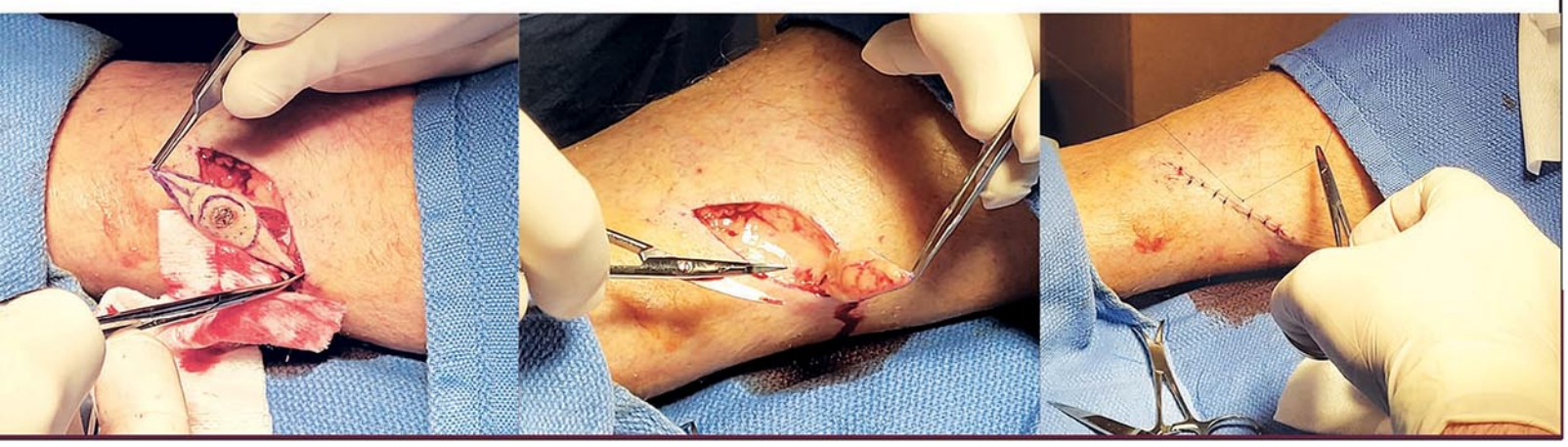
Glenn Goldman



# Techniques in Dermatologic Surgery



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# Chapter 4 Surgical instruments and suture materials

## INTRODUCTION

Proper surgical instrumentation is the key to performing effective surgery. Instruments must be effective, durable, and of high quality. Low-quality instruments are difficult to use, wear out quickly, and provide a low level of service. Instruments are made of tempered stainless chromium steel which resists rusting.

Instruments must be sharp and sterile. Proper use of instruments leads to a durable life, whereas using delicate instruments on the thick skin of the trunk or extremities will shorten the lifespan of the instrument.

A surgical suite must be outfitted with an adequate supply of instruments to run through an entire busy surgical schedule. A rule of thumb is that the practitioner should own twice as many instruments as are needed for a given day. Instruments may be sterilized during the day, but pre-prepared packs of instruments must be available, and spare instruments must be readily at hand.

## SURGICAL EQUIPMENT

### Safety equipment

All surgery suites must be fitted with safety equipment. At a minimum, the equipment must include a standard allergy kit and a bag/mask unit for ventilation during cardiopulmonary resuscitation (CPR). Preferably, the unit is also equipped with a cardiac defibrillator.

- A standard allergy kit contains injectable epinephrine and diphenhydramine which are available in the event of anaphylaxis.
- Most operative suites have an on-site oxygen canister. This can be either piped in or on a trolley.
- While not required by law, a portable defibrillator is indicated for any operative suite **(Figure 1)**.
- All of the earlier items require ongoing maintenance, periodic safety checks, and training.

### Trolleys/surgical stands

Surgical instruments are placed on a sterile paper or drapes over a portable stand known as a Mayo stand. The Mayo stand is a light stainless tray on wheels which is used to store instruments. Mayo stands are easily cleaned with biocides in between procedures.

