

Facial Reconstruction in an Office-Based Operative Setting

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Performing surgery in an operative setting in one's private office has become more desirable in the last several years. If properly planned, it is convenient and beneficial to both patient and doctor. The impetus for such a trend involves several factors. Operating room and anesthesia fees in a hospital setting have progressively increased in recent years. In addition, patients prefer the individualized attention and comfortable surroundings of their doctor's office as opposed to the frequently impersonal, overwhelming environment of most hospital and major medical center operating theaters. Generally, the nursing and ancillary staff in a private physician's office changes infrequently, allowing pre and postoperative care, as well as the surgery itself, to flow smoothly and almost in a routine fashion. This is not always the case in many hospital operating rooms, especially in a teaching hospital, where nursing students, medical students, and anesthesia residents change almost on a daily basis.

Obviously, for patient safety, certain procedures must be done in a regular operating room. However, with proper selection and sound medical judgment, many otolaryngologists and facial plastic surgeons can perform surgical procedures in an office-based setting on a regular basis with safety and efficiency.

PATIENT SELECTION

Most office-based operating rooms are equipped to handle cases that require only local anesthesia or intravenous sedation and not general anesthesia. Patient selection is the most important factor determining where the operation should be performed. Selection involves assessing the patient's overall health status and ability to safely tolerate the necessary anesthetics.

The American Society of Anesthesiologists (ASA) has attempted to classify patient risk for anesthesia by preexisting illness of the patient and the surgery to be performed (Table 34.1).¹ It is safest to limit surgery in an office-based setting being performed under local or intravenous sedation to patients with an ASA 1 or ASA 2 classification.

One also needs to assess the patient's degree of anxiety and determine if a deeper sedation is required. If heavier sedation is given in the office setting, a recovery area should be available with pulse oximetry, cardiac monitoring, oxygen, and the equipment and personnel able to perform advanced cardiac life support in the event of an emergency.

Another major factor in the preoperative anesthetic assessment is the patient's age. Teenagers and younger children will often require general anesthesia for procedures that most adults tolerate under local anesthesia.

TABLE 34.1 American Society of Anesthesiologists (ASA) classification

ASA 1: Normal healthy patient
ASA 2: Patient with mild systemic disease
ASA 3: Patient with severe disease that limits activity, but not incapacitating
ASA 4: Patient with disabling systemic disease that is a constant threat to life
ASA 5: Dying patient not expected to live 24 hours with or without operation

However, if a well-trained pediatric anesthesiologist is available, shorter procedures can easily be done in the proper office setting under general anesthesia using an inhalant anesthetic, such as halothane or sevoflurane with a mask. This is often performed without the need for intravenous access. The length of the procedure should be relatively short, between 15 to 30 minutes, and adequate recovery facilities and personnel should be available.

THE OFFICE PROCEDURE ROOM

The average procedure room must have the following basic equipment to accommodate cases requiring intravenous sedation: oxygen, suction, adequate ventilation, an operating table or reclining operating chair, and adequate space to transfer a patient to a gurney. The room must have high-intensity operating room light(s), or the surgeon may prefer to use a head light. An automatic blood pressure monitor and oxygen oximeter is an essential piece of equipment in sedation cases. Equipment to manage airway emergencies should be within the room and readily accessible. A crash cart should be available within the room or close by within the office.

OFFICE STAFFING

For work to progress smoothly in an office operating room, adequate staffing is needed. Each surgeon may have certain preferences, but a minimal core staff is required. A registered nurse with operating and recovery room experience is most advantageous to aid in both the procedure room and the recovery area. A registered nurse also has the ability to administer intramuscular medication when necessary. In terms of actual assistance during the procedure itself, many surgeons find a well-trained surgical technician quite helpful, allowing the nurse to circulate and attend to more managerial duties. This is probably the minimum staff required for a well-run office-based procedure room. Depending on the case load and budget, additional staff can be added.

APPROPRIATE ANESTHESIA

Approximately 50% of the procedures performed in our office operating room require only local anesthesia. The remainder are done either with a combination of oral and intramuscular sedation or with intravenous sedation provided by an anesthesiologist. If sedation is used, the patient is postoperatively monitored by a registered nurse in a recovery area adjacent to the operating room and discharged when fully awake to the care of an escort.

Local Anesthesia

In almost all cases, local anesthesia consists of 1% lidocaine with 1:100,000 epinephrine mixed with sodium 8.4% bicarbonate in a 10:1 ratio. The bicarbonate buffers the acidity and minimizes the pain of injection. Epinephrine is essential for hemostasis when performing facial reconstruction due to the abundant vascularity in the head and neck. In addition, the vasoconstriction increases the duration of anesthesia. Epinephrine, however, is contraindicated in patients with significant cardiovascular disease.

Decreasing the pain of the infiltration of lidocaine is also accomplished by using a small-gauge needle (i.e., 27 or 30 gauge) and infiltrating the area slowly and precisely. The pain of injection can be further minimized by pre-treating the area with a topical anesthetic cream composed of lidocaine 2.5% and prilocaine 2.5%, EMLA cream. This is placed over the injection site 45 to 60 minutes prior to the injection. EMLA cream is especially helpful in the pediatric population.

One can expect 1 % lidocaine with 1:100,000 epinephrine to provide adequate anesthesia for approximately 60 to 90 minutes. If a longer-acting infiltrative anesthetic is needed, 0.25% bupivacaine with 1 :200,000 epinephrine is used. This can provide anesthesia for up to 3 to 6 hours after injection. One also needs to keep in mind the toxic dose of any agent used. For normal healthy adults, the dose of 1 % lidocaine with 1 : 100,000 epinephrine should not exceed 7 mg/kg, and in general the maximal dose should not exceed 500 mg for the average 70-kg person. The maximal dosage limit for bupivacaine with 1 :200,000 epinephrine is 2.0 to 2.5 mg/kg or up to 225 mg in an average size man. This can be repeated up to every 3 hours, but not to exceed a total dose of 400 mg.

Intramuscular Sedation

Although intramuscular sedation is less popular than intravenous sedation, it can provide both cost-effective analgesia during the infiltration of local anesthesia and sedation during the procedure. Of course, the disadvan-

tages include pain from the injection itself and an inability to titrate the level of sedation in an ongoing manner during surgery. However, properly selected cases can be performed in the office setting easily with this level of anesthesia.

Depending on the level of anxiety expressed by the patient and the extent of the procedure, it may be helpful to premedicate the patient with an oral anti-anxiety medication, such as diazepam. In most cases 10 mg of oral diazepam (Valium) 1 hour prior to surgery adequately relieves preoperative anxiety.

Approximately 30 to 60 minutes before the procedure intramuscular meperidine HCl (Demerol) and promethazine HCl (Phenergan) are given. The dose varies depending on the weight of the patient and level of analgesia required. Generally, between 50 and 100 mg of Demerol is given with 25 to 50 mg of Phenergan. The onset of action is 30 to 60 minutes, and the duration of action is 3 to 4 hours. An overdose of meperidine results in severe respiratory depression. This combination has been safe and effective, but requires prudence, postoperative observation prior to discharge, and accessibility to an adequate recovery area.

Intravenous Sedation

Conscious sedation, monitored anesthesia, and intravenous sedation all refer to attaining a deep level of anesthesia, amnesia, and analgesia with intravenous medication, yet allowing the patient to remain awake enough to ventilate without intubation. Various factors need to be assessed to determine if intravenous sedation is necessary for a given procedure. Once it has been established that a given procedure is appropriate for the office setting, one needs to understand the patient's anxiety level and tolerance for the initial discomfort of infiltrative local anesthesia.

Another consideration is anesthetic cost. For purely elective cosmetic cases, the anesthetic fee is assumed by the patient. This needs to be fully explained to patients before surgery. However, most of the procedures discussed in this chapter are reconstructive in nature and such anesthetic costs are often covered by the insurance carrier.

If heavy sedation is required, it is optimal to have an anesthesiologist provide the intravenous sedation in the office setting. The patient is given optimal anesthetic care and is further benefited by the surgeon having fewer distractions. Providing intravenous sedation in an office setting does require proper staffing and equipment for safe anesthesia and postanesthetic recovery.

