

Management of Hand Burns in Acute Care Setting

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Outline

- Introduction
- Medical management of Burn Injuries at LAC+USC
- Role of the Occupational Therapist
- Practical tips for treating your patient



Hand Anatomy Review



- Basic knowledge of the hand you need to know:
 - Musculoskeletal
 - Soft tissue
 - Wound healing



Burn Injury Facts

- 486,00 injuries requiring medical treatment
- 40,000 acute care hospital admissions
- 3,275 deaths per year were from fire/burn/ smoke inhalation injuries



Burn Injury Facts: 2005-2014*

- Survival rate: 96.8%
- Admission Cause: **43% fire/flame**; 34% scald; 9% contact
- Location of occurrence: **73% home**



Burn Injury Facts

- There are 3 types of burn injuries: thermal, chemical, electrical.
- The most common causes of burns:
 - For adults: flame and electrical burns
 - For children: scald and contact burns



Burn classification System (ABA)

- **Superficial thickness:** only the epidermis is damaged. Characterized by erythema and pain.
- **Superficial-partial thickness:** Epidermis and superficial layer of dermis are damaged. Characterized by erythema and fluid filled blisters



Burn classification System (ABA)

- **Deep-partial thickness:** The Epidermis and more of the dermis are damaged. Characterized by a pale, pink or white color. The epidermis is gone and the wound is dry.
- **Full-thickness:** The epidermis & dermis are destroyed. It looks white or brown; leathery, dry, and rigid.



Burn classification

- **Superficial (like a sunburn)**



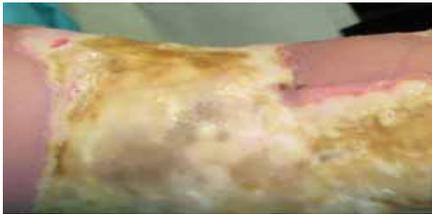
Burn classification

•Partial Thickness:



Burn classification

•Full thickness



Burn Classification



•Can you classify the burn type?

Burn classification

- Rule of Nine



Burn Center Admission Criteria (ABA)

- The ABA has strict criteria for admission to a burn center.



The History of the LAC+USC Burn Center

- The LAC+USC Regional Burn Center is part of the Medical Center which is a Level One trauma center.
- It has provided cutting edge burn care and rehabilitation for over 50 years.
- It is one of the largest Southern California Burn Centers with six ICU beds and 14 ward beds.
- It is a certified burn center.
- It is a training facility for the Navy.



The LAC+USC Burn Center

- The Burn Center team consists of a dedicated multidisciplinary team.



The LAC+USC Burn Center

- Three phases to medical management of burns
 - Emergent: 1st 72 hours after burn injury
 - Acute: After the first 72 hours and when wound healing occurs
 - Rehabilitation: After wounds are healed

The LAC+USC Burn Center

- Acute phase
 - This phase begins after the emergent phase and continues until the wound is closed, either by primary wound healing or skin grafting.
 - This phase is characterized by continued monitoring and treatment of the burn wounds:
 - Partial thickness wounds may convert to deeper wounds
 - Or they may heal on its own
 - All dependent on size of the wound(s) and health of the patient

Medical Management of Acute Burns

- Patients receive daily wound care:
 - Debridement of burned skin
 - Dressing changes:
 - Silver solutions or infused dressings
 - Hypochlorous Acid
 - Enzymatic debrider
 - Antibiotic topical ointments



Medical Management of Acute Burns

- Function of dressings:
 - Protect the wound from infection
 - Maintain contact between antimicrobial agent and wound
 - Provide comfort to patient
 - Can also provide compression for edema control.



Medical Management of Acute Burns

- A patient's burn injury, their support system, age, cognition and resources are taken into consideration when choosing appropriate dressings (i.e. if a patient is homeless with limited access to bathing facilities, a non-changing dressing may be the best choice to protect and heal the burn injury.)



Medical Management of Acute Burns

- Hospitalization is dependent on the patient’s health, wound(s), psychosocial needs, and pain level.
- If the wound requires surgical intervention...



