Chapter 23
Caring for Clients with Burns

Burn Injuries

- 4500 people die from burns each year
- High risk group ~ children and the elderly
- The most common cause of burns
  - Smoking material
  - Scalding
  - Lighting trash fires or furnaces

Burns

- A burn is a traumatic injury to skin and underlying tissue
- Causes of burns:
  - Thermal Heat
  - Chemicals
  - Electricity *~ most damaging
  - Radiation
Thermal Burn

Chemical Burn – Sulfuric Acid

Electrical Burn

Radiation Burn

Pathophysiology and Etiology

- Heat is initial cause of cell damage
- Thermal burns cause the protein in cells to coagulate
- Chemical burns liquefy the tissue and loosen attachment to sub-layers
- Electrical burns are greatest at point of entry and exit
Pathophysiology and Etiology

The Initial Burn Injury Effects:

- **Inflammatory processes**
  - Injures the healing tissue
  - Deactivates tissue growth factors
  - Neutrophils consume available O2 at wound site = tissue hypoxia
  - Injured capillaries thrombose = localized ischemia & tissue necrosis
  - Bacteria colonization, mechanical trauma, and even topically applied antimicrobials can damage viable tissue

Pathophysiology and Etiology

- **Serious burns cause:**
  - Various neuroendocrine changes in the first 24 hours
    - Hyperglycemia
    - Sodium retention = peripheral edema & oliguria
    - Hypermetabolic state = requires more O2 and nutrition
  - Fluid shifts: Ex. Fluid Volume Deficit
    - Edema at burn sites
      - Fluid loss from Seepage
        - Decreased B/P
        - Shock
      - Nursing Diagnosis: Fluid Volume Deficit related to fluid loss from seepage 2° Burns

Pathophysiology and Etiology

Fluid shifts, electrolytes deficits and loss of extracellular proteins can cause:

- Anemia
- Inadequate nutrition of cells and organs from poor circulation
- Gastric ulcers
- Possible renal failure
- Death from complications
Depth of Burn Injury

Burn depth is determined by assessing:
- Color
- Characteristics of skin
- Sensation in the area
- See Table 23-1, pg 307 *

- Burn depth is classified as:
  - Superficial ~ 1st degree
  - Partial Thickness ~ Superficial and Deep 2nd Degree
  - Full thickness ~ 3rd & 4th Degree
  - See Figure 23-1, pg 306
Depth of Burn Injury

• Superficial ~ 1st degree
  – Similar to a sunburn
  – Epidermis is injured, dermis unaffected
  – Red, painful, heals in less than 5 days

• Superficial Partial Thickness ~ 2nd degree
  – Epidermis & dermis are injured, Hair follicles intact
  – Heals in 2 weeks, some pigment changes, no scarring
  – Pink to red, painful, blistered or exuding fluid
  – Blanches with pressure

• Deep Partial Thickness ~ 2nd Degree
  – Epidermis & dermis are injured, Hair follicles intact
  – Heals in 3 weeks, may need debridement, possible scarring, may need skin grafts
  – Patchy red to white, wet or waxy dry
  – Painful with pressure only
  – No blanching with pressure
Deep Partial Thickness ~ 2nd Degree

Depth of Burn Injury

- **Full thickness ~ 3rd Degree**
  - Destroys all layers of the skin
    - Epidermis, dermis, and subcutaneous tissue
  - Skin charred and lifeless
    - Bright red, white, tan, brown, black; leathery covering (eschar)
  - Painless
  - Debridement required
  - Skin Grafts necessary
Depth of Burn Injury

• Full thickness ~ 4th Degree
  – Destroys all layers of the skin ~
    • Epidermis, dermis and subcutaneous tissue
  – Skin charred and lifeless
    • Black, depressed, scarring
    • Painless
  – Debridement required
  – Skin Grafts necessary
Zones of Burn Injury

• Zone of Coagulation ~
  – The center of the injury
  – Where the injury is most severe and deepest

• Zone of Stasis ~
  – The intermediate burn injury area
  – Blood vessels are damaged
  – Tissue can survive
  – Can convert to zone of coagulation if circulation impaired

• Zone of Hyperemia ~
  – Zone of the least injury
  – Minimal damage to epidermis and dermis

• See figure 23-4, pg. 307

Extent of Burn Injury

• See Figure 23-5 and 23-6, pg 308
• Determined by estimating how much surface skin is involved using “Rule of Nines”
• Total Body Surface Area ~ TBSA
• Example:
  – Palm of hand is 1%
  – Head is 9%
  – A arm is 9%
  – A leg is 18%
  – Each side of the trunk is 18%

Rule of Nines
Assessment Findings

- Skin Color ~ Ranges from light pink to black
- Edema or blistering
- Pain ~ Except in full thickness burns
- Pt may exhibit signs of Hypovolemic Shock
  - Hypotension
  - Tachycardia
  - Oliguria or anuria and Breathing Difficulties

Medical Management

- Three major complications ~ Can be life threatening
  - Inhalation injury
  - Hypovolemic shock
  - Infection

Medical Management

- Initial First Aid
- Prevent further injury
  - Secure airway ~ Monitor respirations/Transport
  - Signs and symptoms of inhalation injury
  - See Box 23-1, pg. 308
- Administer O2 and IV en route to a hospital
Medical Management

Acute Care

• Assess the extent of the burn injury and other traumas ~ fractures, head injuries, lacerations, etc.
• Priority in treating burn injuries are:*
  – Ventilation* May need ET tube or trach
  – Initiating Fluid Resuscitation*
  – Pain Control*
  – Treatment of the Burns

Medical Management

Acute Care ~ continued

• Draw Blood
• Fluid Resuscitation
• Pain Management
• Foley Catheter
• Antibiotics
• Tetanus Immunizations

