

Free Flap Surgery

This handout explains what free flap surgery is, how it is different from a skin graft, and why it is used to treat serious wounds that cannot heal on their own. It also explains the types of tissue that may be used, what happens before and after surgery, the possible risks, and how recovery works.

What is a skin graft?

A *skin graft* is a very thin layer of skin that is moved from one place on your body to another. It does not have its own blood supply. It survives by using the blood supply from the place where it is placed. A *flap* is a thicker piece of tissue that is moved from one part of the body to another. A flap keeps its own blood supply.

What is a free flap?

A *free flap* is a piece of tissue that has its own blood supply. During surgery, the tissue is completely disconnected from one area of the body and moved to another area. The surgeon then reconnects the blood vessels in the new place. To reconnect these tiny blood vessels, the surgeon uses a microscope. Because of this, you may hear this surgery called *microsurgery*.

Free flaps are like transplants. The difference is that the tissue comes from your own body. This surgery is complex and usually takes about 6 to 10 hours while you are under *anesthesia* (medicine that keeps you asleep during surgery). Because it is a long surgery, we only recommend it when other options will not work.

What tissues can be used as a free flap?

Different types of tissue can be used:

- **Muscle flaps:** Some muscles are not essential for normal movement. These muscles can be moved with their blood supply to cover a wound. After a muscle flap is placed, it must be covered with a skin graft.
- **Fasciocutaneous flaps:** These flaps include skin and fat with a reliable blood supply.

Why do wounds need free flaps?

Some wounds cannot heal with a skin graft because the area does not have enough blood flow. Examples include wounds where these structures are exposed:

- Bone
- Bare tendon (the tissue that connects muscle to bone)
- Metal hardware from orthopedic surgery
- Major nerves and blood vessels



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These structures do not have enough blood supply to support a skin graft. A flap brings healthy tissue with its own blood supply. This helps:

- Close the wound
- Bring immune system cells to fight bacteria
- Protect important structures like nerves and blood vessels

Flaps are also thicker and stronger than skin grafts. This helps protect the area from the outside environment. When a free flap is used to save a severely injured arm or leg, this is called *limb salvage*.

What are the alternatives?

If the wound cannot be safely covered with tissue, the other option may be *amputation* (surgically removing the limb). In some cases, amputation may be the better option. For example:

- The bone injury is so severe that the joint will not work again
- Severe nerve damage causes loss of feeling in the bottom of the foot
- A *prosthetic* (artificial) limb may provide better function
- A patient cannot safely have a long surgery because of other life-threatening illnesses or injuries

When amputation is being considered, several medical teams talk together. These may include:

- Plastic surgeons (soft tissue surgeons)
- Orthopedic surgeons (bone surgeons)
- Physical Medicine and Rehabilitation doctors, who specialize in recovery and mobility

We will talk with you about each option so we can help you make the best choice for your lifestyle and goals.

When are free flaps not an option?

- Free flaps cannot be done if there are no healthy blood vessels near the wound. For example, a severe injury to the shin bone may destroy all major blood vessels in that area. Without blood vessels to connect to, a flap cannot survive. In this situation, amputation may be required.
- Free flaps may also not be possible if the blood vessels are unhealthy. In these cases, the vessels may be too stiff or have poor blood flow. This can happen with:
 - Vascular disease (calcium buildup in blood vessels)
 - Poorly controlled diabetes
- Free flaps may also not be recommended if a person cannot safely tolerate 6 to 10 hours of anesthesia.
- Some medical conditions increase the risk of healing problems after surgery. These include:
 - Uncontrolled diabetes
 - Poor nutrition
 - Nicotine use (Nicotine narrows blood vessels and reduces blood flow. You must have good blood flow to heal properly.)

What happens before surgery?

- If another medical team believes a free flap is needed, they will contact the plastic surgery team. Our team will review:
 - Your medical history
 - Your injuries
 - Lab results
 - Imaging studies such as X-rays or CT scans
- We will decide if you are a good candidate for a free flap or if another option may work.
- Before surgery, the wound must be clean, and have **no**:
 - Dirt
 - Dead tissue
 - Infection
- We will also need to first treat any other injuries, especially broken bones.
- We may order special imaging to check the blood vessels near the wound.
- When the team agrees to start the limb salvage, we schedule the surgery. Because this surgery takes most of the day, it requires careful planning.

Muscle and Fasciocutaneous flaps

Muscle flaps

Muscle flaps are helpful in areas that need a thinner shape after healing. Over time, the muscle shrinks and blends in with the surrounding tissue. This is helpful in areas like the ankle or lower leg where the width of the leg affects wearing shoes, boots, or pants.

Muscle flaps must be covered with a skin graft. The skin graft is placed over the muscle like a sticker. If the muscle has good blood flow, the skin graft will heal and cover it.

The skin graft donor site is often the most painful part of surgery. It may feel like road rash or carpet burn. We use numbing medicine and special dressings to help with pain. Most discomfort improves within 48 to 72 hours.

Fasciocutaneous flaps

Fasciocutaneous flaps include skin and fat. They usually do not need a skin graft and often have a more natural appearance after healing. However, they cannot be very large. The area where the flap is taken must be able to close with stitches in a straight line.

Skin graft donor sites can be larger because only the thin top layer of skin is removed. This area heals like a scrape.

Common Flaps

Gracilis flap (muscle)

The *gracilis muscle* is a long, thin muscle in the inner thigh. It helps move your leg toward the center of your body, but other muscles also perform this job. Because of this, removing the gracilis muscle usually does not cause weakness.

If this flap is used:

- You will have a 15–20 cm incision on your inner thigh.
- The incision runs vertically toward the lower thigh.
- You will leave surgery with at least one drain in the thigh.

Latissimus dorsi flap (muscle)

The *latissimus* muscle is a large fan-shaped muscle in the back. It helps move and rotate the arm. Other muscles can perform the same functions, so this muscle can be used for reconstruction. This flap is often used for very large wounds.

If this flap is used:

- You will have a 20–25 cm diagonal incision on your back.
- The incision runs from the armpit toward the lower back.
- You will leave surgery with at least two drains in the back.

Anterolateral thigh (ALT) flap

This flap uses the skin and fat on the outer thigh. Sometimes part of the underlying vastus lateralis muscle is also included. Even when the muscle is not included, the surgeon must carefully go through part of the muscle to reach the blood vessels. This flap works well for long and moderately wide wounds.

If this flap is used:

- You will have a 15–20 cm vertical incision on the outer thigh.
- You will leave surgery with at least 1 drain in the thigh.

Vastus lateralis flap (muscle)

The vastus lateralis is one of the four quadriceps muscles in the thigh. These muscles help straighten the knee. Because 3 other muscles do the same job, this muscle can be used for reconstruction without major loss of strength. This flap is helpful for large, wide wounds.

If this flap is used:

- You will have a 15–20 cm vertical incision on the outer thigh.
- You will leave surgery with at least 1 drain in the thigh.

What happens during surgery?

- Free flap surgery usually takes 6 to 10 hours.
- Often 2 surgical teams work at the same time: 1 team prepares the flap, and 1 team prepares the wound.
- The wound team will:
 - Clean the wound and remove unhealthy tissue
 - Find a nearby artery and vein for the flap connection. These vessels are called *recipient vessels*.
- The flap team will:
 - Find the blood vessel that supplies the flap tissue
 - Carefully follow and separate the vessel from the surrounding tissue
 - Disconnect the tissue with its artery and vein attached
- When the flap is ready, it is moved to the wound. We will use a microscope to connect the blood vessels.
- The veins are often connected using a small plastic device called a *coupler*. This connects to a doppler wire that helps us monitor blood flow after surgery.
- The arteries are sewn together with extremely thin stitches.
- When we are sure that blood is flowing, we will stitch the flap into place.
- If a skin graft is needed, it is placed over the flap and secured with small skin staples.

What happens after surgery?

After surgery you will stay in the hospital under the care of the plastic surgery team. Most patients stay in the hospital for 6 to 8 days after surgery.

The Night of Surgery

- You cannot eat or drink. We will give you fluids through an IV (intravenous line). This is in case you need to return to the operating room quickly.
- Nurses will check your flap every hour. They will listen to blood flow using the Doppler device that was connected during surgery. The Doppler sound is like gentle ocean waves. It stays on continuously for 48 hours.
 - Do **NOT** turn off or change the Doppler sound.
 - Tell your nurse immediately if the sound changes or becomes quieter.

The Morning After Surgery:

- If your blood flow is strong, you will start a clear liquid diet (water, broth, apple juice, and Jell-o).
- Later in the day, you can start eating a regular diet.

The First 5 Days After Surgery

- All surgical dressings stay in place for 5 days.
- You will stay on bed rest for 5 days.
- On day 5, we will remove your dressings. We will teach you how to care for the wound at home.

If the Flap is on Your Leg or Foot

You will follow a special dangle protocol (plan):

- For the first 5 days you stay in bed with your legs level with your heart.
- On day 5 we begin “dangling.” This means slowly letting your leg hang below your heart for short periods. You will start with hanging your leg down for 10–15 minutes once every 2 hours.
- Each week the time increases by about 15 minutes until the flap can tolerate 2 hours with the leg down.
- The full process takes about 8 weeks. You do not need to stay in the hospital for the entire protocol.

Possible Complications After Free Flap Surgery

The most serious problem is the flap losing blood flow. This can happen if a vessel twists, there is pressure on the area, or a small blood clot forms. At the University of Washington, the risk of this is low (about 5–10%). If it happens, it is usually during the first 48 hours after surgery. We must return to the operating room quickly to restore blood flow. The longer the flap goes without blood flow, the lower the chance the tissue will survive. If we return to surgery:

- About 90% of the time, we can restore blood flow.
- About 10% of the time the flap cannot be saved and must be removed. If that happens, we will discuss the next steps with you.

Other possible complications include:

- Infection
- Small wound healing problems that need wound care
- Bleeding under the skin (hematoma), which may require another surgery

What happens after you leave the hospital?

- You will leave the hospital when your care team and therapists decide it is safe.
- Physical and occupational therapists will help prepare you for going home.
 - If you have a lower-extremity flap, we will teach you and your family how to follow the dangle plan.
 - If you have a skin graft or other wounds, nurses will teach you how to care for them at home.
- We will give you our clinic phone number. You can call us 24 hours a day for urgent concerns.
- For non-urgent questions, send a message through MyChart. Our clinic team will respond during business hours, usually within 12 hours.
- You will return to clinic about 2 weeks and 6 weeks after surgery. More visits can be scheduled if needed.
- The flap surgery is the biggest surgery you will have. After it heals, you may need smaller procedures to change the shape or size of the tissue so it fits better in its new place on your body. If you need another surgery, it will not happen until at least 3 months after your flap surgery. Your care team will talk with you about this at your 6-week follow-up visit.