In carefully selected circumstances, some surgeons prefer giving intravenous sedation without an anesthesiologist present. Commonly, a combination of versed and fentanyl

is used, the versed at 0.5-mg aliquots and the fentanyl at 25- to 50- μ g aliquots, depending on the respiratory rate and level of anesthesia of the patient.

NECESSARY EQUIPMENT

Soft Tissue Instrument Set

Appropriate instrumentation is mandatory to obtain proper soft tissue handling. A basic soft tissue instrument set should include at least the 10 items described below (Fig. 34.1, Table 34.2). Adson-Brown forceps are atraumatic fine-toothed forceps that work well for grasping deeper soft tissue. For finer, less traumatic manipulation, as in skin closure or eyelid reconstruction, the delicate single-toothed Bishop-Harmon forceps is used. Skin hooks provide even less trauma than forceps and are essential for skin edge eversion, retraction, or tissue undermining. Two varieties of needle holders are used to effectively manage the smaller needles used in facial surgery. A Webster needle holder easily grasps small needles and is used for subcuticular or deeper suturing. A delicate locking Castroviejo needle holder allows for accurate placement of fine sutures used in skin closing, nerve grafting, and other precise work. There are a variety of Stevens tenotomy scissors for undermining or cutting through soft tissues or skin. The tips are curved, tapered, and blunted to allow atraumatic dissection in the direction of the incision or when cutting through the skin. A small suture scissor is used to achieve accurate trimming of fine sutures.

Precise measurement for flap design frequently requires the accuracy of the calipers for measurements less than 20 mm. A ruler is used for measurements beyond 20 mm. Knife handles on the set include the No. 3, No. 9, and the Beaver handle. The Nos. 15 and 11 knife blades are the



Fig 34.1 Soft tissue instrument set.

TABLE 34.2 Soft tissue instrument set

Adson-Brown tissue forceps	Castroviejo calipers
Bishop-Harmon tissue forceps	Small suture scissors
Single and double skin hooks	Nos. 5 and 10 knife blades
Webster needle holder	Moist Sponges
Stevens tenotomy scissors	Needle point electrocautery

most frequently used blades in facial plastic surgery. Most incisions are made with the No. 15 blade, although the No. 11 blade is useful when making precise incisions on the face, as in a running W-plasty or tedious geometric broken line. The No. 10 blade is rarely used on the face, but most helpful for scalp or neck incisions.

It can also be noted in Figure 34.1 that moist sponges are almost always used in soft tissue work on the face. The damp sponge causes less trauma to the soft tissue and blood vessels than a dry sponge. A needle point cautery is used instead of the usual spatulated cautery tip to avoid unwanted thermal damage to surrounding normal tissue.

A camera is an essential and often overlooked piece of equipment in the office and the procedure room. Preoperative photographic documentation is not only necessary for insurance and liability issues, but also assists in maintaining good patient rapport. Progress of the reconstruction needs to be documented for the patient, the physician, and the referring doctors. Important features include a 35-mm camera body, transparency film, a macro lens with a focal length of 105 mm, a through the lens flash, and a sturdy carrying case capable of handling extra equipment.

NECESSARY SUTURE MATERIALS

Most facial defects as a result of Mohs surgery or excision of benign lesions require a layered closure, utilizing an absorbable suture for the subcuticular closure and either a permanent suture or a dissolving gut for skin closure. Through experience, each surgeon develops preferences and will modify them somewhat by observing how particular wounds heal and if newer technology is offered. A basic tenet of soft tissue surgery is to minimize tension on skin closure to avoid scar widening. Ideally, the subcutaneous closure should eliminate most tension on wound closure, allowing the skin closure to only provide appropriate approximation of skin edges under minimal tension. This requires careful thought in suture selection.

The subcuticular suture ideally should have a low coefficient of friction, providing minimal tissue injury from suture passage and having appropriate elasticity to allow for tissue edema during the healing phase. The suture should

cause minimal tissue reaction and have proper tensile strength. It should also have the correct absorption profile, providing tensile strength while needed, but absorbing with minimal foreign body reaction once healing has occurred. The monofilament absorbable synthetic sutures meet most of these requirements and are preferred for the subcuticular closure.

The diameter or size of the suture material needed depends on the anatomic region. In an area where minimal tensile strength is required and the tissue is very thin (eyelid or periorbital area), a 4-0 or 5-0 is appropriate. In the cheek or neck area, more tensile strength is required and the tissue is thicker; therefore a 3-0 or 4-0 absorbable suture should be considered. See Table 34.3 for recommended suture materials.

The ideal skin suture should be pliable and easy to handle, have a low coefficient of friction, have little tissue reaction, demonstrate a high tensile strength, and be resistant to infection. The monofilament nonabsorbable synthetic sutures are ideal for skin closure. Again, the size of the suture is dependent on simple closure or local flap cannot be used to close the defect due to excessive distortion of surrounding features or too much tension on the final closure, an alternative must be used.

Regional skin flaps on the face, such as the midline forehead flap, can often be done under local anesthesia. If a regional flap is not feasible, one must rely on fullthickness skin grafts (FTSG), split-thickness skin grafts (STSG), composite grafts, or a combination of the three. Almost all

TABLE 34.3. Suggested suture material

Material	Suggested needles
Cutaneous	
Monofilament non absorbable synthetic	P-1 or P-3
Polypropylene	
Prolene (Ethicon), dyed blue;	
3-0, 4-0, 5-0, 6-0, or 7-0	
Nylon	
Nurilon (Ethicon), dyed black;	P-1 or P-3
3-0, 4-0, 5-0, 6-0, or 7-0	
Absorbable natural fiber	PC-1, P-1, or P-3
Fast absorbing gut, 5-0 or 6-0	
Plain gut, 5-0 or 6-0	
Chromic gut, 5-0 or 6-0	
Subcutaneous	
Monofilament absorbable synthetic	
Poliglecaprone 25	P-2 or P-3
Monocryl (Ethicon), undyed;	
4-0, 5-0, or 6-0	
Polydioxanone	P-2 or P-3
PDSII (Ethicon), undyed;	
4-0, 5-0, or 6-0	

of these procedures are easily performed in an office procedure room under local anesthesia or light intravenous sedation, but patient selection is most important to ensure patient safety and comfort. Regardless of the technique chosen for closure, there are three principles to achieve better wound healing: minimize trauma to the wound edges, obtain minimal tension on the wound edges, and provide eversion of the skin closure.

When closing a simple defect, as in a fusiform excision, it is important to equalize the sides of the incision to avoid bunching at the ends of the wound. The best way to avoid this problem is to utilize the principle of halving (Fig. 34.3). This done by placing the first suture in the center of the defect. The next suture should be placed to bisect the two remaining halves, and, by continuing this halving, the wound will be closed with equal tension and eversion throughout, even if one side of the incision is initially longer than the other. Another technique to equalize the length of both sides of an excision is to remove a

triangle of skin (Burow's triangle) from the longer side of the wound (Fig. 34.4). Often, if adequate undermining is performed, this step can be avoided.

Local Flaps

The simplest local flap is a fusiform excision, as discussed above. As a general rule, one should favor the simplest repair and avoid more complex closure if possible. Because the skin of the head and neck has a superb subdermal vasculature, almost all local flaps in this area can be designed as a random-patterned flap, as opposed to an axial-patterned flap, which is based on a specific artery. The flaps are almost always elevated in the immediate subdermal plane, and sharp undermining is necessary in all sides of the flap and receptor site in this same plane.

Unilateral Advancement Flap

The classic single-pedicled advancement flap moves entirely in one direction, advancing over the defect (Fig.

