

CONTINENT DIVERSION: THE INDIANA POUCH

12

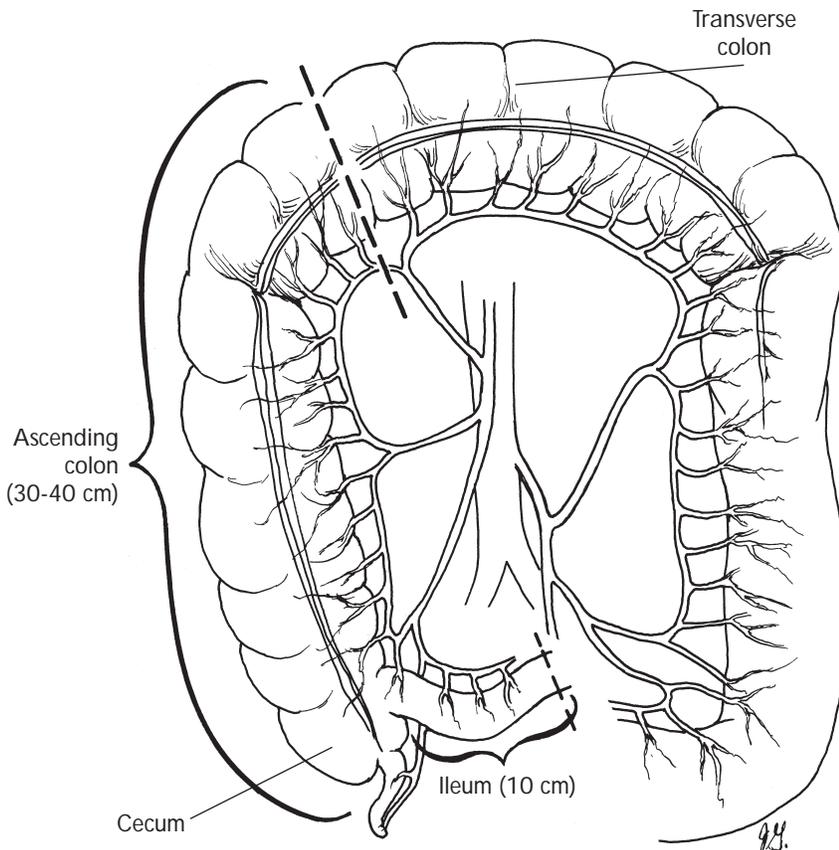
There are numerous surgical variations from which the surgeon may choose for performing a continent urinary diversion.¹⁻³ We believe the Indiana pouch to be the simplest and easiest of these procedures; it is associated with the fewest late postoperative complications.⁴

SELECTION OF INTESTINAL SEGMENT

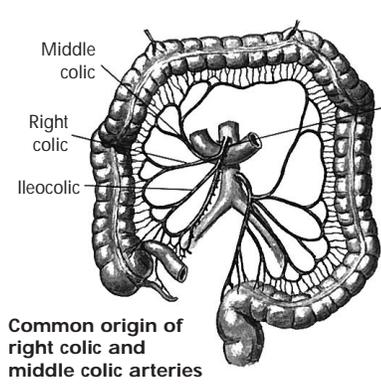
FIG. 12-1. Although a 30 cm segment is the common recommen-

dation, we have found that a 40 cm colonic segment is necessary for a pouch to hold 400 to 600 ml of urine. An ileal segment of 10 cm is used for the continent segment and stoma creation.

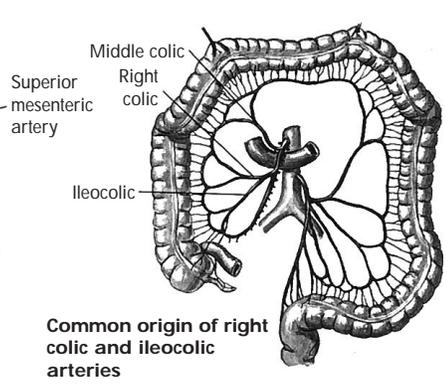
The ascending colon as well as part of the transverse colon must be freed. Before the selected bowel segment is divided, the omentum must be taken off the transverse colon. The more proximal side of the transverse colon must be mobilized for the ileocolonic anastomosis.



