Chemical Peeling

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“Mislike me not for my complexion,
The shadow’d livery of the burnished sun”

Shakespeare, *The Merchant of Venice*
History

• Ancient Egypt: oils, salt, alabaster
  Sour milk – lactic acid
  Sun damage – cultural stigma

• Scripture: emollients, perfumes for wives of Jewish and Babylonian kings

• Turks: used fire to induce exfoliation

• Indian women: urine and pumice
History

• Hungarian gypsies: secret generational formulations

• Madame Pompadour: red wine (tartaric acid) 18th century France
History

• Modern use began late 1800s
  – Unna 1882 described phenol, TCA, salicylate, resorcinol
  – World War I: phenol
  – Lay peelers
  – Litton, Baker-Gordon, 1960’s
• What skin changes occur with aging?
Aging + Actinic Damage

- Loss of subepidermal collagen
- Decreased volume of dermis
- Thinning epidermis with thick stratum corneum
- Irregularities of melanocytes
- Irregular elastosis
Different Causes of Wrinkles
<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>
</tbody>
</table>
## Glogau Classification

<table>
<thead>
<tr>
<th>Group I (Mild)</th>
<th>Group II (Moderate)</th>
<th>Group III (Advanced)</th>
<th>Group IV (Severe)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No keratoses</td>
<td>Early actinic keratoses—slight yellow skin discoloration</td>
<td>Actinic keratoses—obvious yellow skin discoloration with telangiectasis</td>
<td>Actinic keratoses and skin cancers have occurred</td>
</tr>
<tr>
<td>Little wrinkling</td>
<td>Early wrinkling—parallel smile lines</td>
<td>Wrinkling present at rest</td>
<td>Wrinkling—much cutis laxa of actinic, gravitational, and dynamic origin</td>
</tr>
<tr>
<td>No scarring</td>
<td>Mild scarring</td>
<td>Moderate acne scarring</td>
<td>Severe acne scarring</td>
</tr>
<tr>
<td>Little or no makeup</td>
<td>Little makeup</td>
<td>Wears makeup always</td>
<td>Wears makeup that does not cover, but cakes on</td>
</tr>
</tbody>
</table>
Peeling

- Creates a controlled wound
- Simulates regrowth of collagen in more abundance and order – dense, homogenized, parallel
- Elastin, GAG’s
- Epidermal growth and thickening
Post-Peel, Immediate
Post-Peel, 72 hrs
Post-Peel, Complete
Classification of Peel Depth

• Very superficial: exfoliates stratum corneum
• Superficial: between strata granulosa and basale
• Medium: papillary or upper reticular dermis
• Deep: Midreticular dermis
• 14 years post peel
• Solar elastosis improved
• Orderly collagen
• Depth of injury visible histologically
Factors that Affect Depth

- Agent used
- Method of application and number of layers
- Pre-peel degreasing
- Pretreatment – retinoids or hydroxy acids
- Skin thickness
- Sebaceous gland activity and density
- Anatomic unit
Which Agent to Use?

- Phenol
- Baker’s peel
- Jessner’s solution
- TCA 10-35%
- Modified Unna’s resorcin paste
- Jessner’s + TCA
- CO2 + TCA
- Solid carbon dioxide
- Alpha hydroxy acids
- Alpha keto acids
- Tretinon
- 70% Glycolic + TCA
- TCA 50%
- Azelaic acid
Peel Depths

- **Very Superficial**
  - TCA 10-20% 1-2 layers
  - Jessner’s 1-3 layers
  - Glycolic acid 20-30% for 1-2 minutes

- **Superficial**
  - TCA 20-30%
  - Jessner’s 4+ layers
  - Glycolic acid 40-50% for 2-20 minutes

- **Medium**
  - TCA 30-40%, or 50%
  - TCA Plus
    - Jessner’s
    - Glycolic acid
    - CO2

- **Deep**
  - Phenol
  - Baker-Gordon
    - Unoccluded
    - Occluded
Superficial Peels

• Indicated for:
  – Comedonal acne
  – Melasma
  – Skin refresher
  – Nonfacial peeling

• Repetitive peels may promote collagen stimulation

• Low-risk, rapid recovery
Indications – Medium & Deep

- Actinic changes and preneoplasia
- Rhytides (fine)
- Pigmentary dyschromias
  - Woods lamp helpful
- Superficial scarring
- Radiation dermatitis
- Acne vulgaris and rosacea
<table>
<thead>
<tr>
<th>TABLE 4–2.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factors in Patient Evaluation for Subsequent Relative Contraindications</td>
</tr>
</tbody>
</table>

- Fitzpatrick skin type
- Degree of actinic damage and photaging
- Philosophy of sun exposure
- Philosophy of cosmetic usage
- Present and past sebaceous gland density—previous isotretinoin or radiation
- Prior cosmetic surgery
- Philosophy of smoking
- General state of physical and mental health
- Medications
- Pregnancy history
- History of herpes simplex
- History of hypertrophic scarring
- Realistic expectations
Structure of Various Compounds

