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An Overview of Superficial and Medium - Depth Chemical Peels – Part II

B. MEDIUM-DEPTH PEELS

Medium-depth and deep peels are the techniques of choice for deeper wrinkles and photodamaged skin.[11]

Medium-depth peels use:

1. **Trichloroacetic acid** (TCA) 35-50%, which may lead to scarring and dyspigmentation.
2. Combination Peels
   - Monheit Peel - Jessner's solution (14% salicylic acid, 14% lactic acid, and 14% resorcinol in 95% ethanol) in combination with 35% TCA.
   - Brody's Peel - Solid CO2 (dry ice) plus 35% TCA.
   - Coleman Peel - Glycolic acid at 70% plus 35% TCA.
3. 88% phenol, however, it **carries the risk of hypopigmentation and cardiotoxicity.**[1]

MECHANISM OF ACTION

Medium-depth peels reach the papillary and upper reticular dermis. Precipitation of proteins and coagulative necrosis of the epidermal cells occur in 5-7 days. Collagen necrosis in the papillary and upper reticular dermis also occurs. The process causes dermal oedema.[12] Re-epithelialization becomes evident at the radicular shaft of the follicles several days after the necrotic layers have sloughed. This epidermal reepithelization usually occurs at day 7.

1. TRICHLOROACETIC ACID 35-50%

TCA is highly water soluble. The depth of penetration correlates directly to the concentration. TCA penetrates slowly, so one must wait for 5 minutes before assessing the frosting endpoint to avoid overcoating.

The degree of the frosting correlates with the depth of solution penetration.

Level I frosting is speckled white frosting with mild erythema and corresponds to superficial penetration.

Level II is characterized by an even white-coated frost with background erythema. This degree of frosting is usually desirable for medium-depth peels.

Level III is solid white opaque frost with little or no background erythema, usually characterizing deep peels and not desirable in TCA procedures.

The frosting seen with TCA corresponds to epidermal and dermal protein denaturation.

INDICATIONS

Treatment of photoaging and rhytides, actinic keratoses, lentigines, and other pigmentary dyschromias are the principal indications for the TCA chemical peel.

It is also occasionally used, but is variably effective, for superficial acne scars, PIH, melasma, dilated pores, vitiligo, rosacea, seborrheic dermatitis, and other conditions. It compares favorably with 5-fluorouracil (5-FU) cream for the treatment of actinic keratoses, and the duration of benefit may be longer. It has a definite role in improving the fine crosshatched facial rhytides and even moderately deep perioral wrinkles but is not indicated for deeper rhytides caused by muscles of facial expression or lax skin.

As with other chemical peel agents, it generally renders to skin a more pleasant, smooth, and less dry or irritated appearance and feel.[11-13]

PREPARATION

Preparation is similar to that for superficial peels. No other cosmetic treatments with bleaching, depilation or exfoliation should be used for one week before the treatment. Shaving must also be avoided 24 hours before a peel. Signing a consent form before the procedure is recommended.

The face should be wiped with a cleansing and degreasing agent. Vaseline is applied to sensitive areas like what was described for the superficial peels.

APPLICATION METHOD

The TCA is applied using a cotton-tipped applicator, saturated gauze pad or a brush. Smooth strokes are used. Once the peel is applied, "frosting' appears as a white colour, and this is a consequence of epidermal and dermal protein coagulation.

The endpoint for 35-40% TCA peels is the presence of a uniform white frost that clears in 10-15 mins. This means that there is epidermal and papillary dermal injury. The endpoint of a 50% TCA peel is a white, dense, uniform frost that clarifies in 40-50 mins. If there is the presence of a yellow-grey frost, this means that the mid-to-deep reticular dermis was reached and injured and it takes more than 40 mins to disappear.[12] Cool compresses are applied after the peel, to ameliorate the burning sensation in the area. A small fan can also be used.

SIDE EFFECTS

TCA peels are easy to use and predictable at low concentrations of 10-30%, with a low incidence of complications. However, they become unpredictable and erratic at higher concentrations of over 35%. TCA peels at 50% concentrations may result in textural changes and hypopigmentation. It may also produce hypertrophic scarring or full-thickness tissue loss followed by contractile scars.

