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Sataloff's Comprehensive Textbook of
Otolaryngology
Head & Neck Surgery
Facial Plastic and Reconstructive Surgery

Series Editor
Robert T Sataloff



Volume Editor
Anthony P Sclafani

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CHAPTER 3

Soft Tissue Instruments and Sutures

Jonathan Sonne

SOFT TISSUE INSTRUMENTATION

Introduction

To perform complex surgical procedures, a surgeon needs high-quality precision instruments. Individual surgeons will select instruments best suited for the procedure, as the wrong instruments can result in unsatisfactory surgical outcome as well as damage to the instrument. Comfort of the surgeon is important with instruments appropriately sized for the surgeon's hand. Many soft tissue procedures can be performed with four basic instruments: scalpel, scissors, forceps, and a needle holder. More flexibility in performing complex procedures can be achieved by adding skin hooks, retractors, and hemostats to provide a sufficient supply and variety of instruments. Instruments for soft tissue procedures are often borrowed from related fields, and nomenclature can be confusing with instruments bearing the name of its primary function or person who designed it or popularized use.

Surgical Blades and Scalpel Handles

The scalpel is the most commonly used tool in soft tissue surgery. A scalpel consists of a snug-fitting disposable blade on a reusable or nickel-plated handle. There are two main types of scalpel handles, the standard Bard-Parker and Beaver. Bard-Parker style blades have a slot that slides over a corresponding raised portion on the scalpel handle, locking the blade in place. Although there are a variety of Bard-Parker handles, the number 3 handle is considered the workhorse. The number 3 handle may be obtained with ruler inscribed on the side, which is useful to gauge the size of lesions and plan flaps and grafts. Being flat, the number 3 handle is easy to hold, has little tendency to slip or roll, and will not roll around on surgical tray. Round-handled blade holders with knurled surfaces are also available and are popular among surgeons for their pencil-like feel. One such handle, the Siegel handle uses the standard system blades and is popular for delicate work, having a rounded handle and a knurled gripping surface that provides increased control.

The alternative to the Bard-Parker system is the Beaver style handle, which has a different attachment system and blades that are manufactured specifically for its use. The Beaver handle is typically composed of two pieces with the end of the handle being threaded to accept a second piece known as a collet. A slot in the collet accepts the blade and the two pieces, collet and handle, are screwed together to hold the blade securely. Beaver handles are small, narrow, and typically round with a knurled surface but also may be hexagonal in cross section. Beaver handles are especially useful for fine, delicate surgery, as the instrument is small and can be rolled with the fingers.

A variety of blades are available for both the standard Bard-Parker and the Beaver systems, with blade shapes and sizes referred to by numbers. With the Bard-Parker system, the most commonly used blades for soft tissue procedures are the number 15, 10, and 11. The number 15 blade has a small rounded belly and is ideally suited for delicate work on most areas of facial skin. The sharpest part of a number 15 blade is the belly, and thus, this is the area that should be used for cutting. The number 10 blade is large, broad

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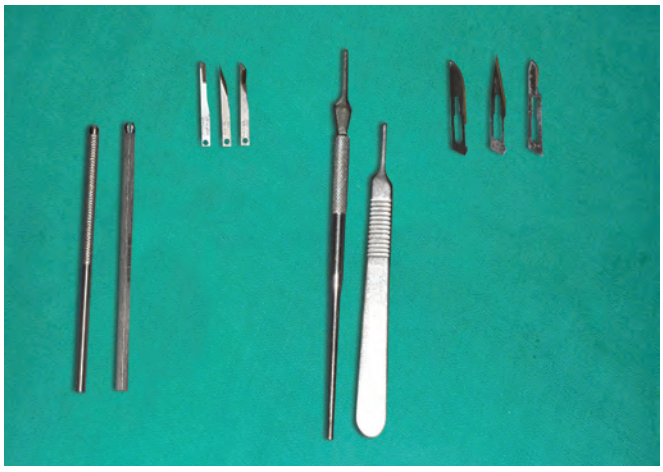

Fig. 3.1: From left to right; Rounded Beaver handle with knurled surface, hexagonal Beaver handle, 64 Beaver blade, 65 Beaver blade, 67 Beaver blade, Siegel handle, Standard number 3 handle with ruler, 10 blade, 11 blade, and 15 blade.



Fig. 3.2: Scissors from left to right; Wescott , Tenotomy, Iris, Ragnell, Kahn, Metzenbaum, Mayo.

and has a full, rounded convexly curved belly and a broad point with a long straight cutting edge. Like the number 15 blade, the sharpest part of the number 10 blade is also the belly. This blade is designed for larger excisional work and is too large for delicate procedures. This blade is especially useful for penetrating thicker skin, such as that found in the nuchal area or scalp. The number 11 blade is triangular with a long, narrow, sharp point. This blade is used for making stab incisions in drainage procedures, performing straight cuts on skin flaps, as well as cutting corners. The number 11 blade can be used as a microscalpel for making very tiny incisions.

Like the blades of the Bard-Parker system, Beaver blades come in a variety of sizes and shapes (Fig. 3.1). Generally, Beaver blades are smaller and sharper than their standard counterparts but tend to dull more rapidly. The number 67 Beaver blade is shaped like a smaller version of the standard number 15 blade with a gently curved belly and a sharp tip. The number 67 Beaver blade is popular for skin surgery and use on delicate tissues. The number 65 blade has a triangular configuration, similar to the standard number 11 blade. The number 64 Beaver blade has a cutting surface on a rounded tip that is used for incising in concavities such as the concha or the medial canthus.

Scissors

Scissors are used to cut and dissect tissue as well as to cut sutures and bandages. Scissors are preferable to a scalpel on flaccid tissue because they stabilize the tissue between the closing blades. Scissors are also preferable for blind dissection in areas where scalpels should be used with caution. Scissors vary in quality. German stainless steel tends to be the highest quality and most expensive, maintaining sharpness longer, resisting damage with routine use, and allowing for greatest precision. Instruments can be returned to the supplier for sharpening, maintaining tip approximation, and repair. Scissor nomenclature can be confusing as the same scissors have different names depending on the specialty using it, and the name often has little relation to the utility in soft tissue surgery.

