



Mohs Surgery

Introduction

Mohs surgery (also called Mohs micrographic surgery) is a specialized surgical treatment for skin cancer. Mohs surgery results in the highest cure rate for skin cancers, while removing the minimum amount of healthy tissue. This information describes Mohs surgery, explains when it is used, how to prepare for it, what occurs during the surgery and how to care for yourself following surgery. If you have questions about Mohs surgery after reading this material, please contact us.

About skin cancer

Skin cancer is the most common and curable form of cancer. Each year in the United States, more than 1 million skin cancer are diagnosed. The three most common types of skin cancer are basal cell carcinoma, squamous cell carcinoma and melanoma (also called malignant melanoma).

Basal cell and squamous cell skin cancers are the most frequently diagnosed and the most curable of skin cancers. They usually appear in one place on the skin, rarely spreading to other parts of the body. However, if left untreated, they can grow locally within the skin and destroy surrounding tissues and structures such as nerves and muscle. Melanoma, which occurs less commonly, is more serious. When left untreated, melanoma can spread (metastasize) to other parts of the body. Early detection and treatment of melanoma are critical. Several uncommon types of skin cancer can also be treated with Mohs surgery.

The goal of treating skin cancer is to remove or destroy the tumor along with surrounding margin of healthy tissue as protection against recurrence. In addition to Mohs surgery, physicians treat skin cancer in the following ways:

- *Cryosurgery* – Freezing the affected skin
- *Curettage and electrodessication* – Scraping the affected skin and then burning the remaining skin with an electrically heated needle
- *Excision* – Cutting out the tumor and the surrounding tissue
- *Radiation therapy* – Using X-ray radiation to destroy cancer cells
- *Chemotherapy cream* – Applying a chemical to the skin to destroy cancer cells

What is Mohs surgery?

Mohs surgery is a meticulous procedure that relies on the accuracy of the microscope, instead of the human eye, to help ensure that all cancer cells are removed when a skin cancer is treated.

Dr. Frederick Mohs pioneered this surgery at the University of Wisconsin in the 1930s. Mohs surgery requires the specialized skill and training of a Mohs dermatologic surgeon who acts as surgeon, pathologist and reconstructive surgeon. (A pathologist is a physician trained to diagnose disease by examining cells and tissue under microscope.)

Initially, the Mohs surgeon functions as a surgeon to remove the visible tumor and a small margin of healthy tissue.

Then, the Mohs surgeon works as a pathologist when he/she meticulously “maps” the removed tissue and divides it into smaller sections to be examined under the microscope for remaining cancer cells. With the Mohs procedure, the surgeon can examine 100 percent of the tissue that surrounds the tumor. This, in most cases, results in a skin cancer cure rate of 97 to 99 percent. Other pathology techniques typically examine only a small portion of the tissue margin.

Finally, the Mohs surgeon functions as a reconstructive surgeon in repairing the wound left by the surgery. Mohs surgeons make every effort to preserve cosmetic appearance and minimize scarring. Reconstruction may be performed by simply sewing up the wound, or by using techniques such as skin flaps and grafts. Occasionally, wounds are allowed to heal on their own (without stitches, flaps or grafts). Dr. Ecker will help you choose the reconstruction technique that is best for you. In most cases, Dr. Ecker will repair the defect himself on the same day of your Mohs surgery. However, in some cases, it may be appropriate to refer you to one of the plastic surgeons he works with.

When is Mohs surgery used?

Mohs surgery is usually recommended for skin cancers that occur on sensitive areas of the body or that have a high likelihood of recurrence. These include skin cancers that:

- Are located in cosmetically or functionally important areas such as around the face, scalp and neck. Mohs surgery can be used on other body areas for skin tumors that have a high risk of recurring.
- Have cells that grow rapidly or deeply.
- Have recurred after previous treatment.
- Occur in immunosuppressed individuals, such as those with HIV, transplant patients, or patients on immunosuppressive medications.

After a suspicious area of skin has been identified, the first step in diagnosing a skin cancer is a procedure called a biopsy. During the biopsy, your physician removes a sample of the affected skin. This tissue sample is then examined under a microscope to see if any cancer cells are present.

If the biopsy is “positive,” this means cancer cells are present and you have a skin cancer. At this point, your physician may recommend Mohs surgery. Some people wonder why Mohs surgery is necessary, especially if no sign of the skin cancer remains after the biopsy. It is important to understand that the skin cancer remains after the biopsy and the skin cancer that is visible to you – or to your doctor – is usually only the surface part of the tumor and that deeper “roots” may remain.

Skin cancers often have roots that extend down into the skin. These cannot be seen with the naked eye. In cases with few roots, traditional treatment can remove the entire cancer. The Mohs procedure is recommended when cancers are deeper and it is essential that the entire tumor be removed while sparing the maximum amount of healthy tissue.

