SIMPLE AND SERIAL EXCISIONS

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Undertaking any facial reconstruction, whether the defect is a scar, a facial defect, or a facial fracture involves addressing the questions why, when, what, where, and how. In scar revision, the questions might be rephrased as:

- Why does the patient have a scar?
- When did the patient first get the scar?
- What caused the scar in the first place?
- Where is it located in reference to the relaxed skin tension lines (RSTLs) (Fig. 1) and the major points of the face (eyebrow, lateral canthus, nasal ala and oral commissure)?
- How can the scar be revised?

*Why does the patient have a scar?* The first step in any facial reconstruction is to identify the cause of the defect or scar and to confirm that the cause has been completely treated. A scar caused by the removal of a basal cell carcinoma requires confirmation that the margins were clear in the original excision. Any excised specimen should be sent for pathologic review. If trauma caused the scar, the patient needs to be evaluated for other facial, cutaneous, or bony abnormalities that may also need correction. If the scar is hypertrophic, the patient should be examined for other hypertrophic scars and should be treated with steroid injections and pressure postoperatively.

*When did the patient first get the scar?* Scar revisions should not be performed less than 12 months after the prior repair because it takes this long for the scar to fully mature. Until a year passes, the ultimate appearance of the scar cannot be judged.

What caused the scar? What caused this patient to heal with an unsightly scar in the first place? Were the original skin margins crushed during repair or as a result of trauma? Was the original closure under too much tension? Are any conditions that originally caused the scar to form still present? Are there any hypertrophic or keloid scars elsewhere on the body?

*Where is the scar?* The location of the scar should be evaluated in reference to the RSTLs (Fig. 2) and the major points of the face (eyebrow, lateral canthus, nasal ala, and oral commissure). If the revision will displace any of the facial reference points, the patient should be told this prior to the procedure. Facial disfigurements caused by primary closure are usually temporary and many resolve in time. A simple fusiform excision and primary closure are indicated when the scar lies parallel to or less than 30 degrees from the RSTL and the wound can be closed without advancing or rotating adjacent tissue. Usually the resultant scar will be well hidden in a wrinkle. The result of this approach, like any other reconstruction, is highly technique sensitive.

Scars or lesions less than 5 mm in diameter can be excised with a circular dermatologic punch and closed primarily without extensive undermining. The wound is closed parallel to the RSTL and the circular defect transforms to an ellipse. The resulting scar will lie parallel to the RSTL.

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TECHNIQUE OF SIMPLE EXCISION

Draw Twice, Cut Once

A symmetric, fusiform ellipse is drawn around the scar (Fig. 3). The length is three times the width. The angles at each end should be less than 30 degrees to prevent a dog-ear deformity after closure. The curvilinear lines on each side of the scar should be equal in length and symmetric. If the lines are asymmetric in length then the excess can be accounted for during closure as this article details below. The orientation of the ellipse may not always be along the axis of the scar. Because the objective of the simple fusiform excision is to hide the resulting incision closure in the RSTL, the long axis of the fusiform ellipse needs to lie parallel to the RSTL but not necessarily parallel to the long axis of the scar.

The scar and surrounding tissue are anesthetized with 1% lidocaine freshly mixed with 1:100,000 epinephrine (10 mL of 1% lidocaine is mixed with 0.1 mL of 1:1000 epinephrine). This mixture is injected with a three ring syringe and a 27-gauge needle, and the injection is performed with a bimanual technique: the right hand injects the solution whereas the left hand confirms subcutaneous placement of the injection. Adequate anesthesia and vasoconstriction is readily and consistently attainable.

How can the scar be revised? Scar revision is performed by simple or serial excisions, when the resulting scar lies parallel to or less than 30 degrees from the RSTL.

Figure 1. The facial relaxed skin tension lines (RSTLs).

Figure 2. Isolated facial scar lying parallel to the RSTL, depicted with dotted lines.

Figure 3. Fusiform Ellipse. An ellipse is drawn around the scar with a length to width ratio of 3:1. The tapered angles should be less than 30 degrees to prevent a dog ear deformity on closure. The long axis of the ellipse is parallel to the RSTL and in this case, also parallels the long axis of the scar.
without distorting the skin; the volume of tissue displaced by the thin 27-gauge needle is the volume of solution injected on withdrawing the needle.

**Traction and Counter Traction**

The ellipse is incised with a No. 15 blade preferably on a No. 9 Bard Parker handle (Fig. 4A and 4B). The blade is bevelled slightly away from the scar, which aids wound eversion on closure. A single hook is placed at the apex of the ellipse and provides counter-traction to the blade traction. The more inferior incision is made first and proceeds through epidermis, dermis, and into the superficial subcutaneous tissue. The scar is then grasped with a Brown-Adson forceps and pulled perpendicular to the plane of the skin as skin hooks provide counter traction parallel to the skin plane bilaterally (Fig. 5). The scar is excised with a No. 15 blade. Frequently there is subdermal fibrous tissue extending deep into the subcutaneous tissue. This deep scar tissue is left in place to provide a strong supporting bed and to deter postoperative scar depression.

