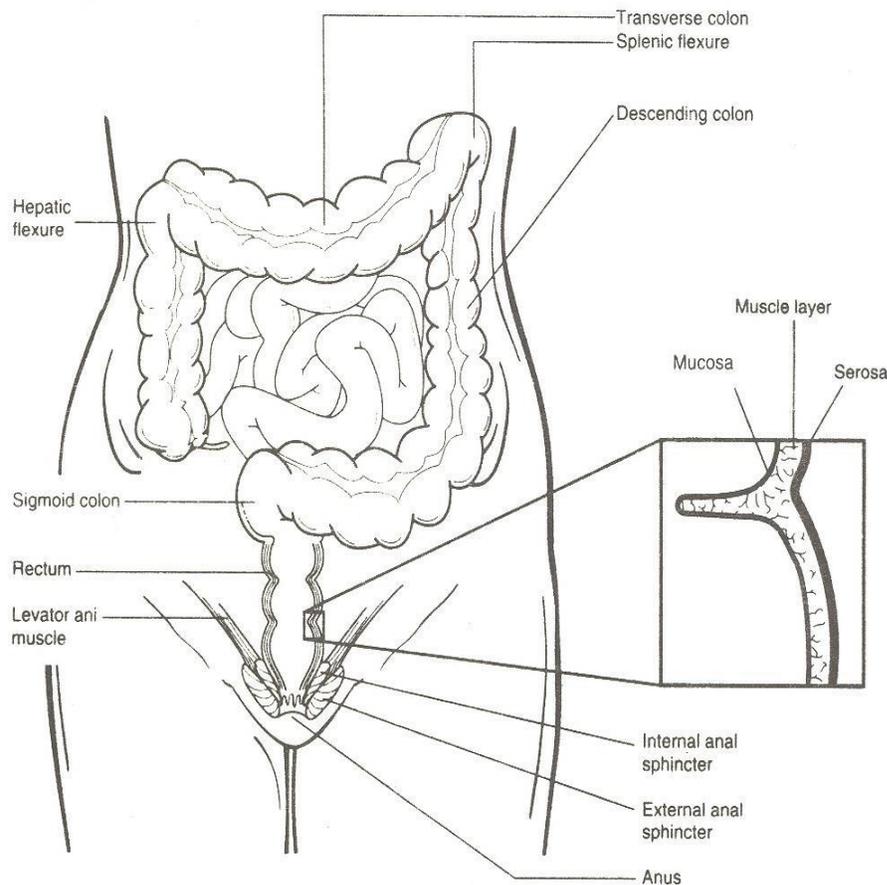


# Colon Surgery: A Guide for Patients and Families

If you are reading this booklet, it is because you, or a loved one, is about to have surgery on the colon. It is important that you understand as best as possible what will happen to your body. This booklet will provide you with information needed to assist in your preparation for surgery, and serve as a basis for questions and concerns you might have.

## About the Colon

In order to understand the different diseases and types of surgery it is necessary to review the anatomy and function of the colon. The colon, also known as the large intestine or large bowel, is a horseshoe-shaped tube that connects to the small bowel where most digestion and absorption takes place, and travels up (ascends) from the lower right side, crosses (traverses) the abdomen, then descends the left side and connects to the rectum in the pelvis (See Figure A below), framing the small intestine on three sides.



**Figure A**

Areas of the colon can be described as either right and left side, or segments: ascending, transverse and descending. There are some distinctive parts of the colon, such as the cecum, the hepatic flexure, the splenic flexure and the sigmoid colon. The cecum is the first portion of the colon and it is where the

appendix originates. The hepatic flexure is the turn between ascending and transverse colon immediately inferior to the liver. The splenic flexure is the turn between transverse and descending colon, immediately inferior to the spleen. The sigmoid colon is an “s” shaped segment at the end of the colon which is often loose and redundant.

The diameter of the colon varies along its course but, on average, is twice as big as the small intestine/small bowel. The rectum is even bigger, at about three times the diameter of the small bowel. The colon is made up of three concentric layers of tissue. The inner layer (lining) is the mucosa; it contains cells that produce mucus, cells that are part of the immune system and cells that absorb water and nutrients. The middle layer is the muscle that contracts to propel the end products of digestion coming from the small intestine and forming stool into the anus. The outer layer is the serosa which is a membrane that covers the colon as well as all other organs within the abdomen. Once the rectum descends into the pelvis there is no longer serosa.

