Resurfacing the Acne-Scarred Face

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Background. Dermabrasion has been a useful method for the improvement of acne scars since 1953. However, the improvement is often limited. Adjuvant procedures are often necessary to improve results.

Objective. To improve the results of resurfacing the acne scarred face. By combining the techniques of subcutaneous filling, laser shrinkage of collagen, dermabrasion, and excision, we hope to achieve better results.

Methods. A Jessner/TCA peel is performed on the neck and décolleté area after the skin has been preconditioned with vitamin A conditioning lotions. The acne scars are subcised with a semi-blunt needle, and the developed pockets are filled with adipose tissue. Following this, the surface skin is vaporized with three passes of the CO₂ laser, and the deeper acne scars in the mid-face region are sanded with a diamond fraise. Residual scars are excised and sutured. A semi-occlusive dressing is used for 5 days, then replaced with an ointment-based moisturizer. After 10 days, a moisturizer-sunscreen is used, followed with a bleaching cream at 15 days. Make-up may be applied after 14 days.

Conclusion. By combining these multiple modalities it is possible to produce a dramatic improvement of the acne-scarred complexion.

SINCE ITS INCEPTION in 1953 by Drs. Kurtin and Orentreich, dermplaning of the acne-scarred face has remained a difficult procedure. Orentreich used refrigerant freezing of the face and a wire brush to plane down the irregularities. Ayers combined the chemical peel with the abrasion to obtain a more uniform rejuvenation. He called the procedure chemabrasion. Burks and Farber advocated resurfacing sun-damaged skin in addition to acne scars. Roenigk refined the indications and discussed the problem with isotretinoin. Finally, Orentreich used subcision to undermine these acne scars, releasing them from their myofascial attachments.

Resurfacing with the Ultrapulse CO₂ laser (Coherent, Palo Alto, CA) became available approximately 6 years ago. There have been several papers published on the benefits of this laser on acne scars. Although the Ultrapulse CO₂ laser is quite beneficial in rejuvenating photoaged skin, the CO₂ laser resurfacing method is not very effective for significant acne scars. Many of these scars are persistent after laser resurfacing and require a more aggressive approach. Atrophic acne scars need subcision and infiltration of the subcutaneous space with the autologous adipose tissue. Acne “ice-pick” scars required deeper dermabrasion or excision of the lesions. Our paper will review rejuvenation of the acne-scarred face with this combination of subcision and small-volume fat transfer, laser resurfacing, dermabrasion, and excision or grafting of persistent lesions.

Methods

Ninety-five patients (ages 16–47, mean 31) (males n = 25, females n = 70) participated in the study. Their program began as follows.

Skin Preconditioning

Our patients are placed on vitamin A skin-conditioning programs before surgery. They apply the lotions twice daily for six to eight weeks. We encourage them to develop a rosy-red hue. This accelerates their wound healing.

Obtaining an Informed Consent

It is important that the patient and the family be fully informed so they understand the importance of preconditioning and postoperative management. In addition to written instructions, they receive a videotape outlining the procedure and postoperative management. To implement the Informed Consent, they sign the following paragraph on the progress sheet: “I have been informed of the benefits and risks of the procedure, the benefits and risks of alternatives and all my questions have been answered.” All patients receive famciclovir (Famvir, 250 mg t.i.d., SmithKline-Beecham Pharmaceuticals, Philadelphia, PA) and cephalin 500 mg t.i.d. for 10 days starting the day following the procedure.

Harvesting Adipose Tissue

We harvest fat to fill in areas of atrophic acne scarring. The lateral thigh fat pocket is the least vascular and is used most frequently. After obtaining intravenous anesthesia, this area is infiltrated with the tumescent solution. After a 20–30 minute waiting period, the adipose is collected using a “vented” 20 cc syringe equipped with a 2.5 mm Mercedes cannula. The plunger is gradually withdrawn as the adipose
tissue fills the syringe. Several syringes are collected. This harvest provides adequate fat for the infiltrating of the cheeks and the freezing of the fat for further infiltrations at a later date. The adipose tissue is washed and transferred to 3 cc syringes. These syringes are centrifuged for 3 minutes at 3400 rpm. Once the infranate is expressed out, the syringe is equipped with a blunt injection needle (Figure 1).

Chemical Peel

A Jessner/TCA peel is used on the chest and neck area, around the eyes and other areas that will not be resurfaced with the CO$_2$ laser. This peel consists of 3 or 4 coats of Jessner peel, followed with the application of 25–35% trichloroacetic acid solution applied in multiple coats to achieve a light white frost (Figure 2). To avoid any apparent lines of demarcation between the “old” sun-damaged individual and the “new” individual, the total rejuvenation often extends up from the areolar complex to the hairline.

