Transjugular Intrahepatic Portosystemic Shunt (TIPS)



Transjugular Intrahepatic Portosystemic Shunt or TIPS is a procedure that uses imaging guidance to create a connection between two large veins in the liver, the portal vein and the hepatic vein. This helps blood bypass the abnormal liver so that it can return to the heart more easily. A small metal device called a stent is placed to keep the connection open. TIPS is performed to reduce the risk of internal bleeding from the stomach and esophagus in patients with cirrhosis. TIPS may also reduce the accumulation of fluid in the abdomen or lungs.

Tell your doctor if there's a possibility you are pregnant and discuss any recent illnesses, medical conditions, allergies and medications you're taking. You may be advised to stop taking aspirin, nonsteroidal anti-inflammatory drugs (NSAIDs) or blood thinners several days prior to your procedure. You will likely be instructed to not eat or drink anything after midnight the night before your procedure. Your doctor will tell you which medication to take the morning of the procedure. Leave jewelry and valuables at home. Wear loose, comfortable clothing. You will be asked to wear a gown. Plan to stay overnight at the hospital for one or more days after the procedure.

What is a Transjugular Intrahepatic Portosystemic Shunt (TIPS)?

A transjugular intrahepatic portosystemic shunt (TIPS) is a tract created to connect two veins within the liver. The procedure typically uses x-ray and ultrasound guidance. The TIPS is kept open by a small, tubular metal device commonly called a stent (http://www.radiologyinfo.org) .

During a TIPS procedure, interventional radiologists use image guidance to make a tunnel through the liver to connect the portal vein (http://www.radiologyinfo.org) (the vein that carries blood from the digestive organs to the liver) to one of the hepatic veins (http://www.radiologyinfo.org) (the veins that carry blood out of the liver back to the heart). A stent is then placed in this tunnel to keep the pathway open.

Patients who typically need a TIPS have portal hypertension (http://www.radiologyinfo.org) , meaning they have increased pressure in the portal vein system. This pressure buildup can cause blood to flow backward from the liver into the veins of the spleen, stomach, lower esophagus, and intestines, causing enlarged vessels, bleeding and the accumulation of fluid in the chest or abdomen. This condition is most commonly seen in adults, often as a result of chronic liver problems leading to cirrhosis (scarring of the liver). Portal hypertension can also occur in children, although children are much less likely to require a TIPS.

What are some common uses of the procedure?

A TIPS is used to treat the complications of portal hypertension, including:

- variceal bleeding (http://www.radiologyinfo.org) , bleeding from enlarged veins that normally drain the stomach, esophagus, or intestines into the liver.
- portal gastropathy (http://www.radiologyinfo.org) , an engorgement of the veins in the wall of the stomach, which can cause severe bleeding.

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- severe ascites (http://www.radiologyinfo.org) (the accumulation of fluid in the abdomen) and/or hydrothorax (in the chest).
- Budd-Chiari syndrome (http://www.radiologyinfo.org) , a blockage in one or more veins that carry blood from the liver back to the heart.

How should I prepare?

Tell your doctor about all the medications you take, including herbal supplements. List any allergies, especially to local anesthetic (http://www.radiologyinfo.org) , general anesthesia (http://www.radiologyinfo.org) , or contrast materials (http://www.radiologyinfo.org) . Your doctor may tell you to stop taking aspirin, nonsteroidal anti-inflammatory drugs (NSAIDs (http://www.radiologyinfo.org)) or blood thinners before your procedure.

Women should always tell their doctor and radiologic technologist (http://www.radiologyinfo.org) if they are pregnant. Doctors will not perform many tests during pregnancy to avoid exposing the fetus (http://www.radiologyinfo.org) to radiation. If an x-ray is necessary, the doctor will take precautions to minimize radiation exposure to the baby. *See the Radiation Safety (https://www.radiologyinfo.org/en/info/safety-radiation) page for more information about pregnancy and x-rays.*

Your doctor will likely tell you not to eat or drink anything after midnight before your procedure. Your doctor will tell you which medications you may take the morning of your procedure.

You should plan to stay overnight at the hospital for one or more days.

The nurse will give you a gown to wear during the procedure.

What does the equipment look like?

In this procedure, x-ray (http://www.radiologyinfo.org) and/or ultrasound (http://www.radiologyinfo.org) equipment, a stent, and a balloon-tipped catheter (http://www.radiologyinfo.org) are used.

This exam typically uses a radiographic table, one or two x-ray tubes, and a video monitor. Fluoroscopy converts x-rays into video images. Doctors use it to watch and guide procedures. The x-ray machine and a detector suspended over the exam table produce the video.