At the anus, the muscle fibers of the rectum form the internal anal sphincter. The internal anal sphincter is surrounded by another muscle called the external anal sphincter; both are responsible for keeping the anal canal closed at all times and open only to produce a bowel movement.

The colon is normally filled with bacteria. These bacteria ferment any fiber that escapes digestion in the small bowel to extract energy and use it to help absorb water and salts.

### **Diseases Affecting the Colon and Rectum**

The colon is at risk of many more diseases than the small bowel. There are several reasons for this disparity. First, the colon is filled with bacteria while the small bowel is sterile. Second, food particles travel through the small bowel very quickly (usually three hours); once they get to the colon, some are eliminated at 24 hours and others remain within the colon for up to seven days. This long stay in the colon makes it possible for bacteria to transform substances into carcinogens (cancer-producing substances) that then can attack the colon lining for an entire week. These carcinogens can first produce polyps and later cancer. A third reason is that the contents become progressively thicker in consistency requiring a lot of force to move along.

When this force exceeds the strength of the wall, diverticuli, which are little pockets, pop out, typically in the sigmoid colon. Because of the amount of bacteria, the colon has a strong immune system to defend itself. When the body loses control of this immune system, inflammation develops and can take the form of ulcerative colitis, Crohn’s disease and even more rare forms of colitis.

In summary the typical diseases of the colon requiring surgery are:

1. Polyps and cancer of the colon or rectum
2. Diverticular disease
3. Inflammatory bowel disease: ulcerative colitis and Crohn’s disease

### **Polyps and Cancer of the Colon and Rectum**

Healthy cells grow and divide in an orderly way. Occasionally, cells begin piling up in disarray and can form a small clump of cells, called a polyp, on the lining of the colon. Most colon polyps are harmless and can be removed during colonoscopy. But, when cells start deforming, multiplying quickly and begin to penetrate through the layers of the bowel wall, they develop into colon cancer.

Polyps that are too big to remove during a colonoscopy, are broad-based or have already turned into cancer require surgery. Colorectal cancer develops in stages: I through IV. These stages are determined after surgery for guidance in terms of additional therapy (usually chemotherapy) and are based on tumor size, penetration through the wall, presence of cancer cells in either the lymph nodes or other organs beyond the colon. Surgery can result in the cure of most patients with colon cancer, and even for those in whom the cancer has advanced too far surgery can often improve their quality of life.

There is a strong connection between polyps and cancer, although some people develop cancer without having polyps. There is also a familial tendency in developing polyps and cancer. In some relatively rare cases, the specific mutations in the genes carried by these families have been identified. One of them is the APC or adenomatous polyposis coli gene. The other one is the “DNA mismatch repair gene” which produces the nonpolyposis hereditary colorectal cancer (HNPCC) or Lynch syndrome. However, in 85 percent of patients, colorectal cancer cannot be traced to any particular gene with current forms of gene analysis.

### **Diverticular Disease**

Diverticuli in the colon are very common in the U.S., probably due to a low amount of fiber in the diet. As previously mentioned, these are small bulges along the colon wall, with most, about 80 percent, located within the sigmoid colon. Within these diverticuli, infection may set in, called diverticulitis, and the inflamed diverticuli may develop small perforations and leakage. These episodes of inflammation may subside and recur over time. After several bouts of inflammation, the colon may scar down and narrow. In other instances, it may join the bladder or the vagina through an area weakened by diverticulitis (colovaginal or colovesical fistula).

Because of the potential for these complications, surgery is recommended either after a few attacks of diverticulitis (typically three) or once these complications have already developed.

### **Inflammatory Bowel Diseases**

Ulcerative colitis only affects the inner layer of the colon, called the mucosa, and produces bleeding ulcers. Crohn’s disease affects all three layers, so it can also produce obstruction and pain. Long-standing ulcerative colitis (more than 10 to 20 years), especially if it affects the entire colon, can lead to cancer. Both ulcerative colitis and Crohn’s disease can result in health issues beyond the intestinal tract, such as inflammation of joints, eyes and liver ducts. Crohn’s disease can also produce problems around the anus in the form of abscesses, fistulas and fissures. Surgery becomes necessary when the biopsies of the colon show cancerous changes (dysplasia) or when medications can no longer control symptoms or if they produce excessive side effects. With removal of the colon and rectum through surgery, ulcerative colitis is cured. In spite of the removal of segments of bowel affected by Crohn’s disease, other areas may become inflamed in the future, thus, all patients need to continue on medications.

