Rehabilitative Needs of the Burn Survivor – Part 2

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10:30 – 12:30

Objectives

• Understand the needs of the burn survivor during the transition out of the acute care setting
• Understand the pathophysiology of burn scar
• Understand the rehabilitative needs of the burn survivor including:
  – Splinting and positioning
  – Therapeutic exercise
• Understand the most recent burn research that applies to Physical Therapy

Classifying the Burn

mechanism of burn
depth of burn
extent of burn

Classification of Burns

Mechanism

• Scald
• Contact
• Flame
• Chemical
• Electrical
• Radiation

Temperatures

• hot coffee 180°
• sauces, soups/broths, noodles make things worse
• hot grease 350°
• grease fire 400°
Burn Depth

Superficial

Superficial Partial Thickness

- involves the entire epidermis and the papillary layer of the dermis
- appearance is moist, red, and weepy
- extremely painful
- good capillary refill
- typically heals in 7-21 days

Deep Partial Thickness

- involves the epidermis, and both the papillary and reticular layers of the dermis
- can appear mottled white, pink, or deep red
- some hair follicles and sebaceous glands remain
- less sensation

Full Thickness

- Entire thickness of epidermis and dermis including epidermal appendages
- White, charred, yellow, brown
- Dry, tough leathery
- Insensate

Burn Depth

- Superficial Burn
  - signs & symptoms
    - reddened skin
    - pain at burn site
    - involves only epidermis
  - healing time 3-7 days
    - injured epithelial cells peel away
    - seldom clinically significant

- Deep Partial Thickness

- Full Thickness Burn

  - Compartment Syndrome: increased pressure within one or more fascial compartments so that vascular perfusion is compromised. Without prompt treatment, the resulting tissue hypoxia can lead first to nerve damage and eventually muscle death
  - Escharotomy: Mid-lateral incision of burned eschar used to relieve pressure of an extremity or the trunk
  - Fasciotomy: surgical procedure where the fascia is cut to relieve tension or pressure
Estimate Extent of Burn

calculating Total Body Surface Area (TBSA)

• 2nd and 3rd degree burn only

• Rule of Nines
  – not accurate for infants and children

• Burn diagrams can illustrate the adult/child anatomical differences

• Lund and Browder used in most burn centers

Rehabilitation Dispositions

• Inpatient Rehabilitation
• Skilled Nursing Facility (SNF)
• Home with continued therapy on an outpatient basis
• Home with continued therapy via home health
• Home independent
• Home and patient has no insurance or ability to pay

Discharge Summary

• Range of motion (ROM)
• Strength
• Mobility
• Ability to ambulate
• Pain control
• Scars
• Current home exercise program (HEP)
• Pressure garments
• Splint wearing schedule
Discharge Summary

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MATURATION PHASE

Maturation Phase

Goal Setting:
- based on the extent and depth of burn, patient's current health status, age, physical and mental condition, time to heal
  - foremost goal is to preserve or regain ROM
  - other goals include:
    - scar management - prevention of hypertrophic scarring
    - strengthening
    - optimize endurance
    - ADL's
    - provide psychosocial support to pt and family

Important information to know
- Surgeries and time to achieve full wound closure
- Level of activity prior to discharge
- ROM during surgery or conscious sedation
- Current wound care
- Damage to tendons

Hypertrophic scarring
- 50% - 67%
- possible causes include:
  » prolonged healing time
  » infection
  » race
  » age
  » location

Therapy Management

Scar management:
- promote optimal wound healing
- minimize hypertrophic scarring
- minimize pain and pruritus, hyperesthesia
Therapy Management

• Hypertrophic scarring
  • the three “R’s”
    » red (vascul arity)
    » raised (height)
    » rigid (pliability)
  • scars are metabolically active for up to 3 years

Maturation Phase

• Scar massage
  • promotes collagen remodeling by applying pressure to scars
  • helps decrease itching and desensitizes the tissue through tactile stimulation
  • provides moisture and pliability through the introduction of moisturizers
  • press hard enough to make the scar blanch
    » circular motion
    » vertical motion
    » horizontal motion
    » pinch and roll
  • any lotion that makes the skin soft
  • avoid lotions that contain perfumes
  • 3-4 times per day

Maturation Phase

• Pressure therapy
  • controls collagen synthesis by limiting the supply of blood, oxygen and nutrients to the scar tissue
  • reduces collagen production to the levels found in normal scar tissue by replacing the pressure exerted by the destroyed skin on underlying tissues
  • encourages realignment of collagen bundles already present