- Most surgeons prefer a Mayo stand with one level (**Figure 2**).
- A four-wheel trolley with two levels of shelves is preferred by some surgeons, as this allows for two trays for the same patient, one used for tumour removal and one for wound closure.
- All trays should be labelled with patient's name, date of birth, and medical record number. The use of one patient's instruments on another patient has occurred and should be considered a "never event".




**Figure 1** A portable defibrillator is highly recommended for all offices where surgery is performed. The defibrillator must be checked weekly and properly maintained.



**Figure 2** Mayo stands are used to hold instruments and are draped for sterility. In between cases, they must be cleaned with reliable bactericidal and virucidal agents.

### Tables

Surgical tables must be strong, adjustable, and comfortable for the patient. Equally important, they must provide the surgeon with ready access to the patient. The most effective surgical tables for the office operative suite are based on the dental chair model.

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- Procedure tables should be hydraulic, mobile, and allow for the surgeon to access the patient in a neutral standing position (**Figure 3**).
- The table must recline, the back must move up and down, and the feet must have a support that can be raised or lowered. These features are standard on most quality examination tables (**Figure 3**).
- The vast majority of tables are now automated and have hydraulic functions. The ability to maneuver the table either with a hand control or a foot control is also standard and allows the surgeon or assistant to move the patient's position without changing gloves or moving.
- The head cushion must be mobile and must move both forwards and backwards. A common challenge during the procedures is neck discomfort, and having the head cushion properly placed will limit the incidence of this problem.
- Most tables are too heavy to be moved easily, however, they are often equipped to swivel, and this is very helpful when performing cases on the feet or legs, where the table in its native position might be a far reach from the electrocautery unit.
- Table coverings/fabric must be durable and non-porous. They are cleaned many times per day with harsh anti bacterial/anti-viral compounds and must be able to stand up to this treatment.

## Electrocautery units

Haemostasis is readily achieved with electrosurgical units. Two main types of electrosurgical units are used. The standard hyfrecator is a mono-terminal unit which can provide electrodesiccation or electrofulguration. The bi terminal unit (has a return pad) can provide electrodesiccation, electrofulguration, electrosection (cutting), and bipolar cautery.

- Units may be wall-mounted, counter-mounted, or on mobile stands. They must be within close reach of the patient, so that the cord allows the cautery tip to reach the patient with ease.
- A stand-mounted unit is ideal when the unit will be shared between multiple rooms



**Figure 3** Surgical chairs should be comfortable, maneuverable, and automated. The modified dental chair is appropriate for most cutaneous surgical procedures. It provides good access to the patient and keeps the patient comfortable during the procedure.

- Uni-terminal hyfrecator units are inexpensive and are readily wall-mounted in all rooms, allowing for basic excision, curettage, and electrodesiccation and other standard minor procedures (**Figure 4**).
- Bi terminal units/electrosurgical units are better suited to more extensive cases in which larger vessels will be encountered. While such units cost several thousand dollars, they are exceptionally durable and reliable and will often last an entire career (**Figure 5**).
- Most bi terminal units will come with a foot-controlled bipolar cautery setup. The bipolar setup is the safest way to treat patients with complex neurosurgical implants or cochlear implants. Similarly, patients with automatic implanted defibrillators are most safely treated with bipolar cautery. The bipolar assembly must often be gas sterilized.
- Smoke evacuators are indicated if a large smoke plume will be generated, especially when destroying lesions containing human




**Figure 4** Wall-mounted uni-terminal electrocautery units are used for many surgical procedures. They are most appropriate for standard excision, curettage, and electrodesiccation. A sterile sleeve should be placed over the hand-piece and a new tip must be used for each patient.



**Figure 5** A bi terminal cautery unit is the best electrosurgical unit for major cases, such as larger excisions, flaps, and grafts. The unit can be used for electrodesiccation, electrofulguration, bipolar cautery, and electrosection. This type of unit is exceptionally durable and may last for an entire career.

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papillomavirus (HPV). Smoke evacuators are now available in multiple configurations.
  - Standard smoke evacuators have a vacuum wand that is held by an assistant.
  - Many newer smoke evacuators attach directly to the electrosurgical pencil and evacuate smoke directly.

