ZOOGRAFTING - A HISTORY OF XENOGRAFTS IN BURN TREATMENT AND CARE

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Introduction: In the U.S., over half a million patients require burn treatment annually. Non-fatal burns constitute a major cause of morbidity, including but not limited to disfigurement, disability, extended hospitalization, and stigmatization. While wound debridement, excision, and autologous tissue transfer is the gold standard of burn treatment, patients with extensive burns often lack sufficient eligible skin in the acute setting.

Skin allografts are thus often used as temporary additional burn dressings; however, they have significant drawbacks including limited supply, increased risk of pathogen transmission, and high cost. While synthetic dressings, such as dermal substitutes and acellular products, are also regularly used and have the potential benefit of long-standing wound coverage, they do so at the expense of time, high cost, and easy injury.

As the current field of burn care emphasizes early intervention and long-term burn wound function, the need for autologous skin graft substitutes remains. Skin xenografts are promising as they distinctively serve as temporary low-cost, non-limited supply, and large dressing-size collagen prostheses for patients with large-scale burns and insufficient autografts.

Methods: This presentation will describe a literature review of the development, advancement, and implementation of zoografting, thereby providing a history of skin xenotransplantation in burn treatment.

Figure 1. Porcine skin.

Figure 2. Burn patient.

Results: Beginning in the 16th century, frog skin xenografts were performed, and have continued in Brazil and Vietnam where allograft shortages persist. The first recorded skin xenotransplant in the U.S. occurred in 1880 in Boston by Dr. E. W. Lee who transplanted sheep skin to the back of a young girl with extensive burns. While unsuccessful, it inspired others to attempt xenograft burn treatments with pigeons, rats, rabbits, cats, dogs, pigs, and cows. Initial procedures failed as success was defined as permanent tissue survival.

Notably, in 1951, the field transformed when Silvetti and colleagues proposed bovine skin xenotransplants as a temporary biological dressing. In the 1960s, porcine xenografts gained popularity due to longer wound adherence, room temperature storage, and improved joint mobility. Bovine and sheep skin xenografts were later refined. Since 2016, the Instituto Doutor José Frota in Brazil has successfully used tilapia skin xenografts.

Conclusion: A history of xenografts in burn treatment remains naive in the literature. An understanding of early xenograft use may serve as a nidus for future efforts toward decreasing morbidity.

Figures 3, 4, 5. Before, during, and 17 days after tilapia xenograft, respectively.