Scissors vary in shape, size, and configuration, including long or short handles, curved or straight blades, plain or serrated blades, and blunt or sharp tips (Fig. 3.2). Each of these features has an impact on the overall utility of the instrument. Selection of scissors is based on personal preference but some basic principles apply. Long-handled instruments allow surgeons to reach under tissue for a longer distance, freeing up large flaps, or operating on areas of thicker subcutaneous tissue such as back of the neck. Short handles, on the other hand, are for fine, more superficial work. The farther the fulcrum from the hand (closer to the tip), the greater the stability and accuracy of the cut, but this benefit comes with a commensurate loss of mechanical advantage. The proper scissors should have adequate mechanical advantage to easily cut tissue at the tip. Cutting tissue at the fulcrum increases the force of the scissors but causes chewing of the tissue and unsatisfactory cutting. Curved blades allow better access to areas requiring fine dissection and provide better visualization

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of the surgical field. Straight scissors are more accurate for straight cuts and have greater mechanical advantage than curved scissors. Blunt-tipped scissors cause less trauma to neural and vascular structures, making them safer when working underneath the skin, such as undermining, and give better visibility when working in deep spaces. Sharp-tipped scissors are more favorable for dissection. One serrated blade and one plain/smooth blade allows for less slippage of tissue between the blades, which can be useful when cutting thin skin without substantial subcutaneous tissue such as around the eye, or in trimming skin grafts.

Iris scissors are a generic term that defines a variety of small delicate tissue scissors. Originally intended for eyelids and ophthalmologic surgery, iris scissors have wide application in facial soft tissue surgery. Iris scissors are sharp tipped, lightweight and are manufactured in a variety of lengths, although most are approximately 4 in long. These scissors can have blades that are straight, which are useful in creating sharp corners or fashioning the tips of flaps, or curved, which improve visibility while cutting. Iris scissors can have a serrated blade to decrease tissue slippage. The Iris scissors are a workhorse instrument for fine dissection with their short handles and sharp tips. With a fulcrum situated farther back from tips, iris scissors have less mechanical advantage than Gradle or Stevens scissors. This can render them less effective for cutting thicker facial skin but allows them to have good precision with delicate tissues. Ribbon finger loops are available on Iris scissors and are felt to be more comfortable and controllable.

The (Stevens) tenotomy scissors are another delicate scissors with origins in ophthalmology. This instrument has a reverse curve on the blade that makes it accurate for small cuts. Like the Iris scissors, the tenotomy scissors have a short handle and a short, usually curved, blade. When compared with the Iris scissors, the tenotomy scissors have a more tapered tip, a more gradual curve, and are less sharp. The fulcrum is more distal, with a larger handle to blade ratio so less arc is traversed by the blade for a given finger motion. This makes the tenotomy scissors well suited for fine, delicate dissection, such as in the periorbital area. The tenotomy scissors have a slightly blunted tip; a similar instrument with sharp tips is called a Gradle scissors.

Wescott scissors are a spring-loaded, pinch-type scissors that are also used in ophthalmologic surgery. These scissors have no rings on the handles but instead are operated by spring action with the blades coming together as the arms of the instrument are squeezed. Wescott scissors have very delicate blades, which open when pressure is released. The tip is finely tapered. When held between thumb and second and third digit, they cut thin tissue with great accuracy. Because the spring opens the jaws, there is little jarring while the scissors are advanced. The spring handle allows for a light touch and good control of the tips, making it a good instrument for delicate procedures such as blepharoplasty.

Operating scissors are tissue scissors that are widely used in general surgery but less so for soft tissue surgery on the head and neck. Well-known operating scissors include the Mayo, Metzenbaum, Ragnell, and Kahn. Mayo and Metzenbaum scissors are larger, heavier instruments. The Mayo scissors have a handle-to-blade-length ratio close to 1:1 thus causing a large arc of the blade for a given finger movement, which makes is less useful for soft tissue work and better for coarser dissection. With its mechanical advantage, the Mayo scissors are popular among general surgeons and are used more as a utility instrument in soft tissue work. Metzenbaum scissors range in size starting from 5.5 in and have long handles with relatively short blades, making the handle-to-blade-length ratio of approximately 5:1. With blunt tips that are good for undermining, the curved Metzenbaum scissors are popular for face-lift surgery. With a sharp blade and heavier weight, Metzenbaum scissors are good for dissection of thicker tissue that might overwhelm a lighter instrument. Metzenbaum scissors come in both standard and small sizes, and the small version, which has a thinner and more delicate blade, is commonly referred to as a "baby" Metzenbaum. Another popular dissection scissors is the Ragnell, which range in size starting at 5 in. This versatile instrument has a blunt tip and a curved blade. The distal half of the Ragnell's blade is flattened, which provides a thin operating edge for subcutaneous dissection and ease of manipulation and control. Some scissors such as the Kahn not only have a cutting surface between the blades, but also sharpened edges on the outside of the blade for ease of dissection.

Fine, delicate scissors should not be used to cut suture material, which can dull the blades. This is especially true with fine scissors such as Iris and Wescott. Stitch scissors come in a variety of sizes and shapes. Personal preference comes to bear when selecting a scissor for this purpose. Some stitch scissors have notches at one tip to catch suture. Long handles on these scissors can give assistants better reach.

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Forceps/Pickups

Forceps, often called "pickups," are nonlocking grasping tools used to hold, stabilize, and retract tissue. In soft tissue surgery, these instruments tend to be small and lightweight. Forceps come in a variety of length, weight, and tip configuration (smooth, serrated, and toothed), the latter two being most commonly used in skin surgery. Serrated tips enable forceps to firmly grasp tissue but cause more crush injury. Toothed forceps usually have a single tooth opposing and inserting into two teeth (1 × 2), allowing for more gentle grasping of tissue with minimal crush injury. Instruments that have teeth are called tissue forceps and are intended for skin, whereas those without teeth are generally nontissue forceps. In addition to grasping tissue, forceps can also handle nontissue items such as sutures. Generally, forceps are used as an extension of the thumb and forefinger of nondominant hand to stabilize tissue, allowing the dominant hand to cut or suture. When using forceps, gentle handling is important so as to neither place undue tension, which can rip tissue nor force which can crush tissue. If tissue requires excessive tension for stabilization or movement, a skin hooks may be a less traumatic option. Some forceps are available with a suturing platform, which is a slightly raised, smooth, flattened bar immediately behind the teeth. When suturing, a surgeon can grab the needle with the suturing platform, making the needle less likely to slip or twist.

