General Surgery - Topic 4 - Burns

Burn Injury and Initial Assessment

Mechanism and Pathophysiology

- A burn damages tissue through heat, chemicals, electricity, radiation or friction.
- The severity depends on the agent, temperature, duration of contact, depth, area and associated injuries.

Local Changes

A. Zone of Coagulation

- The central **zone of coagulation** contains tissue that has suffered irreversible injury.

B. Zone of Stasis

- The surrounding **zone of stasis** has reduced perfusion and may survive if oxygenation and circulation are restored.

C. Zone of Hyperaemia

- The outer **zone of hyperaemia** usually recovers unless further injury or infection develops.

Progression of Tissue Injury

➢ Oedema, infection, pressure and poor perfusion can deepen a burn over the following days.

Systemic Changes

Capillary Leak and Burn Shock

- A major burn causes inflammatory mediators to increase capillary permeability.
- Plasma leaves the circulation and produces tissue oedema, while the effective circulating volume falls.
- This combination can cause burn shock, reduced organ perfusion and acute kidney injury.

Barrier Loss and Hypermetabolism

- Loss of the skin barrier increases evaporation, heat loss and susceptibility to infection.
- The later hypermetabolic response increases energy expenditure and breaks down muscle protein.
- Children, older adults and people with major comorbidities may deteriorate with a smaller burn.

History and Documentation

Details of the Event

➢ Record the exact time, place, agent, duration of exposure and first aid already given.

Copyright by Engacy Learning Private Limited. All rights reserved. Reproduction or distribution without written consent is strictly prohibited.

- Ask whether the injury occurred in an enclosed space, involved an explosion or caused a fall.
- For electrical injury, record the likely voltage, contact duration, loss of consciousness and possible entry and exit sites.
- For chemical injury, identify the chemical and concentration if this can be done safely.
- Document fluids, medicines and dressings already received, including their times.

Patient Factors

- Ask about breathlessness, hoarseness, chest pain, confusion, pain and reduced urine output.
- Record weight, allergies, pregnancy possibility, diabetes, heart or kidney disease, medicines and tetanus immunisation.
- Ask sensitively about the circumstances without suggesting an answer or assigning blame.
- Consider safeguarding concerns when the history and injury pattern do not agree.

Immediate Examination

1. Airway and Breathing

Airway Assessment and Inhalation Injury

- Start an airway, breathing, circulation, disability and exposure assessment while seeking senior help.
- Look for facial burns, soot, singed nasal hair, carbonaceous sputum, hoarseness and an enclosed-space exposure.
- These findings raise concern for inhalation injury, but none alone proves the need for intubation.
- Progressive airway swelling, stridor, respiratory failure or reduced consciousness requires early expert airway management.

Oxygen and Inhaled Toxins

- Give high-concentration oxygen when smoke inhalation or carbon monoxide poisoning is suspected.
- A normal pulse-oximeter reading does not exclude carbon monoxide poisoning.
- Measure carboxyhaemoglobin using co-oximetry and assess the exposure history, symptoms and time since oxygen treatment began.
- Severe smoke exposure with cardiovascular collapse or marked lactic acidosis may require treatment for cyanide poisoning under an emergency protocol.

2. Circulation and Associated Injury

Perfusion and Vascular Access

- Assess pulse, blood pressure, capillary refill, peripheral temperature, mental state and urine output.

Copyright by Engacy Learning Private Limited. All rights reserved. Reproduction or distribution without written consent is strictly prohibited.

- Look for haemorrhage or another cause of shock, especially when shock occurs early after a relatively small burn.
- Obtain reliable intravenous access for a major burn and draw appropriate baseline blood samples.

