



Facial resurfacing: An overview

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 Plasma skin resurfacing

Facial resurfacing is a broad topic referring to procedures that change the texture and appearance of skin. Resurfacing procedures are broadly classified as ablative or nonablative. Ablative procedures are considered the first line treatment for the most common indications for facial resurfacing, which are photoaging and acne scarring. The goal of this review is to provide an overview of the factors that optimize the clinical efficacy of an ablative procedure, including careful patient selection, preoperative skin preparation, correct operative technique, and vigilant postoperative care, as well as review both the traditional and some of the latest technologies that effectively resurface facial skin.

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Facial resurfacing is a broad topic referring to procedures that change the texture and appearance of skin. Although reports of resurfacing date back to ancient times, renewed interest did not begin in America until the early 20th century. Since then, continued innovation in this field has ensued in an effort to find resurfacing procedures that both safely and effectively address the signs of photoaging and acne scarring. Photoaging and acne scarring are the most common reasons for which patients seek resurfacing procedures. These innovations include the introduction of mechanical dermabrasion in 1905 by Kromayer, the Baker-Gordon phenol peel in the 1960s, the laser principle of selective photothermolysis by Anderson and Parrish in 1983, and medium-depth chemical peeling by Brody in 1986.¹⁻⁴ In recent years, further innovation in the field of laser- and light-based technology has resulted in new devices that show promise, including fractional photothermolysis and plasma resurfacing technology. The goal of this review is to provide an overview of both the traditional and some of the latest technologies that effectively resurface facial skin.

erative skin preparation, correct operative technique, and vigilant postoperative care. The ideal candidate for a resurfacing procedure is one who has signs of photoaging or acne scarring. The Glogau photoaging score is a useful grading system for pretreatment classification of patients with aging skin (Table 1).⁵ Other grading systems reported in the literature include the Fitzpatrick wrinkle and elastosis scores and the Obagi classification.⁶ The Fitzpatrick skin type (Table 2) and the patient's ethnicity are also important factors that determine the effectiveness and safety of ablative procedures.⁷ Acne scarring can be classified as ice pick, rolling, or boxcar type (Figure 1). Ablative resurfacing is most beneficial for boxcar and rolling variants.⁸ Relative contraindications to ablative procedures include a history of keloids, isotretinoin use in the previous 6 to 12 months, areas with compromised pilosebaceous units, smokers, and patients who have undergone extensive undermining of skin (ie, facelift) in the previous 6 months.

Patient selection

The clinical efficacy of an ablative procedure is optimized through a combination of careful patient selection, preop-

Skin preparation for a resurfacing procedure

Skin preparation and protection is instrumental in optimizing the clinical benefits of ablative procedures. These steps have been succinctly summarized by Sadick as (1) preconditioning the skin with topical retinoids, alpha hydroxy acids, and hydroquinones and (2) practicing vigilant photoprotection after an ablative procedure (Figure 2).⁹ Antiviral prophylaxis is the standard of care for patients with moderate-to-deep ablation and should be started 1 day before the procedure. The use of prophylactic antibiotics is controver-

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Table 1 The Glogau photoaging scale

Group 1	Group 2	Group 3	Group 4
Ages 28 to 35	Ages 35 to 50	Ages 50 to 60	Ages 65 to 70
No keratoses	Early actinic keratoses	Obvious actinic keratoses	Actinic keratoses $\pm$ skin cancer
Little wrinkling	Early wrinkling/smile lines	Wrinkles at rest	Wrinkling/laxity
No scarring	Mild scarring	Moderate acne scarring	Severe acne scarring
Little makeup	Small amount of makeup	Always wears makeup	Makeup cakes on skin

sial because most studies show a low risk of infection, although one study by Manuskiatti and coworkers found a bacterial infection rate of 4% in pretreated patients undergoing laser resurfacing and 8% in the untreated group.^{10,11}