## **The Surgical Treatment of Colonic Diseases**

### **Colectomy**

Surgery on the colon has traditionally been done through creating a vertical incision in the middle of the abdomen. Over the last decade, the laparoscopic, or minimally invasive, approach, first used for gallbladder surgery, has been extended to colon surgery. Laparoscopy means to work inside the abdomen with small openings using a video camera and long instruments operated from outside the body. In order to gain exposure to all organs, the abdomen is first filled with gas (CO<sub>2</sub>) expanding the abdomen.

Because the colon is located near many vital structures, laparoscopic colon surgery can be difficult to perform. In addition, there are many variables that determine whether a surgeon can perform the surgery laparoscopically or must use traditional surgical methods, including the patient having had previous abdominal surgeries, obesity (especially in males, since they accumulate more fat inside the abdomen than women), very poor lung function and some orthopedic problems in which the legs cannot be positioned properly.

### **Types of colectomies**

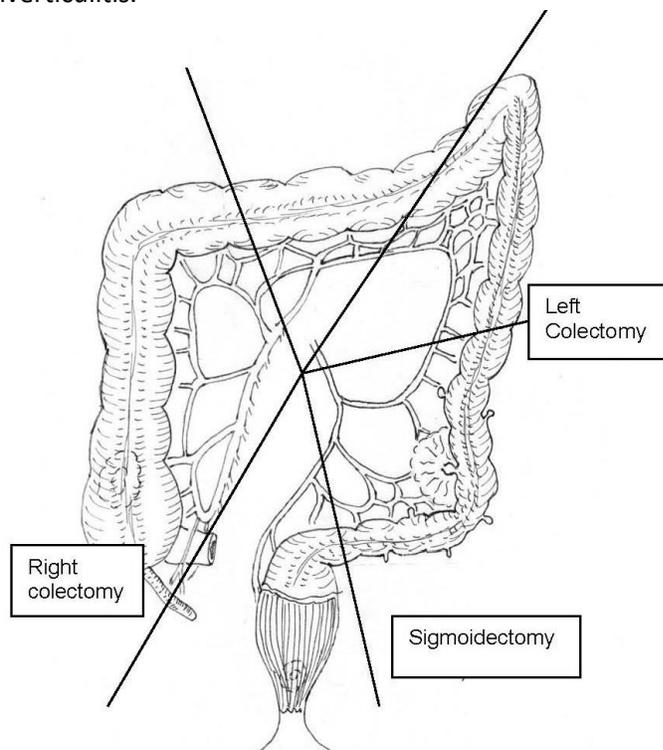
Depending on the disease process, a section of the colon is removed and then the cut ends are rejoined by a procedure called anastomosis. (See Figure B)

**Total abdominal colectomy:** The entire colon is removed and the small bowel is connected to the rectum. This is typically done for some forms of colitis such as Crohn's disease and pseudo membranous colitis.

**Right colectomy:** The colon from the cecum (including the appendix and the end of ileum) to the transverse colon is removed along with the ileocolic vessels and the right branches of the middle colic vessels.

**Left colectomy:** The colon from the splenic flexure to the rectum is removed along with the branches of the inferior mesenteric vessels.

**Sigmoidectomy:** The colon from the descending region to the rectum is removed, typically for diverticulitis.



**Figure B**

## **What to Expect from Colon Surgery?**

The colon is not really an essential organ, although removal of part or of the entire colon does affect the ability to absorb nutrients. Removal of the left colon is tolerated very well with only a transient increase in bowel frequency. Removal of the right colon can increase the frequency of stools through the loss of the valve (ileocecal) between small and large bowel. For most patients it will mean an increase from one bowel movements per day to three or four, which returns back to one per day within a month after surgery.

From the time a person is referred to surgery until the he or she returns to a normal level of activities, there are ten steps. Each of these ten steps is equally important to arrive at a successful outcome.

1. Initial visit
2. Preadmission testing
3. Clearance by other specialists
4. Preoperative bowel preparation
5. Admission to the hospital
6. Surgery
7. Immediate postoperative period
8. Discharge process
9. Follow-up visits
10. Convalescence

## **Your Initial Visit**

By the time you are reading this booklet you may have already been through your initial visit. If not, please let us know if you need directions to our office. It is really useful for us to have as much information about your illness as possible, including your prior medical records. If you have any medical reports or X-rays at home, please mail them to us or bring them with you on your initial visit. Usually we receive these materials directly from your doctor's office, but occasionally they do not arrive before you come.

