Burn Assessment and Management

Objectives
• Discuss the mechanisms and complications of a thermal burn, electrical burn and an inhalation burn
• Explain the factors to consider when determining the severity of a burn

Case Study
• You are called to an elementary school for a burn injury.
• You are told that a staff member lost their grip on a vat of hot oil and spilled it on their arms.
• The patient is in the school nurse’s office.

Questions Regarding the Case Study
• How severe is this mechanism of injury?
• Will you expect to find any compromise to airway, breathing or circulation during your initial assessment?
• How severe will you expect the burn to be?

Patient Assessment
• The patient is awake, conscious and tearful
• She is breathing normally but appears to be in significant pain
• Her burns appear isolated to her hands and lower arms.

Patient Assessment
• Vital signs
  - HR is 96
  - RR is 16
  - BP is 140/88
• Patient History
  - She is 55 years old
  - History of hypertension
More Questions

• Is this a critical burn?
  – Rationale, please
• Treatments?
  – Oxygen?
  – IV size and rate?
  – Pain control?
  – Trauma entry?

Mechanisms of Thermal Burns

Phases of a Burn Injury

• Emergent Phase
• Fluid Shift Phase
• Hypermetabolic Phase
• Resolution Phase

Complications of Thermal Burns

• Infection
• Eschar formation

Burn Assessment

• Scene Assessment
  – Safety First!
  – Mechanism of Injury
    • Chemicals
    • Enclosed space?
    • Other trauma?
    • Intentional?
• Initial Assessment
  – Airway compromise
    • Now?
    • Potential for this later?
  – Breathing
    • Associated with cough
  – Circulation
    • Signs of shock
Potentially Critical Findings

- Hoarseness
- Adventitious airway sounds
- Soot in nose or on tongue
- Singed hair
- Facial edema
- Dysphagia
- Dysphasia
- Adventitious breath sounds
- Significant dyspnea
- Altered level of consciousness

Focused Physical Assessment

- Signs of trauma
  - Musculoskeletal injuries
  - Isolated injuries
  - Evidence of abuse
  - Signs of shock

Focused Physical: Burn Assessment

- Appearance
  - Description and location(s)
    - Redness
    - Blisters
    - Edema
    - Weeping of fluid
    - Charring
    - Sloughing of skin

Determining Burn Severity

- Depth
  - Classification
    - Superficial
    - Partial-thickness
    - Full-thickness

What is the depth of her burn?

Determining Burn Severity

- Body surface area
  - Rule of Nines
    - Adult
    - Pediatric
  - Rule of Palms
    - Small burns
    - Use of the patient's palm
What is the % of BSA Involved in Our Patient?

Determining Burn Severity

- Other factors
  - Burn location
    - Hands, feet, genitalia
  - Age
  - Pre-existing medical conditions
  - Medications
  - Presence of multi-systems trauma
  - Inhalation injury

Back to the Patient

- Is this a critical burn?
- Will you still stick to your original treatment plan?
  - Oxygen rate
  - IV
  - Pain medications
  - Trauma entry

Complications From a Significant Burn Injury

Complications

- Fluid loss
  - Weeping of wounds
  - Hypothermia potential
  - Electrolyte loss
  - Hypovolemia
    - Signs of shock indicate that there is another serious injury present
    - Shock resulting from a burn will typically occur hours after the insult

- Systemic acidosis
  - From tissue death
- Hypoxia
- Infection
- Organ failure
- Eschar
  - Circumferential burns
General Management of Burns

- Airway and ventilatory support
  - Early recognition of potential airway compromise
    - ALS intercept is critical for early advanced airway management
    - Consider transport to a trauma facility if the MOI and/or initial patient presentation indicates a severe inhalation injury

- Circulatory Support
  - IV therapy
    - Parkland formula
      - Specific IV rate for the first 24 hours of a burn
      - Fluid resuscitation if signs of shock
      - Placement for the administration of pain medications

Parkland Burn Formula

- Fluids for first 8 hrs

\[
\text{Total mL} = \frac{4 \times \text{Burn area} \times \text{Wt. in kg}}{2} 
\]

\[
4 \times 20\% \text{ burn} \times 70 \text{ kg} / 2 = 2800 \text{ ml}
\]

