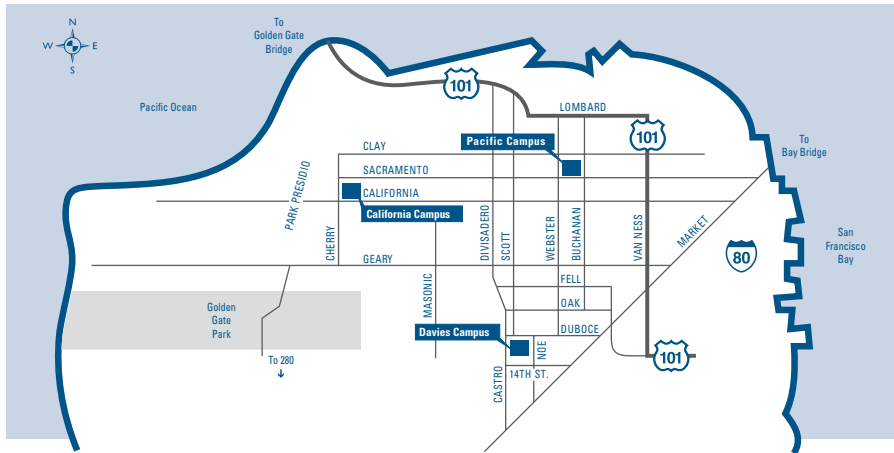


MAPS



Westbound 80 (from Oakland)

Go over Bay Bridge
Turns into Hwy 101
Take Hwy 101 South toward San Jose
Exit Mission/Fell St.
Travel up Fell St. to Scott St.
Left of Scott St.
Medical Center is at the end of
Scott St.

Southbound (from Marin)

Take Hwy 101 South over the
Golden Gate Bridge
Exit Lombard St.
Right on Divisadero St. which will
become Castro St. en route
Medical Center is at the corner of
Duboce and Castro Streets

Northbound (from San Jose)

Take Hwy 101 North towards the
Golden Gate Bridge
Exit Mission/Fell St.
Left on Scott St.
Medical Center is at the end of
Scott St.



Microsurgery

A GUIDE TO
YOUR RECOVERY



California Pacific
Medical Center

A Sutter Health Affiliate

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WELCOME TO CALIFORNIA PACIFIC MEDICAL CENTER

Whether you have come to us for emergency microsurgery or for elective reconstructive surgery, you will probably have questions about your treatment plan. We have designed this booklet to answer many of these questions and to help ensure your healthy recovery.

We are proud of the highly qualified and dedicated team of medical specialists at California Pacific Medical Center. You will have regular contact with our microsurgeons, internists, nurses, hand therapists, and laboratory technicians. Staff and physicians from respiratory therapy, radiology, pharmacy, and social services will assist with your care, as well.

Please review the information in this booklet thoroughly. Feel free to discuss any aspect of your treatment plan with a member of the microsurgery team. Participating and cooperating fully in your care is essential to your recovery.

For a quick reference to questions that patients commonly ask about their surgery...please skip to page 28.

WHAT IS MICROSURGERY?