A popular and versatile forceps is the Adson. With broad handles, Adson forceps are stable and easy to control and taper to a narrow tip that is appropriate for most skin surfaces. Adson forceps come in smooth and toothed models. The Adson 1 × 2 (one tooth on one jaw inserting into two teeth on the opposite jaw) is of medium weight and can be used for grasping a variety of tissues atraumatically. For grasping thicker tissue, the Brown–Adson forceps are a good option. Similar in shape to the Adson, the Brown–Adson forceps have a tip with multiple teeth (8 × 8), a configuration that gently but firmly grasps thicker tissue and is also good for extracting ruptured cyst fragments and friable soft tissue such as lipoma, or sebaceous skin. Brown–Adson forceps are also helpful in situations where gripping tissue is difficult or distributing the force of the forceps is important, such as with cartilage of the nose and ear. For delicate areas, such as the skin of the eyelids, the Bishop–Harmon forceps work well, as they are shorter, lighter, and more delicate to the aforementioned instruments. Bishop–Harmon forceps come in a variety of tip widths and are commonly used with the 1 × 2 tooth configuration. They are a delicate instrument; as such, they require delicate handling as bending of the tip causes malalignment, rendering these forceps incapable of grasping tissue. It should be noted that not all surgeons retract tissue in same manner. Some use forceps exclusively while others prefer skin hooks for less traumatic handling of tissue. With either technique, gentle handling of tissue is important for optimal cosmetic result.



Fig. 3.3: From left to right; Guthrie skin hook, Tyrell skin hook, Frazier skin hook, 10-mm Joseph Hook, Senn retractor, Alms retractor, Bishop–Harman forceps, Brown–Adson forceps, Adson forceps with teeth and smooth Adson forceps.

Skin Hooks/Retractors

Gentle, atraumatic handling to move, retract, or stabilize tissue is facilitated by the use of skin hooks. A skin hook is particularly useful for reflecting wound edges when placing buried sutures, as well as removing standing cone defects. If used properly, skin hooks cause less crush injury than forceps, which is particularly important in areas where cosmesis is a critical concern. A variety of skin hooks are available with single or double prongs, sharp or blunt tips, and a variety of lengths and curvatures (Fig. 3.3). A skin hook with more than two prongs is called a rake, and these instruments are good for retraction of a wounds edge to allow for visualization. Skin hooks used for soft tissue surgery are often the sharp-tipped variety, and caution must be taken to avoid puncture wounds and resultant exposure to transmissible disease to the surgeon and staff. The appropriate skin hook is that which matches the thickness of the tissue. The Frazier skin hook is very popular in soft tissue work. This sharp hook is versatile and lightweight and has a full curve for moving small

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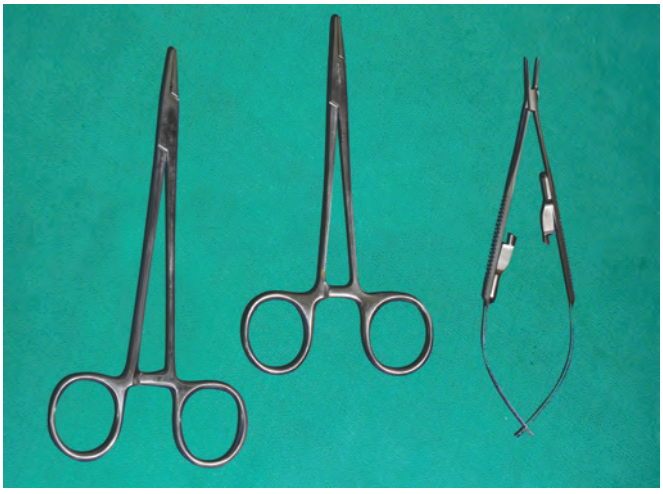

Fig. 3.4: Needle holders from left to right; Crile–Wood, Webster, Castroviejo.

facial flaps and wound edges. A Tyrell skin hook similarly has a single hook but is very small and good for delicate skin such as the eyelid and vermillion of lip. A Guthrie is a sharp, double-pronged skin hook that is small and also used on eyelids and other delicate tissue. A Senn retractor has a three-pronged rake on one end with a small right-angled retractor on the other end and is useful in assisting in surgery in areas where a skin hook is too delicate. A Joseph hook is either single or double pronged, with a thin, sharp, but rather large hook. In the double-hooked configuration, the hooks are separated by 2, 5, 7, 10 mm. Retraction during unassisted surgery can be accomplished in many cases with a self-retaining device such as an Alms retractor.

Needle Holders

Needle holders come in a variety of shapes and sizes, and the instrument should match the needle size (Fig. 3.4). Hence, small needles require small needle holders, whereas larger needles need larger needle holders. Inappropriate size can cause damage and flattening to small needles or slippage of larger needles. For soft tissue work, most surgeons prefer small needle holders with smooth jaws that can grasp fine needles on thin sutures that are used to close wounds. Large jaws with deep ridges and grooves are intended for large needles, as small needles would slip between teeth. Smooth needle holders are considered to be less damaging to finer caliber suture material than those with serrations or fine teeth. Some needle holders are made with hardened tungsten–carbide alloy inserts on the working surfaces of the jaws for more secure grasping and less instrument wear. These inserts can be replaced if broken and generally have gold finger rings to show that they have this feature. Needle holders most often have finger rings and a locking mechanism and are manipulated by pronation–supination action of forearm muscles. The locking mechanism is usually of the ratchet type and intended for the dominant hand. Proper grasp when using a needle holder is with the thumb and forefingers with the index finger resting on the shaft or fulcrum and the third finger resting on the shaft. Some surgeons like to "palm" their needle holders to increase the force that can be applied on needle. Regardless of the way it is held, the needle holder must be a size that fits comfortably in the hand as larger hands find short needle holders difficult to manipulate.

The Webster needle holder is an excellent option for soft tissue surgery. It is approximately 4.5 in in length, lightweight, with short handles, finely tapered narrow jaws, and relatively pointed tips. The Crile–Wood needle holder is longer, measuring approximately 6 in in length and has gently tapered, blunt tips. This instrument is built for suture with larger needles, such as 3-0 or 4-0, making it a good option for thicker skin. The Crile–Wood instrument comes with smooth or serrated tips and, like most needle holders, can be obtained with or without alloy inserts. Instruments with finer jaws are suggested for smaller needles. The Castroviejo needle holder is a pencil-shaped, spring-action instrument, similar to Westcott scissors and can securely handle small needles found on fine sutures. The Castroviejo needle holder has detachable spring handles and an optional self-locking mechanism. Operators with small hands find this instrument to be very comfortable. This needle holder was developed for ophthalmic surgery and allows the needle holder to be both opened and closed by the same pushing action, which avoids jarring that occurs by unlocking a conventional needle holder. As it is held like pencil, it is manipulated with the small muscles of the finger and hand as opposed to normal needle holders that are manipulated by larger pronation and supination muscles of the forearm. This needle holder is highly maneuverable and accurate.