Emergency Care - Thermal Burns

- Stop the burning
- Assess breathing
- Look for signs of airway injury, soot, burnt nasal hair, facial burns
- Humidified oxygen
- Complete initial assessment
- Treat for shock

- Evaluate burns by depth, extent, and severity
- Remove clothing and jewelry
- Separate fingers or toes with sterile gauze pads
- Wrap in dry sterile dressing

General Management of Burns

- Medications for pain management
  - Morphine sulfate
    - Potent analgesic
    - Suppresses the conscious awareness of pain in the brain
    - Reduces anxiety
  - Ketorolac
    - NSAID
    - Suppresses the pain response in the cell membrane
    - Works well with acute, severe pain
  - Nalbuphine
    - Similar properties as morphine
    - Similar effects: sedation, lowered awareness of pain
    - Less side effects as morphine
Another Case Study

You respond to the scene of a house fire with a person trapped. After you arrive on scene you see firefighters at the front door of the house.

Patient Assessment

- Patient is approximately 45 years old and is unconscious/unresponsive to painful stimuli.
- He has heavy soot deposits on his face and in his nose. He is not breathing.
- Firefighters tell you that the patient was not moving when they found him on his bed.
- The patient has no thermal burns on his body.

Mechanisms of Inhalation Injuries

- Superheated air
  - Mechanism similar to a thermal burn
  - Mucous membranes will intensify the burn
  - Fluid shifts may cause progressive airway obstruction
- Chemical burns

Inhalation Injuries Severity

- Product of combustion
- Duration of exposure
- Confined space
Inhalation Injuries

- Edema can be progressive
- May appear mild at first
- Symptoms may not appear for hours

Progressive Edema

Signs and Symptoms of Upper Airway Injury

- Singed nasal hairs
- Facial burns
- Burned specks of carbon in the sputum
- Sooty or smoky smell on breath
- You may see burns of the oral mucosa

Upper Airway

Signs of Respiratory Distress

- Restriction of chest wall movement
- Restlessness
- Chest tightness
- Stridor
- Wheezing
- Difficulty in swallowing
- Hoarseness
- Coughing
- Cyanosis
- Difficulty in swallowing
- Hoarseness
- Coughing
- Cyanosis

Inhalation of Noxious Fumes

- Mucosa in lungs swell and break
- Fluid leaks into alveolar space
- Cilia is damaged
- Mucus builds up
- Airway is plugged
- Oxygen exchange is reduced

Inhalation Assessment Tip

- Isolated burns do not alter levels of consciousness
- If unconscious assume carbon monoxide
Electrical Burns

• Contact Burns (when the current is most intense at the entrance and exit sites)
• Flash Burns
• Arcing injuries (when current jumps from one surface to another)

Severity of Electrical Shock

• Voltage and amperage of the current (amperage kills)
• Alternating or Direct current
• Amount of time the patient is exposed
• Amount of moisture on the patient

Severity of Electrical Shock

• Amount of body surface in contact with water
• Amount of insulation worn by the patient
• Area of the body through which the current passes

Signs and Symptoms of Electrocution

• Dazed or confused
• Obvious and severe burns on the skin
• Unconsciousness
• Weak, irregular, or no pulse
• Shallow, irregular, or absent breathing
• Multiple severe fractures due to intense muscle contractions

Electrical burns are more severe at the point of exit. This child shows exit burns from the face. Point of entry could not be determined.
Emergency Care - Electrical Burns

- Assure your safety first
- Provide airway care
- Provide CPR as needed
- Care for shock
- Care for spinal injuries, head injuries, and severe fractures

Emergency Care - Electrical Burns

- Evaluate electrical burns, looking for at least two external burn sites, entrance and exit
- Cool the burn, remove clothing
- Apply sterile dressing
- Transport, be prepared for cardiac or respiratory arrest

Summary

- Multiple factors should be evaluated when determining the severity of a burn
- Burn injuries will generate inflammation and swelling
  - Severe injuries will result in severe swelling
  - Consider this complication when making treatment and transport decisions
- Emotional care is also a necessary component in the EMT-I’s treatment plan
  - Don’t neglect this!