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Intestinal Transplantation: Facts About Intestinal Transplantation

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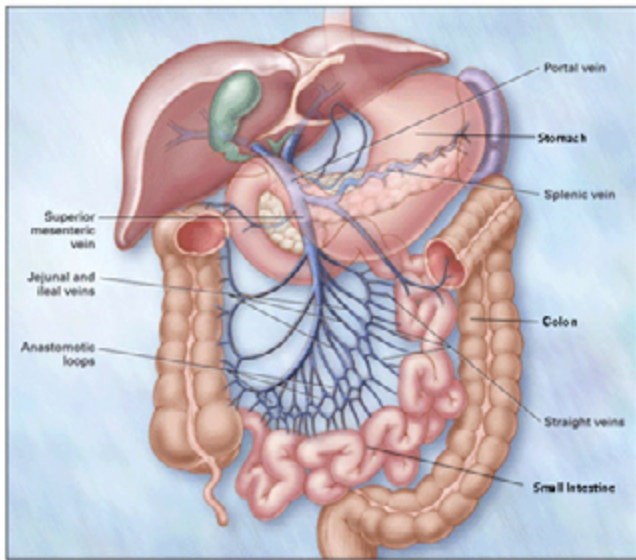
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Intestinal Transplantation

THE NORMAL INTESTINAL TRACT

The digestive tract breaks food down into small pieces. The body absorbs and processes these pieces to create energy. The digestive tract is a hollow tube and is divided into several parts. Each part has a special purpose. These parts are as follows:

- The **esophagus** is the tube that moves food from the mouth into the stomach.
- The **stomach** mainly stores food before it enters the small intestine.
- The **small intestine** (made up of duodenum, jejunum and ileum) is where most food is broken down and absorbed into the body.
- The **large intestine** (or colon) absorbs the water from digested food and forms solid stools.



The small intestine is about seven to eight feet long in newborn infants and grows to about 20 feet by adulthood.

The small intestine is made up of three parts:

- The first part is the *duodenum*, which is about 12 inches long in adults. It is connected to the stomach. Fluids from the pancreas and liver (bile) drain into the duodenum and digest fats, proteins and starches from your diet.
- The middle portion of the small intestine is the *jejunum*. The *jejunum* makes up about half of the small intestine. It absorbs water and nutrients from food.

- The distal small intestine is called the *ileum*. The ileum has special jobs like producing certain proteins and hormones.

INTESTINAL FAILURE

The small intestine is the most important part of the digestive system for absorption. Most people can live without a stomach or large intestine, but it is harder to live without a small intestine. This is because the small intestine is necessary to absorb the nutrients from your diet.

Intestinal failure is when all or most of the small intestine has to be removed or is not working properly. In these situation, life can be extended by providing nutrients directly into the blood stream in liquid form by a tube into your vein (IV). These nutrients are called "total parenteral nutrition" or TPN. When a person has intestinal failure that cannot be treated, he or she requires TPN to survive.

Causes of Intestinal Failure

There are two types of intestinal failure:

1. Short bowel syndrome
 - This is when the small intestine may not be long enough to absorb enough food and water as the body needs.
2. The small intestine or other parts of the digestive tract are not working correctly.
 - This may be because the motion that moves food through the intestine is not adequate.
 - This may also be because the cells lining the intestine are not able to absorb nutrients properly (malabsorption or secretory diarrhea).

When the intestine is too short, a person may have a lot of bowel movements. They may not absorb enough nutrients and they may lose too much fluid. This may result in dehydration. TPN can provide both the amount of fluid and the calories the body needs.

Babies may have intestinal failure for different reasons than older children and adults.

Causes of short bowel syndrome in babies are:

- Birth defects that require removing abnormal intestine.
- Part of the bowel can suffer injury reasons that are not fully understood. One condition called *necrotizing enterocolitis* is where a part of the bowel dies. This is rare, but can happen in babies who are born prematurely.

Things that can damage the intestine and cause short bowel syndrome in older persons are:

- Radiation treatment for cancer that is located near the intestine.
- Not enough blood flow to the intestine because of hardening of the arteries, twisting of the bowel or clotting (thrombosis) of the vein draining the intestine.
- Crohn's disease, an illness that causes damage to the intestine.
- Surgery to remove certain tumors that also removes the intestinal tract.
- A condition where an organ juts into the abdomen (internal hernia) and obstructions that require removal of the intestine.