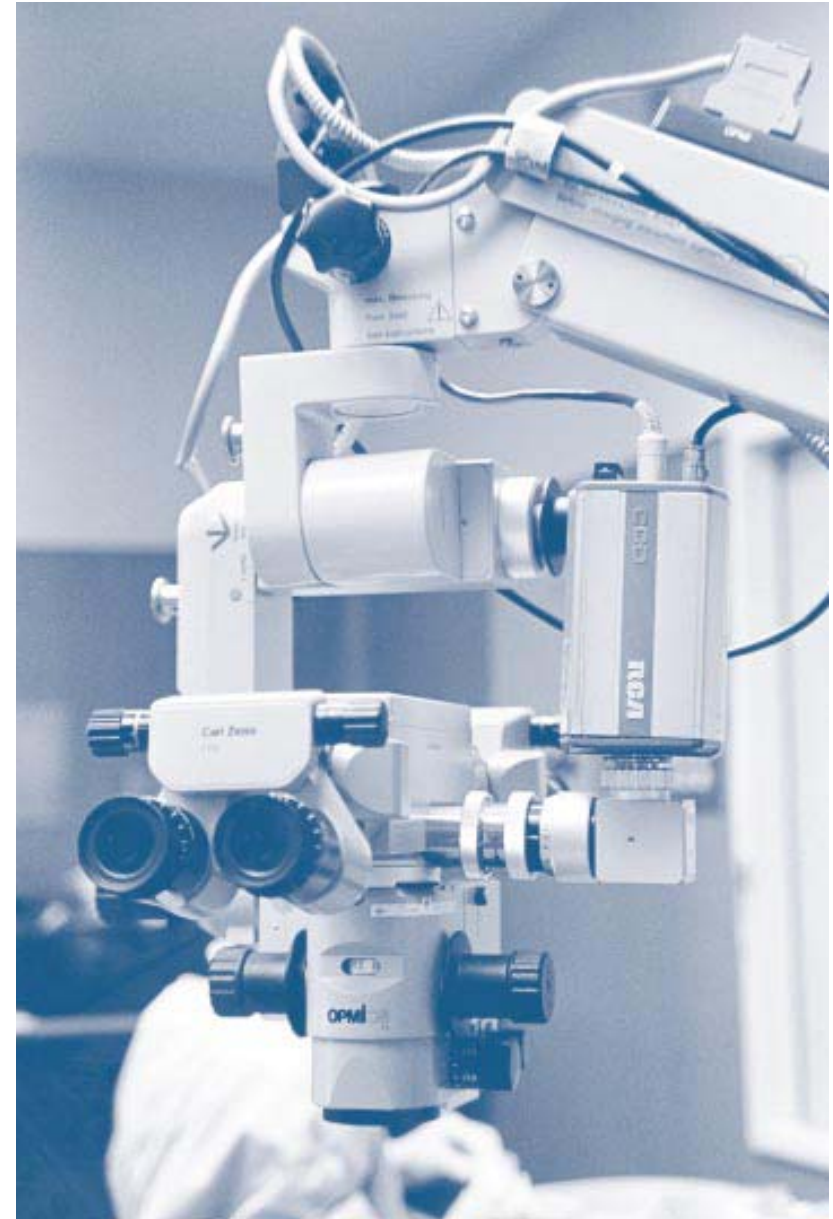
Microsurgery is the sewing together of nerves, tendons, or blood vessels to correct an injury, disease, or congenital defect. To do this, the doctor uses a thread so thin that microscopes are needed as an aid during the procedure. Also, microsurgery makes it possible to reattach digits (fingers, toes), hands, and other body parts, such as the scalp or tongue, as well as free tissue transplants. A free tissue transplant often includes skin and fatty tissue, bone, muscle and nerves.

The goal and keyword with successful microsurgery is FLOW.

Small arteries and veins are reconnected within the operated area. The arteries carry blood to the reattached part (inflow), and the veins carry blood away from the part (outflow). FLOW is blood flow, and all medical and nursing focus, for example medications, heat, I.V. fluids, elevation, etc., is on maintaining the best possible blood flow.

Replantation patients come to California Pacific as emergency cases. The immediate survival of the part depends on reattaching the blood vessels. But, since the ultimate goal of replantation is to restore function to the digit, the repair of bone, nerves, tendons, and soft tissue is also crucial. Depending on the degree of initial damage to the digit, some patients may require later procedures to improve function.

Generally, we schedule free tissue transplants (free flaps) as elective reconstructive surgery. Muscle transplants, for example, can be used to cover a defect caused by an accident, burn, or disease. This procedure may be designed to restore a more normal appearance as well as function.



BRIEF HISTORY OF MICROSURGERY

The early history of microsurgical technique was first recorded in the mid-1500's. Surgeons described their attempts to suture together torn blood vessels resulting from wounds incurred in battle.

It wasn't until 1912 that Dr. Alexis Carrel, a French surgeon, won the Nobel Prize for his pioneering work in developing surgical techniques for vascular anastomosis and transplantation...techniques that are still used today!

Years later, in the 1920's, microscopes were first introduced as a magnification aid during middle ear surgery in Sweden. This led to great advances in the 1950's by ophthalmologists who began to use the microscope to achieve more precise surgical techniques. Use of the operating microscope was seen as revolutionary in many surgical disciplines. And, in 1968, the first successful thumb replantations were performed in England and Japan.