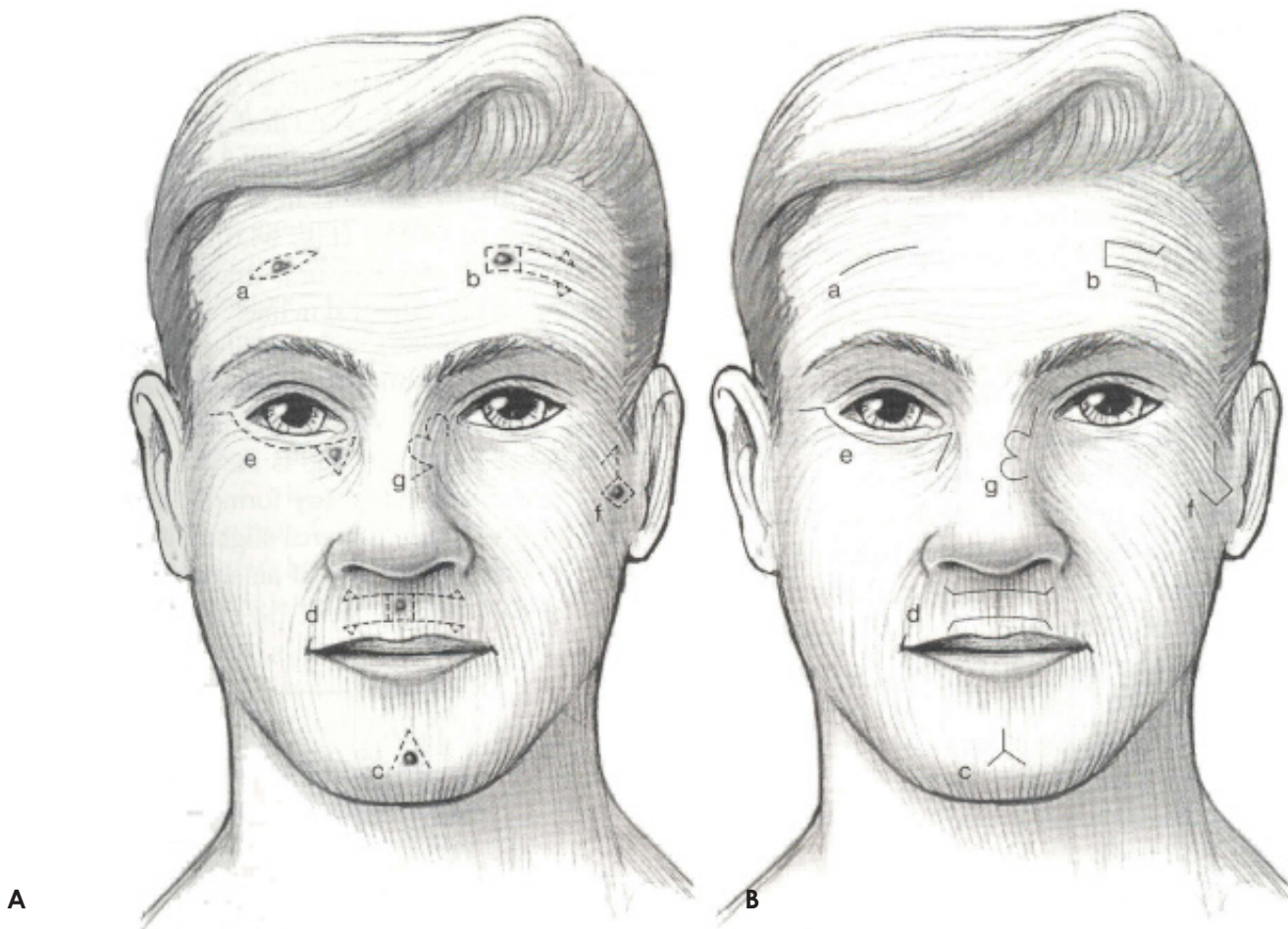


Fig 34.2. A, Preoperative incisions-variety of local flaps performed in office operating room: a, simple fusiform closure; b, unilateral advancement flap; c, V to Y modification of single advancement flap; d, bilateral advancement flap; e, rotation flap; f, rhombic flap; g, bilobe flap. **B,** Postoperative closure-variety of local flaps performed in office operating room: a, simple fusiform closure; b, unilateral advancement flap; c, V to Y modification of single advancement flap; d, bilateral advancement flap; e, rotation flap; f, rhombic flap; g, bilobe flap.

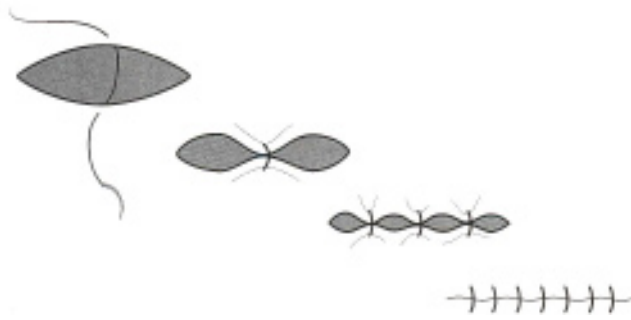


Fig 34.3. Fusiform closure with principle of halving.

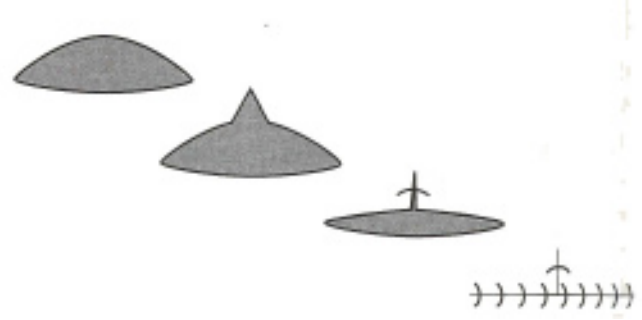


Fig 34.4. Fusiform closure with Burrow's triangle.

34.5). The final closure often resembles the letter “U” and is often referred to as a “U-plasty.” It has limited value in the head and neck due to its somewhat restricted flexibility. The forehead and lip (especially the upper lip) are the two areas where this flap may occasionally be of use (Fig. 34.6). In the face these flaps are rarely designed in a straight line, but commonly follow the natural skin lines. The length to width ratio may be up to 4:1, and excision of Burow’s triangles is seldomly required for closure if adequate undermining is performed. For smaller defects, variation of the single advancement flap is the V- to Y-flap. This design recedes the flap away from the defect and can be used to “bulk up” an area slightly widened somewhat and lengthen an axis of an area (Fig. 34.7).

Bilateral Advancement Flap

The bilateral advancement flap is more flexible in planning, though the same principles of design utilized for the single advancement flap also apply here. A flap is advanced from both sides of a defect that is too large to be closed with a single advancement flap (Fig. 34.8). The final closure resembles the letter “H” and is often referred to as an “H-plasty.” The two flaps do not need to be of equal length. The flap should be designed so that closure of the final line where the two flaps meet is placed in an optimal location such as in the filtrum of the upper lip (Fig. 34.9). The bilateral advancement flap requires extensive undermining and long incision lines, though with adequate undermining closure without the need of Burow’s triangles can be accomplished. Although limited in its use in the head and neck, it can close some forehead and lip defects. An “O-T” or “A-T” flap is a type of bilateral advancement flap in which fewer incisions are made to close a triangular defect by advancing flaps from opposite sides of the triangle (Figs. 34.10 and 34.11).

Rotation Flap

The classic rotation flap covers a triangular defect by rotating a semicircular flap around the pivotal point (Fig. 34.12). It is a versatile broad-based flap capable of closing large defects in the head and neck. The length of the perimeter of the flap should be at least four times the width of the defect itself to allow easy closure with no resultant donor site defect. The relaxing side incision should be placed in a relaxed skin tension line or an anatomic borderline (i.e., nasolabial groove or preauricular crease). Rarely is there a need for an equalizing Burow’s triangle at the distal end of the flap if the surrounding tissue is undermined appropriately.

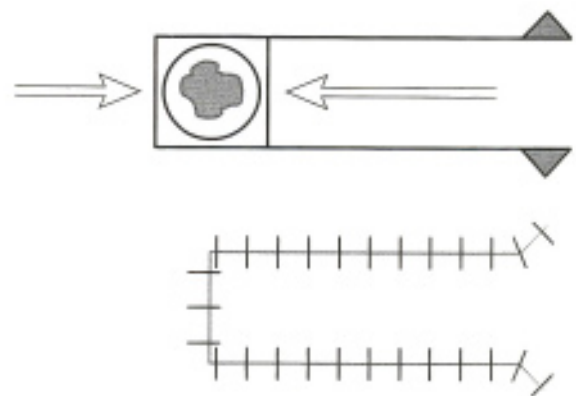


Fig 34.5. Unilateral advancement flap.

