

CHAPTER 4

TECHNIQUES AND PRINCIPLES

Nicole A. Phillips, MD and Ash Patel, MBChB, FACS

Plastic surgery is a specialty defined by principles and techniques, rather than by organ system or disease process. The subdivision of plastic surgery into two types of surgical procedures—reconstructive and cosmetic—is another unique aspect of the specialty. While the dividing line between the two is sometimes very clear, there is often a significant amount of overlap. The goal of reconstructive surgery highlights this overlap: “the restoration of *form* and function.” Both reconstructive and aesthetic surgery rely on a detailed knowledge of anatomy and the foundational principles and techniques outlined below.

I. EVALUATION AND PLANNING

- A. Define the defect
 1. What is missing or abnormal?
 - a. Tissue layers
- B. Disruption of vascular or neural network
- C. What is left behind?
- D. Is the surrounding tissue healthy, or has it been compromised (i.e. radiation therapy, burns, traumatic injury)?
- E. What local tissues are available for use?
- F. What is the best way to restore form and function?
- G. Replace like with like: the best reconstruction will utilize tissues similar to the missing tissues (i.e., glabrous skin for reconstruction of the weight-bearing sole or fingertips).
- H. “Don’t throw anything away”
 1. Spare parts surgery
 2. Composite grafts
 3. Biological dressings
- I. Designing incisions. Incision design is critical, as the location of scars impacts both their visibility as well as their ability to heal.
 1. Ideal incision placement
 - a. Langer’s lines: Langer, a 19th-century anatomy professor in Vienna, first studied and described the relationship between resting skin tension and wounds. However, his studies were carried out on cadavers and were never intended to serve as a guide for surgical technique.
 - b. Borges described relaxed skin tension lines in 1962: these lines follow the furrows formed when skin is relaxed and are revealed by pinching the skin. (Figure 1)
 - c. Best incision designs usually involve a combination of factors
 - i. Allowing for appropriate access

- ii. Taking advantage of pre-existent scars or wrinkles
- iii. Placement with respect to aesthetic subunits

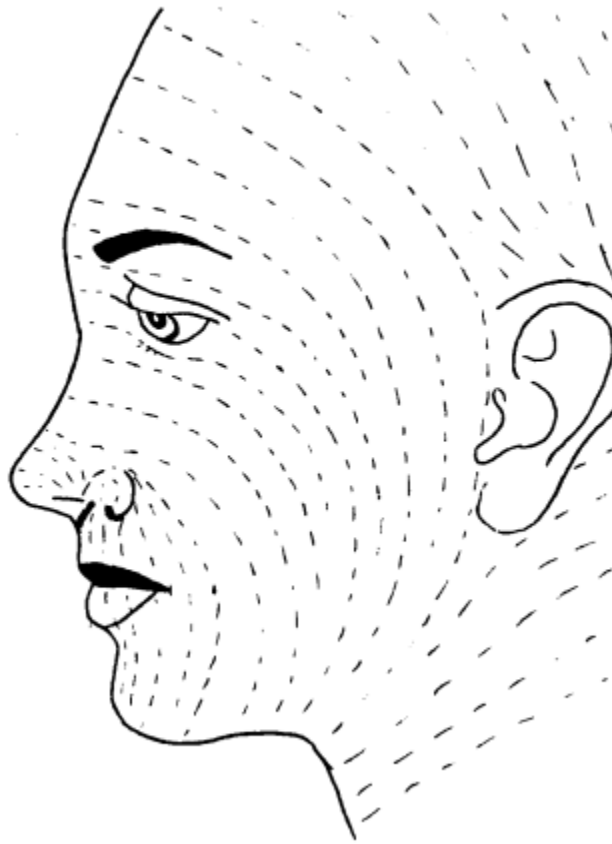


Figure 1. Relaxed skin tension lines (RSTL) versus other skin lines
From Borges A. Plast Reconstr Surg 1984;73(1):144-50.