WHEN THE DIGESTIVE TRACT DOES NOT WORK PROPERLY

There are two main reasons the intestine may not work properly:

1. The inner lining of the intestine is not working. This inner lining is where the pieces of food are broken down into even smaller pieces and moved into the bloodstream.
2. The other type of functional intestinal failure is due to problems with the motion that moves food through the intestine. In this situation the intestine does not move food through the small bowel. These problems can happen in children or adults. Patients with pseudo-obstruction have problems with bowel movements and experience severe nausea and vomiting, especially when they try to eat.

WHAT IS INTESTINAL TRANSPLANTATION?

Intestinal transplantation is when the small intestine is replaced. Sometimes the small intestine is replaced with other organs or with a new intestine from someone who has died. If needed, other organs can be transplanted at the same time.

The first time doctors tried transplanting intestine, it did not work well because the patients' immune system rejected the new organ. The immune system protects the body from disease and foreign substances. The immune system of the transplanted patients treated the new intestine as a foreign substance. Now, there are medications to help prevent the immune system from rejecting the transplanted organ.

WHY DO SOME PEOPLE NEED AN INTESTINAL TRANSPLANT?

If a person cannot digest food and cannot receive TPN for some reason, he or she will starve. But, a patient can get nutrition from TPN. However, TPN has been associated with life-threatening complications when required for a long time.

Some problems that can occur with TPN include:

- We do not know the reason, but almost half of people treated for a long time with TPN develop liver disease. Liver failure develops in some people.
- TPN has to be given through a very large vein. TPN can damage these large veins and there are only six veins large enough to use. If all of these veins are damaged, there is no way to feed the patient. When three or more large veins become damaged, doctors begin to consider an intestinal transplant.
- Putting TPN into the large veins can cause serious infections and clots. If this happens again and again, it may be time for an intestinal transplant.

WHY ARE SOME PEOPLE NOT ABLE TO HAVE AN INTESTINAL TRANSPLANT?

In some patients, the problems caused by the transplantation outweigh the benefits.

That happens in these situations.

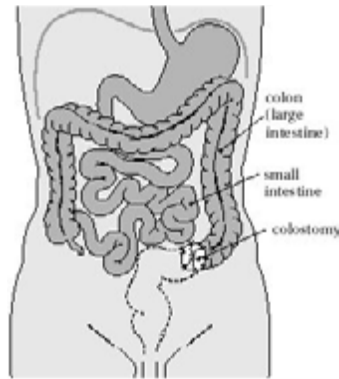
- The patient may die from the surgery because of other serious illnesses.
- The patient has tumors near the intestine that cannot be completely removed.
- The patient has serious infections at the time of surgery.
- The patient has serious problems with the immune system.

Because of problems like these, each patient should be evaluated by an intestinal transplant specialist to decide if a transplant would be the best treatment for him or her.

HOW IS AN INTESTINAL TRANSPLANT PERFORMED?

Organs used in the transplantation are called "grafts." Intestinal grafts often come from someone who has died. An intestinal transplant is a very complex procedure.

The part of the original intestine that does not work is removed. The surgeon usually attaches one end of the graft to the end of the original intestine. Sometimes, the upper end of the graft is connected directly to the stomach. If a stomach and intestine are transplanted together, the stomach is attached to the esophagus at one end. The end of the intestine is attached either to the large intestine or, if needed, goes to a hole (stoma) that stops outside the body (an ostomy). Waste that comes out of the intestine through the hole goes into a bag (ostomy bag). Blood vessels also need to be connected to bring oxygen supply to the new organs.



A colostomy

AFTER THE SURGERY

In many ways, care after an intestinal transplant is the same as after any big surgery.

- You will be given fluids through the veins. These fluid help with good nutrition to promote healing. Antibiotics and antiviral medicines are given to reduce the chance of infection.
- Anti-rejection medicines are given because the body's defense system naturally tends to attack a transplanted organ because it senses the new intestine as something that is not normal for the body. Organ rejection is most common within the first three to six months after transplant.
- **It is important to take the medicines exactly as instructed.** This helps make sure the transplant works and makes it less likely that you will get an infection, rejection, or other problems.

Anti-rejection Drugs

The medicines that help your body accept the new intestinal transplant are the same medicines used for other transplants. Your doctor will choose your medicine from many that are available.

