significantly more likely to experience a wound disruption (OR 3.4, 95% CI 1.8 – 6.5, p < 0.0001) or open wound (3.2, 2.1 – 5.0, p < 0.0001) in the 30 days following their breast or body contouring procedure. Rates of postoperative infection were not different between groups (1.4, 0.76 – 2.5, p = 0.29); however, the rate of reoperations for incision and drainage, and debridement procedures was higher in the SARS-CoV-2 group (1.7, 1.02 – 2.7, p = 0.039). The SARS-CoV-2 group did not experience a higher rate of emergency room visits, but they were readmitted at a significantly higher rate (3.7, 2.8 – 4.9, p < 0.0001).

CONCLUSION: Accounting for crucial predictors of surgical outcomes, patients with a preceding SARS-CoV-2 infection requiring inpatient admission as remote as three months before their breast or body contouring procedure were at a higher risk for wound healing complications and for readmissions. Given the elective nature of many of these procedures, it is possible patients may benefit from longer intervals between their SARS-CoV-2 infection and their operation. The point where postoperative risk begins to equilibrate in these populations has yet to be elucidated. More investigation into the protracted effects of SARS-CoV-2 infection as a predictor of surgical outcomes is required.

**TRACK: MIGRAINE – PERIPHERAL NERVE**

fMRI Data Demonstrate Evidence of Change in Brain Connectivity following Migraine Surgery

**Presenter: Nick Albano, MD**

**Co-Authors: Ahmed M. Afifi, MD, Vivek Prabhakaran, Veena Nair**

**PURPOSE:** While surgical management of migraine headaches is becoming more commonplace in the field of plastic surgery it is still met with some criticism in the greater medical community due to the subjective nature of patient-reported results.1 Many studies have demonstrated that cranial nerve decompression is both safe and effective for the relief of migraine symptoms.2,3 The purpose of this study is to use functional and structural MRI to demonstrate objective changes in the brains of subjects following successful migraine surgery.

**METHOD:** Subjects were recruited from the senior author’s practice. They failed medical management of their migraine headaches and were deemed appropriate candidates for migraine surgery. Subjects participated in one preoperative and one postoperative study visit. The postoperative visit took place a minimum of 6 months following surgery and/or when symptoms plateaued. Each study visit consisted of: 1) neurocognitive battery, 2) fMRI at rest, 3) fMRI while performing verbal fluency task, and 4) static T1 MRI. Statistical mapping was performed to analyze and compare pre- and postoperative fMRI data. Cortical reconstruction and volumetric segmentation were performed to measure cortical thickness and compare pre- and postoperative structural MRI data. Pre- and postoperative measurements were compared using a paired t-test.

**RESULTS:** Preliminary data indicate that chronic migraine patients presenting for surgery score extremely high for depressive symptoms and demonstrate impairment in executive function in the form of poor focus/attention. Analysis of our completed postoperative study visits shows a dramatic improvement in depressive symptoms and a trend toward improved executive function, specifically in the form of verbal fluency tasks. Most interestingly we are seeing potential changes in functional connectivity on fMRI that may correlate with this improvement in verbal fluency. Both pre- and postoperative fMRI images show responses in regions typically activated during this task, but the postoperative images show greater involvement of the right inferior frontal gyrus, in addition to the standard regions. The inferior frontal regions form part of Broca’s area that is typically involved in language production and fluency tasks. This suggests a more co-hemisphere pattern on this task postoperatively, compared to a left-lateralized pattern before surgery.

**CONCLUSION:** Our results further support migraine surgery as a safe and effective procedure. We also demonstrate improvement in depression scoring and attention following surgery. Most importantly we demonstrate objective change in postoperative fMRI data that accompanies the improvement in neurocognitive data. Migraine surgery affects objective, measurable change in subjects’ brains.

**REFERENCES:**

1. McGeeeney, B. E. Migraine Trigger Site Surgery is All Placebo. Headache. 2015; 55(10), 1461 – 1463.
2. Guyuron B, Kriegler JS, Davis J, Amini SB. Comprehensive surgical treatment of migraine headaches. Plast Reconstr Surg. 2005 Jan;115(1):19
3. Ascha M, Kurlander DE, Sattar A, Gatherwright J, Guyuron B. In-depth review of symptoms, triggers, and
treatment of occipital migraine headaches (site IV). Plast Reconstr Surg. 2017 Jun;139(6):1333e1342e.

