Child Life Specialists & Music Therapists: Vital Members of the Interdisciplinary Burn Team

**Saturday, November 5**
**7:30 - 7:45 am**

**Author and Co-authors:**
Beda Willis, MS, CCLS; Doreann Dearmas, ARNP; Carl Schulman, MD, PhD, MSPH; Stephanie Epstein, MM, MT-BC, NICU-MT; Beth Behr, BS, CCLS; Heather Mahony, BA, CCLS
University of Miami, Jackson Memorial Hospital Burn Center, Miami, FL

**Objectives:**
Upon completion of the lecture, attendees should be better prepared to:
- Explore the benefits of an interdisciplinary medical approach in burn care that includes Child Life and Music Therapy
- Discuss the unique services that Child Life and Music Therapy can provide to meet the complex needs of pediatric burn patients
- Demonstrate positive outcomes based on a case study including improved compliance with medical treatments and rehabilitation, developing and utilizing positive coping skills, and improving caregiver participation on medical care

**Abstract:**
Introduction: The American Academy of Pediatrics (AAP) defines patient and family centered care as “an innovative approach to the planning, delivery, and evaluation of health care that is grounded in a mutually beneficial partnership among patients, families, and providers that recognizes the importance of the family in the patient’s life” (2012). Since the 1920s Child Life Specialists (CCLS) have advocated for parent participation in the course of their child’s care which is now the basis for family centered care. Today, CCLS use a broad range of mechanisms to achieve these goals to include preparation, education, self-expression activities, emotional support for families, and facilitating developmental opportunities. Specialized services provided by Music Therapists (MT) also support patient & family centered care through the use of music and music based interventions. Board Certified Music Therapists (MTBC) address and achieve nonmusical goals, such as improving cognitive, speech and language, and physical/motor skills, improving emotional expression, developing and utilizing coping skills, and decreasing pain perception. It is the availability of these services in pediatrics that further advances patient & family centered care. At an ABA verified Burn Center, pediatric burn patients remained on the adult units until January 2014, after which they were transitioned into the mainstream pediatric population. This case study examines the implementation CL and MT services since this time. Patient S., a two year old female who suffered 41% total body burns which was then complicated by overwhelming sepsis. This complication led to significant burn wound progression, causing the loss of her left lower extremity and all digits on both lower and upper extremities. Surgeries, complications, and rehabilitation thereby resulted in a prolonged nine month hospitalization. This case study follows S’s hospitalization through admission, the pediatric intensive care unit (PICU), the general pediatric unit, inpatient rehabilitation, and discharge.

Objectives: Collaborating with physicians, nurses, physical therapists, occupational therapists, psychologists and other medical staff, the CCLS and MTBC provided patient & family centered care to decrease pain perception, increase compliance during medical treatments as well as PT/OT goals, increase understanding of the diagnosis and medical treatments, develop and utilize positive coping skills, prevent caregiver burnout, and address ongoing psychosocial needs of the family.

Method: Throughout the hospitalization, two CCLS and one MTBC provided a variety of services. CCLS provided ongoing developmental needs assessment, establishment of a daily schedule, and co-treatment to address psychosocial needs of the patient and family with the Psychology team. MTBC also provided assistance with deep breathing exercises, musicassisted relaxation, instrument playing, singing, & songwriting. Other interventions provided included the use of burn dolls for teaching, Fisher price medical kits for medical play, age appropriate videos, iPad use, and water play for bath time. These interventions also encouraged caregiver
participation, education of diagnosis/care, and served as a platform to allow caregivers to ask for help and address feelings of distress and hopelessness.