Phenol

Salicylic acid

1,2-Benzenediol (pyrocatechol)

1,3-Benzenediol (resorcinol)

1,4-Benzenediol (hydroquinone)
Pretreatment

• Hydroquinone
  – Decreases melanosomes and inhibits tyrosinase
  – Useful in Fitzpatrick III and IV to prevent hyperpigmentation
  – Begin 1 mo pre-peel and continue post-peel

• Tretinoin (topically)

• Anti-virals
Retinoids

• Topical tretinoin has been shown to:
  – Correct epidermal atypia
  – Thicken atrophic epidermis
  – Eliminate microscopic actinic keratoses
  – Cause uniform dispersion of melanin granules
  – Increase collagen in papillary dermis
  – Increase angiogenesis
Retinoids

• Systemic isotretinoin (Accutane) inhibits collagenase and decreases the sebaceous units – Much more likely to scar with chemical peel

• Recommend waiting 1-2 years before peel
Other Bleaching Agents

• Hydroquinone
• Kojic Acid
• Azelaic acid
Jessner’s Solution

- Resorcinol 14 g
- Salicylic acid 14 g
- Lactic acid 85% 14 mL
- Ethanol 95% q.s.ad 100cc

Also called Coombe Formula or Horvath’s concoction
Jessner’s Solution

- Must be stored in dark bottle else discoloration
- Superficial peeling
- Minimizes toxicity
- Advantages
  - One solution
  - No timing
  - No dilution
- Used in combination peels
Alpha Hydroxy Acids

- Occur naturally
- Superficial peel -- corneolytic
- Time of contact important – must be washed off with water or bicarb
- Exact mechanism of wrinkle improvement unknown
Alpha Hydroxy Acids

- Glycolic – sugar cane
- Lactic – sour milk
- Malic – apples
- Citric – fruits
- Tartaric – wine

- Pyruvic Acid – alpha keto acid – metabolized to lactate
Trichloroacetic Acid (TCA)

- Mix X% solution X gms with distilled H2O to volume of 100cc
- Stable in clear glass bottles for 6 mo (dissolves plastic)
- Works by precipitating proteins
- 10-35% superficial peeling
- 50% deep peeling – caution!
Phenol

• Initially used by Joseph Lister for antisepsis
• More likely to cause pigmentary changes, usually hypopigmentation
• Full strength is keratocoagulant – self-blocks penetration
• Lower strength is also keratolytic – breaks sulfur bridges and penetrates
Baker-Gordon Solution

- Phenol 88% 3 cc
- Distilled H2O 2cc
- Croton oil 8 gtts
- Septisol 3 gtts
Baker-Gordon Solution

- Septisol acts to decrease surface tension and thus increase absorption
- Croton Oil – from the seed of the plant *Croton tiglium*, may enhance phenol absorption and cause inflammation
Baker-Gordon Solution

- Mix before application
- Must be stirred before application because solution is not miscible
- Dilutes phenol to approx 50-55%
- Occluded vs. Unoccluded
Toxicity

• Salicylates: tinnitus, vertigo
• Resorcinol: circulatory collapse, hypothyroidism, methemoglobinemia
• Phenol: arrhythmias
• TCA: none
# Peel Depth

**TABLE 4–5.**
Factors to Quantitate Wounding Agents and Determine Peel Depth

<table>
<thead>
<tr>
<th>Skin defatting technique</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agent used with time and mode of scrub</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mode of application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of cotton applicators, gauze sponges, sable brush</td>
</tr>
<tr>
<td>How wet and for how long</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dilution documentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>If performed—when and how long</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Occlusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tape variety and when removed</td>
</tr>
</tbody>
</table>
Degreasing

- Alcohol, freon, or acetone
- Patient does first, then physician
- Care to be thorough but not too abrasive for uniform absorption
Technique -- TCA

- Frosting indicates deeper penetration
- Fan for pt comfort as peel is exothermic
  (also useful for alpha hydroxy acids)
Technique -- Phenol

- Preop Chemistries, CBC, UA, EKG
- IVF
- Sedation / Analgesia
- No more than 25% at a time with 10-15 minute pauses between segments
- Area more important than strength for toxicity
- Applied in deep rhytids with pointed wooden stick
Example
Phenol Application
Post Peel Month 6
Post-Peel Care

• Moist salve, dressing
• Frequent cleansings
• Bacitracin – zinc may hasten healing
• Preparation H – live yeast cell factor may stimulate fibroblasts to increase collagen
• Pain meds usually only for deep peels
• Sunscreen!
• Makeup during recovery, can usu. begin day 7
Wound Healing, Dry
Wound Healing, Moist
TCA vs. Phenol

- Concentrated TCA (>35%) more likely to scar
- TCA less likely to cause pigmentary changes
- TCA less toxic
Other Forms of Skin Resurfacing

