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Understanding Your Liver

A Patient's Guide to Liver Surgery

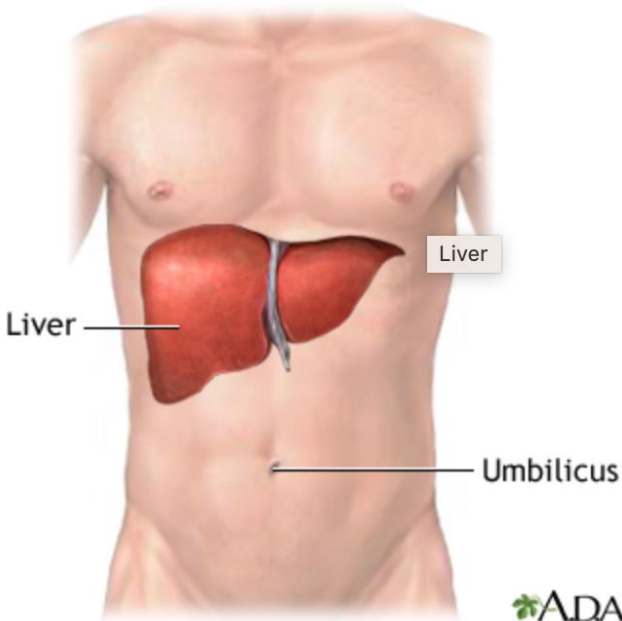


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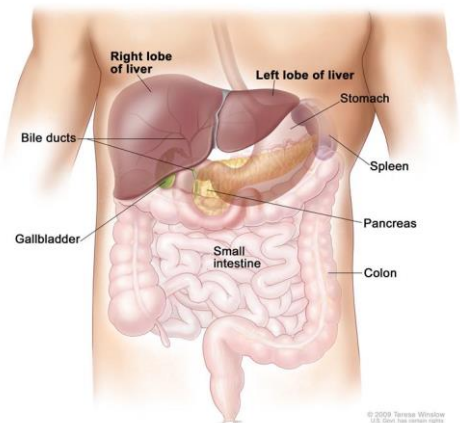
INTRODUCTION

You are scheduled to have surgery on your liver to remove a tumor. This surgery is called a liver resection or *hepatectomy*. The purpose of this booklet is to provide you with answers to some common questions about your surgery, hospital course, discharge home and full recovery. Please read this booklet carefully and *bring it with you when you come to the hospital for your surgery so that you can refer to it as often as is needed.*

ABOUT YOUR LIVER

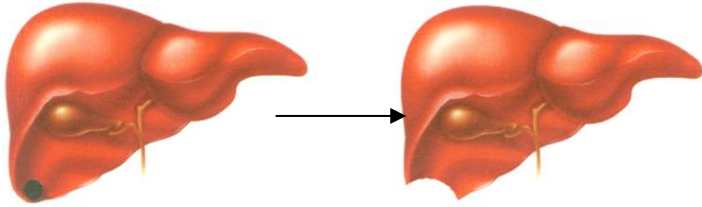
The liver is a large organ located on the right side of your abdomen, just beneath your right ribcage and sternum. Important functions of the liver include:

- Making bile, which helps the body digest fats and absorb the fat-soluble vitamins A, D, E and K
- Making important proteins, like the ones needed to help blood clot properly
- Producing cholesterol
- Filtering the blood and removing toxins and bacteria
- Detoxifying drugs and alcohol
- Storing sugar and fat in a form that the body can easily use for energy

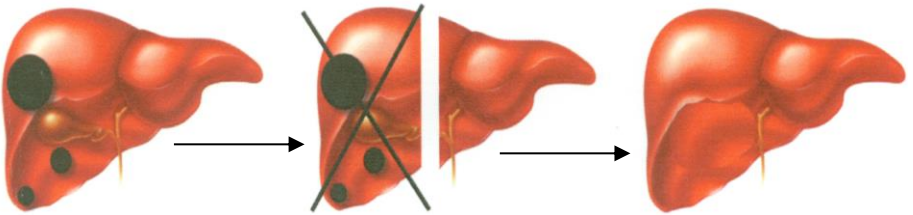


ABOUT YOUR SURGERY

Very small tumors may be removed by a small surgery called a *liver wedge resection* where only the affected area is removed:



However, most tumors require a bigger surgery to remove the tumor or tumors completely. Depending on how healthy your liver is before surgery, about 60-80% of the liver can be removed safely. Your liver will begin to grow back within days after your surgery, and in one month will be just about the same size it was before your surgery:



POSSIBLE COMPLICATIONS OF YOUR SURGERY

Complication	What happens	Prevention & Treatment
Bleeding	The liver stores a large volume of blood, therefore some bleeding during the surgery is expected. Large volume blood loss requiring transfusion is not typical.	Stop taking blood-thinning medicine (anticoagulants) as instructed (typically 5-7 days prior to surgery). Examples of medicines that can cause problems with clotting: Plavix, Coumadin, Ibuprofen (Motrin), Naproxen (Aleve). Make sure to give your doctor a full list of medications, including over-the-counter medications, for evaluation.
Infection	Minor wound and intra-abdominal infections happen about 5-9% of the time. These are usually treated easily with antibiotics, or antibiotics plus drainage of infection.	You will be given intravenous antibiotics and your skin will be cleaned with sterile solution just before your surgery. We use a meticulous sterile technique in the operating room and wash our hands before any exam or treatment.
Bile duct injury or bile leakage	Sometimes small bile ducts on the cut surface of the liver do not seal immediately after surgery.	A drain may be placed at the time of your surgery to control minor bile leakage. The bile ducts eventually seal, and the drain can be removed.
Injury to the bowel or other nearby organs	This is extremely rare but happens more often in people who have had multiple prior surgeries.	Careful technique in the operating room.
Heart problems or stroke	Very rarely, a patient's heart will stop beating or a blood vessel will break during surgery. These complications are rare and do not occur with any more frequency in patients who have liver surgeries than they do in patients who have other types of surgeries.	Careful pre-operative assessment of your general cardiovascular health. If necessary, you will be evaluated by a cardiologist and special tests may be ordered.

Pneumonia

A lung infection can result from intubation and general anesthesia, or from lack of deep breathing after your surgery.

Deep breathing exercises and frequent use of your incentive spirometer after the surgery will help expand your lungs. If pain prevents you from deep breathing, we will adjust your medication as needed.

Blood clots

Lack of movement during and after surgery and inflammation from surgery can predispose you to forming blood clots in your legs. Sometimes these clots can travel to the lungs and interfere with your breathing.

You will wear compression stockings on your legs both during and after your surgery. You may also be given a blood thinning shot (heparin/Lovenox) while you are in the hospital. It is very important that you begin to get out of bed and walk as soon as possible after your surgery.

Kidney problems

A urinary tract infection or mild dehydration may occur after surgery. Rarely, acute renal failure may occur (failure of the kidneys to make urine properly).

Your urinary catheter will be removed as soon as possible after your surgery to prevent infection. Your urine output will be closely monitored after surgery and additional fluids administered if urine output is not adequate.

Liver failure

Liver failure can result in the case where not enough functional liver tissue remains to restore liver activity. This is a rare and severe complication of hepatectomy.

Careful assessment of liver function and volume before your operation so that only a safe amount of liver is removed.

Death

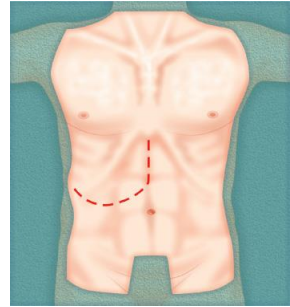
Death after major hepatectomy is extremely rare today, but nationwide still happens up to about 2 out of every 100 surgeries.

Careful preoperative planning, including assessment of your general fitness for surgery and the amount of your liver that can be removed safely.

YOUR INCISION AND PAIN CONTROL

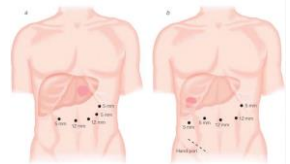
Open Surgery:

The open surgical approach is often through an incision beneath the ribcage like the one shown on the right.



Minimally Invasive Surgery (Laparoscopic/Robotic)

Some tumors can be removed through smaller incisions (*keyhole surgery*) with the help of a camera and special long instruments. This is called laparoscopic/robotic hepatectomy. You will be informed if you are a candidate for this approach. For safety reasons, there may still be a chance of converting to the standard “open” procedure.



Pain control

Several methods of pain control will be utilized to help with your incisional pain. There are many different options and approaches for pain management, including intravenous pain medications, oral muscle relaxants, oral narcotics, and oral anti-inflammatory medications.

Epidural catheters (catheter in the back that helps make your trunk numb) are sometimes used for optimal pain control in addition to multimodal medications.

