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 is about to happen to your body as you are operated on your colon. This booklet will provide you with information to assist in your preparation for surgery, and serve as a basis for questions and concerns you might have.

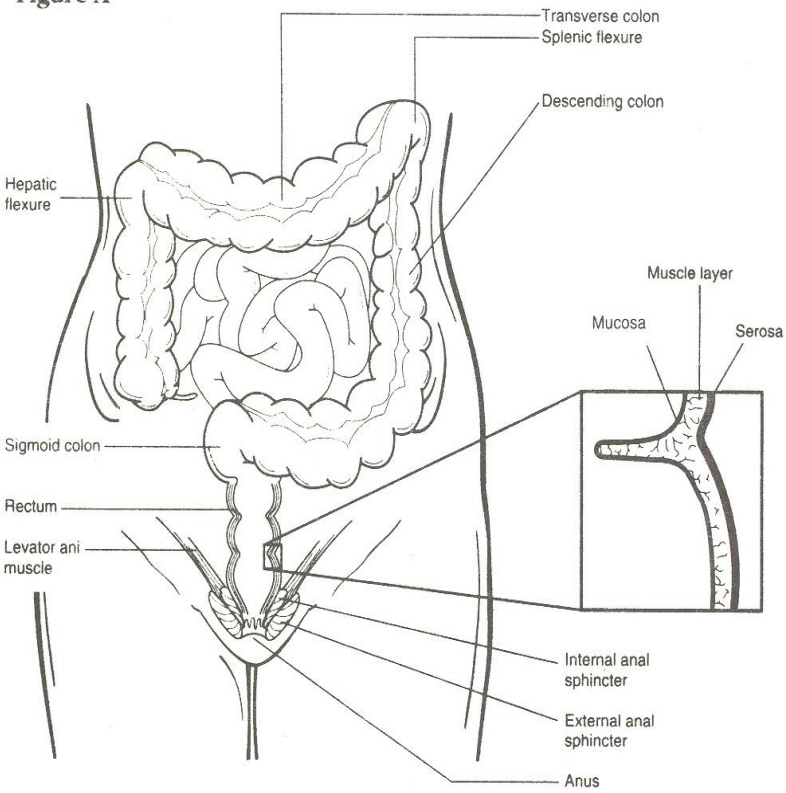
About the Colon

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 traverses the abdomen from the right lower side up and across, then down and connects to the rectum in the pelvis (*Figure A*). The colon can be divided either in sides, right and left, 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 in the average is twice as big as the 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. (*Figure A*) 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 the forming stool into the anus. The outer layer is the serosa which nothing more than the peritoneal membrane covering 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.

Figure A



The colon is normally filled with bacteria that constitute the colonic flora. These bacteria are capable of fermenting part of the vegetable fiber that escapes digestion in the small bowel. The bacteria extract energy from fiber without causing any harm to the host. The colon to help in the absorption of water and salts uses some of the energy generated by the bacteria. Surrounding the colon and rectum there are

lymph nodes that drain any material engulfed by the white cells: bacterial products and even cancer cells.

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, particles travel through the small bowel very quickly (usually 3 hours); once they get to the colon some are eliminated at 24 hours and others remain within the colon for 7 days. This long stay in the colon makes it possible for bacteria to transform substances into carginogens (cancer producing substances) that then attack the 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 pop out like small herniations, typically in the sigmoid colon. Because of the number of bacteria the colon has a stronger immune system to defend itself. When the body loses control of this immune system inflammation develops and this 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:

The cells covering the inside of the colon line up like soldiers. At time this military discipline is lost and they start piling up in disarray. Eventually this mass of cells constitutes a polyp. When these cells start deforming, multiplying fast and begin to penetrate through the layers of the bowel wall a cancer has developed. 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 case 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 Non Polyposis Hereditary Colorectal Cancer (HNPCC) or Lynch syndromes. However, in 85% of patients colorectal cancer cannot be traced to any particular gene with current forms of gene analysis.

Polyps are benign in nature (do not invade in depth) but carry a high risk for cancer. The majority can be removed during colonoscopy. Some are just too big, broad based or have already turned into cancer and, thus 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 in those in whom the cancer has advanced too far surgery often improves their quality of life.

