Biliary Interventions



Biliary interventions treat blockages, narrowing and/or injury of the passages between the liver, gallbladder and small intestine. These passages are called bile ducts. The liver produces a fluid called bile (http://www.radiologyinfo.org) and stores it in the gallbladder. The gallbladder releases bile into the small intestine to help digest your food. If the bile ducts become blocked, it may lead to inflammation or infection of the entire biliary system. This is known as cholangitis (http://www.radiologyinfo.org) . Biliary interventions are used to open narrowed bile ducts, drain excess bile outside of the body, and restore the flow of bile within the biliary system.

Your doctor will tell you how to prepare for your specific procedure and may prescribe an antibiotic. Tell your doctor about any recent illnesses or medical conditions and whether you have any allergies, especially to anesthesia or iodinated contrast material. List all medications you're taking, including herbal supplements and aspirin. Your doctor may tell you not to eat or drink for several hours before your procedure. They may also tell you to stop taking aspirin or blood thinners. Leave jewelry at home and wear loose, comfortable clothing. You may need to change into a gown for the procedure. Ask your doctor if you will stay overnight at the hospital. If not, plan to have someone drive you home.

What are Biliary Interventions?

Biliary interventions are minimally invasive procedures that treat bile ducts that are blocked, narrowed, or injured and gallbladders that are inflamed or infected.

The liver produces bile (http://www.radiologyinfo.org) , a fluid that helps digest food. Bile flows through tubular passageways called ducts to the gallbladder (http://www.radiologyinfo.org) where it is stored. When needed, the gallbladder releases bile through more ducts into the small intestine. This is called the biliary system or biliary tree.

If bile ducts become blocked, bile cannot get to the small intestine. If the duct between the gallbladder and small intestine becomes blocked (usually due to *gallstones (https://www.radiologyinfo.org/en/info/gallstones)* in the gallbladder), the gallbladder may become inflamed or infected (a condition called *cholecystitis (https://www.radiologyinfo.org/en/info/cholecystitis)*).

These conditions may cause symptoms such as:

- jaundice (yellowing of your skin and whites of your eyes)
- belly pain
- nausea and vomiting
- fever
- itching
- dark urine and light stools
- lack of appetite.

Biliary interventions include:

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- Percutaneous transhepatic cholangiography (http://www.radiologyinfo.org) **(PTC).** Using x-ray or ultrasound image-guidance, the doctor inserts a needle through the skin and into the liver. A contrast material (http://www.radiologyinfo.org) is injected into a bile duct and x-rays are taken as the material flows through the biliary tract.

  If a blockage or narrowing is found, additional procedures may be performed, including:
  - **insertion** of a catheter (http://www.radiologyinfo.org) to drain excess bile out of the body.
  - **Placement of a stent (http://www.radiologyinfo.org)** (a small plastic or metal tube) placed inside a narrow duct to keep it open or to bypass a blockage so bile can drain.

Drainage interventions include:

- **Percutaneous transhepatic biliary drainage (PTBD).** Using image-guidance, a catheter (http://www.radiologyinfo.org) is inserted into blocked ducts in the liver so bile can drain out of the body.

  During or following PTBD, you may have a:
  - **Percutaneous cholecystostomy.** Using image guidance, a thin plastic tube called a catheter is placed through the skin into an infected gallbladder to let fluids drain and reduce swelling. Patients who are too ill to have their gallbladder surgically removed (called a cholecystectomy) may have this procedure.

An interventional radiologist is a radiologist who performs minimally invasive procedures with imaging guidance. Interventional radiologists are trained to use fluoroscopy (http://www.radiologyinfo.org) , CT (http://www.radiologyinfo.org) , and ultrasound to guide catheters and wires through the skin through a needle puncture. They use these techniques to perform biopsies, drain fluid or abscesses, insert drainage catheters and to insert stents to open narrowed ducts and blood vessels.

What are some common uses of the procedures?