Additionally, you may be a candidate for non-epidural regional anesthetic approaches for pain control, such as a TAP block, ESP block, or an OnQ pain pump. Transversus abdominis plane (TAP) Block or Erector Spinae Plane (ESP) Block: A local anesthetic is injected into certain tissue planes. When either of these are performed, the nerves are numbed, and you will not feel as much pain in your abdominal area.

Continuous Regional anesthesia catheters (example OnQ Pain Pump)

Small catheters are placed intraoperatively and then connected to a pain pump. It will continuously deliver local anesthetic medication to block the pain in the area of your procedure.

PREPARING FOR YOUR SURGERY

Preoperative Anesthesia Clinic

You may need some additional testing before your surgery to make sure you are healthy enough for major surgery and general anesthesia. Preoperative testing will be ordered through the Pre-Anesthesia (PREPARE) Clinic (415) 353-1099. This may include blood tests, chest x-rays or an electrocardiogram (EKG). Patients having major surgery may also require a scheduled telephone appointment to meet with the Pre-Anesthesia team. During this visit, your health history will be reviewed, and the type of anesthesia used during the surgery will be discussed.

Smoking Cessation

Smoking increases the likelihood of pneumonia and wound healing problems after your operation. In addition, chronic cough due to smoking will make pain control more difficult after your operation. If you smoke, you should quit for at least two weeks before and two weeks after your operation. Smoking cessation aids like nicotine gum can be purchased over the counter. Other options like Wellbutrin or nicotine patches can be prescribed for you if you need further assistance to stop smoking.

Special diet instructions the day before your operation

The day before your surgery your diet will consist of no solid food for 24 hours. You will be on a clear liquid diet. Clear liquids consist of clear broth, coffee or tea (sugar is fine but please no milk or cream), Jell-O, carbonated and non-carbonated drinks, popsicles, Gatorade, and of course, water. Please DO NOT eat or drink anything (including water) after midnight on the night prior to your operation. If you are on blood, heart, or anti-reflux medications, you can take the medication with a few sips of water the morning of your surgery. If you are a diabetic and take oral medication or insulin, please check with your doctor on which medications, and how much, to take morning of surgery.

Bowel cleansing before your operation

You **may be** instructed to take one bottle (10 ounces) of magnesium citrate the morning of the day before your surgery. You can drink the bottle all at once or sip it over time. The magnesium citrate tastes better when chilled. This will make you have loose stools and will clean out your bowels quickly. If you begin to have clear bowel movements, you may stop taking the magnesium citrate. You will be given one or two bottles in your preoperative visit with your surgeon.

If you will be having a colon operation (colectomy) at the same time as your liver resection, you may be instructed to take an additional or alternative bowel cleansing regimen.

Medicines you may need to stop taking before your operation

In your visit with your surgeon or with the anesthesia preoperative clinic your medication list will be reviewed in detail and you will be instructed about which medications to continue the day of surgery. (Please note that the majority, but not all, of the medication you take will likely continue.)

Please tell us if you are taking blood thinners such as Coumadin (also called warfarin), Plavix, or aspirin. You will **likely** be instructed to stop taking these medicines 3-10 days before your operation. Please make sure to ask. You should also stop taking NSAIDs (e.g. Advil, ibuprofen, Tylenol) 3 days before your operation. A baby aspirin (81mg) is probably ok to continue taking.

If you are taking any herbal/non-pharmacological supplements beyond simple vitamins, please tell your physician as some of these have blood thinning qualities and may need to be stopped 3-5 days prior to surgery.

If you have any questions about taking medication before your surgery, please ask your surgeon in your preoperative visit.

SPECIAL INSTRUCTIONS FOR THE DAY OF SURGERY

Our office (or the preoperative care office) will call you 24-48 hours prior to your operation to inform you of your check-in time and location for surgery.

Please call us (415-502-5577) **IN ADVANCE** if:

- You are sick (e.g. cold or flu) and/or have a temperature over 100.5° F
- You get a cut, rash, or infection on your abdomen
- Any change occurs in your overall medical condition
- You have ANY questions about medications
- You have ANY concerns about your operation

What to bring on the day of your surgery:

- Insurance card
- Identification
- Your Advance Directive
- A list of your medications or your pill bottles
- This booklet

Please **DO NOT** bring any jewelry or other valuables.