It was at Davies Medical Center, now known as the Davies Campus of California Pacific Medical Center, that Harry Buncke, M.D., performed the first successful microsurgery in the United States. In 1972, after many years of research, Dr. Buncke led two teams of doctors and nurses in performing the first "toe-to-hand" transplant in the U.S. on a firefighter who lived in San Francisco.

Recently named one of the "Top Ten Plastic Surgeons of the 20th Century" by the American Association of Plastic Surgeons, Dr. Buncke has become internationally known as the "Father of Microsurgery." As a result of these achievements, the science of Microsurgery has developed to include advances in organ transplantation, lymphatic microsurgery, and nerve transplantation throughout the world.



Commonly Asked Questions:

1. What is microsurgery?
2. Maintaining the best possible circulation or blood flow to the operated area is very important. True or False?
Answers: See page: 28.

Notes & Additional Questions To Ask:

After you have awakened from your surgery, you will notice your doctors and nurses making special observations on the operated part(s). Read on for an understanding of these procedures.

Most people are accustomed to having only one doctor. But, here at California Pacific, the system is somewhat different because of the complexity of most cases. Six to eight surgeons are on the micro team, will communicate freely, and may all be involved in your case.

CHECKS BY THE DOCTORS AND NURSES AFTER SURGERY

Your nurse will be observing your replanted finger, transplanted toe, or transplanted tissue flap at least every hour for the first 24 to 48 hours after surgery. As long as everything is stable, these observations are decreased to every two hours over the next few days. The doctors and nurses will be checking the color, temperature, circulation, and the turgor or “tenseness” of the reattached finger or flap. All these signs are indications of blood flow.

FLUORESCEIN & DOPPLER TESTING

In addition to frequent observation of the areas involved, physicians have found fluorescein and doppler testing to be important and accurate clinical tools used in microsurgery cases. These tests monitor blood flow to and from the replanted or transplanted tissue. Staff on the Nursing Unit will perform fluorescein and doppler readings on the flap or reattached fingers.

Fluorescein is a safe chemical dye administered through the I.V. directly into the bloodstream. A machine called the Fluorimeter, developed

at the Buncke Microsurgical Laboratory, measures dye in the affected part. This measurement helps the medical staff determine how much blood is circulating in and out of the digit or flap.

The fluorescein dye “clears” through the kidneys, causing urine to become bright yellow-green and sometimes changing the color of the I.V. tubing. Occasionally, some patients may experience slight nausea or a “funny” taste in the mouth. Both are possible side effects of the fluorescein.

Dopplers are sensitive monitoring devices implanted during surgery. The doppler is placed around the vein in the flap which allows physicians, nurses, and patients to actually hear the blood flowing to and from the flap. This is the most sensitive way to measure the flap’s circulation. If there is a problem with blood flow, the doppler stops immediately. Doppler monitoring begins in the Operating Room, through splint placement, patient movement, and throughout the remainder of the post-operative period.



COMMON MEDICATIONS

The following section will familiarize you with the medications commonly used in treating a patient having microsurgery. Please let your doctor or nurse know if you have any allergies to medications.

Dextran: This is a medicine that is delivered by I.V. It is a plasma expander, which helps increase the volume of fluid circulating in your body. It improves microcirculation by decreasing the thickness of your blood, and helps to prevent the red blood cells from sticking together.