Medical Management

Wound Management

• Prevent infection(Most common organism is staph aureus, Pseudomonas, and candida
• Remove clothing
• Shave hair ~ source of infection
• Cleanse area to remove debris
• Lubricate lips and eyes
• Wound Management includes:
  – The open method ~ the wound is left uncovered
  – The closed method ~ the wound is covered
  – Table 23-3, pg 310
### Medical Management

**Wound Management ~ The Open Method**

- Exposure method ~ left open to air
- Rarely used or used on a small scale ~
  - face or perineum
- Requires isolation
  - Sterile linens, visitors and health care providers wear sterile gowns and mask
  - Skin is sensitive to temperature changes & drafts
    - keep room warm and humidified
    - Protect patient from drafts and temperature changes

### Wound Management ~ The Open Method

- In 2 or 3 days, a hard crust forms over a partial thickness burns
- Epithelialization (regrowth of skin) in 2-3 weeks
- Crusts fall off, is debrided, or loosen by whirlpool
- Eschar ~
  - Hard leathery crust of dehydrated skin
  - Form in full thickness burns
  - Constricts and impairs circulations
  - New skin can not grow under eschar
- Escharotomy ~ incision into eschar
  - Removal of eschar
  - Relieves pressure

### Medical Management

**Wound Management ~ The Closed Method**

- Is the preferred method of wound management
- Burn area is covered with
  - Nonadherent & Absorbent dressing
  - Covered with petroleum jelly / antibiotic ointments
  - Finally covered with occlusive or semi-occlusive dressing
    - Protection from bacteria
    - Minimally permeable to water and O2
  - Trend is to change dressing only once a day due to pain (unless infected)
Medical Management
Antimicrobial Therapy

• 3 Major Antimicrobials used to treat burns
  – Silver sulfadiazine ~ Silvadene (most common)
  – Mafenide ~ Sulfamylon
  – Silver Nitrate

• Other drugs used:
  – Betadine ~ contraindicated with some skin substitutes
  – Garamycin, Furacin
  – Bactroban, Lotrimin, and Loprox

• All drugs applied require using Sterile Technique*
• Most pt’s require IV antibiotics and anti-fungals

Surgical Management

• Debridement
• Skin Grafting
• Skin Substitutes
• Cultured skin

Debridement

• Debridement is the removal necrotic tissue
• Occurs 1 of 4 ways
  – Naturally ~ sloughs away
  – Mechanically ~ dead tissue adheres to dressing
  – Enzymatically ~ removed through topical enzymes
  – Surgically ~ with forceps and scissors during dressing changes or wound cleansing
• Healthy tissue must be covered with a skin graft after debride
## Skin Grafting

- Skin Grafting is necessary for deep partial thickness or full thickness burns
- Wounds greater than 2cm may not granulate fully, leading to a chronic open wound
- Unassisted healing could lead to contractures
- Sufficient blood supply and lack of infection is necessary for the skin graft to take*

## The Purpose of Skin Grafting

- Lessen the potential for infection
- Minimize fluid loss by evaporation
- Hasten Recovery
- Reduce Scarring
- Prevent loss of function

## Skin Grafting

**Sources for Grafts**

- **Auto-Graft** ~ Pt own skin, permanent
- **Allograft or Homograft** ~ Human skin from a cadaver, sloughs away after one week
- **Heterograft or Xenograft** ~ animals skin (Pig) rejected in days or weeks
Types of Autografts

• Split thickness grafts ~ epidermis and a thin layer of dermis
  – Split thickness grafts – epidermis and a thin layer of dermis
  – Obtain from buttock or thigh by a dermatome
  – Less elastic, hair does not grow
  – Full thickness graft used on hands, face & neck and includes epidermis, dermis and subq tissue
  – Comparable to normal skin in appearance and can tolerate more stress

• Slit Graft ~ lace or expansile graft
  – Skin is passed through an instrument that slits it
  – Skin stretches to cover a larger area and graft stretches
Disadvantages of Auto-Skin Graft

- Painful ~ creates new wound
- Donor site scaring ~ pigment changes
- Delay in wound closure ~ waiting for donor sight to heal
- Increased costs and prolonged hospitalization
- Excessive movement on grafted area can interrupt vascularization and disrupt the graft
- Pressure garments are needed up to 2 years
  - Smoothing, reduction of scarring and prevention of contractures

Skin Substitutes

- Bioengineered materials cover the wound and promote healing
  - Applied after wound is clean and debrided
  - Interact with body tissues
  - Examples: Biobrane, Intragra
  - Removed in 2-3 weeks and replaced with a thin autograft
Cultured Skin

- **Cultured Skin** ~ wound closure product that is developed by growing the client’s own skin cells in a lab
  - Grow enough skin for the entire body in 3 weeks from a piece the size of a postage stamp
  - Use a skin substitute for coverage while skin culture is growing
  - Burns heals in 2-3 weeks
  - Skin pigmentation may not match perfectly

Nursing Management

- Assessment of wounds and client’s burn status
- Calculates & Infuses fluid replacement requirements
  - Recognizes & Treats shock
- Relieve Pain
- Wound Care ~ cleanse, dressing changes, apply medications
- Monitor for signs and symptoms of infection
- Therapeutic communication skills ~ coping, body image
- Perform ROM exercises to minimize contractures
- D/C teaching ~ pressure garment, skin care
- See care plan 23-1, pp 313-318*
Considerations

Nutritional Considerations

• Increased protein needs of about 2-4 times \(^ \text{RDA}\) (need to provide more foods like eggs, milk and meat)
• Metabolism may increase up to 100%
• Increased calorie needs
• Require supplemental vitamins and minerals

Gerontologic

• Due to diminished renal, cardiac and respiratory functions a burn can be more complicated for the elderly