

Norfolk's Mermaid Magic: Use of Acellular Fish Skin Substitute (AFSS) in Pediatric Burn Wounds

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Introduction

- A major challenge in full thickness pediatric burn management is the limited availability of donor skin for autografts.
- AFSS is a decellularized North Atlantic codfish skin which acts as a dermal matrix, fostering dermal cell and capillary adhesion.
- Less processing is required compared to mammalian skin substitutes, which allows preservation of omega-3 polyunsaturated fatty acids that may help with anti-inflammatory properties and reduce pain.

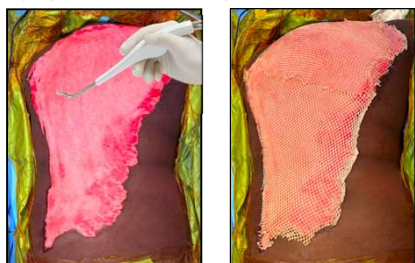


Figure 1. Operative Technique. Burn depth was determined by surgeon. Burn excision was generally performed using hydrosurgery technique.

Purpose

- Describe our early experience using AFSS in pediatric deep partial thickness and full thickness burn wound management.
- Identify potential pediatric burn wounds amenable to the use of AFSS.

Inclusion Criteria

- Patients under 18 years of age who received AFSS as part of their burn management from January 2024 – March 2025.

Methods

- Patient demographics, burn characteristics, and initial management were recorded.
- Outcomes include time to complete re-epithelialization, Vancouver score, hypertrophic scar formation, and need for additional burn related procedures.
- Statistics: Mann-Whitney U with 2 tail probability, Fisher exact test with 2 tail probability, p values ≤ 0.05 .

Demographics

- 15 patients met inclusion criteria.
- Most common burn locations were arms (n=10), hands (n=7), chest (n=5), and feet (n=5).

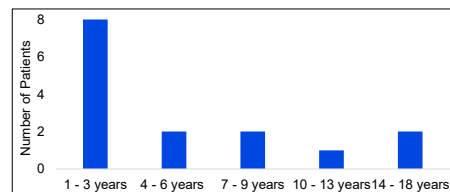


Figure 2. Age of Patients. Of the 15 patients included in this case series, the ages ranged from 1-16 years. The median age was 3.2 ± 5.2 years.

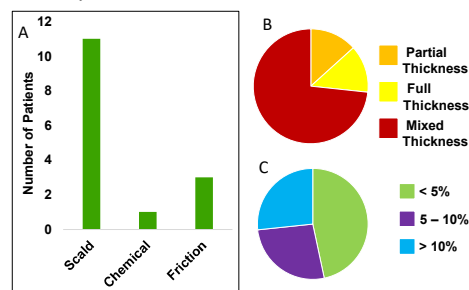


Figure 3 A-C: Burn Classifications. **A. Burn Etiology:** The majority (n=11) of burn were classified as scald/thermal. **B. Burn Depth.** Most of the burns were a mix of partial and full thickness burns, with 2 as entirely partial thickness (2nd degree). **C. Burn Total Body Surface Area (TBSA).** TBSA ranged from 0.5 – 16%. Majority (n=7, 47%) had a TBSA of less than 5%.

Results

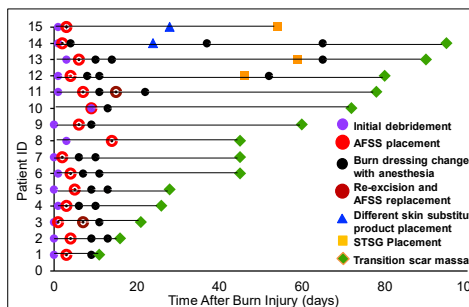


Figure 4. Timeline of Patients' Recovery. Day 0 represents the day of the initial injury for each patient. The day of transition to scar massage (green diamond) represents time to complete re-epithelialization.

- The majority of patients required inpatient care n=13 (87%) with a median hospital LOS of 5.0 ± 5.2 days; 3 patients (20%) required ICU stay.
- The median time from injury to burn excision with AFSS placement was 4 ± 3.2 days.
- 3 patients required Split Thickness Skin Grafts, 2 underwent a change to a different skin substitute, and 2 underwent scar reconstruction.
- The median time to re-epithelialization was 45 days, which divided our cohort for further analysis

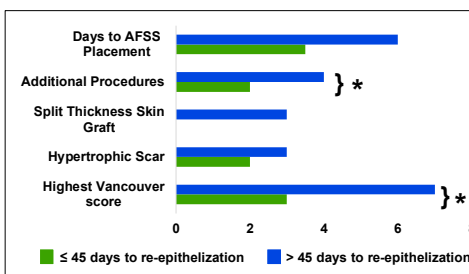
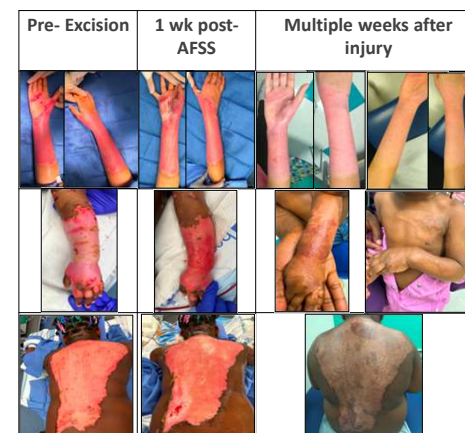


Figure 5. Improved Outcomes with Early Re-epithelialization. Asterisk (*) denotes p=0.05. Patients who achieved early re-epithelialization in less than 45 days had significantly lower Vancouver scores and required significantly fewer additional burn related procedures. There was no significant difference in time to AFSS placement. All 3 patients who required autograft achieved re-epithelialization in greater than 45 days.

Discussion

- This is among the largest studies of AFSS in pediatric burn wound management.
- 77% of patients with full thickness burns avoided skin grafting entirely.
- Hypertrophic scar formation and cosmetic outcomes were very favorable, with only 2 patients undergoing scar reconstruction.
- AFSS represents an excellent tool for small, partial and full thickness pediatric burn wounds.



- Multiple surgeons from 2 surgical services used AFSS with varying techniques, which may have impacted the outcomes. Future studies will aim to standardize management with AFSS and compare to other treatments.

References

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