Circumferential Burns and Compression

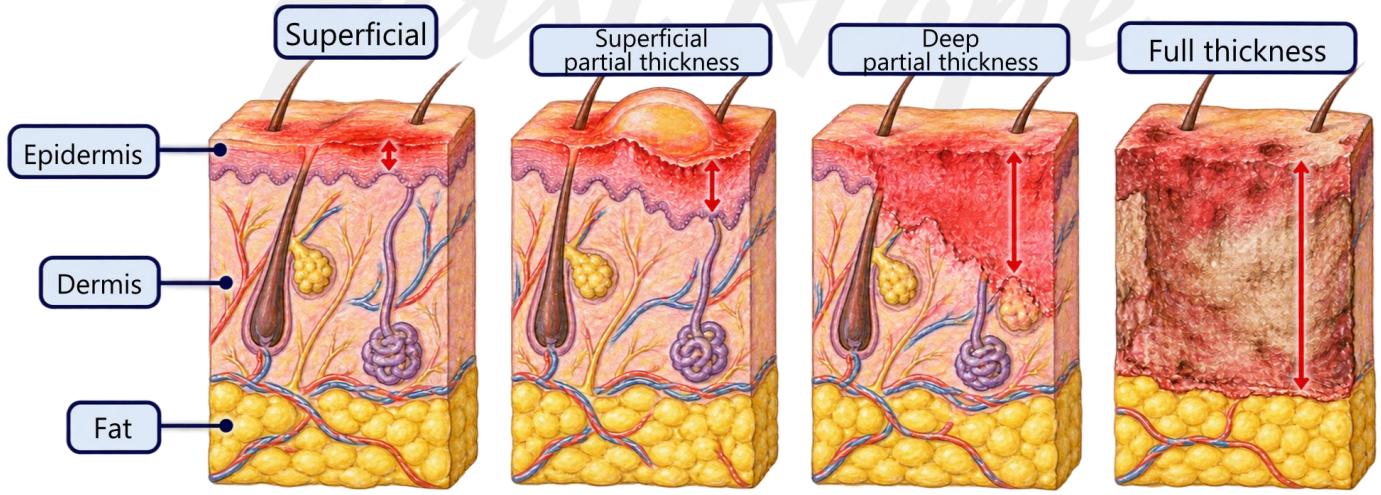
- Check distal pulses, sensation and movement in circumferential limb burns.
- Assess chest expansion because a circumferential deep chest burn can restrict ventilation.

3. Exposure and Reassessment

- Examine the entire body, including the back, while preventing hypothermia.
- Remove jewellery and constricting items before swelling develops.
- Record depth and area on a body chart, with photographs when consent and local policy allow.
- Repeat the assessment because burn depth, airway swelling and perfusion can change.

Depth, Extent and Referral

Burn Depth



The depth of a burn determines which skin layers and appendages remain viable

Depth	Typical findings	Healing tendency
Superficial	The skin is red, dry, painful and blanching.	The epidermis usually heals without scarring.
Superficial partial thickness	The surface is moist, blistered, painful and usually blanching.	It often heals within about two weeks when uncomplicated.

Copyright by Engacy Learning Private Limited. All rights reserved. Reproduction or distribution without written consent is strictly prohibited.