Findings: Issues most concerning in this case pertained to dressing changes, pain tolerance, long term hospitalization, & parent education. Through CL and MT interventions, S. was able to tolerate dressing changes, debridement, and PT/OT as shown by decreased negative behavioral outcomes (i.e., crying, screaming, noncompliance). Patient S. was also able to engage in and utilize positive coping skills including self soothing techniques (i.e., closing eyes, deep breathing, taking breaks and then reengaging when ready), and redirect to preferred activities during painful or difficult treatments or therapies, such as singing, playing instruments, blowing bubbles, or drawing. An additional outcome of interdisciplinary collaboration for S. increased caregiver participation in the patient’s medical care and treatment, as well as providing opportunities for caregiver child bonding. Based on observations, pictures and videos, and feedback from staff and family, CL and MT interventions improved the patient’s ability to comply and cope with medical treatments and long term hospitalization.

Conclusions: The inclusion of pediatric burn patients within the mainstream pediatric population has allowed this unique patient population to receive the compulsory medical and psychosocial care specialized for their inimitable needs. This case study demonstrates the positive observations between CL/MT staff, patient, family, and the burn team. It is advocated that CL and MT services become standard protocol for pediatric burn care to establish an interdisciplinary medical team equipped to address and meet the complex needs of these patients and families.

Disclosure: Beda Willis - No Relevant Financial Relationships to Disclose  
Doreann Dearnas - No Relevant Financial Relationships to Disclose  
Carl Schulman - No Relevant Financial Relationships to Disclose  
Stephanie Epstein - No Relevant Financial Relationships to Disclose  
Beth Behr - No Relevant Financial Relationships to Disclose  
Heather Mahony - No Relevant Financial Relationships to Disclose
Introduction: Severe burn injuries to the neck frequently present a therapeutic challenge to burn rehabilitation therapists as they may result in severe scar hypertrophy and contractures. These injuries seen in the pediatric patient population are of particular challenge due to patient poor compliance and continued growth. Physical therapy (PT) in the burn setting promotes strengthening of local musculature as well as maintaining available range of motion (ROM). Neck scar management interventions include compression garments, massage, exercise, gel inserts and orthotics/splints. Splinting provides direct pressure while maintaining proper positioning across a joint in order to prevent contractures and limit overall scarring.

When full neck ROM is not maintained, scarring may lead to banding and a loss of the neck's natural contour. Conventional thermoplastic neck orthotics have been used to maintain neck position and provide pressure to maturing scars, but they are rigid and limit functional mobility. The Multi-Ring Watusi Collar is a flexible neck orthotic that allows mobility and provides circumferential pressure to the neck. At our burn center, the Multi-Ring Watusi Collar is used in conjunction with a gel insert that consists of a mineral oil based polymer used to moisturize scar tissue and increase skin pliability. The purpose of this single patient retrospective case review was to identify and describe characteristics associated with the prevention, development, and treatment of neck contractures which included the use of Watusi Collar/gel in the pediatric patient population.

Methods: We conducted a retrospective chart review of a 3 y/o male patient that sustained a 13% TBSA deep partial and full thickness thermal burn injury with 7% full thickness on admission. Burn injury areas included: right side of face, ear, cheek along the mandible area extending to the right neck and anterior neck, anterior trunk (mostly on the right side of the chest to the R shoulder and R upper arm). The patient was treated with multiple interventions including surgery, laser therapy, PT, and various orthoses, which included Watusi Collar/gel, to prevent or decrease the progression of neck contracture.

Medical records were reviewed with historical data points recorded that included: demographics, burn admission information, neck contracture notations as well as intervention information, and patient status at last contact.

Results: Hospital course included standard of care debridement with excision and grafting, with 5 additional surgical procedures with discharge at 3.5 weeks. The patient received multiple orthotic interventions including a neck bolster, soft collar, and thermoplast orthotic. While an inpatient, PT and nursing made an effort to keep the patient’s neck extended and monitored for pressure points.

At first follow up visit, PT was prescribed 34x per week for 8 weeks with manual stretching to R shoulder and neck as beginning of contracture was noted. The patient was fit with two Watusi...
collars/gel to properly position and increase pliability of scar on neck. On subsequent follow up, scar banding and contracture was noted and the patient was provided a third Watusi collar and chin strap for added compression and promotion of neck extension. Outpatient PT was initiated in the patient’s home state. The next several follow up visits revealed noncompliance as the patient was not wearing the three Watusi collars, gels, or chin strap. Although PT and independent home exercises were ongoing, the patient was not meeting compliance and functional goals.

