Rehabilitation of the Burned Patient:
Interventions for Edema Management Progressions and a Study of Interventions for Head and Neck Burns during the Inpatient, Rehabilitation and Outpatient Phases
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Interventions for Edema Management Progressions and a Study of Interventions for Head and Neck Burns during the Inpatient, Rehabilitation and Outpatient Phases.

Objectives

- Provide basic understanding of upper and lower extremity edema management interventions and wrappings in the burn patient.
- Provide basic to complex interventions of the head and neck mechanisms of the burn patient from the inpatient to outpatient phases.
AGENDA

8:00 – 9:00  Welcome & Business Meeting

1. Announcements
2. MAC Update
3. Abstract Manuscript Submission Updates
4. Burntherapist.com update
5. Barbara Knothe Burn Therapist Achievement Award
6. Introduction of Topics and Speakers

9:00 – 10:00 Burn Edema Management and Interventions
Dana Nakamura, OTR/L, CLT

10:00 – 10:10 Questions

10:10 – 10:30 Break – Refreshments provided by Bio Concepts, Inc.

10:30 – 11:20 Head and Neck Burns: Addressing the Acute, Rehabilitation and Reconstructive Phases
Jennifer Kemp-Offenberg, OTR/L

11:20 – 11:30 Questions

11:30 – 11:45 Break – Set up for Breakout Sessions

11:45 – 12:45 Breakout Sessions: 30 Minutes Each
Edema Management Techniques
Head and Neck Interventions

12:45 – 1:00 Questions, Final Comments and wrap up.
The BurnTherapist.com web site – is the first site dedicated to the work and endeavors of Burn Occupational & Physical Therapists in an effort to develop outcome based research and clinical improvements for all burn survivors. We are committed to fostering collaborative networking relationships among burn therapists as well as developing clinical research, treatment innovations and improvement in service delivery and care at local, national and international levels.

We also highlight the achievements of Burn Occupational & Physical Therapists as part of the American Burn Association's Occupational & Physical Therapist Special Interest Group through the yearly Barbara Knothe Burn Therapist Achievement Award. We are a resource for therapist driven research and collaboration to provide the best treatment outcomes for the patients that we serve.

Burn Clinical Pearls (formerly Splinting Quarterly)
Each Quarter (January, April, July & October) we will highlight a splinting endeavor that has been created to work with a challenging surgical intervention or as a result of a unique patient need or request. New designs as well as modifications to an existing, established design are welcomed. Post-operative splints as well as adaptive device splints, casting and any other type of ADL modification gladly are welcome. We will also be archiving all of the submissions so that we can maintain a resource of burn splinting knowledge. Contribute to the accumulated knowledge and submit your splint design to today!

Go to the web site www.BurnTherapist.com and get involved!
2016 Barbara Knothe Burn Therapist Achievement Award

Sandra Fletchall OTR/L, CHT, MPA, FAOTA

Sandra has been in practice for over 42 years in burn rehabilitation. As an active member of numerous well known professional organizations including the ABA, ASHT, and AOTA – she also holds the mantle to support and actively participates in less known but equally significant and critical organizations including the Tennessee OT Association; the International Society for Prosthetics and Orthotics; the American Academy of Orthotists and Prosthetists and the Amputee Coalition of America. She has served almost every appointed position in the Tennessee OT Legislative body including Treasurer; Legislative Committee Chair; Licensure Chairperson; Newsletter Editor; and most importantly serving as President over three separate legislative terms. In addition, she has been appointed by the Governor of Tennessee to serve on both the State’s Worker’s Compensation Advisory Panel; as Secretary to Licensure and as Board Member to the OT and PT Examiners State Review.

As similar counterpart to Barb herself, Sandra takes the work to heart and wholeheartedly gives fully to the burn survivor as well as the burn team. She has attained numerous specialty certifications across a spectrum of skills related to both burns and physical rehabilitation including upper extremity traumatic injuries; multiple segment amputees; crush injuries; spinal cord injuries; and work hardening capacity training. It is when these catastrophic injures are presented that Sandra is the most sought after resource and most comfortable in both skills and compassion to bring the burn survivor back to full function. She was so much “at ease” with rehabilitating these tragic individuals that she developed and became owner and director of a specialized work hardening practice facility dedicated to serving multiple burn and amputee trauma survivors – serving not only the individuals in her state but becoming a resource for this specialized rehabilitation service throughout the South Eastern United States. During this time, she was also a lecturer and served as adjunct faculty at both the University of Missouri and University of Tennessee on burn rehabilitation and amputee rehabilitation.

