

Cosmetic Interventions for Dyschromia: Chemical Peels



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INTRODUCTION

Social psychology has long shown us that attractiveness ratings of images relate positively to parameters of skin homogeneity.¹ Faces with even skin color distribution attract more visual attention than those with greater color contrast illustrating the importance of skin color homogeneity with perceptions of beauty.^{2,3,4} Alexis et al showed that dyschromia was one of the 5 most common diagnoses observed at one dermatology center amongst darkly pigmented patients.⁵ In particular, melasma and post-inflammatory hyperpigmentation are major concerns for skin of color patients. Pigment deposition in the skin secondary to trauma from mechanical affects and/or inflammatory skin disease can cause extreme dissatisfaction amongst patients and therapeutic challenges to the physician. The treatment of dyschromia in darkly pigmented patients poses many challenges given the higher risk of post-inflammatory changes and potentially disfiguring scarring. In addition to other modalities that include topical skin bleaching preparations, chemical peeling is one of several ways to successfully remove excess pigment from the skin. This summary provides a review of various peeling agents, indications, and practical tips on performing safe and effective chemical peeling for richly pigmented skin, defined as those with skin types III-VI in this article.

The historical beginnings of chemical peeling lie in Africa with the ancient Egyptians using animal oils, salt, alabaster, and sour milk to aesthetically improve the skin, unknowingly utilizing the properties of alpha-hydroxy acids.^{6,7} Poultices containing mustard,

sulfur, and limestone were used later by the Greeks and Romans.⁷ In the late 1800s, dermatologists pioneered skin peeling for therapeutic benefit publishing data on the removal of ephelides with phenol.⁷ Today, we define chemical peeling as the application of chemical exfoliating agents to the skin which results in destruction of one or more parts of the epidermis and/or dermis with subsequent regrowth of these layers.⁸

PEELING AGENTS

Peeling agents can broadly be classified into different groups such as alpha-hydroxy acids and beta-hydroxy acids. Other types of peeling agents include trichloroacetic acid, retinoic acid, phenol, and combination products, i.e. Jessner's solution. The following discussion will focus on superficial and medium peels most safe and efficacious in skin types III-VI.

Alpha-hydroxy acids

Alpha hydroxy acids are naturally occurring carboxylic acids which work by epidermolysis within minutes of application followed by desquamation and epidermal melanin dispersion. This formulation can produce light peels for uneven pigmentation depending on formulation and percentage used. The prototypical alpha-hydroxy acid is glycolic, a natural constituent of sugar cane, and comes in both solutions and gels, ranging in percentage from 30-70. Other naturally occurring alpha-hydroxy acids include lactic acid (found in sour milk and tomato juice), malic acid (present in apples), citric acid (present in oranges and other fruits), and tartaric acid (present in grapes). These are timed peels and must be neutralized with water or 1% bicarbonate solution otherwise

the acid will continue keratolysis with subsequent desquamation.

Beta-hydroxy acids

Salicylic acid (ortho-hydroxybenzoic acid) is the naturally occurring beta-hydroxy acid family member used for chemical peeling, derived from the bark of the willow tree. Salicylic acid can be formulated in many types of vehicles. Ethanol solutions act as excellent peeling agents for multiple dyschromias including melasma and post-inflammatory hyperpigmentation.⁹ At lower concentrations (3-5%), it functions as a keratolytic agent allowing the penetration of other peeling agents. At higher concentrations (20-30%), it functions as a peeling agent. It also functions as a comedolytic agent given its lipophilic properties being able to produce desquamation of the upper lipophilic layers of the stratum corneum. Beta-lipohydroxy acid is a new derivative of salicylic acid with an additional fatty acid chain, creating increased lipophilic behavior and, therefore, producing a greater keratolytic effect.¹⁰ It is available at concentrations of up to 10% that has antibacterial, anti-inflammatory, antifungal, and anticomedogenic properties.^{10, 11}

Trichloroacetic acid

Trichloroacetic acid (TCA) is an inorganic compound that is present in crystalline form and causes coagulative necrosis of cells through protein denaturation and structural cell death. Degree of necrosis depends on the concentration used. It is self-neutralizing and can create a white frost on the skin, an undesirable effect in richly pigmented skin. Thus, in skin of color, the desired results can be accomplished using a superficial peel with lower percentage solutions (10-25%).

Retinoic acid

Tretinoin (all-trans retinoic acid) is a synthetic vitamin A analogue which has been shown to improve pigmentary abnormalities.¹² It has been used in varying concentrations of 1-9%. The higher percentage has been used as a mask for a period of 8 hours allowing for a gentle peel that lasts 3-4 days.¹⁰

Combination peels

Combination peels allow synergy of different acids and utilization of lower concentrations of individual peels. Peels have the ability to be layered, allowing slow upward titration of strength over a series of peels. Initial layering also has the ability to allow for penetration of second agents. The most commonly used combination peel is Jessner's solution which is a combination of

salicylic acid (14g), resorcinol (14g) and lactic acid (85%) in ethanol (95%). The advantage of this formulation is that there is a synergistic effect from three keratolytic agents, as well as the additional benefit of a phenolic skin-lightening agent (resorcinol). Jessner's solution can also be combined with other peeling agents (i.e. TCA); however, caution should be taken with this peel as the phenolic compound, resorcinol, may create undesirable depigmentation in darker skin types.⁸ Of note, Jessner's solution must be stored in a dark bottle to prevent photo-oxidation.

