Cosmetic Procedures in Patients with Skin of Color: Clinical Pearls and Pitfalls

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Over time, cosmetic procedures have continued to grow in popularity and patients seeking these procedures have expanded to include more patients with skin of color. However, not all cosmetic procedures are created equally and it is important to understand the nuances associated with treating darker skin types. This review aims to provide clinical pearls and pitfalls when performing the following procedures in skin of color: chemical peels, microneedling, injectables (botulinum toxin and fillers), and laser treatments. These procedures have been demonstrated to be safe in skin of color as long as certain precautions are taken into consideration.

KEYWORDS: Skin of color, procedural dermatology, pearls, pitfalls, chemical peels, microneedling, injectables, lasers

In dermatology, the term "skin of color" encompasses people with darker skin tones and captures a wide range of racial and ethnic groups including those from African descent (including Africans, African Americans and Caribbean Black persons), Asian and Pacific Islanders, Native Americans, Alaskans, people of Latin descent, Indians, Pakistanis, and those of Middle Eastern origin among others.[1] Skin color can be categorized using the Fitzpatrick Skin Type classification, which ranges from type I to type VI, with type VI being the darkest. This skin typing system was originally developed to characterize the skin's response to sunlight and UV radiation and correlates skin color with either burning (in lighter skin types), or tanning (in those with darker skin types). Most patients with skin of color were classically defined as skin types IV to VI.[2]

Skin color also has a direct influence on the aging process. Due to higher melanin levels, people with skin of color are less susceptible to sun damage, and tend to show the clinical manifestations of aging 10 to 20 years later when compared to people with lighter skin tones.[3] However, these high melanin levels can also make them more susceptible to dyspigmentation.[3] Aside from pigmentation issues, people with skin of color also tend to develop rough skin, dermatosis papulosa nigra, seborrheic keratoses, and solar lentigines.[3] It is important to take these into consideration when a patient comes in for a cosmetic procedure. Many procedures such as laser treatment have been known to carry more risks for people with skin of color. However, recent advances reveal safe treatment options available for darker skin tones. This paper will specifically examine the following procedures in skin of color: chemical peeling, microneedling, laser procedures, and injectables, namely botulinum toxin, and fillers.

CHEMICAL PEELS

Chemical peeling is a process by which chemical exfoliating agents are applied to the skin to cause a controlled injury by penetrating the epidermis (superficial), papillary dermis (medium), or mid-reticular dermis (deep), with subsequent desquamation and epidermal renewal.[4] Chemical peels have been efficacious in treating acne, melasma, photodamage, lentigines and pigmentary dyschromias along with improving the appearance of fine lines and shallow scars.[4] When assessing an ethnic patient's candidacy for a chemical peel, one must consider the following: prior history of keloid or hypertrophic scarring, comorbid inflammatory cutaneous disease, history of cutaneous herpes simplex virus or herpes labialis, recent history of surgery or radiotherapy which may alter patient's ability to remodel collagen, and concomitant use of oral medications implicated in hyperpigmentation (i.e., oral contraceptives or hormonal agents) along with photosensitizing agents (i.e., tetracyclines or NSAIDs).[5]

The strength of a chemical peel is dependent on the specific wounding agent, its concentration and volume, duration of contact with skin and pressure applied over the skin.[5] A common pitfall of treatment involves inadequate cleansing or degreasing technique which would otherwise ensure even application and hence penetration of the peel, reducing discontinuous areas of untreated skin.[4]

In general, superficial peels are considered safest for patients with skin of color. However, despite the relatively non-invasive nature of this rejuvenation method, it is not without risk. The graded depth

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of injury in medium and deep peels has an increased risk for effacing normal skin structure leading to hypopigmentation, disfiguring scarring and prolonged post-inflammatory erythema.[5] A study done by Vemula et al[4] looked at the effects of five different superficial peels: glycolic acid, lactic acid, mandelic acid, salicylic acid, and 15% trichloroacetic acid (TCA). The complication rate in Fitzpatrick skin types III to VI was 3.8 percent, with skin type VI being the most prone to side effects; however, all side effects, most commonly crusting, post-inflammatory hyperpigmentation (PIH), and erythema resolved within eight months and were less common during the winter.[4]

