

The Art of the Surgical Technique*

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This chapter will serve as your introduction to some theoretical and technical aspects of actually performing surgery. Successful surgery starts with planning before you enter the operating room. To be effective, you must know exactly what you are going to do and pass this information on to the operating room team. Your well-thought-out plan will inspire confidence in the operating room staff. Once in the operating room, you are the team leader. You will coordinate the setup of the operating room and necessary equipment for your procedure.

To be effective, you will need to know the tools of the trade and how to use them. We will discuss the different types of instruments and their general and special uses. We will stress some fundamental techniques, including holding and cutting the skin. We will cover the important instruments used in retraction, hemostasis, suctioning, and suturing. In the last section, we will talk about the role of the assistant, an underestimated and revealing job.

Don't labor over the details of each section in this book. Rather, read the text several times as your abilities and interest increase, each time taking in more detail.

*In recognition of Dr. Milton Edgerton's excellent text on surgical technique, a book all surgeons should read.

Preparation for the operation**Firm plan with contingencies**

When you enter the operating room, you should have a firm plan in mind for the operation. In your early experience, it is worth having a set of contingency plans if things don't go as expected. As your surgical expertise increases, your need to make formal contingency plans will disappear. Early in your career, or later when you are planning a new procedure, it is worthwhile having the steps of the operation and necessary equipment written down to bring into the operating room. The nursing staff will appreciate your preparation and be confident of your abilities.

You are the team leader in the operating room. Your behavior will set the stage for how the operation goes. You set the pace and the quality of the effort. If you are operating in a new setting, be sure to introduce yourself to the nursing staff. Discuss with the operating room team your plans for surgery. Your preparation and willingness to include them in your plans will improve the overall effort and will give the team confidence in your ability to get the job done. This approach applies to every surgeon, from new residents to experienced surgeons in practice for many years.

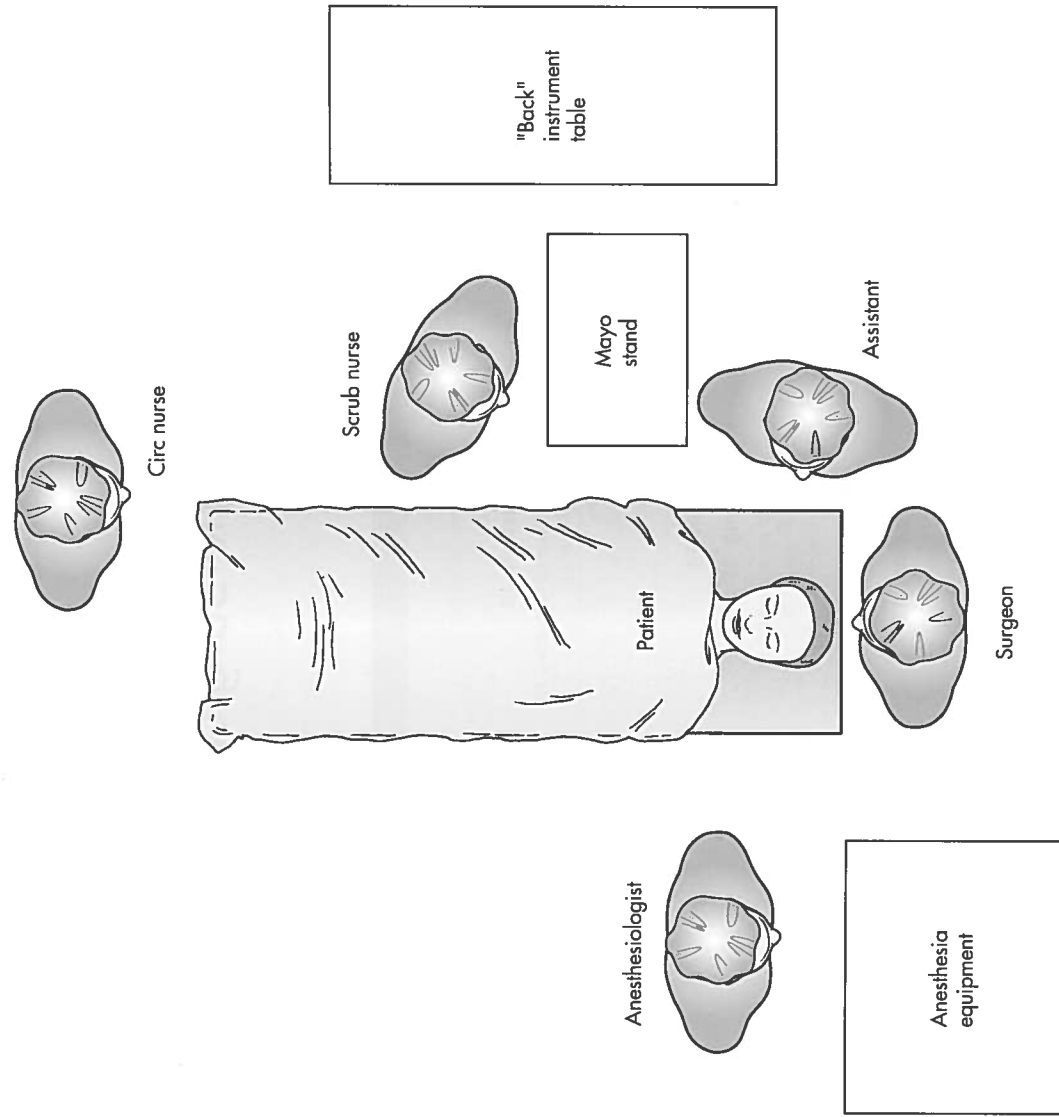


Figure 1-1 Typical operating room setup for an operation on right eye with the patient under general anesthesia.

Room setup

As part of your plan, you should know where the operating equipment will be placed. Generally, the setup is as shown in Figure 1-1. In most cases, the operated eye will be placed away from the anesthesia equipment. The surgeon will sit at the head of the bed. The assistant will sit at the side of the bed corresponding to the operated eye. For some procedures, you may find it easier to sit at the patient's side (for example, lateral tarsal strip and lateral orbitotomy). Feel free to move throughout the case and be comfortable. The nursing table will be on the same side as the assistant, but to the side of the bed.

Equipment setup

For the majority of operations that you perform, you will be in the sitting position. Adjust your chair to the appropriate height with your feet flat on the ground. If you are planning to move around the patient during the operation, as in an orbital floor exploration for a blowout fracture, you may want to stand for the operation. If so, consider step stools to make the assistant and surgeon relatively the same height.

If you expect significant venous bleeding, as in nasal surgery, put the patient in about 10% of reverse Trendelenburg position (head up, feet down) before adjusting the table height. Once the table is at the chosen position and height, make sure that it is locked into position.

If you are using an operating microscope, this is the time to make adjustments to the scope and your chair. There are several possible positions for the operating scope base, but the most common is off the shoulder of the patient opposite to the eye you are operating on. Set the base of the scope to allow for full range of the arm. Make gross adjustments on the microscope height. Set the interpupillary distance of the microscope heads for the surgeon and the assistant. Set the focus of the microscope. If you are doing a conjunctival or canalicular procedure, set the focus of the microscope in the middle of the range. If you are doing deep orbital surgery, set the focus at the top of the travel so that you will be able to adjust the focus with the foot pedal to see deeper tissue without repositioning the operating scope as the dissection continues into the orbit. Most procedures will be performed without a wrist rest, but don't hesitate to use one if it increases your steadiness. Place any special sterile handles on the microscope before you scrub. If you plan to drape the scope, swing the microscope arm away without altering your microscope base position and have the scrub nurse drape the scope away from the operating field. Consider using sterile "baggies" over the handles rather than draping the whole scope to save time and money. Position the microscope and cautery foot pedals in the appropriate spot underneath the head of the table. If you don't do this, you will be surprised how many times you start the operation and reach for the cautery pedal, but find that it is not yet ready to use. Do all this before you leave to scrub.

Skin marking and local anesthesia

Many oculoplastic procedures require skin marking as a guide to incision placement. The majority of incisions will be placed in *natural skin creases* as in the upper lid skin crease for ptosis and blepharoplasty operations. Other skin incisions will be placed *adjacent to anatomic structures* to hide the scar. You should mark the skin before any local anesthetic is injected. Two good choices for marking eyelid skin are available: 1) gentian violet solution and 2) surgical marking pen. Gentian violet can be applied with the sharp end of a broken applicator used as a quill. With experience, you can draw a fine line that does not easily wash off with prepping, but this takes some experience to keep from making a mess. Usually, we use a thin-tipped surgical marker ("Twin-Tip" surgeon's marker, #6650-T, Hospital Marketing Services, Inc., <http://www.hmsmedical.com>). Be sure to degrease the skin with an alcohol wipe before marking.

You should use a local anesthetic with epinephrine for all procedures to provide some hemostasis (due to the vasoconstriction). The most common local anesthetic mixture is 2% lidocaine (Xylocaine) with 1:100,000 epinephrine in combination with 0.5% bupivacaine (Marcaine). Some surgeons choose to add hyaluronidase to the mix, but I have not found this necessary. For larger scalp and face procedures, you may want to consider "tumescence" anesthesia. Using this technique, a large amount of very dilute local anesthetic with epinephrine is injected into the subcutaneous tissues.

This technique firms up the tissues and makes easier to develop flaps and perform liposuction. You won't need this for periocular procedures.

Local anesthetics sting badly (if you aren't feeling sympathetic, have a colleague inject 1 cc of local anesthetic into your eyelid; you will not soon forget how it feels). Two factors are thought to be responsible: 1) a difference in pH and 2) distention of the tissues during rapid injection. To minimize the pain, try injecting a tiny amount—about 0.1 cc—into two or three places and then massage the local anesthetic into the tissues. After a few seconds, inject more anesthetic *very slowly*. This greatly minimizes the pain. Some surgeons buffer the local anesthetic using 1 part 7.5% sodium bicarbonate in 9 parts of 2% Xylocaine with epinephrine (2 cc of bicarb in 20 cc of Xylocaine). I have not found this worth the trouble, but many swear by it. You might want to try it. If you operate with an anesthesiologist, using appropriate agents, the patient can be made totally unaware of any local injection.

Remember to inject just beneath the eyelid skin. Avoid placing the needle into the muscle to prevent a hematoma, which may make intraoperative adjustments of the eyelid difficult; this is especially true with ptosis correction. For an upper eyelid procedure, such as a blepharoplasty or ptosis repair, you should inject 1–1.5 cc of local anesthetic mix.

Topical solutions are available that provide anesthesia. You should know about these two preparations: EMLA cream and Betacaine gel. EMLA cream should be applied in a thick coating 1 hour ahead and covered with an occlusive dressing (topical lidocaine 2.5% and prilocaine 2.5%, AstraZeneca LP, <http://www.astrazeneca-us.com>). Betacaine gel (topical lidocaine 5%, Canderm Pharma, Inc., <http://www.canderm.com>) can be applied for 20–30 minutes ahead without an occlusive dressing. Both preparations provide anesthesia, but no vasoconstriction, so usually additional local injection with epinephrine is required for surgical procedures. Topical agents are also useful prior to Botox or filler injections and can be helpful in children. Overdosing with systemic reaction is unlikely, but possible. Most of the time, I do not use these preparations, but you might find them helpful in your practice.

The majority of eyelid and lacrimal operations can be easily performed under local anesthesia. If you choose to operate without the benefit of an anesthesiologist, you should consider intravenous (IV) sedation to minimize the patient's anxiety. Doses of midazolam (Versed) in 0.5–1.0 mg increments are reasonable to achieve some relaxation. I find it helpful to have a Versed drip running rather than giving intermittent doses of the medication (1–3 mg/hour). Some surgeons prefer preoperative oral sedation with 2–10 mg of oral Diazepam (Valium). Additional pain relief can be given intraoperatively using small doses of a narcotic, such as morphine (1–2 mg IV). Intravenous alfentanil (Alfenta) is useful because of its short duration, but keep in mind that this is a very potent narcotic and a highly abused drug. Avoid oversedation to the point that the patient has lost inhibitions and gets restless or is too sleepy to follow your instructions. A supportive attitude from you and the nursing staff is often as helpful, or more helpful, than intravenous sedation. I am always impressed how many postop patients comment how helpful it was to have the circulating nurse offer to hold hands during the case. The nurse can also alert you when the patient is feeling discomfort.

If your operating situation allows for the efficient use of monitored anesthesia care, your anesthesiologist can medicate any patient to the point at which there is no memory of any pain from the injection and often no memory of the entire operation. The downside of this is more staffing and increased patient cost.

Preparing and draping the patient

In most hospitals, the patient can be prepped while you scrub. This gives time for the local anesthetic to take effect. A traditional Betadine scrub applied in concentric rings away from the planned surgical excisions, repeated three times, provides adequate cleaning of the skin. A surgical stockinet can be used to keep the patient's hair out of the operating field. If the patient's hairline is particularly low or close to the operating field, tape can be used to pull the hair away from the surgical field. If the patient is awake, you will want to prep out the entire face for most procedures under local anesthesia. If the patient is asleep, prep out two eyes whenever there is a need to obtain symmetry between the two sides or if forced duction testing may be required. A good general rule is to prep out a larger area than you think you will need.

Instruments

In the next sections of the chapter, we will discuss several types of surgical instruments. These instruments include:

- Scalpel blades and other cutting tools
- Scissors
- Forceps
- Retractors
- Cautery
- Suction
- Needle holders
- Sutures

You are undoubtedly familiar with several variations of each of these instruments. I will explain the instruments that I have found most useful in my practice. You may already have your own favorite tools for specific jobs, or you may choose to use the instruments that I have suggested.

You will notice that a particular instrument is available in *different lengths and caliber*. In general, *the length of the instrument is related to the depth of the surgical incision in which the instrument will be used*. Most of the eye instruments are only 4 inches long. These instruments are not used in deep incisions and are rarely used for incisions deeper than the eyelid. Similarly delicate instruments used for neurosurgery are much longer, often measuring 12 inches. An example is the curved Yasargil scissors used in optic nerve sheath fenestration. These instruments are 9 inches long and have a finer tip than the familiar Westcott scissors that you may find for eye and cardiac surgery. Ideally, for an optic nerve procedure, we would use a 6 inch instrument, but none is currently available in this scissor type so we make do with the longer instrument. The caliber or strength of the instrument will vary, depending on what tissue is going to be manipulated or cut. We will talk more about the individual variations of each of these instrument types later in this chapter.

