

Special Topic

Combination Hand Rejuvenation Procedures

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Although the hands age at the same rate as the face, the aging process differs and requires a combination treatment approach for optimal rejuvenation. Photoaging causes epidermal changes such as lentigines, actinic keratoses, fine wrinkles, and crepe-like textural change. Thinning of the dermis and subcutaneous fat occurs as a result of both ultraviolet light exposure and intrinsic aging. This process can lead to a skeletal appearance of the hands, with prominent veins and bulging tendons. The combination approach addresses all of these issues, employing lasers, intense pulsed light devices, fractional devices, fillers, peels, vein sclerotherapy, and an effective at-home skin care program as indicated for individual needs and concerns. (*Aesthet Surg J*;29:409–413.)

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The hands—along with the face, neck, and chest—are the most visible parts of the body and require attention to rejuvenation; otherwise, they become an obvious indication of incomplete cosmetic work. There is nothing more startling than a woman with a flawless facial complexion and a pair of mottled, emaciated hands with bulging veins. An optimal treatment approach begins in the office with a program that attends to all of the major issues in the epidermis and dermis, and continues with an at-home regimen to maintain and expand these results.

As we age, in addition to ultraviolet (UV) light exposure (or extrinsic aging), changes occur at all levels of hand anatomy.¹ The epidermis thins and lentigines, actinic keratoses (AK) and seborrheic keratoses (SK), general dyschromia, and textural roughness appear. In the dermis, the quality and quantity of collagen and elastin diminishes, and the capacity for regeneration declines. Capillary fragility, with its attendant bruising, is also common and is primarily caused by UV light damage to the capillary walls. In the subcutis, fat atrophy renders the tendons and bony prominences more noticeable and makes the veins appear to bulge.

Unlike the face, the hand has relatively few adnexal structures such as sebaceous glands, eccrine glands, and large numbers of hair follicles. This fact is an important consideration in planning a series of peels and/or different types of laser treatments because the hands have less capacity to replace the epidermis, so pigmentary

alterations may develop in the course of the healing process. Caution must be exercised.

REJUVENATION OF THE EPIDERMIS AND DERMIS

Rejuvenation for the multiple visible signs of aging in the hands (such as lentigo, AK and SK, fat and muscular atrophy, and vein prominence) is ideally performed in a carefully planned stepwise fashion, beginning with the epidermis and dermis. The degree of damage, the absence or presence of AK or SK, and the number and size of lentigines will determine which of the following options the clinician chooses.

Chemical peels have always been the least expensive treatment modality and are classified as superficial, medium, or deep. They are used primarily to address mild pigmentary alterations. Commonly used agents include glycolic acid, Jessner's solution, and trichloroacetic acid (TCA). The results are heavily dependent on concentration, contact time with the skin, and the manner of the prepeel preparation.² Glycolic peels can be performed in concentrations ranging from 10% to 50%, with a pH of 5. When using a glycolic peel, contact time is particularly important; after the peel is applied, the patient must be observed for signs of redness or symptoms of excessive burning. At the first sign of redness, the peel must be gently wiped off with water-soaked gauze. Extra caution must be observed with TCA peels. Administering a low strength of 10% to 15% mitigates against the risk of scarring or permanent changes in pigmentation.

One of the most serious issues associated with the use of chemical peels is the final concentration. Most of

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Figure 1. **A**, Pretreatment view of a 64-year-old woman with actinic keratoses. **B**, Ten weeks after two photodynamic therapy treatments.

them are formulated in private pharmacies and, after the bottle is opened, the concentration can change because of evaporation. Because of this problem, using a pre-formulated peel is recommended. The SkinMedica peel (SkinMedica Aesthetics, Carlsbad, CA), a combination of tretinoin and glycolic acid, is extremely beneficial because it produces a more predictable improvement of pigmentation and texture as a result of its composition. In addition, a superficial peel is recommended because of the hand's paucity of adnexal structures and relatively thin epidermis and dermis. A deeper peel entails an increased risk of scarring, pigmentary change, creation of a demarcation line between the hand and arm, and persistent erythema.

Hyfrecator use may be indicated to remove SK. SK are wart-like brown papules arising from the epidermis that are frequently seen and palpated on the dorsal surface of the hand. The use of a hyfrecator at a low setting to simply whiten the top of the papule is both effective and safe. Because of their thickness, attempting to remove SK with a laser, peel, or liquid nitrogen runs the risk of scarring the skin.

