Facial Chemical Peels

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Department of Otolaryngology
Grand Rounds Presentation
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History

- Ebers papyrus 3,500 years ago mentions keratolytic formulas
- Egyptians used particles of alabaster mixed with milk and honey
- 1882 German dermatologist P.G Unna described resorcinol, salicylic acid, phenol, trichloroacetic acid
- Frenchman La Gasse World War I – treated soldiers with powder burns to face with phenol
- daughter Antoinette brought to Los Angeles 1930’s
American lay peelers 1920’s-1950’s

1961 Litton presented 50 patients treated with formula he bought from Coopersmith, a lay peeler in Fort Lauderdale

1961 Baker and Gordon presented a peel formula with one patient with a 3 month follow up, became the standard formula

1966 Baker published results in 250 patients
Application of chemical exfoliant to wound the dermis and epidermis

Creates a superficial burn

Classified by depth of injury

- Superficial/Very superficial
- Medium
- Deep
<table>
<thead>
<tr>
<th>Depth</th>
<th>Agent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very superficial (exfoliation): removes stratum corneum</td>
<td>Microdermabrasion (Aluminum oxide [Al₂O₃]) or Diamond</td>
</tr>
<tr>
<td></td>
<td>Retinoic acid</td>
</tr>
<tr>
<td></td>
<td>α-hydroxy acids</td>
</tr>
<tr>
<td></td>
<td>Glycolic acid 30%–50% (1–2 min)</td>
</tr>
<tr>
<td></td>
<td>Jessner’s solution (1–3 coats)</td>
</tr>
<tr>
<td></td>
<td>Resorcinol 20%–30% (5–10 min)</td>
</tr>
<tr>
<td></td>
<td>TCA 10% (1 coat)</td>
</tr>
<tr>
<td>Superficial (epidermal): necrosis of all or part of the epidermis</td>
<td>Glycolic acid 50%–70% applied for 5 to 20 min</td>
</tr>
<tr>
<td>anywhere from stratum granulosum to basal cell layer</td>
<td>Jessner’s solution applied in 5–10 coats</td>
</tr>
<tr>
<td></td>
<td>Resorcinol 50% applied for 30–60 min</td>
</tr>
<tr>
<td></td>
<td>TCA 10%–35% (1 coat)</td>
</tr>
<tr>
<td></td>
<td>Phenol 88%</td>
</tr>
<tr>
<td>Medium depth (papillary dermal): necrosis of the epidermis and part</td>
<td>Glycolic acid 70% applied 5 to 30 min</td>
</tr>
<tr>
<td>or all of the papillary dermis</td>
<td>TCA 35% applied alone or augmented with Jessner’s solution</td>
</tr>
<tr>
<td></td>
<td>Modified Baker-Gordon formula using only 2 drops of croton oil</td>
</tr>
<tr>
<td></td>
<td>Baker-Gordon phenol formula</td>
</tr>
<tr>
<td>Deep (reticular dermal): necrosis of the epidermis and papillary</td>
<td></td>
</tr>
<tr>
<td>dermis that extends into the reticular dermis</td>
<td></td>
</tr>
</tbody>
</table>
Post Peel
72 hours post-peel
Post Peel Complete
Sun exposure and aging

- Coarse rhytids
- Rougher skin texture
- Pigmentary mottling
- Solar lentigines/actinic keratoses
- Epidermal dysplasia
- Epidermal atrophy
- Dermoelastosis
Elastosis - irregular formation of connective tissue
14 years post peel with more orderly, parallel collagen fibers
Patient evaluation

- Skin type
- Complexion
- Skin texture
- Thickness
- Degree of photoaging
- Severity of facial rhytids
- Age related gravitational changes
- Expectations
Patient evaluation

- History of skin disorders like rosacea, seborrheic dermatitis, psoriasis, contact dermatitis
- History of radiation to the face (facial hair?)
- History of Accutane use (12-24 months)
- General medical condition including renal, liver and cardiac function if phenol peel is considered
<table>
<thead>
<tr>
<th>Skin Type/Color</th>
<th>Reaction of First Summer Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>I—White</td>
<td>Always burn, never tan</td>
</tr>
<tr>
<td>II—White</td>
<td>Usually burn, tan with difficulty</td>
</tr>
<tr>
<td>III—White</td>
<td>Sometimes mild burn, tan average</td>
</tr>
<tr>
<td>IV—Moderate brown</td>
<td>Rarely burn, tan with ease</td>
</tr>
<tr>
<td>V—Dark brown</td>
<td>Very rarely burn, tan very easily</td>
</tr>
<tr>
<td>VI—Black</td>
<td>No burn, tan very easily</td>
</tr>
<tr>
<td>Group I (Mild)</td>
<td>Group II (Moderate)</td>
</tr>
<tr>
<td>----------------------</td>
<td>---------------------------------------------------</td>
</tr>
<tr>
<td>No keratoses</td>
<td>Early actinic keratoses—slight yellow skin discoloration</td>
</tr>
<tr>
<td>Little wrinkling</td>
<td>Early wrinkling—parallel smile lines</td>
</tr>
<tr>
<td>No scarring</td>
<td>Mild scarring</td>
</tr>
<tr>
<td>Little or no makeup</td>
<td>Little makeup</td>
</tr>
</tbody>
</table>
Fitzpatrick types I and II are best candidates for chemical peel