She has published 14 clinical chapters and peer reviewed articles focusing on a wide array of topics but always with the central focus on the effective rehabilitation of complex burn sequela. In addition, she has amassed 45 presentations at numerous conferences at both national and international venues including ISBI, WFOT, ABA, ASHT, and ISPO. Moreover, she has been a stalwart fixture providing lectures, education and knowledge for over 40 years at the Tennessee OT Association and over 25 years at the Southern Region Burn Conference. Notwithstanding, she has also served on numerous ABA committees including the Rehabilitation Committee and also as Co-Chair and Chair of the OT/PT SIG.

In summary, Sandra has been a resilient force and essential cog in the burn rehabilitation engine - she never waivers from her post of service and commitment to rehabilitate the burn survivor and more often serves as a constant educator and provider of optimal burn care. She is deeply rooted in the care of the burn survivor and as such highly exemplifies the high merit of standard upon which this award strives to endure and preserve in the spirit of Barb herself. Sandra is a living example of the spirit and commitment needed as a burn rehabilitation clinician.
2016 OT/PT SIG Committee

**Andria N. Agraz, PTA, CLT**
Andria is a Physical Therapist Assistant and Certified Lymphedema Therapist and has been a member of the Richard M. Fairbanks burn rehab team since 2009. Andria has worked in the areas of acute care and outpatient therapy and has been on 2 mission trips to El Salvador to promote and educate burn care and burn therapy. She is a member of the American Burn Association and really enjoys the time spent at conferences learning about new ideas and meeting the clinicians that make burn care so special. Andria has given several guest lectures to the University of Indianapolis PTA program in the area of Lymphedema and assists with the burn therapy lectures as well. In her free time she spends most days with her two daughters and reading wherever she can find a comfy spot. She is excited to be a part of the OT/PT Special Interest Group and is honored to be the current Chair.

**Jennie McGillicuddy, OT**
Jennie lives in San Diego, California but is originally from Louisiana. She completed her undergraduate degree and graduate training at Louisiana State University. She currently works at UCSD Medical Center; primarily in the Burn Unit. She enjoys the challenges that each day presents when treating those individuals with serious burns. Jennie enjoys running, cooking, hiking, yoga, and reading. She is excited to be current Co-Chair of the OT/PT SIG!

**Annick Chouinard, BSc. PT**
Annick is a physical therapist who has been a member of the burn rehabilitation team at the Montreal Burn Center Villa Medica Rehabilitation Hospital since 2003. She has an inpatient and an outpatient adult burn rehabilitation background. Annick teaches burn care and rehabilitation at the university and the post graduate level. Over the years, she has mentored and transmitted her passion for burn care to numerous students and colleagues. She has presented on various areas of burn rehabilitation at local and international conferences. She also participated with the team from the Montreal Burn Center and Helping Hand for Burn Survivors in the creation and distribution of a written guide for patients and their loved ones. Annick is an active member of the American Burn Association. She has been serving on the Rehabilitation Committee since 2014 and she is thrilled to be a co-chair of the OT/PT Special Interest Group.
**2016 OT/PT SIG Presenters**

**Dana Nakamura, OTR/L, CLT**

Dana has been in Burn care for 30+ years. Following graduation from the University of Puget Sound in Tacoma, WA, she worked at Harborview Medical Center in Seattle, WA from 1985-2006 in Rehabilitation Medicine and the University of Washington Burn Center. In 2007, Dana moved to Winston Salem, NC to establish the burn therapy program at Wake Forest Baptist Medical Center. She has been a member of the ABA since 1988; served on the MAC, ARC and Education committees and PT/OT SIG chair, and is the 2008 recipient of the Barbara Knothe Award. Dana reviews manuscripts for Burns and the Journal of Burn Care & Research. She currently serves as co-chair for the Southern Region Rehab Symposium, ABLS instructor, “It Happened in Seconds” Firefighter Burn Injury Awareness Training instructor, Phoenix Society SOAR Program Coordinator and Trainer, Victim2Victor Burn Support Group organizer and facilitator and Executive Board Member of the Piedmont Firefighter’s Burned Children’s Fund. She teaches in the OT programs at Winston Salem State University and Cabarrus College of Health Sciences. In her spare time, she enjoys knitting, crocheting, canning and crafting for her Annual Holiday Craft fundraiser for burn patient/family needs.