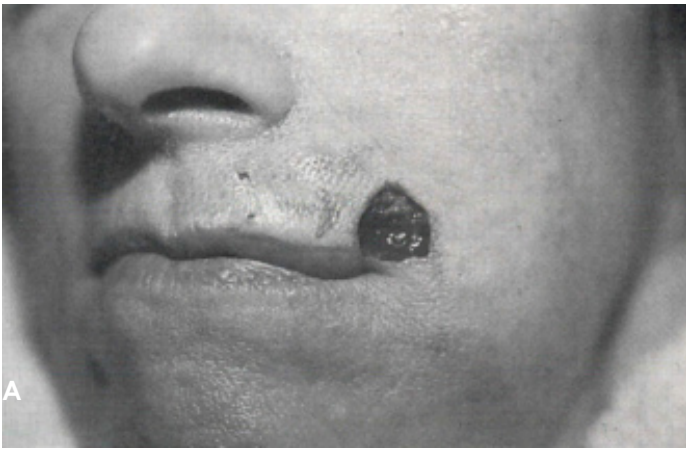


Fig 34.6. A, Unilateral advancement flap for lateral upper lip reconstruction. **B,** Three months postoperatively.

Interposition Flaps

Interposition flaps, sometimes called transposition flaps, are flaps that are raised from their donor site and rotated over adjacent tissue to be placed in the defect site. This usually requires a combination of rotation and advancement of tissue. The interposition of flaps in such a manner provides great flexibility for closure of a variety of large and small defects in the head and neck.

A classic example of an interposition flap is the bilobe flap. It is a double transposition flap, useful when the primary defect is located in inelastic skin and the adjacent skin is relatively mobile. Elastic skin, by means of the double transposition, can indirectly be used to close the inelastic skin of the primary defect.

The bilobed flap is actually two transposition flaps using a smaller flap to close a defect left by a larger flap when the defect left by the larger flap is too large to close primarily.

The standard bilobe design transposes skin over a total of 180° and commonly results in a standing-cone deformity at the point of rotation. An improved design minimizes this problem. It involves transposing each flap only 45° (a total of 90° to 100°), and a Burow' triangle is included in the initial design of the flap. Wide undermining is necessary for the final closure (Fig. 34.13).²

The advantages of the bilobe flap are that it is single staged and provides excellent color and texture match with little distortion. The result cosmetically is much better than that usually obtained with a skin graft.

The rhombic interposition flap is a quite reliable alternative for closure of many smaller defects of the head and neck. This flap takes advantage of the elasticity of the skin adjacent to the defect by rotating and advancing that skin over the recipient site.³ The tension across the secondary defect is now perpendicular to that of the original defect. Once the flap is interposed into the defect, the secondary defect can easily be closed primarily.

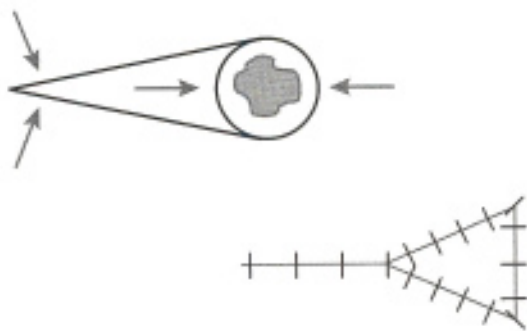


Fig 34.7. V to Y variation of single advancement flap.

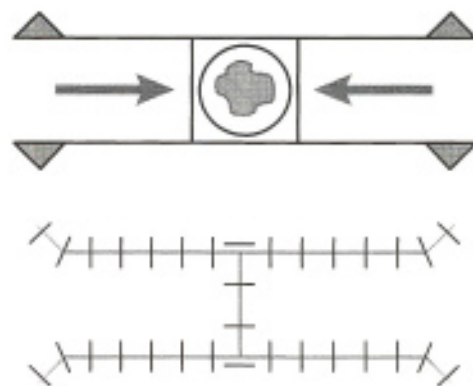


Fig 34.8. Bilateral advancement flap.

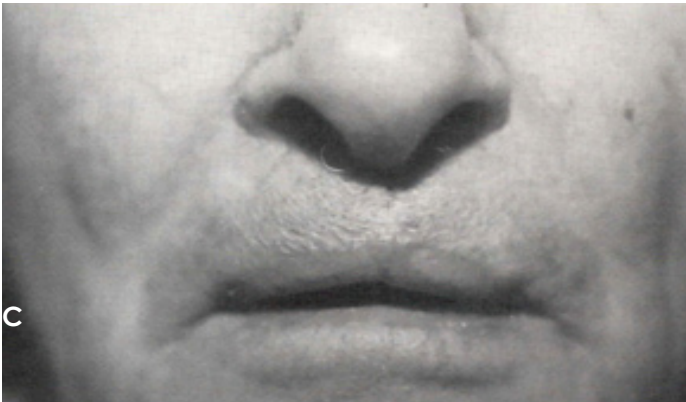


Fig 34.9. **A**, Central upper lip defect. **B**, bilateral advancement flap for central upper lip reconstruction. **C**, Three months postoperatively.

The classic rhombic flap is constructed around a geometric four-sided defect of equal side lengths and tip angles equal to 60° and 120° . The flap is drawn by bisecting the 120° angle with a line the length of which is equal to the lines forming the initial parallelogram around the primary defect. The flap is then created by drawing another line from the free end parallel to one of the existing sides of the defect. The flap tip produced in this way equals 60° . Since the closure of the secondary defect creates the majority of the tension for the flap, orientation of the

rhombic should be decided by examining the favorable relaxed skin tension lines with respect to closure of the defect (Fig. 34.14). The rhombic flap is perhaps the most difficult to visualize geometrically, but, once mastered, is a workhorse flap for many reconstructive surgeons.

Full-Thickness Skin Grafts

An FTSG is composed of full-thickness epidermis and dermis.⁴ It can be very useful for certain facial defects, most notably nasal tip defects, but will often compromise proper skin color, texture, and consistency match with adjacent nasal skin. Secondary spot dermabrasion or CO₂ laser resurfacing 10 weeks later may improve the cosmesis of the graft.

The thinnest FTSGs are obtained from the upper eyelid and postauricular area. Medium-thickness FTSGs can be harvested from the preauricular and cervical areas. The thickest grafts are from the nasolabial and supraclavicular regions. The preauricular FTSG is generally the graft of choice for nasal tip and most facial defects due to its thickness and color match from sun exposure. The donor site is well camouflaged in the preauricular crease. For larger or rounder defects, the donor site can be closed with a rhombic transposition flap. One must be careful not to harvest hair-bearing skin, especially in males with a heavy beard.

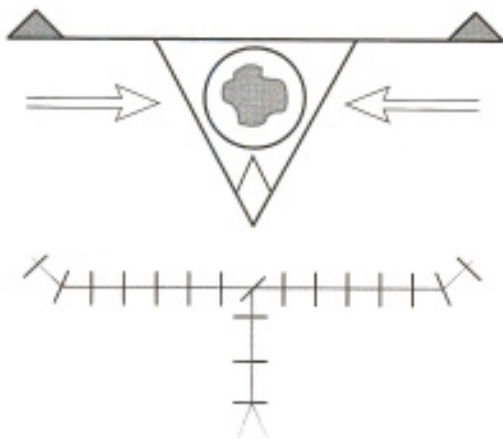


Fig 34.10. T-plasty variation of bilateral advancement flap.