Cutting the skin

Hand position

Now that you are properly positioned at the head of the bed of a patient who has been prepped and draped, your next job is to make a skin incision. Remember you are positioned with your feet flat on the ground and your elbows at your side in flexion slightly more than 90 degrees. Hold your hands in the functional position, like holding a pencil with your hand in slight flexion at the wrist. This will improve your dexterity and strength.

There are three tools used for cutting the skin:

- No. 15 scalpel blade
- Colorado microdissection needle
- CO₂ laser

Most of our comments not only pertain to the traditional scalpel, but also to the cutting cautery needle and CO₂ laser. It is worth learning the traditional surgical techniques with the scalpel and scissors. As your skill increases, you will likely find that using the microdissection needle or laser shortens the operating time.

As you hold the scalpel with the pencil grip, you will notice that, on the scalpel handle, there is a groove or flat area where your index finger will rest. The scalpel is supported between your thumb, index finger, and middle finger (Figure 1-2).

The eyelid skin is mobile. Precision cutting requires immobilization of the skin with the help of your fingers or the assistant's fingers. Use your ring finger to rest on the patient, stabilizing the skin or guiding your hand. Learn to use the ring finger on your dominant hand and the thumb and forefinger on your nondominant hand to stabilize the skin (Figure 1-3). If the tissue is slippery, using a gauze pad for some traction will be helpful.

It is best to start the skin incision with the tip of the scalpel blade. As you move across the incision, lay the scalpel down so that you are cutting with the curved part of a no. 15 blade. As the wound edges start to separate, observe the depth of the wound. Ideally, you want to cut eyelid skin only and not extend the cut into the orbicularis. This is difficult to do, but nevertheless worthwhile. Controlling the depth



Figure 1-2 Holding the scalpel with the pencil grip. Note that the hand is in the “functional position” in slight flexion.

of any eyelid incision is critical. Remember that the eyelid is only slightly more than 1 mm thick at the skin crease, and you do not want to extend your incision into the cornea. You might find that using a corneal protector is a useful safeguard initially. With experience, you will probably find it easier not to use a corneal protector for scalpel cutting or cutting cautery incisions. Adjust the pressure to maintain the proper depth of the wound. Like driving a car, look “down the road,” as you pull the scalpel across the skin. All of this is happening as you or your assistant holds steady tension on the skin. Remember, tight skin can be cut more easily and accurately than more mobile skin. Like most instruments for eye surgery, the scalpel is a “finger tool.” As you bring your fingers toward your palm with the scalpel tip, you may need to reposition your hand and repeat the cutting process in lengths of the wound (Figure 1-4). As you get more experienced, you will be able to flex your fingers and move your hand at the same time.

This is a good time to remind you of your good body position. You should feel relaxed and at ease as you cut. Make sure your elbows remain close to your side rather than up high, which will convert the scalpel to an “arm tool” rather than a “finger tool.” You will be doing many incisions in



Figure 1-3 Skin stabilization. During upper eyelid blepharoplasty, the skin fold is stabilized and stretched with the surgeon's fingers while the upper eyelid is drawn downward using a lid margin traction suture. Note that a Colorado microdissection needle* is being used for the incision. With experience, the traction suture can be eliminated and the surgeon can use fingers to stretch the skin tight.

*The original micropoint electrocautery needle was called the “Colorado” needle. Other brands of true microdissection needles are now available. In this text, the terms Colorado needle and microdissection needle are considered to be the same. However, this fine tungsten microtipped needle should not be confused with the older needle point monopolar cautery tool available in many operating rooms.

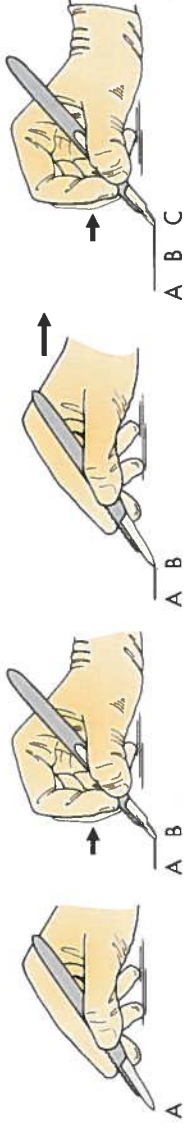


Figure 1-4 Flexion of the fingers with the scalpel blade followed by movement of the hand (adapted from Edgerton M, *The art of the surgical technique*, Baltimore, 1988, Williams & Wilkins).

your life, so learn to cut away from important structures such as your fingers and the eye. There are several types of scalpel blades that you should be familiar with.

Scalpel blades

- No. 11 blade: This blade has a sharp point that is good for tight angles and curves. It is not useful for longer incisions because it may cut deeper than you expect.
- No. 15 blade: This is the best all-purpose scalpel blade for eyelid and facial skin; 98% of your eyelid surgery with a scalpel will be done using a no. 15 blade.
- No. 10 blade: The no. 10 blade is shaped like a no. 15 blade except bigger. This blade is used primarily for thicker skin incisions. It is not used for periosteal incisions, but can be helpful in facial flaps.
- Beaver blades (<http://www.bd.com>) The #66 Beaver blade (#376600) is a special purpose right-angled blade. Its primary use is for making cuts in tight spaces. It is especially useful for nasal mucosal incisions in dacryocystorhinostomy (DCR) procedures. Angled keratomes designed for anterior segment surgery work in a similar fashion (Figure 1-5). Other useful blades are the #64 blade (#376400) rounded tip, sharp on one side), #76 blade (#376700, a mini #15 blade), both useful for delicate shaving of tissue off sclera or cornea. The needle blade #375910 is good when you need to make a microincision. Beaver handles come in a variety of lengths, the most common being 10 cm. Longer length handles (13 and 15.5 cm) are useful for deep orbitotomy or craniotomy cases.

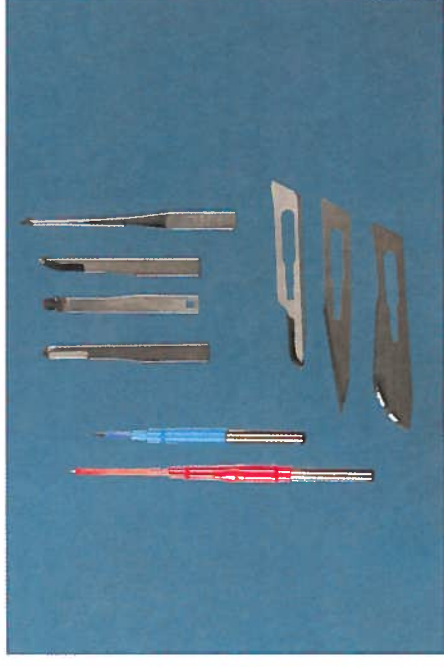


Figure 1-5 Surgical cutting instruments: Left, “Colorado” microdissection needles (blue: shorter (preferred); red: longer). Right, Beaver blades 376400, 376600, 37600, 375910. Bottom (from top): scalpel blades no. 15, no. 11, and no. 10.

Other cutting tools

Two other useful cutting tools are available for eyelid surgery: the microdissection needle and the CO₂ laser. The microdissection needle has been my choice for the majority of periocular surgical procedures in recent years. This unipolar cautery device does an excellent job of cutting and cauterizing the thin eyelid tissues. The needle is made of tungsten with an extremely fine tip. Tissue in contact with the tip is vaporized. Getting used to this instrument takes some practice. Cutting the tissue should be done with superficial light passing over the tissue in a "painting" motion with the needle slightly angled as if you are using a paint brush. If you find that carbon is building up on the tip of the instrument, you are moving too fast, you are cutting too deep, or you have the power turned up too high. The trick of using this tool is cutting only at the very tip so that there is little thermal damage to the surrounding tissues. Using a "blend" mode gives cutting and cautery. Try this for the dissection of an upper eyelid blepharoplasty skin muscle flap. Once you get used to this "bloodless" field, you will have trouble going back to scissors. You should use a smoke evacuator to eliminate the hazardous smoke produced by this tool. The patient requires grounding as with the use of other unipolar cautery equipment. The use of this unipolar cutting tool is sometimes limited to tissues anterior to the orbital septum, because the electric current is carried into the orbit and causes pain for many patients under local anesthesia. The tip works on the dry eyelid skin, but works best on tissues deep to the skin. For this reason, some surgeons prefer using a blade for the initial skin incision as the wound is sharper. I use a blade in many cosmetic cases and switch to the needle for any deeper work. You may find the Colorado needle with a foot pedal useful, but I prefer the hand switch on the cautery handle itself. Two companies make a microdissection needle (Stryker Colorado needle, Stryker Medical, <http://www.stryker.com>, 800 869 0770; and Tungsten microsurgical needle E1650, Valleylab, <http://www.valleylab.com>, 800 722 8772). The shortest length needle is the easiest to work with on periorcular tissues.

The CO₂ laser is also a useful tool for cutting eyelid skin. Like the microdissection needle, tissues are vaporized with excellent cautery of capillaries and small veins. The Coherent UltraPulse 5000C CO₂ laser was introduced years ago and remains a work horse in my practice. The current model is the UltraPulse Encore made by Lumenis (Lumenis Inc., <http://www.lumenis.com>, 801 656 2300). These lasers remain the gold standard for laser incisional and resurfacing work. As when using a microdissection needle, large vessels are often cut with the laser rather than cauterized, so you will need a bipolar cautery tool on the operating room table as well. Both these cutting and cauterizing tools can shorten operating times considerably. If you have a CO₂ laser available, you should try this as a cutting tool. You must emphasize "pulling apart the tissues" with your forceps. There is no "touch" or "feel" involved in the cutting. It is all visual so technique is very important. Once you learn it, you will love it. Patients have less discomfort with the CO₂ laser than with the Colorado microdissection needle. Some precautions are necessary. You will need sandblasted instruments to prevent reflection of the laser energy. Metal corneal shields are a must. Surgeons and staff must wear protective goggles.

Smoke evacuation is necessary. Care with oxygen and the use of wet drapes are important to prevent fire. The majority of procedures in this text will be described with the use of the microdissection needle, but I suggest you try the laser, especially for upper blepharoplasty. The skills that you will learn using the microdissection needle and the laser are complementary; learning one will help you with the other.

Placement of skin incisions

Most skin incisions that you will make are hidden in natural creases or wrinkle lines (Figure 1-6). The *upper lid skin crease* is a natural place to make incisions in the upper lid. The upper lid skin crease will often be carried laterally into a "laugh line." If you are working away from an area where you are not familiar with the wrinkle lines, ask the patient to contract the facial muscles in that area. You will see wrinkles and folds in the skin that will show you where to place your incisions. You can anticipate these lines. Remember that the natural skin creases occur perpendicular to the direction of the muscle fibers causing this crease. Contract your frontalis muscle and you will see the furrows of the forehead perpendicular to the frontalis muscle fibers.

Other skin incisions can be camouflaged by placing them near anatomic structures such as the eyelashes or eyebrow. Adults generally have no lower lid skin crease. Skin incisions in the lower lid are usually placed *adjacent to the lower lid lashes* (subiliary incision). This incision can also be carried laterally into a "laugh line." Similarly, eyebrow incisions can be hidden by placing the incision *adjacent to the upper or lower margin of eyebrow hairs*. Incisions can be placed within the brow itself but can cause permanent visible scarring as a result of the loss of cilia roots. Other examples of camouflaging scars near facial structures include pretrichial hairline incisions, preauricular skin incisions, and incisions along the ala of the nose. Older style incisions such as the Stallard Wright lateral orbitotomy incision and the Lynch incision have been largely replaced by incisions that leave a better scar.

Anxiety and tremor

Every surgeon has a tremor to some degree or another. This tremor will be worse when you are anxious, are tired, or have drunk too much coffee. If you find that your tremor is bothersome, try to eliminate these factors. I occasionally hear of a resident who takes a beta-blocker before performing an operation. This might serve as a confidence booster, but is really not necessary once you learn to relax during surgery. A big part of being anxious when learning surgery is the feeling that you will look bad to your teacher or others observing. Consequently, you get more nervous and your tremor will increase. Don't forget, everyone in the operating room is on your side, doing everything they can to help you do your best for the patient. If you are feeling a little shaky, you might want to explain to your teacher that you are nervous. Usually, this confession will bring some deserved empathy, and your tremor will settle down a bit. Take a few deep breaths. Make sure that your chair and the table height are appropriate. Try to relax your forearms and loosen your grip on the instruments. If this does not work, consider a wrist rest. *I have yet to see a student who had a tremor that kept him or her from being a good surgeon.*

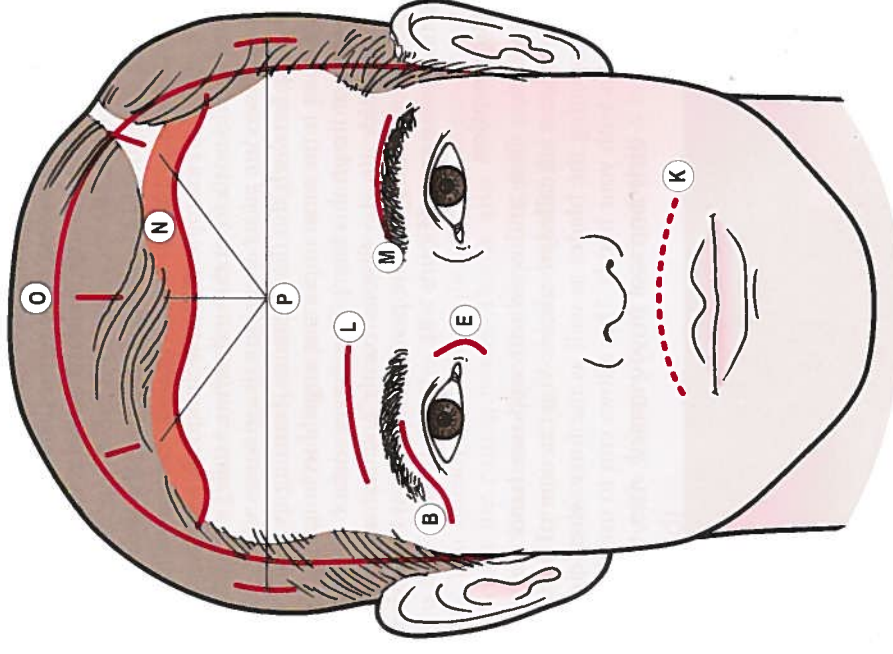


Figure 1-6 Facial incisions are typically hidden in natural skin creases or placed next to anatomic structures for camouflage. (A) Upper lid crease incision extended into lateral canthal laugh line for lateral orbitotomy. (B) Traditional Stallard Wright lateral orbitotomy incision (rarely used). (C) Modified Berke lateral canthotomy incision. (D) Transcranial incision. (E) Frontothmoidal (Lynch) incision (rarely used). (F) Upper lid crease incision. (G) Vertical lid split incision. (H) Subiliary incision. (I) Transconjunctival incision for medial orbitotomy. (J) Inferior transconjunctival incision. (K) Gingival upper buccal incision. (L) Forehead furrow incision. (M) Suprabrow incision. (N) Pretrichial incision. (O) Transcoronal forehead incision. (P) Endoscopic browplasty incisions.