Dana’s research interests include edema management and complementary/alternative medicine for pain management. She is honored to be part of this year’s PT/OT SIG program, and thanks the committee for the opportunity to share knowledge and experience. Feel free to contact Dana at dynakamu@wakehealth.edu.

**Jennifer Kemp-Offenberg, OTR/L**

Jennifer is an Occupational Therapy clinician practicing for the past 21 years with her focus in hand therapy and the past 15 years of practice in both pediatrics and adult burn rehabilitation. Jenn has worked at two verified burn centers, University of California Irvine Medical Center in Orange, California and now currently at Shriners Hospitals for Children-Galveston Texas as the Manager of Rehabilitation Services. She has been an active member of the American Burn Association currently serving on the ABA Rehab Committee, AOTA and local Texas State OT Association.
BURN EDEMA

By Dana Nakamura, OTR/L, CLT
Objectives

• Discuss basic physiology in burn edema formation
• Present management strategies for early and late burn edema
• Demonstrate upper and lower extremity edema management techniques and materials/products in breakout session

Physiology

• Edema formation is an integral part of the physiological response to burn injury

• Edema develops when the rate of filtration out of microvessels is greater than flow in the lymphatic vessels

• Biphasic pattern of formation:
  – Immediate and rapid increase in water content of burn tissue in the first hour after injury
  – More gradual increase in fluid flux of both burned and non-burned soft tissue during the first 12-24 hours after injury
Hypovolemia & Rapid Edema Formation

- Unique due to extremely rapid onset as compared to other types of edema
- ALL variables change significantly in the direction required to increase fluid filtration
  - ↓ plasma volume
  - ↓ cardiac output
  - ↓ urine output
  - ↑ systemic vascular resistance resulting in ↓ peripheral blood flow
- Initial therapeutic goal is to restore vascular volume and preserve tissue perfusion to minimize tissue ischemia

Hypovolemia & Rapid Edema Formation

- Physiological conflict exists in the balance between edema process in hypovolemia
  - Edema = massive efflux of intravascular fluid to the interstitial spaces due to altered Starling forces
- Amount of edema formation in burned tissue dependent upon
  - type and extent of burn injury
  - provision of fluid resuscitation
  - type and volume of fluid administered
- As hypovolemia is treated with crystalloid infusion, edema can continue to increase

Fluid Resuscitation

- Elevates blood flow and capillary pressure, contributing to further fluid extravasation
- Without sustained IV replacement of vascular fluid losses, edema formation is somewhat limited as tissue blood flow and capillary pressure decrease
- Edema occurs when lymphatic drainage does not keep pace with the increased volume of fluid that crosses the microvascular barrier
**Physiology Review**

Starling’s Law
- Describes flow of fluid on a capillary/cellular level
- Fluid forced into the interstitial spaces from the arterial end of a capillary
  - arterial capillary hydrostatic pressure > colloid osmotic pressure
- Fluid flows into venous end of a capillary
  - venous capillary hydrostatic pressure < colloid osmotic pressure

**Pressure Gradients**
- Hydrostatic Pressure
  - Arterial capillary hydrostatic pressure 35 mmHg
  - Venous capillary hydrostatic pressure 15 mmHg
- Colloid Osmotic Pressure
  - Determined by the concentration of proteins in the blood plasma
  - Attracts fluid from interstitial space back into the vascular compartment
    - Protein molecules attract water molecules and bring back into lymphatic system
  - Approximately 25mmHg is normal in the interstitium