Hemostats and Clamps

Hemostats are available in curved or straight configurations and have a ratchet lock situated near the finger rings (Fig. 3.5). With transverse serrations along the jaws, these instruments are effective at grasping tissue, particularly blood vessels. In soft tissuefbf work, most hemostasis is

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Fig. 3.5: From left to right; Hemostat, chalazion clamp, Backhaus perforating towel clamp, Jones towel clamp, and Lorna/Edna nonperforating towel clamp.

accomplished with electrocautery, but arterial bleeding can render electrocautery less effective. As such, hemostats are less needed in soft tissue work where larger blood vessels are less frequently encountered and ligature is less commonly required. However, a hemostat is invaluable when confronted with larger vessels such as seen on the scalp. Similar to scissors, curved hemostats provide greater maneuverability in deep wounds than their straight counterparts. A hemostat can also used for blunt dissection and probing. When used for hemostasis, the blood vessel should be grasped as close to the tip of the instrument as possible with tip up. When used this way, when a suture is placed around vessel, it can be snuggly and easily tied beneath the tips of the hemostat. This technique keeps crushing of surrounding tissue to a minimum and allows the most secure ligature to be applied on vessel as possible. Commonly used hemostats are the Halstead and Hartman, both commonly called a "mosquito." The Hartman is smaller and more delicate with serrations along the entire length of the jaws, and it is excellent for soft tissue work.

The Desmarres clamp is intended to grasp and stabilize the eyelid during incision and drainage of chalazion. This instrument can also be useful in treating lesions in mucous membranes, including oral mucosa where subcutaneous structures are freely mobile or difficult to grasp. It is a helpful instrument that can secure difficult to handle structures such as the earlobe, lips, nasal ala, and tongue. Shaped like a forceps, the Desmarres clamp has a flat plate that is opposed by a thin ring with a variable approximated thumbscrew clamp to secure skin between the ring and plate. Once affixed to the tissue, hands-free operation is possible. As the thumbscrew is gently tightened, blood flow ceases and the clamp maintains a dry field. Care must be taken not to apply too much pressure so as to cause neurovascular injury. Slow release of the thumbscrew allows for rapid identification of blood vessels requiring further attention.

A towel clamp allows sterile drapes to be firmly anchored into place, which is particularly convenient for longer procedures where drapes can be dislodged by inadvertent patient movement. A towel clamp may also be used to anchor an electrocautery cable. Towel clamps are available in conventional or cross-action styles, in large and small sizes, and in perforating and nonperforating configurations. A popular towel clamp is the Backhaus, which is shaped like a scissors but has jaws that bow out to form a circular shape and sharp tips that meet centrally and overlap slightly. A similarly scissor-like clamp that is nonperforating is the Lorna/Edna clamp. A locking mechanism allows this clamp to hold more bulk. A clamp with similar tips but having a handle more like a forcep than a scissor is the Jones towel clamp. This reverse spring action instrument, which lacks a locking mechanism, is preferable for lighter drapes. An alternative to a towel clamp is disposable drapes with an adhesive strip, but these tend not to remain secure, especially on contoured surfaces.

Instrument Care

Instruments are an investment, and proper care is essential to prolong their usefulness. As soon as possible after their use, instruments should be carefully placed in cleaning solution, soaked to remove blood and debris and scrubbed with a soft brush if needed. Special attention is needed with sharp instruments such as hooks and sharp scissors. An ultrasonic cleaner not only helps minimize handling of sharp instruments, it is also an effective way to clean instruments, especially hinged instruments such as hemostats, needle holders, and scissors. After cleaning with a disinfectant solution, instruments should be rinsed and dried. Hinged instruments benefit from instrument milk (oil–water emulsion that acts as lubricant). After cleaning, instruments should be placed individually rather than dumped en masse into surgical trays and sterilized. Manufacturers provide instructions on cleaning, sterilization, and maintenance.

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SUTURE MATERIAL

Role of Sutures in Wound Healing

The primary function of a suture is to maintain closure and to promote healing during the time when the wound is most vulnerable. The process of wound healing can be affected by the amount of suture material used, the suture type, the suturing technique, and the amount of tension on the suture. The process of wound healing has been divided into three separate phases: initial lag phase (days 0 to 5) where the wound strength is relatively minimal, fibroplasia phase (days 5 to 14) where a rapid increase in wound strength occurs, and the maturation phase (days 14 on) where there is further connective tissue remodeling. An important aspect of wound healing is that only 7% of the final tensile strength of the wound is achieved at 14 days. Therefore, with the use of nonabsorbable cutaneous sutures removed at about a week, buried absorbable sutures play a critical role during the initial lag phase when innate wound tensile strength is determined mostly from epidermal cellular and fibrin adhesion.

Properties of Suture Material

Often, there is more than one appropriate method of wound closure. For instance, wound closure on a young child will be different than wound closure in an elderly patient with multiple comorbidities and thin skin. As such, selection of suture material is based on the patient's health, age, the anatomic location of the wound, and a surgeon's preference and experience handling the various sutures materials. A surgeon must choose the method of closure that affords technical ease, efficiency, a secure closure, minimal pain, and optimal scarring. Furthermore, skin differs throughout the body in relation to thickness, elasticity, speed of healing, and tendency to form hypertrophic scars. It should be noted that suture material manufactured by different companies has similar chemical components, but performance qualities may not be identical.

Attributes of an ideal suture include easy handling, the ability to form secure knots, and high tensile strength. In addition, the suture should be able to stretch to accommodate wound edema as well as recoil to initial length as the wound retracts. For the purposes of practicality, it should be easily sterilized, visible, and reasonably inexpensive. Unfortunately, no one suture encompasses all these characteristics. The US Pharmacopeia is the official organization that provides standards through definitions and descriptions of physical characteristics.