Types III-VI have greater risk of pigmentary dyschromia
Pretreatments

- Tretinoin (thins stratum corneum, thickens epidermis, disperses melanin throughout epidermis)
- Hydroquinone 4-8% -blocks tyrosinase from forming precursors for melanin (use when treating dyschromias or Type III-VI)
- Topical steroids
Pretreatments

- Herpes simplex outbreak can be caused by chemical peels
- Must be considered in all patients – especially those with a history
- Heralded by unusually severe facial pain that is unexpected and delayed
- Can cause scarring
- Acyclovir from 1-3 days preoperatively to 14 days postoperatively
- Some start antibiotics 1-2 days preoperatively (cephalexin)
Superficial peels

- Indicated for:
  - Comedonal acne
  - Melasma
  - Skin refresher
  - Nonfacial peeling

- Repetitive peels may be required to gain maximum benefit (usually 6-8 every 1-4 weeks)

- Low-risk, rapid recovery
Superficial peeling agents

**TABLE 20-3  Agents Used for Superficial Chemical Peeling**

<table>
<thead>
<tr>
<th>Agent</th>
<th>Concentration</th>
<th>Mechanism of action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trichloracetic Acid</td>
<td>10–25%</td>
<td>Protein precipitation</td>
</tr>
<tr>
<td>Jessner’s Solution</td>
<td>Formulated</td>
<td>Keratolysis</td>
</tr>
<tr>
<td>Glycolic Acid</td>
<td>Keratinocyte</td>
<td>Protein precipitation</td>
</tr>
<tr>
<td>Jessner’s Solution</td>
<td>Formulated</td>
<td>Keratolysis</td>
</tr>
<tr>
<td>Glycolic Acid</td>
<td>40–70%</td>
<td>Keratinocyte dyscohesion</td>
</tr>
<tr>
<td>Salicylic Acid</td>
<td>5–15%</td>
<td>Epidermolysis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Keratolysis</td>
</tr>
</tbody>
</table>
Heals in 1-5 days

Very superficial agents include glycolic acid 20-70%, 10% TCA, salicylic acid

Multiple superficial peels do not equal a medium depth peel
Medium and deep peel indications

- Actinic changes and preneoplasia
- Rhytides (fine)
- Pigmentary dyschromias
  - Woods lamp helpful
- Superficial scarring
- Radiation dermatitis
- Acne vulgaris and rosacea
<table>
<thead>
<tr>
<th>Agent</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. TCA–50%</td>
<td>Not recommended because of risk of scarring</td>
</tr>
<tr>
<td>2. Combination–35% TCA–solid CO₂ (Brody)</td>
<td>The most potent combination</td>
</tr>
<tr>
<td>3. Combination–35% TCA–Jessners (Monheit)</td>
<td>The most popular combination</td>
</tr>
<tr>
<td>4. Combination 35% TCA–70% Glycolic (Coleman)</td>
<td>An effective combination</td>
</tr>
<tr>
<td>5. 89% Phenol</td>
<td>Rarely used</td>
</tr>
</tbody>
</table>
Specific chemicals

- Alpha-hydroxyacids
- Jessner’s solution
- Trichloroacetic acid
- Baker-Gordon peel formula
Alpha-hydroxy acids

- Present in foods
- Glycolic acid, Lactic acid most common
- Low concentrations - reduction of cohesiveness of stratum corneum cells resulting in thinning
- High concentrations – complete epidermolysis
- Action is stopped by water dilution
- No known systemic toxicity
- Can be combined with TCA to produce medium peel
Jessner’s solution

<table>
<thead>
<tr>
<th>Table 18-2</th>
<th>Jessner’s Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resorcinol</td>
<td>14 g</td>
</tr>
<tr>
<td>Salicylic acid</td>
<td>14 g</td>
</tr>
<tr>
<td>Lactic acid</td>
<td>14 g</td>
</tr>
<tr>
<td>Ethanol</td>
<td>95% to total volume 100 ml</td>
</tr>
</tbody>
</table>
Jessner’s solution