## Instrument sterilization

While it is a mundane task, instrument cleaning and sterilization is an essential part of proper patient care and instrument maintenance. Improper sterilization can lead to the spread of disease, and great attention to detail is warranted. Soiled instruments are first soaked in a bactericidal/virucidal solution. They are then manually brushed to remove any particulate while still immersed in the solution. Instruments are then placed in an ultrasonic cleanser which vibrates them in a cleansing solution to make sure that the cleaner gets into every tiny nook and cranny. The instruments are then rinsed with water, dried, packaged, and placed in an autoclave for heat and pressure sterilization (**Figures 6a** to **c**).

- Instrument sterilization should be laid out in a suitable space, so that instrument flow goes from dirty to clean.
- *Sink:* Instruments should first be placed in a stainless steel dish in a deep, wide stainless steel sink. This dirty utility sink should be used only for cleaning instruments.
- *Ultrasonic cleaner:* The ultrasonic cleaner should be placed adjacent to the utility sink on a non-porous counter that is easily sterilized.
- *Drying space:* Instruments are next laid out to dry on a towel.
- *Autoclave:* Instruments are wrapped in sterilization paper, marked with sterilization tape, and then placed into the autoclave.
  - Most offices now use portable, countertop autoclaves. Autoclaves require adequate ventilation and create substantial heat. The countertop on which they rest must be sturdy and heat tolerant.
  - Autoclaves require distilled water which is stored on site.
- *Storage:* Instruments are stored in a dry cabinet. All sterilized instruments have an expiration date on them, after which time they must be re-sterilized prior to use.

## Ancillary equipment

- Refrigerators are used to store neuromodulators, medications, and ice packs. Refrigerators for patient use must not be used for storage of food.
- Refrigerators must be monitored continuously and a log of temperature must be maintained.
- Sharp containers should be mounted on the walls within easy reach for facile sharp disposal.
- Drop buckets are ideal waste receptacles, and many are on wheels. They allow for easy intra operative disposal of blood-soaked gauze and other waste.
- A call button which can be pressed with an elbow in the middle of a procedure is also helpful if additional assistance during a procedure is warranted.



a


c



b

**Figure 6** Sterilization of instruments must be accomplished with diligence in all cases. (a) Dirty instruments are first placed in a cidal wash, then scrubbed, and then sonicated. (b) The instruments are then placed in a standard autoclave for heat and pressure sterilization. (c) The masking tape that is placed on the sterile packs will only turn black when the autoclave has done its job and the instruments have been subjected to appropriate heat.

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# SURGICAL INSTRUMENTS

Instrumentation may seem straightforward; however, the type of tools one uses can make a difference in working life years for the surgeon and can facilitate the procedure being performed. In general, the surgeon should purchase the finest instruments within budget. Quality surgical instruments will last for years. Sharp, durable scissors will greatly improve the experience of the surgeon and will make procedures much easier. Inexpensive, budget instruments quickly dull and/or become loose. There are many suppliers of quality surgical instruments. It is helpful to purchase in bulk to obtain discounts.

## Scalpels

While disposable scalpels are acceptable, they are generally neither ergonomic nor cost-effective in a procedural practice.

- The standard scalpel has a flat handle which is often etched with measurements.
- A rounded scalpel holder is lighter and more ergonomic. The handles are often knurled for a better grip. This type of handle can be rolled between the fingers and is particularly helpful for rounded excisions, Mohs surgery, and flaps (**Figure 7**).
  - Number 15 blades are typically used for facial surgery.
  - Number 11 blades are used for making stab incisions. They are dangerous and should be employed with caution.
  - Number 10 blades are large blades with a long belly. They are well-suited to excisions on the trunk and proximal extremities where the dermis is thick.

## Forceps

Forceps are used to grip tissues. Plain forceps have no teeth and can be used to grab large areas of skin, but most surgeons prefer toothed forceps. Toothed forceps are preferred in most cases, because they can be used to hold onto skin with only gentle pressure (**Figure 8**). As forceps can damage tissues, they should be handled delicately. Toothed forceps that are used in a rough manner will become misaligned and will not close properly. Once this has occurred, it is challenging to repair them.