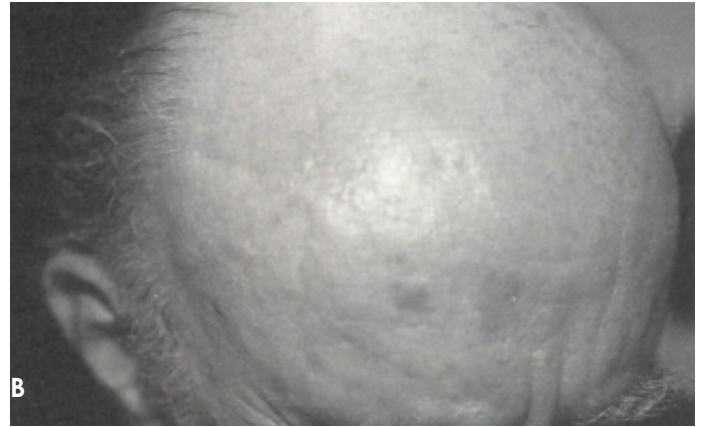
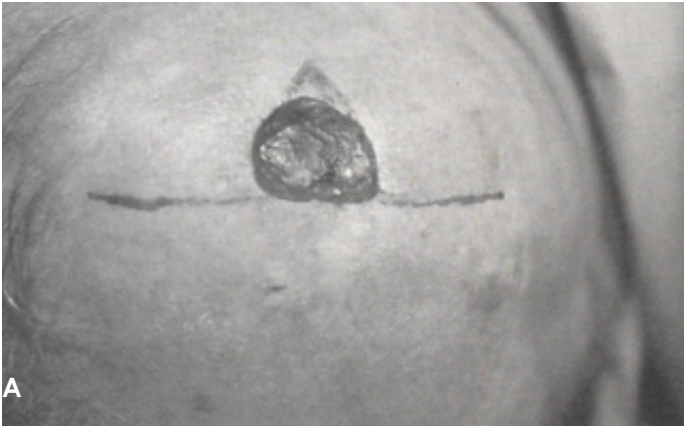


Fig 34.11. A, T-plasty designed to close forehead defect **B,** Three months postoperatively.

Performing FTSGs in the office setting can easily be accomplished simply with the instruments listed above for soft tissue procedures. The Castroviejo calipers are used to accurately measure the recipient site and donor site. A template made by pressing a nonadherent bandage (Telfa) into the wound and trimmed appropriately can aid in accurately marking out the donor site. The donor and recipient sites are anesthetized with 1% lidocaine with 1:100,000 epinephrine and prepped into a sterile field. After waiting 10 to 15 minutes for the epinephrine to take effect, the FTSG is then harvested using a No. 15 blade and the donor site is most often closed primarily. The graft is harvested to include subcutaneous fat and then placed into a saline-soaked sponge. Thinning of the FTSG is often required and is done by trimming the excess fat from the undersurface using a Stevens tenotomy scissors. The thickness of the graft can be tailored to best fill the contour of the recipient site.

The FTSG can now be secured into place. Initially, four anchoring permanent sutures are placed at the four quadrants of the graft at 90° from each other (usually with a 4-0 or 5-0 Prolene suture). Then the perimeter of the graft is sewn in using a running suture of 6-0 fast absorbing gut. Sewing from the less secure graft to the more secure skin edge of the recipient site allows for less movement of the graft as it is sewn in.

The FTSG must have maximum contact with the base of the recipient site with no separation of the undersurface of the graft to the recipient wound bed. This prevents possible seroma or hematoma formation under the graft, potentially interfering with neovascularization. This contact is ensured by using basting sutures of 6-0 fast absorbing gut, which bind the FTSG to the underlying tissue. Multiple full-thickness perforations are made through the FTSG to allow for exudate to drain and prevent fluid collection under the graft. These ideally should be done in the direc-

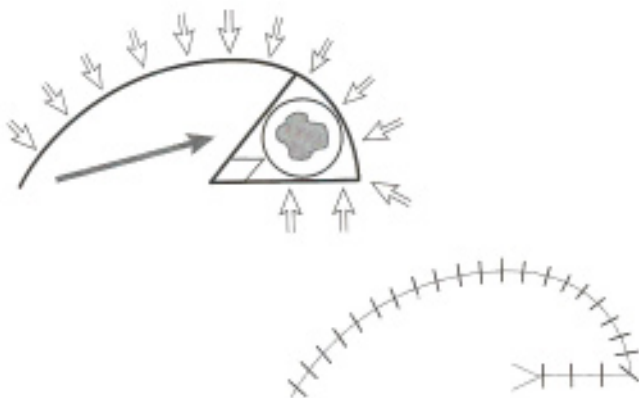


Fig 34.12. Single rotation flap.

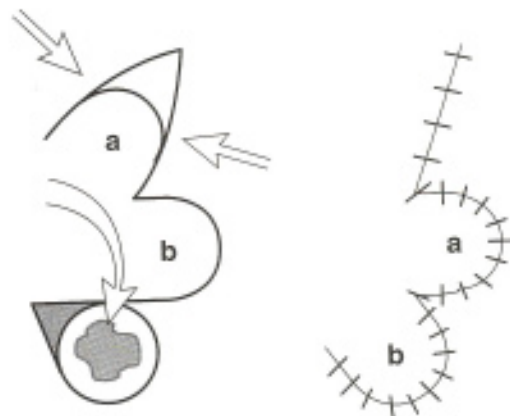


Fig 34.13. Bilobe flap.

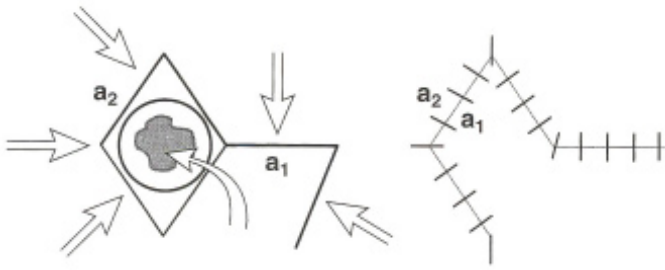


Fig 34.14. Rhombic flap design.

tion of the relaxed skin tension lines (Fig. 34.15).

A bolster dressing is of key importance for survival of the FTSG to ensure contact between the graft and base of the wound and diminishing mechanical shearing forces during the early healing phase. One end of an interrupted 4-0 or 5-0 Prolene suture is left long to be tied over the bolster to its contralateral suture. Two to three pairs of these sutures are used. It is preferable to place these sutures 2 to 3 mm from the wound edge to avoid pulling and tension on the sides of the graft as the bolster is sewn in place.

The bolster consists of antibiotic ointment and Telfa over the graft, followed by moist sterile cotton or Xeroform Gauze, followed by securing the tie-over sutures. This bolster is then further secured with a transparent adhesive dressing such as Tegaderm. The dressing can then be removed carefully in 6 to 7 days, at which time any permanent sutures can be removed and the graft adequately cleaned.

Split-Thickness Skin Grafts

Split-thickness skin grafting involves a transfer of epidermis and a portion of dermis. The advantages are that it provides good coverage with a high survival rate. It is best used for coverage after removal of very high-risk malignancies and acts as a window to monitor possible tumor recurrence or in defects that are too large to be covered by an FTSG (Fig. 34.16). The disadvantage is that the STSG offers poor color and texture match and thus is rarely used for definitive facial reconstruction, except for very shallow defects such as skin loss only of the anterior auricle (Fig. 34.17). The thickness of the STSG can vary, but usually an intermediate size of 0.012 to 0.018 in works best for facial reconstruction.

The most convenient and accessible donor site for STSG is the anterolateral thigh. This provides a large, relatively flat area to harvest the graft and low morbidity for the patient. Other less commonly used donor sites include the

inner aspect of the upper arm, abdomen, buttocks, or hip. For smaller grafts used for facial defects, potential donor sites include the supraclavicular area, lateral neck, and preauricular skin.

For larger STSG, the air-driven Padgett and Zimmer dermatomes allow for accurate and vibration-free harvesting of grafts (Fig. 34.18). The proper size blade is secured onto the dermatome, and the correct thickness is set. The donor and recipient sites are anesthetized with 1 % lidocaine with 1:100,000 epinephrine and prepped in a sterile fashion. Any prepping solution, such as a Betadine type of solution, must be cleaned before obtaining the graft to ensure even removal of the tissue. The donor site is then lubricated with sterile mineral oil. The handpiece is held at a 30° to 45° angle on the donor site, the dermatome power is engaged, and the unit is guided forward with a gentle downward pressure for even cutting of the graft. To aid in flattening the donor site, a tongue blade is used to depress the skin in front of the dermatome. The harvested STSG is then placed in sterile saline.