WHAT TO EXPECT IN THE OPERATING ROOM

You will arrive in the pre-operative room. There you will meet your surgical team, Operating Room Nurse, Anesthesia Team and Induction Room Nurse prior to you going to the Operating Room (OR). Your OR Nurse will give you pre-operative teachings which will re-enforce what was discussed in the Surgeon's Clinic. This includes the catheters, and the Sequential Compression Device that will be put on your legs to prevent clots. We encourage that you ask questions and express your concerns at any time. Once you're in the OR, you will meet the Surgical Nurse and Anesthesia Tech. The OR team will put monitoring devices on you to monitor your vital signs. The OR Nurse will notify family members via text message when the surgery starts and will provide updates.

WHAT TO EXPECT DURING YOUR HOSPITAL STAY

Where will I go after the operation?

After your operation, you may be taken to a special care unit for recovery and close observation overnight. However, often, with "keyhole surgery" and some open surgery you might go directly from the recovery room to the regular post-surgical hospital patient unit.

Enhanced Recovery After Surgery (ERAS) Protocol

We follow special postoperative protocols that will aide in healing and help you get back to your usual self. This includes but is not limited to the following:

- Blood glucose monitoring
- Early ambulation – it is important to sit in a chair and walk as soon as possible to prevent a lung infection and/or blood clots
- Incentive Spirometry use – helps with deep breathing to prevent pneumonia
- Early urinary catheter removal – to prevent a urinary tract infection
- Various methods of pain control – multiple approaches to control your pain will be utilized so you will not require high amounts of narcotics
- Dietician consult – education about nutrition and supplements to help you heal

- Physical and Occupational Therapy – safe mobilization and adjustments as needed with postoperative surgical pain

What is a typical hospital recovery after a liver resection?

Assuming everything goes as expected, you will be transferred to the surgical floor on the day after your operation. You will have excellent pain control with patient-controlled analgesia (PCA), a machine that allows you to deliver pain medicine to yourself when you need it, and/or an epidural catheter.

As soon as you are awake, you will be encouraged to **BREATHE DEEPLY** using a device called an incentive spirometer. This is very important for preventing pneumonia after your operation.

You will be assisted out of bed to a chair on the day of surgery or the first day after your surgery and will be assisted with walking on or before the second day after surgery. **Walking soon after your surgery is very important to prevent blood clots, stimulate bowel function and prevent loss of muscle tone.** Once you are safely able to get out of bed, your urinary catheter (a tube used to drain your bladder) will be removed.

Most patients can begin to drink a little clear liquid by the second or third day after surgery, and soon after are able to eat regular food. Once you can drink adequately, your IV fluids will be discontinued, and you will be weaned from IV medication.

For patients who undergo laparoscopic/robotic (keyhole) surgery, their recovery is faster and often will not have any drains or catheters.

Pain Control

An epidural placed prior to surgery is intended to control your pain, facilitate early movement, and speed your recovery. Your bladder may not function while this is being used and a urinary catheter may need to stay in until your epidural is removed.

If you are in so much pain that you cannot comfortably breathe or get out of bed with assistance, please tell your nurse immediately so that your pain needs can be addressed in a timely manner. Do not try to act tough. It's important that you are comfortable to be able to cough, take deep breaths, and walk.

How long will I be in the hospital?

On average, most patients will be in the hospital for 4-10 days after major liver resection done in an open fashion and 1-4 days after major liver resection done in a laparoscopic/robotic fashion. In general, conditions for safe discharge home include:

- You have normal bowel function.
- You can eat and drink.
- You no longer need IV medication.
- Your pain is controlled well with medication you take by mouth.
- You have no signs or symptoms of untreated infection or bleeding.
- You can walk and carry out basic functions independently.

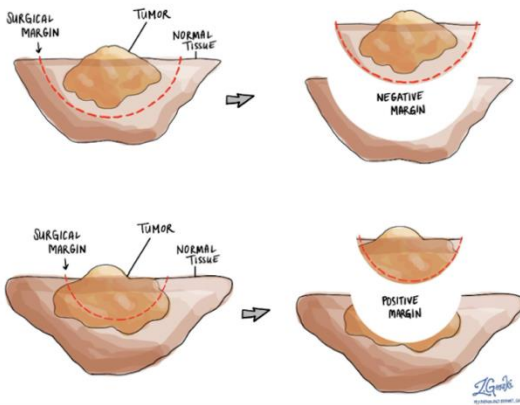
The day of discharge

You will be informed in advance of your planned discharge date to enable you to make appropriate travel arrangements. A member of our surgery team will review your discharge paperwork, instructions, medication, and follow-up appointments in detail before your discharge.

When will I receive the pathology results?