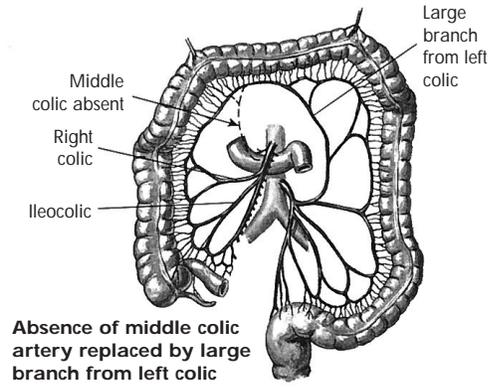
Variations in Colic Arteries



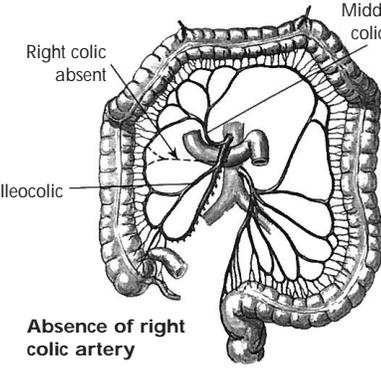
Common origin of right colic and middle colic arteries



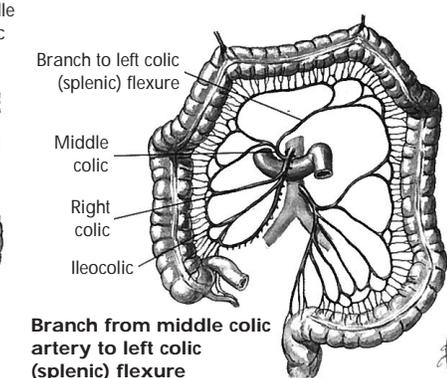
Common origin of right colic and ileocolic arteries



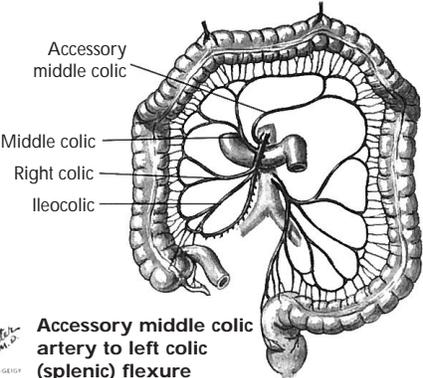
Absence of middle colic artery replaced by large branch from left colic



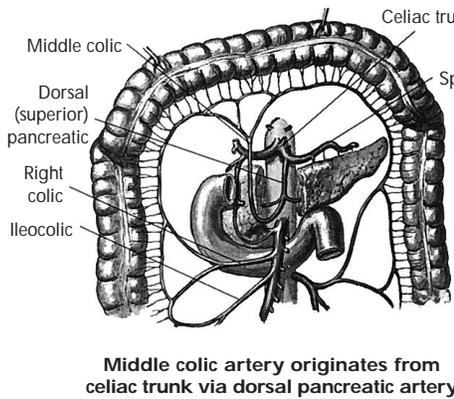
Absence of right colic artery



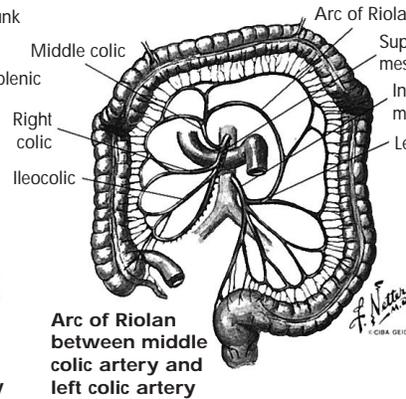
Branch from middle colic artery to left colic (splenic) flexure



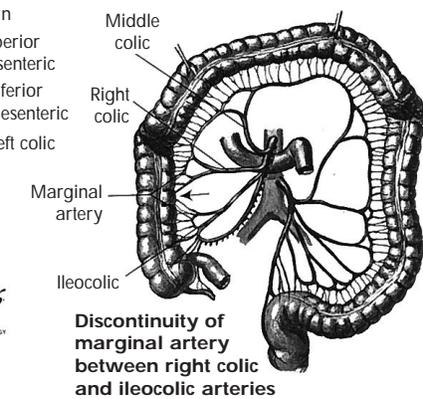
Accessory middle colic artery to left colic (splenic) flexure



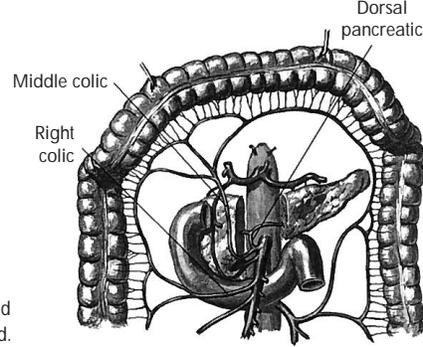
Middle colic artery originates from celiac trunk via dorsal pancreatic artery



Arc of Riolan between middle colic artery and left colic artery



Discontinuity of marginal artery between right colic and ileocolic arteries



Middle colic artery gives origin to dorsal pancreatic artery

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FIG. 12-2. There are many variations of the vasculature of the ascending and descending colon.⁵

DETUBULARIZATION OF COLONIC SEGMENT AND POUCH CREATION

The surgeon divides the entire antimesenteric length from part of the transverse colon all the way down to the cecum for complete detubularization.

Before dividing the antimesenteric side of the colon, the surgeon should consider the location of the cecostomy tube placement and the potential sites for the uretero-colonic anastomosis.