Checkpoint

- Remember to have a plan when you enter the operating room. Let the staff know what the plan is. Know what the room setup will be. Know the instruments. Your preparedness will inspire confidence and set the pace for the operation.
- You must have a plan for the operation and some contingencies if things don't go as planned. You would be surprised how many residents come to the operating room expecting to be "shown" what to do. As a resident, the more you know, the more you will get to do, and the faster you will learn.
- Get the patient, operating table, your stool, and your body in a comfortable position before starting. Have all the equipment prepared before you make a skin incision.
- Why should you mark the skin and inject the local anesthetic before scrubbing?
- Do you need to write down the names of special instruments, sutures, or equipment that you will be using?
- Let the operating room nurses know what you are planning, especially if you anticipate any change from the routine.
- Practice stabilizing and cutting the skin on pieces of chicken at home. It is not the perfect model, but it can be helpful. Practice everything you can at home, including cutting, suturing, and tying. Operating room time is very valuable.
- Learn to be comfortable and relaxed in the operating room. As a surgeon, it is your home and workplace for a big part of your career.

Cutting tissue with scissors

How do scissors cut?

Scissors cut by the *shearing and squeezing action* of the blades crossing so close together that tissue between the blades is separated in a controlled fashion. The majority of skin incisions, especially on thicker skin, should not be made with scissors because of this “crushing action” of the scissors blades. Some surgeons do, however, use scissors to cut the thin skin of the eyelid. Most surgeons reserve scissors for dissection of deeper tissue planes.

Types of scissors

In the Storz instrument catalog, there are 50 pages of scissors showing almost 200 types. Hopefully, after reading this section, you can make a sensible choice in selecting the right scissors for the surgical step you are doing. Scissors vary in the following characteristics:

- Length
- Caliber
- Tip sharpness
- Blade design
- Cutting motion

We will look at each of these characteristics briefly.

Length

Choose the proper length scissors for the depth of the wound that you are working in. Most of the instruments on the eye tray are 4 inches long. This size goes with the scale and depth of the usual ocular procedures. Longer instruments would be less steady and bump into the microscope. You will use many 4 inch instruments in oculoplastic surgery. Plastic surgery instruments are usually 6 inches long and fit the normal hand size better. In most cases, the longer neurosurgical instruments are not useful. For orbit surgery, on occasion, you may use a longer neurosurgical scissors for the particular tip rather than the length (Yasargil scissors).

Caliber

In general, thicker scissors blades are used for tougher tissues. This is fairly intuitive. You would not use a delicate Westcott scissors to cut through the thick dermis of the cheek. Similarly, you would not use the tough Mayo scissors to cut eyelid skin. Remember it is the blade tip size, not the length of the instrument, that you should consider for the delicacy of the tissue you want to cut. You will find that many longer delicate instruments are available.

Tip

The tip of a pair of scissors may be blunt or sharp. Blunt-tipped scissors are usually used for dissection in tissue planes. Sharp scissors are used to cut through tough tissues such as scar tissue. Face lift scissors have slightly sharpened rounded tips to facilitate flap dissection in the subcutaneous plane.

Blade design

Scissors blades are made as *straight* or *curved* (Figure 1-7). Most straight scissors are used for cutting sutures and bands, and are sometimes called “suture scissors.” It is easier

to cut a straight line with straight scissors than with curved scissors. Curved scissors are useful for tissue dissections. The curved angle of the blade lifts the tissue planes apart as the tip cuts the reflected tissue, which is placed on stretch. The curve of a scissors blade is easy to palpate through tissues. You will learn to protect tissues against the convex surface of the curve. An example of this technique is separating the levator aponeurosis from the underlying Müller’s muscle. As the two layers are *pulled apart*, fine tissue bands will be seen stretching between the tissue planes (learning to “pull” the layers apart is the most important surgical technical tip I can give you; more on this later). The convex surface of the scissors can slide up the fibrous bands and rest against the aponeurosis. Cutting can be performed without buttonholing the aponeurosis (Figure 1-8).

Cutting motion

Most scissors close and open with opposite hand motions. These scissors are called *iris scissors*. You can control the force when opening the blades as well as the force when closing the blades with your hands. This allows you to use the scissors tips as a dissecting tool as you spread open the tissue



Figure 1-7 Blades of the straight Mayo scissors compared with those of the curved Stevens tenotomy scissors. Notice that the length and caliber of the scissors are also different.

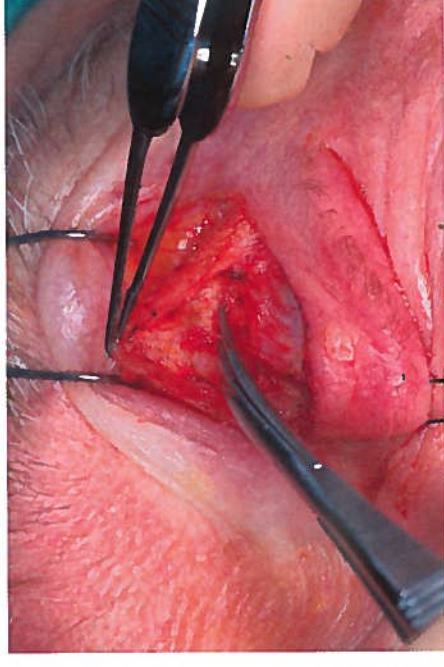


Figure 1-8 Dissection of levator aponeurosis from Müller’s muscle using curved Westcott scissors. Note how “pulling” the tissues apart creates bands of tissue that are easy to see and cut. The convex side of the scissors blades should be against the tissue that is the strongest; in this case the aponeurosis (see Figure 1-10, B).

planes by opening the scissors. *Spring scissors* open with the recoil of a spring mechanism in the handle of the scissors. Westcott scissors are an example of this type. These scissors are generally used for fine tissues where minimal hand motion is required (“finger tools”). The spring action determines the force of the opening of the blades, making these scissors somewhat more difficult to control and less useful for dissecting tissues with the opening of the blades.

You will remember that scissors cut by a shearing action. Most iris-type scissors are designed as right-handed cutting tools. Imagine holding a pair of iris scissors in your hand. Push your thumb away from the palm and pull your fingers toward your palm. This action squeezes the blades of the scissors more tightly together, increasing the cutting power. You may recall doing this as a child playing with dull scissors. You quickly learn that squeezing the blades together increases the cutting power. This is also why left-handed children sometimes have trouble cutting with right-handed scissors. Try squeezing the blades together the next time you use a pair of scissors.

Cutting with scissors (you learned this as a child)

Spring scissors, or Westcott scissors, are held as finger tools, like a pencil. As with any scissors, you should gently squeeze the blades together in a continuous action. As the scissors cut, *watch the tissue separate. Avoid clicking or snipping the scissors closed in one quick motion* (close the scissors like you may have been taught to slowly squeeze the trigger of a gun or a camera shutter release button). Quick motions do not allow you to evaluate the depth or length of the scissors cut as you proceed. Observing how the tissues spread apart as you cut them is the very best way to stay in the correct surgical plane.

Watch less skilled surgeons or nurses cut your sutures. Often they will snip away at the suture. This type of cutting is too inaccurate for tissues.

As you proceed with cutting tissue, do not close the blades completely to the tips. You will lose your place in the wound if you close the scissors. Again, remember when you first learned to use scissors as a child. Initially, every time you cut a piece of paper, you would close the scissors blades completely. It was difficult to make a straight continuous smooth line. You had to start over each time you cut. As you learned to use the scissors better, you found that you could more effectively cut a continuous line by closing the scissors halfway to two thirds and then advancing the blades forward. This is the same technique that you should use in cutting tissue. *As the blades cut approximately halfway closed, push the blade forward in the same plane and cut again.* Don’t cut with the full closure of the blade until the end of the incision.

Remember when cutting with curved scissors to position the curve of the scissors along the curve of the incision. Many of the incisions that you will be making, such as the skin crease incision, are curved.

When using an iris or ring scissors place your middle finger in one ring and your thumb in the other ring. Use this grip with the index finger providing three-point fixation of the scissors (Figure 1-9). These larger scissors are useful as a “finger and hand” tool. The same cutting motion that is described above should be used with this type of scissors. You might want to practice this technique on a piece of paper to make sure that



Figure 1-9 Holding scissors. Left, iris or “ring” scissors (a “finger and hand tool”). Right, Westcott scissors, the most common spring scissors used in eyelid surgery (a finger tool).

you have the idea. Probably you may be using scissors in more than one way already. Dr. Edgerton’s book nicely describes the function of scissors. Scissors can be used for cutting sutures and tissue, functioning as “shearing cutters.” Scissors can be used to spread open planes as “push cutters” (Figure 1-10). Planes may be dissected using “lateral sweeps” or “pull wedges.” Small vessels may be squeezed closed with the shearing action of scissors. Palpation of the curved blade of scissors can be used to help guide a deep tissue dissection.

Checkpoint

- Compare two types of scissors that you may be familiar with: straight Mayo scissors and Stevens tenotomy scissors (see Figure 1-7). Mayo scissors come in many variations, so look at the scissors pictured. This variation is almost 7 inches long and has thick straight blades with fairly pointed tips. The Stevens scissors are just over 4 inches long and have thinner curved blades with blunt tips. Which scissors would be best for cutting sutures in a deep abdominal wound? The Mayo scissors, of course. The straight, thick, pointed blades are not well suited for tissue plane dissection. The shorter, curved, blunt-tipped blades of the Stevens scissors are ideally suited for the tissue plane dissection of the relatively superficial layers of the eyelid.
- Think of which layers of the eye or eyelid Westcott scissors are suited for. Would you choose sharp or blunt Westcott scissors for a conjunctival peritomy? The soft conjunctival and episcleral tissues would tear if sharp-tipped scissors were used.
- Remind yourself how to cut tissue using a plain piece of paper. Draw a straight and a curved line. Try cutting the line in “snips.” Now try cutting the line with smooth continuous strokes, not closing the blades completely. Which is easier, more accurate, and faster? Cut the straight line with a curved scissors. Cut the curved line with the curved scissors using the curve of the blades “with” the curve of the line. Now cut the curved line with the scissors blades turned “against” the curve. You should be getting the idea that learning how to use your tools correctly produces a better and faster result.

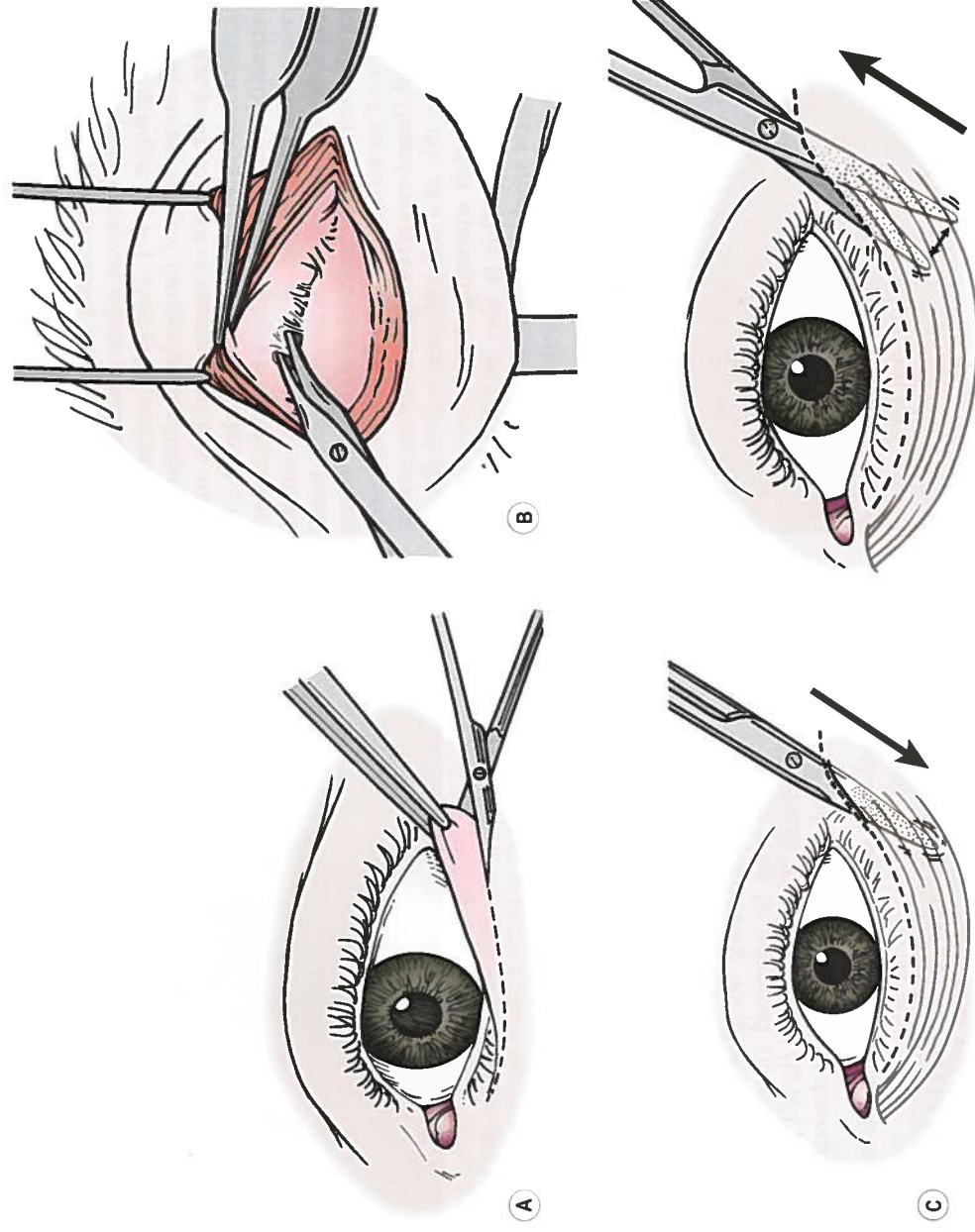


Figure 1-10 Uses of scissors. (A) Shearing cutters. The normal cutting action of the scissors is shown with Westcott scissors trimming redundant skin and muscle off a lower blepharoplasty flap. (B) Push cutters. The blades are open halfway, and the tissue is cut by pushing the scissors against the tissue. A good example is the dissecting of Müller's muscle off the levator as shown in **Figure 1-8**. (C) Lateral sweeps or pull wedges. The blades are inserted closed and opened in the wound or as they are pulled out. The action is with the outside of the scissor blade (dull side). This can be used to create a dissection plane, for example between the orbicularis muscle and the orbital septum. Scissors are typically used in this fashion to open an abscess pocket (adapted from Edgerton M, *The art of the surgical technique*, Baltimore, 1988, Williams & Wilkins).