Medical Management of Acute Burns

- Debridement involves surgically removing all the dead or infected tissues to the healthy wound bed to ensure blood flow and reduce the chance of infection.
- Skin grafting is the technique of removing healthy skin tissue from another part of the body (donor site) or other source to cover the burn wound.
- Skin grafts are surgically attached through the use of sutures, or staples, with/without fibrin glue.



Medical Management of Acute Burns

- Autografts**
 - Split Thickness (STSG): Harvested skin is taken at the level of the mid-dermal level. It is used in either sheet or meshed forms
 - Full Thickness (FTSG): Solid sheet of skin including both epidermis and dermal layers. It is used for very deep small areas.



Medical Management of Acute Burns

- **Meshed (STSG):** The mesh graft can be expanded or unexpanded. A mesh graft is used to cover large wounds, when the patient has very little donor skin sites, or to allow for the wounds to heal. A mesh graft can be expanded up to 4x its original size.
- Typical and safe size is 1:1 or 2:1
- Rarely used on the hand





Dermatome for STSG



Harvested Meshed STSG



Medical Management of Acute Sheet STSG

- A Sheet STSG is primarily used for small areas or for improved cosmesis
 - Facial burns
 - Neck burns
 - Female breast burns
 - Pediatric burns
 - Hand burns



Medical Management of Acute Burns FTSG

- Full thickness skin grafts are used to cover deep wounds or areas that require coverage of exposed tendons or musculoskeletal structures.
- Typically will be used for palmar burns



Medical Management of Acute Burns

- Skin grafting care: Intra-operatively-
 - After the graft is applied, the surgeon will apply dressings to protect the graft.
 - The dressings are protected with compressive wraps to 1. reduce edema; 2. allow the graft to adhere to the wound
 - The OT will enter the O.R. and apply splints to immobilize all joints adjacent to the graft site to protect it from shearing.





Intra-operative hand splint
Applied with compressive wrap.



Medical Management of Acute Burns

- Skin graft care, cont'd
- Post-operatively, the grafted sites will be immobilized 3-10 days. This is dependent on the health of the graft, wound, and patient.
- On the day of a surgical dressing takedown, the MDs and team assess the graft. If the graft is healthy, therapy can commence or resume. This usually occurs on POD # 5 or 7.



Medical Management of Acute Burns

- On a POD #2 dressing take down of a sheet STSG, OTs re-dress the hand with compression tape and re-apply the splint.
- This is to ensure that the graft will be protected until medically cleared to resume ROM of the UE/hand joints.
- OTs working on the Burn Unit will provide the patient with daily splint checks to ensure proper fit/placement of the splint for optimal graft protection.



**Medical Management of Acute Burns:
Sheet STSG**

POD # 2: Do you see any seromas?



POD # 5: Looking good!
Can begin ROM



Medical Management of Acute Burns

•Applying compressive tape to the hand



Anchor



Add web spacers



Medical Management of Acute Burns

•Applying compressive tape to the hand, cont'd.



Wrap fingers and hand: distal to proximal



Medical Management of Acute Burns

- Applying compressive tape to the hand, cont'd.



Volar surface



Cut slits for better function



Role of Occupational Therapist

- Member of a multidisciplinary team and larger rehabilitation family
- Expert in providing burn occupational therapy services, per American Burn Association Criteria
 - Knowledge of burn evaluation and treatment
 - Wound care assessment
 - Edema and scar management
 - Splinting and positioning
 - ADLs



Role of Occupational Therapist

- Patient advocate
- Resource for Occupational Therapists in the community
- Educator for clients, families, care-givers, other healthcare providers, and occupational therapy students
- The Cheerleader: Reminding patients how much they've improved and that they are not alone in their recovery.



Role of Occupational Therapist

- The occupational therapist has a very important role in the assessment and treatment of the burn patient in all phases of care
- The OT is present from the very beginning of the burn patient’s care.
- As soon as the patient is considered medically stable, the MD orders OT for any burn injury to the head, mouth, neck, chest, torso, upper extremities (UEs), and hands.



