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Purpose: Penile inversion vaginoplasty (PIV) is the most common gender affirming genital procedure for trans feminine patients. The purpose of this study was to investigate the impact of tranexamic acid (TXA), an antifibrinolytic, on bleeding and bleeding-related complications in vaginoplasty surgery.

Methods: Retrospective chart review was performed on patients undergoing PIV from February 2018 through March 2020 by the senior author (K.G.) at the University of Wisconsin Hospital and Clinics. Patients who received TXA received a combination of topical and intravenous TXA. Data collected includes patient demographics (age, body mass index, race, comorbidities, and tobacco and illicit drug use), intraoperative data (duration of surgery, estimated blood loss, fluid administration, TXA use and dose, and complications), and postoperative data (drain output, complications within 30 days, and revision surgery). Subgroup analysis on the effect of TXA was performed using independent sample t-test.

Results: Seventy-four patients were included in this study with 56 patients receiving TXA and 18 patients who had surgery prior to initiation of TXA protocol. There were no thromboembolic events observed in the TXA or the non-TXA group. Ninety percent of all complications were Clavien-Dindo Grade 1 and did not require intervention. There was a significantly lower EBL in the TXA group compared to the no TXA cohort (299.1 ± 64.3 vs. 347.2 ± 84.8, p=0.013). Patients who received TXA had significantly fewer wound related complications than those who did not receive TXA (21.4% vs. 66.7%, p<0.0001). Similarly, there were fewer neo-vagina skin graft failures in the TXA group, though this did not reach significance (0.0% vs. 11.1%, p=0.057). There was no significant difference in drain output between the two groups.

Conclusion: No thromboembolic events were observed with intravenous and topical tranexamic acid use in trans feminine patients undergoing penile inversion vaginoplasty surgery. TXA was also associated with lower intraoperative blood loss as well as fewer wound healing complications. Further research is needed to further study its use in gender affirmation surgery.

3 Vitamin D Improves Autologous Fat Graft Retention

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Purpose: Autologous fat grafting is a widely used technique in aesthetic and reconstructive surgery, however, unpredictable volume reabsorption may lead to unsatisfactory outcomes. Previously, we demonstrated that a fat-soluble Vitamin D3 analogue, calcitriol, significantly improved fat retention in a xenograft mouse model by 25% across multiple donors when injected systemically (p < 0.05). While calcitriol has minimal toxicity, is FDA approved, and has positive immunomodulatory and antioxidant properties, systemic administration bypasses key Vitamin D synthesis regulatory steps, thus increasing risk with high-dose use. We hypothesize that systemic supplementation with Vitamin D3 (cholecalciferol) will likewise improve fat-graft retention similar to calcitriol while avoiding potential regulatory and iatrogenic risk. In this study we compared in vivo human fat graft retention in mice treated with systemic cholecalciferol, calcitriol or vehicle control in a mouse xenograft model. In vitro adipose lipoaspirate culture was used to interrogate the therapeutic mechanism of action.

Methods: Lipoaspirate was harvested from 6 unique donors using a 2mm cannula and used in parallel for both in vitro and in vivo studies. In vivo: 0.3mL of lipoaspirate was injected bilaterally on dorsal flanks of homozygous Foxn1nu immunocompromised mice. Calcitriol (50ng), cholecalciferol (50ng, 500ng, 5000ng) or vehicle control were administered thrice weekly by IP injection. Graft volume retention was measured at 12 weeks. In vitro adipose lipoaspirate culture was used to interrogate the therapeutic mechanism of action.
Results: Previously, we demonstrated that systemic administration of 50ng calcitriol thrice weekly significantly improved human fat graft retention across multiple donors in a mouse xenograft model. Our current in vivo data suggest 5000ng cholecalciferol is similarly effective. In-vitro assays show 62.5nM and 250nM cholecalciferol significantly increased adipose stromal cell viability compared to controls (85.3+/−2.9% and 87.7+/−3.7 versus 77.6+/−2.8%, respectively p<0.05). Analysis of final adipose 1,25(OH)2D3 concentration by ELISA showed both calcitriol and cholecalciferol treatments equally increased Vitamin D metabolite concentrations in all donors. qRT-PCR analysis of gene expression show that pro-survival autophagy is significantly increased by both cholecalciferol and calcitriol, though increased concentration of calcitriol was required to induce significant increases from controls.