The patient underwent multiple reconstructive and release surgeries to his neck with additional laser treatments as well.

Conclusion: In this pediatric patient case as well as many pediatric burn patients, the postoperative management of full thickness burns of the neck can be a challenge for physical therapists due to compliance and patient growth. Despite the various interventions currently available to minimize scar hypertrophy and contracture, regaining full neck ROM and function with minimal scarring remains difficult. Early intervention with Watusi Collar/gel is a reasonable approach in the prevention or treatment of neck contractures in order to produce good functional outcomes at the completion of burn rehabilitation. Further research in this area is warranted.

Disclosure: Megan Mobley - No Relevant Financial Relationships to Disclose
R. Fred Mullins - No Relevant Financial Relationships to Disclose
Richard J. Cartie - No Relevant Financial Relationships to Disclose
A Collaboration of Disciplines Creates a Customized, Reproducible Neck Collar for the Treatment of Burn Scar Contractures and Accompanying Electronic Applications for Measuring Outcomes

| Author and Co-authors | Katherine Bale, OTA; Erin Graham  
<table>
<thead>
<tr>
<th></th>
<th>North Carolina Jaycee Burn Center, UNC Health Care, Chapel Hill, NC</th>
</tr>
</thead>
</table>
| Objectives            | Upon completion of the lecture, attendees should be better prepared to:  
|                       | - Recognize the potential benefits of collaborating with students in other degree programs to solve problems  
|                       | - Understand how to use a 3D printed mold to fabricate a foam neck collar  
|                       | - Recognize uses and benefits for electronic tablet applications for measurements of human movement, not limited to the neck |
| Abstract              | Neck contractures from burn injuries are frequently an area of concern for Occupational Therapy (OT) staff in the Burn Intensive Care Unit (BICU) and in outpatient clinic at the North Carolina Jaycee Burn Center. In our quest for an alternative to current orthotic devices used to address this problem we became engaged with the biomedical engineering (BME) students here at the University of North Carolina (UNC). We needed a flexible collar that allowed freedom of movement for cervical rotation and stretching, while providing adequate pressure to the neck burns to prevent burn scar contracture, loss of function and decreased mobility.  
|                       | The BME student group chose to focus their senior project on this issue. Over the course of the academic year for 2015-2016 the BME students and OT staff of the UNC Jaycee Burn Center worked together to find a functional solution. We began by framing the problem and identifying the needs we had. The students and OT staff met almost weekly to review progress made and changes needed, as well as next steps.  
|                       | The result of this interesting collaboration is a new 3D printed mold which allows repeated foam neck collar fabrication with integrated strapping system and two electronic tablet based applications for measuring ROM and neck curvature outcomes.  
|                       | Future presentations will present the results achieved and indications for future research. |

Disclosure:  
Beth Bale - No Relevant Financial Relationships to Disclose  
Erin Graham - No Relevant Financial Relationships to Disclose
Surgical Techniques for Neck Contractures, a Burn Center’s Experience

**Author and Co-authors:** Harris S. Mir, MD¹; R. Fred Mullins, MD²; Rizal Lim, MD³; Patricia S. Graham⁴; Cara C. Joseph⁴

¹Kendall Regional Medical Center, Burn and Reconstructive Centers of Florida, Miami, FL
²Joseph M. Still Burn Center at Doctors Hospital and Burn and Reconstructive Centers of America, Joseph M. Still Research Foundation, Augusta, GA
³Kendall Regional Medical Center, Miami, FL
⁴Joseph M. Still Research Foundation, Augusta, GA

**Objectives:** Upon completion of the lecture, attendees should be better prepared to:
- Discuss the complication of neck contractures following severe burns
- Share our experience of reconstructive efforts to alleviate and/or resolve neck contractures.