Another common epidermal change seen on the dorsal surface of the hands are AK—typically red, scaly patches that may bleed or peel. There are multiple treatment options, including liquid nitrogen or topical agents such as 5-fluorouracil, imiquimod, Solaraze (PharmaDerm, Melville, NY), or Carac (Sanofi Aventis, Bridgewater, NJ), to name a few. However, liquid nitrogen frequently causes blisters and subsequent hypopigmentation; the topical agents may cause oozing and bleeding sores that can take weeks to heal. The recurrence rate when using these agents is high. An extremely effective technique approved by the US Food and Drug Administration (FDA) for treatment of AK is photodynamic therapy (PDT; [Figure 1](#)).³ The most common technique employed is application of Levulan (DUSA Pharmaceuticals, Wilmington, MA) in

a single layer to the entire hand and in a second layer to thick AK, after degreasing the skin with acetone or alcohol, and then allowing the product to incubate for one hour. The Levulan is then activated with an intense pulsed light (IPL) device or a BLU-U blue light device (DUSA Pharmaceuticals).⁴ AK frequently coexist with lentigines and this procedure will effectively treat both conditions. Because the medication penetrates to a deeper level of the epidermis through the hair follicle, it may reduce the recurrence rate and more effectively treat AK with a reduced risk of scarring the skin. Many times, only one treatment is needed; occasionally, a series of two to four treatments is necessary. Healing normally takes about two weeks. Side effects include crusting, redness, and temporary discomfort that can be treated with topical agents, such as Biafine (Ortho Dermatologics, Skillman, NJ) to accelerate the healing process.

Lentigines, or brown macules, are the most common cutaneous alteration and can be treated with laser devices whose target chromophore is melanin. In order for treatment to be effective and to avoid unwanted adverse effects, it is important to use a wavelength that targets the appropriate skin chromophore while avoiding absorption by other skin chromophores; otherwise, treatment may result in white spots or striping. A broad spectrum of wavelengths can be used, because melanin has a wide range of absorbance. The most common devices used are the Q-switched alexandrite laser (755 nm), the Q-switched ruby laser (694 nm), and the frequency doubled Q-switched neodymium-doped yttrium aluminium garnet laser (532 nm). A single pass may be performed and the pulses may be stacked over flat SK. The shorter the wavelength, the greater the risk of posttreatment or halo hypopigmentation related to the effect of treatment on any pigmented surrounding skin. In all laser treatments, regardless of the specific

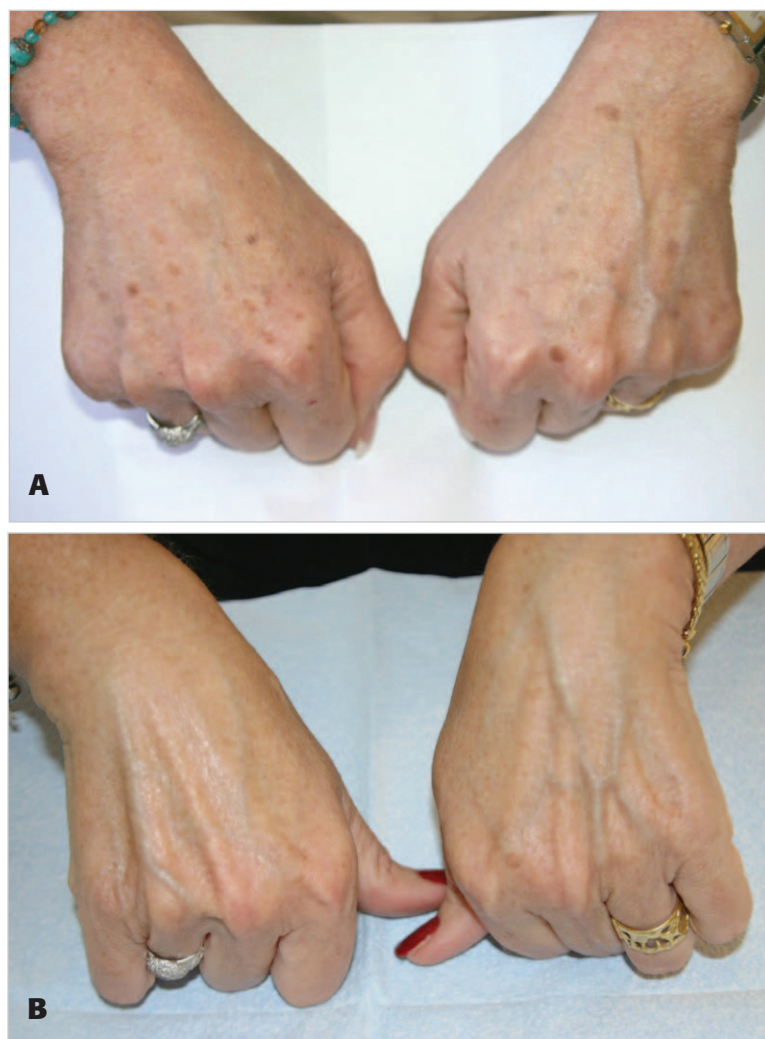


Figure 2. **A**, Pretreatment view of a 49-year-old woman with sun damage. **B**, Six weeks after intense pulsed laser treatment.

device used, the spot size must be small enough to treat only the desired area. In general, an IPL device is usually the first choice because it will normalize the pigment of the entire dorsal surface of the hand (Figure 2). IPL devices typically treat the skin surface with a large footprint for each pulse and often only 15 pulses per hand are necessary. Because a cutoff filter is used, the treatment parameters can be adjusted to the underlying skin type. After a laser treatment, each individual lentigo turns darker and may develop a crust that can take as long as two weeks to completely heal. The healing process can be accelerated by having the patient undergo microdermabrasion between seven and 10 days after treatment to speed the removal of any crusts.

