Intravenous Tranexamic Acid in Implant-based Breast Reconstruction Safely Reduces Hematoma Without Thromboembolic Events

Presenter: Joseph Banuelos, MD

Co-Authors: Jason M. Weissler, MD; Christin A. Harless, MD; Steven R. Jacobson, MD; Nho Van Tran, MD; Minh-Doan T. Nguyen, MD, PhD; Oscar J. Manrique, MD; Jorys Martinez-Jorge, MD

Affiliation: Mayo Clinic, Rochester, MN

PURPOSE: Antifibrinolytic medications, such as tranexamic acid (TXA), have recently garnered increased attention in plastic surgery. Despite its ability to mitigate intraoperative blood loss and need for blood transfusion, there remains a paucity of research on TXA in breast reconstruction. The aim of this study was to investigate whether intravenous TXA reduces the risk of postoperative hematoma following immediate implant-based breast reconstruction.

METHODS: A single-center retrospective cohort study was performed to analyze all consecutive patients undergoing immediate 2-stage IBR following mastectomy over 2 years (2015–2016). The incidence of postoperative hematomas and thromboembolic events among all patients was reviewed. The patients in the intervention group received 1,000 mg of intravenous TXA before mastectomy incision and 1,000 mg at the conclusion of the procedure. Fisher’s exact test and the Mann-Whitney–Wilcoxon test were used. Multivariate logistic regression models were performed to study the impact of intravenous TXA after adjusting for possible confounders.

RESULTS: A total of 868 consecutive breast reconstructions (499 women) were reviewed. Overall, 116 patients (217 breasts) received intravenous TXA, whereas 383 patients (651 breasts) did not. Patient characteristics and comorbidities were similar among the groups. Patients who received TXA were less likely to develop hematomas (n = 1; 0.46%) than patients who did not (n = 19; 2.9%) after controlling for age, hypertension, and type of reconstruction (prepectoral and subpectoral; P = 0.018). Adverse effects of intravenous TXA, including thromboembolic phenomena, were not observed. Multivariate analysis demonstrated that age and hypertension independently increase risk for hematoma.

CONCLUSION: Intravenous TXA safely reduces risk of hematoma in IBR. Further prospective randomized studies are warranted to further corroborate these findings.

Extended Drain Dwell Duration Following Muscle Flap Closure for Complex Spine Surgery Does Not Increase the Risk of Surgical Site Infections

Presenter: Matthew A. Wright, BA

Co-Authors: Jaime Lynn Bernstein, MD; Philipp Franck, MD; Daniel O. Lara, BS; Arash Samadi, BS; Leslie Cohen, MD; Roger Hartl, MD; Ali Baaj, MD; Jason A. Spector, MD, FACS

Affiliation: Weill Cornell Medical College, New York, NY

PURPOSE: Surgical drains are routinely used to prevent the accumulation of fluid at the operative site, an effect known to decrease the risk of seroma and theoretically lower the chance of abscess or small hematoma formation. Despite these potential benefits, significant debate exists in the literature regarding the risk that such drains might be imparting on the development of surgical site infections (SSIs), and the use of prophylactic antibiotics to “cover the drain” remains a common practice despite scant evidence that closed suction drains increase the risk for SSI. The purpose of the present study is to examine our database of over 12 years of muscle flap closure following complex spinal surgery to determine the effect of drain dwell duration on postoperative wound complications including SSI.

METHODS: For this retrospective review, 301 consecutive index cases of complex spine surgery with immediate muscle flap closure (paraspinal, trapezius, latissimus dorsi, and/or thoracolumbar fascia) by the senior author from 2006 to 2018 were identified. The electronic medical record was reviewed for patient characteristics, perioperative details, and outcomes. Examination of the effect of median drain dwell duration on the primary endpoint, SSI, was first conducted via the Mann-Whitney test followed by univariable logistic regression analysis for both the primary endpoint and secondary endpoints including wound
complication requiring reoperation and the need for hardware removal due to infection.