Classification of resurfacing procedures

Resurfacing procedures are broadly classified as either ablative or nonablative. Nonablative devices are currently limited to laser- and radiofrequency-based technology and are considered second line to ablative procedures for the treatment of skin laxity, rhytids, and acne scarring. Their chief advantage is minimal postoperative recovery time and low risk of scarring because they selectively wound the dermis while sparing the epidermis. Several excellent reviews are available on nonablative procedures and they will not be further addressed here.^{12,13}

Ablative procedures by definition refer to wounding of the skin to the level of the dermis by a chemical, mechanical, or thermal mechanism. They include chemical peels, dermabrasion, laser ablation, and a variant of electrosurgical ablation known as plasma resurfacing. These procedures are classified by the level of the wound as superficial, medium, or deep (Table 3 and Figure 3). Ablative procedures are the gold standard for addressing the signs of photoaging and scarring. Through removal of the epidermis, they address skin textural and pigmentary concerns. When the injury extends to the dermis, new collagen formation is triggered, which subsequently improves skin laxity and the appearance of rhytids. The chief disadvantages of ablative procedures are the length of “downtime” while waiting for re-epithelialization and the risks of infection, prolonged erythema, transient postinflammatory hyperpigmentation, cicatricial scarring, and permanent hypopigmentation, which increase with the depth of ablation. Additionally, systemic complications are a concern with the use of deep phenol peels.¹⁴

Chemical peel resurfacing

Chemical resurfacing is the application of chemical agents to produce a controlled partial thickness injury to the skin. Several different peeling agents are available, categorized as superficial, medium, and deep based on the depth of ablation.

Indications

Indications for superficial chemical peels include comedonal acne, postinflammatory erythema, and Glogau group 1 (mild) photoaging. Medium depth chemical peels address dyschromia from dermal melasma and Glogau 2 to 3 (mod-

erate to advanced) photoaging. Deep phenol peels are best reserved for patients with Glogau 3 to 4 photoaging and are especially effective for the deep rhytids in the perioral and periorbital regions. Superficial chemical peels are safely used in all Fitzpatrick skin types. Medium and deep chemical peels are best reserved for Fitzpatrick skin types 1 and 2, used with caution in skin types 3 to 4, and are typically not recommended for skin types 5 to 6 due to the risk of dyschromia.¹⁵

General technique

A gentle soap free cleanser is used to remove all makeup and facial products. The skin is then vigorously “defatted” for approximately 3 minutes with either rubbing alcohol or acetone to remove surface sebum, allowing an even absorption of the lipophobic chemical peeling agents. The endpoint of this “defatting” procedure is a brisk erythema. The peeling solutions are uniformly applied to the 6 large cosmetic units (forehead, left cheek, right cheek, nose, chin, and periorbital area) with cotton gauze (Figure 4). The upper eyelids are typically left untreated due to the risk of the chemical agent dripping into the eyes. For the perioral and periorbital cosmetic units, cotton tipped applicators are used for better control. When performing a deep phenol peel, the entire face is treated with cotton tipped applicators. If rhytids are present, an assistant spreads the skin and the solution is applied with the broken end of a cotton applicator to ensure that the peeling solution penetrates the base of the rhytid.

Superficial chemical peels

The endpoint of application is erythema and streaky whitening.¹⁶ A clear frost is not desirable because it indicates penetration into the dermis. Trichloroacetic acid and salicylic acid peels self-neutralize, however, alpha hydroxy acid (ie, glycolic acid) peels require neutralization with cold water or saline after certain amount of time that is determined based on the concentration and pH of the peeling agent.

Table 2 Fitzpatrick’s sun-reactive skin types

Skin type	Color	Tanning response
I	White	Always burns, never tans
II	White	Usually burns, tans with difficulty
III	White	Sometimes burns, usually tans
IV	Brown	Rarely burns, tans very easily
V	Dark brown	Very rarely burns, tans very easily
VI	Black	No burn, tans very easily

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