Skin hooks

You may not be familiar with the use of a *skin hook*. This is one of the oldest surgical instruments and, when used correctly, one of the *most gentle retractors*. Skin hooks are available in different sizes and with varying numbers of prongs. The most useful skin hook for eyelid surgery is the Storz *double fixation hook*, a small double-pronged hook (Storz E0533) (**Figure 1-11**). There are also *small single-pronged hooks* that can be used for very delicate tissues (Tyrell iris hook; Storz E0548) and *rake-type skin hooks* with multiple prongs that are used for lacrimal surgery (Knapp lacrimal sac retractor; Storz E4538). A *large double-pronged skin hook*, known as the Joseph hook (Storz N4730), is useful for retraction of large tissue flaps. The Senn-Kanevel retractor (Storz N4780), or other modification of the Senn retractor, has large hooks on one end and a right-angled narrow blade retractor on the other end. This is a good all-purpose, soft tissue retractor for facial procedures. Obviously, you must be quite careful with these hooks not to pull the hook toward the eye where inadvertent puncture of the globe could occur.

Retraction and exposure

Fingers as retractors

One of the major differences between learning ocular surgery and oculoplastic surgery is learning how to manipulate and retract tissues. Most of the retraction done in ocular surgery is done with a lid speculum. You will learn to use a variety of tools to hold the tissues. You are already familiar with the best and most gentle retractor of all, *your fingers*. You will learn to use all the fingers on your nondominant hand to support or put the tissues on stretch. At the same time, you will be holding a cutting tool in your dominant hand with your thumb, first and second fingers while at the same time using the ring and small finger as retractors while you work (visualize holding a blade with the “pencil grip” and stretching the tissues with your other fingers—try this). A finger covered with a gauze sponge helps to stabilize slippery tissues.

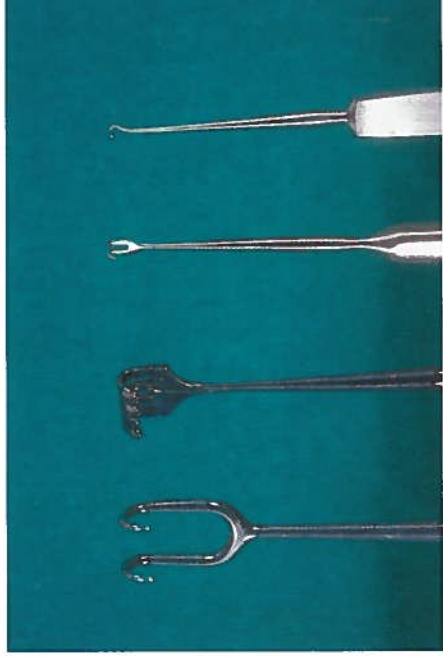


Figure 1-11 Skin hooks (left to right): large double-pronged (Joseph) skin hook, lacrimal rake, small double-pronged skin hook, small single-pronged hook (Tyrell).

Forceps

The most common type of instrument to hold tissue is a forceps. All forceps work the same, using a pinching action of the fingers to grasp tissue. Forceps differ in length, caliber, and tip. Length and caliber differ for the same reasons as all instruments in general. The tips of forceps can either be *smooth* or have *teeth*.

Smooth forceps generally cause more trauma than forceps with teeth. Because there is low friction on the tip of smooth forceps, more pressure is required to hold tissue. Consequently, the tissue tends to be *crushed*. Smooth forceps (**Figure 1-12**) are used only on delicate tissues if concern exists over tearing the tissue with forceps with teeth. Variations of smooth forceps include diamond dusting and small serrations on the inner surface of the blades. These variations increase the friction of the forceps and reduce the pressure required to grasp the tissue.

Forceps with teeth offer a better grip with *less crushing of tissue*. You should use forceps with teeth whenever possible. Several types of forceps with teeth are available. The most common form has two teeth on one blade opposing a single tooth on the other blade. In general, forceps with multiple small teeth are more delicate than forceps with fewer and larger teeth. As you grasp the tissue with forceps you should use gentle pressure to close the tips. The teeth should not leave marks in the tissue.

As you get more facile using surgical instruments, you will use the single tooth of a toothed forceps as a skin hook to lift and sometimes unroll a skin edge. This blade is known as a *lifting jaw*. When grasping tissue, select the layer of tissue that is the least susceptible to injury. It is better to grasp the dermis or subcutaneous fat than the skin edge directly.

You will find that Paufigue forceps do a great job for most periocular work. They have small teeth that grasp delicate tissues, but the blades and grip are stout enough to work with heavier tissues. You should be familiar with lighter and heavier forceps with teeth. Useful more delicate forceps include Castroviejo suturing forceps. Heavier forceps useful in the cheek, scalp, and lower face include Adson and Brown-Adson forceps (Storz N5405 and N5420).



Figure 1-12 Forceps. Top: Adson forceps (large forceps with teeth, for cheek and scalp). Middle: Forceps without teeth (smooth). Bottom: Paufigue forceps with teeth (the most common forceps that you will use). Forceps tips. Left: Adson forceps. Middle: smooth forceps. Right: Paufigue forceps.

Jeweler type forceps are the smooth pointed forceps that you are probably already using in your practice to remove delicate sutures (Storz E1947 1).

Dissection technique

Most surgery is not cutting, but separating tissue planes. This concept may be the most important in this text. The surgeon and assistant should *pull the tissues apart, as the surgeon separates the tissues with the cutting tool*. For example, to separate the orbicularis muscle from the orbital septum, the surgeon should hold the scissors in the dominant hand and grasp the muscle with forceps in the nondominant hand. The assistant should grasp the septum with another forceps. Working together, the two pairs of forceps “pull” the orbicularis muscle off the septum. You will see small fibrous bands that are easy to separate with the scissors. Colorado needle, or laser (**Figure 1-13**). *In a sense, your nondominant hand shows your dominant hand what to do*. You will notice that it is easy to operate with an experienced surgeon as your assistant because the layers are pulled apart for you. Use this technique whenever possible. There are a few planes that you work where this technique is not possible. For example, in the subcutaneous plane of the cheek, you will have to sharply incise the tissues. Have an experienced surgeon check your dissection technique to confirm that you are correctly *pulling the tissues apart and separating the planes with the cutting tool*.

Remember to avoid “snips,” close the scissors slowly. Watch how the tissues open. This can be one of the most “elegant” and rewarding of surgical techniques (Box 1-1).

Retractors

There are three types of retractors:

- Self-retaining retractors
- Hand-held retractors
- Suture retractors

The *Jaffe eyelid speculum* is an excellent self-retaining retractor for eyelid surgery (**Figure 1-14**). This speculum was

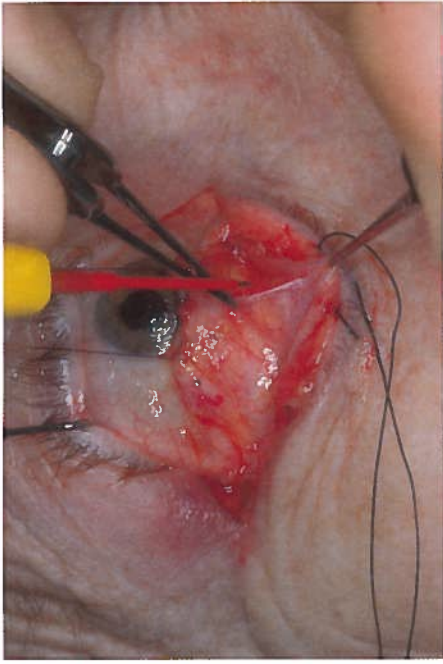


Figure 1-13 The surgeon and assistant work together to “pull” the tissues apart. Notice the bands of tissue stretched between the orbicularis muscle and the orbital septum that are easy to cut.

Box 1-1

Dissection Technique That You Must Know

- Most surgery is not cutting, but separating tissue planes
- Grasp the tissue layers that you want to separate (don't hold the skin when you are separating the muscle from the septum)
- Grasp the tissues close to where you want to work on them
- Learn to “pull” the tissues apart as you cut with the scissors or Colorado needle
- Look for the fibrous bands that will show as you pull the tissues apart
- Separate the layers with controlled closure of the scissors rather than short “snips.” Watch the tissues open as you close the blades

originally designed for cataract surgery to retract the eyelids independently without any pressure on the globe. I use this retractor in almost every lid procedure. Self-retaining retractors are rarely used in orbital surgery because it is difficult to position the retractors adequately in the orbit. The constant pressure on the tissue with a self-retaining retractor can limit circulation to the eye. There are self-retaining retractors made for lacrimal surgery, but I have not found these instruments to be satisfactory.

Hand-held retractors are useful, but require a good assistant. The well-trained assistant will move the retractors as the surgery proceeds from area to another. When maximum retraction is not necessary, the assistant eases the pressure on the retractor to improve circulation. The most commonly used hand-held retractor for eyelid surgery is the *Desmarres lid retractor* (size 1: 13 mm; Storz E0981) (Figure 1-15). The shape of the Desmarres lid retractor is helpful to atraumatically retract tissues. Useful orbital hand-held retractors are the malleable retractors and the Sewall orbital retractors. The *flat-bladed malleable retractors* (ribbon malleable retractors, Codman, <http://www.codman.com>, 800 255 2500) come in different widths and can be bent to suit the particular needs of the procedure. Tapered malleable retractors are helpful in deep wounds, but require special ordering. *Sewall retractors*

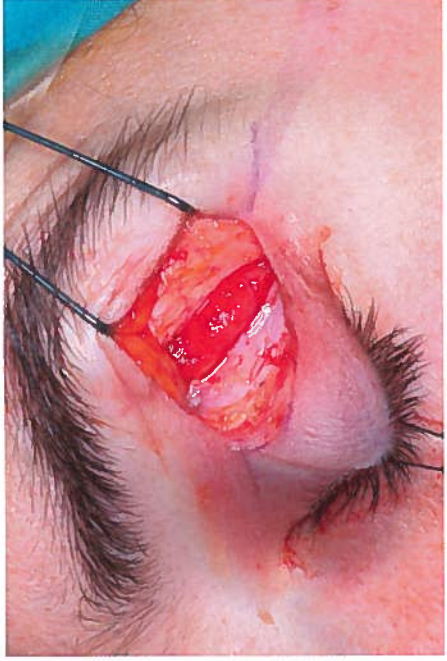


Figure 1-14 Jaffe eyelid speculum in place. The speculum can be used to open the surgical wound (as shown here for a lacrimal gland biopsy) or can be used to elevate an eyelid away from the operating site. It is a useful tool in almost every eyelid procedure.

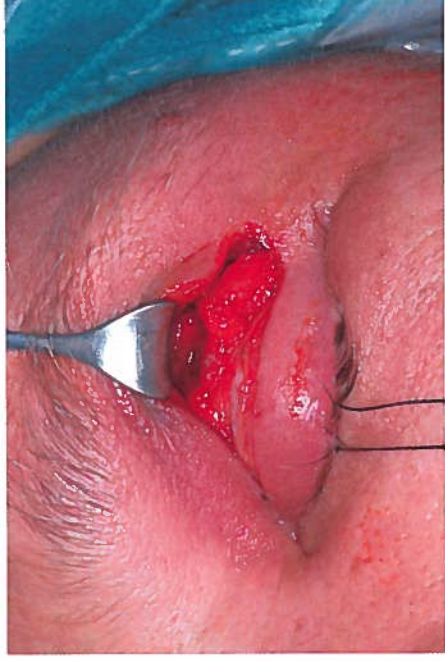


Figure 1-15 The Desmarres lid retractor is used similarly to the Jaffe lid speculum, but must be hand held. This retractor can be placed over a Jaffe lid speculum for extra retraction, a useful combination. Here, the Desmarres lid retractor is opening a skin crease incision to drain a superior orbital abscess.

are commonly used to retract orbital tissues. A disadvantage of both malleable retractors and Sewall retractors is that “towing-in” of the retractor may damage tissues, especially those deep in the orbit (experienced orbital surgeons fear the towed-in retractor as a cause of blindness more than any cutting instrument). You will find that orbital exposure is improved by lining the wound with *neurosurgical cottonoids* (similar to the lap sponges you used to pack off the bowel as a general surgery student) (Figure 1-16). The familiar *nasal speculum* is a type of hand-held retractor.

Sutures can be used as retractors. No manipulation by a surgical assistant is necessary. As many sutures as necessary can be placed to provide good tissue exposure (4-0 silk). Hand-held retractors can be placed on top of the suture retractors to give extra retraction when necessary. As with any other static or self-retaining retractor, if problems with circulation are anticipated, suture retractors should be avoided or frequently released (Figure 1-17).

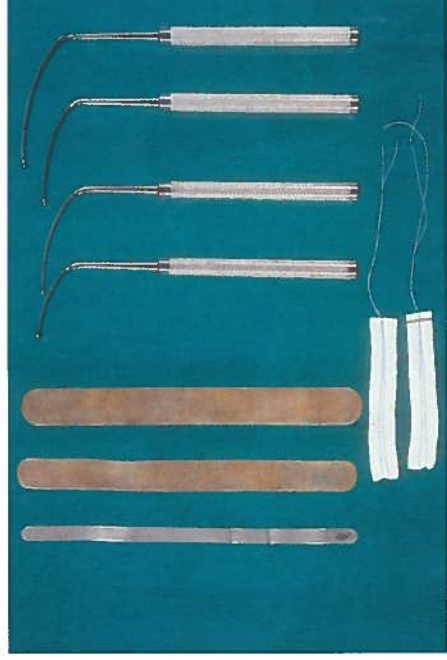


Figure 1-16 Orbital retractors (left to right): malleable retractors, Sewall retractors, and neurosurgical cottonoids (below).

