cushioning and bedding, secondary to insurance coverage. Eleven patients had a preoperative history of non-compliance with conservative management, nine of which experienced ulcer recurrence.

All ulcers were stage III-IV; most involved the ischia (18/34) or sacrum (9/34). Twenty-one ulcers had underlying osteomyelitis, associated with increased admissions (p=0.027) and length of stay (p=0.043).

Overall, there was a 40-percent recurrence rate in ulceration following flap reconstruction. Recurrence did not correlate with age, sex, nutritional status, or osteomyelitis. However, preoperative non-compliance with conservative therapy was associated with recurrence (p=0.007).

CONCLUSION: Flap reconstruction remains essential in the management of pediatric pressure ulcers. However, surgery is only part of the treatment required for these complex patients. Unlike prior studies, our work shows similar recurrence in children compared to adults. We conclude that flap reconstruction should only be performed in patients and families compliant with non-operative elements of care. Additionally, surgeons should be aware of the nature and importance of the various biopsychosocial factors that perpetuate ulcers and inhibit wound healing, and optimize these factors pre- and post-operatively.

Pediatric Open Tibial Fractures in the United States: Analysis of Incidence, Operative Strategies and Resource Utilization over 15 Years

Presenter: Alexandra Bucknor, MBBS, MRCS, MSc

Co-Authors: Klaas H.J. Ultee, PhD; Anne Huang, BS; Anmol S. Chattha, BA; Austin D. Chen, BS; Salim Afshar, DMD, MD; Samuel J. Lin, MD, MBA; Matthew L. Iorio, MD

Affiliation: Beth Israel Deaconess Medical Center / Harvard Medical School, Boston, MA

INTRODUCTION: Open tibial fractures are complex injuries to manage, often requiring combined plastic and orthopedic care. Centralization of services may improve patient outcomes and cost-efficiency. This study aims to characterize the epidemiology, operative trends and resource-utilization of pediatric open tibial fractures in the United States.

METHODS: Retrospective analysis of the Healthcare Cost and Utilization Project Kids’ Inpatient Database for all available years (1997, 2000, 2003, 2006, 2009 and 2012) was undertaken. Data were retrieved for children ≤18 admitted with open tibial fractures. The Cochran-Armitage test was used to evaluate trends in patient and hospital characteristics, post-operative complications and operative modality over time.

RESULTS: Over the years sampled, 9,339 children were admitted with open tibial fractures. Mean age was 12.35 years.

The incidence of open tibial fractures has decreased, from 1,924 (27.7 per million) in 1997 to 1,005 (13.9 per million) in 2012. From 1997 to 2012 there were significant changes in management over time. There was an increase in proportion of cases admitted to large (51.9% to 69.8%, p<0.001) urban, teaching (49.8% to 75.8%, p<0.001) hospitals. Primary internal fixation increased (35.1% to 59.2%, p<0.001), while flap reconstruction decreased (38.6% to 26.7%, p<0.001). Complication rates were stable (3.1% to 3.3%, p=0.475), while charges increased over time ($20,067 to $65,736, p<0.001).

CONCLUSION: There is a clear trend toward centralization of care; however, there has been no improvement in complication rates, with a decrease in flap reconstruction. The role of plastic surgeons in the management of these injuries should be further investigated.

Reference Citations:
1. Aquina CT, Probst CP, Becerra AZ, Iannuzzi JC, Kelly KN, Hensley BJ, et al. High volume improves outcomes: The argument for centralization of rectal cancer surgery. Surgery. 2016;159:736–48.

Evaluation of Bilateral Cleft Lip Patients Using Anthropometry in a Multicultural Setting: Defining Predictive Measurements of Severity Pre and Post Operatively
**Presenter:** Caroline Yao, MD  
**Co-Authors:** Michelle Elise Carriere, MD; Meghan McCullough, MD; Allyn Auslander, MPH; Jordan W. Swanson, MD; William Magee, MD, DDS  
**Affiliation:** Shriners Hospital for Children, Los Angeles, CA

**INTRODUCTION:** The current classification system for bilateral cleft lip merely quantifies clefts as complete versus incomplete, providing insufficient prognostic information. By objectively exploring the spectrum of this disease in different ethnicities, we aimed to identify predictive measurements of pre-operative and post-operative severity.

**METHODS:** Pre- and post-operative anthropometric measurements and standardized medical photographs were collected of patients with bilateral cleft lip during medical missions conducted by Operation Smile in Bolivia, Madagascar, Morocco and Vietnam. Ratios of nostril width, cleft width and lip transverse length, as well as measurements of philtral height and the columellar-philtral angle, were calculated and compared pre- and postoperatively. Two experienced cleft surgeons and two non-medical lay persons subjectively ranked both pre- and postoperative medical photographs based on perceived severity. Using these rankings, we assessed which facial ratios were most predictive of ranking scores.

**RESULTS:** Of the 33 analyzed patients all main facial ratios significantly improved: nostril width from 0.93±0.13 to 0.74±0.12 (p<0.001), cleft width from 0.74±0.23 to 0.23±0.08 (p<0.001), lip transverse length from 0.76±0.12 to 1.33±0.15 (p<0.001), philtral height from 7.04±2.06 mm to 8.09±2.02 mm (p=0.009) and columellar-philtral angle from 54±26 degrees to 93±17 degrees (p<0.001). Ratios did not differ significantly among different countries. Significant positive correlations were found pre- and post-operatively between lay persons (Pearson r=0.786 (p<0.001) and 0.819 (p<0.001)), between surgeons (Pearson r=0.773 (p<0.001) and 0.669 (p<0.001)) and between both groups (Pearson r=0.901 (p<0.001) and 0.752 (p<0.001)). Stepwise regression showed that cleft width and nostril width were the strongest predictors of preoperative rank scores (p<0.001, p=0.010). Postoperatively, lip transverse height was notably predictive of post-operative severity (p=0.067).

**CONCLUSION:** Similar morphologies were observed across different ethnicities for bilateral cleft lip patients, suggesting that setting universal markers of severity is reasonable. This pilot demonstrates that cleft width and nostril width were most predictive of overall perceived cleft severity for both surgeons and laypersons. Although post-operative predictors were harder to establish, we believe this can be attributed to our small sample size and highlights the necessity of further outcome data collection. Our current study presents easily identifiable landmarks on the cleft face to showcase the spectrum of disease morphology before surgery and the variability in outcomes after surgical repair.

---

**Acute Ear Burns: An Algorithm for Treatment**

**Presenter:** Maureen Beederman, MD  
**Co-Authors:** Laura S. Humphries, MD; Essie Kueberuwa Yates, MD; Lawrence J. Gottlieb, MD, FACS  
**Affiliation:** University of Chicago Medical Center, Chicago, IL

**INTRODUCTION:** The exposed position of the external ear on the head, as well as its structure, makes it uniquely susceptible to thermal burns. The goals of treatment of the burned ear are to prevent chondritis, maintain form and function and salvage auricular structure. We propose a classification system and management algorithm for ear burns to better treat these injuries.

**METHODS:** A retrospective chart review was performed on patients who were seen and diagnosed with ear burns at The University of Chicago Medical Center (UCMC) from 2007–2013. Charts were reviewed and searched for key phrases, including “ear” “burn” “chondritis” “cartilage” and “sulfamylon”. Microbiology and pathology data were examined for details regarding infections and chondritis. Patients with ear burns were initially managed similarly with topical sulfamylon, removal of pillows to prevent direct pressure on ears, hydrotherapy, and bedside debridement. They then progressed down the algorithm taking