Newer Peels

Newer peels not previously discussed include pyruvic acid, ferulic acid, and mandelic acid. Pyruvic acid has diverse properties acting as a keratolytic and antimicrobial agent that has been shown to be effective for treating pigmentary disorders in light-skinned patients.^{10, 12} Ferulic acid is a hydroxycinnamic acid. It is an organic phenolic phytochemical found in plant cell wall components. The combination of ferulic acid and phloretin (a dihydrochalcone which is a type of natural phenol found in apple tree leaves and Manchurian apricots) has been used for antioxidant and peeling effects. Mandelic acid is a newer peel and is one of the largest alpha-hydroxy acids. It is able to provide a slow and uniform penetration of epidermis and dermis.¹⁰ The combination of mandelic acid with quick penetrating salicylic acid has been showing to be effective in the treatment of pigmentary disorders such as melasma.¹³ Further testing is needed to show safety and efficacy of these newer peels, especially in skin types III-VI.

PRACTICAL TIPS

Patient selection and preparation

Patient selection is incredibly important prior to performing chemical peels. Patient assessment is essential when establishing and setting reasonable expectations, choosing the most suitable peel, and avoiding complications.

1) Obtain a medical history with particular attention to a history of delayed wound healing, hypertrophic scar formation, prior herpes simplex virus infection (HSV), drug intake, and smoking. Smoking slows the healing process and should be addressed. Prescribeprophylactic antivirals in patients with history of HSV infection. Consider stopping topical retinoids 5-7 days prior to the procedure. Identify photosensitizing medications (i.e. tetracycline derivatives, thiazides, amiodarone).

2) Review patient ethnicity as skin type alone is not always an accurate assessment of how the skin will respond.⁸

3) Discuss risks, benefits and possible complications and review patient consent forms.

4) Set realistic expectations.

5) Photograph full face and specific areas prior to starting chemical peels.

6) Start a pretreatment priming regimen 2-4 weeks prior to peeling which includes: photoprotection (UVA/UVB sunscreen SPF 30 or greater), gentle cleansing, and application of a lightening agent (i.e. hydroquinone, azelaic acid, and/or kojic acid).

7) Consider doing a small test area prior to the series of peels, especially when treating dyspigmentation.

Procedure

1) Choose your peel wisely. When choosing your peel, think about skin type and ethnicity while determining the depth of the wound to be created (superficial or medium only in darker skin types). The key factors in determining the depth of the wound include: the agent used, the concentration of the agent being used, the amount of agent used, the method of defatting, the amount of pressure applied to the skin during the peel, and the duration of time that the peeling is in contact with the skin. Any of these key factors can be manipulated to achieve a lighter or heavier peel. Minor fluctuations can be purposefully utilized to the physician's advantage; however, take great caution as they can also produce unwanted side effects.

2) Degrease the skin. The purpose of degreasing or defatting the skin is to remove excess oils in order to allow for an even penetration of the peeling agent. The skin can be degreased with isopropyl alcohol in triplicate, acetone, or chlorhexidine. The more the skin is degreased, the more the peel will penetrate.

3) Prepare the patient and peel. Prepare the patient by removing hair from the face, applying an occlusive ointment to the lips, placing cotton balls to bilateral ear openings, and instructing the patient to keep eyes closed during the entire procedure. Prepare the treatment area with your peel (clearly labeled), applicators, cool water, 1% sodium bicarbonate if needed, and extra gauze. Options for application tools include cotton-tipped applicators, 4x4 gauze folded into squares, makeup sponges, and small brushes. Gauze has the

advantage of directing tactile pressure on the skin surface.

4) Apply the peel meticulously and carefully. Keep an eye on time and always be in discussion with your patient to make sure he or she is comfortable. Consider keeping a fan directed toward the patient's face to increase comfort. The typical patient experiences a burning, tingling, or itchy sensation for 2-5 minutes. Neutralize the peel if indicated. Lastly, rinse the treated area with large amounts of cool water. If increased erythema or frost was noted at the time of the peel, consider application of a thin coat of a low potency topical steroid.

Post-Peel Care

1) Always provide the patient with written post-peel instructions.

2) Immediately after the chemical peel, photoprotection and bland emollients should be started.

3) After a few days, a return to normal cleansing activities can be resumed. Instruct patient to avoid dermabrasion, retinoids, and any harsh skin treatments for 1 week.

4) One week after the chemical peel, hydroquinone and topical retinoids can be restarted.

CONCLUSIONS

Dyschromia continues to be a major concern for patients with skin types III-VI who present to the dermatologist desperate for treatment. Although many new technologies continue to emerge, chemical peeling continues to offer a safe and effective modality in treating pigmentary alteration. Many peeling agents are now available and new agents are being investigated. Moving forward, more comparative research is needed to develop a true hierarchy of peel effectiveness for various skin types and disorders.¹⁰

Although chemical peeling has the potential to produce consistent improvement in richly pigmented skin types, great care should always be taken with appropriate patient selection, proper choice of peeling agent and concentration, and meticulous technique. As darkly pigmented skin has increased risk of disfiguring dyschromia and scarring, use of chemical peels should not be taken lightly and should only be performed by qualified, trained, and experienced clinicians.

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Melasma Before



Melasma After