

A Profile of Hand Rejuvenation Options

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The hand is the most abused part of our body, yet at the same time one of the most sensual organs. Once believed to contain the vein of love connecting to the heart, gentlemen hurried to express their admiration by pressing their lips to the ladies' hands. A touch or a shake of the hand symbolized the transfer of power, healing, and creating as illustrated in the famous painting by Michelangelo, "The Creation of Adam" which adorns the ceiling of the Sistine Chapel.

Our hands show the toll of our work. Exposed to the elements of the sun and wind and harsh detergents, they become weathered and wrinkled. With advancing age, the hands gradually lose their skin elasticity, fat deposit, and muscle mass. Still, the hands remain the first in line to greet and size another person. A plump, smooth, hand is associated with youth, aristocracy, and lack of hard labor. A thin or "bony" hand with lax atrophic skin and mottled pigmentation exposing the underlying veins and tendons denotes a frail, powerless hand, devoid of sensuality.

The importance of preserving the youthful, energetic appearance of the hands, their strength, sensitivity, and sensuality in the face of the unyielding elements of nature and time, was recognized for many centuries. Noble men and women tried to shift the center of attention from the back of their hands to their nails. Nail shaping, polishing, and coloring became popular. Still, one cannot help but wonder when a youthfully faced female presents with hands that seem to be "misplaced."

"People can never guess my age until they look at my hands." "When I look at my hands I get depressed." These are remarks we sometimes hear. During the last decade, advances in chemical peel, laser, and fat augmentation have allowed us to claim the hands into the realm of rejuvenation.

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Consultation and Physical Exam

A detailed examination of a patient's hands with notation on the different locations and changes of both intrinsic aging and photoaging must be recorded, and a sense must be established as to the cosmetic goals of the patient. Different treatment options can be used to target various aspects of aging as outlined in the table. This should be reviewed with the patient as it relates to the cost and expected improvements. Risks of the procedures, their limitations, and alternatives should be outlined. Once realistic expectations are established and the treatment modality best fitting the desired outcome and anticipated downtime is selected, a thorough history and physical exam should be performed to assess any risks or contraindications to the procedure. Relative contraindications for a medium to deep chemical peel, laser resurfacing, and/or fat transfer would include: history of collagen vascular disease, tendency for keloid or hypertrophic scarring, carpal tunnel syndrome, active infection (an absolute contraindication), peripheral neuropathy, Raynaud's syndrome, immunodeficiency disorders, and any hand pathology. Appropriate studies for the chosen procedure should be obtained, which may include a medical clearance.

Operative Techniques

Polaroid and/or digital pictures of the hands are taken, and the superficial skin changes are outlined. The superficial skin is then treated with the modality chosen which may or may not require prior local or topical anesthesia. The most effective treatment depends on the purpose; multiple lentiginos are easily treated with Q-switched Nd:YAG, alexandrite, or ruby lasers (Figure 1). More recently, intense pulsed light (IPL) has been used to treat lentiginos.^{1,2}

"Lunch time peels" refer to microdermabrasion or glycolic acid peels where minimal to no erythema is observed and a fleeting discomfort, at most, is experienced. This procedure is effective for those who simply seek a refreshed look with an improvement of their skin tone and no disruption of their work or social life. In general, a minimum of 4 to 6 consecutive treatments are needed prior to the appearance of a cosmetic improvement. Since the stratum