Ultrasound machines consist of a computer console, video monitor and an attached transducer (http://www.radiologyinfo.org) . The transducer is a small hand-held device that resembles a microphone. Some exams may use different transducers (with different capabilities) during a single exam. The transducer sends out inaudible, high-frequency sound waves into the body and listens for the returning echoes. The same principles apply to sonar used by boats and submarines.

The ultrasound technologist applies a small amount of gel to the area under examination and places the transducer there. The gel allows sound waves to travel back and forth between the transducer and the area under examination. The ultrasound image is immediately visible on a video monitor. The computer creates the image based on the loudness (amplitude), pitch (frequency), and time it takes for the ultrasound signal to return to the transducer. It also considers what type of body structure and/or tissue the sound is traveling through.

A catheter is a long, thin plastic tube that is considerably smaller than a "pencil lead." It is about 1/8 inch in diameter.

The stent used in this procedure is a small wire mesh tube often covered with fabric.

This procedure may use other equipment, including an intravenous (http://www.radiologyinfo.org) line (IV), ultrasound machine and devices that monitor your heart beat and blood pressure.

How does the procedure work?

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A TIPS reroutes blood flow in the liver and reduces abnormally high blood pressure in the veins of the stomach, esophagus, bowel (http://www.radiologyinfo.org) and liver, reducing the risk of bleeding from enlarged veins.

A TIPS procedure involves creating a pathway through the liver that connects the portal vein (the vein that carries blood from the digestive organs to the liver) to a hepatic vein (one of three veins that carry blood from the liver to the heart).

A stent placed inside this pathway keeps it open and allows some of the blood that would ordinarily pass through the liver to bypass the liver entirely, reducing high blood pressure in the portal vein and the associated risk of bleeding from enlarged veins.

How is the procedure performed?

Image-guided, minimally invasive procedures such as a TIPS are most often performed by a specially trained interventional radiologist in an interventional radiology suite or occasionally in the operating room. Some interventional radiologists prefer performing this procedure while the patient is under general anesthesia, while some prefer conscious sedation for their patient.

The doctor or nurse will position you on your back.

The doctor or nurse will connect you to monitors that track your heart rate, blood pressure, oxygen level, and pulse.

A nurse or radiologic technologist (http://www.radiologyinfo.org) will insert an intravenous (http://www.radiologyinfo.org) (IV) line into a vein in your hand or arm to administer a sedative. This procedure may use moderate sedation or general anesthesia. A breathing tube is not mandatory but may be used depending on physician and patient preference.

The nurse or radiologic technologist will sterilize the area of your body where the catheter is to be inserted. They will sterilize and cover this area with a surgical drape.

Your physician will numb an area just above your right collarbone with a local anesthetic (http://www.radiologyinfo.org) .

The doctor will make a very small skin incision at the site.

Using ultrasound, the doctor will identify your internal jugular vein (http://www.radiologyinfo.org) , which is situated above your collarbone, and guide a catheter, a long, thin, hollow plastic tube into the vessel.

Using real time x-ray guidance, your doctor will then guide the catheter toward the liver and into one of the hepatic veins. Pressures are measured in the hepatic vein and right heart to confirm the diagnosis of portal hypertension, and also to determine the severity of the condition. To help plan for the placement of the TIPS stent, a contrast material will be injected in the hepatic vein to identify the portal venous system. Access from the hepatic vein into the portal vein is achieved by using a TIPS needle (a special long needle extending from the neck into the liver). A stent is then placed connecting the portal vein to the hepatic vein using x-ray guidance. Once the stent is in the correct position, a balloon is inflated within the stent expanding it into place.

The balloon is then deflated and removed along with the catheter. Subsequently, pressures are measured to confirm reduction in portal vein blood pressure. Additional injections of contrast (portal venograms) may be performed to confirm satisfactory blood flow through the TIPS.

The doctor removes the catheter from the neck and applies pressure over the jugular vein to prevent any bleeding. The small incision in the skin is covered with a bandage. No sutures are necessary.

You will be admitted to the hospital following your procedure, where you will be closely observed.

This procedure is usually completed in an hour or two but may take up to several hours depending on the complexity of the condition and vascular anatomy.

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What will I experience during and after the procedure?

The doctor or nurse will attach devices to your body to monitor your heart rate and blood pressure.

You will feel a slight pinch when the nurse inserts the needle into your vein for the IV line and when they inject the local anesthetic. Most of the sensation is at the skin incision site. The doctor will numb this area using local anesthetic. You may feel pressure when the doctor inserts the catheter into the vein or artery. However, you will not feel serious discomfort.