Several conditions can cause a blockage or narrowing in bile duct, including:

- inflammation of:
  - the liver (cholangitis)
  - the gallbladder (cholecystitis (https://www.radiologyinfo.org/en/info/cholecystitis))
  - the bile ducts with scarring (primary sclerosing cholangitis)
- cancer of the pancreas, gallbladder, bile duct, liver, or enlarged lymph nodes due to a variety of different tumors
- gallstones in the gallbladder or in the bile ducts
- injury to the bile ducts during surgery
- infection.

How should I prepare?

Patients are routinely given antibiotics prior to this procedure.

Your doctor may test your blood prior to your procedure.

Prior to your procedure, your doctor may test your blood to check your kidney function and to determine if your blood clots normally.

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

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(NSAIDs (http://www.radiologyinfo.org)) or blood thinners before your procedure.

Tell your doctor about recent illnesses or other medical conditions.

Women should always tell their doctor and 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.*

You will receive specific instructions on how to prepare, including any changes you need to make to your regular medication schedule.

Other than medications, your doctor may tell you to not eat or drink anything for several hours before your procedure.

You may need to remove your clothes and change into a gown for the exam. You may also need to remove jewelry, eyeglasses, and any metal objects or clothing that might interfere with the x-ray images.

Plan to have someone drive you home after your procedure.

This procedure is often done on an outpatient basis. However, some patients may require admission following the procedure. Ask your doctor if you will need to be admitted.

What does the equipment look like?

In these procedures, x-ray equipment, ultrasound or CT scanning may be used for image guidance. In addition, additional equipment such as a catheter, balloon and/or stent may be used.

X-ray equipment:

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:

Ultrasound scanners consist of a computer console, a video display screen, and a transducer (http://www.radiologyinfo.org) that is used to scan the body and blood vessels. The transducer is a small hand-held device that resembles a microphone, attached to the scanner by a cord. The transducer sends out high frequency sound waves into the body and then listens for the returning echoes from the tissues in the body. The principles are similar to sonar used by boats and submarines.

The ultrasound image is immediately visible on a video monitor. The equipment creates the image based on the amplitude (strength), frequency, and time it takes for the sound signal to return to the transducer.

CT:

The CT scanner is typically a large, box-like machine with a hole, or short tunnel, in the center. You will lie on a narrow examination table that slides into and out of this tunnel. Rotating around you, the x-ray tube and electronic x-ray detectors are located opposite each other in a ring, called a gantry. The computer workstation that processes the imaging information is located in a separate room where the technologist operates the scanner and monitors your exam. The CT scanner obtains x-ray "slices" of your body as the gantry moves you through the scanner. These slices are typically between 0.1 and 1 cm thick.

Additional equipment:

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- Catheter: a long, thin plastic tube, about as thick as a strand of spaghetti.
- Balloon: a long, thin plastic tube with a small balloon at its end.
- Stent: a small, wire mesh or plastic tube.

How does the procedure work?

Biliary interventions typically begin with **percutaneous transhepatic cholangiography,** which uses x-rays and a contrast material to create pictures of the bile ducts and gallbladder. If there is a blockage, the doctor may:

- place a tube to drain excess bile out of the body
- open a narrowed bile duct
- place a stent to keep a bile duct open
- restore the flow of bile within the biliary system.

Percutaneous transhepatic biliary drainage uses image-guidance to insert a catheter through the skin and into the liver. The tube is left in place in the liver to let bile drain outside of the body into a collection bag. A stent may be placed after the drainage procedure to keep a narrow or blocked duct open.

Percutaneous cholecystostomy uses image guidance to place a tube into an infected gallbladder that allows bile fluid to drain out into a collection bag outside of the body. This procedure is often done when surgically removing the gallbladder is too risky.

Patients with an inflamed gallbladder or cholecystitis, or symptoms related to gallstones, are typically treated with intravenous antibiotics or surgical removal of the gallbladder (cholecystectomy). For more information, see the Gallstones (https://www.radiologyinfo.org/en/info/gallstones) page.

How is the procedure performed?

Prior to your procedure, your doctor may perform ultrasound (http://www.radiologyinfo.org) , computed tomography (CT), or magnetic resonance imaging (http://www.radiologyinfo.org) (MRI) exams.