Treatment pearls to minimize the risk of side effects include application of the exfoliating agent all at once, as opposed to an iterative manner which increases duration of contact. In addition, immediate application of triamcinolone 0.025% cream or ointment post procedure may help to mitigate inflammation.[4,5] One can also consider preemptive treatment for PIH, otherwise known as "priming" of the skin with a melanogenesis inhibitor such as topical hydroquinone 4% used twice daily or use of a topical retinoid such as tretinoin 2 to 4 weeks prior to performing the peel. It is important to consider use of "superficial" peeling agents to limit potential side effects. Glycolic acid 20% to 50% and salicylic acid 20 to 30% when used as peeling agents only target the stratum spinosum and have a low side effect profile for all skin tones.[5] However, because glycolic acid is not a self-neutralizing peel, it is important to make sure neutralization occurs after a shorter period in patients with skin of color to avoid hyperpigmentation[5,6] In addition, a study on melasma by Salam et al[5] recommended increasing efficacy of a glycolic acid peel and reducing resultant pigmentary dyschromias by combining treatment with a topical triple combination formulation (hydroquinone 5%, tretinoin 0.05% and hydrocortisone acetate 1% cream) in between chemical peels performed every three weeks.

Besides superficial peels, some medium depth peeling agents may also be used such as trichloroacetic acid 35% to 50%, trichloroacetic acid 35% + glycolic acid 70%, Jessner's solution + trichloroacetic acid 35%, 88% phenol unoccluded, or solid CO_2+ trichloroacetic acid 35%.[7] Both TCA and glycolic acid peels are particularly useful in treating melasma because a physician can control the depth of the peel.[6] When treating patients with skin of color with a medium depth peel, the authors recommend performing a test spot with a small volume of the exfoliating agent applied along the jawline or under the chin one week prior to full face treatment to ascertain suitability to the patient's skin.[7] Overall, the complications caused by medium to deep depth peels are well studied in the literature and more common in skin of color patients. Therefore, it is the authors' recommendation to perform these procedures judiciously and only if they are experienced in treating patients with darker skin types and comfortable managing potential complications. The complication rate can be mitigated by careful patient screening, appropriate selection of peeling agent and proper patient education on pre and post procedure care.

MICRONEEDLING

Microneedling entails puncturing of the skin at uniform depths within the dermis with multiple fine needles, resulting in a controlled cutaneous injury. This triggers wound healing and percutaneous induction of collagen and elastin. Ultimately, this form of rejuvenation corrects textural irregularities and improves skin firmness. Microneedling and its variants have favorable safety profiles for the treatment of acne, post-acne scarring, melasma/melanosis, and hyperhidrosis in skin of color patients.[8] Unlike other resurfacing modalities such as chemical peels and lasers, there is no full thickness destruction of the epidermis, lowering the possibility of complications such as PIH and making it an advantageous alternative for skin of color patients.[8] Microneedling can also be used for transdermal drug delivery of tranexamic acid and depigmenting serums through formation of evenly spaced micropores in the stratum corneum. In addition, fractional radiofrequency microneedling (FRNM) uses the added benefit of radiofrequency currents delivered by insulated needles to induce dermal changes.[8] Moreover, the risk of hyperpigmentation is minimized because there is no target chromophore or use of thermal energy. Hence, microneedling can be safely performed at repeat intervals.[8] Microneedling with subcision has been successful in treating skin of color patients with post-acne scarring. During subcision, a needle is inserted beneath the scar, which releases the fibrous tissue anchoring the scar and restores normal contour of the skin.[9] Bhargava et al[9] studied the efficacy and safety of using a combination of microneedling and subcision. Results revealed that 95.6 percent of patients saw improvement by at least one grade, with minimal side effects that resolved within two days. The combination treatment proved to be safe and effective in skin types III, IV, and V. It was, however, more effective for rolling and boxcar scars compared to ice-pick scars.[9] Overall, microneedling is a minimally invasive, well tolerated procedure with minimal downtime in skin of color patients.

INJECTABLES

Injectables are also considered safe aesthetic options in skin of color. Botulinum toxin (BoNT) is commonly used to improve the appearance of dynamic rhytides of the head and neck. It is produced by the bacterial species *Clostridium botulinum* and has seven known serotypes (A–G). Botulinum toxin promotes denervation and hence dampens muscular activity through blockage of acetylcholine release at the neuromuscular junction. Careful evaluation of facial anatomy and muscle bulk prior to administration of botulinum toxin nuances the dose needed to treat a specific anatomic unit.[10] For instance, 10 to 20 units of botulinum toxin type A (BoNTA) have proven to be effective in treating glabellar lines in Japanese patients who tend to have narrower and shorter corrugator muscles in comparison to Caucasian patients.[11] On the contrary, East Asian populations possess larger muscle bulk of the masseter necessitating 20 to 30 units per side for an end goal of a tapered lower face.[12] Another study surveyed African American females on high priority treatment areas and found that among the 45- to 65-year age group, patients were most bothered by sagging underneath the chin and or appearance of a double chin.[19] This area can safely and successfully be treated with neuromodulator and hence should be considered for future treatments in this