**Filtration & Reabsorption**
- Filtration
  - At capillary level, nutrition to cells obtained through filtration
  - Movement of water, vitamins, etc. from an area of high pressure to lower pressure across a semi-permeable membrane
- Reabsorption
  - Fluid moves from interstitium back into the venule or lymphatic by process of reabsorption or diffusion
  - Movement of a substance from areas of higher concentration to lower concentration
    - 90% of fluid that filters into interstitium is reabsorbed by the venous capillary
    - 10% is absorbed by the lymphatics
Alteration in Cellular Membranes

- Membrane depolarization may be caused by different factors in different states of shock
  - Very little known of time course of changes in membrane potential in burns
  - Don’t know extent to which altered membrane potentials affect total volume requirements and organ function in burn injury, or even shock in general

Burn Wound Edema

- Excessive amount of hydrophilic plasma protein leaks out of damaged capillaries
- Moisture accumulates with formation of opaque, gelatinous covering in base of wound
  - Contains proteolytic enzymes and other elements (bacteria, bacterial toxins, prostaglandins, necrotic debris) that all contribute to sustaining and perpetuating chronic inflammatory state

Types Of Burn Wound Edema

- Acute Edema
  - Transudate edema due to inflammatory phase of wound healing
  - Initial “soft” swelling primarily composed of water and electrolytes (serous drainage)
  - Resolves in 2-5 days

- Sub-acute and Chronic Edema
  - Exudate due to high plasma protein content
  - Slow to rebound, viscous
  - Lymphatic vessels reached maximum transport capacity
  - Should have dissipated within 2 days – 2 weeks, but remains
  - Chronic Edema — edema becoming hard, dense and eventually fibrotic
Edema Management Modalities and Techniques

• Acute Edema
  – Early positioning and elevation
    • Elevation decreases arterial hydrostatic pressure
    • Positioning and splinting
  – Bulky dressings
    • Provides counterforce to decrease excess flow of fluid into tissue
  – Gentle, limited/controlled motion of involved structures (if not contraindicated)
    • Exercise/stretching
    • Massage

• Subacute Edema and Chronic Edema
  – Use of edema reduction techniques that activate the lymphatic system to absorb macromolecules
    • Compression — bandaging, garments/devices, splinting
    • Manual Edema Mobilization
    • Manual Lymphatic Drainage
    • Skin Taping

Elevation and Positioning

• Efficient position = slightly above heart level
  – Higher elevation does not further enhance removal of excess fluid
  – For every incremental elevation of body part there is an incremental decrease in arterial perfusion pressure
Dressings/Bandages

• Purpose of dressings
  – Absorption of drainage
    • Absorbent dressing or semi-permeable dressing that allows evaporation of transudate
    • Thickness of dressings = amount of drainage present
  – Protection of wounds
  – Pain management

Dressing Types

Topical agents
  • Ointments and fine-mesh or porous-mesh impregnated gauze
  • Topical antimicrobial agents with coarse mesh gauze
    – Burn dressings ~20 layers thick
    – Gauze bandages (kerlix and sof-kling)

Biologic wound dressings
  • Cadaver allograft, xenograft, allogenic amnion

Hydrocolloid dressings
  • Powders, wafers, pastes that provide moist environment for healing

Synthetic or biosynthetic and silver impregnated dressings
  • Selection based on present condition of wound and expected outcome
  • Advantages → less pain, less pain medications, shorter wound healing time, improved patient compliance, lower costs

Post-op Dressings

• Large bulky dressings
  – Enough pressure to stop bleeding at grafts and donor sites
  – Some Burn Centers utilize outer wrap of aces or coban
  – If applied too tightly OR edema develops after dressings applied, may cause increased pressure to grafts/donor sites

• Negative Pressure Wound Therapy (NPWT = V.A.C.)
Activation of Lymphatic System

- Manual Edema Mobilization (MEM)*
  - A multi-faceted treatment method of lymphatic vessel stimulation to mobilize high protein edema in an overloaded lymph system
- Complete Decongestive Therapy (CDT)
  - Treatment method for movement of lymphatic fluid in a damaged lymph system
  - Combination of manual lymph drainage, compression, decongestive exercises and skin care