You will be asked about the medications you have taken in the past and what you are presently taking. Please remember to bring a list of all your medications as well as any over-the-counter drugs or supplements you may be taking. We are particularly interested in the dosage of blood thinners and any dietary supplements that you may be taking. During the initial visit we will get a full medical history and perform a physical exam. The surgeon will also perform a rectal exam on you. Most patients already had examinations prior to this visit, but we are looking for very specific elements in this exam to help in planning your surgery.

At the end of the visit, you will be informed of your options, asked to select the date for surgery and sign a consent (permit). You will also be asked to sign a separate consent for blood transfusion. Unless your red cell count is very low before surgery there is a very low chance of needing a blood transfusion. Blood transfusion is considered very safe nowadays as donated blood is tested for all of the feared infections (AIDS, hepatitis).

While still unusual, there may be transfusion reactions in the form of fever and chills. Because of the fear of infections, many patients inquire about autologous blood (banking their own blood in advance) or designating a donor (family member or friend). While this seems logical, there are many problems with this. First, there can be transfusion reactions to our own blood, so we do not routinely give patients back the blood they banked. Second, unless the patient has serious bleeding, all that is accomplished by

banking blood is depriving the body of its own valuable cells when they are greatly needed. And, patients can have reactions to the anemia induced by the blood donation including fainting episodes and potential injuries from falling. Lastly, in the State of New Jersey, autologous blood not used for the donor cannot be used by anybody else and must be discarded, creating a waste of resources all around.

### **Preadmission Testing**

Before your admission to the hospital we need to be sure that you are healthy enough to undergo surgery.

- We will assist you in arranging an appointment to have blood work drawn, which may include cell counts, coagulation profile, electrolytes, glucose and blood urea nitrogen.
- We usually ask for a urine sample to be sure that your bladder is sterile.
- Depending on the age of the patient we will also ask for a chest X-ray and electrocardiogram.

During this second visit to the hospital you will have an opportunity to discuss the general anesthesia you will receive. Another option is to have a pump that delivers analgesics into your blood stream at the push of a button, called patient-controlled analgesia (PCA).

### **Pre-operative Bowel Preparation**

In preparation for surgery, bowel preparation is essential to minimize the chances of postoperative infections. Bowel preparation consists of three parts: diet, laxatives and antibiotics. Please read and obtain needed supplies prior to starting.

#### **Two Days Before Surgery:**

- 1.No solid foods may be eaten.
- 2.Drink only a clear liquid diet starting at breakfast. (Clear liquids include water, tea and coffee with no added milk or cream, broth, carbonated beverages. Do not eat milk products, solids, or jello.)
- 3.Take 4 bisacodyl tablets (i.e., Fleet or Dulcolax) at bedtime.

#### **The Day Before Surgery:**

1. Continue drinking a clear liquid diet all day, do not eat solid food.
2. Start to drink one gallon of GoLYTELY® (polyethylene glycol & electrolytes) at 12:00 Noon

Instructions for GoLYTELY:

- Take 240 ml every ten minutes up to four liters or until your fecal discharge is clear and free of solid matter. Rapid drinking of the solution is recommended rather than drinking small amounts continuously.
  - It usually starts to work in 30 to 60 minutes.
  - Take any other needed medications at least one hour before you start the solution.
  - You should fast for three hours prior to ingestion of the solution; clear liquids are allowed after ingestion of the solution.
3. Take 500 mg Flagyl and 1 gm of Neomycin by mouth at: 7:00pm and 11:00pm
  4. Shower carefully with a strong soap the night before surgery.
  5. Ensure that your umbilical area (belly button) is clean.
  6. Take nothing by mouth after midnight on the day of your surgery. (Remember: No candy, no mints, no chewing gum, and no water)
  7. Follow special instructions for your medications.

## Admission to the Hospital

You will be asked to come to the admissions office about two hours prior to the start of the surgery.