Configuration

The physical configuration of a suture describes whether it is single stranded or monofilament (polypropylene or nylon) versus multistranded or multifilament (silk). Multifilament sutures come in twisted and braided types. Sutures that are braided are advantageous as they easier to handle and tie. However, braided sutures have increased tissue reactivity due to the potential ingress through capillary penetration of foreign material and bacteria between the strands. Once bacteria have become harbored in crevices of braided sutures, they can avoid phagocytosis, making wound infection rate significantly higher in braided sutures as compared with monofilament. As a result, monofilament suture may be better suited for closing contaminated wounds. Monofilament suture's attributes are its strength and low tissue drag but tends to have poorer handling.

Coefficient of Friction

The coefficient of friction determines how easily a suture will pass through the skin. A suture with low coefficient of friction such as polypropylene (Prolene; Ethicon, Inc, Somerville, NJ, USA) slides through tissue easily and is often used for running subcuticular closures. Lower coefficient of friction also means a more slippery suture, often requiring additional throws as the knots are more likely to unravel.

Suture Cross-sectional Diameter (Caliber)

To meet US Pharmacopeia standards, the average strand diameter must remain within defined limits. The diameter of a suture is reflected by a number of zeros. Hence, the smaller the caliber of the suture, the more zeros. For example, a 6-0 nylon suture has smaller diameter than 4-0 nylon. However, the actual diameter of a given suture depends on the chemical composition of the suture, meaning a 5-0 surgical gut has a different (larger) diameter than 5-0 polypropylene.

Tensile Strength

To meet US Pharmacopeia standards, suture must meet minimum tensile strength requirements. Tensile strength is defined as the amount of weight required to break a suture divided by its cross-sectional area. This relationship is not linear. The standard for identifying varying tensile strength of a given suture material is determined by a number of zeros. The smaller the cross-sectional

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area, the more zeros. Sizes start with 0 and progress downward through 2-0, 3-0, 4-0, and 10-0. Thus, 4-0 nylon has a greater diameter than a 6-0 nylon and, therefore, a greater tensile strength. A suture should be selected that has an adequate tensile strength for its specified purpose. Effective tensile strength is an additional measurement that assesses tensile strength of a suture that is looped and knotted. A knotted suture has approximately one-third the tensile strength of the same material unknotted.

Knot Strength

The least reliable part of a suture is the knot. Knot security describes the quality of the suture that allows it to be tied securely with the minimum number of throws per knot. Greater knot strength decreases the risk of wound dehiscence. Knot strength is calculated by determining the force necessary to cause knot slippage and is directly proportional to the suture's coefficient of friction as knots stay tied due to friction produced by one part of the knot acting on another. A suture with a high coefficient of friction has good knot security but tends to drag through the skin and is less easily handled, and, conversely, a smooth suture has decreased knot security and requires extra throws.

Tissue Absorption

Tissue absorption reflects the body's ability to degrade suture over time. Absorbable suture is defined as one that loses most of its tensile strength within 60 days. Absorbable suture undergoes degradation and absorption in tissues. Nonabsorbable suture maintains tensile strength and is resistant to absorption. However, most foreign tissue will eventually undergo some degree of absorption over time. The rate of absorption is especially pertinent to late suture complications, such as development of granulomas, which increases in sutures that are slowly absorbed. Absorbable suture is generally used for buried suture to approximate deep tissues. Nonabsorbable suture is most often used externally in skin closures requiring eventual removal or may be used for deeper sutures for wounds that require prolonged support. The rate of tissue absorption is distinct from the rate of tensile strength loss as suture may display rapid loss of tensile strength yet be absorbed slowly.

Elasticity

Elasticity refers to a suture's intrinsic ability to be stretched and return to its original length after stretching. A suture with good elasticity will stretch when wound edema occurs and the return to its original length and form after swelling resolves thereby maintaining wound edge approximation. Consequently, the ability to stretch allows a highly elastic suture such as polybutester (Novafil) to expand without leading to strangulation or laceration of the tissues when edema occurs but still reapproximates the wound edges when edema subsides.

Plasticity

Plasticity refers to the capacity of a suture to be permanently molded or altered. Unlike elasticity, plasticity is the ability of a suture to stretch with edema without returning to its original form once the deforming stress of swelling resolves. Sutures with high plasticity may become loose once swelling decreases, thus failing to maintain tissue reapproximation.

Memory

Memory refers to the inherent capacity of suture material to return to its former shape after being manipulated. A suture with a high level of memory is stiffer and less pliable, making it more difficult to handle. A suture with memory is also susceptible to becoming untied, necessitating additional knots. Memory also allows a suture to remain free of curling and other contortions that may interfere with surgical handling and use.

Handling

Ideally, suture material should handle comfortably and naturally. Handling encompasses the aforementioned factors including configuration, diameter, elasticity, plasticity, and memory. In general, braided sutures are easier to handle than monofilament. Braided suture has a higher coefficient of friction, rendering it easier to grasp. Silk, in particular, is known for excellent handling and ease of knot tying.

Tissue Reactivity

Tissue reactivity is the inflammatory response within the wound evoked by the presence of a substance foreign to the body. This response peaks within 2 to 7 days and is a function of the type and configuration of the suture. Natural materials such as silk and gut are more reactive than synthetics such as polypropylene. Generally, the greater the amount of suture material implanted, the greater the risk of a tissue reaction. Superior tensile strength and knot security are important qualities that not only reduce the

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Table 3.1: Absorbable suture

Suture	*Material*	*Processing*	*Filament*	*Tensile strength*	*Tissue reaction*	*Complete absorption, days*
Catgut	Cow or sheep intestine	None	Twisted monofilament	Poor	High	70
Chromic catgut		Tanned with chromic acid salts		Poor	High	90
Fast absorbing gut		Heat treated		Poor	High	60
Polyglycolic acid (Dexon)	Synthetic polymer of glycolic acid	Dyed, undyed, coated polycaprolate	Braided or monofilament	Good	Moderate	90–100
Polyglactic acid (Vicryl)	Synthetic copolymer of glycolic and L-lactide	Dyed, undyed, coated galactin 370	Braided	Good	Moderate	60–90
Polydioxanone (PDS)	Synthetic polymer of paradioxanone	Undyed	Monofilament	Good	Low	180–210
Polytrimethylene carbonate (Maxon)	Copolymer of glycolide and trimethylene carbonate	Dyed	Monofilament	Good	Low	180–120
Poliglecaprone (Monocril)	Synthetic copolymer of glycolide and caprolate	Undyed	Monofilament	Good	Low	90–120

risk of suture breakage, but also decrease the quantity of foreign material remaining in the wound by allowing finer sutures and fewer knots.