*Developed by Sandra Artzberger, MS, OTR, CHT
Email: artzberger@nconnect.net

Manual Edema Mobilization

- Manual therapy technique: "massage"
- Specific exercise program before and after each segment of massage, and at end of treatment
- Follow lymphatic pathways and re-route congested lymph to uninvolved areas
- Incorporate traditional edema control methods
- Home self-management program
- Low stretch bandaging when necessary

Manual Edema Mobilization

- Purpose: To decongest the normal
  - Application to patient having persistent high protein edema with intact, but overwhelmed nodes and lymphatic system
  - NOT designed for person with lymphedema or lymphadenectomy
Contraindications for MEM

- Infection – potential to spread the infection
- Inflamed areas – potential to increase the inflammation and pain
- Hematoma/blood clot – potential to dislodge the clot
- CHF/severe cardiac problems – potential to overload the cardiac system
- Acute wound healing (inflammatory stage) – potential to disrupt the “clean up” process
- Renal failure, liver disease – potential to overload systems
- Active cancer, lymphoma – potential to spread the cancer
- Primary or secondary lymphedema – needs more involved manual lymphatic drainage and re-routing of fluid to other parts of body
- Caution: Pregnancy, Hypertension

Manual Edema Mobilization

- Treatment techniques will be demonstrated in Breakout session

Complete Decongestive Therapy

Four Components of CDT:
- Manual Lymph Drainage (MLD)*
- Compression Therapy
  - External support to prevent re-accumulation of fluid into tissues
  - Short-stretch bandages and compression garments or combo of both
- Decongestive Exercises
  - Exercise beneficial to ↑ muscle strength, ↓ resting heart rate, ↑ strength in bone, tendons and ligaments, ↓ decrease body fat
  - Active exercise beneficial to increase blood capillary permeability, filtration and lymphatic load of water
  - Most beneficial when compression garments/bandages used on affected limb
  - Gradual progression of exercise imperative
  - Exercise program prescribed to fitness level
- Skin and Nail Care
  - Meticulous care of skin and nails is essential to prevent infection
  - Any defect in skin, from trauma, heat or other causes, can be entry site for bacteria
Complete Decongestive Therapy

- **Manual Lymph Drainage (MLD)**
  - Four basic strokes: stationary circle, pump, rotary, scoop
  - Strokes applied in two phases
    - **Working** phase (light directional pressure sufficient enough to stretch the subcutaneous tissue against the underlying fascia to its elastic capacity)
    - **Resting** phase (pressure released and the elasticity of the skin moves the therapist’s hand passively back to the starting position)
  - NOT “massage” → traditional massage (“to knead”) can have negative effects on lymphedema including active hyperemia due to histamine release (↑ blood capillary pressure and capillary filtration, results in more water accumulating in tissue spaces, overloading already stressed or impaired lymph system)
  - Certification as CLT for evaluation/treatment

Compression Therapy

- Prevents re-accumulation of evacuated lymph fluid
- Increases tissue pressure
- Improves venous and lymphatic return
- Improves the effectiveness of the muscle and joint pumps during activity
- Fibrinolytic: helps to break up and soften deposits of connective tissue and scar tissue
- Compensates for lost skin elasticity

Compression Therapy

- **Low Stretch Bandages**
  - Resistive Force
  - Low resting (when no muscle contraction) and high working force (when muscle contracting)
  - Cohesive dressings --- Coban, CoFlex
  - Lymphedema dressings --- Comprilan, Rosidal, Elastomull, Tricofix
Compression Therapy

• High Stretch Bandages
  ◦ Compressive Force
  – Low working pressure and minimal resistance during exercise
  – High resting pressure may produce tourniquet effect while resting
  – Potential to exert too much force and collapse the lymphatics as bandages stretch with contracting muscle and relax with relaxing muscle
  – Too much pressure can be exerted during relaxation phase
  – Ace bandages

Compression Therapy

• Other compressive bandages/devices
  – Tubigrip/Tubiflex
  – Edema glove
  – Dome Paste bandage
  – Casting/splinting

• Foam inserts, gel sheets, chip bags --- benefit of building up neutral warmth to reduce induration
  – NOTE: first notable change will be softening of edema and pain reduction, THEN girth reduction