Diverticular disease:

Diverticuli in the colon are very common in the US and the rest of the Western civilization. This is probably due to a reduction of fiber in the diet in the past. As previously mentioned these are small herniations along the wall, 80% are within the sigmoid colon. Within these diverticuli infection may set in, diverticulitis, and the inflamed diverticuli may develop small perforations and leakage. These episodes of inflammation may subside and recur over time. With 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:

In Ulcerative Colitis the disease only affects the mucosa and produces bleeding ulcers. In Crohn's disease it affects all layers so it can also produce

obstruction and pain. Long-standing ulcerative colitis (more than 10-20 years), especially if it affects the entire colon, can lead to cancer. Both, ulcerative colitis and Crohn's disease can result in extra-intestinal manifestations 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 the medications no longer control the symptoms or produce excessive side effects. With removal of the colon and rectum by 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 an opening up and down in the middle of the

abdomen. Over the last decade the laparoscopic approach, first used for gallbladder surgery, has been extended to colon surgery. Laparoscopy means to work inside the abdomen without opening it but using a video camera and long instruments operated from outside. In order to gain exposure to all organs the abdomen is first filled with gas (CO2) creating like a tent out of the anterior wall of the abdomen. The progress and adoption of laparoscopy in colon surgery has been slow because of the peculiar anatomy of the colon: it occupies most of the abdomen in a deep posterior location in close proximity to many vital structures. Fortunately, industry has worked very diligently in making available to surgeons instruments that have made laparoscopic surgery on the colon just as safe and effective as in gallbladder surgery. However, there are still some conditions that make laparoscopic surgery either very difficult or impossible. These include: having had previous surgeries in the abdomen, 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.

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 pseudomembranous colitis.

Right colectomy:

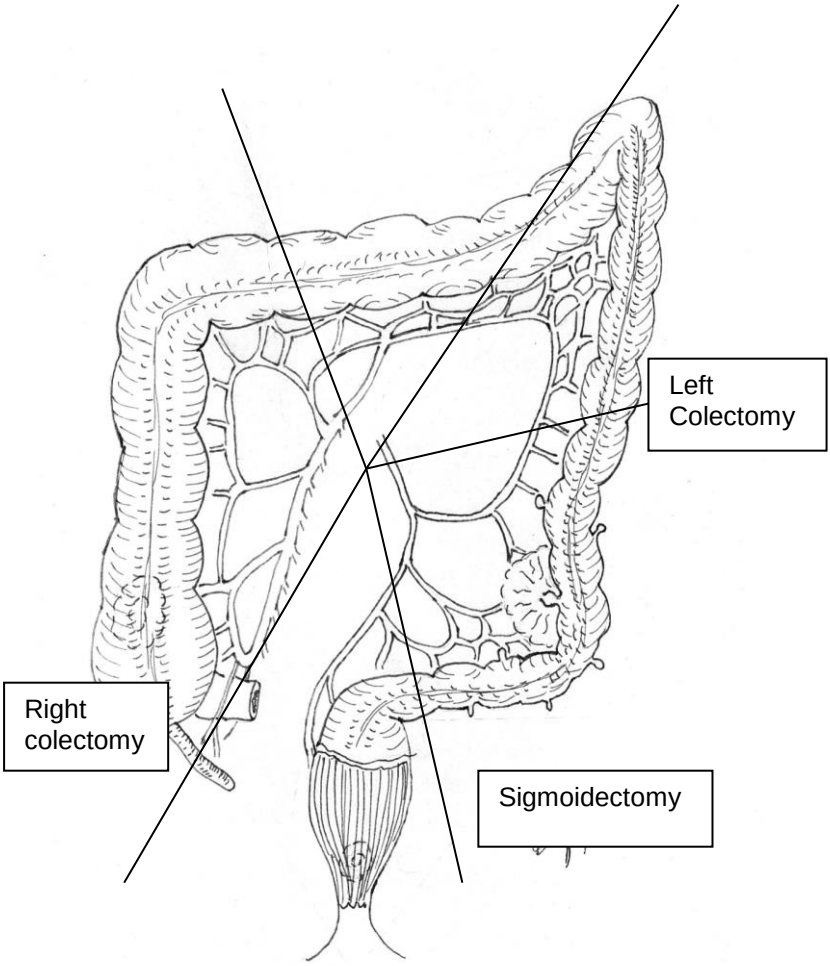
The colon from the cecum (including the appendix and the end of ileum) to the transverse colon is removed along with the ileocolic vessels and the right branches of the middle colic vessels.

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.



Are there any consequences of losing part of the colon?

The colon is not really an essential organ, removal of part or the entire colon does affect the ability of 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 is an increase from 1 to 3-4 bowel movements per day which returns back to one per day within a month after surgery.

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, abscess, or diffuse, peritonitis. For localized leaks a drain can be placed in radiology without the need of reoperation. When the leak is uncontrolled then another operation is required and more often than not a colostomy or an ileostomy is created to control the intestinal contents. Leaks are more common in emergency surgeries with poor bowel preparation and infection present in the abdomen. When taking all comers who have colonic surgery anastomotic leaks occur in about 4% of cases.