Conclusion: Cholecalciferol (Vitamin D3) is a highly promising therapeutic for improving fat grafting outcomes. Our in vitro data suggests that in the context of hypoxia, nutrient depletion, or growth factor deprivation, such as occurs immediately following fat grafting, vitamin D3 promotes stromal cell autophagy. In this context, autophagy is crucial for maintaining cellular ATP production and macromolecular synthesis and, therefore, represents an essential pro-survival pathway which allows grafted cells to survive. The results herein provide evidence to incorporate vitamin D3 as a safe, cost-effective nutritional supplement into the peri-operative workflow to improve fat viability after grafting.

Four-flap Breast Reconstruction: Assessing Breast-q and Donor Site Morbidity in Bilateral Stacked Autologous Breast Reconstruction

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Purpose: Patients undergoing bilateral autologous breast reconstruction may benefit from increased flap volume using bilateral stacked deep inferior epigastric perforator (DIEP) and profunda artery perforator (PAP) flaps. Four-flap reconstruction patients are a unique population in which to compare donor site morbidity of the two most commonly used free flaps in breast reconstruction (DIEP and PAP). Our aim was to characterize the donor site morbidity and overall patient outcomes of four-flap breast reconstruction patients.

Methods: Retrospective chart review was performed for all patients undergoing four-flap breast reconstruction by two surgeons between 2014-2019 at a single academic medical center. Inpatient surgical site pain location and pain scores by Numeric Pain Rating Scale (NPRS) were recorded during the immediate post-operative admission. All patients were contacted to complete the B.Reast-Q reconstructive module and the Lower Extremity Functional Scale (LEFS). Four-flap BREAST-Q scores were compared to bilateral DIEP and to bilateral PAP patients as reference populations.

Results: A total of 63 patients undergoing four-flap breast reconstruction were identified. BREAST-Q (n=38) scores demonstrated mean Satisfaction With Breasts of 66.1+/−32.2, Psychosocial Well-Being 70.8+/−34.3, Sexual Well-Being 44.5+/−36.5, Physical Well-Being Chest 72.8+/−32.5, and Physical Well-Being Abdomen 63.6+/−34.9. In comparison to bilateral DIEP (n=180), and bilateral PAP reconstruction patients (n=43), four-flap BREAST-Q scores were similar. No difference in BREAST-Q scores remained after matching four-flap patients to bilateral DIEP patients by Age, Race, BMI, Zip Code, and radiation history. With regard to donor site morbidity, mean instances of donor site pain location recorded at the abdomen (9.72, 95%CI[7.78-11.66]) were significantly higher than the thigh (2.82, 95%CI[1.63-4.00]) during the post-operative admission (p<0.0001). Mean pain scores by NPRS were similar between abdomen, thigh, and breast surgical sites. Subjective survey data revealed more donor site pain at the PAP site, a patient preference for the DIEP donor site, and easier post-operative care for the DIEP donor site. Further, a majority of patients felt the thighs were aesthetically improved post-operatively (54.29%). Long term survey outcomes from the LEFS (n=35) demonstrated a mean score of 92.4% (SD 10.9). The majority of women would make the same decision for four flap breast reconstruction (81.82%).

Conclusion: This is the largest consecutive series of four-flap breast reconstruction outcomes reported to date. Patients undergoing four-flap breast reconstruction have more immediate donor site pain at the abdomen than the thigh, but more thigh pain after discharge home once ambulating. BREAST-Q scores in four-flap patients demonstrate overall high patient satisfaction that is similar to both bilateral DIEP and bilateral PAP reconstruction patients. In patients who require increased flap volume for body appropriate breast reconstruction, four-flap reconstruction is comparable to bilateral DIEP and bilateral PAP by BREAST-Q scores.