The donor site is then covered with a semioclusive dressing such as Opsite or Tegaderm and left in place for 7 to 10 days. A serosanguinous collection of fluid may form under the dressing during the first 24 to 36 hours postoperatively and can be drained with a needle and then patched with a piece of Opsite. The wound will re-epithelialize in 1 to 3 weeks.

The STSG is secured to minimize mechanical shearing forces and fluid collection under the graft. The perimeter is closed with a running 6-0 fast absorbing gut with several interrupted 4-0 or 5-0 Prolene sutures to secure the edges. The 6-0 fast absorbing gut is also used for basting sutures to ensure coaptation of the STSG to the base of the defect. It can then be dressed similarly to the FTSG. Dressing and sutures are removed in 7 to 10 days.

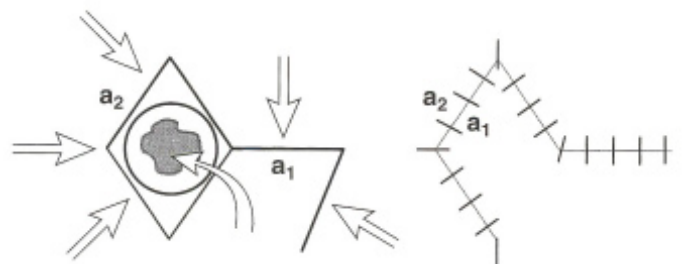


Fig 34.15. Full-thickness skin graft.

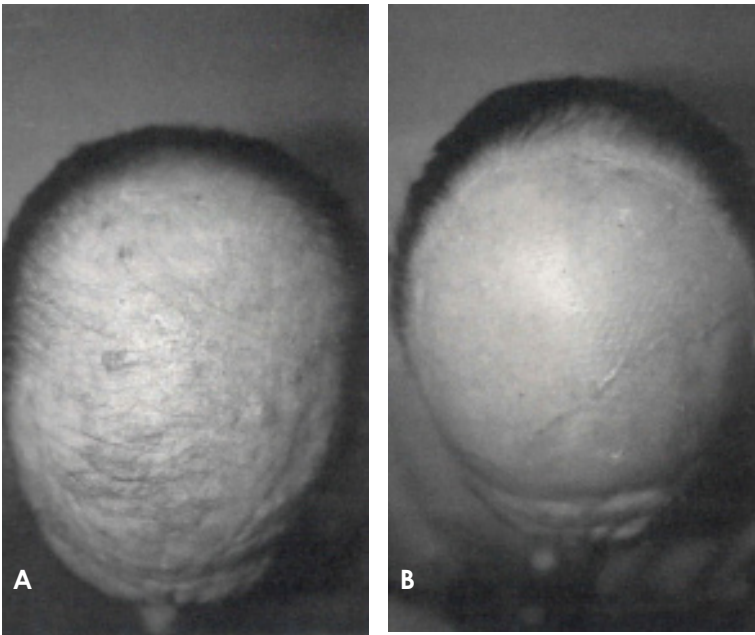


Fig 34.16. A, Scalp covered with multiple aggressive basal cell carcinomas. **B,** STSG for scalp coverage after removal of lesions.

Unipedicled Midline Forehead Flap

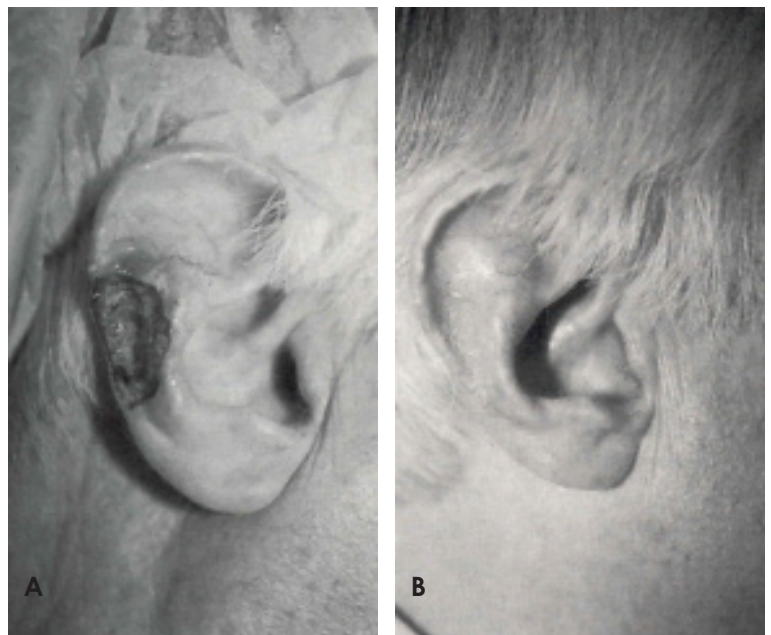
The most common regional flap used for Mohs reconstruction in our office procedure room is the unipedicled midline forehead (MFF) for major nasal reconstruction. If the nasal defect cannot adequately be closed by simple closure or local flaps and cosmetic concerns limit the use of skin grafts, the MFF is an excellent choice for a rewarding nasal reconstruction.⁵ Defects most ideal for reconstruction in the office procedure room usually only involve full-thickness skin defects.

The unipedicled MFF is basically an axial pattern flap based on one set of supratrochlear vessels and the dorsal nasal vessels (Fig. 34.19). It provides an abundant, well-vascularized, nondelayed reconstruction with excellent

color and texture match for nasal tissue. The thickness can be tailored and serve as a cover for virtually any major nasal defect. Nasal defects 2 to 4 cm wide can be closed easily with the MFF. Wider defects will require a combined closure using an MFF with another option, such as cheek advancement or nasolabial flaps. The resultant donor site defect can almost always be closed primarily with minimal deformity.

The flap is quite hearty due to its dual blood supply from both the internal and external carotid systems. The supratrochlear artery is the terminal branch of the ophthalmic division of the internal carotid artery, and the dorsal nasal artery is a branch-of the facial artery from the external carotid system.

Fig 34.17. A, Cutaneous defect of anterior auricle. **B,** STSG used to reconstruct defect, three months postoperatively



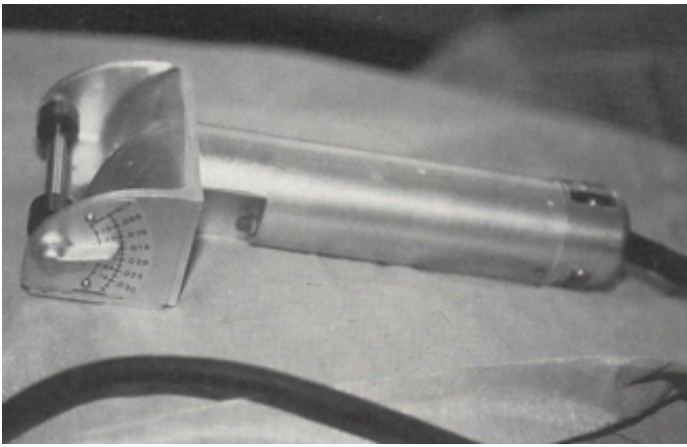


Fig 34.18. Padgett dermatome.