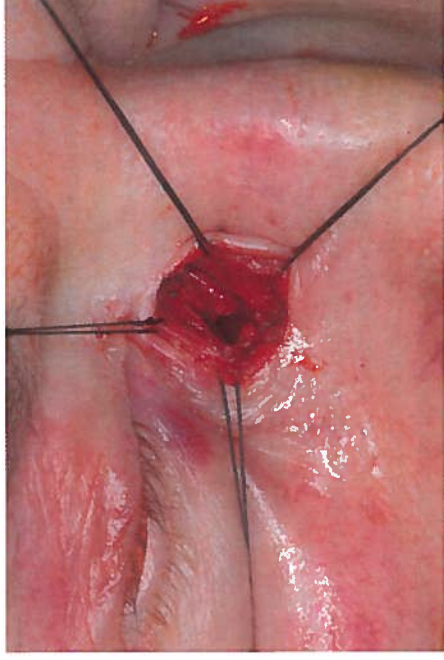


Figure 1-17 Use of 4-0 silk suture retractors for exposure of an external dacryocystorhinostomy wound.

Hemostasis

Preoperative considerations

Achieving hemostasis is another new technique to most ophthalmic surgeons. You will need to master some simple techniques for controlling bleeding if you are going to do eyelid surgery safely. Effective hemostasis technique begins with using an injection of *local anesthetic with epinephrine* (1:100,000) in every operation on the face. You should always inject the local anesthetic before prepping the patient and scrubbing, allowing about 10 minutes to pass to achieve maximum hemostasis.

Your time in the operating room will be shorter, and your patients will suffer less postoperative bruising if you remind them to stop taking all anticoagulant medications before surgery. *Warfarin* (Coumadin) should be stopped 5 days preoperatively with the consent of the patient's internist. *Aspirin-containing products* should be stopped 10–14 days before surgery. *Nonsteroidal anti-inflammatory medications* should be stopped 3–5 days before surgery. Remember that most patients do not consider aspirin and other over-the-counter medications as important when you ask what medications they are taking. You must ask specifically about these medicines. A

long list of herbal remedies can affect coagulation, especially when used in combination with other anticoagulants. Among others, the 3 “G’s” (garlic, ginseng, and ginkgo) should be stopped before operation. High doses of vitamin E can negatively affect coagulation as well. Under some circumstances, operating on the patient who is anticoagulated may be necessary but, to minimize the chances of hemorrhage, you should stop anticoagulants whenever possible.

Tamponade

An easy way to temporarily control bleeding is *tamponade*. Your finger, a gauze pad, or a Q-tip compressing the bleeding tissue against bone will stop most bleeding. Similarly, you can obtain hemostasis by *pinching the tissue* between your fingers or in a forceps. This is usually a temporary measure, but will minimize blood loss and facilitate your attempts to use cautery. An example of this is the bleeding that occurs after a wedge resection of the lid. The marginal artery usually bleeds. By holding the lid margin between the blades of the forceps, you can control the bleeding while you apply bipolar cautery.

If the point of bleeding cannot be identified, the wound may be *packed with a gauze sponge* to control bleeding. As the packing is removed, you may be able to isolate individual bleeding spots.

Most arteries encountered in oculoplastic surgery do not require *clamping* and *tying* to gain control of bleeding. However, placing a small hemostat on a bleeding artery may facilitate your attempts to use cautery. For larger arteries, suture ligatures or vascular clips can be used, but this is usually necessary only in large orbital procedures. You can avoid bleeding in enucleation surgery by clamping the optic nerve before cutting it. This requires some practice, but leaves a dry orbit after the removal of the eye. The stump of the optic nerve can be cauterized and the clamp removed.

Cautery

You must learn how to use cautery to do eyelid surgery. Three types of cautery are available:

- Heat
- Bipolar cautery
- Unipolar cautery

Battery-operated hand-held cautery units can be used for small areas of bleeding. In general, these are too inefficient for any lid surgery other than the smallest procedures, such as lid biopsies or chalazion incision and drainage. You can control the temperature of the heated wire somewhat by turning the cautery unit off and on. If you depress the finger switch continuously while you apply cautery, the tip gets very hot and will burn through the tissue, often causing more bleeding. I also use the hot tip as a cutting and cautery tool for dissection of delicate vascular tissues as in the separation of Müller's muscle and the levator aponeurosis, which works nicely. You should remember to turn off any supplemental oxygen when using this tool. Under certain conditions, a fire can result.

Bipolar cautery

Bipolar cautery is commonly used in oculoplastic surgery. Because the current passes between the tips, there is little

spreading of tissue damage. Normally, the tissue is wet enough to conduct the current between the cautery tips (this type of cautery is also referred to as a “wet field” cautery). Many surgeons accustomed to doing ocular surgery have a difficult time using bipolar cautery for eyelid surgery. The main problem is holding the cautery tips too closely together, preventing adequate amounts of tissue from being cauterized. The current has to flow through the tissue held between the cautery tips to affect coagulations. Using a bipolar cautery with a “non-stick” tip (Weck “Biceps” coagulator) works well. Like other instruments, bipolar cautery forceps are made in different lengths with different tips (the “jewelers” forceps tip is a good size for eyelid operations).

You must become adept at bipolar cautery to do eyelid surgery. Consider these three steps:

- Exposure
- Tamponade
- Cautery

Your assistant should provide exposure of the bleeding area with fingers, hand-held retractors, or forceps. If there is considerable bleeding, the assistant can provide temporary tamponade with a gauze pad while you ready a cotton-tipped applicator and the bipolar cautery tool. *Bipolar cautery technique is easiest if the surgeon, rather than the assistant, applies the tamponade* (the roles can be reversed, but the same person using the cautery tool should provide the tamponade). The surgeon places the bipolar tips in proximity to the cotton-tipped applicator. The applicator is rolled away from the bleeding site, and cautery is applied immediately. If bleeding is brisk, you may be able to provide tamponade on the tissues proximal to the bleeding site to decrease the flow of blood. If this does not work, suction can be used to provide exposure of the bleeding vessel.

Unipolar cautery

Unipolar cautery (also called monopolar cautery) can be used to provide periorbital hemostasis as well. The most useful form of unipolar cautery is the microdissection or microsurgical needle discussed above. This needle provides simultaneous cutting and cautery and reduces the bleeding of soft tissues dramatically. As you may have figured out by now, this needle is often referred to as the “Colorado” needle, the proprietary name of the original product. The microdissection (or microsurgical) needle should not be confused with the cutting needle of other unipolar systems. The tungsten tip of the microdissection needle is much finer and causes less thermal damage to the surrounding tissue. Unipolar cautery with a wider flat blade is used only when all other attempts to stop bleeding fail. Remember that teamwork is necessary for efficient hemostasis techniques. A helpful assistant can make a big difference.

Bone wax

You will encounter bleeding from small perforating vessels in bone. Bipolar cautery will not stop this bleeding. Unipolar cautery can be used to provide hemostasis in bone because the current spreads directly into the bone. As a better alternative, you can use *small pieces of paraffin* or *bone wax* to plug the bleeding sites. The surrounding bone must be relatively dry to get the wax to stick.

Drugs

We have already talked about the *preoperative use of epinephrine* in the local anesthetic to decrease bleeding. You will notice the effect of the epinephrine on the surgical site by the blanching of the injected area. Similarly, injections can be used intraoperatively for additional vasoconstriction. Initially, the hydrostatic pressure effect of the injected fluid into the tissue helps control capillary bleeding as well. You can apply 0.05% oxymetazoline (Afrin) or 5% cocaine solution topically to the nasal mucosa to cause vasoconstriction. Agents such as Gelfoam, Avitene, and Surgicel can be used to promote clotting, increasing platelet activation. Thrombin (topical thrombogen) works a step later in the clotting cascade, stimulating the conversion of fibrinogen to fibrin. A small piece of Gelfoam soaked in thrombin solution as a packing material is an excellent way to stop recalcitrant bleeding from nasal mucosa (enhances platelet aggregation and fibrin formation).

If you start doing bigger flaps or reconstructive craniofacial work, you will become familiar with products that can be “lifesaving.” To stop trouble bleeding or cerebrospinal fluid (CSF) leaks, FloSeal and Tisseal (<http://www.baxter.com>) are especially helpful. FloSeal contains bovine thrombin suspended in gelatin granules so the mechanism is similar to the Gelfoam/thrombin combination. The mix sticks to wet tissue and does not swell to the degree that Gelfoam does. Tisseal (a “fibrin glue”) contains human fibrinogen, bovine thrombin, and an antifibrinolytic agent (to stabilize the clot). FloSeal tends to be more useful for cranio-orbital applications, but you should know about both. Your neurosurgical and ENT colleagues can give you tips on how to use these materials.

Occasionally, special situations occur in which hypotensive anesthesia can be used to reduce bleeding. This technique is not commonly used in the United States. In vascular tumors, preoperative intra-arterial embolization of large vessels can be used to minimize bleeding encountered during surgery.

Drains

Suction drains can be used postoperatively to increase hemostasis and decrease swelling and the risk of infection. If you are performing surgery involving large flaps, active suction devices (“grenade” type) attached to a Jackson-Pratt drain will be helpful. Some surgeons use passive drains, such as Penrose or rubber band drains, routinely for orbital surgery procedures. I rarely use these. Remember that a drain is not a substitute for intraoperative hemostasis.

Suction

Suction is a useful technique to clear unwanted blood, irrigation fluid, or other fluid from the surgical site to increase exposure of the operative wound. Three types of suction tips are used in oculoplastic surgery (**Figure 1-18**):

- Flexible suction catheter
- Yankauer tonsil suction tube
- Frazier and Baron suction tubes

The flexible suction catheter can be used to suction blood and irrigation fluid out of the nostril when you are performing



Figure 1-18 Suction types (top to bottom): Yankauer tonsil suction, Frazier suction tube, Baron suction tube, and flexible suction catheter.

ing tear duct surgery. It is also useful to pass this catheter down the nasal pharynx to remove fluid before extubation. The Yankauer tonsil suction tube is an all-purpose suction tip that is used primarily in wide surgical wounds when a large-bore general suction device is needed. The Frazier suction catheter is the most useful suction device for oculoplastic surgery. This metal angled catheter (9 French) provides directed and accurate suction to individual bleeding sites. A small version of the Frazier suction catheter is called the Baron catheter (available in 3, 5, and 7 French). Most suction catheters have a port that can be occluded to increase the suction pressure. For mild bleeding, this port does not need to be occluded. When more bleeding is present, the port may be occluded to give more suction. When dealing with tissues that are easily sucked into the catheter tip, such as orbital fat or brain, you should *suction over a gauze pad or neurosurgical cottonoid* to clear the fluid without damage to the underlying tissue.

Smaller suction tips get occluded easily and will require irrigation of the suction tube with clear fluid as necessary. You might find that clamping the suction tubing when it is not in use will make the operating room quieter.

The rigid suction tubes can also be used to provide gentle retraction of tissue. For most effective control of bleeding, the surgeon should use the suction tube and the cautery tool simultaneously, rather than the assistant and surgeon each holding one.

Suturing

Types of suture material

Suture material varies in three basic characteristics:

- Absorbable or permanent
- Monofilament or multifilament
- Natural fiber, synthetic, or metal wire

Absorbable sutures degrade naturally over time. No removal is required. Common absorbable sutures include gut (fast absorbing, plain, and chromic), Vicryl, Dexon and Monocryl and PDS (polydioxanone). These sutures vary in degradation time from 5 days to more than 30 days. Permanent sutures do not degrade in human tissue. Examples include nylon,

Checkpoint

- What is the best retractor?
- How are forceps with teeth like retractors? Which is more gentle: forceps with teeth or smooth forceps?
- Try the Jaffe lid speculum on the next ptosis procedure you perform (your operating room may have to order one for you).

- Review the different types of self-retaining and hand-held retractors. When you place suture retractors, try placing them at the intersection of the thirds on each side of the wound.

For cautery with an assistant, there are four hands available. The assistant's hands provide retraction, usually with two pairs of Paufigue forceps. The surgeon's hands hold a cotton-tipped applicator (gauze or suction) and the cautery tool. The surgeon's steps for bipolar cautery are:

- Apply tamponade with the cotton-tipped applicator
- Ready the cautery tool
- Release the bleeding vessel: slowly roll the cotton-tipped applicator away to expose the exact point of bleeding
- Coagulate the vessel (making sure you have enough tissue between the blades)

Ask the operating room nurses what types of suction and drains are available in your operating room.

polyester, Prolene, and stainless steel. These sutures can remain indefinitely in a deep closure, but must be removed if used on the skin.

Monofilament sutures are made of a single strand of material. *Multifilament sutures* are made of braided strands of single filaments. Monofilament sutures cause less tissue reaction and are easier to pull out than multifilament sutures. Braided sutures are easier to handle than monofilament sutures (said to have a better “hand”). Multifilament sutures have a higher coefficient of friction and therefore maintain tension on a wound and hold a knot better than monofilament sutures. You will find that you need to use the “3-1-1” “1-1-1” tie with braided sutures, but you can usually use a tie with monofilament sutures. Silk sutures are considered the gold standard in terms of handling and tying. Manufacturers sometimes combine characteristics to make a more versatile suture. An example of this is braided nylon sutures. These permanent sutures have little tissue reactivity and have a better hand than monofilament nylon.

Natural fibers including silk and gut are available. Chromic sutures are gut (collagen) sutures that have been treated for greater resistance to absorption. Fast absorbing gut sutures are made to be used on the skin and reabsorb in 5–7 days. *Synthetic sutures* include nylon, polyester, polypropylene (Prolene), and expanded polytetrafluoroethylene (Gore-Tex). Metal wire sutures, usually stainless steel, may be used for deep closure when a strong permanent suture is required. Wire sutures are used in some types of fracture and telecanthus repair.

You might notice that we have not mentioned glue so far. Surgical skin adhesives can be useful, but really have not “caught on” much at this point. *Dermabond* (Ethicon) is an alternative for sutures. You can use it on small lacerations in

children and avoid the local anesthetic. I have used it on external DCR incisions and functional skin crease incisions with good success, and it is used in many other areas of surgery. It is helpful to put ointment on the skin around the wound where you do not want the glue to adhere. I expect we will see more use of surgical glues in the coming years. You may want to give it a try.