RESULTS: The cohort was 50.8% male and with an average age of 59.0 ± 18.0 years and body mass index of 27.8 ± 6.7 kg/m². In 85% of cases, ≥1 drain was in intimate contact with the hardware and/or bone graft, and patients received no >24 hours of postoperative intravenous cefazolin (or other appropriate perioperative coverage in case of documented allergy) unless further antibiotics were indicated. There were 15 cases of SSI, overall, making for an incidence of 4.9%. Drain durations were clearly documented in 271 cases. Median drain dwell duration among these cases was 19 days (interquartile range [IQR], 14–27 days), overall, 19 days (IQR, 14–27 days) among cases which did not develop SSI, and 22 days (IQR, 15–30 days) among cases which did develop SSI (P = 0.231). Univariable logistic regression analysis also demonstrated no increased risk with longer drain dwell times for the development of SSI (odds ratio [OR], 1.03; 95% confidence interval [CI], 0.98–1.08; P = 0.282), wound complication requiring reoperation (OR, 1.02; 95% CI, 0.96–1.09; P = 0.559), or subsequent removal of hardware due to infection (OR, 1.03; 95% CI, 0.95–1.11; P = 0.528).

CONCLUSIONS: In this large retrospective series of 301 cases spanning over 12 years, we demonstrate that increased drain dwell duration is not associated with SSI, wound complication requiring reoperation, or need for hardware removal due to infection. These findings, particularly in light of the high-risk nature of the cohort in which 85% of patients had drains placed adjacent to hardware and/or bone graft, contribute to the evidence that increased drain dwell times do not place patients at greater risk of SSI and that such patients do not need prophylactic antibiotics for drain coverage.

Mechanism of Skin Improvement in Radiation Wounds Following Fat Grafting: The Fate of Adipose-derived Stem Cells and Role of Stromal Vascular Fraction

Presenter: Timothy Daugherty, MD, MS
Co-Authors: Carrie Harrison, BS; Lauren Hughes, BS; Joel D. Reichensperger, BS; Kristin Delfino, PhD; Nicole Z. Sommer, MD; Michael W. Neumeister, MD, FRCSC, FACS
Affiliation: Southern Illinois University School of Medicine, Springfield, IL

PURPOSE: Consequences of radiation include thickened, fibrotic and inelastic skin. Fat grafting helps alleviate this damage by decreasing epidermal thickness, increasing vascularization, and decreasing fibrosis. The exact mechanism is not understood and carries many hypotheses including the effects of adipose-derived stem cells (ADSCs) within fat. The first aim of this study was to determine which components of fat cause benefits seen with postradiation fat grafting with the hypothesis that pure ADSC group would have the greatest difference in epidermal thickness. The second aim was to determine the mechanism by which these skin changes are mediated with the hypothesis that human ADSCs can differentiate into epithelial stem cells to regenerate the skin.

METHODS: The dorsal skin of nude mice was directly radiated. Four weeks postradiation, injections were performed under the radiated skin with either human lipoaspirate, stromal vascular fraction, or pure ADSCs. The pure ADSCs were confirmed as p63+ with flow cytometry before injection. The mice were euthanized at 2 and 4 weeks postinjection. Epidermal thickness was measured to determine treatment effect. Immunohistochemistry was performed using an antibody specific for human epithelial stem cell marker p63 and imaged using confocal microscopy. Nuclei positive for DAPI or p63 were quantified using ImageJ.

RESULTS: At 2 weeks, all experimental groups that were injected with human cells (ADSC, SVF, and lipoaspirate) had statistically thinner epidermis compared to the radiation-only control group without statistical differences between experimental groups. At 4 weeks, lipoaspirate and SVF groups remained statistically thinner than control groups with no statistical difference between the two. At 4 weeks, the epidermal thickness of the ADSC group was not statistically different than controls. There was a significant decrease in epidermal thickness from week 2 to week 4 in the lipoaspirate, SVF, and matrigel-only groups. Immunohistochemistry showed the presence of p63+ human cells in all experimental groups and absence in control groups. At 2 weeks, there is a statistically higher percent of p63+ cells in the ADSC and SVF groups compared to all other groups. From week 2 to week 4, there was a significant increase in the percent of p63+ cells present in the lipoaspirate group. At week 4, all experimental groups had a statistically higher percentage of p63+ cells than control groups without statistical differences between the experimental groups.

CONCLUSIONS: These findings suggest that improvements seen in radiated skin after fat grafting are due to presence of transferred ADSCs. ADSCs are likely not the only factor necessary to mediate the changes and the other components present within the SVF and lipoaspirate are likely important because these 2 groups maintained significantly thinner epidermis at 4 weeks, whereas the pure ADSC group did not. The ADSCs seem to convert into epithelial stem cells as evidenced by the presence of p63+ human cells within the epidermis of the experimental