Role of Occupational Therapist

- Initial evaluation: Key components**
 - Diagnosis:
 - Size of burns: TBSA %
 - Level of burns
 - Type of burns
 - Location of burns
 - Any other injuries/disease process



Role of Occupational Therapist
Initial evaluation

- History of Injury/Reason for admission: How? When? Where?
- Past Medical History
- Psychosocial History
- Language/Communication
- Cognition



Role of Occupational Therapist
Initial evaluation

- Occupational Role: Treatment will be geared toward occupational role(s) and must be age appropriate
 - Infant/Toddler
 - Student
 - Worker
 - Retiree
 - Hobbies/Sports/Other meaningful activities



Role of Occupational Therapist
Initial evaluation

- ROM measurements
- Strength
- Sensation
- Edema



Role of Occupational Therapist
Initial evaluation

- Current ADL assessment:
- What can the patient do; Can't do;
- Assess OOB as best as able. Want to simulate normal ADL functioning.
- **Need to be sensitive to the patient's emotions when using the mirror if they have facial burns or to look at wounds/grafts when performing self care and dressing tasks**

Role of Occupational Therapist
Initial evaluation

- Pain levels: Use these pain scales
- Numeric score: 0-10; 0/10= no pain; 10/10 = severe pain
- Wong-Baker FACES scale” 0-10; face=level of pain
- FLACC: Used for infants and nonverbal patients
- **All burn patients have pain. It is important to know if they need to be medicated prior to treatment**

Role of Occupational Therapist
Initial evaluation

- Precautions
- Problem List
- Patient/Caregiver Goals
- Therapy Goals
- Frequency and Duration
- Discharge Recommendations:
 - Preference is normal function: **HOME**



Role of Occupational Therapist
Treatment

- Treatment consists of:
 - Exercises,
 - Positioning and or splinting,
 - ADL participation,
 - Patient and caregiver training/education...



Role of Occupational Therapist Treatment

•Expectation is Full, Functional, Normal ROM

- Non-surgical or pre-operatively:
 - AROM exercises done DAILY
 - Proximal UE -1 set of 15 reps 5x day
 - Hand: Tendon gliding & opposition- 1 set of 10 reps/hour
 - PROM: Prolonged stretch: 20-30 seconds
 - AAROM: 1 set of 15 reps 3-5x day



Role of Occupational Therapist Treatment

•Post-operatively:

- For STSG: Post-op day 5 or 7: When the patient is medically cleared to resume ROM of the grafted area...
- For FTSG/Integra: POD#10-14.
- It is imperative that the OT monitor the graft during ROM.



Role of Occupational Therapist Treatment

•Positioning and Splinting

- Very important to maintain joint ROM and prevent/minimize contractures
- Wounds heal from the wound margins towards the center of the wound.
- If wounds are over a joint it pulls the joint...
 - On the dorsum of hand: MCP joints into hyper extension
 - Over the volar wrist: wrist flexion



Role of Occupational Therapist Treatment

- Hand Extension contracture: dorsal wound will pull the MCPs into hyperextension causing a clawed hand
- Splint/Position in functional position at 20° of wrist extension
- Must maintain Intrinsic + position:
- MCPs at 70° of flexion

• Image courtesy of Performance Health



Burn/Intrinsic +



Role of Occupational Therapist Treatment

- Tight MCPs
- Overall tightness of digits



Flexion mitt



Role of Occupational Therapist Treatment

- Thumb adduction: decrease in 1st web space
- 1st web space release using Z-plasty method



Role of Occupational Therapist Treatment

- 1st web spacer options



Role of Occupational Therapist Treatment

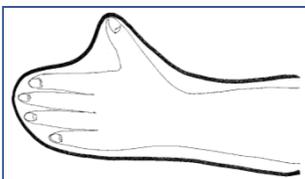
Creeping of web spaces

Consider using Web spacers



Role of Occupational Therapist Treatment

- Palmar burn splinting: Maintain arches and ability to extend MCPs...