**Abstract:**

Introduction: Burn related injuries remain one of the most common injuries worldwide. Management of burns to the neck, especially those of second and third degree, pose greater challenges to burn surgeons due the anatomical locale of the burn. A common complication, secondary to neck burns, is contracture. Neck contractures present the potential to hinder functionality such as eating, speaking, and maintaining proper range of motion. Functionality is not the only compromised aspect of the patient’s physical recovery, neck contracture requiring reconstructive procedures can result in untoward aesthetic outcomes.

Due to the advances in burn wound healing and treatment, the mortality rate of severely burned patients has significantly decreased and therefore results in an increase in percentage of patients living with neck contractures. Various methods both surgical and nonsurgical are available to treat severe neck contracture. Skin grafting, the most common method, and is highly advocated by burn surgeons. Full thickness skin grafts (FTSG) are favored over split thickness skin grafts (STSG) due to superior results in functionality and aesthetics. Although favored, cons of FTSG are that a large supply from donor sites is not always readily available and retrieval of the nonburned donor skin can often leave large scars.

Skin flaps are a more complicated type of skin grafting that is utilized when blood vessels, fat, and occasionally even muscle need to be moved from the donor site to the injured location. Neck contractures treated by skin flaps often result in poor cosmetic outcome; however, liposuction can aid in contouring the donor skin on the injury site.

Methods: We present our case experience of ten patients (6 males, 4 females) that were admitted to our burn center for management of various degrees of neck contractures. We will report demographics, surgical procedures both acute and reconstructive, and outcomes.

Conclusion: Burn injury is a serious and constant threat internationally and neck contracture is an unfortunate sequela of serious burns. We hope to share our experience of both traditional and individualized approaches for management and resolution of neck contracture. Burn and reconstructive surgery is ever evolving, dissemination of gained knowledge from experience can lead to continued research for optimal functionality and cosmesis in regards to neck contractures.

**Disclosure:**

Harris S. Mir - No Relevant Financial Relationships to Disclose
R. Fred Mullins - No Relevant Financial Relationships to Disclose
Rizal Lim - No Relevant Financial Relationships to Disclose
Patricia S. Graham - No Relevant Financial Relationships to Disclose
Cara C. Joseph - No Relevant Financial Relationships to Disclose
Introduction: Neck burns pose a challenge to the burn and reconstructive surgeon as the thin anterior neck skin is uniquely prone to flexion contracture and hypertrophic scarring. Current literature mainly focuses on reconstructive techniques including dermal matrices, vacuum assisted closure therapy, pedicled fasciocutaneous flaps, and free flaps in the treatment and reconstruction of head and neck wounds; there is little written about initial neck burn management and outcomes. The purpose of this study is to characterize the epidemiology, treatment, and outcomes of neck burns at a single burn center.

Methods: This is a retrospective review of the burn registry database at an ABA verified burn center over an 18 month period. Inclusion criteria were all pediatric and adult patients presenting with neck burns during the study period. Exclusion criteria were inadequate or incomplete documentation, loss to follow up, friction burns, or death prior to documented healing. Datapoints included age, sex, burn mechanism, burn size, burn degree, skin-grafting, time to healing, length of follow up, documented functional limitations, hypertrophic scarring, and need for reconstructive procedures.

