**Bowel Diversion Surgeries:**
**Ileostomy, Continent Ileostomy, Ileoanal Reservoir and Colostomy**

**What is bowel diversion surgery?**
Bowel diversion surgery allows stool to leave the body when the large intestine is either removed or requires diversion to provide the time needed to heal. Some bowel diversion surgeries or the creation of an ostomy, diverts the bowel to an opening in the abdomen where a stoma is created. The stoma is formed by rolling the bowel's end back on itself, like a shirt cuff, and stitching it to the abdominal wall. An ostomy pouch is attached to the stoma to collect stool. Bowel diversion surgeries affect the large intestine and often the small intestine.

An ostomy can be placed in various sites on the abdomen (A). Once the incision is made, the ileum is pulled through the incision (B), and a rod is placed under the loop. The loop is cut open; one side is stitched to the abdomen (C). The portion of intestine is flipped open to expose the interior surface (D), and the opposite side is stitched in place (E).
Other bowel diversion surgeries reconfigure the intestines after damaged portions are removed. For example, after removing the colon, a surgeon can create a colon-like pouch out of the last part of the small intestine, avoiding the need for an ostomy pouch.

**Anatomy**
The small intestine runs from the stomach to the large intestine and has three main sections: the duodenum, which is the first 10 inches; the jejunum, which is the middle 8 feet; and the ileum, which is the final 12 feet. Bowel diversion surgeries only affect the ileum.

The large intestine is about 5 feet long and runs from the small intestine to the anus. The colon and rectum are the two main sections of the large intestine. Semisolid digestive waste enters the colon from the small intestine. Gradually, the colon absorbs moisture and forms stool as digestive waste moves toward the rectum. The rectum is about 6 inches long and is located right before the anus. The rectum stores stool, which leaves the body through the anus.

**Bowel Diversion Surgeries**
The type, degree, location of bowel damage, and personal preference, are all factors in determining which surgery is most appropriate. For example, those whose disease affects the ileum are poor candidates for ileoanal reservoir surgery or continent ileostomy because of the increased risk of disease recurrence and the need for pouch removal. Some only need a temporary diversion; others need permanent bowel diversion.

**Common Conditions Leading to a Colostomy**
The most common indications in children are: congenital anomaly, anorectal anomaly and Hirschsprung’s disease. The most common indication in adults is cancer.

**Common Conditions Leading to an Ileostomy**
There are several conditions that can require removal of the entire colon (large intestine) and rectum leading to an ileostomy.

*Ulcerative Colitis* (UC) is an inflammatory condition that affects only the large intestine (never the small intestine). The cause is unknown, but it is felt that there is a combination of genetic
and environmental factors. UC occurs when the body's immune system attacks the cells in the lining of the large intestine, resulting in inflammation and tissue damage. UC primarily affects young people (teens and early 20s). It causes frequent urgent bowel movements (10-20 per day) with bleeding, pain and loss of appetite. Many medical treatments are available, but not everyone responds. Surgery is required for hemorrhage, perforation, or when the disease becomes intractable (continued symptoms despite maximum medical therapy). The disease is completely cured when the colon is removed.

**Familial Adenomatous Polyposis** (FAP) is an inherited condition in which hundreds and even thousands of polyps develop in the colon at a young age. By the age of about 20 years, if the colon is not removed, colon cancer will inevitably develop.

**Crohn's Disease** also can require removal of the entire colon and rectum. In contrast to UC, Crohn's disease can affect not only the large intestine but also the small intestine, sometimes at the same time or at different times.

Other conditions that may be treated with bowel diversion surgery:
- congenital bowel defects
- nonfunctioning rectum
- bowel obstructions
- cancer of the colon and/or rectum
- Inflammatory bowel disease (IBD)
- uncontrolled bleeding from the large intestine
- injury/trauma to the intestinal tract
- injuries to the nerves that control evacuations and continence
- diverticulitis are all possible reasons for bowel diversion surgery.

**Surgical Options for Bowel Diversion**

**Colostomy**
Colostomy diverts stool to a stoma created in the lower abdomen. The end of the colon that leads to the rectum is closed off and becomes dormant. Stool collects in an ostomy pouch.