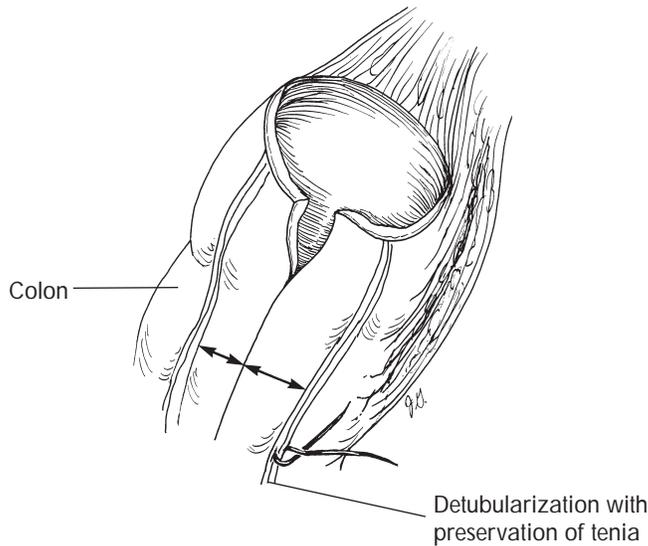
Depending on the type of ure-

terocolonic anastomosis to be performed, the location of the colonic teniae may be important.

FIG. 12-3. As many teniae as possible should be preserved with the antimesenteric division.

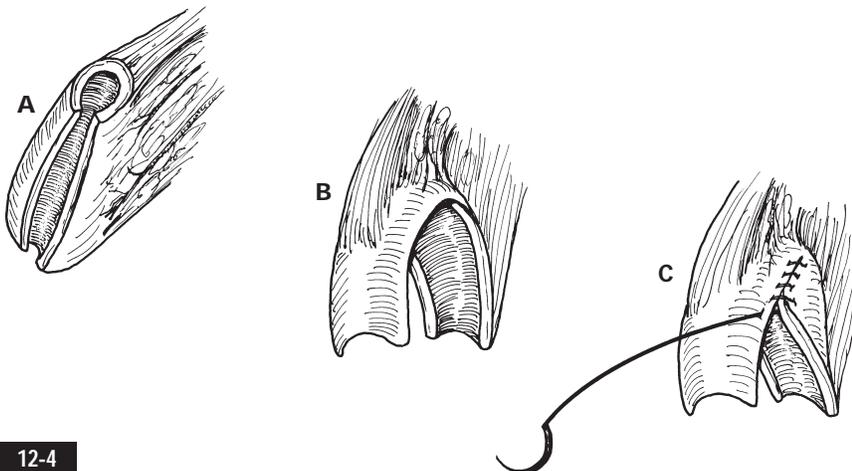
FIG. 12-4. The open colonic segment is folded and reapproximated with a running stitch (2-0 chromic) first and then a running horizontal mattress stitch (2-0 Vicryl).

FIG. 12-5. We prefer to use either straight-needle (Davis and Geck) sewing for creation of the pouch or a “no-forceps” curved-needle sewing technique because both are timesaving compared with traditional methods.