Other more common complications are pigmentary disturbances, like hypo or hyperpigmentation. Hyperpigmentation is usually post-inflammatory and temporary and can be treated with tretinoin, bleaching creams and sun protection creams. Bacterial infections are uncommon, and when they occur are often thought to be the result of inadequate postoperative wound care.[12]

2. COMBINATION PEELS

The trend is to combine lower concentration TCAs with less potent superficial peeling agents due to the risks involved with higher concentration TCA peels.

A. MONHEIT PEEL – JESSNER'S SOLUTION PLUS 35% TCA

This peel uses Jessner's solution (JS) as a keratolytic agent to further TCA penetration.[14] It is performed by first degreasing the face using a degreasing agent followed by the application of JS. The endpoint is reticulate frost.[3]

JS is a superficial peeling agent that has been used for over 100 years. This superficial peeling agent was formulated by Dr Max Jessner, a German dermatologist, and constitutes a mixture of 14g each of salicylic acid, resorcinol, and 85% lactic acid in 95% ethanol to make 100ml of the effective peeling agent.[15] After pre-treatment with the JS, 35% TCA can be applied to extend injury into the dermis. The combination of JS and 35% TCA peel is rarely associated with scarring complications.[16]

INDICATIONS

The Monheit peel is useful for moderate actinic damage, pigmentary dyschromias, and minor wrinkles.[12]

B. BRODY PEEL - SOLID CO2 (DRY ICE) PLUS TCA 35%

This approach of combining solid CO2 and TCA creates a controlled medium-depth peel. Dry ice is easily available and can be found at local supermarkets or pharmaceutical companies.

After degreasing, a hand-sized block of dry ice dipped in a 3:1 acetone solution is initially applied on the face to cause epidermal injury. This allows for the superficial-to-deep penetration of the TCA. The application time of solid CO2 ranges from 3 to 15 seconds. The endpoint is transient white frost with residual erythema. This step is followed by the application of 35% TCA. This extends the injury into the dermis. The endpoint of the TCA application is an even light white or solid white frost.[3,12,] Histological studies show that this type of peel results in damage through the papillary dermis.[17]

INDICATIONS

The indication of this peel is moderate actinic damage, superficial hyperpigmentation and minor wrinkles. This type of peel can also be used for the improvement of the contours of pitted scars.

C. COLEMAN PEEL: GLYCOLIC ACID 70% PLUS TCA 35% COMBINATION PEEL[3,12]

70% glycolic acid superficial peel is used followed by 35% TCA to extend injury to the dermis. The technique of application is slightly different. Before the procedure, patients are asked to wash their faces with soap.

The glycolic acid is applied for approximately 2 minutes until an endpoint of erythema is reached. It then needs to be neutralised with water or an alkaline neutralising agent, like 10% sodium bicarbonate, ammonium salts or sodium hydroxide prior to the application of the TCA.

INDICATIONS

It is useful for moderate actinic damage, pigmentary dyschromias, and minor wrinkles. A medium-depth peel should not be used elsewhere other than on the face or the scalp because of the risk of scarring.

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3. PHENOL PEEL

Unoccluded 88% phenol is a medium-depth peel. It is rarely used for full-face peeling because of the risks of cardiotoxicity including cardiac arrhythmias (phenol has dual hydrophilic and lipophilic properties and is readily absorbed through the skin and distributes widely through the body within minutes) and hypopigmentation.[18] Coagulation of epidermal and superficial dermal proteins occurs immediately after phenol application. Histologically there is an increase in collagen and elastic fibers. A new way of applying 88% phenol was described by de Mendoca et al.[19] This was the punctuated pattern technique for individual rhytids. The advantage is that it decreases phenol exposure.

CONCLUSION

A chemical peel can be a simple office procedure. Superficial and medium-depth peels can treat a variety of conditions, like pigmentation, photoaging and superficial scarring. Careful patient and peel selection will ensure procedural success with excellent results. Chemical peels are not a one-time procedure and should be repeated with maintenance peels to achieve maximum improvement and prevent recurrence. With the advent of lasers and newer techniques, the use of chemical peels has slightly declined, however, its simplicity as an office procedure, minimal morbidity, easy availability and cost-effectiveness ensure that it still holds an important place as a tool to treat dyschromias and photoaging.

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