If you receive a general anesthetic (http://www.radiologyinfo.org) , you will be unconscious for the entire procedure. An anesthesiologist (http://www.radiologyinfo.org) will monitor your condition.

If the procedure uses conscious sedation, you will feel relaxed, sleepy, and comfortable. You may or may not remain awake, depending on how deeply you are sedated.

When the needle is advanced through the liver and the pathway is expanded by the balloon, you may experience discomfort. If you feel pain, you should inform your physician; you may be given extra intravenous (http://www.radiologyinfo.org) medications.

As the contrast material (http://www.radiologyinfo.org) passes through your body, you may feel warm. This will quickly pass.

After the procedure, you will be monitored closely and your head will be kept elevated for a few hours after you return to your room. Often, symptoms are mild or controlled enough that the procedure can be done electively and patients may go home the next day. If your TIPS is being performed emergently for significant bleeding you will typically be monitored in intensive care beforehand and during recovery; GI bleeding from portal hypertension can be life threatening.

You should be able to resume your normal activities in seven to 10 days.

Follow-up ultrasounds will be performed frequently after the TIPS procedure to make sure that it remains open and functions properly.

Who interprets the results and how do I get them?

Prior to leaving the hospital, you may have an ultrasound exam to determine the effectiveness of the procedure and placement of the stent.

After the procedure is complete, the interventional radiologist (http://www.radiologyinfo.org) will tell you whether the procedure was a success.

What are the benefits vs. risks?

Benefits

- A TIPS is designed to produce the same physiological results as a surgical shunt (http://www.radiologyinfo.org) or bypass, without the risks that accompany open surgery.
- TIPS is a minimally invasive procedure that typically has a shorter recovery time than surgery.
- Your TIPS should have less of an effect on candidacy for future liver transplantation versus open surgical bypass because the abdomen has not been entered which can form scar tissue making future transplantation more difficult.
- The stent that keeps the shunt open (TIPS) is contained entirely inside the diseased liver, and is removed with it during a transplant operation.
- Studies have shown that this procedure is successful in reducing variceal bleeding in more than 90 percent of patients.
- No large surgical incision is necessary—only a small nick in the skin that does not need stitches.

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Risks

- Any procedure that penetrates the skin carries a risk of infection. The chance of infection requiring antibiotic treatment appears to be less than one in 1,000.
- There is a very slight risk of an allergic reaction to the contrast material used for venograms (http://www.radiologyinfo.org) . Also, kidney failure (temporary or permanent) due to contrast material use is a concern, particularly in patients with poor kidney function.
- Any procedure that places a catheter inside a blood vessel carries certain risks. These risks include damage to the blood vessel, bruising or bleeding at the puncture site, and infection. Interventional radiologists are specifically trained to perform the procedure in such a way as to reduce these risks to as low a level as possible and will take precautions to mitigate these risks.

Other possible side effects/complications of the procedure include:

- fever
- muscle stiffness in the neck
- bruising on the neck at the point of catheter insertion
- delayed stenosis, or narrowing within the stent

Serious complications, reported in fewer than five percent of cases, may include:

- occlusion, or complete blockage, of the stent and rapid recurrence of symptoms
- infection of the stent or fabric lining
- abdominal bleeding that might require a transfusion
- laceration of the hepatic artery, which may result in severe liver injury or bleeding that could require a transfusion or urgent intervention
- heart arrhythmias (http://www.radiologyinfo.org) or congestive heart failure (http://www.radiologyinfo.org)
- radiation injury to the skin is a rare complication (it may happen in complex and lengthy procedures requiring extended fluoroscopy use)
- death (rare)

What are the limitations of TIPS?

Patients with more advanced liver disease are at greater risk for worsening liver failure after TIPS. If your liver failure is severe, a TIPS may not be recommended and a different procedure may be needed to control your symptoms. Patients with severe liver disease are also at risk for encephalopathy (http://www.radiologyinfo.org) , which is an alteration of normal brain function that can lead to confusion due to buildup of toxic substances in the bloodstream ordinarily removed by the liver. Encephalopathy can be treated with certain medications, a special diet, or by revising the TIPS. In some cases the stent must be blocked off intentionally to solve this problem.

Although extremely rare, children may also require a TIPS procedure. TIPS in children are more likely to be performed before liver transplant in those with ascites or variceal bleeding resistant to traditional medical treatments. The greatest difference in performing TIPS in children is their tremendous variability in size, physiology, and medical diseases. This can result in significant challenges in creating the TIPS.

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