is a relatively novel technique that involves removing and shaving down the skull’s inner calvarial table and cancellous bone to increase intracranial volume and reduce ICP. Previous studies have shown success in pediatric patients. The present study describes the effectiveness of ICE in adult patients with IIH.

**METHODS:** A retrospective review was conducted of 9 patients from the ages of 18–61 years who underwent ICE for the treatment of IIH. Preoperative and postoperative clinical parameters including patient symptoms, presence of papilledema, and available ICP or cerebrospinal fluid opening pressures were compared. Procedural details and complications were noted. Intracranial volume increases were calculated using available pre- and postoperative computerized tomography scans.

**RESULTS:** Mean follow-up for the 9 patients in this series was 8 months. Technically successful ICE was performed in all patients within the cohort without any surgical complications. At the time of last follow-up, 4 (44%) of 9 patients were either symptomatically improved or asymptomatic. Three (33%) of 9 patients with headache had a reduction in or complete resolution of this symptom. Papilledema was resolved in all patients (4 of 4) with this sign. Postoperative intracranial volume expansion ranged between 6.9% and 18%.

**CONCLUSIONS:** ICE is a safe procedure that can provide symptomatic improvement for some adult patients and thus has a role in treatment of refractory IIH outside of the pediatric population. This surgery expands the intracranial volume and thus promotes ICP normalization, which may lead to the reduction or complete resolution of the signs and symptoms of IIH. ICE may be used as part of a multidisciplinary management approach in the treatment of refractory IIH.

**Anticoagulation Protocols in Hypercoagulable Microvascular Head and Neck Reconstruction**

**Presenter:** Katie G. Egan, MD

**Co-Authors:** Trang Nguyen, BA; Danielle Crowe, LPN; Niaman Nazir, MD, MPH; Wojciech H. Przylecki, MD; Brian T. Andrews, MD

**Affiliation:** University of Kansas Medical Center, Kansas City, KS

**BACKGROUND:** Inherited and acquired hypercoagulable conditions affect 15% of the population, and these conditions are often considered a relative contraindication to microvascular surgery. Anticoagulation protocols may be used to improve outcomes of microvascular surgery. The effects of anticoagulation protocols on success rates in the hypercoagulable head and neck population and complications related to these protocols have not been well described.

**METHODS:** A retrospective review was conducted of subjects who underwent microvascular head and neck reconstruction at a tertiary medical center over a 6-year period. Hypercoagulable subjects were defined as having an inherited coagulopathy or preoperative thrombotic event. Perioperatively, subjects were treated with individualized anticoagulation protocols. Outcomes studied were microvascular flap complications (thrombotic event or flap loss) and anticoagulation-related complications (flap or donor site hematoma). Multivariate analysis was used to compare outcomes.

**RESULTS:** A total of 137 head and neck microvascular reconstructions were performed during the study period. A preoperative thrombotic event had occurred in 23 of 24 subjects; 18 of 23 subjects (78.3%) had a history of deep venous thrombosis, 5 (21.7%) of PE, and 5 (21.7%) of spontaneous thrombotic stroke before 50 years old. Five subjects (20.8%) were diagnosed with an inherited or acquired thrombophilic disorder preoperatively. All subjects were treated with aspirin intraoperatively and daily postoperatively (n = 26; 92.9%), unless contraindicated by allergy. Subjects were stratified based on preoperative and intraoperative risk factors to receive either group 1 (low risk): prophylactic-dosing subcutaneous anticoagulation (n = 13; 46.4%); group 2 (medium risk): prophylactic-dosing continuous heparin infusion at 500 units/h (n = 8; 28.6%); or, group 3 (high risk): therapeutic anticoagulation/continuous PTT goal-based heparin infusion (n = 5; 17.9%). An inferior vena cava (IVC) filter was utilized in 12 reconstructions and was placed preoperatively in 9 subjects (32.1%) and postoperatively in 3 subjects (10.7%). All flaps were successful; however, 2 of 28 flaps (7.1%) were salvaged by operative revision from postoperative thrombotic events, 1 arterial and 1 venous, occurring on postoperative day 1. Focal necrosis requiring surgical excision and advancement occurred in 2 of 28 flaps (7.1%). A hematoma occurred at the site of flap inset in 3 of 28 reconstructions (10.7%) and at 2 donor sites (7.1%). Multivariate analysis of anticoagulation protocol did not demonstrate a statistical effect on flap complication rate or salvage. However, there was a statistically significant higher rate of both flap and donor site hematomas in group 3 with the use of therapeutic anticoagulation (P = 0.04). Subjects who had an IVC filter had a statistically higher rate of hematomas (P = 0.002) and trended toward increased flap complications (P = 0.06).