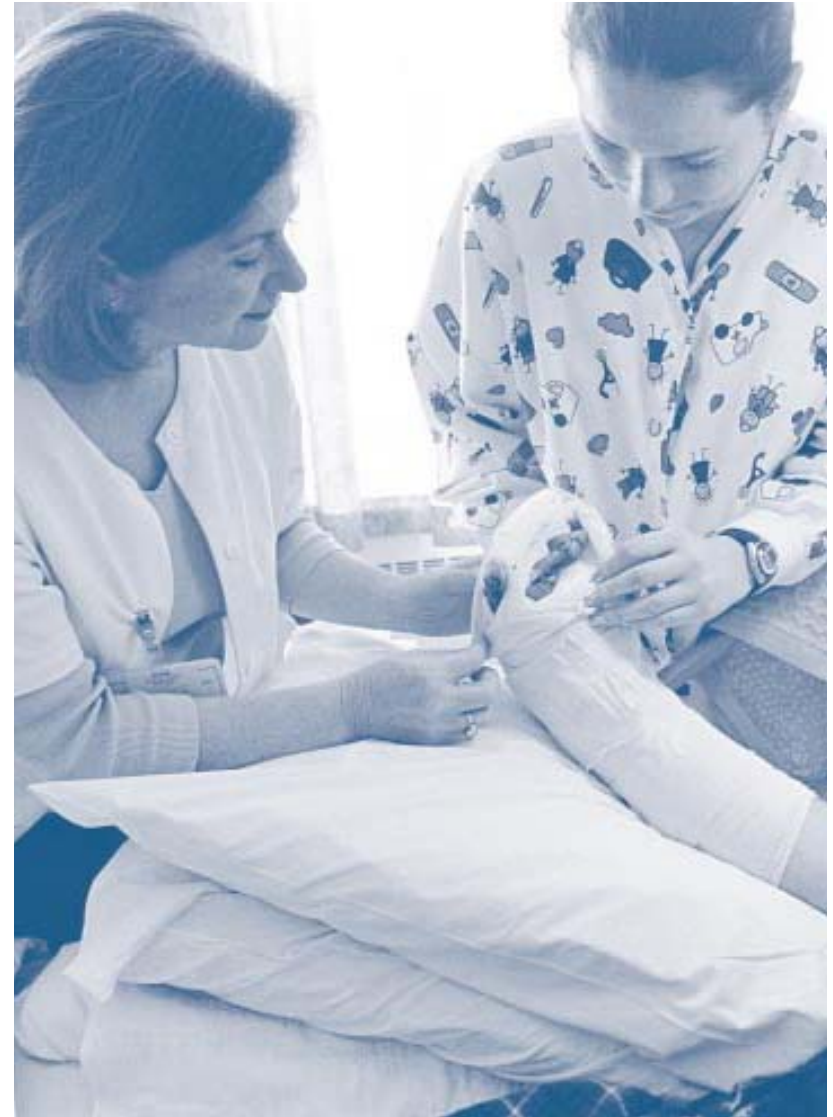
Antibiotics: You will receive intravenous antibiotics for two or more days following your surgery. Infected wounds may require prolonged antibiotic therapy. In the case of a complicated infection, we may consult with an infectious disease specialist, a physician with advanced training in caring for patients with infectious disease.

Aspirin: Physicians prescribe aspirin to most microsurgical patients.

- It has an ANTI-clotting mechanism that decreases the clotting ability of blood.
- It decreases the chance of a small clot forming in the repaired vessels which could decrease your circulation.

Heparin: The medical staff may prescribe this anticoagulant (“blood thinner”) for several days following digit replantation and tissue transplants to prevent clot formation in the damaged tissue. It is given intravenously by slow drip at a prescribed rate and is monitored daily by a lab test to keep the blood level of the drug within a therapeutic and safe range. If you become aware of any unusual bleeding, for example from your nose, mouth, digit, or urine, please report it promptly to your nurse.

The medical staff may prescribe various other drugs and antibiotics for special cases or circumstances.



PAIN AFTER SURGERY

It is normal to have some pain after surgery. The medication that your physician prescribes to help ease this discomfort is available in injection and pill form. Your nurses will ask you to tell them how strong your pain is using the scale below. **A 0 on the scale means no pain, and a 10 on the scale means the worst pain you can imagine.**

0-10 Numeric Pain Intensity Scale

0	1	2	3	4	5	6	7	8	9	10
No Pain					Moderate					Worst Pain

Severe or unrelieved pain can cause vasospasm, a narrowing of the newly attached vessels. In turn, this vasospasm makes it harder to maintain good circulation to the operated area. Consequently, it is very important for you to ask for pain medication when you need it. You may want to use the pain scale to set a comfort goal, such as having no pain that is worse than a **5** on the scale. Please be sure to inform your nurse or doctor if the medication is not giving you adequate relief.

Also, it is important to address your pain as soon as it starts. It is harder to relieve pain once it has become severe. Managing pain early and adequately is key to controlling it effectively. For example, if you know you will be doing something that will increase your pain, take your pain medicine first. Finally, you will need it less and less as days go by.

NO SMOKING

You may not smoke. That is, smoking is absolutely prohibited.

The drug nicotine constricts, or narrows, your arteries and veins. This is the worst thing that could happen to your new blood vessels!

