812 Evaluation of Dermal and Epidermal Replacement Strategies for the Treatment of Full-thickness Wounds

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Introduction: In full-thickness (FT) wounds, autologous skin cell suspension (ASCS) is used in combination with widely meshed split-thickness skin grafts (mSTSGs) to obtain definitive closure, reducing donor skin requirements compared to traditional autografting (AG) techniques. In the treatment of these wounds, dermal matrices (DMs) are also often utilized to address various challenges including need for temporization, mitigation of contour defects, covering avascular structures, and modulation of scar formation. Varying DMs exist and are composed of different biologic and synthetic materials designed to address these clinical needs. The purpose of this study was to compare outcomes obtained in FT wounds using 3 different DMs coupled with ASCS+mSTSG in immediate or delayed AG procedures.
Methods: A FT excisional porcine wound model was used. DMs evaluated included a single-layer dermal matrix composed of bovine dermal collagen and elastin (Col/E), a bilayer construct composed of a bovine collagen-glycosaminoglycan with a silicone epidermal layer (Col/GAG), and a synthetic bilayer polyurethane DM (Poly/U).
DMs were applied, managed, and grafted following manufacturer's recommendations. AG included ASCS+mSTSG (1:80 expansion, 3:1 mesh). Wounds were evaluated for inflammation, infection, DM take, AG take, re-epithelialization, and contracture over 49 days post-excision. Additionally, biopsies were evaluated to further inform tissue generation and healing outcomes.
Results: Results related to healing outcomes are reported in the table below. Inflammation at wound margins was noted during acute phase of healing for all DMs and visual cues for infection were noted in 1 wound for Col/E, 3 wounds for Col/GAG causing partial loss of DM, and 1 wound for Poly/U. All signs of infection were resolved by day 14.
Conclusions: ASCS+mSTSG can be used successfully over DMs composed of various materials in both immediate and delayed AG procedures. No difference was observed on percent AG take between the DMs, however the data suggest that time to definitive closure is impacted based on utilized DM and AG strategy, with potential implications on contracture.

813 Histologic Changes of Skin Biopsies After Autologous Skin Cell Suspension

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Introduction: Over 10,000 cases of autologous skin cell suspension have been performed around the world for the treatment of burn and soft tissue injuries. A key component of the procedure is the harvest of skin biopsies which are exposed to enzymatic degradation. In some regions, epidermal graft harvest has been attempted manually without enzymatic degradation. Our study goal was to examine the histologic changes of the skin biopsies in manual versus enzymatic degradation.
Methods: Our study was an IRB-approved, prospective controlled analysis of residual skin harvested from 10 patients undergoing hernia repair. Two specimens from each patient were procured intraoperatively with each measuring 2x3cm. Each specimen produced two 4mm punch biopsies from three regions (control, mechanical, and enzymatic) for a total of 12 specimens per patient. Enzymatic specimens were prepared using the Avita Medical ReCell® system per manufacture instructions for use. Mechanical specimens were prepared using an abrasive pad until epidermis was macroscopically removed. Histologic analysis was performed with hematoxylin and eosin stain and whole slide scanning. Two or more investigators reviewed each biopsy concurrently with consensus agreement on the remaining epidermis and evidence of degraded reticular dermis. Descriptive statistics were used to assess the variances in the three groups.
Results: The mean residual epidermis was 9% in the enzymatic group, 35% in the mechanical, and 98% in the control. Epidermal harvest was higher in the enzymatic group relative to the mechanical group (two tailed t-test = 0.0008). Reticular dermis was degraded in 10% of the mechanical specimens and none of the enzymatic specimens.
Conclusions: Epidermal harvest was more consistent in the enzymatic group with less trauma to the dermis. Our study suggest that mechanical harvest requires larger donor sites given the decreased epidermal harvest. Further research is needed to determine impact of cell isolation technique on autograft cell suspension viability and distribution of cell types harvested.