TABLE

CLINICAL PRESENTATION OF HAND AGING AND ITS TREATMENT

Intrinsic Aging	Treatment
Epidermal skin changes Fine wrinkles, xerosis, senile purpura	Retinoids, moisturizers, microdermabrasion, ¹⁰ dermabrasion, laser resurfacing, ⁴ intense pulsed light (IPL), ^{1,2} superficial chemical peels, ¹¹ N-light (nonablative lasers)
Epidermal lesions Seborrheic keratosis, stuccokeratosis	Cryotherapy, superficial or medium depth chemical peels, microdermabrasion, dermabrasion, CO ₂ laser resurfacing, ⁴ Er:YAG resurfacing
Dermal changes Dermal atrophy (results in transparent, easily brusable skin)	Microdermabrasion, dermabrasion, N-light, collagen (Zyderm, Zylast), medium, deep (some even suggest superficial ¹¹) chemical peels, Er:YAG, CO ₂ laser resurfacing, Nd:YAG resurfacing
Subdermal changes Loss of subcutaneous fat (results in transparent, easily brusable skin)	Soft tissue fillers such as Fascian, or autologous fat transfer ⁴ (Figure 2), silicon injections (not recommended secondary to unpredictable outcome and granuloma formation)
Photoaging	
Epidermal skin changes Idiopathic guttate hypomelanosis, solar purpura, solar lentigo, melasma, mottled hyperpigmentation	Intense pulse light (IPL), ^{1,2} retinoids, hydroquinones, kojic acid, 20% azelaic acid are effective for melasma and hyperpigmentation. Superficial chemical peels, microdermabrasion, ¹⁰ N-light (nonablative lasers), cryotherapy, superficial or medium depth chemical peels, microdermabrasion, dermabrasion, CO ₂ laser resurfacing, Er:YAG resurfacing, laser, Q-switched Nd:YAG, alexandrite and ruby lasers can effectively target lentigos (Figure 1). All modalities should be followed by daily sunblock use.
Epidermal lesions Actinic (solar) keratosis, milia	Same treatment as above, Efudex cream, photodynamic therapy, manual extraction (for milia)
Dermal changes Elastotic tissue deposition	Nonablative lasers (N-light, nonablative Nd:YAG), IPL, ² microdermabrasion (may increase elastin content), ¹⁰ dermabrasion, CO ₂ and Er:YAG laser resurfacing, chemical peels (medium and deep), coblation (electrokinetic decomposition) ¹²

comeum is exchanged every 2 weeks (a process that slows as we age) the superficial peels should be spaced at 2 to 4 week intervals, and work best when combined with a post peel regimen of sunscreens and antioxidant moisturizers. As noted in the table, the superficial peeling agents can be used either alone or in combination with other modalities to treat melasma, fine wrinkles, xerosis, solar lentigines, mottled hyperpigmentation, seborrheic keratosis and, in combination

with Efudex (fluorouracil peel), can be very effective in treating actinic keratosis.³ The superficial peeling modalities can be safely used in all skin types. The higher concentration of glycolic acid peel is well tolerated over the dorsal hands and forearms. Medium depth peels with trichloroacetic acid (TCA), unlike the superficial peeling methods, are often performed as a single treatment, which may be repeated at a yearly interval. A 35% TCA peel is usually more predictable

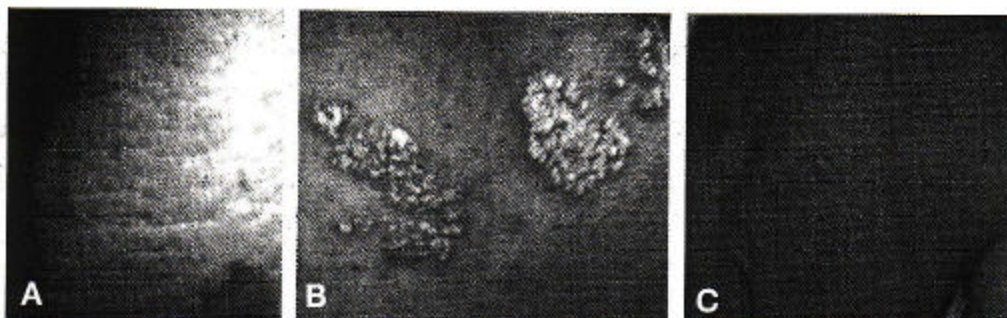


Figure 1A. The dorsum of the hand of a 56-year-old female with a close-up photograph of her solar lentigo. Similar lentigines were seen throughout the dorsal hands bilaterally. **Figure 1B.** An intraoperative photograph showing the multiple solar lentigines treated with a frequency-doubled Q-switched Nd:YAG laser. Note the whitening of the surface of the lentigines, demonstrating the desirable treatment fluence. **Figure 1C.** One month postlaser—the dorsal hand shows a clear improvement with no remaining signs of the lentigines.

in its depth of penetration than the 50% TCA and is a safer concentration for treating photoaging and fine to moderate wrinkles (Glogau photoaging groups II to III). The medium depth peels produce wounding extending to the papillary dermis and upper reticular dermis. Care must be exercised in Fitzpatrick skin types IV-VI to avoid pigmentary alterations, which may follow medium and deep peels. A test spot is advisable in these skin types. The skin is prepped by a defatting agent such as acetone prior to the chemical peel in order to assure the evenness of the TCA peel. The end point is reached when frost (solid whitening of the skin) is observed, indicating penetration of the peel into the papillary dermis. Further reapplication of the peel beyond this point increases the risk of post peel scarring and is not recommended for the treatment of photoaging. The erythema that follows may last for 1 to 2 months, during which strict sun protection is advisable.