Results: During the study period, 163 neck burns were evaluated; 73 were included, while 90 were excluded. Of the 73 included cases, ages ranged from 5 months to 92 years (average=33) in a 66% male, 70% Caucasian group. The average TBSA was 7.5±7.2%, with the most frequent mechanisms being scald (37.0%) and flame (35.6%) burns. Average neck burn percentage was 0.55±0.42%, with the anterior neck being burned in 87.7% of cases. Burn degree was predominantly second degree (87.7%), with fewer third (11.0%) and first degree (1.3%) burns. Second and third degree burns were initially treated with bacitracin/polymyxin B (57.0%) or petroleum jelly (43.0%). Average time to healing was 21.0 days for second and 25.8 days for third degree burns. The average follow up period for the study group was 127.0 days. At the end of follow up, four individuals (5.5%) continued to experience cervical range of motion limitations and hypertrophic scarring, of which three received skin grafting. Six individuals (8.2%) experienced hypertrophic scarring without functional limitations, and four of these seven patients (5.5%) subsequently received triamcinolone acetonide injections. Six individuals (8.2%) underwent grafting, with two allografts, one xenograft, and three immediate split thickness sheet grafts. All three individuals initially receiving xenograft/allograft experienced cervical range of motion limitations, while the autografted individuals did not experience these types of limitations. All three individuals initially receiving xenograft/allograft went on to experience various degrees of hypertrophic scarring, while one individual initially autografted experienced hypertrophic scarring.

Conclusion: The majority of neck burns heal without cosmetic or functional consequence. While neck burns receiving autograft healed well in this study, deeper burns that required twostage grafting have a high incidence of hypertrophic scar formation and subsequent limitations of movement. The use of dermal substitutes or alternatives to current acute burn surgery techniques for this population should be considered to optimize long term outcomes.

References and Resources:
ii. Shridharani SM. et al. A systematic review of acellular dermal matrices in head and neck reconstruction.
<table>
<thead>
<tr>
<th>Disclosure:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alap Patel - No Relevant Financial Relationships to Disclose</td>
</tr>
<tr>
<td>Franca Kraenzlin - No Relevant Financial Relationships to Disclose</td>
</tr>
<tr>
<td>Derek Bell, MD - No Relevant Financial Relationships to Disclose</td>
</tr>
</tbody>
</table>

The Use of Methadone Plus Gabapentin as a Multimodal Pain Regimen Compared with Traditional Pain Management Protocols in Burn Patients: A Retrospective Study

Saturday, November 5
8:45 - 9:00 am

Elmira Ahnood, BS, Student; John Griswold, MD; Sharmila Dissanaike, MD; Mohanad Elshiekh, MD; Jennifer Kesey, MSN, RN, FNP-BC, CWS
Texas Tech University Health Sciences Center, Timothy J Harnar Burn Center, Lubbock, TX

Objectives:
Upon completion of the lecture, attendees should be better prepared to:
- Understand of the pathophysiology of pain
- Describe side effects in the ICU of traditional Morphine/benzodiazepine pain management programs

Abstract:
Introduction: Traditional means of pain control in burn patients has typically been opioids, mainly morphine. Most common opioids have multiple side effects that include reduced GI motility, nausea, vomiting, tube feeding intolerance, urinary retention, sedation, and delirium. Methadone on the other hand, although a very adequate pain reducing medication, has minimal opioid like side effects. In addition, gabapentin, a neuropathic pain reduction pain medication potentiates the action of Methadone and in combination improves overall pain management, again without many side effects. Finally, the use of this regimen is less costly, and is thought to help shorten length of stay.

Methods and materials: This is a descriptive/observational study comparing the use of methadone and gabapentin with traditional pain analgesia regimens of morphine plus benzodiazepines. Prior to 2014 a standard traditional pain approach was used in our Burn Center, methadone and gabapentin used since 2014. This is a retrospective study evaluating pain management since the start of the methadone/gabapentin protocol compared to the historical controls of similar demographics using morphine and benzodiazepines. A total of 100 patients were evaluated in both treatment periods. Pain control as well as side effects, cost, and length of stay were evaluated.

Results: Methadone/gabapentin demonstrated adequate pain control with minimal delirium, GI tract complications, urinary tract complications. In addition it was less costly and showed a statistically evident reduction in length of stay.

Conclusions: Methadone/gabapentin has demonstrated in our unit to be a superior pain management approach with at least equivalent if not improved pain control, using enteral route as opposed to the need for intravenous infusion, in a cost effective way. It has far less side effects and helps shorten hospital length of stay.