**Undermining**

After obtaining hemostasis, the skin edges are pulled perpendicular to the skin plane with single skin hooks (Fig. 6). The assistant holds the distal skin hook whereas the surgeon simultaneously retracts the proximal hook and palpates with the left fourth finger the depth of the undermining. Undermining is performed with a No. 15 blade in the subdermal plane deep to the subdermal plexus. The depth of

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**Figure 4.** A. A single skin hook provides counter traction for the incision. A No. 9 handle with a No. 15 blade incises the epidermis and dermal layers at a slight bevel (B) away from the scar. This facilitates epidermal eversion during closure.
Figure 5. The scar is excised off the subcutaneous tissue with a No. 15 blade. This is facilitated with traction on the excised skin and scar perpendicular to the facial plane with a Brown-Adson forceps and counter traction on the incised skin edges parallel to the facial plane with opposing single skin hooks.

Figure 6. The skin edges are undermined. With an assistant holding the more distal skin hook, the surgeon holds the proximal skin hook to lift a curtain of tissue. The junction of the dermis and subcutaneous tissue is incised with a No. 15 blade. A constant depth of undermining (in the subdermal plane) is assured by palpating the amount of tissue between the blade and the fourth finger of the left hand, as illustrated.
undermining is monitored by the fourth finger of the left hand as it follows on the skin surface, the belly of the blade incising the deeper tissue. This bimanual technique confirms elevation in the proper tissue plane. The skin hooks are then placed at the midpoint of the wound bilaterally, crisscrossed, and used to estimate the amount of tension on wound closure. If the edges do not approximate with minimal tension further undermining is indicated.

Deep and Cuticular Sutures

Fundamental to any scar revision is the use of deep tension-bearing sutures so that the epidermal closure is free of tension. The authors prefer 5-0 PDS (polydioxanone) sutures on a P-2 or P-3 needle. A P-2 needle has the shape of a small half circle. It is sturdy and can withstand significant torsion as the deep dermal sutures are placed. A skin hook facilitates the placement of precise deep sutures in the subdermal plane that exit just beneath the epidermal layer (Figs. 7A and 7B). It is best to place the needle as close as possible to the hook where the skin is stabilized. The needle is then inserted into the contralateral skin margin, entering and exiting the dermis at the same depths as the first side. A running locked stitch of 5-0 fast absorbing gut (Ethicon) is placed with the assistance of Bishop Harmon forceps. This cuticular stitch everts and apposes the epidermal skin margin (Fig. 8). An alternative skin closure can be made with either running locked or interrupted 6-0 nylon.

It is important to approximate any two equidistant points on each side in three dimensions (Fig. 9A–D): (1) care is taken to assure that the needle is placed at an equal distance from the wound corner as it is inserted into each of the skin margins to prevent dog ears, (2) the deep suture should be placed at the same dermal layer in both skin margins to ensure the approximation of epidermal margins, and (3) the superficial sutures are placed to ensure the symmetric eversion of the skin margins. Do not invert the skin edges or leave them flat (i.e., on the same plane as the surrounding skin). Antibiotic ointment is applied to the suture line for 5 days. The cuticular sutures are removed in 5 days if they have not already dissolved. Adhesive skin strips (Steri-strips) are applied to support the skin edges for an additional 2 to 4 days.

TECHNIQUE OF SERIAL EXCISION

When the facial scar (e.g., a burn scar) or lesion (e.g., a hemangioma or a pigmented hairy nevus) is too large to excise in one stage, serial excisions can be performed. The initial incision is made entirely within the lesion and normal and abnormal tissue is advanced. Another excision is performed in 3 to 4 months, until the lesion or scar is completely excised. This technique may be used instead of tissue expansion. The specific surgical techniques are the same as the techniques used for simple excision.

POSTOPERATIVE CARE

Patients with simple or serial scar revisions are followed for postoperative wound erythema, keloids, hypertrophic scarring, scar depression or widening. Dermabrasion is used on elevated scars at 6 to 8 weeks after the revision. Hypertrophic or keloid scars respond well to injections of intralesional steroids. Earlobe keloids are treated with a pressure earring for 3 months postoperatively and with monthly steroid injections for at least 3 months. Facial hypertrophic scars may also respond to silicone sheeting. Depressed scars can be avoided with proper wound eversion. They may be corrected with collagen, autologous fat injections, or revision surgery. Periodic reinjections caused by resorption of filler material may be required. Newer implant materials, such as AlloDerm (LifeCell Corp., The Woodlands, TX) or Gore-Tex (W. L. Gore, Flagstaff, AZ), hold some promise as fillers for the future. The patient is advised to use sunblock for at least 1 year after the revision.

ISSUES IN SIMPLE AND SERIAL EXCISION

The Distorted Face

Primary closure after excision of large cutaneous lesions or scars on the face may lead to facial distortions, of the nasolabial lines, alar facial junction, or eyebrow. These distortions usually resolve spontaneously within 6 to 8
weeks postoperatively. This occurs as the skin expands under the influence of underlying muscles that have direct insertion into the skin. Certain areas are more susceptible to permanent distortions, such as the lower eyelids and the nasal alae, and may require postoperative revisions.

Selective Undermining

There are times when it is preferable to undermine more extensively on one side than the other. This will limit the amount of deformity on the less undermined side; for example, if a closure is close to the hairline, it is better to advance forehead skin up to the hairline rather than to inferiorly displace the hairline.

SUMMARY

Scars oriented less than 30 degrees to the RSTL may be excised with a simple fusiform ellipse running parallel to the RSTL. As with
any reconstruction, the results are technique sensitive. Large scars are removed serially whereas scars less than 5 mm may be removed with a dermatologic punch and closed primarily.

ACKNOWLEDGMENT

The authors thank Adam Springer for his detailed illustrations that accompany this manuscript.

References


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