Non-surgical scar revision
By Michael J. Visconti, DO, Emily R. Davis, DO, and Kent J. Krach, MD, FAAD

Introduction

- Aesthesis of scar is the single most important patient-perceived determinant of surgical outcome
  - Quintessential scar: imperceptible, fine line, level with the surrounding skin, camouflaged by natural creases/folds
  - Undesirable scar: thick, wide, raised, or depressed, erythematous, telangiectatic, interruption of natural relaxed skin tension lines (RTSLs), track marks
- Preoperative discussion managing and setting realistic expectations is vital
  - Scar formation is an inevitable aspect of the healing process.
  - The goal is to improve the appearance of the scar rather than erase.
  - Scars may take up to and beyond a year to mature so often the best scar revision is a tincture of time.

Preoperative considerations

- Medical/social history:
  - Cigarette smoking (dose dependent effect; discontinue 3 weeks prior), history of hypertrophic/keloidal scarring, diabetes mellitus, malnutrition, uncontrolled hypertension, acute congestive heart failure, history of congenital heart defects, prosthetic heart valve, joint replacement, HSV (prophylaxis 1 gram valacyclovir 2-5 days prior to procedure), blood thinners (INR <3 for warfarin), systemic corticosteroids, cyclosporine, VEGF-inhibitors, oral tyrosine kinase inhibitors, oral supplements (discontinue all unnecessary supplements 10 days prior)
- Surgical sites prone to poor wound healing:
  - Shoulders, central chest, upper back, proximal arms

High-yield therapeutic modalities

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<th>Class</th>
<th>Therapeutic Modality</th>
<th>MoA</th>
<th>Timing</th>
<th>Dosing</th>
<th>Technique</th>
<th>Adverse Effects</th>
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<tbody>
<tr>
<td>Class I corticosteroids</td>
<td>Decreased fibroblast activity/collagen production</td>
<td>One month postoperative (fibro-fatty tissue present)</td>
<td>0.1 - 1.0 mL of triamcinolone (TAC) 10-40 mg/mL, every two to six weeks * 40 mg/mL is most optimal</td>
<td>Inject within the largest portion of the scar within the dermis</td>
<td>Atrophy</td>
<td></td>
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<tr>
<td>Imiquimod</td>
<td>IFN-α induces collagen breakdown and decreases TGF-β (driver of keloid formation)</td>
<td>Variable, as early as the night of procedure</td>
<td>5% cream, 12 packets</td>
<td>Nightly for eight weeks, poke hole in packet to reduce overuse and waste</td>
<td>Skin irritation</td>
<td></td>
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### High-yield therapeutic modalities

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| **Silicone**  
- Gel  
- Cream  
- Oil  
- Sheets  
- Embedded tape | Unclear; occlusion/hydration of stratum corneum and cytokine-mediated signaling to dermal fibroblasts | Variable; upon removal of sutures or full epithelialization of wound | Concentrations range as high as 100%; commonly sold with hypochlorous acid (anti-inflammatory agent) | Apply every 12-24 hours for at least two months; prolonged fixed application (two to seven days) may be effective in severely hypertrophic/keloid scars | Skin irritation, unsightliness of products, difficulty securing product |
| **5-Fluorouracil**  
- Intralesional | Inhibition of fibroblasts (via TGF-β2 gene) → decreased collagen production | Variable; as early as one week postoperatively | Max = 150 mg/treatment with most evidence in 20-45 mg/treatment range; distributed in one bottle of 50 mg/mL; max chemotherapy infusion dose is 1500 mg | Variable, repeat weekly to every other week to monthly | Pain, burning, ulceration (avoid superficial injection), hyperpigmentation |

### Lower-yield therapeutic modalities

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<tr>
<td><strong>Massage</strong></td>
<td>Mechanically suppresses the dermis → thinning, cessation of oxygen/nutrient supply, reduction in edema</td>
<td>Recommendation is to wait one month</td>
<td>Apply emollient, then firm pressure to blanch the scar, massage for 10 minutes, one to two times per day</td>
</tr>
</tbody>
</table>
| **Pressure therapy**  
- Garment | Theorized reduction in collagen synthesis | One to three weeks after wound closure; up to six months postoperatively | 15-25 mmHg of pressure garment for at least 23 hours per day over 6-12-month period | Pain, skin irritation, unsightliness of garment, prolonged application requirement |
| **Vitamin E** (tocopherol)  
- Oil, gel, cream, compounds | Theorized to enhance scar remodeling through antioxidant and anti-inflammatory properties | Variable (immediately vs. 4-6 months postoperatively) | Apply one to three times daily for up to 12 months | Allergic contact dermatitis (33%), erythema multiforme-like and urticarial eruptions |
| **Radiotherapy** | Inhibiting fibroblast proliferation, diminishing collagen synthesis | Initiated within 24-48 hours postoperative | 15-20 Gy (standard unit of radiation); split over five to seven sessions | Erythema, hyper/hypopigmentation, edema, desquamation, ulceration, atrophy |
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Clinical pearl

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<tr>
<th>Intralbal administration of triamcinolone/5-FU (1:9 TAC:5-FU ratio) has greater efficacy than monotherapy</th>
<th>Instructions:</th>
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<tr>
<td>Median number of sessions required: three</td>
<td>Obtain 1 ml syringe with 30g needle</td>
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<td>Draw up 0.1 ml (4 mg) of 40 mg/ml TAC</td>
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<tr>
<td></td>
<td>Combine with 0.9 ml (45 mg) of 250 mg/5 ml 5-FU</td>
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<td></td>
<td>Average dose of 5-FU per treatment: 20-45 mg (0.4-1.0 ml)</td>
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References: