

Hand Rejuvenation: A Comprehensive Review of Fat Grafting

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Dermal atrophy, bulging reticular veins, and prominent bones and tendons are characteristic of the aging hand. Demand for cosmetic procedures to restore a youthful appearance to the dorsum of the hand has risen in recent years. A review of the literature reveals that of the many options for hand restoration, autologous fat grafting stands out as the most promising choice compared with many available alternative options such as microdermabrasion, peeling agents, and dermal fillers. This article details the surgical technique and relevant anatomy necessary for successful hand rejuvenation. Future advancements may rely on further study into adipose-derived stem cells. (*J Hand Surg Am.* 2016;41(5):639–644. Copyright © 2016 by the American Society for Surgery of the Hand. All rights reserved.)

Key words Hand rejuvenation, fat grafting, cosmetic, autologous.

HAND AESTHETICS

The appearance of the hands is a telltale sign of a person's true age.¹ Studies have shown that people are able to roughly estimate a person's age solely by viewing their hands.² Other than the face and neck, the hands are the most visible part of the human body and often have high exposure to environmental factors such as ultraviolet light and common household chemicals, which may lead to accelerated aging.^{3–6} Therefore, it is unsurprising that the popularity of procedures to restore a youthful appearance to the hands has increased by over 60% in the past decade.^{2,7–11}

The challenge for surgeons is to reverse the effects of aging by restoring the smooth contour and fullness characteristic of a young hand. Extrinsic effects on the hand include dermatoheliosis, or photoaging, which leads to wrinkles and irregular pigmentation

such as solar lentigines, solar purpura, punctuate hypopigmentation, actinic keratosis, seborrheic keratosis, and telangiectasia.^{6,12,13} Aging also leads to intrinsic effects such as the gradual disappearance of subcutaneous fullness and tissue atrophy in the form of collagen depletion and dehydration.^{11,14,15} This leads to dorsal skin wrinkling and greater visibility of the extensor tendons, and makes subcutaneous veins appear more blue and tortuous.^{3,16}

Multiple options are available for physicians and patients to consider for addressing these factors, all of which have their own unique affects on the dorsal appearance of the hand. Ablative procedures using trichloroacetic acid or phenol skin peels improve the quality of the skin by inducing dermal thickening and can also lighten pigmentation changes.^{1,8,12,17,18} Surgical hand lift excises redundant skin and wrinkles from the dorsal hand, wrist, and forearm.^{18–20} Dermal fillers such as polymethylmethacrylate, calcium hydroxyapatite (Radiesse, Merz Aesthetics, Franksville, WI), hyaluronic acid, poly-L-lactic acid, collagen, and silicone create a fuller-looking hand by reducing skin laxity and wrinkling and by hiding prominent structures such as bones, tendons, and veins. Some achieve this through the induction of neocollagenesis.^{5,6,9,11,13,15–17,21,22} Laser treatments such as Q-switched lasers, intense pulsed light, photodynamic therapy, ablative fractionated lasers, non-ablative fractionated lasers, non-ablative resurfacing lasers, radio frequency, and plasma skin

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TABLE 1. Alternative Methods for Youthful Hands

Alternative	Disadvantages	
Ablative procedures	Trichloroacetic acid skin peel ^{1,8,12,18}	Epidermis and basal membrane injury leading to fibrosis of papillary dermis and dyspigmentation
	Phenol skin peel ^{17,18}	Epidermis and basal membrane injury leading to fibrosis of papillary dermis and dyspigmentation. Hypertrophic scars may also form
Skin tightening	Hand lift ^{18–20}	Injury to superficial branch of radial nerve and dorsal branch of ulnar nerve, wound dehiscence, and decreased range of motion of wrist. Significant damage to epidermis and basal membrane leading to postinflammatory skin hyperpigmentation
Dermal filler	Polymethylmethacrylate ⁹	Contour deformity, sensory dysfunction, inflammatory symptoms, stiffness
	Calcium hydroxyapatite (Radiesse) ^{9,13,21}	Contour deformity, inflammatory symptoms, stiffness. Transitory erythema, pruritus, ecchymosis, and edema that can last up to 2 wk
	Hyaluronic acid ^{6,9,11,13,15}	Contour deformity, inflammatory symptoms, skin induration
	Poly-L-lactic acid ^{9,13,16}	Contour deformity, inflammatory symptoms, subcutaneous nodules
	Collagen ^{5,6,22}	Nodule formation resolved by 6 mo, allergic reaction to bovine collagen
	Silicone ¹⁷	Migration leading to subdermal mounds, yellowing of silicone
Laser	Q-switched laser ^{8,13}	Erythema, hypopigmentation, hyperpigmentation, scarring, textural change, crusting, bleeding, bullae formation
	Intense pulsed light ^{8,13}	No significant side effects observed
	Photodynamic therapy ¹³	Pruritus, erosions, erythema, edema, pain, scaling, crusting
	Ablative fractionated lasers ^{8,13}	Risk of infection, dyschromia, scarring. Healing is slow and prone to complications
	Non-ablative resurfacing lasers ^{8,13}	Requires multiple treatments
	Non-ablative fractionated lasers ¹³	Erosions, herpetic reactivation, secondary bacterial impetiginization, edema, acneiform eruptions
	Radio frequency ⁸	Has not been studied for cosmetic benefits
Vein therapy	Plasma skin regeneration ²³	Erythema, edema, desquamation
	Sclerotherapy ¹³	Pain, ecchymosis, various degrees of edema, coagulum of treated veins
	Endovenous laser ablation ¹³	Skin burn and hand swelling
	Phlebectomy ^{12,17}	Bruising and edema are variable and will be slowly resorbed
Cosmetics & Accessories	Jewelry ¹²	
	Makeup ¹²	
Dermocosmetics	Antioxidants ^{8,12}	Chronic use of such agents potentially results in thickening of epidermis and dermis through stimulatory effects on keratinocytes and fibroblasts. In addition, retinoids are known to reduce pigmentary abnormalities through dispersion of melanin granules and through reduction of rate of transfer from melanosomes to keratinocytes
	Growth factors ¹²	
Other	Percutaneous collagen induction ^{18,24}	Interleukin-10 increase, <i>MC1R</i> gene down-regulation, no adverse effects
	Dermabrasion ¹⁷	Hyperpigmentation, hypopigmentation, and sharp border with untreated skin are possible

regeneration provide a variety of visible effects including epidermal whitening, removal of visible lesions, improved skin texture, reduced noticeable wrinkling, and dermal remodeling.^{8,13,23} Prominent veins can be treated by sclerotherapy, endovenous laser ablation, and phlebectomy.^{12,13,17} Percutaneous

collagen induction and dermabrasion are mechanical techniques that invoke epidermal thickening and elastin deposition.^{17,18,24} Finally, accessories, cosmetics and dermocosmetics such as jewelry, makeup and antioxidants respectively, in addition to growth factors are a common choice for patients wanting to

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