- It takes 30 to 45 minutes to go through the admission process, which involves filling out some papers, verifying your insurance, and assigning you a bed in the hospital.
- From the admissions office you will be directed to an area of the hospital where you will meet the doctor and nurses for a final checkup.
- If you had not signed the consent form at the initial visit, you will have to sign it at this time.
- You will encounter many new people asking you many of the same questions. This is a safety mechanism to make sure you do not have any drug allergies, and that we have as much information on record as possible.
- From this area you will be transported to the holding area in the operating room where again you will be asked more questions.
- By this time, you should not have any jewelry on you. An intravenous will be started in your arm, and you will receive some sedative to make you feel comfortable.
- Finally, your anesthesiologist will bring you to the operating room.

## Surgery

Everyone working in the operating room will have a facemask. There are usually two nurses assigned to each operating room who will come to greet you and assist you to the operating room table.

The anesthesiologist will place you under general anesthesia. From the time you fall asleep until we start the surgery there is an additional hour that we need to pad and position your legs, examine and irrigate the rectum, scrub the abdomen and anal area, and finally cover the rest of your body.

The operation will take between three and five hours depending on technical factors such as the severity of the disease, location in the colon and degree of difficulty in accessing the area.

## Immediately After Surgery

After surgery, you will spend approximately two hours in the recovery room and then you will go to your room. You will not remember much of what happened the day of your surgery. You will wake up the following day realizing that there are a number of devices attached to your body:

- Intravenous tube in your arm and perhaps another intravenous tube in one of your neck veins.
- Nasogastric tube draining gastric juice for at least a day after surgery.
- A catheter in your bladder and possibly one in your new rectum.
- Your legs will be wrapped in plastic inflatable stockings that will periodically inflate and deflate to help blood circulate through your veins and prevent the formation of blood clots.

**The most important device of all is your call button for your nurse.**

You may have another button to push analgesics (pain medications) into your system as needed.

## Next Days

The day after surgery you will be assisted to get out of bed and sit up in a chair. Being out of bed helps aerate your lungs and gives you a sense of well-being.

By the second post-operative day we start removing devices such as the bladder catheter and the oxygen cannula. We will then encourage you to walk in the room and possibly in the hallways.

Usually by the third postoperative day, we start detecting signs of your bowel recovering from surgery. Signs of bowel activity start with sounds that we can hear with a stethoscope of you passing gas and stool, either through the rectum or the ileostomy if we created one.

Once we document bowel activity, we will start a clear liquid diet that is the same as the pre-operative liquid diet. After 24 hours of tolerating liquids, we will add solid food. At this point we are interested in your bowel function: frequency and consistency.

### **Possible Surgical Complications**

The most feared complication of a colectomy is when the connection fails and results in a leak of the anastomosis. Since the intestinal contents contain bacteria, leaks result in infections either localized, called an abscess, or diffuse, called peritonitis. For localized leaks, a drain can be placed in radiology without the need of reoperation.

If the leak is uncontrolled, then another operation is required and, more often than not, a colostomy or an ileostomy would be created to control the intestinal contents. Leaks are more common in emergency surgeries with poor bowel preparation and infection present in the abdomen. Including emergency surgeries, anastomotic leaks occur in about 4 percent of colonic surgery cases.

Surgical complications can include wound infections, wound separation and blood clots in the legs, which can migrate to the lungs. In surgeries of the colon extending into the rectum, nerve injuries can occur from positioning of the legs in stirrups. When mobilizing the rectum, the bladder can be injured as well as the nerves involved in sexual function, resulting in erectile dysfunction or retrograde ejaculation.

In patients with risk factors for heart disease, coronary attacks, cerebrovascular accidents and pulmonary complications may also occur. The occurrence of any of these complications is rare and is usually related to the need for extensive surgeries because of the nature of the disease.

### **Discharge Process**

You will be ready to go home once you are eating, the intravenous fluids are stopped and you are tolerating medications by mouth. Discharge instructions include:

- Avoid lifting any object heavier than 10 pounds (four weeks)
- Avoid baths in the tub (four weeks)
- Avoid driving (four weeks)
- You should be careful with your diet, avoiding spices or any food item that can elicit diarrhea.
- You will be encouraged to walk as much as you can.
- There is no problem going up stairs.

Avoid sudden changes in temperature or exposure to people with colds since developing a cough or sneezing will be painful in your incision area, as well as being potentially dangerous.

### **Follow-Up Visits**

You will return to see your surgeon in approximately two weeks from the time of discharge. At this point, we will check your incisions and go over bowel function and diet.