Various lasers are capable of selectively targeting melanosomes. The most effective ones include the Q-switched lasers such as the ruby (694 nm), alexandrite (755 nm), and Nd:YAG (532 nm and 1064 nm). These are effective in treating solar lentigines, ephelides, and melasma, with melasma showing variable response depending on the depth of the melanosomes. Although clearance of epidermal pigmentation is common after 1 to 3 treatments, recurrence is frequent upon ultraviolet exposure. When using the Q-switched Nd:YAG, the frequency-doubled 532 nm wavelength is preferable due to its more superficial penetration (Figure 1). Proper fluence is evident through immediate whitening of the treated lesions in Figure 1B.

In very selected cases, the CO₂ laser resurfacing technique yields good results if the hand is not completely resurfaced. Just as in the face, here too, resurfacing must be blended with the forearm, thus avoiding an unwanted demarcation seen in the hand as a glove effect. Detailed methods of this technique have been published in the past.⁵

In order to correct the subdermal changes, the most optimal treatment, in our opinion, is autologous fat transfer. The donor site is chosen often based on the patient's preference. In men, the donor region is often the lateral flanks; in females, it is the hip, buttock, lateral thigh, or lower abdomen. A wide area of the skin overlying the donor site is prepped with betadine and an incision with No. 11 blade is produced. Tumescent mixture is prepared and infiltrated into the subcutaneous plane via a syringe or an infusion catheter. A mild stinging sensation may be felt by the patient treated under local anesthesia. Fat is harvested using a 14-gauge accelerator extraction cannula attached to a 10 cc syringe.⁵ Approximately 10 cc of fat is needed per hand. Once harvested, the syringe is capped with an 18-gauge 1-in needle and placed with its tip downward. After standing a few minutes, the fat separates to the surface and the serosanguinous fluid is discarded. The recipient site of the hand is prepped and draped in a similar fashion as the donor site, and a small wheal is raised at the site of planned needle stick using lidocaine. The fat is injected from the dorsal wrist or from sites between the metacarpophalangeal joints as shown in Figure 2B. The harvested fat is infiltrated into the subcutaneous tissue through a single or through multiple 18-gauge needle sticks (depending on the degree of correction needed), and uniform blending of the fat is achieved by molding it with the operator's hands. The 2 hands are then compared for symmetry. Suturing is not required. The patient is instructed to avoid strenuous activity and to elevate the hands for the next 48 hours.

Postoperative Complications

When performed by an experienced surgeon with the proper technique, side effects are rarely seen. Prior to performing chemical peels and microdermabrasion, a thorough history of other creams (retinoids, Efudex) or peels (laser, dermabrasion, deep peels) used in the weeks or months