Fluid Absorption and Capillarity

Fluid absorption is the ability of a suture to take up fluid after being immersed while capillarity is the extent the absorbed fluid is transferred along the strand. Capillarity is an inherent "wicking" property of multifilament suture due to the available interstitial spaces, which are not present in monofilament sutures. Braided polyester (Mersilene; Ethicon, Inc, Somerville, NJ, USA) shows capillarity, whereas braided silk with wax and chromic gut do not have capillarity. Capillarity is also related to the ability of a suture to transport and spread microorganisms, thus increasing the potential for infection complications. For instance, braided nylon can take up three times as many microorganisms as monofilament nylon.

Absorbable Suture Material

An absorbable suture is generally defined as one losing most of its tensile strength within 60 days. Common absorbable sutures are catgut, polyglycolic acid (Dexon; Covidien, Mansfield, MA, USA), polyglactic 910 (Vicryl; Ethicon, Inc, Somerville, NJ, USA), polydioxanone (PDS; Ethicon, Inc, Somerville, NJ, USA), polytrimethylene carbonate (Maxon; Covidien, Mansfield, MA, USA), poliglecaprone (Monocryl; Ethicon, Inc, Somerville, NJ, USA), and catgut. Absorbable sutures are mainly used as buried sutures to reduce tension on wound edges. The ideal absorbable suture has low reactivity, high tensile strength, slow absorption, reliable knot security. No absorbable suture possesses all of these properties so selection of a particular suture demands weighing the advantages and disadvantages of each (Table 3.1).

Catgut

Catgut or surgical gut, is a natural product composed of purified connective tissue, mostly collagen, derived from sheep or cattle intima. Catgut has been used for centuries but is becoming less common as it has poor tensile strength and poor in vivo knot stability. Catgut is degraded by proteolysis in which enzymes created by polymorphonuclear leukocytes and monocytes digest the suture proteins. This degradation process causes significant tissue reactivity. Catgut maintains its tensile strength for 4 to 5 days and after 2 weeks its knot security is essentially gone. To delay its absorption time and reduce its tissue reactivity, catgut can be soaked in chromic acid salts. Chromic gut retains tensile strength for 14 days, is absorbed in 21 days, and can be used as a top layer for skin closure.

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Fast absorbing gut (Ethicon, Inc, Somerville, NJ, USA) is heated to induce faster absorption and is primarily used as an epidermal suture in situations where suture removal would be difficult such as in children or in split-thickness skin grafts. Synthetic sutures tend to have substantially less tissue reactions and more predictable resorption and are becoming a preferred option over catgut.

Polyglycolic Acid (Dexon; Covidien, Mansfield, MA, USA)

Polyglycolic acid is a polymer of glycolic acid and in 1970 was introduced as the first synthetic absorbable suture. Polyglycolic acid has superb tensile and knot strength, when compared with catgut. Since polyglycolic acid is not an organic substance and is absorbed by hydrolysis, it does not elicit the same inflammatory response as catgut, which is absorbed by proteolysis. With less tissue reactivity, polyglycolic acid also has delayed absorption as compared with catgut. Tensile strength loss of polyglycolic acid is 40% after 7 days, 80% at 15 days, 95% at 28 days, and completely gone at 90 to 120 days. In its monofilament configuration, polyglycolic acid is stiff and hard to work with, but its braided form has greater ease of handling. Polyglycolic acid is also available with a synthetic coating (Dexon Plus) to smooth knot tying and passage through tissues. Dexon II has a newer synthetic coating of polycaprolate, which decreases the coefficient of friction to further improve smoothness and knot security. The coating also decreases the potential to harbor bacteria. Polyglycolic acid can extrude or "spit" through the suture line.

Polyglactic Acid (Vicryl; Ethicon, Inc, Somerville, NJ, USA)

Vicryl was introduced in 1974, as the second synthetic suture material. Polyglactic acid is a copolymer of lactide and glycolide with a coating of polyglactic 370 and calcium stearate. This lubricant coating provides Vicryl with superb handling and smooth tie down properties. Eight per cent of tensile strength is maintained at 28 days and complete absorption occurs between 60 and 90 days. As a synthetic, Vicryl is degraded by hydrolysis and thus has minimal tissue reactivity. Polyglactic acid comes in a braided configuration and is supplied dyed or undyed, but when dyed, it can be visible beneath skin surface, so is less popular in soft tissue procedures. Polyglactic acid is useful as a buried suture to approximate wound edges until the wound has gained enough tensile strength to keep the edges from separating. Similar to polyglycolic acid, polyglactic acid can extrude or "spit" through the suture line, which appears as a lump that resolves with time. Vicryl Rapide is a partially hydrolyzed suture that is sterilized with gamma irradiation, thus speeding its absorption but leaving its physical properties intact. Vicryl Rapide is also absorbed through hydrolysis, maintaining 50% of its tensile strength at 5 days, 0% at 2 weeks. Vicryl Plus is impregnated with triclosan, a well-known antimicrobial material with a long history of safe use as the active agent in consumer healthcare products. Pediatric surgeons have noted less postoperative pain with use of this suture, which is likely due to inhibition of bacterial colonization and subclinical infection.

Polydioxanone (PDS; Ethicon, Inc, Somerville, NJ, USA)

PDS is a polymer of polydioxanone that has prolonged tensile strength in vivo when compared with Vicryl or Dexon. PDS retains 74% of tensile strength at 2 weeks, 58% at 4 weeks, 41% at 6 weeks. Polydioxanone is hydrolyzed more slowly than other synthetic absorbable sutures with complete breakdown occurring by 180 days. This suture is especially useful in situations where extended wound tensile strength is required. Polydioxanone has minimal foreign body reaction and is a monofilament so it is less likely to harbor bacteria, making it a good alternative in a wound that has bacterial infection. Due to its intrinsic stiffness, polydioxanone is more difficult to use than braided alternatives. Polydioxanone II or PDS II has decreased stiffness and smoother handling characteristics while maintaining original tensile strength qualities. This suture comes both dyed and undyed.