The choice of suture material depends largely on the surgeon's experience and individual preference. As you can see, there is no perfect suture, but rather many good materials to choose from. If you are interested in detailed closure choice, read on. If not, skip to the next section on needles.

These are the common suture choices for me. I like absorbable sutures on the eyelid skin. Patients don't like to have sutures out and it saves time postoperatively in the office. That being said, absorbable sutures tend to scar more, often untie or break, and frequently are not entirely gone at 1 week causing the patient some consternation. I no longer recommend Vicryl sutures for superficial skin closure as they take a long time to resorb and often leave tracks. For common functional surgeries, I use 5-0 fast absorbing running suture and tie with an extra throw (3-1-1-1) for the skin. I will often put an extra interrupted suture in the skin crease over a running closure. Many of my colleagues use a simple running suture with 6-0 nylon or Prolene. In cases where you are trying to get the absolute least scarring, a subcuticular Prolene removed at 5-8 days is a nice way to go (see below). For subcutaneous

closure, I use Vicryl or PDS sutures. There is a tendency for Vicryl sutures to "spit" (sterile abscesses rising to the surface as they absorb). The monofilament absorbable sutures, PDS and Monocryl, can avoid this, but require more careful knot tying as they are "more slippery." Clear sutures do not show through thin skin, but are more difficult to work with.

Types of needles

There are several types of needles available. Needles have the same parts, but vary by shape, size, and point (Figure 1-19) as follows:

- Shape
 - 3/8 circle
 - 1/2 circle
 - 1/4 circle
- Size
- Point
 - Taper
 - Cutting
 - Reverse cutting
 - Conventional cutting
 - Spatula

You will notice that the most common shape is the 3/8 circle needle (Figure 1-19, B). These needles are used for all general-

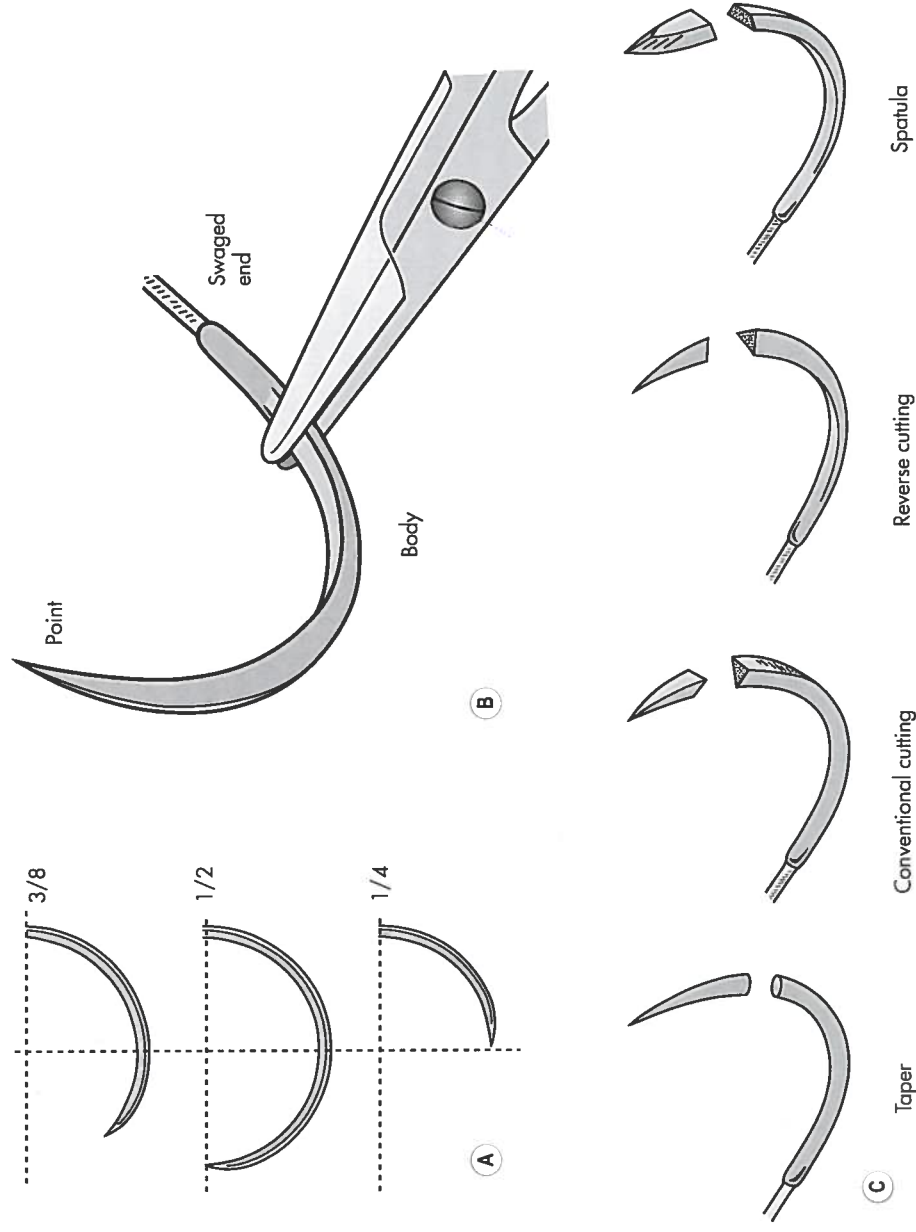


Figure 1-19 (A) Needle shapes. (B) Needle parts. (C) Needle points.

purpose suturing. Other shaped needles are used for special purposes.

The half-circle needle is used to suture in tight spaces. You will use these needles often. The most common use for a half-circle needle in oculo-plastic surgery is to attach the lateral tarsal strip to the peritosteum (4-0 Mersilene, braided polyester, Ethicon 1779G, double-armed). The sharp curve of the needle is ideal for reaching between the peritosteum of the lateral orbital rim and the orbital tissues. The 4-0 Mersilene is permanent and does not cause the suture granulomas that are common with 4-0 Vicryl sutures. I use a double-armed suture that nicely "tucks in" the strip against the peritosteum. The mucosal flaps of an external dacryocystorhinostomy can be closed with a half-circle needle and a chromic gut suture (Ethicon 798; 4-0 chromic gut G-2 half-circle cutting needle). The uses for this needle are similar to those for the P-2 needle. Because the mucosa heals fast and is not under tension, a chromic suture is used. In oculo-plastic surgery, 5/8 inch needles are rarely used.

The needle point will determine how easily sutures pass through tissue. Two types of needle points are available: taper and cutting (Figure 1-19, C). Taper point needles come to a sharp point and push through tissue. There is no cutting edge of the needle. Taper needles are used in delicate tissues such as bowel. In oculo-plastic surgery, taper needles are used for bridge sutures under extraocular muscles.

The majority of needles that you will use are cutting needles. Cutting needles have sharpened edges along the curvature of the needle. Rather than push through the tissue, these needles cut the tissue, facilitating penetration of the needle through the tissue. The two common types of cutting needles available are:

- Reverse cutting
- Conventional cutting

The most commonly used needle is the reverse cutting needle. This needle, when viewed on end, appears as an up-ended triangle (Figure 1-19, C). The sharp edges of the needle are on the outer curvature.

The conventional cutting needle, when viewed on end, is a triangle pointed upward. The sharp edge of the cutting needle is on the inner curvature. Typically, a conventional cutting needle creates a bigger hole in the tissue than a reverse cutting needle. The natural motion of passing a needle tends to pull the needle superiorly out of the wound. If the cutting blade is facing upward, the needle tends to cut superiorly as well as along the needle pass. The reverse cutting needle easily pushes through the tissue without enlarging the needle tract.

Several variations of taper needles are available. The most common variation is the spatula needle (Figure 1-19, C). The spatula needle is designed to pass through tissue in a lamellar fashion. The most commonly used spatula needle is used to reattach the levator aponeurosis to the tarsal plate (Ethicon 7731; 5-0 monofilament nylon S-24 spatula needle). The shape of the spatula needle facilitates a lamellar pass through the tarsus.

Many other variations of taper and cutting needle points are available. The next time you are in the operating room, ask the nursing staff to show you the suture packs. You will see a diagram of the needle shape and point on each package. You are guaranteed to be overwhelmed if you browse the

Ethicon suture catalog online. You will find some good illustrations on the comparison of needle sizes and shapes that are useful when you are looking for a new suture and needle. You might find it interesting to look at some of the needle and suture brochures available from the major suture manufacturers (often they are available in the operating room). You will be impressed at the thought and the fine detail that goes into the development of these super-sharp stainless steel needles that we take for granted.

To help you appreciate the differences in needle points, compare passing a taper needle with a cutting needle of the same size and shape. Try to pass a tapered 4-0 silk suture through the lid margin as a traction suture. Repeat the same needle pass with a 4-0 silk suture on a cutting needle. You will be amazed at the difference in the way the needle is passed.

The size of the needle corresponds to the size of the suture. This choice largely depends on how much strength is required to keep the tissues sewn together. Thicker tissues under greater tension require larger sutures. Often, the choice of needles and suture size is a process of elimination. A smaller suture would break and a larger suture seems too big.

Needle holders

Two types of needle holders are used in oculo-plastic surgery:

- Spring handle (Castroviejo needle holder)
- Ring handle (Webster needle holder)

The most common needle holder is the Castroviejo needle holder. This spring-action needle holder is excellent for the delicate work of oculo-plastic surgery. The Castroviejo needle holder is held with the traditional pencil grip as this needle holder is a "finger tool" (Figure 1-20). The index finger and thumb control precise movements for delicate suturing. I prefer the locking variation of the Castroviejo needle holder. It should not be used for needles larger than 4-0, however.

The traditional plastic surgical ring handle needle holder is used for 4-0 or greater sized needles. The most commonly available ring handle needle holder is the Webster needle

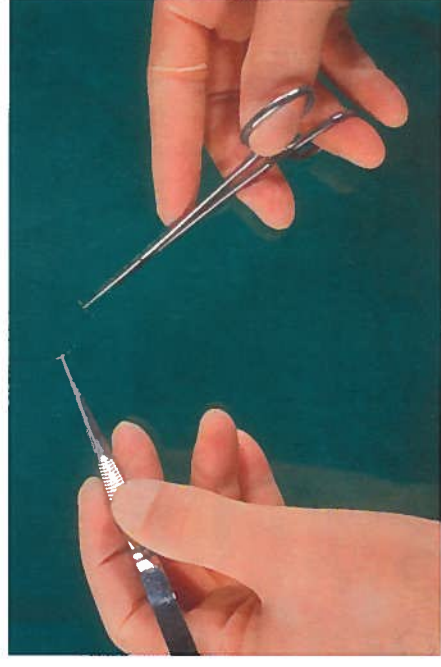


Figure 1-20 Holding the needle holder. Left, The pencil grip of the spring (Castroviejo) needle holder. This is the most common needle holder that you will use. Right, The "thumb/ring finger grip" of a ring handle (Webster) needle holder.

holder. This type of needle holder is held with the *thumb/ring finger grip*. The index finger serves to direct the tip of the needle holder. This grip allows the needle holder to be used with finger, hand, and wrist motions (Box 1-2).

The needle should be loaded on the needle holder approximately three fourths of the way back on the needle. If you look at a larger needle, you will notice that there is a flat platform that ends where the suture is swaged on to the needle (refer back to Figure 1-19, A). If you hold the needle on the round part of the needle holder, you will lose control and the needle will rotate.

Box 1-2

Sutures for Oculoplastic, Orbital, and Lacrimal Surgery

- #### 2-0 Sutures
- 2-0 Vicryl: strong stitch to use as deep anchoring sutures on cheek flaps (Ethicon J328H CT-3 taper point)
 - 2-0 Vicryl: strong smaller reverse cutting needle also good for anchoring flaps (Ethicon J459H X-1 needle)
 - 2-0 PDS; good anchoring suture for SMAS lift procedures, longer lasting than Vicryl (Ethicon Z317H 26 mm SH taper point, violet)
- #### 3-0 Sutures
- 3-0 Gore-Tex® CV-3: for indirect browpexy (Gore N10 PH-24 double-armed)
 - 3-0 Vicryl: strong small reverse cutting needle good for anchoring flaps and deep closure in scalp and cheek (Ethicon J458H X-1 needle)
 - 3-0 Vicryl: strong smaller taper needle and stitch good for anchoring sutures in tight areas for cheek or scalp flaps (Ethicon J305H RB-1 needle)
 - 3-0 PDS: similar to Vicryl above, but longer lasting. Clear suture is good for anchoring facial flaps (Ethicon Z423H 19 mm FS-2 reverse cutting, clear)
 - 3-0 PDS: similar to Vicryl above, but longer lasting. Violet suture is helpful in hair-bearing areas (Ethicon Z398H 19 mm FS-2 reverse cutting, violet)
 - 3-0 Mayo trocar: for threading fascia during frontalis sling (Richard-Allan 216703, <http://www.aspensurgical.com>)

4-0 Sutures

- 4-0 chromic: long reverse cutting needle for Quicker suture and suturing oral mucosa (Ethicon 793G G-3 needle, double-armed)
- 4-0 chromic: short half-circle needle useful for suturing the flaps for external dacryocystorhinostomy (Ethicon 798G G-2 needle, double-armed)
- 4-0 Vicryl: short half-circle reverse cutting needle, useful for tight spaces that require subcutaneous closure or anchoring (cheek tissue at lateral canthus) (Ethicon J504G P-2 needle)
- 4-0 Vicryl: short reverse cutting needle for subcutaneous closure (Ethicon J464G P-3 needle)
- 4-0 Vicryl: longer reverse cutting needle for brow closure (Ethicon J682H PS-1 needle)
- 4-0 Vicryl: shorter and more sturdy than the PS-1 needle, good for tight spaces (Ethicon J496G PS-2 reverse cutting needle)
- 4-0 PDS: for subcutaneous flap suture (Ethicon Z494G 13 mm P-3 needle reverse cutting, clear)
- 4-0 PDS: anchoring suture for subcutaneous closure in hair-bearing areas (Ethicon Z513G 19 mm PS-2 needle reverse cutting 3/8 curve, violet)

is away from the site of the next needle pass. Always suture with your dominant hand. Most of the thin skin in the periocular area will require fixation with forceps to facilitate the needle pass. Efficient suturing techniques require that you “control” the tissues—get the tissues to act the way that you want them to. Grasp the tissue lightly with the tooth of the forceps very close to where you want to place the needle point. Place the point of the needle *directly adjacent* to the forceps and drive the needle through the tissue “following the curve of the needle,” pushing the needle toward your chest. Take note of the depth at which the needle emerges from the wound. Grasp the near side of the wound and place the tip of the needle at the same depth. Complete the pass of the needle until the needle holder touches the skin. Regrasp *both* wound edges *directly adjacent* to the needle and begin to pull the needle out of the wound. Do not grasp the tip of the needle. Advance the needle until you can grasp 3/4 of the way back so you can load the needle for the next suture pass (Figure 1-21).

