limited by situational acuity and workflow limitations. Operative planning requires nuanced understanding of facial biomechanics and is complicated by complex and/or compound injuries which distort normal anatomy and challenge visuospatial conceptualization. Competency achievement often is incumbent on individual residents who have limited time, variable baseline knowledge, and are subject to institutional differences in training environment, faculty expertise, and case load. The aim of this study was to design a standardized schematic for teaching facial fracture management and evaluate its performance improving resident operative planning.

METHODS AND MATERIALS: Printable schematics of the facial skeleton, coronal and sagittal, with soft-tissue overlay were developed. Instructions on depicting fracture pattern, incisions, plating sequence, load-bearing/sharing plates, locking/non-locking screws, and monocortical/bicortical screws were given. Senior residents (PGY4–6; n = 5) evaluated computed tomography of three unique mandibular fracture patterns (symphyseal, unilateral parasymphysis/contralateral angle, and bilateral angle fractures) and submitted three operative plans per case: first without guidance, then with written instruction, and finally using the schematic (total n = 45). Performance in each trial was graded on content (whether operative components were included) and conceptual correctness (whether content was correct). Likert-scale surveys were given assessing understanding, communication, and operative planning.

RESULTS: Schematic use improved operative plan content and facilitated communication of resident operative schemes. Of 7 content domains spanning approach, plating strategy, and screw selection, a mean of 2.3, 3.7, and 6.5 were included with no guidance, written instruction, and schematic use, respectively. Information on approach (P = 0.001), plating type (P = 0.02), screw location (P < 0.000), monocortical/bicortical screw type (P = 0.000), and screw locking status (P = 0.000) were significantly improved when comparing pre- and postintervention plans. All subjects “agreed” (n = 2) or “strongly agreed” (n = 3) that schematic use aided operative planning and communication.

CONCLUSIONS: Simple, guided interventions can enhance surgical training by identifying knowledge gaps, improving visuospatial conceptualization, and facilitating targeted discussions with attendings.

Long-Term Evaluation of Predictors of Alveolar Bone Regrafting

**Presenter:** Allison C. Hu, BA

**Co-Authors:** Amanda C. Miller, BS; Candace H. Chan, BS; Saloni Gupta, BS; Brian N. Dang, BS; Arvin Pal, DDS; Alex Lambi, MD; Claire Liu, BS; Nicole Lee, DDS; Libby F. Wilson, MD; Justine C. Lee, MD, PhD

**Affiliation:** David Geffen School of Medicine at University of California, Los Angeles, Los Angeles, CA

**PURPOSE:** Alveolar bone grafting (ABG) is a highly invasive operation performed in cleft lip and palate (CLP) patients. Although possible complications include infection, wound dehiscence, and graft resorption, the most critical complication is the need for regrafting. Regrafting not only exposes the patient to a second invasive procedure and additional operative risks but also increases in the overall cost of treatment and contributes to poorer long-term psychosocial functioning. Therefore, in this work, we investigate the possible predictors of alveolar bone regrafting.

**METHODS:** CLP patients from 2 institutions were retrospectively identified. Demographic, clinical, and operative details were collected from patient records. Age at initial ABG was grouped into early (4–7 years old), standard (8–10 years old), late (11–13 years old), and very late (>14 years old). Descriptive statistics were summarized, chi-square tests and t tests were used for bivariate analysis, and multivariate logistic regression was performed in SPSS.

**RESULTS:** Overall, 143 patients with CLP (84 males, 57.3%) underwent initial ABG between ages 4 and 20 years. Mean age at time of initial ABG and time of review was 10.7 ± 3.2 years and 22.2 ± 5.2 years, respectively. Most patients had unilateral CLP (n = 104, 72.7%). Average follow-up was 7.9±3.9 years. Of the patients who received alveolar bone regrafting (n = 52, 36.4%), average time to regraft was 4.2±3.4 years. No significant differences were found in ethnicity, insurance status, lateral incisor abnormality, operative techniques, graft material, postoperative complications, and hospital length of stay between patients with and without regrafting. However, bilateral cleft lip and longer time to orthodontic movement after ABG were correlated with higher rates of regrafting. Male sex and early age group at initial ABG on the other hand were predictive of lower rates of regrafting.
CONCLUSIONS: Bilateral cleft lip and longer time to orthodontic movement are predictive of ABG regrafting.