Compression Therapy

• To glove or not to glove?
  – LIGHT compression with a loose elastic glove okay (can pull at least 1/8” away from fingers)
    • Prevents refill and stimulates lymphatic uptake and flow every time patient contracts muscle
  – HARD compression will collapse the lymphatics = no protein re-absorption
    • With hard compression, just squeezing out fluid into adjacent interstitial spaces and therefore no protein absorption
    • Protein molecules remain in the interstitium and one function of these macromolecules is...to absorb water = re-swelling!
Kinesio Taping® Method
• Kinesio Taping® Method developed by Dr. Kenzo Kase in 1979 after 6 years of clinical development
  – From 1979-1981, invented Kinesio Tex Tape, specially for the Kinesio Taping® Method
• Therapeutic taping method using uniquely designed elastic tape
  – Enhances the function of different tissues and physiologic systems
  – Can be applied and worn for extended periods with continued therapeutic benefit between therapy visits

Kinesio Taping® Method
• Helps body return to homeostasis
• Appropriate for any stage of treatment
  – Acute, Subacute, Rehabilitative, Chronic
• Advantages of use:
  – Allows normal ROM
  – Effect of tape changes with different applications
  – Can be worn 3-5 days with good skin tolerance
  – Effective treatment between therapy visits
  – Economical treatment modality
  – Safe for all populations
    • Infants, geriatrics, chemotherapy patients, burns

Kinesio Taping® Method
• Unique qualities of Kinesio Tex Tape
  – Constructed of 100% cotton and elastic fibers
  – Applied to substrate paper with 10% stretch
  – Elasticity is 40-60% of its resting length
  – Stretches along longitudinal axis only
  – Thickness and weight are similar to skin
  – Adhesive is 100% medical grade, acrylic and heat-activated
    • Micro-grip deep set adhesive provides better grip with less surface area
  – No medication in tape
  – Latex free and Hypoallergenic
Kinesio Taping® Method

- Five Major Physiological Systems affected
  - Skin
  - Fascia
  - Circulatory/lymphatic systems
  - Muscle
  - Joint

Basic Tape Terminology

- **Target Tissue**: Tissue that requires treatment

- **I Strip**: Solid strip of tape, may be cut to length and width of target tissue
  - Tape cut to mirror the muscle to which it will be stuck
  - **Y Strip**: Tension is dispersed through and between two tails over target tissue
  - **X Cut**: Tension focused directly over target tissue and dispersed through tails at each end
  - **Fan Cut**: Tension is dispersed over target tissue through multiple tails

Basic Tape Terminology

- **Anchor**: Beginning of application; *no tension*
- **Ends**: Last part of tape that is laid down; *no tension*
- **Base**: Tape beyond anchor. *Stretched portion of tape between anchor and end. “Therapeutic Zone”*

- **Proximal**: Attachment closes to midline of body *(origin)*
- **Distal**: Attachment furthest from midline *(insertion)*
Kinesio Taping® Method

• Treatment techniques will be demonstrated during Breakout session

Questions?

Thank you!
References


Edgar DW, Briffa NK, Cole J, Wood FM. Whole arm water displacement volumetry is a reliable and sensitive measure: a pilot to assess acute postburn volume change. J Burn Care Res. 2014 Dec 10 Epub.


Shimizu S etal. Burn depth affects dermal interstitial fluid pressure, free radical production and serum histamine levels in rates, J Trauma, 2002.


Courses completed by speaker:
MEM in Burn Rehabilitation
OT/PT Special Interest Group
Sandy Fletchall, OTR, CHT, MPA
Chicago, IL 2002

Manual Edema Mobilization of the UE
Sandra Artzberger, OTR, CHT, MS
Covington, WA 2003

The Lebed Method© Focus on Healing
Shelly Lebed-Davis, Founder
Puyallup, WA 2005

Academy of Lymphatic Studies
Lymphedema Certification Course
Boca Raton, FL 2005

KT1: Fundamental Concepts of the Kinesio Taping® Method and KT2: Advanced Concepts and Corrective Techniques of the Kinesio Taping® Method
KinesioTaping Association International, Monroe, NC
HEAD AND NECK BURNS: ADDRESSING THE ACUTE, REHABILITATION AND RECONSTRUCTIVE PHASES