**Ileostomy**
Ileostomy diverts the ileum to a stoma. Semisolid waste flows out of the stoma and collects in an ostomy pouch, which must be emptied several times a day. An ileostomy bypasses the colon, rectum, and anus and has the fewest complications of all ileal diversions. For some, an ileostomy is preceded by removal of the colon (colonectomy) or the colon and rectum (protocolectomy). The anal canal is stitched closed.
A conventional ileostomy, also called a Brooke ileostomy, a small incision is made through the abdominal wall (usually on the lower right side) to which the cut end of the ileum is sutured. The ileum may protrude from the skin, often as far as 2 in (5 cm). Patients with this type of stoma are considered fecal-incontinent. After a conventional ileostomy, an ostomy bag is worn over the stoma and attached to the abdominal skin with adhesive. While most people with a Brooke ileostomy lead a normal life, a significant number will have episodes of leakage with skin irritation, allergies to the adhesives, problems with "bag bulge", limitation in activities, and difficulty making the emotional adjustment to life with an appliance pending the age of the patient when the ileostomy is placed. Approximately 11% with a Brooke ileostomy will require a surgical revision during their lifetime. This may be for retraction of the stoma with inability to maintain a seal, stoma prolapse, or hernia.

Ileoanal reservoir
Ileoanal reservoir surgery is an option when the large intestine is removed but the anus remains intact and disease-free. The surgeon creates a colon like pouch, called an ileoanal reservoir, from the last several inches of the ileum. The ileoanal reservoir is also called a pelvic pouch or J-pouch. Stool collects in this reservoir and then exits the body through the anus during a bowel movement. People who have undergone ileoanal reservoir surgery initially have about 6 to 10 bowel movements a day. Two or more surgeries are usually required, including a temporary ileostomy, and an adjustment period lasting several months is needed for the newly formed reservoir to stretch and adjust to its new function. After the adjustment period, bowel movements decrease to as few as 4 to 6 a day. Approximately 5-15% of those with a reservoir experience many evacuations each day and/or anal incontinence.
Continent Ileostomy

Continent ileostomy is an option for those who are not good candidates for a reservoir surgery because of damage to the rectum or anus but do not want to wear an ostomy pouch. In this procedure, the large intestine is removed and a colon-like pouch, called a Kock pouch is made from the end of the ileum. The surgeon connects the Kock pouch to a stoma. A Kock pouch must be drained each day by inserting a tube through the stoma. An ostomy pouch is not needed and the stoma is covered by a patch when it is not in use.

The Kock pouch has been modified to the Barnett continent intestinal reservoir (BCIR). This procedure creates a reservoir made from the small intestine, together with a valve also made from the small intestine, and a stoma. This gives the patient control over the evacuation of their intestinal waste. Several times daily, while seated on the toilet, a catheter is inserted to drain the internal pouch. There is no urgency to doing this and evacuation can be delayed until a convenient time (much longer than with a J-pouch). Since no appliance is required, the stoma is flat and only requires a small covering to collect mucous that is produced by the stoma tissue. Initially the pouch has a limited capacity (3-4 ounces) and must be given time to expand.

BCIR (Barnett Continent Intestinal Reservoir)
**Bowel Diversion Complications**

Risks associated with the diversion procedures include excessive bleeding, infection, and complications due to general anesthesia. After surgery, some patients experience stomal obstruction (blockage), inflammation of the ileum, stomal prolapse, or irritation of the skin around the stoma.

Among patients who have undergone a Brooke ileostomy, medical literature reports a 19–70% risk of complications. Small bowel obstruction occurs in 15% of patients; 30% have problems with the stoma; 20–25% require further surgery to repair the stoma; and 30% experience postsurgical infections. The rate of complications is also high among patients who have had a continent ileostomy (15–60%). The most common complications associated with this procedure are small bowel obstruction (7%), wound complications (35%), and failure to restore continence (50%). The mortality rate of both procedures is less than 1%.

**Aftercare**

Following surgery, the patient is instructed in the care of the stoma, placement of the ileostomy bag, and necessary changes to diet and lifestyle. Because the large intestine (a site of fluid absorption) is no longer a part of the patient's digestive system, fecal matter exiting the stoma has a high water content. The patient must therefore be diligent about their fluid intake to minimize dehydration. Once the ileostomy has healed, a normal diet can usually be resumed, and the patient can return to normal activities.

**Related Mosby Skills:**

Ostomy Appliance: Change (PSA)

**References:**

Organizations