Fat Augmentation

The atrophic acne valleys are subcised and the adipose tissue is transferred under the dermis in the subcutaneous plane. An overcorrection is planned. Multiple small filaments of adipose tissue are deposited in a retrograde fashion as the needle is withdrawn (Figure 3). Multiple passes layer the new tissue between the underlying muscle and superficial dermis.

Laser Resurfacing

Following the infiltration of the adipose tissue, the CO$_2$ laser is used (Table 1). Laser resurfacing is begun on the forehead, and 3 passes in this area shrink the collagen and improve the acne scars. As this procedure moves onto the cheeks, small acne scars are improved, and fine lines are diminished (Figure 4). The eyelids may be resurfaced, and these same eyelid settings are also used to feather the resurfacing into the jawline and the hairline.

Dermabrasion

A large dome-shaped, coarse diamond fraise is used on the Bell-Hand engine to further improve the acne scars. This area is cooled with a freon 11/ethyl chloride mixture (Fluro-Ethyl, Gebauer Labs, Cleveland, OH), and the dome wheel is used to plane down the dermis to the depth of the acne scars. Less speed is used on the Bell-Hand engine, as this partially denatured collagen is more susceptible to abrasion.

<table>
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<th>Area</th>
<th>Energy (mJ)</th>
<th>Power (W)</th>
<th>Pattern</th>
<th>Size</th>
<th>Density</th>
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<td>60</td>
<td>3</td>
<td>8</td>
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<td>250</td>
<td>50</td>
<td>3</td>
<td>5</td>
<td>4</td>
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</tbody>
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*Equipped with the computer pattern generator (CPG) Handpiece.

Avoid density settings of 7 or more.

Also used for feathering.
and requires less torque for smoothing. These procedures may require 2–3 additional freeze-plane cycles to sand out the acne pits (Figure 5). These cycles can also be used in the mid-forehead area, where there is adequate depth of the subcutaneous tissue. However, only 1 or 2 cycles may be possible on the thinner skin areas of the face, such as the temples. Usually, only limited or no cooling with Freon 11/ethyl chloride is used on the jawline, as this area is more susceptible to hypertrophic scarring.

**Laser Touch Up**

The 3-mm Tru-spot handpiece on the Ultrapulse CO₂ laser is used for final touch-up (300 mJ, 6 W) to vaporize any residual sides of acne valleys or scars. This combination of the planing and re-lasering is adequate to abolish most acne scars. Side-lighting is used to help visualize these pits as they are vaporized away.

**Excision and/or Grafting**

Any significant lesions that are not removed with sanding are excised with a scalpel or a disposable punch (Acu-Punch, Acuderm, Inc., Ft. Lauderdale, FL) (Figure 6). If a circular acne scar is larger than 2.5 mm, the excised area may be grafted with skin from the hair-bearing scalp that has been denuded of hair roots. This gives the same pore pattern as the face. These large punch grafts are held in place by the postoperative occlusive dressings for 5 days. Alternatively, large scars are excised and sutured. Subcutaneous sutures (5-0 polyglactin 910) hold the larger incisions together until tensile strength has developed, so there is very little scar stretch-back. These excisions are not readily visible on the healed face.

**Manual Dermasanding**

Transition zones such as the jawline, eyebrows, residual tissue irregularities, persistent blood vessels are dermasanded following the method of Harris and Noodleman.²² Sterilized 2 × 2 inch sections of silica carbide paper (Norton sandscreen, 150 grit) are wrapped over a wet, rolled gauze. Abrasion blends in these transition zones and irregularities (Figure 7).

**Postoperative Dressings**

A very important part of this aggressive skin resurfacing is the postoperative semi-occlusive wound dressings.²³,²⁴ We
use a combination of meshed polyethylene and silicone sheeting. The meshed polyethylene (N-terface, Winfield Labs, Dallas, TX) is applied to the areas that were deeply dermabraided. The face is then covered with the silicone sheeting (Silon-TSR, Bio Med Sciences, Inc., Bethlehem, PA). These dressings are held in place by 4 × 4s and tube gauze (Figure 8). The patient changes the 4 × 4 dressing and the tube gauze daily, but the semi-occlusive silicone and meshed polyethylene dressing will stay in place for 4–5 days. Then, these dressings are removed and a petrolatum-based ointment is applied for an additional 5 days (Aquaphor, Beiersdorf Inc., Norwalk, CT). After several hours of exposure to the petrolatum-based ointment, residual crusts begin to dissolve. These are washed off by a mild soap (Aquamil, Persón-Covey, Glendale, CA) in the shower. This cycle of ointment application and gentle washing is redone several times daily during this phase of wound healing.

After 10 days a moisturizing sunscreen is applied. Around 17–20 days, a bleaching cream is used in the cheek area of the patients with darker complexions. During this initial stage of wound healing, any itchy, red streaks are immediately treated with the nightly applications of silicone gel sheeting (Silon-SES Bio Med Sciences, Bethlehem, PA) and intralesional steroids.