If they narrow, the flow of blood decreases and, in turn, the tissues become oxygen-starved. The slowed circulation also increases the chance of clotting. Breathing second-hand smoke can cause the constricting effect of nicotine, as well. **We strongly recommend that you do not smoke, use a nicotine patch, or inhale someone else's smoke for 6 weeks after surgery.** Also, you must avoid nicotine in the form of smokeless tobacco, such as chewing tobacco and snuff.

Commonly Asked Questions:

- 6. Will I have pain?
- 7. Can I smoke?

Answers: See page: 28.

Notes & Additional Questions To Ask:

BODY HEAT: STAYING WARM

Lowered body heat causes the blood vessels to constrict, or narrow, decreasing the flow of blood to the affected part. To prevent this, we ask you to follow six safeguards:

- Keep your whole body warm—cover up with sheets and blankets.
- Drape a heating pad and towel over the affected part.
- Keep out of drafts.
- Keep windows closed.
- Keep the room thermostat above 70 degrees.
- Keep the affected part covered with a towel when walking or when in a wheel chair.

BLOOD TRANSFUSIONS

Frequently, the medical staff gives blood transfusions to patients who have microsurgery. It may be necessary to receive blood soon after your admission to the hospital.

Due to the time limits involved, you may receive blood from the Blood Bank. There are some risks you should know about before you get a blood transfusion:

- The risk of getting HIV from a blood transfusion is 1 in 900,000 people.
- The risk of getting Hepatitis C from a blood transfusion is 1 in 250,000 people.
- **THESE ARE VERY LOW RISKS!**

Your doctors will discuss a transfusion with you more fully before you receive any blood. And, if time allows, a family member may donate his or her own blood (donor designated). Please ask your nurse if you have any further questions or concerns about blood transfusions.



LEECHING: WITH A LITTLE HELP FROM OUR FRIENDS

To help prevent the replanted part from failing, we have a new line of employees – medicinal leeches. Used in medical care since the time of the Roman Empire, leeches are now finding a role in modern microsurgery. When applied to these newly replanted parts, not only do they remove blood from the engorged area painlessly, but also they inject a vasodilating (vessel-widening) and an anti-clotting substance that improves blood flow.

A single leech treatment takes fifteen to thirty minutes and is overseen by a physician or a nurse. Leech applications may be required as often as four or more times a day until circulation is fully restored.

Nobody likes to be confined to bed, especially in a hospital after the surgery is over. But, as you will see in the following section on body rest, some very sound reasons exist for staying in bed following microvascular surgery.

MUSCLE TRANSFERS/FLAPS

Depending on individual cases, muscle transplant to the lower extremities usually requires a patient to remain on bed rest. We must guard the muscle, new vessels, and stitches against excess pressure and swelling. Lowering the leg or walking will cause such pressure and swelling. Once your doctor allows you to use a wheelchair, you must still keep your operated leg elevated at all times.

Preparing your leg for changes in pressure in the dependent position requires lowering it little by little over a few days with the instruction of the physical therapist. This activity usually begins 2-3 weeks after

surgery and after your doctor has cleared you to do this. In addition, we will apply an ace wrap around the flap every time you lower your leg to support the flap and prevent swelling.

If you have had a muscle flap to your leg, it is important to keep your leg elevated at all times until your doctor clears you for increased activity and your therapist instructs you to begin a “dangling procedure”. The therapist will explain and demonstrate this procedure for you.

SKIN DONOR SITES

With some replanted digits and with most muscle transplants, the doctor will remove a thin layer of skin, usually from the thigh or hip, during surgery. This skin will be used to cover the muscle or exposed finger.

The first day after surgery, a dry bandage will cover the skin donor site. Then, within 24 hours, the doctor will remove this bandage. Directly over the donor area will be a yellow Vaseline gauze called Xeroform. Do not remove this Xeroform. It is normal to have some bleeding and wetness on the Xeroform. To promote drying of this site, the nursing staff will use a heat lamp or hair dryer on it at short intervals. As the Xeroform begins to dry and the skin beneath it begins to heal, the edges of the Xeroform will start to curl up. As this occurs, your doctor will trim the edges. Eventually, all the Xeroform will lift off, revealing a lighter area of skin. Do not pull off the Xeroform gauze prematurely. Pulling it off early can cause blistering, bleeding, and increased pain.