The reconstruction can be performed under local or intravenous sedation depending on the surgeon's or patient's preference and overall medical condition. The repair begins with precise assessment of the defect's size, location, and thickness. To further camouflage the reconstruction, at times the defect is modified to allow reconstruction of an entire esthetic unit of the nose (e.g., tip or dorsum). A template corresponding to the flap design is then fashioned and traced on the cephalic portion of the midline forehead adjacent to the hairline. If the defect is not midline, the flap is pedicled opposite the side of the defect to maximize the arc of rotation and minimize kinking of the vascular pedicle. Reverse planning around the pivot point using a gauze template is then performed to predetermine the length of the flap and to assess its degree of rotation. Our flaps usually measure 2.0 to 4.0 cm in width and 6.0 to 9.0 cm in length. The creation of the flap begins with two parallel incisions extending from the hairline down to the unilateral vascular pedicle, tapering to approximately 1 cm in diameter, through galea but superficial to the periosteum. The incisions are tapered superiorly to allow for a V-closure and to eliminate a "dog ear" deformity. As an alternative, an M-plasty can be utilized to enhance closure and avoid violating a low widow's peak. For most reconstructions, except when a thick flap is required, the cephalic two-thirds of the flap can be elevated sharply in the subcutaneous plane. In cases where a thicker musculocutaneous flap is required, the subgaleal approach provides a rapid, avascular plane for elevation.⁶ In either case, at the level of the eyebrow the flap should be elevated bluntly in the subgaleal plane with great care taken to preserve the subtrochlear vascular pedicle. A unipedicled flap will have its base between the median aspect of the brow and the medial canthus, thereby giving this flap greater length than that of the bipedicled flap. To obtain even greater length, a relaxing incision can be used at the base of the

flap; however, care must be taken not to compromise the vascular pedicle.

Due to the excellent vascularity of this flap, the distal one-third can be immediately debulked of soft tissue to better approximate the tissue thickness of the recipient site, providing the subdermal vascular plexus is not compromised. This will also enhance tissue sculpting and may eliminate the need for defatting of the flap later on. If intraoperative tissue expansion is employed, the distal edges of the flap are trimmed until bleeding is noted, indicating healthy tissue. The flap is then rotated in an arc of 180° in either direction and carefully inset.

The donor site is closed in two layers using absorbable galeal sutures and skin closure (Fig. 34.20). To facilitate a tension-free closure, moderately large forehead defects can be liberally undermined to the level of the lateral brow. Also, the use of the relaxing incisions in the galea parallel to the defect will allow the skin to loosen, permitting a tensionless closure. This is particularly useful in the young patient who has less laxity of the brow. The recipient site is closed in two layers using absorbable dermal sutures and vertical mattress Prolene skin sutures to evert the approximated skin edges. The cephalic one-fourth of the flap is left free without sutures, as it will be divided at the second stage.

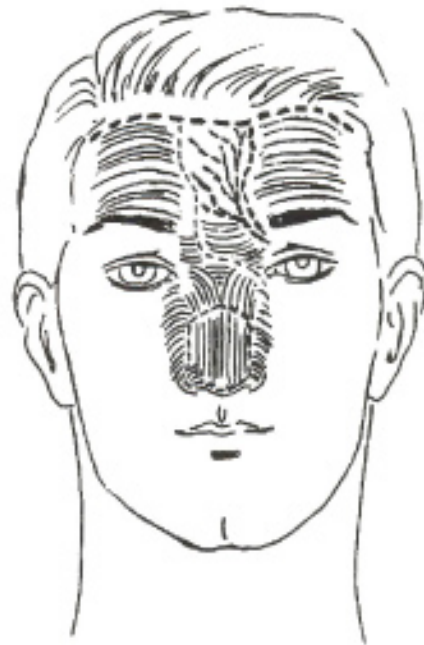


Fig 34.19. Unilateral midline forehead flap based on set of supratrochlear and supraorbital vessels.

Postoperative care consists of a pressure dressing around the forehead for 24 hours. Under the raw undersurface of the pedicle, nonadherent gauze coated with Bacitracin ointment is used and is changed daily. Bacitracin is also applied to the suture lines three times a day for the first 3 postoperative days. The sutures on the nose are removed in 3 to 5 days, and the donor site staples are removed in 5 to 7 days.

In most cases, within 3 weeks following the initial repair sufficient neovascularization has occurred to enable the flap to be self-supporting (Fig. 34.21). The pedicle is generally divided at this time, unless the host bed is compromised secondary to previous radiation therapy, scarring, or small vessel disease. In such cases, pedicle division is delayed. Prior to division, the distal flap is tested for viability by compression of the proximal vascular pedicle and confirmation of capillary refill in the transposed forehead skin. The flap bridge is then divided and tailored so that sufficient tissue is preserved for the repair of the unsutured defect in the interbrow region. The remaining tissue is discarded (Fig. 34.22).

SCAR REVISION

Z-plasty

Z-plasty is basically two skin flaps that are raised and interposed over each other such that the tissue is borrowed from areas of excess and interposed to areas of deficiency. Z-plasty has three basic functions: (1) to rotate the long axis of a scar from an unfavorable to a favorable position, (2) to lengthen a contracted scar line, and (3) to align anatomic lines that have been misaligned. By achieving the desired result when doing a Z-plasty, one must accept a new scar that is three times the length of the original (Fig. 34.23). The amount of lengthening achieved by Z-plasty is related to the length of the central and lateral limbs as well as to the angle of the Z-plasty. In general, a 30° Z-plasty achieves a 25% increase in length of the axis to the central limb, a 45° Z-plasty achieves a 50% increase, and a 60° Z-plasty achieves a 75% increase (Fig. 34.24).³⁴ Our general rule is to use no Z-plasty with arms greater than 1 cm in the face or 1.5 cm in the neck. If greater length gain is needed, the scar is broken up with two or more nonadjoining Z-plasties. Most often, we utilize a 60° angled Z-plasty, though we will work with angles from 45° to 70°, adjusting to the individual case. For longer scars, a multiple Z-plasty can be utilized.

All Z-plasties are planned, marked out with Castroviejo calipers, scratched out with the tip of an 18 gauge needle, and created with a No. 11 scalpel. Wide undermining

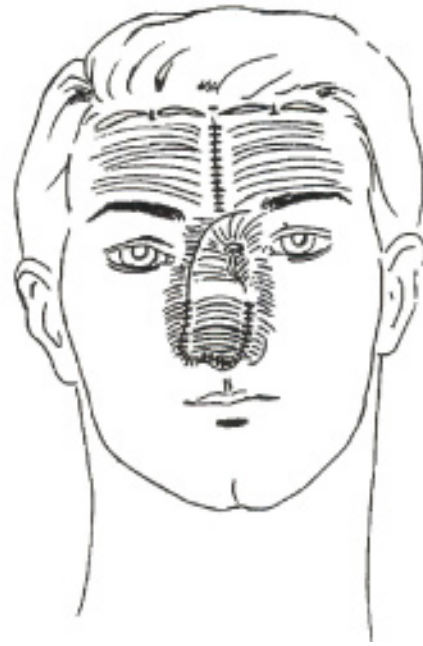


Fig 34.20. MFF sewn into nasal defect and closure of donor site.

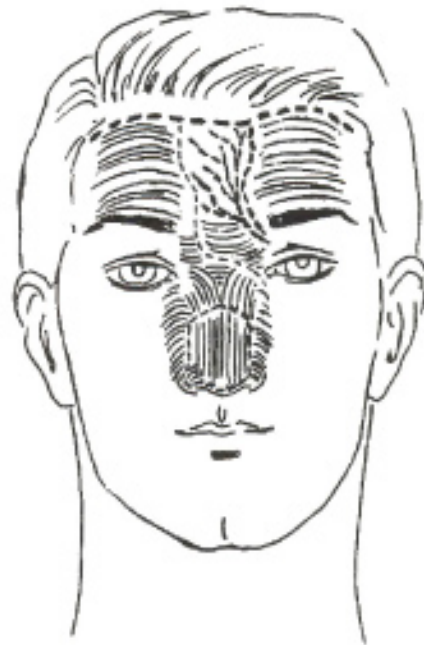


Fig 34.21. Release of pedicle of MFF performed 3 weeks after initial reconstruction.