A more aggressive approach to rejuvenating the epidermis—one that could more significantly improve the overall texture of the skin—is treatment with fractionated devices, such as the Fraxel re:pair and the Fraxel re:store lasers (Reliant Technologies, Mountain View, CA), the Harmony Pixel laser (Alma Lasers, Buffalo Grove, IL), and the Active FX and Deep FX lasers (Lumenis, Santa Clara, CA). These devices represent

an improvement over the early resurfacing lasers, which proved to have too many serious side effects like scarring and pigmentary alteration. By using fractionated technology to selectively wound small columns of skin, enabling the skin to heal from side to side, many of these side effects can be eliminated. The Fraxel re:store is a 1540-nm device initially designed for use on the face. Because its technology permits significant sparing of tissue while delivering significant results, its use was expanded to include hand treatments. An energy level of 30 to 40 mJ and a treatment level of seven to 10 are applied, depending on skin type. The Active FX and Deep FX are 10600-nm devices and can be used for hand treatments—at least when applied very judiciously to reduce the risk of thermal damage. All of these devices require extensive experience to avoid adverse events and are recommended only for those who are familiar with the technology. In addition to eliminated lentigenes, treatment with a fractionated device usually has the added benefit of improving the overall quality and texture of the skin.

The radiofrequency device by Thermage (Hayward, CA) rejuvenates tissue by working at the level of the

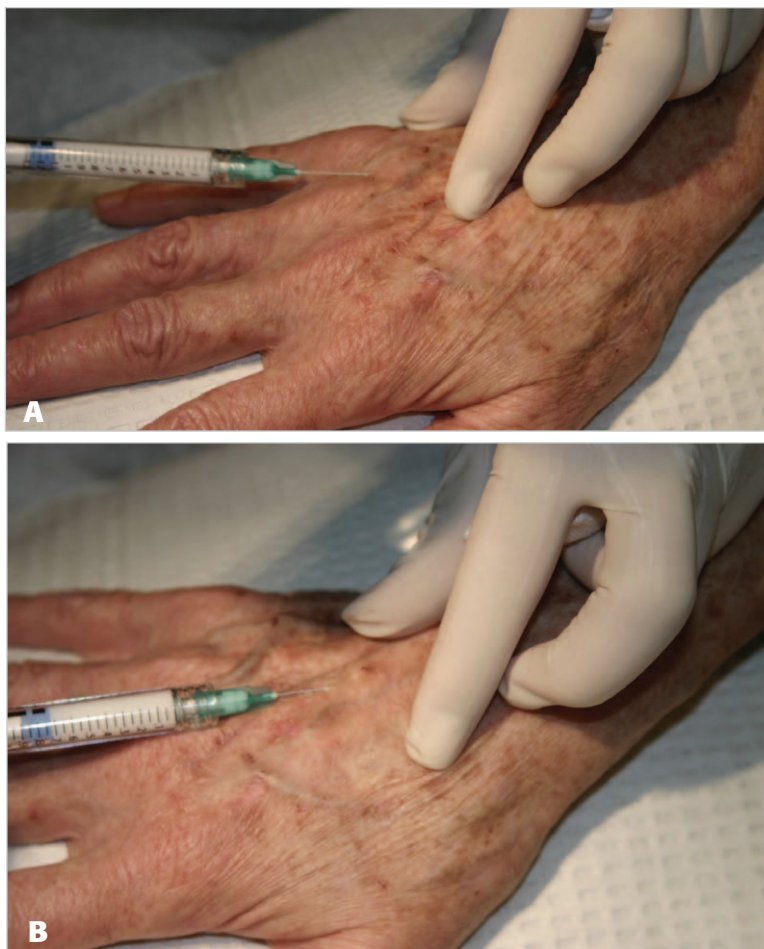


Figure 3. A 59-year-old woman receiving her first (A) and second (B) injections of Radiesse (BioForm Medical; San Mateo, CA).

dermis and subcutis to stimulate tissue remodeling and reduce tissue laxity. Procedural guidelines were established in a multicenter clinical study.⁵

Before treatment, all jewelry should be removed. Nerve blocks or subcutaneous injection are not used for anesthesia but topical anesthesia may be applied. The skin is moistened with alcohol and a 1.5-cm² skin marking grid is applied on the hand. Settings for the 1.5-cm² ST Thermo tip are from 82 to 84.5 joules. First, a staggered pulse is applied across the grid, treating distal to proximal, ulnar to radial. Next, a second staggered pass is completed. Finally, a dorsal angle is marked at the head of the third metacarpal and treatment is applied in a vector fashion, with the vectors extending to the base of the first and fifth metacarpals. Parallel vectors can be made at 1-cm intervals both radially and in an ulnar direction. The treatment level setting is titrated to the patient's heat tolerance and not beyond. Note that the Thermo device will not remove lentigines, because the device does not treat epidermal changes.