- Standardized solution
- Salicylic acid – keratolytic
- Resorcinol – benzene derivative, keratolysis
- Lactic acid – AHA, keratolysis
- Used alone causes superficial epidermal peel
- Number of applications controls depth
- No neutralization is necessary
- Can be combined with TCA for medium peel
- Possible to have salicylate toxicity (tinnitus, headache, nausea) or resorcinol toxicity (methemoglobinemia)
Trichloroacetic acid

- Dissolves keratin, coagulates skin proteins, causes precipitation of salts
- Neutralized by tissue fluids
- Causes frosting
- 10-30% superficial peel
- 35-50% superficial-medium depth peel
- 50% should be avoided due to scarring
- Proper technique to mix is weight-to-volume ratio, i.e. 50% solution is 50 g TCA crystals in enough distilled water to make 100cc of solution
Phenol

- 88% is standard concentration
- Carbolic acid or hydroxybenzene
- Used alone causes medium depth peel
- Causes keratin protein coagulation
- Rapidly absorbed through skin, metabolized in the liver, excreted renally
- Can lead to renal failure, hepatotoxicity, directly irritates myocardium causing arrhythmias
- Requires cardiac monitoring and testing of kidney/liver/cardiac function
- Use hydration to prevent problems
- Peel in subunits with 15-20 minutes per site
Deep Peel

Baker-Gordon formula

- 3cc of 88% phenol
- 2cc distilled water
- 8 drops Septisol (emulsifying agent)
- 3 drops croton oil (lysis epidermal cells, causes inflammation from plant Croton tiglium)
- Some authors have used occlusion to increase penetration
- Requires anesthesia and monitoring
TCA Peeling

Depth of peel depends on multiple factors:
- Skin type
- How skin was primed
- How acid is applied
- How many layers of acid are applied
- How wet the applicator is with acid
TCA peeling steps

- Skin priming – increase reepithelialization and decreased risk of hyperpigmentation
- Cleaning – alcohol, acetone, Hibiclens, etc.
Application

- Patient is inclined at 45 degrees
- Use cotton-tipped applicators or folded 2x2 gauze
- Peel in aesthetic units
- Feather edges
- Observe for signs of peel depth
Figure 9-3
Diagram illustrating the three stages I use in the application of a TCA peel to the face.
Peel depth

- **Level 0** – no frost, minimal erythema, removes stratum corneum
- **Level I** – irregular light frost, some erythema, superficial epidermal peel, 2-4 days healing
- **Level 2** – white frost with pink showing through, full thickness epidermal peel, about 5 days to heal
- **Level 3** – solid white frost, no pink background, extends into papillary dermis and takes 5-7 days to heal
30% TCA peel
30% TCA

Figure 9-4
(A) A woman with level 1 photodamage. (B) The same woman 8 weeks after a level 2 TCA peel (using 30% TCA).
Deep Peel, Baker-Gordon
Application
Tape occlusion
6 months
Baker-Gordon/CO2-35% TCA

FIG 7-12: Fitzpatrick type II and Bolognia photoaging group I with the most severe defects in the perioral area. The patient was peeled with occluded Baker’s solution in the perioral and glabellar areas and CO2 plus TCA, 35%, on the remaining areas. A, before; B, immediately after peeling; C, immediately after tape removal at 48 hours; D, 90 days after.
Baker-Gordon peel
Post peel care

- Occlusive ointment: Eucerin cream, Elta, bacitracin ointment, A&D ointment, Crisco until re-epithelialization occurs
- Lubriderm or Eucerin cream
- May wear makeup
- Topical steroids
- Antivirals and antibiotics
- Sunscreen
Wound healing when dry
Wound healing when moist
Complications

- Hyperpigmentation
- Hypopigmentation
- Scarring
- Persistent erythema
- Herpes outbreak
- Milia
- Infection
- Lines of demarcation
Hyperpigmentation
Hypopigmentation
Persistent erythema
Lines of demarcation
Herpes outbreak
Candida infection
Pseudomonal infection
Scarring
Laser versus chemical peel

- CO₂ laser produces injury to depth of 0.14-0.22mm compared with 0.60-0.80mm with deep chemical peel
- Chemical peel requires some user expertise, mixing chemicals
- Laser requires having a laser, computer controlled handpiece with pattern generator makes much easier
Laser versus chemical peel
Immediate
2 weeks later
One year later
Authors conclude that peel is equally effective in thin-skinned areas.

Laser better in thick glandular skin but had more hypopigmentation, longer discomfort, longer postop erythema.
Conclusions

- Chemical peels remain an important tool
- Knowledge of chemicals used, methods and indications important
- Make sure the treatment matches the patient’s problem and expectations
Facial Chemical Peels

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