PATHOLOGICAL TYPES OF SCARS AND THEIR IMPACT ON TREATMENT

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Pathological Types of Scars

- Atrophic Scars
- Normotrophic Scars
- Hypertrophic Scars & Keloids
- Mixed Scars
Factors affecting scar development

Inflammation and Oedema

**Minimal**
- ↓ TGF Beta 1 and 2
- ↓ Active fibroblasts
- Insufficient Collagen Synthesis
- ↓ Atrophic Scar

**Adequate**
- ↓ Active fibroblasts Slightly ↑
- ↓ Insufficient Collagen Synthesis
- ↓ Normotrophic Scar

**Extensive**
- ↑ TGF Beta 1 and 2
- ↑ Active fibroblasts
- ↓ Excessive collagen synthesis
- ↓ Hypertrophic scar

**Nonhomogenous**
- Uneven conc. TGF Beta 1 and 2
- Uneven conc. Active fibroblasts
- ↓ collagen synthesis in Islets
- ↓ Mixed scar
Factors affecting scar development

Inflammation & Oedema

Minimal Atrophic
- Animal bites
- Acne scars
- Facial Wounds
- Children
- Certain locations
- Loss of integrity of dermis
- Post-surgery scars
- Deficiency of O2, vitamin C

Moderate Normotrophic

Extensive Hypertrophic & Keloid
- Irritant introduction or contact
- Chronic inflammation
- UVR
- Genetic (Keloids)
- Crossing skin lines
- Certain locations
Management of Scars is a combination therapy.
Normotrophic Scars

**Inflammatory stage**
- Debridement
- Oedema Control (alpha chemotrypsin)
- NSAIDs
- Antibiotics

**Proliferarion Stage**
- Contractubex
- Compression silicone sheeting (areas famous for hypertrophic scarring)
- Enzymotherapy
- Cryodestruction

**Maturation Stage**
- Compression hydration
- Dermaroller
- Vit C applications (Ascorbic acid)
- Microdermabrasion
- Peeling
- Enzymotherapy
- Cryodestruction
- PDL
Enzymotherapy

- Proteolytic enzymes dilute necrotic mass
- Hyaluronidase depolymerizes hyaluronic acid.

Occlusive Hydration

- Maximal hydration of the scar formation zone
- Reduction of transepidermal water loss
- Acceleration of cell migration
- Increase of fibroblast proliferation and synthetic activity
Cryotherapy

- Evens overhanging scar edges
- Reduces interstitial edema

Early Microdermabrasion

- Evens and improves the scar surface
- Clears away the epidermal (lipidic) skin barrier of the scar area along with epidermis, which enables medicinal products to penetrate freely into the skin.
- Scar bottom is elevated by the vacuum to the surrounding skin level, counteracting myofibroblasts

**Better avoided in Fitzpatrick skin phototypes 4-6**
Medium & Deep Chemical Peel

- TCA 30-50% sessions

LASER

- NON Ablative PDL for erythematous scars eliminates vascular component
- Fractional CO2 Laser for non-erythematous scars

Collagen Induction Therapy (CIT)

Dermaroller

- Creates minute channels stimulating islets of collagen synthesis
Atrophic Scars
Types of Atrophic Scars

Acne Scar subtypes

Ice pick

Rolling

Boxcar

Icepick Scars

Boxcar Scars

Rolling Scars
Management of Atrophic Scars

Scar considered fresh during 1st year, golden time of treatment is first 7-9 months

Aims
• To Smoothen scar demarcation line
• To even overhanging scar edges
• Transdermal induction of collagen synthesis
• To elevate Scar bottom

Tools of management in Fresh atrophic scars
?? Enzymotherapy (Proteolytic Serrapeptase, Nattokinase and Hyalorinase) / Topical creams
Occlusive Hydration (Till wound bottom reaches skin level)
Cryotherapy
Microdermabrasion (NOT FOR ICEPICK ATROPHIC SCARS)
Dermaroller
Peeling
Laser Correction

NO CONTRACTUBEX
Management of Old Atrophic Scars

**Tools of management**

- Dermaroller

- Laser Correction of erythematous scars / Laser or Peeling for nonvascularised Scars

- **Subcision (Nokor needle)**

- Excision / Punch excision

- Hydration

- Microdermabrasion

- Autofibroblasts

- **Autologous Fat Transfer / Fillers [only after subcision]**
Nokor needle
Pathological Scars
# Pathological Scars