- *Adson forceps:* Adson forceps are larger, more durable tissue forceps that are optimal for working on the trunk, scalp, or proximal extremities. They are relatively inexpensive.
- *Bishop-Harmon forceps:* "Bishops" are the most commonly used forceps for facial features. They are small, light, and delicate. They can grip thinner skin gently and cause less tissue injury than Adson forceps. Bishops forceps are maneuverable and provide a high degree of manual dexterity. Most Bishops forceps have multiple holes in the handles to optimize their minimal weight. Bishops forceps are expensive and must be handled gently. They are the surgical instruments most likely to be damaged by misuse, and at approximately $200 each for a quality pair; they warrant special care and handling.

## Needle drivers

Quality needle drivers are a must. They should be tailored to the surgeon's desires, and they vary by size and bulk to match up with various needles and tissue types. Needle drivers are among the most expensive instruments to purchase, but they are of great importance to the proper performance of surgical procedures. Some surgeons use smooth jaws, but most will prefer grooved or toothed jaws which allow for easier grip of needle and thread. The most durable needle drivers have tungsten tips which provide a longer lifespan and greater durability.

The needle holder handle should be appropriate for the type of skin being sutured – the longer the handle and the bigger the jaw, the greater the advantage for exerting force through the needle point. For this reason, many practices keep a "heavy" set for excisions on the back and a "fine" set for excisions on the face.

- Facial needle drivers are most commonly *Webster* or Petite Webster or *Halsey* needle drivers. These range in size from 4.5 inch to 5 inch and allow for fine manipulation (**Figure 9**).
- On the trunk or proximal extremity, common needle drivers are the *Mayo Hegar* and *Olsen Hegar*, but there are many other subtypes.

Some needle holders incorporate scissors which allow the surgeon to tie and cut independently, but this type of needle driver has a learning curve to avoid inadvertently cutting suture.



**Figure 7** Three types of scalpel handles and blades are demonstrated. At left is a #11 blade on a standard scalpel handle. In the middle is a #15 blade on a rounded handle. This is the most commonly used configuration for surgery on the face and distal extremities. The rounded handle allows for easy rotation and angling of the scalpel blade. At right is a disposable #10 scalpel blade. The #10 is most suited to trunk and extremity excisions. Be careful with its large blade which extends all the way to the handle and can cut the surgeon.



**Figure 8** Forceps are used to grasp tissue. The toothed Adson forceps (Top) are the workhorse for excisions on the scalp, trunk, and extremities. The delicate Bishops forceps (Bottom) are used for fine facial work.

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**Figure 9** Needle drivers for most cutaneous surgery should be 5 inch or 4.5 inch. Tungsten-carbide inserts will last for years and will maintain the grip on needles far longer than standard instruments. Needle drivers should only be used for grasping needles. At left is a standard needle driver for surgery on the trunk and extremities. The delicate needle driver at right is best for fine facial surgery.