REVOLUMIZATION TECHNIQUES AND FILLERS

Newly prominent age- and UV-related vessels, tendons, and bones can be addressed through revolumization. By plumping the hands, tissue laxity and

a reduction of vascular and bony prominences can be achieved.

Several different acceptable fillers and a collagen stimulant are available that can be safely used in the hands. Volume loss in the hands is addressed by reconstituting the subcutis with a tissue stimulant such as poly-L-lactic acid (Sculptra; Sanofi Aventis) or simply replacing the volume with a filler such as fat, hyaluronic acid products, such as Restylane (Medicis Pharmaceutica, Scottsdale, AZ) or Juvéderm (Allergan), or calcium hydroxylapatite (Radiesse; BioForm Medical, San Mateo, CA; Figure 3).^{6,7}

While fat transfer has been shown to be effective, it often requires multiple treatments, is of uncertain duration, and has been frequently associated with adverse events such as lumps. Fat injection is a two-part procedure, each of which may cause complications. First, fat is harvested from the abdomen or upper thigh, which may result in side effects such as infection or bumpiness. Second, fat is injected into the hand, which may lead to a "mitten" or pillow-like appearance. Although injected fat occasionally performs like a graft and establishes its own blood supply, it can still result in an uneven appearance to the "mitten." For these reasons, the author prefers the use of either the above mentioned hyaluronins or Radiesse. Restylane has also been shown

to stimulate production of collagen so that overall, in the author's experience, the volume effect can persist in the hand for anywhere between six and 18 months.

Poly-L-lactic acid can be successfully used in the hand in a dilute preparation to avoid the formation of nodules or papules. Several treatments may be required and, in contrast to other products, a waiting period is necessary to determine whether full correction has been achieved.⁸

Injection of these materials is remarkably easy. First, the skin is tented between the fingers of the noninjecting hand, just slightly medial to the second metacarpal space. Approximately one quarter of the syringe of either the hyaluronin or Radiesse is then injected in a bolus fashion, being careful to avoid injecting into a vein or a tendon. The bolus is then gently massaged medially toward the wrist until it is flat. The next injection can take place at the next metacarpal space until the entire syringe is emptied.

VEIN REMOVAL

Vein removal is often found to be unnecessary after volume restoration, which can render previously prominent veins invisible. However, if bulging or prominent veins remain a cosmetic problem, they can either be treated with the use of sclerotherapy or surgical or laser removal. Sclerosing agents such as sotradecol are most commonly used, but may leave a residual hemosiderin stain that lasts for several months. Foam preparations are also used on the hands. Endovenous technology is also an option, but care must be exercised to avoid thermal injury using this procedure.⁹

FOLLOW-UP TOPICAL SKIN CARE REGIMEN

Patients whose treatment is successful are sent home with a detailed instruction sheet on how to maintain their rejuvenated hands. The use of sunscreen when they are outdoors is paramount; those who engage in cycling or hiking also need to wear gloves when participating in these activities. In addition, the daily use of an antioxidant (such as a cream or serum containing vitamin C or green tea extract) and the nightly use of a low-strength retinoid (such as Renova [Ortho Dermatologics]), along with a ceramide-containing moisturizer, will maintain the quality of the epidermis while continuing the stimulation of collagen synthesis begun in the office with through laser treatments and/or fillers.^{10,11}

CONCLUSIONS

A multimodal approach to hand rejuvenation must be exercised with caution. Each individual must be evaluated for the type of procedure (or sequence of procedures) that would benefit him or her most. For example, if a sequence is chosen that includes a light alphahydroxy peel followed by an IPL treatment and then revolumization is contemplated, the patient should be examined at each step to make sure that healing is adequate and that the desired results have been achieved before proceeding further. A

combination approach involves a greater risk of complications, but also a greater possibility of achieving an optimal result. In summary, the combination of a superficial peel, laser treatment, and volume restoration combined with (and *only* when combined with) a well-planned at-home care program can result in beautiful, youthful appearing hands, regardless of the patient's age. ■

DISCLOSURES

The author is a consultant and clinical investigator for Medicis and a consultant and lecturer for Allergan.

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