By Jennifer Kemp-Offenberg, OTR/L
Lecture Objectives:

1. Review basic physiology and anatomy of the face and neck
2. Outline EBP & therapeutic interventions for face and neck burns:
   • Acute Phase
   • Rehabilitation/Outpatient Phase
   • Reconstructive Phase
3. Provide non-surgical management through splinting
4. Describe various surgical reconstructive interventions for face and neck burns
5. Recognize common challenges encountered in pediatric and adult burn care
Burn Injury Incidence

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- In 2014, total of reported burn injury cases by age = 203,422
- Children ages 0-16 years = 28% of reported burn injuries
- Adult ages 20-60 years account for 54% of reported burn injuries

Burn Injury by % TBSA

- Reporting partial and full thickness burns
- Total number = 178,186 burn survivors (excluding 25,236 patients with missing or unknown data)

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Anatomy/Physiology Review of the Face/Head:
Facial Expressions:

**Epicranius Group**
(Movements include)
- Glancing upward (raise eyebrows)
- Facial expression of surprise

**Orbital Group**
(Movements include):
- Opening eyelids
- Closing eyelids
- Squinting eyes

**Nasal Group**
(Movements include):
- Wrinkle nose
- Flaring of external nares
Anatomy/Physiology Review of the Neck and Shoulder:

Acute Management of Face/Neck Burns

Acute Admission Assessment:
• Distribution of burn
• Degree of burn depth for facial/neck involvement
• Potential risk for functional impairments:
  1. facial/neck scar contractures
  2. structure deformities
  3. hypertrophic scar formation
• Assess facial edema

Optimal Positioning Regimen:
- Neck in midline
- Positioned in 10° - 15° of extension
- Head above level of the heart
- No use of pillow
- Towel roll behind shoulder-scapular region
Acute Management of Face/Neck Burns

Patient & family education regarding the prevention of facial/neck contractures:

- Early pressure application
- Active exercises
- Passive exercises
- Scar massage
- Splinting

Pressure Application:
- Pressure for the face through a mask & neck through a splint
- Gentle pressure with application of soft mask when wound closure not achieved

(Phoֹ inserted)

Active Exercises:
- Initiated acute phase
- At 3 to 5 days post-operatively or by physician recommendation
- Affected areas by burn injury and identified cutaneous functional units related to development burn scar contracture
- Daily with multiple performances of detailed exercise program
Acute Management of Face/Neck Burns

- Neck Extension Exercises
- Neck Flexion Exercises
- Neck Rotation Exercises
- Neck Lateral Flexion Exercises
Acute Management of Face/Neck Burns

**Passive Exercises:**
- Initiated acute phase
- Passive stretching exercises to mouth, eyelids, cheeks
- Affected areas by burn injury and identified cutaneous functional units related to development burn scar contracture (Richard R, et al., J Burn Care Res 2009;30:625-631)
- Daily performances of detailed program

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**Scar Massage:**

**Benefits of scar massage:**
1. Decreases pruritus
2. Improves mobility of tissue
3. Softens underlying tissue
4. Improves lymph drainage in scar tissue
5. Decreases pain to scar region

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3 basic scar massage technique concepts:
1. **Depth**
2. **Pressure**
3. **Movement**
Acute Management of Face/Neck Burns

Splinting:
- Initiated acute phase

- Types of splints initiated:
  - Soft neck collar
  - Hard neck orthosis
  - Mouth splint (static or dynamic)
  - Ear conformer

Rehabilitation/Outpatient Management of Face/Neck Burns

- Initial Assessment of Facial/Neck Burns:
  - Scar appearance/hypertrophy formation
    (MVSS, POSAS, tonometer or outcome measurements)
  - Scar contractures or deformities present
    Areas of potential scar contracture formation
  - Limitation in mobilization of joints
Rehabilitation/Outpatient Management of Face/Neck Burns

Initial Assessment of Facial/Neck Burns:

- Facial measurements:
  1. Eye opening/closure
  2. Mouth opening/closure
  3. Mouth closure with neck extension

