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West Michigan Cancer Center

Radiation & Surgical Specialties

SURGICAL ONCOLOGY

LIVER SURGERY

THE LIVER

The liver is the largest solid organ in the body and is located in the upper right-quadrant of the abdomen under the rib cage. Functionally it is a major source of proteins for the body, processes much of the food we eat playing a critical role in carbohydrate and lipid metabolism. It also is an important "filter" for the removal of drugs and toxins, and helps to fight infections. The liver also produces bile that is secreted via the bile ducts into the gut. The gallbladder, although not part of the liver, is intimately associated with the inferior surface of the liver, and is connected to the main bile duct via the cystic duct. Bile is stored within the gallbladder and during eating the gallbladder contracts and secretes it into the gut to facilitate absorption of fat. Anatomically the liver lies beneath the diaphragm and on top of the right kidney and intestines. The liver weighs approximately 2% of a person's body weight (1.5kg). The liver is the only organ in the body that has a double blood supply. The liver can be divided into a right and left lobe.

Is it true that the liver regrows following resection?
The liver is the only organ in the body that is able to regenerate (regrow). This means that when part of the liver is removed, the volume of the remaining liver increases (hypertrophies) until it returns to the volume of the original whole liver. This normally takes up to 8 – 12 weeks following a major liver resection. Up to 70% of a healthy liver can be removed. However, in the presence of chronic liver disease or chemotherapy, a larger remnant is required, reducing the amount of liver that can be removed.

What is the goal of performing liver resection?
Liver resection refers to the removal of a portion of the liver. This operation is usually done to remove various types of liver tumors, either primary (arisen within the liver) or secondary (spread to the liver from elsewhere). The principal aim of performing a liver resection is to completely remove the tumor without leaving any tumor behind. The success of liver resection depends upon the location of the tumor, the number of tumors, and the amount of liver left after removal of the tumor, and the biology of the tumor.

What patients require a liver resection?
Most patients who require a liver resection have metastases (secondary's) from a colorectal (bowel) cancer. Less commonly other secondary cancers from neuroendocrine tumors (like carcinoid), renal cancer or melanoma are resected. The most common primary liver cancer that is resected is hepatocellular carcinoma (HCC or Hepatoma). This is a cancer that originates in liver cells (primary), and is usually associated with underlying chronic liver disease. Primary cancers of the bile ducts, cholangiocarcinoma, are less commonly resected. There are a number of benign lesions that occur in the liver. Most don't cause any symptoms or problems and can be monitored or left alone.

How is a liver resection performed?
The most common method of removing part of the liver is by an open operation (laparotomy). In some instances it is possible to undertake the operation laparoscopically (keyhole surgery). The open technique is the preferred method for major resections particularly and in those tumors that are difficult to access. Only a minority of liver resections can be performed laparoscopically. A camera, known as a Laparoscope, connected to a high intensity light is introduced through a small incision and a further three puncture wounds are made to allow the surgical instruments to be introduced. Once the liver has been resected a small incision is made low down in the abdomen to allow the tumor to be extracted. Irrespective of the method used the principals are the same: The liver is mobilized. The vessels to the portion being resected are isolated and controlled. A cut is then made through the liver substance (parenchyma) and care is taken to seal off the blood vessels and bile ducts that pass across the plane of transection.

What are the potential complications?
There are risks with all surgery. Complications occur in about 20% of cases and most are mild and easily resolved. Rare but severe complications that are specific to undergoing liver resection include;

- Bile leak from the cut surface occurs in 5-10% of patients. This is usually self-limiting and is treated by external drainage. It may require an endoscopic procedure to decompress the bile ducts, and rarely reoperation is required.

- Bleeding either at the time of surgery or soon after, may require blood transfusion or re-operation. In most instances it resolves without further intervention.
- Liver failure may occur if the liver remnant is insufficient to support normal function. This is one of the most severe complications of undergoing liver surgery. Liver failure leads to progressive jaundice (yellow), ascites (fluid collection in the abdomen) and coagulopathy (abnormality in blood clotting). It may result in death if the liver is unable to regenerate in a timely manner.
- Respiratory complications (infection, collapse, fluid collections) are not uncommon as a result of prolonged ventilator support and poor inspiratory effort post-operatively. This may require antibiotic treatment or drainage.