When the healed donor site is newly exposed from the Xeroform gauge, you may apply creams or moisturizers, such as Eucerin cream, to keep the area soft. The lighter coloring of the skin donor site will change somewhat over time and with exposure to sun. Remember to keep the donor site out of direct sunlight until the redness has faded. Wear a sunblock to keep the area from becoming too dark.

SURGICAL DRAINS

In all muscle donor sites, the doctor will insert a drainage tube during surgery. This tube, called a Jackson-Pratt tube, has a pear shaped bulb that is attached to it and is kept compressed. The compressed bulb causes a suction that collects fluids which normally would accumulate beneath the donor incision area. Your nurse will empty and measure the amount of drainage every eight hours, or more often, if necessary.

Surgically placed drains are commonly used for many types of operations and serve to relieve fluid build-up. There are many types: The Jackson-Pratt is the one used in most microsurgical cases.

ARTERIOGRAM

A short discussion of the arteriogram is included here. It is not a “focus” of microsurgical care. However, sometimes it is part of the diagnostic work-up scheduled prior to tissue transplant surgeries.

One of the tests you may experience is an arteriogram, which is used as a diagnostic tool prior to a muscle transplant or toe-to-finger transplant. The microsurgeons are able to view and “map out” the circulatory system in the area to receive the transplant, as well as to check the vascular structure of the donor tissue. Thus, doctors can anticipate any potential problems and plan their surgical strategy accordingly.

The examination will take place in the X-ray Department. A physician will a) inject a small amount of local anesthetic around either the femoral (groin) or brachial (arm) artery, b) insert a small plastic tube through this numb area, and c) position the tip of the tube in the vessel supplying blood to the area being studied. A liquid, sometimes

referred to as “x-ray dye,” is injected through the tube and makes the vessel visible. After the injection, you may feel a warm flush as the liquid travels through your system. Then, the x-rays are performed and will record any obstruction or narrowing of the arteries under examination.

After the x-ray, you will be taken to the recovery room where a nurse will monitor your pulse and blood pressure. In addition, the nurse will observe the area of the injection for any possible bleeding, and make sure you are feeling okay. Then, you will return to your room where you will be asked to remain in bed for a few hours to prevent bleeding at the injection site. You may eat as soon you feel up to it.



HAND THERAPY

The rehabilitation phase of your recovery will begin once the condition of your replant, transplant, or muscle flap has stabilized. At our hand therapy center, you will meet occupational therapists and physical therapists who specialize in the treatment of hand injuries and other microsurgical cases. They are part of the microsurgery team and communicate daily about your care with the surgeons and nurses.

Initially, your therapist will:

1. Change your dressing.
2. Make a splint out of a plastic material to protect and position your hand, arm, or leg in the proper position for healing.
3. Provide you with information about your injury, precautions, and what to expect during your rehabilitation.
4. Begin an individualized exercise program designed to restore function to your hand, arm, or leg. These exercises will be done slowly and gently at first, then gradually increased based on the specific anatomy which was involved in your surgery.

It is important that you follow your hand therapist's instruction completely to prevent damage to any of the delicate repairs made in surgery.

After you are discharged from the hospital, you will continue to attend therapy as an outpatient for dressing changes and exercises. If you do not live in the Bay Area, we will arrange for you to see a therapist in your local area after you leave the hospital. We stay in touch with therapists who live in other areas and are familiar with our procedures. Your doctor will provide your operative report and therapy prescription to your local therapist, when you are discharged.

Throughout your rehabilitation, our therapists will continue to follow your case. They will communicate frequently with the therapist you are seeing at home in order to update your therapy program and clarify physician's orders. Each time you return to see your doctor, please make an appointment with your hand therapist at California Pacific Medical Center at the same time, if your insurance carrier covers this service. If this service is not covered, you may still choose to receive therapy as a "self pay" patient. The phone number is (415) 565-6612.



SOCIAL SERVICES

Traumatic injury and hospitalization produce emotional distress as well as physical discomfort. You may have concerns about yourself, your family, your job, or your finances. A social worker is part of the microsurgical team and available to provide crisis intervention and counseling. This professional can help you and your family cope with anxieties, fears, and stresses that you may face. If you have questions or concerns about your treatment in the hospital, preparing to go home, your medical coverage, or your disability coverage, then please ask the social worker for help with your needs.