- Dermabrasion
- Laser
Laser Versus Deep Peel

- Patient left is peel, right laser
Laser Versus Deep Peel

- Postoperative day 1
Laser Versus Deep Peel

- Two weeks postop
Laser Versus Deep Peel

• One year later
Laser Versus Deep Peel

• 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
Complications

- Pigmentary changes
  - Feather application to avoid demarcation line
  - Exacerbated by estrogen, sun, certain drugs
- Scarring
  - Ectropion
- Infection
  - Staph
  - Pseudomonas
- Herpetic outbreak
- Persistent erythema
Scarring

• Perioral scarring after TCA 50% peel
Scarring
Demarcation Line

- Avoid by feathering peel at edges
Pseudomonas Infection
Herpetic Outbreak
Final Thoughts

• Efficacy of chemical peeling well established
• Technique and training key to avoiding complications
• Individualize to patient needs
History

- Transplantation of animal omentum – 1839
- Autotransplantation of fat 1893
- 1911– Histopathological studies
- 1911– Cosmetic augmentation post-rhinoplasty
- 1929 – Liposuction attempted, d/c’ed after resulted in leg amputation
- 1978 – Modern liposuction
Cell Biology of Fat

- Mesodermal origin
- Organized in lobules supplied by one arteriole
  - <1cm: descends from subdermal plexus
  - >1cm: ascends from fasical arteries
- Brown fat – regulates heat
- White fat – lipid storage
- Cervicofacial fat relatively constant in adult
Fat Cells

- Cells undergo hypertrophy, not hyperplasia
Indications

• Improvement of contour via augmentation/reduction of subdermal tissue volume
• Removal of localized fat deposits (wattles and jowls)
• Correction of asymmetries
• Adjunct to face/neck lift
• Enhancement of malar eminences
Contraindications

• Absolute—generalized obesity, collagen vascular disease, endocrine disorders, bleeding disorders
• Relative—inelastic skin, cellulitic or pitting defects, stretch marks, age > 55, hypertension, diabetes, fine dermal rhytids
Workup

• Examine and mark in sitting position
• Take preoperative photographs
• Specific areas to assess
  – Submental (wattles)
  – Submandibular (jowls)
  – Mandibular contour
  – Cervicomental angle
  – Buccal and parotid areas
Suction Design

- Mark in upright position

FIG. 188-2. Marking of area of adiposity on patient. A: Correct position for patient examination. B: Marks identifying areas to be suctioned. Lines from left ear indicate use of indirect approach, and lines from lower chin indicate use of direct approach.
Cannulas

• Blunt tip cannula good for general work
• Cobra tip good for fibrous areas
Cannulas

- Liposhaver may be less traumatic
Example -- Liposhaver
Cannula Size

- Recommend 4-6 mm cannulas with suction 8-10 mm from end

FIG. 188-4. Effects of using small cannula (top) compared with large cannula (bottom) in reducing likelihood of surface irregularities.
Techniques

- **“Wet”**
  - Hypotonic salt solution + lidocaine/epi injected subdermally
  - Decreases bleeding and helps dissection
  - Distorts tissues
  - Higher incidence post-op edema & ecchymosis

- **“Dry”**
Technique

• Direct approach
• 10-12 times per tunnel
Technique

- Indirect approach

FIG. 188-10. Indirect approach in defining chin–neck contour.
Technique – Nasal Aperture
Technique – Lower Eyelid
Liposuction Approaches
Technique

• Multiple tunnels designed to lay flat smoothly

Technique

FIG. 188-8. Nondominant hand assesses residual subcutaneous fat volume.
Other Uses

• Adjunct to rhytidectomy

FIG. 188-12. Liposuction as an adjunct to classic rhytidectomy.
Other Uses

- May augment effect of chin implant
Fat Grafting

- No smaller than 16-18 gauge cannula
- Expect 75-80% volume
- Volume stabilizes by 6-9 months
- Filter harvested fat
- Overcorrect 20-30%
Technique

- Inject distally first
Areas Helped by Fat Grafting

- Glabellar frown line
- Inframalar groove
- Nasolabial fold
- Cheek hollows
- Mentum
- Oral commissures
Example – Fat Augmentation
Complications

• Minor
  – Ecchymosis (common)
  – Dysesthesia (common)
  – Irregularities, bulges, depressions (leave 2mm subdermal fat)
  – Pigmentation changes (avoid sun)

• Major
  – Neural and vascular injury
  – Hematoma/seroma
  – Infection
  – Skin loss
Summary

• Liposuction
  – Use dry technique with blunt 4- to 6-mm cannula
  – Use crisscross method to minimize surface irregularities
  – Direct suction aperture away from skin

• Lipoinjection
  – Harvest with 18-gauge or larger cannula
  – Inject small quantities (usually in 0.1-mL increments) beginning distally
  – Overcorrect by about 30%