Role of Occupational Therapist Treatment

- **Other hand contractures to consider:**
 - Pseudo mallet finger/swan neck deformity
 - Pseudo boutonniere deformity



Image courtesy of Performance Health



Role of Occupational Therapist Treatment

- **Activities of Daily Living (ADL):**
 - It is a very important part of the patient's recovery.
 - All patients are expected to perform some or most of their self care & dressing tasks.
 - Adaptive equipment is **NOT USED** unless the patient has a co-morbidity that limits their function or was using equipment at baseline.



Role of Occupational Therapist Treatment

- **Edema management:**
 - Edema is a natural part of wound healing.
 - It is very important for the OT to be vigilant in reducing edema from affected areas.



**Role of Occupational Therapist
Treatment-edema**

- Consider using an edema glove
- Or using compressive taping as a temporary measure if there are small open wounds...



**Role of Occupational Therapist
Treatment**

- Scar management:**
 - Attempt to prevent scars from becoming thick, hard, tight...The OT will begin scar management:
 - Moisturize scars
 - Perform and teach scar massage/mobilization
 - Use pressure to flatten scars
 - Use silicone gel sheet to soften and flatten scars



**Role of Occupational Therapist
Treatment**

- Compression garments:**
 - Worn 23 hours daily
 - Initially start with temporary measures to reduce edema and the appearance of scars.
 - Custom made compression garments are measured and fitted when the wounds are completely healed and patient demonstrates good ROM and no edema.



Role of Occupational Therapist Treatment



Image Courtesy of Performance Health



Role of Occupational Therapist Treatment

- **Patient and Caregiver Education include:**
 - ROM exercises
 - Splint wearing schedules/application/precautions
 - Edema management
 - Scar management
 - Sun protection and skin care



Role of Occupational Therapist

- **After care recommendations:**
 - Independence with ADLs
 - Scars continue to contract/mature up to 2 years
 - Stretching and exercises must be integrated into daily routines
 - Need for ongoing splinting and positioning
 - Psychosocial needs should be addressed
 - Cosmesis has an impact on occupational identity
 - Edema and sensory changes are ongoing



Some of our dedicated OTs



Acknowledgment

•Thank you to the following:

- Our patients and families
- LAC+USC Burn Center
- Our fellow LAC+USC OTs
- Becky Stahley, OTR/L of Performance Health



Resources

- Alisa Ann Ruch Burn Foundation (www.aarbf.org)
- American Burn Association (www.ameriburn.org)
- AOTA (www.aota.org)
- Burn Therapist (www.burntherapist.com)*
- Model Systems Knowledge Translation Center (www.msktc.org/burn/model-system-centers)
- Phoenix Society (www.phoenixsociety.org)
- Firefighters quest for Burn Survivors (www.firefightersquest.org)
- Social media: LAC+USC Medical Center.



Appendix



Hand Anatomy Review

- Muscles/Tendons:
 - Shortening/tightness**
- Extrinsic
 - -Flexors and Extensors
- Intrinsic-
 - All For One And One For All
 - A: abductor pollicis brevis
 - F: flexor pollicis brevis
 - O: opponens pollicis
 - A: adductor pollicis
 - O: opponens digiti minimi
 - F: flexor digiti minimi
 - A: abductor digiti minimi
- Ligaments*
 - Collateral ligaments**
- Cartilage
- Blood vessels
- Nerves*
 - Light touch sensation
- Skin*
 - Contractures**
 - Web space creeping**
- Lymphatics*
 - Lymphedema**
- Hair*
 - Loss of hair follicles



Hand Anatomy Review

- ARCHES IN THE HAND
- **MUST BE PRESERVED TO HAVE NORMAL HAND FUNCTION**
 - PROXIMAL TRANSVERSE: RIGID
 - DISTAL TRANSVERSE: MOBILE
 - LONGITUDINAL: MOBILE
- **WHEN THE ARCHES ARE COMPRISED, FUNCTION IS IMPACTED**
 - IMPORTANT TO INCORPORATE ARCHES INTO SPLINTS WE MAKE AND TYPE OF ACTIVITIES WE HAVE PATIENTS PERFORM



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THANK YOU