THERMAL BURNS

The critical question to determine for burns patients is the urgency of any operative intervention.

Depth of burn is best assessed by capillary refill in the base of the wound, and by the presence/absence of sensation.

In general, large burns (>5% or crossing a major joint) should be referred early to a burns unit on an immediate basis. Smaller, deep burns can be referred on an outpatient basis.

Hot water and steam burns in general do not require skin grafting. Hot oil and flame burns often do.

The emergency management of burns consists of:
- Early cooling with tepid water– this is of greatest benefit
- Asepsis, with silver dressings or cream
- Elevation and prevention of oedema
- Administration of tetanus vaccine

Partial thickness or worse burns of >15% require volume replacement
- The Parkland formula is 4ml/kg x weight x %BSA
- This often results in large volumes (>10L to be administered)
- 50% of the fluid should be administered in the 1st 8 hours after the burn
- The other 50% should be administered in the next 16 hours
- Fluid administration should be titrated to:
  - Urine output 1ml/kg.hr
  - Normal pH and haematocrit

If there is any concern about an airway burn early RSI should be undertaken.

Any clinical concerns about a burn should be discussed with a tertiary burns unit.
Issues to cover

- Classification
- Who needs debridement
- Management tricks
- Resuscitation
<table>
<thead>
<tr>
<th>Depth</th>
<th>Histology</th>
<th>Appearance</th>
<th>Sensation</th>
<th>Healing</th>
</tr>
</thead>
<tbody>
<tr>
<td>First-degree:</td>
<td>Epidermis only</td>
<td>Erythema; blanches with pressure</td>
<td>Intact; mild to moderate pain</td>
<td>3-6 days without scarring</td>
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<tr>
<td>Second degree:</td>
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<tr>
<td>· Superficial</td>
<td>Epidermis and superficial dermis; skin appendages intact</td>
<td>Erythema, blisters, moist, elastic; blanches with pressure</td>
<td>Intact; severe pain</td>
<td>1-3 weeks; scarring unusual</td>
</tr>
<tr>
<td>· Deep</td>
<td>Epidermis and most dermis; most skin appendages destroyed</td>
<td>White appearing with erythematous areas, dry, waxy, less elastic; reduced blanching to pressure</td>
<td>Decreased; may be less painful</td>
<td>&gt;3 weeks; often with scarring and contractures</td>
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<tr>
<td>Third-degree:</td>
<td>Epidermis and all of dermis; destruction of all skin appendages</td>
<td>White, charred, tan, thrombosed vessels; dry and leathery; does not blanch</td>
<td>Anesthetic; not painful (although surrounding areas of second-degree burns are painful)</td>
<td>Does not heal; severe scarring and contractures</td>
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<tr>
<td>Old System</td>
<td>New System</td>
<td>Summary</td>
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<tr>
<td>First degree</td>
<td>Not classified</td>
<td>Fiery red, very painful, but not blistered</td>
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<tr>
<td>Second degree</td>
<td>Partial-thickness</td>
<td>Extend through the epidermis and may penetrate into the dermis. Healing by regeneration, full function and appearance should be recovered.</td>
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<tr>
<td>Third degree</td>
<td>Full-thickness</td>
<td>Penetrate the dermis and may involve subcutaneous tissue. Hair follicles, sebaceous glands, and sweat glands are destroyed. Healing occurs through scar formation and re-epithelialization.</td>
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<tr>
<td>Fourth degree</td>
<td>Complete burns</td>
<td>Extend into the subcutaneous tissue to include muscle, fascia or bone. They may generate systemic toxic reactions or rapidly lead to infection or sepsis.</td>
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</tbody>
</table>
### Classification

- **Surgical or conservative management?**

<table>
<thead>
<tr>
<th>SURGICAL</th>
<th>CONSERVATIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Early (&lt;24hrs): SIZE</strong></td>
<td>Sunburn (1st degree)</td>
</tr>
<tr>
<td>Large burns (&gt;10%) of various depths</td>
<td>Superficial blistered</td>
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<tr>
<td>Deep burns</td>
<td>Mid – deep depth depending on progress</td>
</tr>
<tr>
<td><strong>Later (&lt;14 days): PROGNOSIS</strong></td>
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<tr>
<td>Smaller deep burns</td>
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<tr>
<td>Uncertain prognosis</td>
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</table>
SUNBURN: intact skin

PARTIAL THICKNESS
- Blistered
- Skin Sloughing

FULL THICKNESS
- ‘Plastered on’
- Painless
- No capillary refill
PARTIAL THICKNESS – SUPERFICIAL

HOT WATER
STEAM

Good capillary refill
Remove dead skin
Leave blisters alone¹
Deep Partial Thickness

Cooking oil

Acid

Questionable capillary refill
Full Thickness Burns – hot oil

Full thickness

No capillary refill

Insensate
FULL THICKNESS
Fire
Alkali exposure
NO CAPILLARY REFILL
Management

• Early cooling\(^2\)
• Analgesia
• Asepsis
• Complications
  – Oedema
  – DVT
  – Tetanus
SSD$^{3,4}$
My practice

• Flamazine
  – Daily
  – Occlusive dressing
  – Change with vitamin E cream wipe down
  – Face/genitals
    • Chloramphenicol tds

• Emphasize
  – Elevation
  – DVT prophylaxis
  – ADT status
Special Cases – Hands/Feet
Special areas

• Hands and feet:
  – Dry
  – Tough
  – Flamazine daily

• Face and genitals
  – Chloramphenicol ointment BD
Resuscitation

• Call from Longreach
• 45yo farmer
  – Tractor explosion
  – Facial burns
  – Extensive body surface area
  – Estimate 70% partial to deep burns

• Advice?????
Issues

• Futility?\textsuperscript{5}
  – LD50 90%
• Accuracy
  – Realistic assessment
• Volume
• Airway
  • ?decision to intubate
• 4ml x weight (kg) x %BSA burned
  – 50% in 8hrs then 50% in 16hrs
  – Hartmann’s
• Our patient:
  – Weight 80kg
  – $320\text{ml} \times 40 = 12.8\text{L}$
• Titrate to urine output
  – 1ml/kg.hr
  – Watch
    • $\text{K}^+$
    • pH/lactate
    • Airway oedema
    • Creatinine
Airway

• Inhalational burns
  – Intubate
  – Bronchoscropy

• Facial burns
  – Any doubt: intubate!
    • EARLY
    • DO NOT WAIT FOR STRIDOR
    • Fluid resus

• Prepare for surgical airway
Post ED Care

• Important advice
  – Elevation
  – Immobilization
  – Signs of infection
  – Sun care
5 most important messages

1. Early cooling
2. Asepsis and elevation
3. Communication of findings rather than presumptive diagnosis
4. Fluid resus = L.O.T.S.
5. Don’t be afraid to intubate early
References


5. Harrington DT. Burn injuries and burn care. Med Health RI. 92(5) 172 - 180