What are the risks of Mohs surgery?

As with every surgery the risk of complications does exist. Complications associated with Mohs surgery are uncommon, but may occur. When they do occur, they include, but are not limited to:

- *Bleeding* – Excessive bleeding under a wound that has been sewn up (sutured) can delay healing.
- *Infection* – Rarely, wounds become infected and may require antibiotic treatment.
- *Loss of nerve and muscle function* – Uncommonly, the surgery may result in impaired nerve or muscle function. This is often temporary, but may be permanent.
- *Poor healing* – In some instances the wound created by the surgery may heal slowly or not as well as anticipated.
- *Swelling* – All surgery result in swelling that decreases gradually during healing.
- *Scarring* – All techniques to remove skin cancer can cause scarring. With Mohs surgery, the wound that is present after removal of the skin cancer is the smallest possible; this helps minimize scarring.

Preparing for surgery

To prepare for surgery, follow the measures below.

Medications

Take all your usual medications including insulin on the day of surgery unless directed otherwise. Important: If you take aspirin, clopidogrel (Plavix) or warfarin (Coumadin) because you have had angina, a heart attack, a stroke, a near stroke (transient ischemic attack) or blood clot, continue to take the medication in the prescribed dose.

If you are taking aspirin, ibuprofen or other nonsteroidal anti-inflammatory medication for headaches, pain or as a preventive measure, stop taking these medications for at least

two weeks (aspirin) or two days (ibuprofen and others) before surgery and for three days after surgery. These products may increase bleeding during or after surgery. To avoid these products, read the labels of all over-the-counter medications. If you are unsure whether it is safe to take a medication, ask the pharmacist. Aspirin may be listed on labels as “salicylic acid” or “salicylates.” Some people are surprised to learn aspirin is in Alka-Seltzer and Pepto-Bismol. During this period before and after surgery, take acetaminophen (Tylenol or Aspirin Free Anacin) for discomfort. **Note:** Make sure you discuss your medications and any drug allergies with us prior to your surgery.

If you have a pacemaker or defibrillator, please let us know before your scheduled procedure. If you have had an artificial joint placed within 12 months of your surgery, pre-operative antibiotics may be indicated. If you have an artificial valve or have been instructed by your physician to take antibiotics prior to procedures, please let us know.

The night before surgery

You may want to wash your hair the night or morning before surgery because you will be asked not to shower for 24 hours after the surgery. Also, try to get a good night’s sleep before your surgery.

If the skin cancer is on your face

On the morning of surgery, wash your face thoroughly and do not apply any makeup. Also, do not wear clothing you must pull over your head as it may be difficult to remove following surgery.

Tobacco use

Stop tobacco use for as long as possible before and after surgery to permit the best possible healing. Using tobacco can slow or impair proper healing. For additional assistance in quitting tobacco use, ask your physician about a consultation with a smoking cessation specialist.

A companion for the day

Mohs surgery is done on an outpatient basis (no need for an overnight hospital stay), however, the process can last most of the day if the tumor is large. Because Mohs surgery usually involves a series of sessions with the surgeon, which are separated by waiting periods, it is helpful to have someone accompany you. Your companion may sit with you during the waiting periods, bring you a meal and drive you home. If you are given relaxing or sedating medication during surgery, a driver is required.

Food before surgery

In most cases, no sedation is used for Mohs surgery. If you are not scheduled to receive sedation, eat a normal breakfast or lunch on the day of your surgery.

Bring something to do

Because you will be waiting for the tissue to be checked under the microscope, bring something to do such as crossword puzzles, knitting, a computer, book or magazines. At Minnesota Dermatology, we do have wireless internet available. Ask the front desk staff for the necessary credentials to get onto our public network.

What happens on the day of the surgery?

Mohs surgery can take from 1 ½ to all day depending on the size and number of skin cancers, and on the method of reconstruction. Most Mohs surgeries are finished in 2 to 4 hours.

Local anesthesia and sedation

We will do all we can to make you comfortable during the procedure. Most of the time, we will use only a local anesthetic to numb the affected skin and the area surrounding it. To do this, we will inject local anesthetic using a fine needle. The injection of anesthetic should be the only discomfort you feel.

Sometimes, Dr. Ecker may recommend that you take a sedative pill to help calm you.

The surgery

Once the anesthetic and/or sedation had taken effect, the Mohs surgery proceeds as follows:

1. Dr. Ecker will remove the visible tumor and a thin layer of skin beneath and surrounding the visible tumor.
2. After this is done, a pressure bandage will be applied to the site and you will be asked to wait in the waiting room.
3. While you wait, we prepare the layer of tissue that has been removed by dividing it into sections. Each section of tissue is thinly sliced and the slices are mounted on a glass slide for microscope examination. Dr. Ecker uses a “map” to keep track of the exact location of each piece of tissue. It takes from 60 to 90 minutes to process and examine the tissue.
4. If Dr. Ecker finds additional tumor cells, he can easily pinpoint the exact location within the treatment site. At this point, you will return to the surgery room for the surgeon to remove additional tissue at the affected site. This tissue is then mapped and examined as before.
5. These steps are repeated until all tissue appears free of tumor cells under the microscope.