- Patient education

Rehabilitation/Outpatient Management of Face/Neck Burns

Patient & family education regarding the prevention of face/neck contractures:

- Pressure application

- Active exercises

- Passive exercises

- Scar massage

- Splinting

Rehabilitation/Outpatient Management of Face/Neck Burns

• **Pressure Application**
  • Indicated deep partial thickness or full thickness face/neck burn injuries
  • Applied following adequate wound closure

  • Types:
    1. Custom transparent face mask
    2. Pressure garments
    3. Custom silicone mask
    4. Silicone or non-silicone gel inserts
    5. Silicone or non-silicone gel inserts with pressure garment
    6. Hard neck orthosis
    7. Community Reintegration including Make-up Program
Rehabilitation/Outpatient Management of Face/Neck Burns

Transparent Silicone Lined Face Mask

Rehabilitation/Outpatient Management of Face/Neck Burns

Non-silicone gel inserts with pressure garment

Rehabilitation/Outpatient Management of Face/Neck Burns

Custom Silicone Mask
Rehabilitation/Outpatient Management of Face/Neck Burns

- **Active Exercises**
  - Mouth/lip movements
  - Eye movements
  - Cheek movements
  - Neck mobility
  - Shoulder mobility

- **Passive Stretching Exercises**
  - Manual horizontal or vertical stretching
  - Stack of tongue blades
  - Circumferential stretching via "Ocke"
  - Mouth splint

- **Scar Massage**

  - Assess scar characteristics of:
    - Face (Eye/Nose)
    - Mouth (upper/lower lips, commissures)
    - Neck (anterior, posterior & lateral aspects)
    - Shoulder/Chest
Rehabilitation/Outpatient Management of Face/Neck Burns

• Splinting
  • Mouth Orthoses
    • Circumferential
    • Vertical
    • Horizontal
  • Neck Orthoses
    • Anti-Torticollis
    • Neck Extension Collar
    • Neck Flexion Collar
    • Watusi Collar
Rehabilitation/Outpatient Management of Face/Neck Burns

Community Reintegration
Skin Care / Make-up Program
School Re-Entry Program

Reconstructive Management of Face/Neck Burns

Non-Surgical Management

Reconstructive Management of Neck Burns

Surgical Management

Skin Grafting ± Dermal Template
Tissue Expander (TE)
Interpositional Skin, MC or FC Flap
Z-plasty or Modified Z-plasty
Modified MC or FC Z-plasty
Alias % FC or MC Z-plasty
Micros with Distant Skin Flap Transfer
Reconstructive Management of Face/Neck Burns

Tissue Expander (TE) Technique

March 2010

January 2012

Reconstructive Management of Face/Neck Burns

Surgical Management

Interpositional Skin Flap Technique

alias Modified Z-plasty Technique

alias ¾ Z-Plasty Technique

Reconstructive Management of Face/Neck Burns

Surgical Management

Interpositional Skin MC or FC Flap Technique

Z-Plasty or Modified Z-plasty Technique
Reconstructive Management of Face/Neck Burns

Upper & Lower Eyelid Deformities
- Ectropion
- Endotropion

Surgical Management:
Nasolabial skin flap
FTSG

Challenges in Pediatric Patient Burn Care
- Challenges present throughout the continuum of care:
  - Parents understanding of intervention importance/compliance
  - Compliance for garments/splints/exercise program
  - Tolerance of scar massage (pain/itch)
  - Integration into ADL’s and play
  - Self image and physical appearance
  - Return to school

Challenges in Adult Patient Burn Care
- Lack of compliance with home program
- Pain and itching
- Lack of follow-up
- Lack of funding for continuum of care
- ADL/IADL performance
- Return to work
Conclusion

- Burn injuries sustained to the face and neck also need to account for the functional movement of the shoulder in rehabilitation
- Early intervention when addressing face and neck is a necessity for improved outcomes for pediatric and adult burn survivors
- Along the continuum of care: function, cosmesis and psychological aspects of the individual need to be a focus of care
- Need further studies with large sample sizes to describe the difficulties and effectiveness of various therapeutic interventions

Questions??

References

Data from the ABA National Burn Repository® 2015 Report, database Version 11.0.
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