809 An Allogenic Fat-First Approach to Burn Reconstruction Mitigates Adhesion and Soft Tissue Deficit.

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Introduction: Adipose and adipose-derived stem cell therapies have met success as adjunctive treatment during burn reconstruction with well described benefit in the delayed-treatment of soft-tissue deficits. While the use of allogeneic skin is well-described, adipose tissues have typically remained autologous. Allogenic fat is not commonly used in burn care, however, in large, complex burns where autologous tissue is limited adipose may not be readily available for harvest or use. Understanding the efficacy of allogeneic tissues in this setting is critical to expand our reconstructive options. Here we describe a protocol utilizing allogeneic fat as well as examine the efficacy of this approach on burn-wound contractures, adhesions, and soft-tissue deficits.
Methods: Female, Yorkshire swine received 16, 4x4 cm full-thickness burns. After 48 hours, eschar was removed to fascia. Wounds were stratified to receive either A) No Reconstruction, B) Skin-Only, C) Fat-Only, D) Immediate-Skin, Delayed-Fat, or E) Immediate-Fat, Delayed-Skin. All fat utilized was allogeneic sourced from vendor-matched swine. At 8-weeks post-engraftment animals were sacrificed and all wounds were collected for photography, ultrasound, histology and serum studies.
Results: Use of allogeneic fat significantly improved terminal soft-tissue thickness under both immediate and delayed administration ($p < 0.05$). Immediate use of allogeneic fat significantly improved tissue mobility vs. untreated and skin graft controls ($p < 0.05$). Contracture was most significantly affected by timing of skin graft placement, however, could be further mitigated under standard delayed-fat approached with allogeneic tissue.
Conclusions: Here we demonstrate use of allogeneic fat in both traditional-delayed and a fat-first approach with significant mitigation of adhesion when applied as an initial basal layer. Both immediate and delayed allogeneic fat were sufficient to improve on soft tissue deficits.

810 Synthetic Platelet-Mimetics with Gentamicin: Outcomes in Deep Partial-Thickness Burns

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Introduction: Infection and prolonged inflammation in deep partial-thickness burns can lead to inadequate healing. In addition to their role in hemostasis, activated platelets also contain granules with anti-inflammatory properties which may impact wound healing. However, portability and storage of platelets remain a challenge. Synthetic platelet-mimetics (SPM) avoid these difficulties, but like natural platelets, SPM have vesicles that can transport bioactive agents, such as antibiotics. We sought to evaluate wound healing outcomes in deep partial-thickness burns treated topically with SPM.
Methods: A total of 30 circular, deep partial-thickness burns were created on the dorsum of 2 porcine models. Each wound measured 5cm in diameter and was standardized using a thermocoupled burn device. Sets of six wounds were randomized into five groups: SPM, gentamicin alone, SPM with gentamicin, a vehicle control (saline), or dry gauze (the standard of care, SOC). Additionally, two separate 5cm diameter circular areas were demarcated to serve as normal skin controls. Wounds were assessed at post-burn days 3, 7, 14, 21, 28, 60 and 90 with a variety of non-invasive imaging and punch biopsies. Treatments were re-applied at each assessment. The primary outcome was the amount of wound re-epithelialization, measured histologically, at post-burn day 28. Secondary outcomes consisted of the percentage of wound contraction, amount of superficial blood flow, and mean bacterial load.
Results: The amount of wound re-epithelialization in wounds treated with SPM was 96% whereas those treated with the SOC measured only slightly less at 92% ($p = 0.56$). The percentage of wound contraction was 39% in the SPM with gentamicin group, while in the SOC group contraction was higher at 45% ($p = 0.20$). Moreover, superficial blood flow in the SPM group was measured to be 168% of normal skin controls, while wounds in the SPM with gentamicin group were slightly lower at 160%, and in wounds treated with the SOC blood flow was 110% of normal skin controls ($p = 0.27$). The mean bacterial load in each group was measured at post-burn day 3 and notably consisted of bacterial load being the lowest in wounds treated with gentamicin alone at 17/100, meanwhile in wounds treated with the SOC or those in the SPM with gentamicin group, mean bacterial loads were significantly higher at 43/100 and 47/100, respectively ($p = 0.02$).
Conclusions: SPM applied to deep partial-thickness burns did not significantly improve measured outcomes over the