VOX PORCINE WOUND HEALING STUDY

2-LOG REDUCTION IN BIOBURDEN

Effects of Combined Negative Pressure Wound Therapy and Topical Oxygen on Bioburden and Tissue Healing in a Porcine Mode, August 2023 | L. Lavery DPM, A. Killeen DPM,M Wright-Carter DVM, University of Texas Rio Grande Valley

Clinical Benefits Observed

Rapid Bioburden Reduction: 2-log reduction in S. aureus by Day 7 with combined therapy (vs. minimal change with iNPWT alone).

Enhanced Tissue Quality: Sustained angiogenesis (Factor VIII) and progressive collagen maturation (Masson's trichrome scores 3-4).

Consistent Contraction: All combined therapy wounds achieved ≥50% area reduction by Day 11, demonstrating reliable early healing response.

2-Log Reduction

Decrease in bacterial burden by Day 7

Optimized

Increased microvascular density & collagen

93% PWAR

Max wound area reduction by Day 28

Conclusion & Recommendation

Combined NPWT + Topical Oxygen is a promising strategy for contaminated or hypoxic wounds. In this porcine model, it effectively **reduced bioburden** and supported **angiogenesis & collagen organization**.

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Mechanisms & Clinical Benefits

How Combined Therapy Works

The Synergistic Effect

NPWT optimizes mechanics & fluid dynamics while TOT fuels metabolic repair. Together they enhance bacterial clearance and matrix organization beyond either modality alone.

Negative Pressure (NPWT)

Promotes macro/micro-deformation. Removes exudate/edema, improves perfusion gradients (-125 mmHg).

Topical Oxygen (TOT)

Corrects local hypoxia. Supports ATP production, collagen synthesis, angiogenesis, and ROS-mediated bacterial killing.

Study Overview

28-DAY PILOT

Model Design
4 Yorkshire-cross pigs, 8 standardized 5-cm full-thickness dorsal wounds.

Therapies Tested
NPWT Alone vs. Combined NPWT + Topical Oxygen (various cycles).

Infection Arm
Inoculated with 1×10^6 CFU/mL *S. aureus* under occlusion pre-therapy.

Key Endpoint
16S rRNA Bioburden.

Key Findings Summary

Decreased Bioburden
Combined therapy showed rapid bioburden reduction vs. minimal change with standard NPWT in contaminated wounds.

Improved Tissue Quality
Histology revealed enhanced angiogenesis and more mature collagen architecture in combined therapy groups.

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