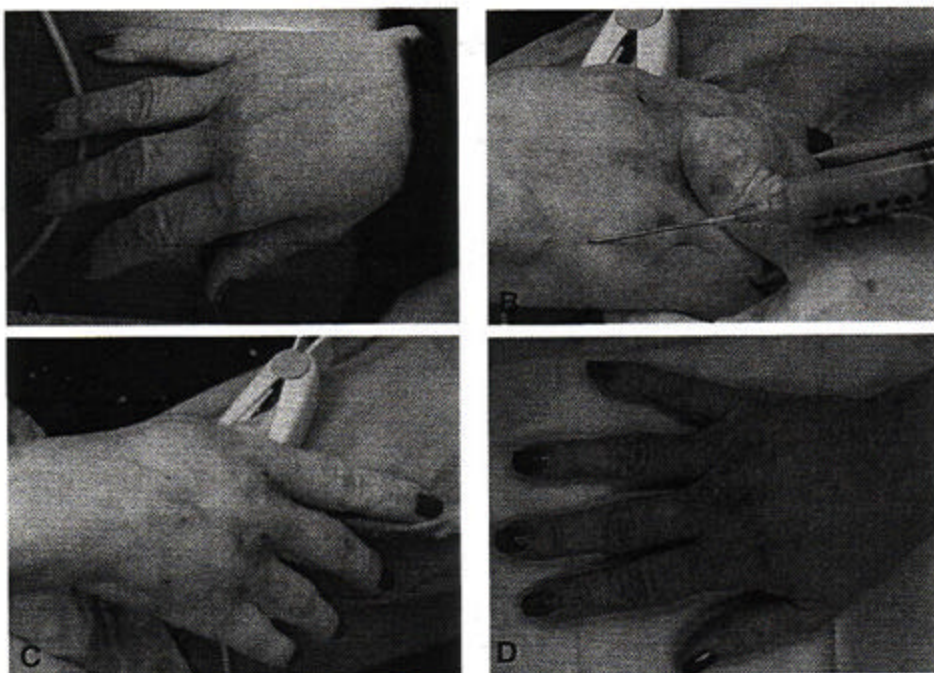


Figure 2A. Dorsal hand showing moderate subcutaneous atrophy with resultant exposure of the superficial veins and tendons. **Figure 2B.** The harvested fat is injected into the subcutaneous compartment of the prepped hand using a 10 cc syringe connected to an 18-gauge 1-in needle. Care is taken to avoid puncturing the superficial vasculature. **Figure 2C.** The hand is shown here immediately after fat injection followed by molding of that fat by the operator's hands. **Figure 2D.** At 3 weeks post-op, a clear improvement of the hand is noted. A uniform appearance of the injected fat hides the previously prominent vessels and tendons, conferring a more youthful and rested appearance to the hand.

before or planned to be used after should be taken. Prior peels, topical, and especially oral retinoids may accentuate the penetration depth of the peel, slow the healing time of the skin (oral retinoids) and thus may lead to higher risks of complications. The prepeel defatting procedure should be performed with care as it can lead to a mechanical abrasion of the epidermis with subsequent increased penetration of the peel and its associated complications.

Care should be taken when using Q-switched lasers on skin types IV and above due to the high risk of hypopigmentation (usually resolving with time). Scarring and postinflammatory hyper- or hypopigmentation may occur in any skin type when the fluence used exceeds the therapeutic energy required.

Laser resurfacing of the hand may result in scarring, hyper- or hypopigmentation, glove effect, and infection. Fat harvesting may lead to localized complications such as ecchymosis, infection, pain, scarring, or edema. Fat trans-

fer to the hand has been reported in rare occasions to cause "lumpiness" (irregularities of the hand). Two out of 72 patients in one study complained of irregularities⁶; the same study reported one case of infection among the 72 patients treated. Infection as in the reported case resolves with antibiotic therapy and can usually be avoided by prophylactic antibiotic therapy. Hematoma, while not uncommon, can usually be avoided by careful infiltration above the superficial vasculature and abstaining from blood thinning preparations 1 week to 10 days prior to the procedure. Edema is commonly seen but is short lived, although it has been reported to last up to 1 month.⁶

Discussion

In the properly selected patient and in the hands of an experienced surgeon, a combination of therapeutic modalities can be safely offered for hand rejuvenation. The degree of

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correction of the epidermal, dermal, and subcutaneous levels depends on the combination of therapeutic modalities chosen. When used appropriately, these improvements are clear, with little down time, and often last longer than in other body areas. A study by Aboudib, et al⁶ showed that 98% of 72 patients receiving fat filling into their hands were happy with the results, with 2 patients slightly dissatisfied due to contour irregularities. While fat harvesting shows a moderate degree of resorption anywhere between 3 months and 6 months following the procedure,^{7,8} in the hands this absorption is significantly reduced^{6,9} with 60% to 80% of the results often lasting more than a year following the procedure. Although newer nonablative techniques and different filling substances have become available, the gold standard for hand rejuvenation remains laser therapy for epidermal aging, medium depth peels and CO₂ resurfacing for epidermal and dermal aging, and autologous fat transfer for subcutaneous tissue atrophy.

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