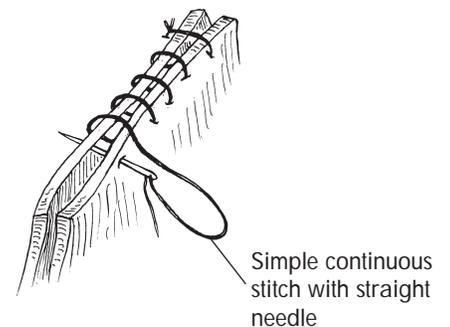


12-3

Complete Detubularization of Colon and Reapproximation



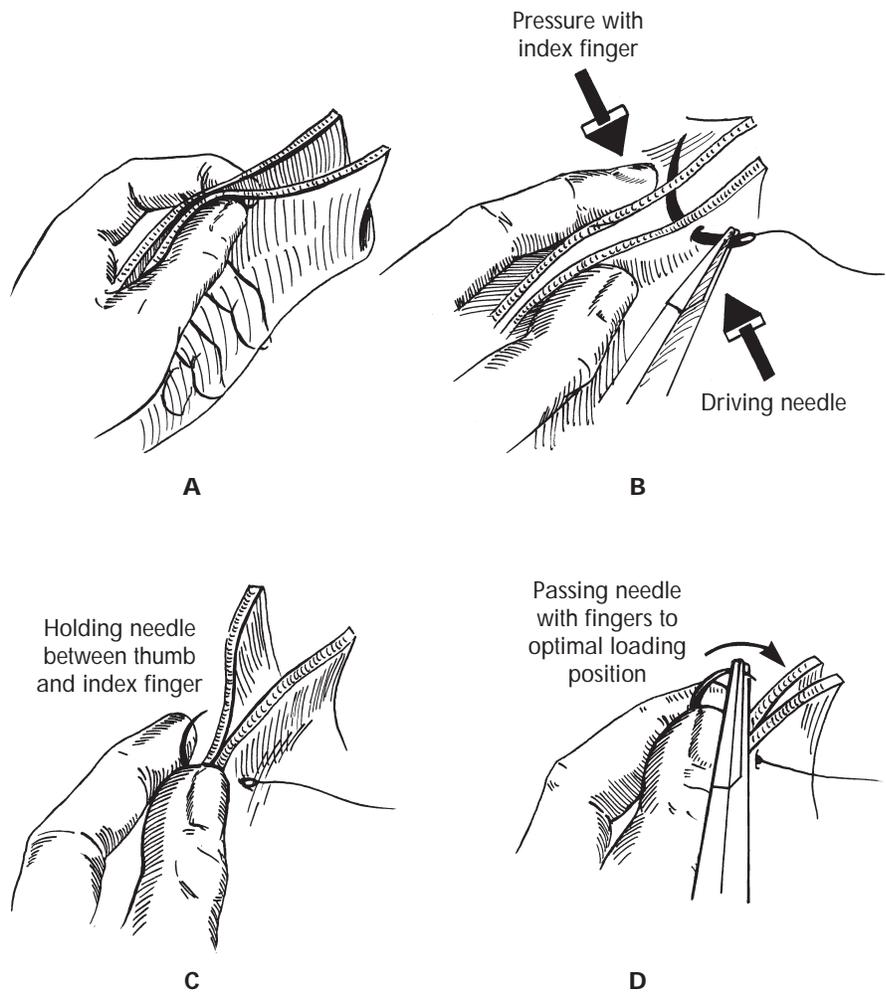
12-4



12-5

Simple continuous stitch with straight needle

**No-Forceps Quick Reloading
Stitch Using Curved Needle**



12-6

FIG. 12-6. With the no-forceps sewing technique, a right-handed surgeon uses the left thumb and index finger to secure the two layers of tissue to be sewn together (A). The other three fingers hold the bowel in place.

The surgeon's right hand drives the needle through the tissues while the left index finger and thumb apply slight counter-pressure against it (B).

When the needle comes through the other side, the surgeon's left index finger and thumb grasp the needle while the right hand repositions the needleholder for the next stitch (C and D). In essence, this maneuver facilitates a contin-

uous stitching motion with the right hand on the needleholder.

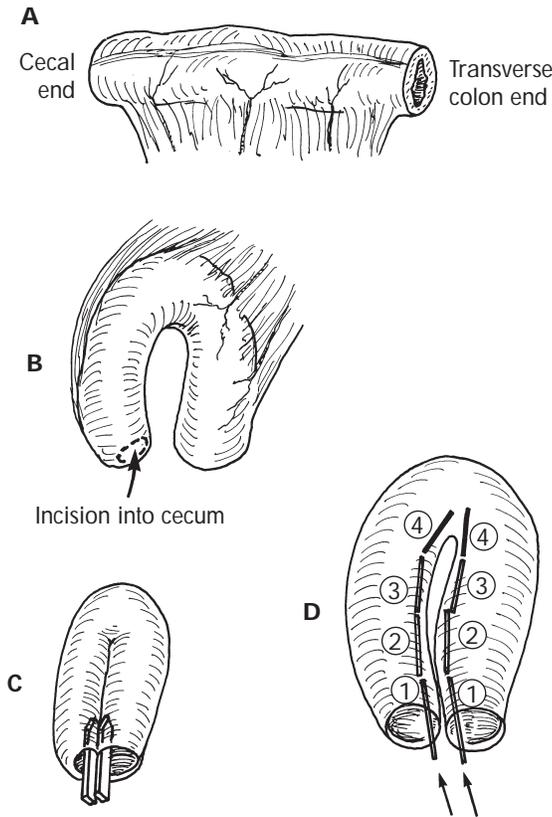
ABSORBABLE STAPLES FOR POUCH CONSTRUCTION

GIA 75 (Autosuture, U.S. Surgical, Norwalk, Conn.) absorbable staples are an excellent and quick way to construct the pouch.⁶

FIG. 12-7. After an opening is made in the cecum (A and B), the two arms of the stapler gun are passed into the folded lumen at the antimesenteric line (C).