- 2. Aesthetic units and subunits (Figure 2)
 - a. Have been described for multiple anatomic regions, including breast, face, and lower extremity
 - b. Defined by naturally-occurring concave and convex surfaces
 - c. Scars that cross aesthetic subunits are more noticeable than those that are hidden in the boundaries between subunits

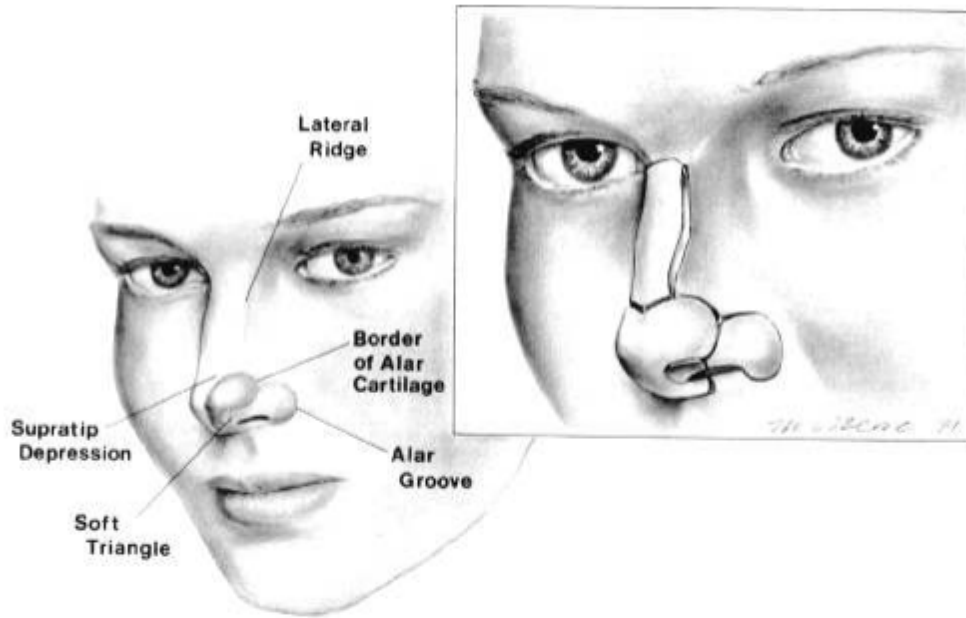


Figure 2. Conforming to its underlying skeleton, the surface of the nose is crossed by gentle valleys and low ridges that divide it into topographic subunits. They are the dorsum, tip, sidewalls, alar lobules, and soft triangles.

From Burget G, et al. The subunit principle in nasal reconstruction. Plast Reconstr Surg 1985;76(2):239-47.

E. Methods of excision

1. Elliptical
 - a. Most common method
 - b. Usually designed with length: width ratio of 3:1
2. Wedge
 - a. Used for lesions located at or near a free tissue margin
3. Circular
 - a. May be utilized when shorter scar is desired
4. Serial
 - a. For large lesions which cannot be excised in one stage (i.e. congenital nevi)
 - b. Frequently used in conjunction with tissue expansion

II. THE RECONSTRUCTIVE LADDER

A. Conceptual framework for understanding reconstructive options (Figure 3)

1. Starts with most simple option: i.e., healing by secondary intention
2. Progresses to more complex options in a step-wise fashion

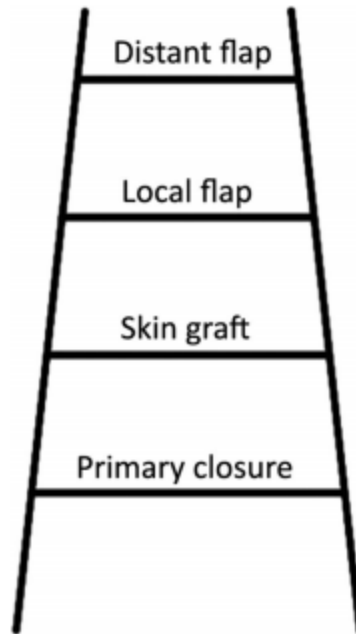


Figure 3. An early version of the reconstructive ladder
 From Janis J, et al. *The new reconstructive ladder: modifications to the traditional model. Plast Reconstr Surg.* 2011 Jan;127 Suppl:205S-212S.