Disclosure:
Elmira Ahnood - No Relevant Financial Relationships to Disclose
John Griswold - No Relevant Financial Relationships to Disclose
Sharmila Dissanaike - No Relevant Financial Relationships to Disclose
Mohanad Elshiekh - No Relevant Financial Relationships to Disclose
Jennifer Kesey - No Relevant Financial Relationships to Disclose
Risk Factors Necessitating Early Ophthalmologic Evaluation of Facial Burns

Author and Co-authors: Serena Jingxi Day, BS, Medical Student III, Alap Patel, BA; Derek E. Bell, MD
University of Rochester, Rochester, NY

Objectives: Upon completion of the lecture, attendees should be better prepared to:
- Describe the morbidity of ophthalmic complications in facial burn patients
- Identify risk factors associated with the development of short and long term ophthalmic complications in facial burn patients
- Recognize the need for early ophthalmologic evaluation of facial burn patients who present with advanced age, active smoking status, inhalation injury, 2nd or 3rd degree burns, or need for intubation

Abstract:
Introduction: Facial burns with ocular involvement often lead to significant morbidity. There are currently no guidelines for ophthalmologic consult in the management of facial burns. This study aimed to identify risk factors for short and long term ophthalmic complications in facial burn patients. Upon validation, these risk factors could distinguish patients who require ophthalmologic evaluation and prompt intervention.

Methods: Retrospective case review was conducted of facial burn patients presenting to an American Burn Association verified regional burn center from June 2007 to May 2016. Demographic, injury-related, and hospitalization-related variables were assessed for correlation with short and long term ophthalmic complications. Short term complications analyzed were visual loss on presentation, lagophthalmos, ectropion, chemosis, ocular hypertension, chalasis, conjunctival necrosis, and orbital or periorbital infection. Long term complications analyzed were lagophthalmos, cicatricial ectropion, exposure keratopathy, scleritis, and corneal stem cell deficiency.

Results: From June 2007 to May 2016, 1126 facial burn patients presented to a regional burn center’s inpatient and outpatient settings. One hundred thirty seven (12.2%) had associated periorbital and orbital injuries. Of the ocular burns, 66.4% were male and 75.9% were Caucasian. Average total body surface area (TBSA) burned was 9.72% (range, 0.02 – 75.13%), and average facial surface area burned was 1.64% (range, 0.02 – 6.65%). One hundred and twenty patients (87.6%) received an ophthalmologic consult. Sixty patients (43.8%) developed short term ophthalmic complications, with the most common being chemosis (n = 36, 26.3%). Eight patients (5.8%) developed long term complications, with the most common being lagophthalmos (n = 4, 2.9%). Two flash burn patients (1.5%) developed cicatricial ectropion and underwent full thickness skin grafting to the eyelids. One scald burn caused a localized corneal stem cell deficiency, which led to chronic keratitis requiring long term steroid treatment. Statistically significant risk factors (p < 0.05) for both short and long term ophthalmic complications included inhalation injury, higher percentage of body with 3rd degree burns, and presence of corneal injury. Development of short term complications was significantly associated (p < 0.05) with advanced age, higher TBSA burns, and higher percentage of body with 2nd degree burns. Significant associations (p < 0.05) with long term complications included active smoker status, 3rd degree eyelid burns, periorbital edema, need for intubation, longer duration of mechanical ventilation, longer length of hospitalization, and bloodstream infection. Short term complications associated (p < 0.05) with the development of long term complications included visual loss on presentation, chemosis, lagophthalmos, and ectropion.

Conclusions: Ocular involvement is an important consideration in the management of facial burns. Specific demographic, injury related and hospitalization related variables are associated with the development of ophthalmic complications. Patients with the risk factors identified by this
study should receive prompt ophthalmologic consult and frequent follow up exams to prevent late morbidity.

Applicability to practice: Providers should obtain early ophthalmologic evaluation for facial burn patients who present with advanced age, active smoking status, inhalation injury, 2nd or 3rd degree burns, or need for intubation.