Polytrimethylene Carbonate (Maxon; Covidien, Mansfield, MA, USA)

Polytrimethylene was developed to combine the excellent tensile strength of polydioxanone with improved handling properties. A synthetic monofilament, polytrimethylene is composed of copolymer of glycolide and trimethylene carbonate. Polytrimethylene retains 81% of its strength at 14 days, 59% at 28 days, 30% at 42 days. This suture is completely absorbed by hydrolysis between 180 and 210 days with minimal tissue reaction. More supple than polydioxanone and with 60% less rigidity, polytrimethylene has favorable handling characteristics. This suture has excellent first throw holding capacity and smoother knot tying than Vicryl or Dexon, which facilitates tissue approximation and reduces knot repositioning.

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Table 3.2: Nonabsorbable suture

Suture	*Material*	*Processing*	*Filament*	*Tensile strength*	*Tissue reaction*	*Complete absorption*
Silk	Silk	Dyed, coated with beeswax or silicone	Braided	Low	High	Significant proteolysis at 2 years
Nylon (Ethilon, Dermalon)	Synthetic polymer of nylon	Clear or dyed	Monofilament	High	Low	66% of tensile strength at 2 years
Nylon (Nurolon, Surgilon)		Dyed, silicone coated	Braided			
Polypropylene (Prolene)	Synthetic polymer of propylene	Clear or dyed	Monofilament	High	Low	Never
Polyester (Ticron, Ethibond)	Synthetic polyethylene terephthalate	Dyed, coated	Braided	High	Low	Never
Polyester (Dacron, Mersilene)		Dyed, uncoated				
Polybutester (Novafil)	Synthetic copolymer of butylene terephthalate and polytetramethylene ether glycol	Dyed	Monofilament	High	Low	Never
ePTFE	Expanded polytetrafluoro-ethylene		Monofilament	High	Low	Never

Poliglecaprone (Monocryl; Ethicon, Inc, Somerville, NJ, USA)

Poliglecaprone is a synthetic, absorbable, monofilament made of a copolymer of glycolide and e-caprolactone. When compared with Vicryl Rapide, poliglecaprone subcuticular closure resulted in significantly smaller, less reactive scars with lower tendency for hypertrophic scar formation. This suture has significant initial tensile strength, allowing for a smaller suture. Dyed Monocryl retains 30–40% of its tensile strength at 2 weeks, whereas undyed retains 25% at 2 weeks. Complete absorption through hydrolysis is achieved at 90 to 120 days.

Barbed Suture (Quill SRS; Angiotech, Vancouver, Canada)

Barbed suture is a knotless synthetic suture that is made of absorbable dyed polydioxanone (PDS) or undyed poliglecaprone (Monocryl), as well as nonabsorbable undyed polypropylene (Prolene) and dyed nylon. Barbed suture allows bidirectional fixation of wounds. Suturing with barbed sutures begins at middle of a wound and extends out in two directions from this midpoint. Barbs within the suture material distribute tension across the wound, eliminating the need for knots. Because the barbs prevent backwards slippage, there are not gaps in tension and as a continuous deep suture, there is even reapproximation not seen with individual interrupted deep sutures. A continuous deep suture also allows time savings when applying deeper layers of suture. This suture does have significant memory, which makes for less favorable handling.

Nonabsorbable Suture Material

The term nonabsorbable is generally defined as material that is appropriately resistant to degradation mechanisms of living mammalian tissue. This term, however, is relative because many of these suture materials are eventually degraded (Table 3.2).

Silk

Silk is created from natural protein filaments spun by larva of the silkworm species *Bombyx mori*, which are excreted as it builds a cocoon. Silk is dyed for easier visibility, braided for ease of handling, and coated with wax or silicone to reduce friction and capillarity. Silk has excellent handling properties, and it is soft and easy to tie. Silk has the lowest tensile strength of any nonabsorbable suture, and this strength decreases over a year and is gone by 2 years. As a natural product, silk elicits a significant inflammatory reaction exceeded only by catgut. Due to its braiding, silk has high capillarity, and it should be avoided

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in areas prone to infection. For soft tissue work, its ease of handling and softness make it good for retraction during surgery or in mucosal areas.

Nylon (Ethilon; Ethicon Inc, Somerville, NJ, USA)

Introduced in 1940 as the first synthetic suture, nylon is a polyamide fiber. Nylon is most widely used as a monofilament, has high tensile strength, excellent elastic properties, and has minimal tissue reactivity. Nylon has also prominent memory that subsequently demands to an increased number of knot throws (three to five) to hold knot in place. Alcohol-soaked forms of nylon are available that overcome its issues with memory and low pliability. Multifilament braided nylon sutures (Nurolon, Surgilon) are seldom used in cutaneous surgery because, despite being more pliable and easier to handle, they have a higher infection rate. Although classified as nonabsorbable, nylon is partially degraded by hydrolysis, retaining two thirds of original strength after 11 years. Since it maintains its tensile strength for so long, some surgeons use clear buried nylon sutures to prevent scars from spreading.

Polypropylene (Prolene; Ethicon, Inc, Somerville, NJ, USA; Surgilene, Covidien, Mansfield, MA, USA)

Polypropylene is a plastic suture formed by catalytic polymerization of propylene. Inducing minimal tissue response, this suture is extremely inert and has a higher tensile strength than nylon. Polypropylene is not subject to degradation. Having a very slippery surface with low adherence to tissue, makes it ideal for use as a running intradermal stitch because it slides out easily. Extreme smoothness, however, compromises knot security and extra throws are required when using this suture. Known for its plasticity, polypropylene stretches to accommodate swelling of a wound thus causing minimal cutting of tissues. When swelling recedes, this suture remains loose.

Braided Polyesters (Ethibond, Mersilene; Ethicon, Inc, Somerville, NJ, USA, Ticron; Covidien, Mansfield, MA, USA)

Polyester sutures are braided multifilament sutures composed of polyethylene terephthalate. Braided polyesters were manufactured to provide the same tensile strength and low tissue reactivity as monofilaments but with improved tissue handling and knot security. These sutures are manufactured both coated and noncoated. Mersilene is a noncoated braided polyester that has a rough surface that produces drag when pulled through tissue and when knots are set. To ameliorate this problem, a coating is applied to polyesters such as in Ethibond. Coated polyesters can crack after implantation, and this can induce an inflammatory response. Braided polyesters are valued for their extremely high tensile strength, minimal tissue reactivity, good handling, and for being long lasting.