**CONCLUSIONS:** In our experience, the choice of anticoagulation protocol in hypercoagulable subjects does not affect reconstructive outcomes. However, we found that
thrombophilic subjects who are deemed highest risk and receive IVC filters and therapeutic anticoagulation perioperatively are more likely to have postoperative complications, including an increase in hematomas with therapeutic anticoagulation.

A Computerized Approach to Facial Transplantation: Evolution and Application in 3 Consecutive Face Transplants

**Presenter:** Elie P. Ramly, MD

**Co-Authors:** Rami S. Kantar, MD; J. Rodrigo Diaz-Siso, MD; Allyson R. Alfonso, BS, BA; Eduardo D. Rodriguez, MD, DDS

**Affiliation:** New York University Langone Health, New York, NY

**INTRODUCTION:** Face transplant (FT) candidates present with unique anatomic and functional defects unsuitable for autologous reconstruction, making the accurate design and transplantation of patient-specific allografts particularly challenging. In this case series, we present our computerized surgical planning (CSP) protocol for FT.

**METHODS:** CSP, computer-aided design and manufacturing, intraoperative navigation, and intraoperative computerized tomography have been successfully incorporated into a comprehensive protocol. Three consecutive FTs were performed. CSP and postoperative results were compared using computerized tomography–derived cephalometric measurements, and the literature was reviewed.

**RESULTS:** Two full and 1 partial FT were successfully performed using the CSP protocol. CSP facilitated the execution of FT with minor angular and translational cephalometric variations on immediate postoperative imaging. Our evolving experience was accompanied by a decreased reliance on cadaveric simulation, from 10 mock transplants and a research procurement before the senior author’s first clinical FT (2012) to 6 mock transplants and no research procurement before the third FT (2018). Operative time was significantly reduced from 36 to 25 hours, as was the need for major orthognathic surgical revision. This reflects the learning curve and variable case complexity, but is also representative of improved planning and execution, complemented by the systematic incorporation of CSP into FT.

**CONCLUSION:** A CSP protocol allows for refinement of operative flow, technique, and outcomes in partial and full FT. Standards for functional and esthetic outcomes are bound to evolve with the field’s growth, and computerized planning and execution offer a reproducible approach to FT through objective quality assurance.

Early Cleft Repair Versus Nasoalveolar Molding: Comparing Preoperative Severity and Postoperative Results Utilizing a Computer Engineered AI System

**Presenter:** Pedram Goel, BS

**Co-Authors:** Erik Matthew Wolfswinkel, MD; Artur Fahradyan, MD; William Magee, MD, DDS; Mark M. Urata, MD, DDS; Jeffrey A. Hammoudeh, MD, DDS

**Affiliation:** Keck School of Medicine of USC, Los Angeles, CA

**BACKGROUND:** Early cleft lip repair (ECLR) can be performed safely and effectively. One persistent question is whether ECLR may be offered to wide unilateral complete clefts who historically would have received nasoalveolar molding (NAM). This study aims to compare the preoperative cleft severity of ECLR patients to those who underwent NAM pretreatment and compare postoperative outcomes.

**METHODS:** Unilateral CL patients (January 1, 2005, to September 11, 2018) were retrospectively reviewed and divided into 2 groups: ECLR (age <3 months) and presurgical NAM with CL repair (age 3–6 months). Pretreatment CL severity was assessed using an AI computer engineered system that calculated cleft width ratios (CWRs, pretreatment cleft width divided by commissure width). For further analysis, a second subset of wide complete cleft lip patients undergoing ECLR (excluding incomplete clefts) was created to compare to the NAM group.

**RESULTS:** Seventy-four ECLR patients and 25 NAM patients (average age at repair 32.24 and 117.56 days, respectively) met inclusion criteria. Mean CWR was 0.456 for ECLR patients and 0.501 for NAM patients ($P = 0.165$). The ECLR subgroup considering only patients with complete cleft lips had a mean CWR of 0.520, suggesting that this group had more severe clefts. The ECLR subgroup’s average lip length, frontal nasal breadth, commissure length, nostril breadth, nostril width, and nasal angle symmetry ratios were compared to the NAM group’s postoperatively. The average lip length, frontal nasal breadth, and commissure length symmetry ratios for the ECLR subgroup of 27 complete clefts were 0.88, 1.05, and 0.92, respectively, compared to 0.93, 1.08, and 0.89 for the NAM group ($P = 0.181$, $P = 0.526$, $P = 0.378$). The average nostril breadth, nostril width, and nasal angle ratios among the ECLR subgroup were 1.09, 1.17, and 1.12, respectively,