Infections and Antibiotic Usage in Facial Gunshot Wounds

**Presenter:** Andrea P. Biaggi-Ondina, BSA

**Co-Authors:** Paul Deramo, MD; Venkata S. Kothamasu, BSA; Benjamin W. Kim, BA; David J. Wainwright, MD

**Affiliation:** University of Texas Health Science Center at Houston, Houston, TX

**PURPOSE:** Gunshot wounds (GSW) to the face are devastating injuries with significant risk of head and neck infection. The associated soft tissue loss, ischemia, bony destruction, and frequent involvement of the oral and sinus cavities are responsible for infections, which can be difficult to predict. Most published reports and practice management guidelines recommend broad spectrum antibiotics with various duration of therapies. However, there are few detailed reports on specific injury patterns and rates of infection, and the optimal antibiotic regimen remains controversial. The purpose of this study was to categorize specific injuries, identify predictors of infection, and elucidate the role of antibiotics in GSW to the face.

**METHODS:** A retrospective review of all patients presenting with GSW to the face from 2009 to 2017 was performed on a single institution trauma database. Inclusion criteria were patients who had a GSW to the face, survived more than 48 hours and received care at our trauma center. Isolated GSW to the skull/brain were excluded. General demographics, firearm information, injured structures, surgical data, antibiotics administered, and head and neck infection results were extracted from each eligible patient’s chart. Head and neck infections were defined as culture-positive wound aspirates. Univariate and multivariate statistical analyses were then performed to examine the relationships between injured structures, surgical intervention, antibiotic exposure, and head and neck infection.

**RESULTS:** Of 537 patients, 270 met inclusion criteria. Median age was 28 (interquartile range [IQR], 20–41) years and patients were predominantly male (83%) and injured by handgun (93%). Eighty-nine percent of patients had facial fractures, 52% had oral cavity involvement, and 50% had maxillary sinus involvement. Seventy-seven percent of patients underwent surgery with median 2 (IQR, 1–3) number of procedures. Eighty-nine percent of patients received antibiotics on admission for median 4 (IQR, 3–8) days and 15.2% of patients developed head or neck infection on median hospital day 9 (IQR, 6–14). On univariate analysis, head and neck infections were significantly increased with injuries to oral cavity (10.7% versus 4.4%; \( P < 0.01 \)), maxillary sinus (10.7% versus 4.4%; \( P < 0.01 \)), and bony fracture (14.8% versus 4.4%; \( P < 0.01 \)). On multivariate analysis, factors associated with head or neck infection include oral cavity involvement (OR, 1.2; \( P = 0.04 \)), sinus involvement (OR, 1.2; \( P = 0.045 \)), and number of procedures (OR, 1.1; \( P = 0.0005 \)).

**CONCLUSION:** GSW to the face cause destructive injuries often requiring multiple procedures and leading to frequent infection. Oral cavity and sinus involvement are associated with statistically higher rates of head and neck infections, even in the setting of antibiotic use. Our data suggest that GSW to the face without oral cavity, sinus involvement, or need for multiple surgeries have low infection rates and may not benefit from antibiotics. Prospective data are needed to assess whether an antibiotic-restrictive protocol is safe in the setting of uncomplicated GSW to the face.

Orthoptic Vision Therapy: Establishing a Protocol for Management of Diplopia Following Orbital Fracture Repair

**Presenter:** Brandon J. De Ruiter, MD

**Co-Authors:** Robert P. Lesko, BA; Barry Tannen, OD, FCOVD, FAAO; Noah Tannen, OD; Edward H. Davidson, MD

**Affiliation:** Case Western Reserve University, Cleveland, OH

**PURPOSE:** Nonentrapment-associated diplopia following orbital fracture repair is a well-recognized problem affecting up to 25% of patients at 3-month follow-up. Observation is the standard-of-care; however, symptoms may be protracted and/or debilitating. Orthoptic therapy is a form of ocular physical therapy that, like occupational therapy following hand injury, achieves functional rehabilitation through targeted exercises. Despite wide application in academic optometry, it has yet to be applied postoperatively. In this study, we present a protocol for using orthoptics to treat postoperative diplopia and describe preliminary testing results.