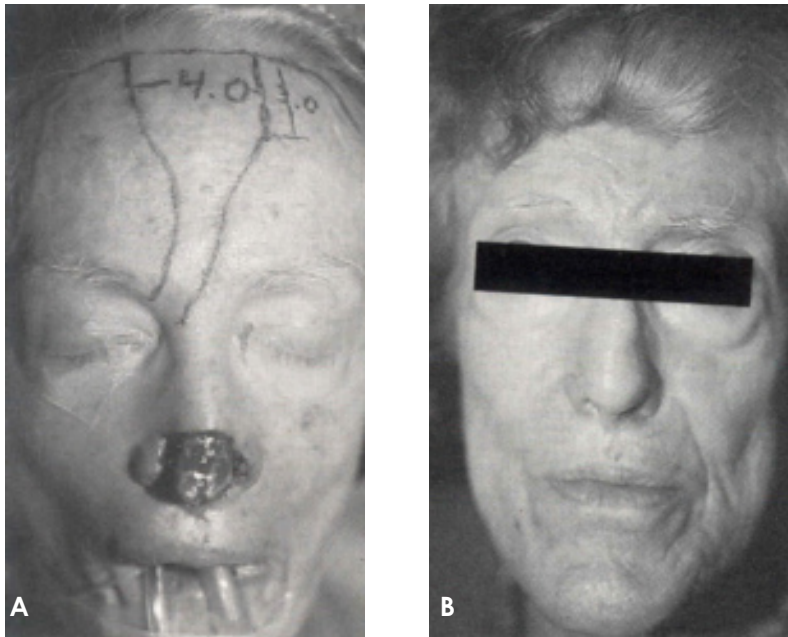


Fig 34.22. A, Unilateral MFF design for 4.0 X 3.0 cm cutaneous defect of nasal tip. **B,** Three months postoperatively.

is necessary in all sides for tension-free rotation of the interposing flaps. Closure is dependent on meticulously placed interrupted subcuticular sutures of monofilament synthetic absorbable suture. Leveling of the sides of the wound edges are then done with fine nylon or fast absorbing gut cutaneous sutures. The closure is then reinforced with steristrips.

W-Plasty and Geometric Broken Line

The running W-plasty and the geometric broken line (GBL) closure of Webster are two techniques used to camouflage scars in the face that are greater than 2 cm in length (Fig. 34.25).⁹ The W-plasty scar revision procedure was first described by Borges in 1959. The objective is to excise the scar and close the defect in one of the above manners to disguise a straight line that is easy for the eye to follow into a pattern that is more difficult for the eye to follow. A GBL closure is a challenge to execute properly.

It is important to realize that the running W-plasty is not a multiple Z-plasty and does not cause any increase in scar length. Scar revision of this type should be delayed as long as possible in children under 21 years of age, as delayed scar maturation will exaggerate the resultant defect. There are some general guidelines to aid in designing a W-plasty scar revision. The entire width of the original scar must be excised when designing the W-plasty. No part of the pattern should cross into the scar. No leg of the scar should be over 6 mm in length, and the angles of the Ws should be about 60° with one set of legs in the direction of the

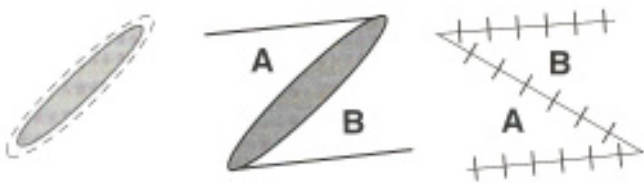


Fig 34.23. Single Z-plasty design.

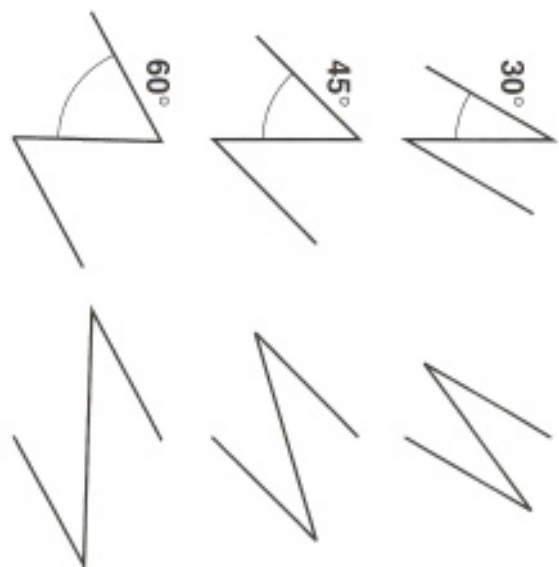


Fig 34.24. Lengthening achieved by Z-plasty variations

Resting Skin Tension Lines (RSTL). One must avoid designing a repair so as to disrupt a normal anatomic boundary line such as the eyebrow or philtral ridge.

Once one side is marked out, the mirror image on the other side is drawn. The design should be scratched in with the tip of an 18-gauge needle, and then, with a No. 11 blade, each cut should be made toward the scar itself. The scar in the W-plasty should be excised as one piece. The technique of skin hook stabilization, wound edge handling, and wide sharp undermining on all sides as discussed previously must be strictly adhered to. The sides are then brought together using interrupted subcuticular synthetic absorbable sutures at the tips of each point along one side only. Skin closure is accomplished with a running locked suture. A 6-0 mild chromic cat gut is used at each tip, up one side and then back down the other side, again catching each tip. The wound is then reinforced with steristrips. Although the design of the GBL closure is somewhat more complex, the same principles apply to its excision and closure (Fig. 34.26).

Patients undergoing this type of scar camouflage must be warned that the wound will be somewhat erythematous for several months postoperatively before becoming pale. They should also plan for dermabrasion of the scar at 6 to 12 months after surgery.

Dermabrasion

Dermabrasion using the traditional rotary high speed or lowspeed dermabrader can be done in an office procedure room.¹⁰ It is done under local anesthesia, and occasionally sedation is required if larger surface areas are involved. The biggest concern with dermabrasion cases is the aerosolized blood and skin particles. The room must be well ventilated, and the surgeon and staff must wear protective

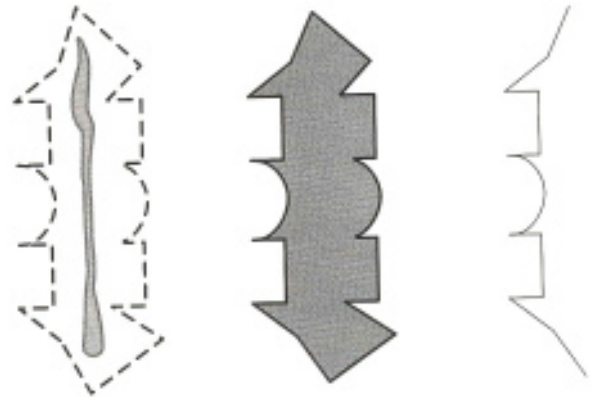


Fig 34.26. Geometric broken line.

gowns, hats, gloves, and face shields. All exposed equipment and surfaces must be appropriately disinfected at the end of the procedure. A battery-operated low-speed wire brush dermabrader causes less aerosolization and works well for dermabrading small areas of the face.

CO₂ LASER RESURFACING

Cutaneous laser resurfacing using a carbon dioxide laser has become a common office procedure to treat facial rhytids or scars.” The room requires staff properly trained in laser safety and laser equipment. They must also be trained in laser emergencies such as a laser burn or an accidental ignition. The room must be well ventilated, and a portable smoke evacuator is essential to evacuate laser plume, which can cause airway irritation to both the patient and surgeon. Laser approved eye protection and masks must be worn during these procedures. Appropriate warning signs must be posted to notify others within the office that a laser procedure is being performed.

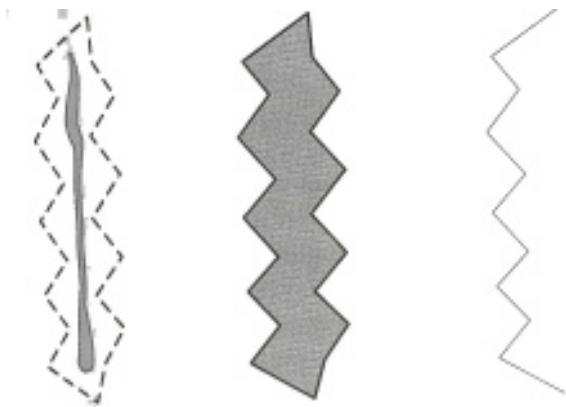


Fig 34.25. Running W-plasty.

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