Some of these anti-rejection medicines are:

- **Tacrolimus.** This one is used the most often.
- **Corticosteroids.**
- **Antibodies.** These block some of the actions of your body's defense system.
- **Mycophenolate mofetil, cyclosporine or sirolimus**

Nutrition after the transplant

You might be able to begin eating a few days or weeks after surgery. Liquids are given to you through your mouth, into your vein (IV), or through a feeding tube until you can eat. TPN may be needed for a while after surgery, but is decreased as you begin to eat. Sometimes patients are fed through a tube placed into the stomach or small intestine. The goal is to have you able to eat within four to six weeks after the transplant. Some patients may need fluid given through the vein for several more months.

Babies who have never eaten solid food before the transplant often will not eat well after transplant and may need to be fed a liquid diet through a tube. Low-allergy formulas are used at first because anti-rejection medicines may cause food allergies. Solid food may be added later.

Most food is easy to digest. You may see increased stools (diarrhea) after drinking sweet liquids like juice or after eating fried foods. Eventually, most babies and children can eat or drink milk products.

Testing for Rejection of the Transplanted Organ

There is no blood test to determine if rejection of the intestinal transplant is taking place. There may not be symptoms when rejection is just beginning. An device called an endoscope is often used to take samples (biopsies) of the transplanted intestine soon after the operation. This device is passed into the intestine through a stoma. Biopsies may be taken every week or every month in the beginning when the risk of rejection is highest. Later, when the risk decreases, samples may be taken once a year. If the patient also has a liver transplant, blood tests will check for liver damage and to determine if a liver biopsy is needed.

If a biopsy does show rejection, treatment is started in the hospital. This treatment may include large amounts of a corticosteroid (methylprednisolone) and increased amounts of tacrolimus or antibody preparations. More tests may be done to see if the condition has improved or if other medicines are needed. In some cases of severe rejection, the graft may have to be removed and another transplant performed.

Prevention of infection

The risk of infection is high after an intestinal transplant. This is because many microbes that can cause infection normally live in the intestine and help digest your food. The graft cannot be sterilized (cleaned of all germs) before it is placed into the patient. Also, the intravenous (IV) tubes in the large veins must be left in place for a while and this can also cause infection. To help decrease the chance of infection, the patient is given medicines to help prevent infections (antibiotics).

The anti-rejection medicines make some common virus infections dangerous to a patient who has gotten a transplant. Most transplant centers give antiviral drugs for several weeks or months after transplant. Blood tests are also checked occasionally after transplant to look for two of the common viruses, cytomegalovirus (CMV) and Epstein-Barr Virus (EBV).

After the patient goes home

Many of the things that were done in the hospital must also be checked at home to make sure the transplant continues to function well.

These things include:

- Checking the patient's vital signs: temperature, heart rate, and blood pressure. A fever or higher heart rate may be an early sign of infection or not getting enough fluids (dehydration).
- Checking the patient's body weight.
- Checking how much fluid the patient is drinking (or getting by IV).
- Checking how much solid food the patient is eating.
- Checking the patient's stool output. Diarrhea or having less stool output may be a sign of a serious problem that needs immediate medical attention.

Intestinal transplantation is complex and may be associated with complications, and readmissions to the hospital. Many transplant centers require patients to live near the hospital for several months after surgery. After returning home, the patients should work with the transplant team to determine if he or she can go back to their regular doctor for help with what to eat, to be sure his or her blood pressure is in a safe range, and to be sure he or she has enough fluids.

However, most transplant centers prefer to monitor anti-rejection medicines themselves. The transplant center may also make sure tests are done if there are problems with the graft. Most transplant centers also want to be told of any major changes to the patient's condition, hospitalization, or if he or she made a visit to an emergency department.

Regular blood tests are an important part of care after the operation. Before returning home, you should choose a local lab for testing. In the beginning, blood tests are done once a week or even more often. After a while, testing may be required less frequently. Test results are sent to the transplant center.

Medications at home

To keep the new intestine healthy, you must take several medicines at the correct times.

Medicines that may be needed include:

- Anti-rejection medicines to prevent rejection of the transplant.
- Medicines to prevent infections that are common in patients taking anti-rejection medicines.
- Extra nutrition (nutritional supplements) and medicines are often needed even if the intestinal transplant is working well.
- Blood thinners to prevent blood clots.
- Treatment for high blood pressure.