<table>
<thead>
<tr>
<th>Feature</th>
<th>Hypertrophic Scars</th>
<th>Keloids</th>
</tr>
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<tbody>
<tr>
<td>Incidence</td>
<td>Frequent</td>
<td>Rare</td>
</tr>
<tr>
<td>Time of Development</td>
<td>Soon after injury</td>
<td>May take months</td>
</tr>
<tr>
<td>Genetic Predisposition</td>
<td>None</td>
<td>Present</td>
</tr>
<tr>
<td>Race</td>
<td>None</td>
<td>Related to skin Colour</td>
</tr>
<tr>
<td>Sex</td>
<td>None</td>
<td>Females</td>
</tr>
<tr>
<td>Age</td>
<td>Children</td>
<td>10-30 Years</td>
</tr>
<tr>
<td>Extension</td>
<td>Within wound</td>
<td>Outgrows wound area</td>
</tr>
<tr>
<td>Natural History</td>
<td>Subsides with time</td>
<td>Rarely subsides</td>
</tr>
<tr>
<td>Sites</td>
<td>Areas of Motion, Scar crossing joints or skin lines</td>
<td>Areas of little motion, Sternum, shoulders, ear lobules</td>
</tr>
<tr>
<td>Aetiology</td>
<td>Tension ??</td>
<td>Unknown</td>
</tr>
<tr>
<td>Content</td>
<td>↓ Calcium, ↓ Magnesium, ↓ Mucinous ground substance, ↑ Fibroblasts, ↑ Foreign body reaction</td>
<td>↑ Calcium, ↑ Magnesium, ↑ Mucinous ground substance, ↓ Fibroblasts, No Foreign body reaction</td>
</tr>
<tr>
<td>Fast Blue collagen stain</td>
<td>Blue</td>
<td>Reddish</td>
</tr>
<tr>
<td>Response to treatment</td>
<td>Good</td>
<td>Poor</td>
</tr>
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Management of Hypertrophic Scars & Keloids

Aims:
Reduction of Scar Mass +/- Induction of new proper collagen synthesis
Improving texture and elasticity of scar

Treatment options are similar but Hypertrophic scars have better prognosis

A solitary tool of management seldom works
Management of Hypertrophic Scars & Keloids

**Non Invasive**

*Occlusive dressings / Compression therapy*

*Intralesional corticosteroid injections (decreases TGF Beta 1 and Inflammatory mediators)*
Intralesional Immunomodulators (Interferon) injections: Inhibits type I,II,IV Collagen synthesis
Intralesional Calcium Channel Blockers (Verapamil): ↓ collagen synthesis & ↑ collagenase production
Intralesional Antineoplastic Agents 5FU, Belomycin, Tamoxifen & Doxorubicin

Topical Immunosuppressant Tacrolimus ointment: Inhibits TNF alpha
Topical Retinoic Acid (Retin-A): Inhibits DNA synthesis in fibroblasts and lymphocytes (Not FDA approved)
Topical Imiquimod 5% cream “Aldara” (Immune response modifier): Decreases collagen synthesis (Not FDA approved)
Botulinum toxin

**Minimally Invasive**

*Cryosurgery for small lesions* (affects microvasculature causing cell damage via intracellular crystals, leading to anoxia)

Radiation therapy

Light therapy (IPL)

Laser therapy (Non Ablative PDL & Fractional)

**Surgical Excision**
# Management of Hypertrophic Scars & Keloids

<table>
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<tr>
<th>First-line treatment</th>
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<tbody>
<tr>
<td><strong>Cryotherapy</strong>, May cause hypopigmentation, pain</td>
<td>Intralesional corticosteroids, May cause discomfort, skin atrophy, telangiectasia</td>
</tr>
<tr>
<td><strong>Silicone sheeting</strong></td>
<td>رسولائع للاستعمال الداخلي (e.g., Contractubex, Mederma), Limited effect alone</td>
</tr>
<tr>
<td><strong>Pressure dressing for six to 12 months</strong></td>
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| Second-line and alternative treatment                                               |                                                                 |
| **Surgical excision**, If alone, can be followed by more aggressive growth in up to 84% of cases |                                                                 |
| **Combined cryotherapy and intralesional corticosteroid injection**                 |                                                                 |
| "Triple keloid therapy" (surgery, corticosteroids, and silicone sheeting)          |                                                                 |
| **Pulsed dye laser**                                                                |                                                                 |
| Intralesional Verapamil and silicone sheeting                                         |                                                                 |
| **Intralesional Fluorouracil**, Effective; May cause hyperpigmentation, wound ulceration |                                                                 |
| **Bleomycin tattooing**, Effective; May cause pulmonary fibrosis, cutaneous reactions |                                                                 |
| **Postsurgical intralesional interferon**, Expensive; May cause pruritus, altered pigmentation, pain |                                                                 |
| **Radiation therapy alone or Postsurgical**, May cause cancer, hyperpigmentation, paresthesias |                                                                 |
| **Onion extract topical gels (e.g., Contractubex, Mederma)**, Limited effect alone |                                                                 |
Compression

• Mechanically holds growth
• Compresses scar vasculature leading to anoxia

Dermabrasion

• Microdermabrasion and rotation dermabrasion have little value
• Might stimulate collagen synthesis
• Sandabrasion may have a role

Radiation

• Effect disputable
• Risk of malignancy
• Age and site restrictions
Pulsed Dye Laser (585 nm)
Induces photothermolysis, resulting in microvascular thrombosis

Limited value, best if used early in combination with other modalities
Promising therapies that aim at decreasing collagen synthesis

Antiangiogenic factors, including vascular endothelial growth factor (VEGF) inhibitors

Phototherapy (photodynamic therapy [PDT])

UVA-1 therapy, narrowband UVB therapy)

Transforming growth factor (TGF)–beta3

Tumor necrosis factor (TNF)-alpha inhibitors (etanercept)

Recombinant human interleukin (rhIL-10)
THANK YOU