Maturation Phase

• Silicone

Maturation Phase

• Therapeutic exercise

Maturation Phase

• Splinting

Maturation Phase

• Research
  • studies have failed to demonstrate positive effects on height, pliability, and vascularity
  • decreases in itching and pain have been shown, as well as improvements in levels of anxiety and depression

Maturation Phase

- Pressure garments
  - garments must fit snugly
  - apply distal to proximal
  - need to be worn 23 hours a day
  - concave areas can be filled with inserts
    - silicone
    - elastomere
    - foam padding
    - sun block must be applied prior to donning

- Research
  - 12-year study to determine the effectiveness of custom pressure garments
  - Data was obtained on 54 subjects
  - Objective measures were obtained for hardness, color, and thickness of scars
  - Compression garment therapy is effective for those with moderate to severe scarring

Research

- Recommended use
  - deep dermal wounds that healed spontaneously over weeks (>21 days)
  - grafted wounds surrounded by deep dermal wounds that healed spontaneously over weeks
  - children and young adults
  - persons of color
  - body locations where compression can be applied (inserts)
  - instances where vascular support is needed

- Silicone research
  - randomized, double-blinded, placebo-controlled trial
  - scale measures included pigmentation, vascularity, pliability, pain, pruritus
  - at 4 months the silicone treatment group had reductions in all areas except pain

- Stretching and joint mobilization
  - stretching to the point of blanching
  - grades I, II used for inpatients and post-op, grades I-IV used once scar is maturing

Therapy Management

- Silicone
  - possible mechanisms of action include:
    - controls scar hydration
    - increased pressure
    - absorption of silicone
    - increases the temperature of the scar

Maturation Phase

- Medical
  - studies on scar maturation
  - elastomeric garments
  - silicone gel
  - foam padding
  - sun block

- Research
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Rehabilitation

• Muscle catabolism
  • after a burn protein is catabolized, leading to a loss of lean body mass and muscle wasting
  • can persist for up to 9 months beyond full wound healing

Rehabilitation

• 83 young adults who sustained large TBSA burns as children.

• Outcome measures included strength, mobility, ADL’s as well as psychological outcome measures

• Majority of subjects outcome measures were within the normal range when compared to young adults of similar age that were not burned

• Areas most impaired were strength which limited ADL’s

• Area of improvement - provide program to develop overall strength for severely burned children


Rehabilitation

• Therapeutic exercise
  • research has shown that supervised exercise programs for strengthening and endurance can lead to:
    → improvement in muscle strength, power and lean body mass
    → improve aerobic capacity
    → decrease the number of surgical interventions


Rehabilitation

• Home exercise program
  • have realistic expectations
  • too many exercises can be daunting
  • encourage most important exercises
  • emphasize function
  • does the family have or know resources for regaining fitness
    → this can be an asset towards community integration
  • be creative
  • don’t provide at the last minute

Home Exercise Program

• BAD EXAMPLE
  → Outpatient therapy 3x/week - facility 45 minutes away
  → Wear flexion splint for 4-6 hours daily
  → Wear extension splint 4-6 hours daily/twice per day
  → Do all exercises on ther-ex program 3-4 times per day (20 exercises in packet)
  → Perform scar massage 2-3 times daily, 3 minutes per square inch (15 square inches total)
  → Use door pulleys 6-8 times per day (there were four exercises in ther-ex program that called for overhead reaching)

Splinting

• Things to consider:
  → Check fit
  → Amount of time
  → Complexity of splint
  → can the family don the splint?
Modalities

There's little evidence that supports the use of modalities for scar management

• Cold
• Ultrasound
• Iontophoresis
• Electrical stimulation
• Heat
  • Fluidotherapy
  • Paraffin

Modalities

• Hot packs
  • Increased layering is required, anywhere from 8-10 layer for approx. 15-20 minutes
• Fluidotherapy
  • Temp: 100-110 deg F for 20 minutes
  • Provides a great heat delivery
  • Allows for AROM in medium
  • Contraindications: open wounds

Modalities

• Paraffin
  • Lower temps required (114-120 deg F) for 20 minutes
  • Improves extensibility; decreases pain, adds moisture
  • Can apply with low load, low grade stretch
  • Do not place wax back in paraffin, to avoid cross-contamination
  • 2 techniques:
    • Directly dipping hand 8-10 dips, then wrapped with plastic wrap and ace wraps
    • May need to have pt hold an object for a composite flexion position
    • Spreading paraffin with brush onto affected area