Some medicines, particularly anti-rejection medicines, are taken for life. Other medicines are required for only a short period of time after the transplant operation. Anti-rejection medicines have many side effects. They must be taken exactly as prescribed to be effective. Too little medicine allows the body's defense system to attack or reject the new intestine. Too much medicine interferes with fighting infection and causes other side effects. Taking medicines at the wrong time can reduce the medicine's effectiveness. After a while, if there are no signs of rejection, the patient may be able to take fewer medicines. However, rejection can still happen even when medicines are taken properly. In that case, other medicines will be needed.

The following can be signs of transplant rejection. If any of these occur, call the doctor:

- Diarrhea or increased fluid coming from the stoma
- Loss of appetite or weight loss
- Swelling and pain in the abdomen
- Nausea and vomiting
- Blood in the fluid coming from the stoma or in the stool
- Fever
- Swelling or unusual redness of the stoma
- Dehydration

Preventing infection at home

Medicines that prevent rejection decrease the body's ability to fight serious infections.

You can protect yourself after leaving the hospital in several ways:

- Check your temperature if you feel warm. If you have a fever, swollen lymph glands, coughing, nighttime sweats, or new snoring, there may be an infection and you should notify your doctor.
- Get the blood tests that the doctor orders.
- Take all the medicines exactly the way you have been instructed.
- Avoid getting germs:
 - Avoid people who have infections - especially chicken pox, a cold or flu, mononucleosis (mono), or tuberculosis (TB). Transplant patients who were around someone with an infection should tell their transplant doctor right away.
 - Take antibiotics before and after dental work or other types of medical treatments, if recommended by your doctor.
 - Wash your hands very well, especially before eating, after touching objects that carry germs (money, doorknobs, and public telephones), and after using the bathroom, especially in public restrooms.
 - Avoid compost piles, construction sites, damp hay, and rotting plants, fruits, and vegetables.
 - Wear gloves during activities such as gardening.
 - Wear shoes when outdoors.
 - Cover your body, including arms and legs, when hiking.
 - Some vaccines use a live virus (polio, tuberculosis, measles, shingles) and are bad for a person who is on anti-rejection drugs. Do not get these vaccines and avoid people who have recently had any of them.
 - Get tetanus shots as needed (for example, in case of an animal bite or a dirty cut).
 - Get a flu shot every year.
 - Do not share razors, toothbrushes, or eating and drinking utensils.
 - Practice safe sex. Use a condom. Having many sex partners increases the chance of getting an infection.
 - Drink only treated city or bottled water. If you are not sure the water is clean, ask the local water authorities (phone numbers are listed on the monthly water bill) or the EPA Safe Water Hotline at (800) 426-4791.

- If you are around animals and pets:
 - Avoid contact with animal urine, stool, or vomit, and especially bird droppings.
 - Wash hands well after touching pets.
 - Do not allow house pets to roam freely outside, especially cats, because they may catch infections outdoors that they can give to humans.

Getting back into a normal routine

Sleep

Sometimes transplant recipients develop the urge to sleep during the day and stay awake at night. Avoid long daytime naps. That will make it easier to sleep at night.

Regaining Strength

Transplant recipients are often weak right after transplantation. Exercise, rather than rest, is usually the best way to regain strength. If possible, exercise under the care of a physical therapist. Swimming in a chlorinated pool is usually okay after the drainage and feeding tubes have been removed, and all wounds and tube sites have healed. Most patients should be able to go back to work or school a few weeks or months after an intestinal transplant.

Driving

Adult intestinal transplant patients are usually able to drive after surgery, but first check with the transplant center. Some medicines slow your reflexes, and reduce your ability to see or make good driving decisions. If the doctor says it is okay to drive, fasten your seatbelt. The seatbelt will not hurt the intestine transplant.

Alcohol

Most transplant centers advise against drinking alcohol after an intestinal transplant.

Medical Alert Identification

Many transplant centers suggest wearing medical alert identification, such as a pendant or bracelet sold under the brand name MedicAlert® (Tel: 1-800-830-0546 or e-mail: service@medical-id.com). This kind of ID tells others about the transplant if the patient cannot talk. The ID should describe the type of transplant, for example, "Intestine Transplant" or "Intestine and Liver Transplant." It should also list if the patient is taking anti-rejection medicines and any other important medical information.