Other complications are wound infections, wound separation, 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 entered and 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 can also occur. The occurrence of any of these complications is rare and usually related to need of extensive surgeries because of the nature of the disease.

What to expect from undergoing an operation on the colon?

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

Initial visit:

It is very likely that by the time you are reading this booklet you have already gone through the initial visit. Occasionally, this booklet is mailed to patients prior to their visit to the office. We have printed material with directions to our office so please let us know if you need it.

- Prior medical records: It is really useful for us to have as much information about your illness as possible. If you have any medical reports or X-rays at home, please mail them to us or bring them with you to your initial visit. Usually we receive these materials directly from your doctor's office, but occasionally they do not arrive before you come.

Medications: You will be asked about the medications you have taken in the past and what you are presently taking. Please remember to make us a list of all the medications. We are particularly interested in the dosage of blood thinners and any dietary supplement 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. We are aware that most patients already had examinations prior to this visit, but we look for very specific elements in this exam that help us in the planning of the 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. However, these rare events tend to be emergencies when it is not really practical to discuss the pros and cons of a blood transfusion. Blood transfusion has become very safe nowadays. All of the feared infections (AIDS, hepatitis) are extremely rare because all blood is

tested. While still unusual the more common problems are transfusion reactions in the form of fever and chills. Because of the fear of infections many patients inquire about autologous blood (banking your own blood) or designating a donor (family member or friend). For most people autologous blood seems the most logical option. The problems with autologous blood are multiple. First, there are also tranfusion reactions to our own blood, and therefore we do not routinely "give back" to patients the blood they banked. Therefore, unless the patient has serious bleeding all what is accomplished by banking blood is depriving the body from these valuable cells at a time when they are in great need. Some patients have reactions to the anemia induced by the blood donation including syncopal 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 has to be discarded creating a waste of resources all around. Large studies have shown that problems with blood are more common when it comes from designated donors than from volunteers. A possible explanation is that family

members and friends feel so obligated to help the patient that they may not be entirely truthful about risk factors.

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.

Anesthesia

During this second visit to the hospital you will have an opportunity to discuss the general anesthesia you will receive.

Patient Controlled Analgesia (PCA)

The other option is to have a pump that delivers analgesics into your blood stream at the push of a button, called patient controlled analgesia (PCA).

Preoperative bowel preparation:

In the past, patients were admitted to the hospital for bowel preparation. Now, insurance coverage does not approve hospitalization for bowel preparation, so we rely on patients and families to be very meticulous about this important step prior to surgery.
Many patients undergoing an IPAA have already had some form of bowel preparation for colonoscopy, which is usually drinking a polyethylene glycol solution (Golytely). In preparation for surgery, the bowel preparation is essential to minimize the chances of postoperative infections. Bowel preparation consists of three parts: diet, laxatives and antibiotics.

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.

3. Do not eat milk products, solids, or jello.
4. You may take an oral liquid supplement as prescribed.
5. Take 4 biscacodyl tablets (i.e. Fleet or Dulcolax) at bedtime.

ONE DAY BEFORE SURGERY:

1. Continue drinking a clear liquid diet all day, do not eat solid food.
2. Take 1 ½ ounces of Fleets Phosph-soda (45 mls) mixed with 3 ounces (90 mls) of water at:

   3 PM
3. Take 1 gm of Erythromycin and 1 gm of Neomycin by mouth at:

   7 PM and 11 PM
4. Shower carefully with a strong soap the night before surgery.
5. Take nothing by mouth after midnight on the day of your surgery.

   Remember: No candy, no mints, no chewing gum, no water

6. Follow special instructions for your medications. Discuss with your surgeon and medical doctor concerns regarding taking your medications the morning of surgery.

- This is essential to undergo general anesthesia. The anesthesiologist will not proceed with anesthesia if the stomach has not been absolutely empty for eight to 12 hours.

- We strongly recommend going to bed early the night before surgery. If you have trouble falling asleep you are welcome to take a sleeping pill.

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 on record as much information 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 the body.
- The operation will take between 3 and 5 hours depending on technical factors such as the severity of the disease, location in the colon and degree of obesity.

Immediate postoperative period:

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 stocking that will periodically inflate and deflate to make 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.

Day After Surgery

The day after surgery you will be assisted to get out of bed and sit up in a chair. Although this may seem cruel one day after major surgery, it is not really that bad. Being out of bed helps aerate your lungs and gives you a sense of well-being.

By the second postoperative 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 the stethoscope to your 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 preoperative 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.

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 any food item that can elicit diarrhea.

-You will be encouraged to walk as much as you like.

-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 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.