Closing the wound

Once Dr. Ecker has removed the entire tumor, he will evaluate the wound created by the surgery. He will discuss a plan for closing the wound. The choices for wound closure include:

- *No stitches* – When no stitches are used, this means the wound will be left open to heal on its own. This is called “second intention healing.” This can produce good results at certain sites.
- *Simple sutures* – If there is enough loose skin next to the wound, a straight row of sutures (stitches) can be used to close the wound. This is the most common closure technique.
- *Skin flap* – A skin flap is used when your wound is too large, complex, or next to important structures to close by using a straight row of sutures. With a skin flap, Dr. Ecker shifts nearby skin into place to cover the wound. The skin flap is then sutured (sewn) into place.
- *Skin graft* – With a skin graft, Dr. Ecker will remove a piece of skin from elsewhere on the body and use it to cover your wound.

Care following surgery

After surgery, a member of your health care team will give you written instructions on how to care for the wound. Make sure you ask questions if any of the instructions are unclear.

After the surgery, return home and then rest for the remainder of the day.

If you receive conscious sedation

For 24 hours after conscious sedation it is common to have lapses of memory, slowed reactions and impaired judgment. You must have a driver drive you home if you receive conscious sedation.

For 24 hours:

- Do not drive or operate motorized vehicles or equipment.
- Do not return to work.
- Do not assume responsibility for small children or anyone dependent on your care.
- Do not drink alcohol.
- Have a responsible adult stay with you for the rest of the day.
- Rest for the remainder of the day.
- Avoid rough play or sports.
- You may wish to avoid making important decisions or signing legal documents.

For discomfort

Take acetaminophen (Tylenol or Aspiring Free Anacin) in the recommended amount for pain following surgery. Rarely, Dr. Ecker may prescribe stronger pain medication.

Unless instructed otherwise, continue your usual medications after surgery. Occasionally, an antibiotic will be prescribed after surgery.

Restrictions

It will also be important to restrict certain activities. Follow these guidelines for at least the first week after surgery:

- Do not participate in vigorous athletic activities while stitches are in place.
- Do not lift anything heavier than ten pounds.
- Do not vacuum.
- Do not use alcohol for three days after surgery and avoid tobacco for three weeks after surgery. These can slow the healing process or cause bleeding.
- Do not bend over if the surgery was done on your face. This can cause blood to rush to your face and potentially cause bleeding.
- Do not bathe for prolonged periods or submerge yourself under water. You may shower after 24 hours.
- Do not swim or use a hot tub until you have had your stitches removed.

Healing time

Healing time depends on the size of the wound that results from surgery and the method used to close it.

When the physician closes the wound with stitches, preliminary healing (prior to stitches being removed) takes about 1 to 2 weeks. When stitches are not used, healing can take from 2 to 8 weeks.

Healing from surgery continues under the skin for 1 to 2 years. After two months, most wounds appear thick, red and tight. Softening of the scar will naturally occur after this point. Massaging the wound after two months can speed up the softening. You should notice most of the improvement in skin surface appearance during the first six months. The redness will fade as well over several months.

Follow-up after surgery

Immediate

Keep all follow-up appointments scheduled at the time of surgery. You may also need to have stitches removed. This usually occurs approximately 1 to 2 weeks after surgery.

Long-term

Once you have had one skin cancer, you are at a higher risk than the general population for the development of another skin cancer. You should have regular, full-body skin examinations. Ask your doctor to advise you how frequently this should be done. If you have concerns at any time following your Mohs surgery, please contact us.

When to call us

Contact us promptly if you experience any of the following:

- Fever of 100.4 degrees Fahrenheit (38 degrees Centigrade) or higher
- Bleeding not controlled by direct pressure
- Pain not relieved by medication
- Increased swelling around the wound
- Reopening of the wound
- Increased redness and warmth around the wound
- If you have bleeding, the most common time for this to occur will be within the first 24-48 hours of surgery. If you encounter this, the first thing to do is to hold very firm pressure over the wound with gauze for 45 minutes straight without peaking at the wound. If you still have bleeding despite this, repeat for another 45 minutes. If the bleeding persists after this second round, contact us at 612-486-4200. After hours, for emergencies, call 952-856-0035 and Dr. Ecker or Angie Rohland will help you.

Conclusion

Mohs surgery is a precise method for removing skin cancers; it has the highest cure rate, while sparing the maximum amount of healthy tissue.