demographic.[19] In addition, a meta-analysis on treatment of glabellar and lateral canthal lines with onabotulinumtoxin A in Caucasian and Asian populations found a higher occurrence of eyelid edema, eyelid sensory disorder or eyelid ptosis post treatment.[24] This was attributed to anatomic variations, highlighting the importance of setting realistic yet differential expectations across skin of color patients.

As the primary signs of facial aging in ethnic women are rooted more in soft tissue redistribution and localized volume loss as opposed to wrinkles in Caucasian women, filler injections are becoming a preferential rejuvenation method for skin of color patients. For instance, hyaluronic acid filler with a cohesive polydensified matrix has been effective in correcting nasolabial folds and augmenting lips and perioral region in skin types IV, V, and VI.[13,16] Grimes et al[14] looked specifically at the effectiveness of six different hyaluronic acid fillers in softening nasolabial folds in skin types IV, V, and VI. Juvéderm® Ultra, Juvéderm® Ultra Plus, and Juvéderm® 30 (AbbVie, North Chicago, Illinois) were administered in a high concentration of 24mg/mL while Hylaform, Hylaform Plus, and Captique (Genzyme, Cambridge, Massachusetts) were administered in a lower concentration of 5.5mg/mL. All types of hyaluronic acid filler at both concentrations did not yield a higher risk of long term dyspigmentation or scarring compared to the Caucasian cohort.[14] In addition, Hamilton et al[17] demonstrated safety of biostimulatory filler such as poly L-lactic acid in patients with skin of color, however with the added caution against overcorrection by spacing out treatment intervals.[17,18] Treatment pearls for filler injections in ethnic skin include administration of filler in a deeper dermal plane to minimize risk of hemosiderin deposition and bruising. In addition, one should minimize the number of consecutive punctures and instead lay down filler in a threadlike fashion with the end goal of reducing post inflammatory erythema and hyperpigmentation.[15]

LASER PROCEDURES

Modern day laser treatments are rooted in the concept of selective photothermolysis: localized heating and therefore focal destruction using a specific wavelength which is absorbed by a target chromophore (water, melanin or oxyhemoglobin).[20] When any form of thermal energy is absorbed by tissue, the heat is dissipated to the surrounding tissue; the time it takes for tissue to cool halfway to its original temperature is termed thermal relaxation time. Hence, the optimal pulse duration should be less than or equal to the thermal relaxation time of the target tissue.[21]

Traditionally, laser treatment has posed more risks for patients with skin of color because the higher melanin content in the epidermis often competes with the target chromophore, which can result in overheating and lead to blister formation, scar or permanent dyspigmentation.[21,25] One way to determine which patients with skin of color are more likely to develop post-inflammatory hyperpigmentation is to look at the palmar and digital crease hue. This method is especially useful in patients with mixed heritage, for which the Fitzpatrick skin typing might not work as well.[16] Lasers can either be non-ablative fractional or ablative fractional. Ablative lasers use longer wavelengths and can cause deep destruction of the skin while non-ablative lasers leave the stratum corneum intact. Ablative lasers tend to be more effective but result in a longer recovery time and increased risk of side effects in patients with skin of color.[21] Non-ablative lasers such as the 1550 nm and long pulsed 1064 nm Nd: YAG laser have been shown to be both safe and effective in skin of color. Based on previous studies, these lasers did not have permanent adverse effects. Use of longer wavelengths is recommended as this reduces the absorption of light by epidermal melanin.[23,25] Epidermal cooling and topical steroids used post procedure are also recommended to minimize adverse effects.[20] In addition, implementing skin cooling when using pulsed dye lasers allows the use of higher fluences without increasing the risk of complications.[20,25]

CONCLUSION

To achieve the perpetual goal of patient-centered care and to better anticipate and manage complications of cosmetic procedures, dermatologic providers must familiarize themselves with the anatomic and physiologic variations in patients with skin of color. Cosmetic procedures can be safely and effectively performed in this population, however laying a foundation for success entails an enhanced understanding of the unique patient characteristics of patients from diverse ethnic backgrounds.

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