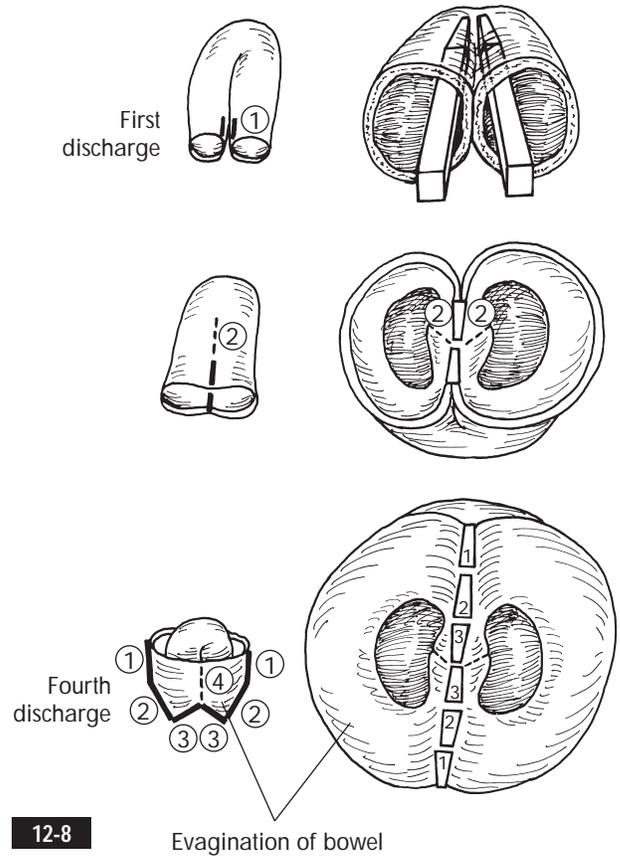
The engaged stapler is discharged after satisfactory placement (D).

Detubularization and Pouch Construction Using Absorbable GIA 75 Staples



12-7

Three or Four Stapler Discharges Necessary for Pouch Construction



12-8

FIG. 12-8. On the average, three or four discharges using reloadable staples are necessary to complete the pouch.

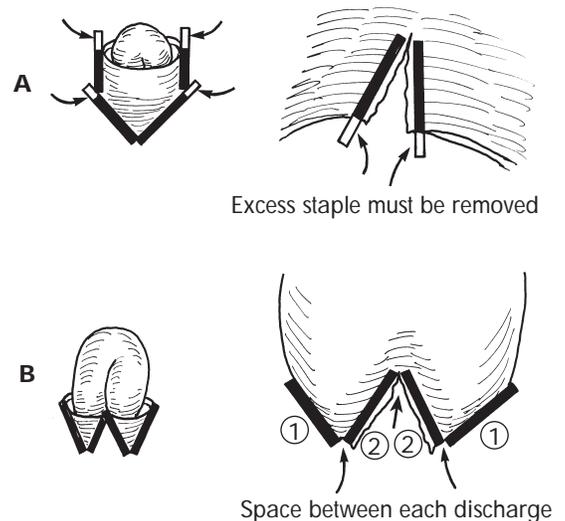
FIG. 12-9. Redundant staples are cut off the distal end (A).

Because these staples are thick, the surgeon must clear a space at the crotch for the placement of the subsequent stapler (B).

These small spaces between the staples rarely require extra stitches.

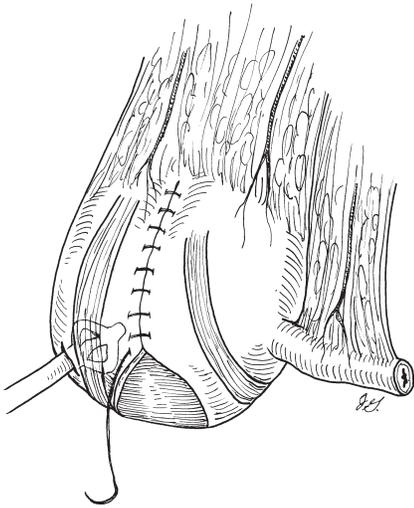
We prefer to use this method over manual sewing for the creation of the Indiana pouch.

The pouch should be checked for fluid leakage at the staple lines after the pouch is completely closed.



12-9

Incomplete Pouch Construction in Preparation for Ureterocolonic Anastomosis and Cecostomy Tube Placement



12-10

CECOSTOMY AND URETEROCOLONIC ANASTOMOSIS

FIG. 12-10. With the pouch placed in the right pelvic gutter, the surgeon selects the position for the placement of the cecostomy tube (Malecot or 26 Fr Foley catheter with a 30 ml balloon). The cecostomy tube is placed and secured with a pursestring stitch (0 chromic).

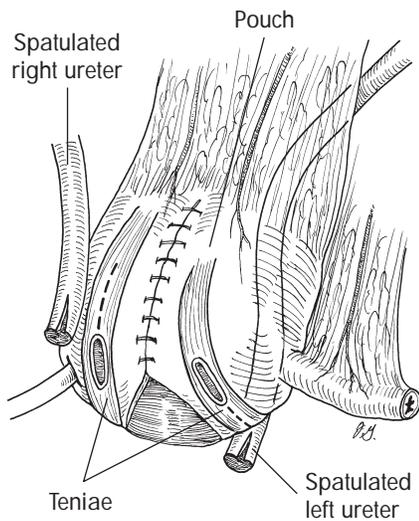
URETEROCOLONIC ANASTOMOSIS

The ureters have been clipped at the time of their division earlier in the operation and now have had time to become dilated and hydronephrotic. This dilated state makes spatulation and reimplantation of the dilated ureters simple.