General risks of surgery including wound infection, deep vein thrombosis (DVT), pulmonary embolism, or development of a hernia at the incision site. There is an increased risk of post-operative complications if you are overweight or if you smoke.

Is there a chance of dying from this operation?
There is a risk of dying associated with any operation. The risk of dying following a liver resection depends upon the extent of the resection, the quality of the liver and your other medical conditions. About 2 patients in every 100 undergoing liver resection will die within the peri-operative period as a result of a complication. Because a liver resection is generally performed after a diagnosis of cancer, the risk of not having the surgery is balanced against the risks of the surgery itself.

How long will I be in hospital?
Most patients will be in hospital between 5 and 10 days. At the time of discharge you will be mobilizing independently, eating and drinking a reasonable diet and able to undertake most self cares. It normally takes approximately 3 months to get back to your normal activities. This is very individual and it may take longer.

What happens before the operation?
This very much depends on upon the reason that you require a liver resection. You would have undergone imaging of your liver, CT or MRI, to stage the extent of the disease, and had a number of blood tests and other investigations to determine your suitability for the operation. Prior to being scheduled for surgery the findings of these investigations will be discussed with you, and the various treatment options outlined. You will need to have blood taken immediately prior to your proposed date of surgery to ensure that blood is available in the event that you require a blood transfusion. You will be given specific instructions about when to stop eating and drinking, please follow these carefully as otherwise this may pose an anesthetic risk and we may have to cancel your surgery. You should bath or shower before coming to hospital as you normally would. You do not need to shave any of the abdominal hair. You should take all your normal medication even on the day of surgery with a small amount of water. If you are on any medication that affects blood clotting you need to let the surgeon know well in advance of your surgery, as they may need to be stopped.

What happens when I arrive at the hospital?
You will be seen by the nursing staff and taken to your room. You will be asked to change into a surgical gown. The surgeon and anesthetist will visit you and answer any questions that you have. You will be asked to sign a consent form, and the surgeon will mark the operative site with indelible ink to avoid any potential confusion. You will be taken into the operating room by a nurse who will with you until you are asleep.

What happens after the operation?
You will be woken up in the operating room after the operation has been completed, and taken into the recovery area. You will have an intravenous line in your arm and usually a larger central line in the jugular vein in your neck that are attached to fluid, and enables the staff to give you medication. A small cannula will be in the radial artery in your wrist that is used to monitor your blood pressure continuously. You will have an oxygen mask over your mouth that will administer supplemental oxygen. You will have a catheter in your urinary bladder to monitor your kidney function, and this is removed usually on day 2 or 3. You will be able to eat and drink as soon as you are hungry after the procedure. It is very important in the first 24 hours after your operation that we are able to monitor your condition closely. There are a number of checks that will be routinely performed, over this time including throughout the night.

How much pain will I experience post-operatively?
Most people experience moderate pain, which is readily, controlled using a combination of treatments. The anesthetist will have a discussion with you prior to the operation regarding how your pain will be controlled. It is our usual practice to combine local nerve blocks (intra-thecal, epidural or wound catheters) with systemic analgesia (intravenous or oral painkillers). You will be given patient controlled analgesia (PCA) post-operatively which allows you to control the administration of the painkillers. Once you are tolerating a reasonable diet, the PCA will be removed and you will be given oral painkillers as required. You will experience some pain/discomfort from your incision, especially on movement, and you will need to communicate the severity of the discomfort to the medical staff looking after you so that the medication can be optimized

to your needs. At the time of discharge you will be given a supply of painkillers and post-operative instructions on what to take when. After about 14 days most patients are only requiring minimal analgesia to control their pain.

YOUR RECOVERY

Your belly will be sore after liver resection. This usually lasts about 1 to 2 weeks. You may also have nausea, diarrhea, constipation, gas, or a headache. You may have a low fever and feel tired and sick to your stomach. The skin around the incision the doctor made may be numb because nerves were cut. This is common and may get better with time. But it is likely that you will always have some numbness where the incision was made. You may need 4 to 8 weeks to fully recover.

This care sheet gives you a general idea about how long it will take for you to recover. But each person recovers at a different pace. Follow the steps below to get better as quickly as possible.

How can you care for yourself at home?