- B. The “reconstructive elevator” (Figure 4)
1. Proposed by Gottlieb and Krieger in 1994
 2. Best reconstructive option is not always the least complex

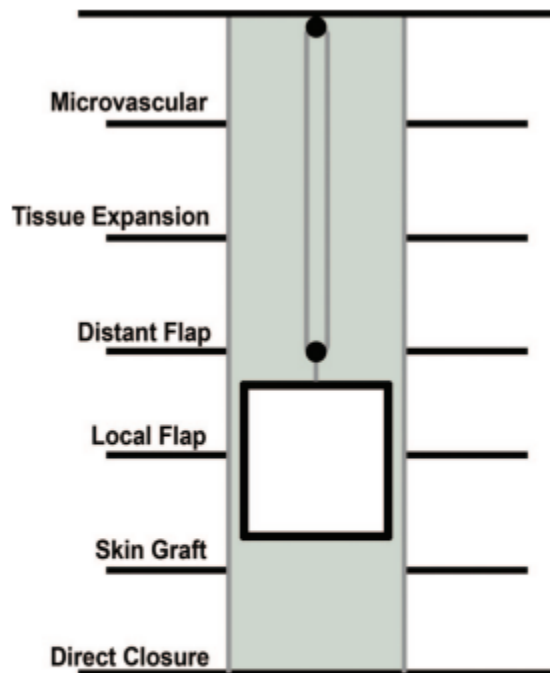


Figure 4. The reconstructive elevator, as proposed by Gottlieb and Krieger. This formulation emphasizes the importance of selecting the most appropriate level of reconstruction as opposed to defaulting to the least complex.

From Gottlieb L, et al. From the reconstructive ladder to the reconstructive elevator. Plast Reconstr Surg. 1994;93:1503-1504.

III. PRINCIPLES OF SUTURING

- A. Layered closure. Any wound deeper than skin should be closed in layers.
 - 1. Eliminate dead space
 - 2. Prevent dehiscence while wound healing is occurring
 - 3. Precisely approximate skin edges without tension
- B. Wound edge eversion
 - 1. Takes advantage of scar contraction
 - 2. Allows for optimal wound healing
- C. Choosing suture
 - 1. Permanent versus absorbable
 - 2. Monofilament versus multifilament
 - 3. Suture size
 - 4. Needle type
 - a. Cutting
 - b. Taper
 - 5. Surgical glue
 - 6. Staples
- D. Timing of suture removal
 - 1. Sutures should be removed from face within 5-7 days
 - 2. Sutures in other anatomic areas should be removed within 7-14 days
 - 3. Exceptions include wounds that cross joints, wounds that are under significant tension, wounds in irradiated or otherwise damaged surgical fields

IV. SUTURING TECHNIQUE

- A. Simple interrupted sutures: most commonly used suture technique (Figure 5)
 - 1. Needle enters epidermis at 90-degree angle
 - 2. Needle turned to exit immediately below deep dermis
 - 3. Care must be taken to enter and exit at same levels on opposite side

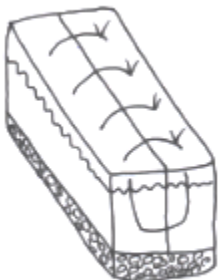


Figure 5. Simple Interrupted Suture Technique

- A. Running simple sutures
 - 1. Rely on well-approximated wound edges
 - 2. Not as precise as interrupted sutures, but faster
- B. Subcuticular sutures
 - 1. Needle passed horizontally through the superficial dermis, parallel to skin surface
 - 2. Can be running or interrupted
 - 3. Allows close approximation of skin edges without need for external skin sutures
- C. Horizontal mattress sutures (Figure 6)
 - 1. Everting sutures that spread tension across a wound edge
 - 2. Needle passed across the wound and then back the other way
 - 3. Useful in fragile tissue
 - 4. Also useful in suturing glabrous skin of hands/ feet
 - 5. Can be performed as a running suture

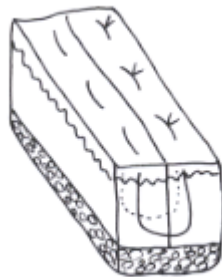


Figure 6. Horizontal Mattress Suture Technique

- A. Vertical mattress sutures (Figure 7)
 - 1. Used for increased wound eversion
 - 2. Far-far near-near suture placement

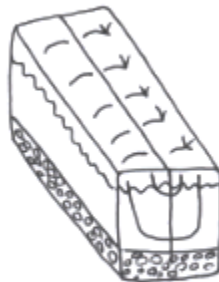


Figure 7. Vertical Mattress Suture Technique

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