Disclosure:
Serena Jingxi Day - No Relevant Financial Relationships to Disclose
Alap Patel - No Relevant Financial Relationships to Disclose
Derek E. Bell - No Relevant Financial Relationships to Disclose

<table>
<thead>
<tr>
<th>Early complication</th>
<th>Late complication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>-------------------</td>
<td>-----</td>
</tr>
<tr>
<td><strong>Demographics</strong></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>44.97 ± 19.77</td>
</tr>
<tr>
<td>Active smoker</td>
<td>21 (35%)</td>
</tr>
<tr>
<td><strong>Injuries</strong></td>
<td></td>
</tr>
<tr>
<td>Inhalation Injury</td>
<td>20 (33.33%)</td>
</tr>
<tr>
<td>TBSA</td>
<td>14.87 ± 18.33</td>
</tr>
<tr>
<td>% body with 2nd Degree burn</td>
<td>8.95 ± 11.77</td>
</tr>
<tr>
<td>% body with 3rd Degree burn</td>
<td>10.44 ± 12.51</td>
</tr>
<tr>
<td>Eyelid burn</td>
<td>44 (73.33%)</td>
</tr>
<tr>
<td>1st deg</td>
<td>37 (61.67%)</td>
</tr>
<tr>
<td>2nd deg</td>
<td>3 (5%)</td>
</tr>
<tr>
<td>3rd deg</td>
<td>5 (8.33%)</td>
</tr>
<tr>
<td>Corneal injury</td>
<td>37 (61.67%)</td>
</tr>
<tr>
<td>1st deg</td>
<td>31 (51.67%)</td>
</tr>
<tr>
<td>2nd deg</td>
<td>5 (8.33%)</td>
</tr>
<tr>
<td>3rd deg</td>
<td>1 (1.67%)</td>
</tr>
<tr>
<td>Periorbital edema</td>
<td>37 (61.67%)</td>
</tr>
<tr>
<td><strong>Hospitalization</strong></td>
<td></td>
</tr>
<tr>
<td>Intubated</td>
<td>7 (87.5%)</td>
</tr>
<tr>
<td>Length of stay</td>
<td>31.13 ± 5.36</td>
</tr>
<tr>
<td></td>
<td>25.43</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>Vent days</td>
<td>18.38 ± 16.55</td>
</tr>
<tr>
<td>Positive blood culture</td>
<td>3 (37.5%)</td>
</tr>
<tr>
<td><strong>Early complications</strong></td>
<td></td>
</tr>
<tr>
<td>Visual loss</td>
<td>5 (62.5%)</td>
</tr>
<tr>
<td>Lagophthalmos</td>
<td>3 (37.5%)</td>
</tr>
<tr>
<td>Ectropion</td>
<td>2 (25%)</td>
</tr>
<tr>
<td>Chemosis</td>
<td>8 (100%)</td>
</tr>
</tbody>
</table>

**Short-term complication risk factors**
- Demographics
  - Advanced age
- Injury
  - Higher TBSA
  - Higher percentage of body with 2nd degree burns

**Long-term complication risk factors**
- Demographics
- Active smoker
- Injury
  - 3rd degree eyelid burns
  - Periorbital edema
- Hospitalization
  - Need for intubation
  - Longer hospital and ICU length of stay
  - Longer duration of mechanical ventilation
  - Bloodstream infection
- Short-term complications
  - Visual loss on presentation
  - Lagophthalmos
  - Ectropion
  - Chemosis