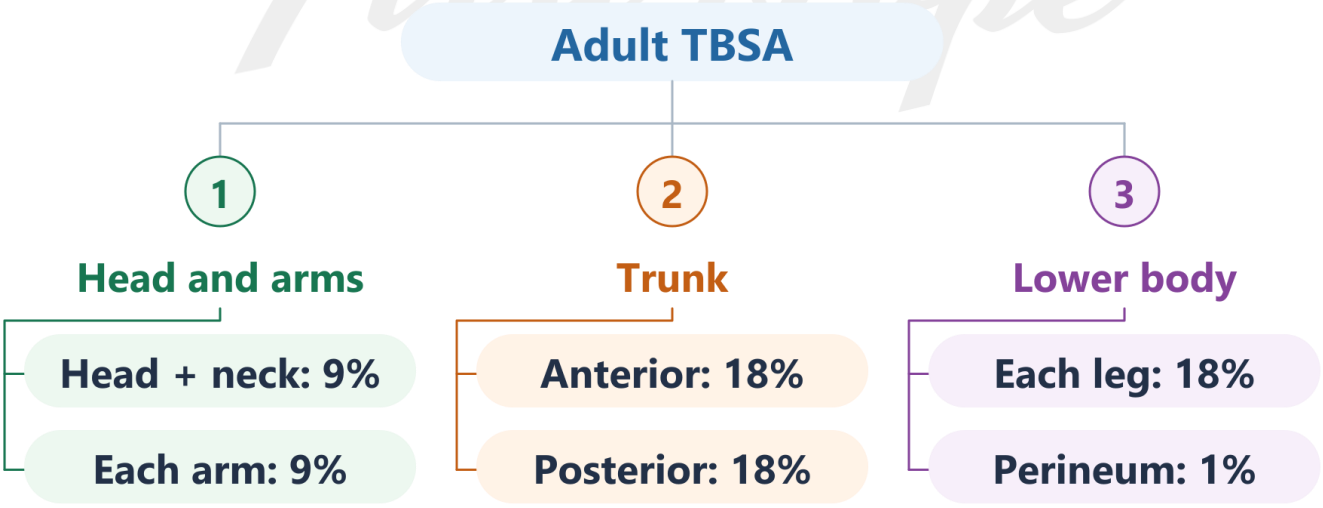
Depth	Typical findings	Healing tendency
Deep partial thickness	The surface may be pale or mottled, with reduced blanching and sensation.	Healing is slower, and grafting or substantial scarring may occur.
Full thickness	The surface may be white, brown or leathery, with loss of pinprick sensation.	Most significant areas need surgical closure because dermal regenerative elements are destroyed.

- Assess colour, moisture, blanching and sensation together rather than relying on one feature.
- A painless centre does not mean that the injury is minor, because deep burns can destroy sensory endings.
- Mixed-depth burns are common and need repeated assessment by an experienced clinician.

Estimating the Burned Area

1. Adult Rule of Nines

- Count partial-thickness and full-thickness areas when estimating the percentage of total body surface area, or **TBSA**.
- Do not include isolated superficial redness in the resuscitation TBSA.



Adult region	Whole-region TBSA
The whole head and neck	9%
Each whole upper limb	9%
The anterior trunk	18%
The posterior trunk	18%

Copyright by Engacy Learning Private Limited. All rights reserved. Reproduction or distribution without written consent is strictly prohibited.

Adult region	Whole-region TBSA
Each whole lower limb	18%
The perineum	1%

2. Palmar Surface Method

- For small scattered burns, the patient's entire palmar surface including the fingers is approximately 1% of TBSA.
- State which hand-area method was used because the palm without fingers represents a smaller area.

3. Lund and Browder Method

- Use a **Lund and Browder chart** for children because their head and leg proportions differ from those of adults.
- The chart also gives a more detailed estimate for irregular adult burns.
- An accurate area estimate prevents both inadequate resuscitation and excessive fluid administration.

Burn-Centre Consultation and Transfer

Burn Depth, Area and Important Sites

- Seek urgent specialist advice for full-thickness burns or partial-thickness burns involving about 10% TBSA or more.
- Deep burns of the face, hands, feet, genitalia, perineum or major joints need specialist assessment even when the area is small.

Inhalation, Mechanism and Patient Factors

- Suspected inhalation injury, chemical burns, high-voltage electrical injury and lightning injury also require specialist advice.
- Significant associated trauma, major comorbidity, uncontrolled pain or rehabilitation needs can increase the need for transfer.
- Children may benefit from a burn centre because of their dressing, pain, safeguarding and rehabilitation needs.

Stabilisation Before Transfer

- Stabilise life-threatening problems before transfer and send the assessment, fluid chart and treatment times with the patient.

Copyright by Engacy Learning Private Limited. All rights reserved. Reproduction or distribution without written consent is strictly prohibited.

FREE PREVIEW

Click here to visit our website

MBBS PREMIUM NOTES

Complete MBBS notes for every subject and year are available only in the FirstHope app.

Scan or click here

Click here to get the app >

Available on Google Play

Browse MBBS notes by year

firsthope.co.in/mbbs

Click here to explore MBBS >

Scan or click here

FirstHope Medical on Instagram

@firsthope.medical

Click here to follow

App and notes help

Find answers about access and downloads

Click here for help

YEAR 1 / YEAR 2 / YEAR 3 / YEAR 4