Polybutester (Novafil; Covidien, Mansfield, MA, USA)

Polybutester is a thermoplastic copolymer composed of a copolymer of butylene terephthalate and polytetramethylene ether glycol. This monofilament suture is designed to be stronger, less stiff, and with a lower coefficient of friction than nylon or polypropylene. Polybutester is known for its elasticity, having the capacity to stretch 50% of its length at loads of only 25% of its knot-breaking level. In comparison, at similar loads nylon would only stretch 25%. This elasticity at low loads allows elongation when edema occurs and maintenance of tension as edema recedes, which reduces suture marks and suture cut-through. This elasticity helps maintain tissue reapproximation throughout healing process.

ePTFE (Gore-Tex CV4; Gore Medical)

Expanded polytetrafluoroethylene (ePTFE) is a synthetic, nonabsorbable, monofilament suture made of polytetrafluoroethylene that has been expanded to produce a porous microstructure that is 50% air by volume. This suture is white in color and provokes minimal tissue response. Due to its expanded form, ePTFE allows cellular ingrowth. The tensile strength of this suture does not change in vivo. Furthermore, ePTFE does not degrade in presence of infection and is not subject to tissue enzymes. This suture is soft and supple and has excellent handling.

Surgical Needles

A great many options are available when choosing a suture needle. Factors to be considered include the thickness and accessibility of tissue to be sutured, the size of suture material selected, and the importance of cosmetic result. The needle has three basic components: eye, body, and point. The eye is that part which is attached to the suture material. Most sutures are swaged (suture material is encased within the eye) so that the suture and needle are a continuous unit. The needle thickness should match the diameter of the suture so that too wide of a tunnel is

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not created by the needle as it passes through the tissue. The body determines the shape of the needle and is the part of the needle that is grasped with the needle holder. In cutaneous surgery, the body of the needle is always curved. Cordage is described as a fraction of the arc of a circle and three eighths is commonly used for cutaneous procedures. The point of the needle extends from the tip to the maximal cross-sectional area of the body. The shape of the cross section of a needle is designed for the type of tissue through which the needle must pass. For soft tissue and fascia, the taper needle, which is round in cross-section, is ideal. Needle points are also available in conventional cutting or reverse cutting form. A conventional cutting needle has a cutting edge on inside of curve and a flat edge on the outside, whereas a reverse cutting needle is the opposite, having a flat edge on the inside with cutting surface to the outside. Reverse cutting needles minimize the risk of cutting through tissue in a direction perpendicular to the wound edge.

Staples

Staples are an alternative to sutures. Made of stainless steel, staples combine the highest tensile strength with low tissue reactivity and low infectious complications. Staples are most commonly used in wounds under a great degree of tension such as the scalp. Staples provide excellent wound aversion without strangulation and minimum cross-hatching of the scar. Staples are also placed faster than sutures.

BIBLIOGRAPHY

1. Anderson RM, Romfh RF. Techniques and the use of surgical tools. New York, Appleton-Century-Crofts, 1980.
2. Baker SR, Swanson NA. Local flaps in facial reconstruction. St Louis, MO:Mosby; 1995.
3. Bennet RG. Fundamentals of cutaneous surgery. St Louis, MO: Mosby; 1988: 240-73.
4. Berbstein G. Choosing the correct surgical instruments. Adv Dermatol. 1995;10:245-83.
5. Dumitriu S. Textile-based biomaterials for surgical applications. In: Polymeric biomaterials. London, United Kingdom: CRC Press; 2002:512.
6. Ford HR, Jones P, Gaines B, et al. Intraoperative handling and wound healing: Controlled clinical trial comparing coated VICRYL plus antibacterial suture (coated polyglactin 910 suture with triclosan) with coated VICRYL suture (coated polyglactan 910 suture). Surg Infect (Larchmt). 2005;6:313-21.
7. Grande DJ, Neuburd M. Instrumentation for the dermatologic surgeon. J Dermatol Surg Oncol. 1989;15:9 288-97.
8. Hochberg J, Meyer KM, Marion MD. Suture choice and other methods of skin closure. Surg Clin N Am. 2009;89:627-41.
9. Moy RL, Waldman B, Hein DW. A review of sutures and suturing techniques. J Dermatol Surg Oncol. 1992;18:785-95.
10. Newburg M. Instrumentation in dermatologic surgery. Semen Dermatol. 1994;13(1):10-9.
11. Niessen FB, Spauwen PH, Kon M. The role of suture material in hypertrophic scar formation: Monocryl™ vs Vicryl Rapide™. Ann Plast Surg. 199;39:254-50.
12. Tajirian AL, Goldberg DJ. A review of sutures and other skin closure materials. J Cosmet Laser Ther. 2010;12:296-302.
13. Villa MT, White LE, Alam M, et al. Barbed sutures: a review of the literature. Plast Reconstr Surg. 2008;121:102e-8e.
14. Weber LA. The surgical tray. Dermatol Clin 1998;16(1):17-24.

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Sataloff's Comprehensive Textbook of
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Facial Plastic and Reconstructive Surgery is part of a comprehensive series entitled *Sataloff's Comprehensive Textbook of Otolaryngology—Head and Neck Surgery*. Other volumes in the series are devoted to various specialties within the field, including Otology/Neurotology/Skull Base Surgery, Rhinology/Allergy and Immunology, Laryngology, Head and Neck Surgery and Pediatric Otolaryngology.

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Anthony P Sclafani MD FACS is Director of Facial Plastic Surgery at Weill Cornell Medical College in the Department of Otolaryngology at Cornell Weill Medical Center, New York, NY, USA. Dr Sclafani is board certified in both otolaryngology and facial plastic and reconstructive surgery, and is a fellow of the American Academy of Otolaryngology—Head and Neck Surgery and the American Academy of Facial Plastic and Reconstructive Surgery. He has received the Sir Harold Delf Gillies Award and twice received the Ira Tresley Award from the American Academy of Facial Plastic and Reconstructive Surgery for excellence in research. He is a Past-President of the New York Facial Plastic Surgery Society.



Dr Sclafani has lectured at regional, national and international surgical meetings and has published extensively in the field of facial plastic surgery. He serves as an editor of facial plastic surgery and otolaryngology periodicals and textbooks, and is Editor-in-Chief of the journal Facial Plastic Surgery.

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ISBN 978-93-5152-459-5
9 789351 524595