Your doctor may provide medications to help prevent nausea and pain and antibiotics to help prevent infection.

You will lie on the procedure table.

A nurse or 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. It does not require a breathing tube. However, some patients may require general anesthesia (http://www.radiologyinfo.org) .

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 you receive conscious sedation, a nurse will administer medications to make you drowsy and comfortable and monitor you during the procedure.

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

Percutaneous transhepatic cholangiography (PTC):

The doctor inserts a thin needle through the skin below the ribs and into the liver using ultrasound and x-ray (fluoroscopy) guidance. The doctor injects contrast material into the liver and bile ducts and takes x-rays of the biliary tract.

Percutaneous transhepatic biliary drainage (PTBD):

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If there is a blockage, the doctor inserts a catheter into ducts within the liver to let bile drain out of the liver. There are three ways to drain the bile:

External: The catheter is inserted above the blockage in the bile duct. Bile flows through the catheter outside of the body into a drainage bag.

Internal/external: The catheter is inserted through the blockage into the small intestine. Bile flows both into the small intestine and outside the body into a drainage bag. This is the most common drainage catheter used.

Internal: A small metal cylinder called a stent (http://www.radiologyinfo.org) is placed inside a blocked or narrowed duct to keep it open. A catheter is placed inside the duct connected to a drainage bag outside the body. If the stent keeps the duct open, the catheter is removed.

The length of time a drainage bag is needed varies from patient to patient. You will be instructed on how to care for the drainage catheter.

Percutaneous cholecystostomy: Using ultrasound and x-ray (fluoroscopy) guidance, the doctor inserts a thin catheter through the skin below the ribs and into the gallbladder. The catheter may be left in place until the gallbladder can be removed or permanently.

Catheter tube change: Drainage catheters are usually changed every 8 to 12 weeks. To change the catheter, a wire is passed through the drainage tube so the existing tube can be removed and replaced with a new tube. When the new drainage catheter is in place, the wire is removed.

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

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

You will remain in the recovery room until you are completely awake and ready to return home.

In general, for all these procedures, you should be able to resume your normal activities within a few days. In some cases, you may have a catheter exiting your side and draining bile into a bag. The length of time a drainage bag is needed varies from patient to patient. Consult your interventional radiologist for information about your treatment.

Who interprets the results and how do I get them?

The interventional radiologist (http://www.radiologyinfo.org) or doctor treating you will determine the results of the procedure. They will send a report to your referring physician, who will share the results with you.

Your interventional radiologist may recommend a follow-up visit.

This visit may include a physical check-up, imaging exam(s), and blood tests. During your follow-up visit, tell your doctor if you have noticed any side effects or changes.

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What are the benefits vs. risks?

Benefits

- PTCs and percutaneous cholecystostomy tubes do not need a large surgical incision, only a small nick in the skin. No stitches are needed.
- In general, the time spent in the hospital for biliary interventions is less than for open surgery.
- Recovery time is significantly shorter than open surgery.

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 if the procedure uses an injection of contrast material (http://www.radiologyinfo.org) .
- There is a small risk of bleeding related to the procedure. If this occurs, the bleeding almost always stops on its own. If treatment becomes necessary, this can almost always be achieved with arterial embolization, a minimally invasive technique.
- There is a very small risk of damage to the gallbladder, bile duct and blood vessels or bowel perforation
- Risks related to the drainage tube include:
    - swelling, bleeding or skin infection of the skin around the tube
    - tube blockage.
    - leaking around tube
    - tube malposition
- Bleeding in and around the liver.
- Lung infection.

What are the limitations of Biliary Interventions?

Minimally invasive procedures such as biliary interventions may not be appropriate for all patients. The decision as to whether your specific situation can be treated with these techniques will be made by your doctor and interventional radiologist. In general, minimally invasive procedures are preferable to surgery.

In some cases, a recurrence of the underlying problem such as blockage of a stent or cholecystitis may occur. In these cases, a repeat biliary intervention may be necessary. If this is not appropriate, a different procedure may be recommended.

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