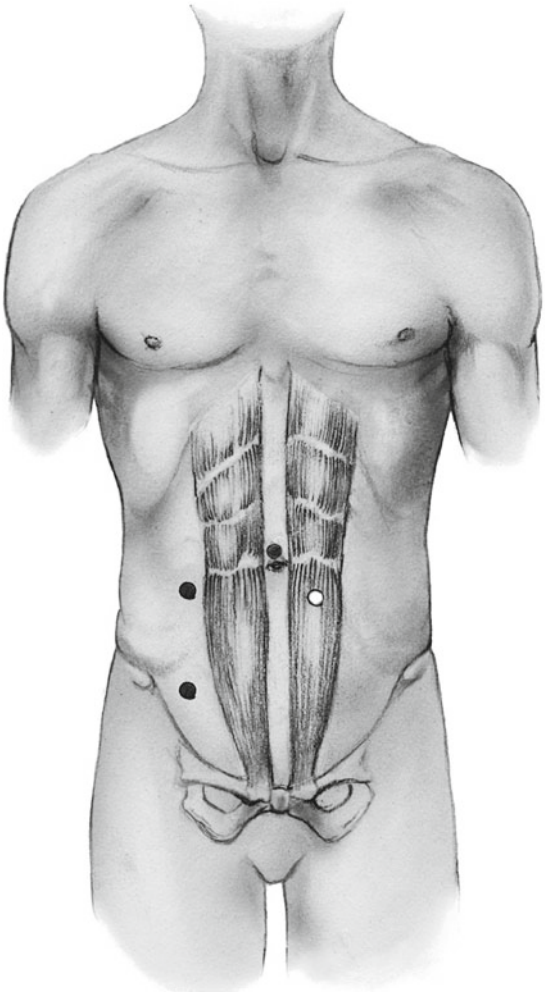

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Further Reading

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