An alternative needle passing technique is to pass the needle through the wound and then grasp the tip of the needle with the forceps and pull it out. As the needle is being pulled out, you use your needle driver to reload the needle. My preference is the former method. You might try both. The important part is not to spend a lot of time reloading the needle.

Recently, I have begun using a helpful old suturing technique. Hang a single prong Tyrrell skin hook from the end of the wound. This puts the wound under some tension, stabilizes the edges for suturing, and helps with spacing. The technique works well for upper eyelid skin crease incisions.

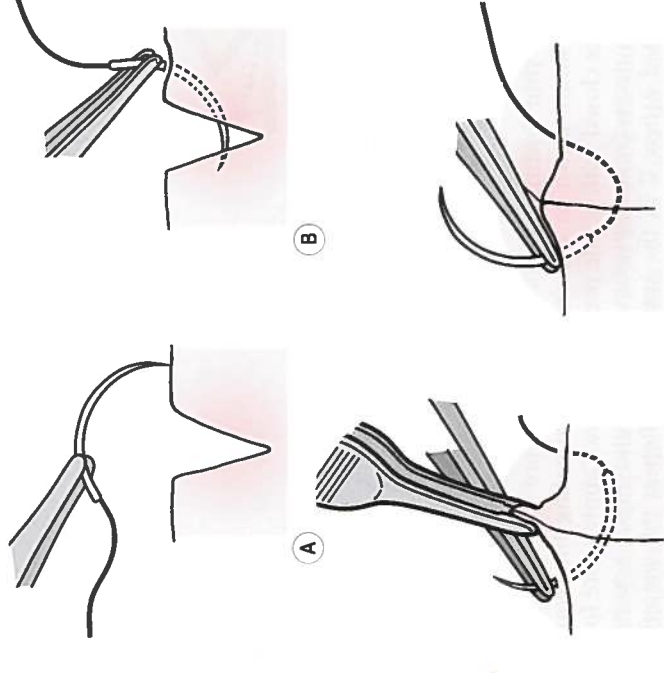


Figure 1-21 Passing the needle through the wound. (A) Pass the needle to enter perpendicular to the skin. (B) The needle should leave and enter the wound edges at the same depth. (C) Use the Paulique forceps to grasp both edges of the wound. Advance the needle with the needle holder, first pushing the needle, then pulling the needle out. Take care not to grasp the tip of the needle. (D) When the needle is advanced enough, reload it before you remove it from the tissue. You are then ready for the next needle pass.

Superficial and deep sutures

Suture placement can be considered either deep or superficial. *Deep*, or buried, sutures are used to close the subcutaneous or deeper layers of tissues. These sutures close dead space, provide wound stability, and remove tension from the final skin closure. Deep sutures are not required on the eyelid skin, but are used in the periocular area. Deep suture passes may be placed through periosteum, muscle, subcutaneous fat, or the dermis of thicker skin. Any dead space should be closed with deep sutures to prevent hematoma formation. Deep sutures may be used to anchor skin and muscle flaps and usually provide some degree of anatomic overcorrection. Long-lasting absorbable suture material (such as PDS, Vicryl, Dexon, or Monocryl) is usually used for buried sutures. My personal preference is PDS suture for most subcutaneous closure.

Superficial sutures are placed on the skin. Superficial sutures may be either *interrupted* or *running (continuous)*. Interrupted sutures provide accurate wound alignment and appropriate eversion of the wound edges. When repairing a complex laceration, you can use interrupted sutures initially to tack together the wound in an anatomically correct alignment. When you are suturing a long wound, a good place to start is to divide the wound into halves with interrupted sutures. This prevents misalignment of the wound edges and the creation of a “dog-ear” at one end of the wound.

You can use running or continuous sutures to close incisions placed in natural skin creases or wrinkle lines as slightly more inversion of the wound may occur. Running sutures are faster to place and easier to remove than interrupted sutures. A nice healing running suture in an eyelid skin crease is a “subcuticular” suture. This suture enters the end of the wound and the trailing end is tied on itself. The needle is passed in and out of the wound edges in a plane parallel to the skin surface. The suture travels through the most superficial portion of the orbicularis muscle (there is no subcutaneous layer of the eyelid skin). At the end of the wound, the needle is brought through the skin and the suture is tied on itself. After about 1 week, the knot at one end of the wound is cut and the suture is pulled out. Prolene suture, 6-0, is ideal for this closure as it is slippery and easy to pull out. Remember that Prolene requires a 3-1-1 tie to ensure a secure knot.

For wounds outside of skin crease lines, it is best to use interrupted sutures to give better wound eversion, preventing a depressed scar. Two types of interrupted sutures are used to close the surgical wound:

- Simple suture
- Vertical mattress suture

Simple sutures are the most commonly used interrupted suture (Figure 1-22, A). When correctly placed, simple sutures provide good wound alignment and eversion of the wound edges. When a greater amount of wound eversion is necessary, vertical mattress sutures can be used (Figure 1-22, B). The “far–far, near–near” suture pass is especially useful to provide wound eversion of the lid margin when you are repairing a lid laceration. In skin creases, a simple running suture is used (Figure 1-22, C).

To maintain spacing of the wound closure, use the “halving” method. Successively divide the wound into halves (Figure 1-23, A). If, despite careful wound closure, redundant tissue or a “dog-ear” exists at the end of the wound,

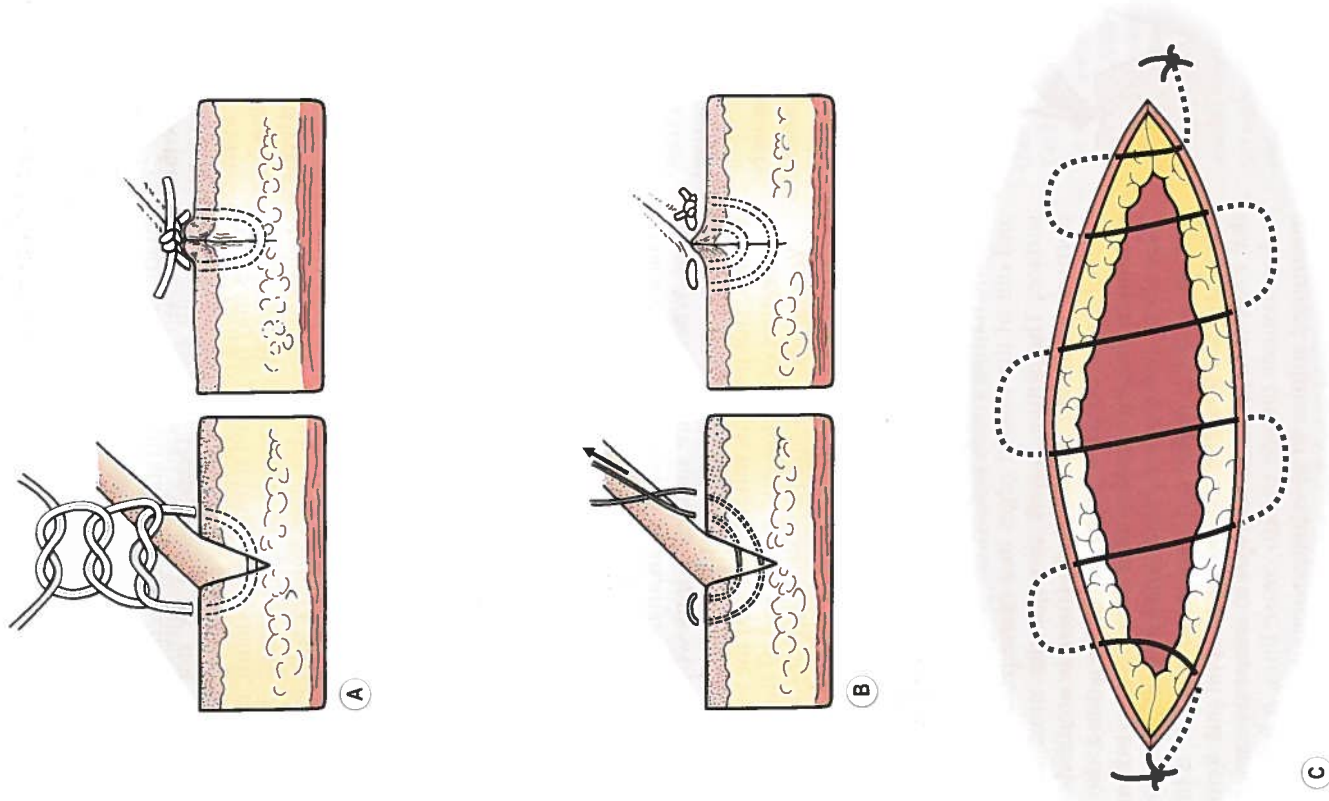


Figure 1-22 Placement of skin sutures. (A) Simple interrupted suture. (B) Vertical mattress suture used for maximum wound eversion. (C) Running "subcuticular" suture.

it can be excised at the expense of a slightly longer scar (Figure 1-23, B).

Tying the suture

Most sutures passed in oculo-plastic surgery are tied with an *instrument tie*. There are some simple tricks that you should learn to make your knot tying secure and efficient (Figure 1-24, A). Imagine passing a suture through the wound edges. As you withdraw the needle, the two arms of the suture make a V. Place your instrument in the V and wrap the needle end of the suture around the needle holder twice (Figure 1-24, B). Grasp the end of the suture with the needle holder (grasp the suture near the end; Figure 1-24, C) and

pull your instrument toward you (Figure 1-24, D). Pull the suture down to the tissue, approximating the wound edges closed with gentle pressure. Do not apply more force than necessary to approximate the wound edges. You have created a new V in the suture arms. Repeat the wrapping of the needle holder and now reverse the pull of your hands with the needle holder being pulled away from you (Figure 1-24, E). Make sure that the knot lies down squarely on the first pass. Repeat this for a third time, completing the 2-1-1 surgeon's square knot (Figure 1-24, F).

Let's add two refining steps. When you start a tie, grasp one end of the suture with your forceps (held in your non-dominant hand) close to the end of the suture. Orient the

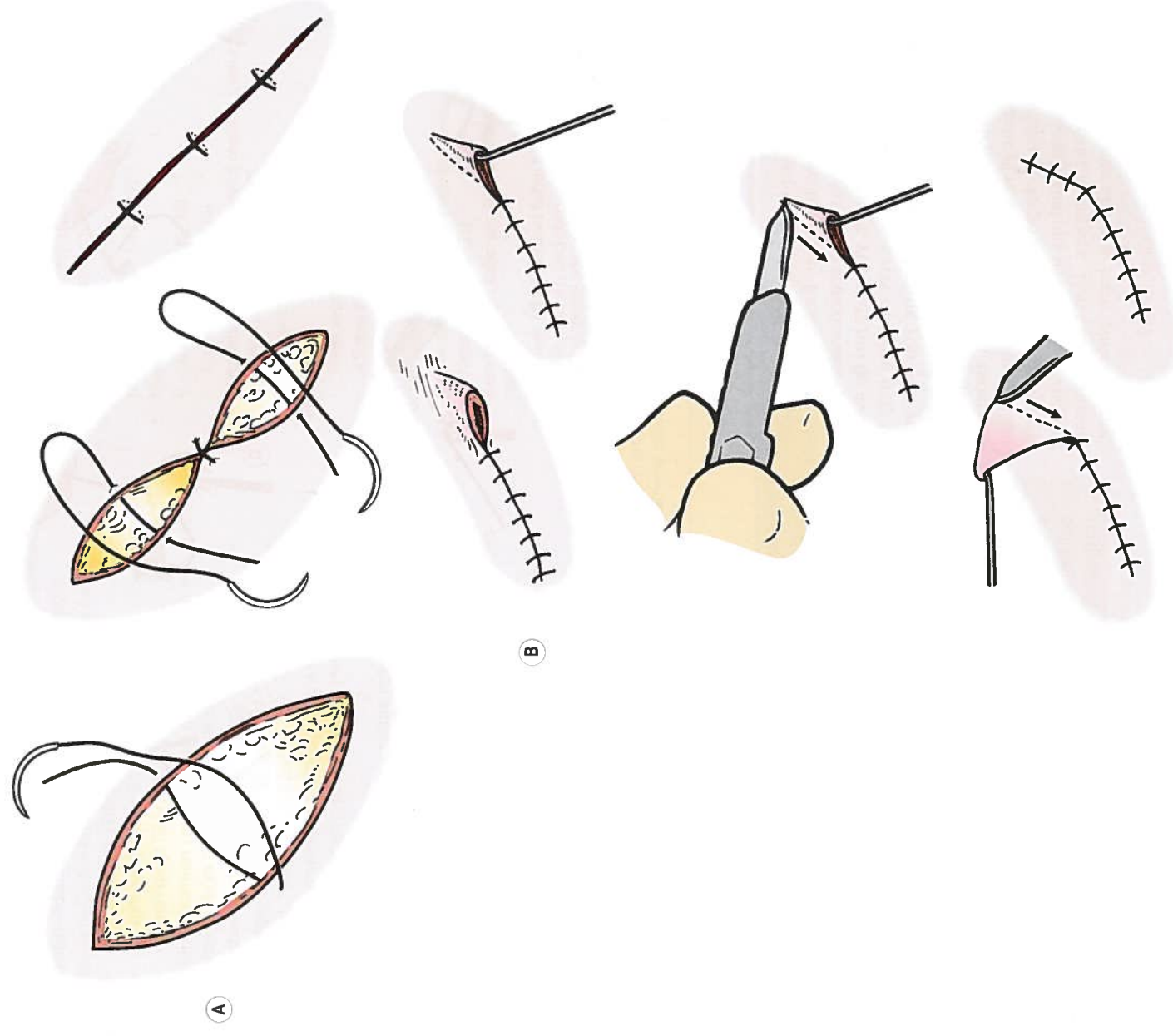


Figure 1-23 (A) "The halving" method for closure of surgical wounds. (B) "Dog-ear" excision of redundant tissue.

suture (sometimes using a gentle twist or pulling the suture to be parallel to the needle holder. Now wind the suture around the needle holder (not the needle holder around the suture). Because the needle holder and the suture are parallel, there will be very little "spring" in the suture and little tendency for the suture to unwind from the needle holder. Be sure that you understand this. The second point to remember is that, before you wind the suture around the needle holder, place the needle holder close to the end of the suture. Avoid the tendency to bring the needle holder to

the end of the free suture once the suture is wrapped around the needle holder. Practice with large sutures until you have this technique mastered. Then practice with smaller sutures. As you get better, concentrate on how to minimize your hand movements, making each tie look "easy." If you play violin or guitar, you know that minimizing your finger movements between notes is essential. *Learn to operate quickly, not by hurrying, but by moving your hands efficiently.* If each step takes twice as long as necessary, the whole operation will be twice as long as necessary.