**Results**

We were able to achieve a 75 to 80% improvement of acne scars (Figures 9–14). The laser resurfacing shrunk the dermal collagen; the subcutaneous subcision with the layering of adipose tissue into the newly formed pocket puffed out the acne valleys; and the dermabrasion planed down ice pick scars. Any residual scars were excised, grafted or re-lasered.
Not all cases required all procedures. However, the jawline and neck were peeled, and the face was lasered in every case. Seventy-four percent required additional dermabrasion of the central cheek and forehead areas. Thirty-seven percent required subcision and fat transfer. Sixty-three percent had some lesions that required excision-suturing. Fifteen percent needed excision-grafting. This grafting was used for 2.5 to 3-mm round scars that could not be easily excised with an elliptical excision. It was impossible to state which procedure resulted in the most improvement, for this varied from case to case. Atrophic scars required filling; ice pick scars needed planing; and all cases needed blending with the peel (Table 2).

The combination postoperative dressing of meshed polyethylene and silicon sheeting provided an atmosphere that decreased the inflammatory, exudative response of wound healing and kept the skin from dessicating following the exposure to air. The reepithelialization from the sebaceous follicles of the face was rapid. After 5 days, it was possible to remove the occlusive dressing and replace it with an ointment-based moisturizer. At the end of 10 days, a moisturizer-sunscreen was used. These patients could apply makeup after two weeks.

Ten patients (11%) underwent a repeat procedure after 8–10 weeks. Usually, the mid-cheek area was replaned. At this time, the skin was still undergoing remodeling and responded rapidly to additional trauma, healed rapidly, and yielded additional improvement. The adverse sequella were minimal. Four patients (3%) had mild cases of breakthrough herpes simplex flare-ups. These were controlled by doubling the antiviral dose. Three cases (2%) developed perioral pustules from Candida albicans. Eleven cases (11%) developed bacterial infection that responded to gentamycin ointment. Thirty-one cases (32%) noticed excessive erythema; however, this improved by 8 weeks. In 39 patients (42%), hyperpigmentation developed, first in the cheekbone area and then spread onto the cheeks. This disappeared with sun-avoidance and the application of bleaching cream. Slight hypopigmentation became evident in 15 cases (16%) during the follow-up period. Five patients (6%) complained of a line of demarcation.
marcation of the jawline. This was blended with a repeat Monheit peel. One case (1%) developed a persistent red streak on the jawline. This responded to the daily application of silicone gel sheeting for 6 weeks.

**Discussion**

By combining these techniques, we were able to achieve a pleasing result with the resurfacing of the acne-scarred face. None of these procedures alone proved adequate. A chemical peel may make the face look fresher for several weeks because of residual edema, but in the long term the acne valleys return. The chemical peel was used in this sequence to blend the jawline, the eyelids, brow, and hairline with the rest of the resurfaced face. Three passes with the UltraPulse CO₂ laser tightened the skin and gave a temporary improvement to depressed acne valley scars, but the long-term benefit was inadequate in the significantly scarred face. Dermabrasion, by itself, did not puff out the acne valleys or shrink the collagen. It was the subcision and elevation of the atrophic acne valleys that was the most beneficial sole procedure for improving these types of scars (Figures 9, 10). However, it was the combination of techniques that gave the best overall, global improvement (Figures 11, 12).

The skin of the central cheek could tolerate this extensive resurfacing. The semi-occlusive wound-healing environment supported this combination of procedures. With occlusion, the wound was not exudative, and the re-epithelialization was rapid. Erythema was less persistent. The meshed polyethylene inter-dressing protected the dermis, but it was porous enough to spread out the exudate, so that this fluid could transpire through the silicone sheeting. This combination provided an occlusive environment that shielded the skin from the drying effects of air.

It was possible to repeat the procedure in 8 to 10 weeks and re-treat the central cheek area to yield further improvement. Complications have been minimal. The blotchy hyperpigmentation seen in the individuals with darker complexions was blended in with the early use of bleaching cream. Lines of demarcation were diminished by blending between the laser and the peel with dermasanding. With the occlusive dressings, persistent erythema was not a problem.

We found it better to do any punch grafting or punch suturing during the time of the procedure. The polyethylene mesh held the grafts in place for 5 days. After that, the re-epithelization covered the grafts sites. They were often invisible. Contrariwise, if grafting is done weeks before resurfacing, the grafts may fall out or the ring-scars may be visible, even after the subsequent resurfacing.

We recommend this multiple approach to significantly improve the acne-scarred face. No single procedure will accomplish these benefits of the combination
of small-volume fat transfer, subcision of trabeculae, laser resurfacing, and dermabrasion. Those interested in improving the acne scarred face should become proficient in all of these techniques.

References