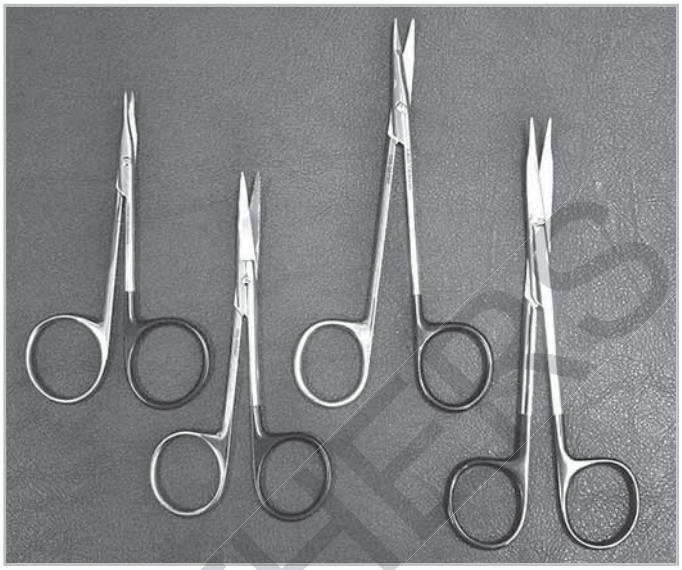


**Figure 10** Four types of surgical scissors. Far left: Gradle scissors are exceptionally sharp and fine. They are ideal for working with fine, delicate facial skin; Second from left: Standard iris scissors or tissue scissors are sharp scissors for cutting through dermis and subcutis. They are ideal for the excisional component of standard excisions; Second from right: Undermining scissors, such as these Shea undermining scissors are sharp with one serrated edge and slightly rounded tips. They are ideal for undermining on the face where they produce little tissue damage and glide easily through tissues; and Far right: Heavy duty tissue scissors are used for excisions on the scalp, trunk, and proximal extremities.

## Scissors

Scissors are used for dissection, cutting tissue, and cutting sutures (**Figure 10**). Scissors that are used for dissection have rounded ends to allow for gentle spreading without cutting. Scissors may be straight or curved. Curved scissors allow the operator to see the area being undermined. Specialized sharp scissors are meant to cut tissue only and will dull quickly if used to cut sutures.

- Tissue scissors are used to cut through the dermis and other layers of tissue. They are very sharp and usually have pointed ends that are curved.
  - *Iris scissors* are sharp, pointed tissue scissors. They are very sharp and are used for tissue excision on areas with moderate to thick dermis such as the scalp, cheeks, forehead, temple, and extremities.
  - *Gradle scissors* are small, delicate scissors. They are exceptionally sharp. They are used in conjunction with a scalpel for the excision of facial tumors or Mohs surgery in areas where the skin is thin. They are exceptionally precise.
- Undermining scissors have rounded tips to allow for the spreading of tissues prior to cutting. Undermining scissors may be used to cut through facial attachments, but in general, they should not be used to cut the dermis, as this will dull them more quickly.
  - *Metzenbaum* scissors are the most common undermining scissors. They are strong and durable and are used on the trunk, proximal extremities, scalp, and other areas where the dermis is thicker and the facial layers are strong.
  - *Shea* undermining scissors are smaller and more delicate. They combine a dissecting scissors with a delicate, sharp cutting implement. They are ideal for performing facial reconstructions.
  - *Castroviejo scissors* are delicate scissors used for eyelid surgery. They have extremely fine tips and are light and delicate (**Figures 11a and b**).
- Suture cutting scissors are heavy-duty, sharp, and pointed shears. They are designed to tolerate the repeated cutting of synthetic suture material. No matter how strong they are, suture scissors will need to be sharpened periodically.
- *O'Brien* scissors have a hooked end to finesse the removal of sutures (**Figure 12**).

## Skin hooks and specialized clamps

- *Skin hooks* are used to retract tissue edges either during undermining or to aid in hemostasis. Skin hooks on the face are fine, delicate, and usually have one hook. Larger hooks are used on the trunk or proximal extremities. Double hooks are most useful for the retraction of larger flaps of tissue. Hooks are of great assistance on the scalp where vessels often retract under deeper tissues.
- *Mosquito* clamps are used to grasp and clamp arterial vessels to aid in hemostasis. They are available in small sizes to assist in facial surgery or larger size for surgery elsewhere on the body.
- *Alice* clamps are strong, double-pronged sharp clamps that emulate the pincers of an insect. They are used to hold onto cysts during excision or to retract tissues. They can also be used to assist with closure.
  - Grab both sides of the closure and gently close the Alice clamp to take tension off the wound edges during closure.

## Curettes

Curettes are used to remove superficial skin cancers, precancerous lesions, and benign keratoses. While disposable curettes are readily available and inexpensive, they are very sharp and may cut through normal tissue. They are most useful for removing clavi and seborrheic keratoses on the trunk or extremities. A good set of high-quality curettes will last for years, can be re-sharpened, and they have a better "semi-sharp" quality than disposable curettes. They will, therefore, not cut through normal tissues.

SAMPLE PROOFS







**Figure 11** Castroviejo scissors are fine scissors for working on the eyelids. (a) So, surgery on the lid margin uses a topical tetracaine anesthetic, an eye shield, and Castroviejo scissors. Erythromycin ophthalmic ointment can be used to lubricate the shield. (b) Delicate Castroviejo scissors are ideal for removing eyelid lesions.