**TRACK: RESEARCH/TECHNOLOGY**

**PAPER**

**Identification of Novel Circulating Non-hematopoietic Cells Orchestrating Tissue Fibrosis after Injury**

**Presenter:** Dominic Henn, MD

**Co-Authors:** Kellen Chen, PhD, Artem Trotsyuk, Dharshan Sivaraj, Michael Longaker, MD, Geoffrey C. Gurtner, MD

**PURPOSE:** The majority of circulating cells that are recruited to sites of injury are derived from the hematopoietic system, mainly consisting of myeloid and lymphoid cells. Whether non-hematopoietic mesenchymal cells are present in the circulation and play a role in tissue remodeling after injury has remained a topic of debate.

**METHOD:** We used lineage tracing with transgenic Col1-GFP as well as VavCre-mTmG mouse models, parabiosis, flow cytometry, confocal microscopy, and single-cell RNA sequencing (scRNA-seq) to analyze circulating cellular subpopulations recruited to excisional wounds and ischemic skin flaps at acute (3 and 7 days) and chronic (1, 3, and 6 months) stages. Next, GFP-expressing circulating collagen producing cells were systemically depleted using GFP-specific CD8+ T killer cells (Just eGFP death inducing, or JEDI) and the effect on tissue repair was determined using scRNA-seq and analysis of collagen ultrastructure.

**RESULTS:** We identified non-hematopoietic circulating fibroblast-like cells, termed ‘fibrocirculators’, that exhibit stem cell characteristics and produce collagen. These cells were most abundant during the chronic remodeling stage of tissue repair (1 month after injury) and persisted within the tissue up to 6 months after injury. Fibrocirculators exhibited multiple interactions with myeloid cells and their recruitment was triggered by the tumor necrosis factor (TNF) pathway, specifically by TNFSF12/TWEAK. Targeted systemic depletion of fibrocirculators using JEDI T cells accelerated wound healing, decreased fibrotic collagen architecture, and reduced pro-fibrotic gene expression of wound fibroblasts.

**CONCLUSION:** We have identified a novel population of circulating non-hematopoietic mesenchymal cells that are recruited to sites of injury and exhibit pro-fibrotic characteristics. Targeted depletion of these cells may lead to novel therapeutic opportunities for chronic fibrotic conditions such as hypertrophic scars and pulmonary fibrosis.

---

**TRACK: RESEARCH/TECHNOLOGY**

**PAPER**

**Comparing Extracorporeal Shockwave and Hyperbaric Oxygen Therapy in Enhancing Wound Healing in a Streptozotocin-Induced Diabetic Rodent Model**

**Presenter:** Yur-Ren Kuo, MD, PhD

**PURPOSE:** Studies have revealed that both extracorporeal shock-wave therapy (ESWT) and hyperbaric oxygen therapy (HBOT) can accelerate wound healing. This study aimed to compare the effectiveness of ESWT and HBOT in enhancing diabetic wound healing. A dorsal skin defect (area, 6Â—5 cm2) in a streptozotocin-induced rodent model of diabetes was used. Fifty male Wistar rats were divided into five groups (n=10 in each subgroup): normal control rats, diabetic control rats receiving no treatment, diabetic rats treated with one session of ESWT (ESWT-1) and two sessions of ESWT (ESWT-2), and diabetic rats treated with HBOT. Postoperative wound healing was assessed once every three days. Histologic examination was performed with hematoxylin and eosin staining. Ki-67, eNOS, vascular endothelial growth factor (VEGF), and 8-hydroxy-2-deoxyguanosine (8-OHdG) were evaluated with immunohistochemical (IHC) staining. The wound area was significantly reduced in the ESWT and HBOT groups compared to that in the diabetic controls (P < 0.001). However, the wound healing time was significantly increased in the HBOT group compared to the ESWT-2 group. Histological findings showed a significant increase in neovascularization and suppression of the inflammatory response by both HBOT and ESWT compared to the controls. IHC staining revealed a significant increase in Ki67, VEGF, and eNOS but suppressed 8-OHdG expression in the ESWT group compared to the HBOT group. Two sessions of ESWT facilitated diabetic wound healing more effectively than HBOT by suppressing the inflammatory response and enhancing cellular proliferation and neovascularization and tissue regeneration.