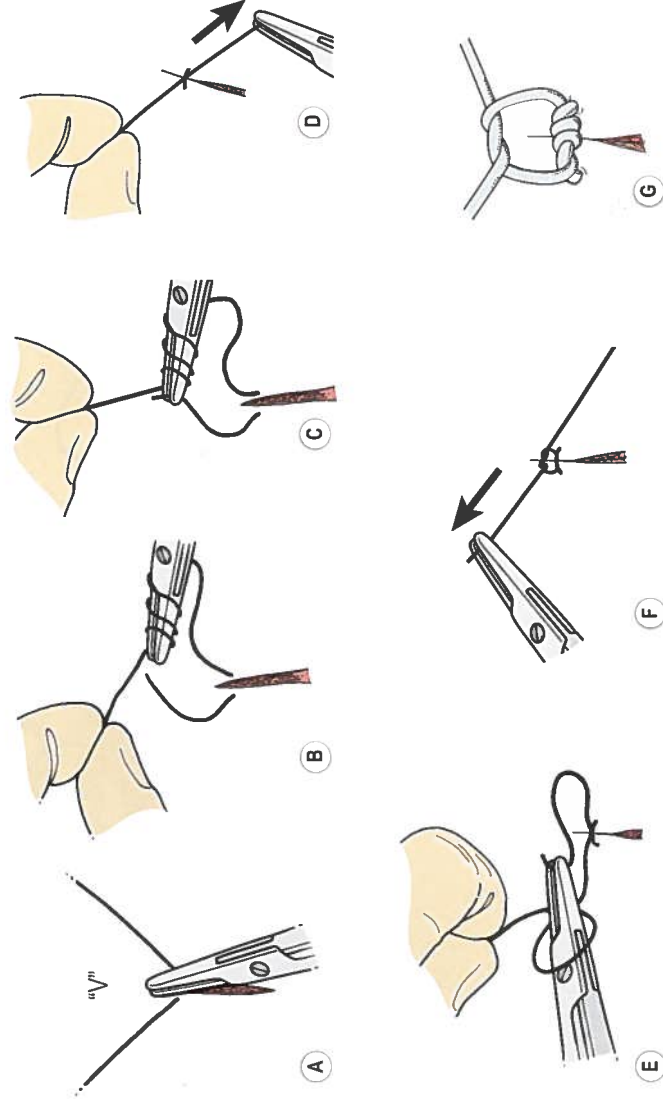


Figure 1-24 The instrument tie. (A) Place the needle holder in the V. (B) Wrap the suture around the needle holder three times. Try to make the suture and the needle holder parallel so there is not much “curl” in winding the suture. (C) Grasp the end of the suture (it should be near the needle holder to minimize your movements). (D) Pull the needle holder toward you and the suture end away from you. Notice that the knot should lie flat as you pull it down with each throw. (E) Put the needle holder in the V and wrap the suture around the needle holder once. Grasp the suture end and pull your hands in the opposite direction. (F) Repeat a third time, pulling your hands in the opposite direction again. (G) Each time, watch the knot tied flat.

The surgical assistant

The job of the surgical assistant is to *anticipate* and *facilitate*. It is said that good surgeons make surgery look easy, but the fact that *good assistants make surgeons look good is seldom appreciated*. If you are just learning surgery, you may not be aware of how important a good assistant is. Every day you may be operating with experienced surgeons assisting you. For you to appreciate the value of the assistant, try operating with a surgeon even less experienced than you. You will quickly realize the value of an interested and experienced assistant.

You also may not be aware of how your success as an assistant relates directly to your abilities as the primary surgeon. An experienced teacher can easily identify students with excellent surgical potential by the way they assist in surgery. Don't underestimate your value as an assistant or your ability to learn while assisting.

Checkpoint

- Do you remember the main differences between monofilament and multifilament sutures for handling and tying? Which has the better “hand?” What type of suture is the gold standard for handling?
- What are the main needle types and shapes? What is the most common needle point for sewing skin?
- Practice suturing using the “pencil grip” for the Castroviejo needle holder and the “thumb/ring finger grip” for the Webster needle holder.
- Explain the “in the V” technique for suturing to a colleague also learning to suture. Try the refinements suggested to make your ties smoother (Box 1-3).

Box 1-3

Instruments of Special Interest for Eyelid Operations

Retractors

- 4-0 silk traction suture (Ethicon 783 P-3 cutting needle)
- Jaffe lid retractor: recommended for all lid procedures as a self-retaining retractor (Storz E0997)
- Senn-Kanavel retractor (Storz N4780)
- Desmarres lid retractor: useful hand-held retractor for eyelids and eyelid incisions

- Size 0: 11 mm (Storz E0980)
- Size 1: 13 mm (Storz E0981)
- Size 2: 15 mm (Storz E0982)

- Size 3: 17 mm (Storz E0983)

Skin hooks

- Storz double fixation hook: fine double hook (Storz E0533)
- Tyrell iris hook: fine single hook (Storz E0548)
- Joseph double hook: larger double hook (Storz N4730)
- Knapp lacrimal sac retractor: four-prong blunt tip (Storz E4538)

Forceps

- Paufigue forceps: good all-purpose tissue forceps (Storz E1831)
- Adson forceps: cheek tissues (delicate, Storz N5405)

Box 1-3 Continued

- Brown-Adson forceps: cheek tissues (Storz N5420)
- Sanders-Castroviejo suturing forceps: delicate forceps
 - 0.12 mm teeth (Storz E1796)
 - 0.3 mm teeth (Storz E1797)
 - 0.5 mm teeth (Storz E1798)
- Bishop-Harmon straight tissue forceps: useful to thread fascia through Mayo trocar needle eye (Storz E1500)
- Lambert chalazion forceps (clamp)
 - Large, 15 mm (Storz E2632)
 - Small, 10 mm (Storz E2630)
- Halstead mosquito hemostatic forceps (Storz E3922)
- Kelly hemostatic forceps: larger than Halstead type (Storz N5511)
- Jeweler type forceps for fine suture removal (Storz E1947 1)

Needle holders

- Castroviejo needle holder: the most useful needle holder
- Straight locking, heavy, for 4-0 needles (Storz E3850)
- Straight locking, medium, for 5-0 and smaller needles (Storz E3861)

- Webster needle holder: used for 3-0 or larger needles
 - 19 mm jaw (Storz N5712)

Scissors

- Stevens tenotomy scissors
- Curved (Storz E3562)
- Straight (Storz E3560)

- Westcott tenotomy scissors: curved right, blunt tips, used for most delicate dissections (Storz E3320 R)
- Westcott stitch scissors: sharp-tipped, good for punctoplasty procedures (Storz E3321 WH)
- Mayo scissors
 - Straight (Storz N5235)
 - Curved (Storz N5236)
- Metzenbaum scissors: curved regular, useful for cheek dissections (Storz N5111)
- Facelift scissors

Elevators

- Freer septum elevator (also called a periosteal elevator)
 - 4.5 mm (Storz N2348)
 - 6.5 mm (Storz N2349)

Suction and hemostasis

- Frazier suction tube (9 French): general-purpose suction catheter (Storz N2421)
- Baron suction tube: small Frazier-type suction tube (Storz N0610)
- Yankauer tonsil suction tube: blunt-tipped suction catheter used for mouth and throat (Storz N7550)
- “Colorado” microdissection needle
- Bipolar cautery
- Unipolar cautery
- Disposable high-temperature cautery

Major points

- Being prepared will demonstrate your competence and instill confidence in the operating room team.
- Have the room setup in mind before you enter the operating room. Set your operating stool height first, then the operating table, and finally the microscope. Adjust the interpupillary distance on the eyepieces and set the focus of the scope. Position the necessary foot pedals before you scrub.
- Use a local anesthetic with epinephrine on all patients. Mark and inject the skin before preparing the patient.
- Learn as much as you can about the “tools of your trade”:

- Scalpel blades and other cutting instruments
- Scissors
- Forceps
- Retractors
- Cautery
- Suction
- Needle holders
- Sutures

- Spread and stabilize the skin before any incision. Be aware of your body position. Always inject or cut away from the eye or your fingers. The no. 15 scalpel blade and the microdissection needle are the most useful cutting tools.
- Hide incisions in wrinkle lines or natural skin creases, when possible.

- Scissors vary in the following characteristics:

- Length
- Caliber
- Tip sharpness
- Blade design
- Cutting motion

The scissors you will use most often are Westcott spring scissors and Stevens iris-type scissors. Use the curve of the scissors blade to your advantage. Make cutting a continuous motion. Avoid “snipping.”

- Oculoplastic surgery requires skill in retracting tissues.

Types of instruments use to retract tissues are the following:

- Your fingers
- Forceps
- Skin hooks
- Retractors

- Use forceps with teeth whenever possible. Learn to “pull” the tissues apart as you dissect with scissors. To separate the orbicularis muscle off the orbital septum, grasp the muscle with one forceps and the septum with another forceps (using an assistant). Gently “pull” the layers apart as you separate them with the scissors. Most surgery is not cutting, but separating tissue planes.

Major points Continued

- There are three types of retractors:
 - Self-retaining retractors
 - Hand-held retractors
 - Suture retractors
 - The most useful self-retaining retractor is the Jaffe lid speculum. Hand-held retractors including the Desmarres vein retractor (for eyelids) and the Sewall and malleable ribbon retractors (for orbital retraction) are very important tools; 4-0 silk sutures are excellent suture retractors.
 - Intraoperative hemostasis begins with stopping aspirin and nonsteroidal anti-inflammatory medications well in advance of surgery. Inject local anesthetic with epinephrine 10 minutes before making any incision. Learn to tamponade tissues.
 - Learning effective bipolar cautery technique is a must. Consider these three steps:
 - Exposure (assistant)
 - Tamponade (surgeon)
 - Cautery (surgeon)
 - The roles can be reversed.
 - Three types of suction tips are used in oculoplastic surgery:
 - Flexible suction catheter
 - Yankauer tonsil suction tube
 - Frazier and Baron suction tubes
 - Suture material varies in three basic characteristics:
 - Absorbable or permanent
 - Monofilament or multifilament
 - Natural fiber, synthetic, or metal wire
 - Monofilament sutures are less reactive than multifilament sutures, but are more difficult to work with. Multifilament sutures hold tension and maintain a knot better than monofilament sutures.
 - Needles vary by shape, size, and point: Half-circle needles are best for tight spaces (lateral canthoplasty). Reverse cutting needles are used on the skin. Spatula needles are used for most lamellar passes through tissue.
 - Two types of needle holders are used in oculoplastic surgery:
 - Spring handle: Castroviejo needle holder
 - Ring handle: Webster needle holder
- Use the "pencil grip" for the Castroviejo needle holder and the thumb/ring finger grip for the Webster needle holder.
- Sutures may be continuous or interrupted. Continuous sutures are used in natural skin creases or wrinkle lines (upper lid skin crease). Two types of interrupted sutures are used to close the surgical wound:
 - Simple suture
 - Vertical mattress suture
 - The vertical mattress suture provides the most wound eversion.
 - The job of the surgical assistant is to anticipate and facilitate. Your success as an assistant relates directly to

- your abilities as the primary surgeon. To be a good assistant, you need to be a part of the operation. Don't wait to be told what to do. Don't underestimate your value as an assistant or your ability to learn while assisting.
- The surgeon and the assistant work as a team. As with any team, all the players must know what the surgical plan is. As an assistant, you should be entirely familiar with the steps of the operation and any changes that the surgeon may have in mind for a particular patient. You cannot *anticipate* if you do not know the steps of the operation.
 - Your job as an assistant starts with the room and equipment setup. You may be the person to administer the local anesthetic or prep and drape the patient while the surgeon scrubs. Once in the operating room, you need to *position yourself where you can see what is happening* and be a part of the operation. You would be surprised at the number of surgical students who don't do well as assistants, claiming that they can't see the operating field. If you can't see, move so you can see. If you can't get in a reasonable position to see, let the surgeon know so the situation can be changed. *To be a good assistant, you need to be a part of the operation.* Don't wait to be told what to do. If the lighting is poor, adjust the operating room lights. If there is bleeding, provide exposure and tamponade. Perhaps you can offer suction. As the dissection proceeds, move with the surgeon, constantly adjusting your retractors to provide the best exposure possible. If you cannot see the area of interest well, it is likely the surgeon cannot either. As the dissection continues, provide gentle countertraction to facilitate cutting tissue or spreading of the tissue planes. *If you don't know how to help, ask what you can do to help.*
 - If you see the surgeon passing a suture, have a suture scissors ready to cut the ends of the suture. Use scissors with a straight blade and sharp tips. Hold the scissors with the tripod or thumb/ring finger grip. This allows you to stabilize the scissors with your index finger. Sometimes, it is helpful to rest the scissors on your nondominant index finger as if you were using a pool cue. The surgeon should pull the suture to the side (not straight toward you) so that you can see the full length of the suture. It is difficult to cut a suture if you are looking down the length of the suture. You may find it helpful to slide the scissors down the suture for a few inches to the knot. This gives you both visual and proprioceptive input as to where to close the scissors. Try to cut with the scissors tips to improve your accuracy. *Remember to close the scissors slowly rather than snip the suture.*
 - Your efforts practicing as an assistant will help you to become a good surgeon. Take advantage of the opportunity to learn. Be interested. Ask questions. Develop a passion for the operating room. Not only will operating be how you will support your family, but it will become a part of who you are. It all starts with you as an assistant.

Suggested reading

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