Activity

- Rest when you feel tired. Getting enough sleep will help you recover.
- Try to walk each day. Start by walking a little more than you did the day before. Bit by bit, increase the amount you walk. Walking boosts blood flow and helps prevent pneumonia and constipation.
- Avoid strenuous activities, such as bicycle riding, jogging, weight lifting, or aerobic exercise, until your doctor says it is okay.
- For at least 8 weeks, avoid lifting anything that would make you strain. This may include a child, heavy grocery bags and milk containers, a heavy briefcase or backpack, cat litter or dog food bags, or a vacuum cleaner.
- Hold a pillow over your incision when you cough or take deep breaths. This will support your belly and decrease your pain.
- Do breathing exercises at home as instructed by your doctor. This will help prevent pneumonia.
- Ask your doctor when you can drive again.
- You will probably need to take 4 to 8 weeks off from work. It depends on the type of work you do and how you feel.
- You may be able to take showers (unless you have a drain near your incision). If you have a drain near your incision, follow your doctor's instructions to empty and care for it. Do not take a bath for the first 2 weeks, or until your doctor tells you it is okay.
- Ask your doctor when it is okay for you to have sex.

Diet

- You can eat your normal diet. If your stomach is upset, try bland, low-fat foods like plain rice, broiled chicken, toast, and yogurt.
- Drink plenty of fluids (unless your doctor tells you not to).
- Check with your doctor before drinking alcohol. Alcohol can damage the liver.
- You may notice that your bowel movements are not regular right after your surgery. This is common. Try to avoid constipation and straining with bowel movements. You may want to take a fiber supplement every day. If you have not had a bowel movement after a couple of days, ask your doctor about taking a mild laxative.

Medicines

- Your doctor will tell you if and when you can restart your medicines. He or she will also give you instructions about taking any new medicines.
- If you take blood thinners, such as warfarin (COUMADIN®), clopidogrel (PLAVIX®), or aspirin, be sure to talk to your doctor. He or she will tell you if and when to start taking those medicines again. Make sure that you understand exactly what your doctor wants you to do.
- Take pain medicines exactly as directed.
  - If the doctor gave you a prescription medicine for pain, take it as prescribed.
  - If you are not taking a prescription pain medicine, take an over-the-counter medicine that your doctor recommends. Read and follow all instructions on the label.

- Do not take aspirin, ibuprofen (ADVIL®, MOTRIN®), naproxen (ALEVE®), or other non-steroidal anti-inflammatory drugs (NSAIDs) unless your doctor says it is okay.
- If you think your pain medicine is making you sick to your stomach:
  - Take your medicine after meals (unless your doctor has told you not to).
  - Ask your doctor for a different kind of pain medicine.
- If your doctor prescribed antibiotics, take them as directed. Do not stop taking them just because you feel better. You need to take the full course of antibiotics.

Incision care

- If you have strips of tape on the incision, leave the tape on for a week or until it falls off.
- Wash the area daily with warm, soapy water, and pat it dry. Don't use hydrogen peroxide or alcohol, which can slow healing. You may cover the area with a gauze bandage if it weeps or rubs against clothing. Change the bandage every day.
- Keep the area clean and dry.

Follow-up care is a key part of your treatment and safety.

Be sure to make and go to all appointments, and call your doctor or nurse call line if you are having problems. It's also a good idea to know your test results and keep a list of the medicines you take.

When should you call for help?

Call 911 anytime you think you may need emergency care. For example, call if:

- You passed out (lost consciousness).
- You have severe trouble breathing.
- You have sudden chest pain and shortness of breath, or you cough up blood.
- You have severe pain in your belly.

Call your doctor or nurse call line now or seek immediate medical care if:

- You have pain that does not get better after you take your pain medicine.
- You have a fever, chills, or body aches.
- You have loose stitches, or your incision comes open.
- You are bleeding from the incision.
- You have signs of infection, such as:
  - Increased pain, swelling, warmth, or redness.
  - Red streaks leading from the incision.
  - Pus draining from the incision.
  - Swollen lymph nodes in your neck, armpits, or groin.
  - A fever.
- You have trouble passing urine or stool, especially if you have pain or swelling in your lower belly.
- You have pale-colored stools along with dark urine and itching.
- Your stools are black and tar-like or have streaks of blood.

Watch closely for changes in your health, and be sure to contact your doctor or nurse call line if:

- You do not have a bowel movement after taking a laxative.