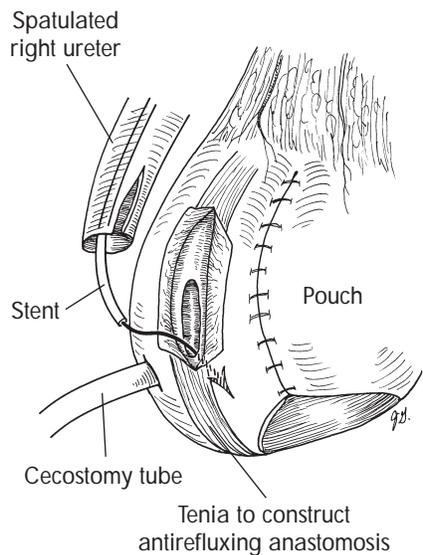
On the left side, it is critical that the ureter have a gradual descent without any twisting. If the ureters have been clipped and dilated full of urine, they will not twist. If the ureters are open, the surgeon can pass an 8 Fr red rubber catheter or stent to the left kidney to prevent twisting.

If there is too much tension on the left ureter after it is brought through to the right side, the surgeon should reexamine the retroperitoneal tunnel to make sure

Ureterocolonic Anastomosis Using Teniae



12-11



12-12

that there are no sharp angles. The surgeon also should make sure that the ureter and its adventitia are free from the level of the left kidney down. The surgeon must decide the optimal position of the left ureteral anastomosis in relation to the pouch.

For the ureterocolonic anastomosis, we use either the Le Duc method or implantation through the teniae of the colon.

The advantage of traditional ureteral implantation is that a good, long antirefluxing segment is covered with the colonic teniae. The disadvantage is that after the pouch is created, there are few teniae in the correct position for ureteral implantation.

The advantage of the Le Duc procedure is its versatility in placement anywhere in the pouch. The disadvantage is the reconstruction of a less satisfying antirefluxing segment, which may be shorter than planned.

URETEROCOLONIC ANASTOMOSIS USING TENIAE OF COLON

FIG. 12-11. Teniae are selected, and the surgeon first addresses the more difficult left ureterocolonic anastomosis. We usually bring the left spatulated ureter under the pouch and into a position for implantation.

FIG. 12-12. Teniae should be opened with sharp dissection and should be undermined on either side approximately 4 cm.

Many techniques of implantation are available but the principle of ureteral spatulation and creation of an antirefluxing segment are the same. Spatulation ensures a wide-open anastomosis and the tunneled or fixed segment of 4 cm or more ensures the antireflux mechanism. Generally, a ratio of 1:4 (width of the ureter to the length of the tunnel) is a good rule.

After the spatulation has been accomplished, the first three

stitches at the vertex are the most important. The ureterocolonic anastomosis is completed using large stitches placed circumferentially around the ureter for support and fixation.

After the first three stitches are placed, the surgeon inserts a Bard 8 Fr ureteral diversionary stent up the ureter to the kidney and then brings it into the cecum and out the cecum through a separate opening. The surgeon then places a holding stitch (2-0 chromic) around the stent at the point where it exits the cecum. Any diversionary stent with a self-retaining mechanism at its proximal end is acceptable.

The undermined tenia can be reapproximated over the ureter to create an antirefluxing mechanism.

Le Duc ureterocolonic anastomosis is described in Chapter 13 (see p. 131).

TAPERING OF ILEAL SEGMENT AND STOMA CREATION

The pouch is completely closed after ureterocolonic anastomosis and cecostomy tube placement.

By instilling saline solution via the cecostomy tube, the surgeon can now test for pouch capacity and for any leakage at the suture lines.

Although rarely seen, any leakage at the open ileostomal end implies an incompetent ileocecal valve.

FIGS. 12-13 AND 12-14. In addition, the surgeon can now estimate the proper orientation of the stomal end for the shortest and easiest straight line for catheterization.

In general, the stoma will favor a position on the right side; however, we have had rare occasions in which the stoma favored either a midline position at the umbilicus or the left side.

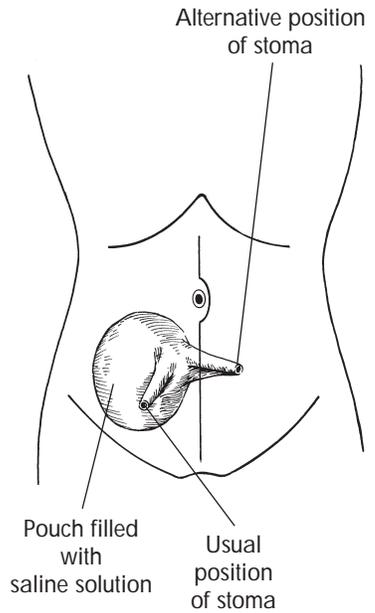
FIG. 12-15. The ileal segment is 10 cm long. We insert a Foley catheter (14 Fr) with a balloon inflated to 15 ml with saline solution.