Commonly Asked Questions:

8. What kinds of things should I call my doctor about once I get home?
 9. Can I wear a sling after I go home?
- Answers: See page: 28.

Notes & Additional Questions To Ask:



GLOSSARY

Abdominal rectus muscle:	groin or stomach muscle.
Arteries:	blood vessel sending blood away from the heart.
Arteriogram:	x-ray study of the arterial system.
Bed Rest:	to remain in bed at all times.
Blanching Time:	number of seconds it takes blood to return to an area that has been pinched. (Used to check circulatory condition of replanted or transplanted tissue.)
Dangle:	a prescribed activity to allow the feet to be lowered off the side of the bed while sitting.
Digit:	finger.
Donor Site:	area from which a skin or muscle graft is taken.
Edema:	swelling
Elective Reconstruction:	an operation that is planned and scheduled (as opposed to an emergency).
Fluorescein:	a harmless fluorescent yellow dye used intravenously in small amounts to detect circulation in replanted or transplanted tissue.

Free Flap:	tissue that is moved from one place to another.
Gracilis Muscle:	small muscle of the inner thigh.
I.V.:	intravenous, usually pertaining to a tube that is temporarily inserted in one of your arm veins to deliver fluids and medication.
Jackson-Pratt (JP):	brand name for suction bulb used to drain operative sites of excess blood.
Latissimus Dorsi Muscle:	large back muscle covering the shoulder blade.
Microsurgery:	surgery performed under a microscope.
Plastic Surgery:	(from the Latin word: plasticus “to mold”) surgery intended to repair or restore lost, mutilated, or deformed parts.
Pre and Postoperative:	before and after your operation.
Replantation/Replants:	reattachment of a limb or finger to its original position.
Turgor:	tenseness of skin; varies from shriveled to normal to swollen.
Vasodilator:	a medication that dilates the blood vessels.
Vasospasm:	narrowing of the blood vessels.
Veins:	blood vessels returning blood to the heart.

ANSWERS TO COMMONLY ASKED QUESTIONS:

1. What is Microsurgery?

Answer: Microsurgery is the sewing together of nerves, tendons, or blood vessels to correct an injury, disease, or congenital defect with a thread so thin that microscopes are needed as an aid during the procedure.

2. Maintaining the best possible circulation or blood flow to the operated area is very important. True or False?

Answer : True

3. When can I eat?

Answer: Not right away. You will be able to eat when your doctor has determined that you are stable enough after surgery.

4. When can I get out of bed?

Answer: Usually 5-10 days after surgery, depending on your recovery and your injury. It is important to remain in bed and keep the injured hand elevated at all times to promote healing.

Remember: Hand above elbow-elbow above heart.

5. When can I go to the bathroom?

Answer: Anytime...as long as you remain in bed. You can use a bedpan to urinate or have a bowel movement.

6. Will I have pain?

Answer: It is normal to have some pain after surgery. Severe or unrelieved pain can cause vasospasm or narrowing of the newly attached blood vessels. Please be sure to tell your nurse or your doctor if the pain medication is not giving you adequate relief.

Your nurses will teach you the Pain Scale using the numbers 0 (**no pain**) to 10 (**worst pain**) to rate your pain.

7. Can I smoke?

Answer: Absolutely not.

Cigarette smoking is harmful to your health and to the well being of those around you. Also, smoking can slow the healing process and affect the blood flow to your hand. (Nicotine causes blood vessels to constrict or narrow.) **We strongly recommend that you do not smoke, use a nicotine patch, or inhale someone else's smoke for 6 weeks after surgery.**

Hospitalization can be a good time to quit smoking; please talk with your nurse about information on smoking cessation programs.

8. What kinds of things should I call my doctor about when I get home?

Answer:

- Elevated temperature.
- Any redness, swelling, or increased drainage from your toe/finger, muscle flap, or skin graft site.
- Any change in color of your replant or flap, especially a dusky, gray color.
- Severe pain that is unrelieved by your medication.

9. Can I wear a sling when I get home?

Answer: Only if you need to walk a long distance for a prolonged period of time and cannot hold your hand above your heart. While your affected hand must be higher than your heart at all times, moving the shoulder and elbow is also very important. When wearing a sling, patients tend not to move their shoulder or elbow; therefore, it is not usually recommended.