**Figure 12** Sutures are most easily removed with specialized O'Brien scissors which have a small hook to grab the sutures.



**Figure 13** Typical set of curettes available for curettage of benign and malignant lesions.

- Fox curettes are flat (not angled) and are most commonly used (**Figure 13**).
- For most lesions, a larger curette is first used followed by smaller curettes to tailor the final curettage.
- Curettes are sized by number and roughly correspond to the size in mm.
- Cannon curettes have an angled tip which may decrease the amount of pressure required to remove the epidermal lesion.

## Surgery sets

The instruments needed for a specific surgery are best collated and stored together for future use. They are sterilized as a set and opened for a specific use (**Figures 14a to d**).

## PEARLS

- Buy high-quality instruments and maintain them carefully.
- Use delicate instruments on the face (Bishops forceps, Petite Halsey needle driver, and rounded, knurled scalpel handle with #15 blade).

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**Figure 14** Surgery trays for cutaneous surgery are packaged and sterilized together. (a) Surgery tray for trunk and extremities – Scalpel with #15 or #10 blade, Adson forceps, Iris scissors, Undermining scissors, Standard 5 inch or larger needle driver, Mosquito clamp, Two Alice clamps, Bishops forceps (if desired), Suture scissors, Sterile cotton-tip swabs, Soft, sterile, and absorbent gauze, Light handle cover, and Cautery pencil and tip. (b) Facial surgery tray – Rounded, knurled scalpel handle with #15 blade, Bishops forceps, Gradle scissors, Iris scissors, Shea undermining scissors, Petite Halsey needle driver (4.5 inch) with delicate jaws, Mosquito clamp, Two Alice clamps, Suture scissors, Sterile cotton-tip swabs, Soft, sterile, and absorbent gauze, Light handle cover, and Cautery pencil and tip. (c) Mohs surgery initial stage tray – Rounded, knurled scalpel handle with #15 blade, Bishops forceps, Gradle scissors, Mosquito clamp, and Alice clamp. (d) Eyelid removal tray – Eye shield, Erythromycin ophthalmic ointment, Tetracaine drops, Saline, Castroviejo scissors, and Bishops forceps.

- Use larger, more durable instrument on the back (Adson forceps, Olsen-Hegar, or Mayo-Hegar needle driver, #10 blade).
- Do not cut thick tissue with gradle scissors. They will quickly dull.
- Keep instruments sharp and use a reliable sharpening company/service.
- Clean and sterilize instruments meticulously and maintain the sterilization equipment.
- Only cut sutures with suture scissors. Using tissue scissors or undermining scissors to cut sutures will destroy the scissors.
- Use all fingers to hold instruments in a manner to maximize their utility (**Figure 15**).



**Figure 15** A needle driver is held with the thumb and fourth finger looped. The second finger is used to stabilize the body of the needle driver and the third finger rests in the crux above the finger loop.

## FURTHER READING

Gandhi SA, Kampp JT. Dermatologic surgical instruments: A history and review. Dermatol Surg 2017; 43:11–22.

SAMPLE PROOF

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# Techniques in Dermatologic Surgery

Techniques in Dermatology is a "how to" text designed to provide basic instruction in the field of dermatologic surgery. Replete with photos, the chapters provide the reader with a solid basis in the most common procedures in dermatology. Unlike more didactic texts this is a bullet point learning experience, heavy on demonstration. The target audience is the general dermatology resident or advanced medical student. We describe what instruments to use, how to inject anesthesia, what sutures to choose, and how to manage a broad variety of benign and malignant skin lesions. Most texts on surgery of the skin are expansive. Techniques in Dermatology is more like a playbook, designed to be opened and used at the bedside. Written in plain English we hope that this text can be utilized worldwide as the field of dermatologic surgery expands and as dermatology training programs integrate procedural techniques into their education. While the text is primarily intended for dermatologists, it will also find use for primary physicians and surgeons who focus on skin disease, regardless of subspecialty.

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