With the catheter balloon inflated, the location of the ileocecal valve can be palpated.

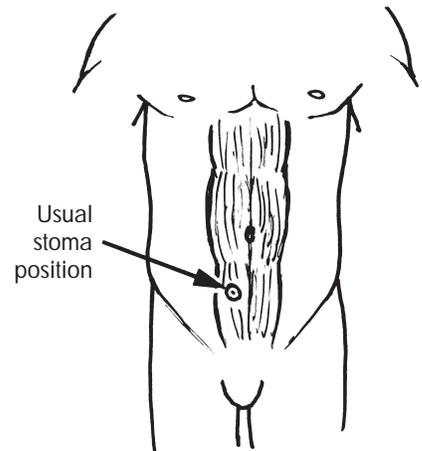
Temporary 2-0 chromic stitches are placed through the ileum and around the Foley catheter along the mesenteric border to hold the catheter in position. The stitches are spaced out and tied down without excessive tension. These holding stitches can be pulled out without difficulty after the stapling is performed. This maneuver helps to facilitate the stapling process and temporarily fixes the catheter in an optimal position against the intestinal wall.

Babcock clamps placed along the antimesenteric side are used for countertraction. The GIA 60 stapler is placed snugly against the catheter and engaged over the ileum. The surgeon should check for any undesirable angles or pockets before discharging the staples.

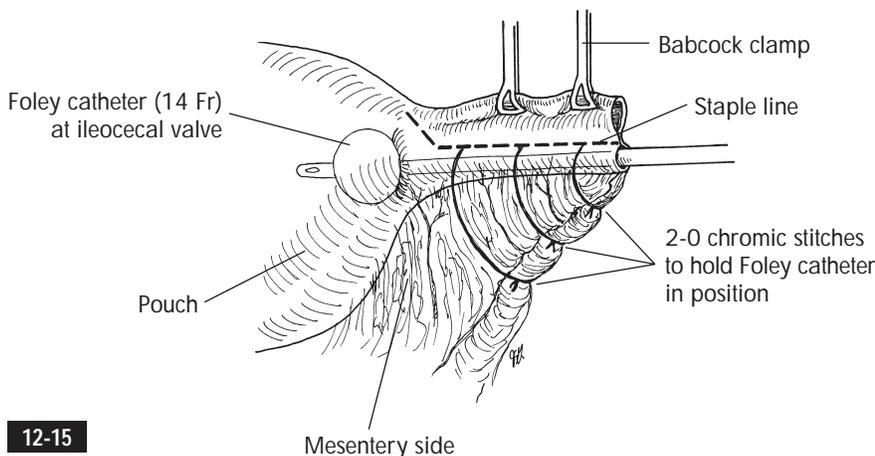
Testing for Optimal Placement of Stoma



12-13



12-14



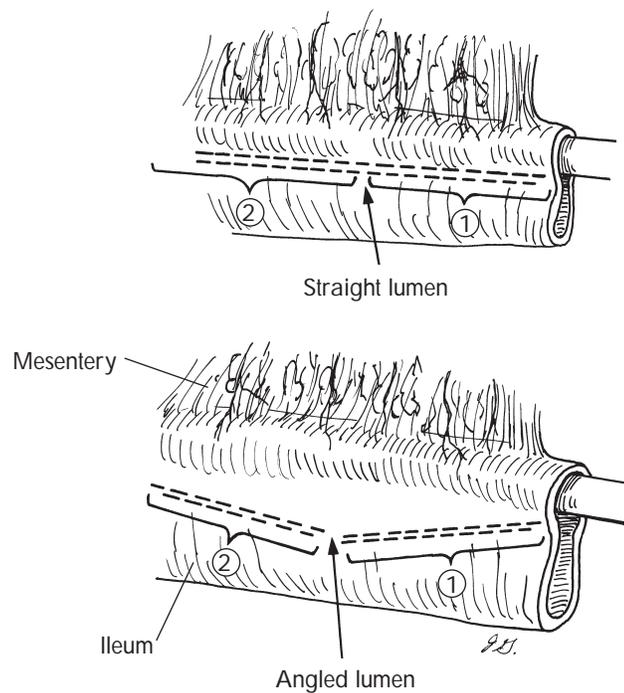
12-15

FIG. 12-16. It is absolutely critical that the newly created lumen be straight and have no sharp angles; otherwise self-catheterization will be difficult for the patient.