**Inhalation injury**
**Higher 3rd degree burn area**
**Corneal injury**
Introduction: Skin substitutes have emerged as a fundamental component of burn wound care, routinely used for temporary coverage of deep dermal and full thickness wounds prior to definitive autografting. While autologous split or full thickness skin grafts are widely recognized as the best definitive coverage of burn wounds requiring grafting, insufficient quantities of donor skin or unsuitable recipient beds often make autologous grafts a suboptimal option for early excisions and grafting. Nonetheless, early coverage of wounds with a protective epidermal layer serves to help decrease metabolic rates, heat and fluid loss, microbial colonization, additional physical trauma and pain after burn injuries. To achieve coverage of wounds, allografts and xenografts are commonly used as temporizing measures. The longstanding belief that cadaveric allograft coverage is superior to xenograft as a temporary biologic wound dressing has not been substantiated in the literature. There have only been two studies that have directly compared allograft to xenograft, but time to re-epithelialization (healing) was notably not previously analyzed. This study aims to further investigate outcome differences between xenograft and allograft, analyzing time to healing, rate of graft complications, and rate of aesthetic and functional deformity.

Methods: A retrospective review of the burn registry database at a moderate volume ABA verified regional burn center was conducted over a 19 month period, from November 2013 to May 2015. Adult and pediatric patients who received temporary allografting or xenografting followed by definitive autografting for a burn injury were included. Data points included patient demographics, burn etiology and location, total burn surface area, grafted area, graft thickness, procedure time, percent graft take, time to complete re-epithelialization, complications following grafting, and cost.

Results: 77 patients were included, comprising 187 total skin graft sites. 52 patients received temporary burn wound coverage with allograft and 25 patients received temporary burn wound coverage with xenograft. The allograft group had an average of 2.3 graft sites per patient and the xenograft group had an average of 2.6 grafts sites per patient, which translated to a total of 122 allografted and 65 xenografted sites. All patients had third or fourth degree burns, with third degree burns representing the major burn degree for patients undergoing allografting or xenografting (92.6% vs 92.3%, p = 0.94, respectively). Average allografted area was 450.9 ± 618.6 cm² per patient and average xenografted area was 477.0 ± 866.2 cm² per patient (p = 0.88). The most common burn etiologies were flame (28.8%), scald (23.1%), friction (19.2%), and contact (19.2%) in the allograft group and contact (28.0%), flame (28.0%), and frostbite (16.0%) in the xenograft group. The most common burn sites were thigh (15.6%), hand (10.7%), forearm (9.8%), and leg (9.0%) in the allograft group and foot (18.5%), leg (10.8%), knee (9.2%), and hand (9.2%) in the xenograft group. There was a trend toward shorter procedure and total operating room (OR) times when using xenograft versus allograft. Average total OR time per cm² area grafted was less when using xenograft (10.1 vs 13.0 seconds per cm² grafted). Total procedure time was also lower in the xenograft versus autograft group (4.6 vs 6.5
seconds per cm² grafted). The average allograft cost was found to be $2.25 per cm² compared to the average xenograft cost of $0.46 per cm². All patients received a split thickness skin graft following temporary coverage of their burn wounds with allograft or xenograft. Average autografted area was 429.1 ± 620.6 cm² per patient in the allograft group and 287.0 ± 435.4 cm² per patient in the xenograft group (p = 0.60). Average percent graft take of autograft was 99.5 ± 1.5% in both the allograft and xenograft groups. Average total time to complete re-epithelialization was 44.1 ± 14.0 days in the allograft group and 45.2 ± 17.9 days in the xenograft group (p = 0.66). Complications following autografting in the allograft versus xenograft groups included hypertrophic scarring (27.9% vs. 20.0%; p = 0.25), hypersensitivity (7.4% vs. 12.3%; p = 0.26), and decreased range of motion (10.7% vs. 12.3%; p = 0.73). There was a significantly higher rate of dyschromia in the allograft versus xenograft group (23.8% vs. 7.79%; p = 0.01).

Conclusions: Xenograft is an effective, cheaper, and more readily available alternative to allograft for temporary biologic coverage of burn wounds and does not confer increased risk of aesthetic or functional deformity, nor does it negatively impact time to healing.

References:

Disclosure:
Megan Pencek - No Relevant Financial Relationships to Disclose
Franca Kraenzlin - No Relevant Financial Relationships to Disclose
Derek Bell - No Relevant Financial Relationships to Disclose