The surgical specimen will be delivered to the pathology department where it will be examined under a microscope. Results from this examination will take anywhere from 5 – 7 business days. The final pathology report and next steps related to the results will be discussed with you. Below you will find what the pathology report will discuss.

- **Tumor type and size** – although imaging and biopsies are helpful, the true size and type of cells / make-up of the tumor are more well defined once it is surgically removed
- **Margins** – how much distance is between the tumor and normal tissue (to ensure the entire tumor was removed), and if the tumor extends into any other organs or lymph node(s)



- **Grade** – poorly differentiated, moderately differentiated, or well differentiated. Poorly differentiated tumors are typically associated with worse prognosis compared to well differentiated
- **Pathologic Stage** – This is a combination of the size of your tumor, nodal involvement, and/or cancer cells distant to the site of the tumor

QUESTIONS FOR YOUR SURGERY TEAM

While you are in the hospital recovering from your surgery, your clinical team will see you twice daily, once in the morning and once in the evening. UCSF is a teaching hospital and residents will be involved in your surgery as well as in your care every day as they are key members of your team. Morning rounds usually begin around 6 a.m., but the start time of evening rounds vary from early afternoon to late evening. The team does this “rounding” so that we can keep a close eye on your recovery and address all your questions and concerns as efficiently as possible. Your attending surgeon or their partner will see you at least once a day and will directly be involved in all aspects of your care. If at any time you or members of your family are concerned about your care, please bring your concern to the attention of any member of your team.

RETURNING HOME AFTER YOUR SURGERY

Activity level

It is normal to feel easily fatigued after your surgery. Simple tasks may be tiring. Asking someone to assist with errands like grocery shopping is recommended for the first four to six weeks after surgery. If you had an open incision, do not lift anything heavier than a gallon of milk until your first postoperative visit. Your surgeon will tell you when it is safe to resume certain activities.

Basic activities of daily living should not be limited. Although you may need to take a nap during the day, **AVOID STAYING IN BED** all day. You can shower every day unless otherwise instructed. Getting the wound or drain (if present) wet is OK. Get dressed and walk frequently to help build your strength.

Driving

Do not drive until you have completely stopped taking pain medication and are able to respond to emergency situations appropriately. Your doctor will advise you on timing if unclear.

Exercise

Resume moderate exercise as tolerated, generally 4-6 weeks after your surgery.

Sexual activity

When you go home, you may resume sexual activity unless instructed otherwise by your physician.

Diet

You may not have much of an appetite after your operation. This is common. You may need to adjust your portion size and eat more frequent, smaller meals daily. You have no food restrictions, but are encouraged to eat well-balanced, low fat meals. Go slowly and eat only what feels comfortable to you.

Alcohol is cleared from the body by the liver, and your liver will take time to heal completely. You should **avoid alcoholic beverages** for three months after your operation unless otherwise instructed by your doctor.

Wound care instructions

If your staples or stitches are not all removed before you leave the hospital, they will be removed at a follow-up clinic visit. Shower every day while home. It is okay to allow water and soap to wash over the staples/stitches, and then pat dry afterward. It is important to keep the wound clean for optimal healing. If any stickers or dressings are on, remove them and change them daily if they are still needed. If you develop any spreading redness, warmth, increased pain, or drainage from your wound, please call us right away.

Discharge medications

In general, by the time you are discharged home, you will have resumed all the medications you took at home before surgery. Sometimes your home medications will be changed by your surgical team. You will also be given a prescription for pain medicine. *A list of medications and dosing instructions will be discussed with and provided to you before your discharge.* If you have any questions about your medications at any time, please ask any of your team members. If you have questions after discharge, please call your surgeon's office.

NOTES:

REASONS TO CALL YOUR SURGEON:

- Chills or fevers of 101°F (38.3 °C) or higher
- Swelling, warmth, or increased redness around your incision
- Drainage of fluid from your incision, especially if it is cloudy, thick, or foul smelling
- Any sudden increase in abdominal pain or new abdominal pain
- Persistent diarrhea, nausea, vomiting or inability to eat and drink
- Constipation or inability to pass gas for longer than 3 days
- Your skin or eyes turn yellow, or your urine becomes dark
- Any new or unexplained symptoms

Contact Information (during business hours):

- Contact our clinic (415) 502-5577 for any questions
- You can send a MyChart message anytime directly to Dr. Alseidi
- Your clinical questions may be answered by our team of nurses and Nurse Practitioners

**For after-hours concerns, contact the physician on-call at
(415) 502-5577***

**While there is always a physician on call, if a medically urgent situation arises, please call 911.*