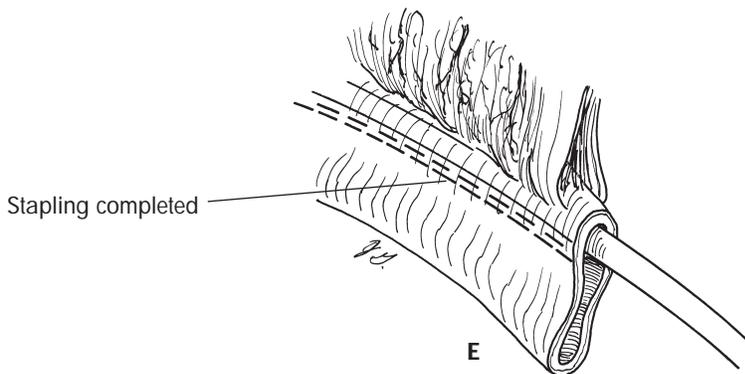
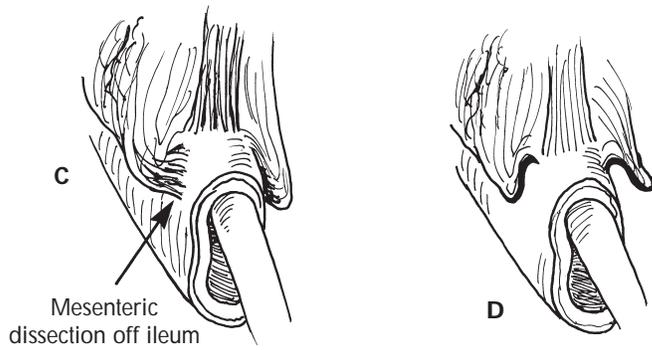
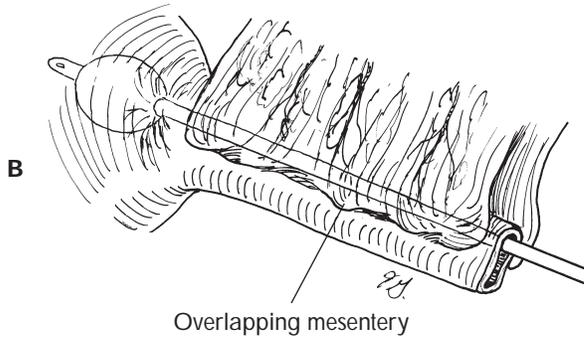
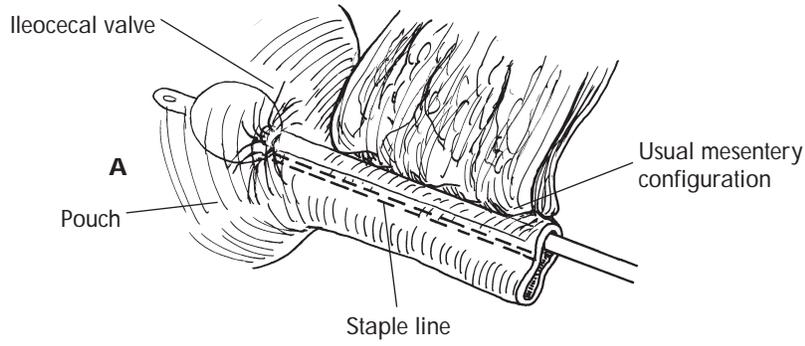
As the stapling approaches the end of the ileum and the cecum, diagonal stapling is sufficient. The diagonal stapling is close to the junction of the ileocecal valve. Simple stitches at the ileocecal junction over the staples are helpful.

FIG. 12-17. Often the fatty mesentery of the ileum may overlap the area for the stapling (B). The surgeon can simply dissect the fat and vessels from the ileum on either side while leaving the main branches in the middle (C and D). Once adequate space is established, the surgeon proceeds with the stapling (E).

The stoma should be flat against the abdominal skin.



12-16



KEY POINTS

- To create the pouch, a 30 to 40 cm colonic segment from the cecum up to the transverse colon and 10 cm of ileum are necessary.
- The selected bowel segment is divided and the transverse colon is mobilized.
- Detubularization of the colonic segment is performed and the pouch is constructed.
- The use of absorbable GIA 75 staples for pouch construction can be considered.
- Ureterocolonic anastomosis using the teniae of the colon or the Le Duc method is performed and a stent is placed.
- The cecostomy tube is placed and pouch closure is completed.
- The pouch is tested for capacity and leakage at suture or staple lines.
- The competence of the ileocecal valve is checked.
- Optimal placement of the stoma is determined.
- The ileal segment is tapered using a GIA 60 stapler over a Foley catheter (14 Fr).
- The stoma is flushed with the Foley catheter in place.

POTENTIAL PROBLEMS

- *Unexpected cecal or ascending colon lesion:* Use alternative ileal conduit and intraoperative general surgical consult (preoperative barium enema is useful in planning the surgery)
- *Difficulty bringing transverse colon down for anastomosis:* Mobilize transverse colon more and create a side-to-side anastomosis
- *Left ureter brought over to right side with some tension:* Mobilize ureter all the way up to the kidney → ensure that parietal peritoneal tunnel is wide → ensure that inferior mesenteric artery is not in the way
- *Unable to find suitable tenia for ureterocolonic anastomosis:* Use Le Duc procedure
- *Incompetent ileocecal valve:* Open pouch and add more sutures to fix the valve against the cecal wall
- *Angled tapering of ileum:* Redo the region

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