

Case Series: Multi-Modality Topical Oxygen Therapy in the Treatment of Complex Chronic Wounds

Christina Harman, PA-C - PRISMA Health Wound Healing and Hyperbaric Medicine Center

Background: Chronic, non-healing wounds present significant clinical challenges, particularly in patients with complex comorbidities and a history of failed conventional therapies. Multi-Modality Topical Oxygen Therapy (ITOT)*, which concurrently delivers cyclical compression and pressurized topical oxygen, has emerged as a promising adjunctive wound healing therapy. This case series evaluates the effectiveness of ITOT therapy in three patients with recalcitrant chronic wounds of varying etiologies.

Figure 1:
ITOT device



Methods: Three patients with longstanding, nonhealing lower extremity wounds were treated at a wound care center after failing multiple standard and advanced wound care interventions. ITOT therapy was initiated as adjunctive treatment, often in combination with CTPs and compression therapy. Wound dimensions were serially measured, and relevant laboratory and imaging studies were reviewed to monitor progress and exclude complicating factors such as osteomyelitis.

Results: All three patients demonstrated significant wound healing following the initiation of ITOT therapy. **Case 1**, a 71-year-old male with PAF, chronic diastolic CHF, diet-controlled DM, aortic stenosis, dementia, malnutrition, and ASCVD, presented with a three-year-old right ankle pressure injury and concurrent left medial heel pressure injury. Prior treatment included debridement, NPWT, two failed STSGs, and 21 HBO treatments. The patient refused amputation, leaving no remaining surgical options. ITOT was initiated alongside CTP applications. Despite intermittent setbacks due to difficulty in maintaining consistent pressure relief, the wound achieved full closure at treatment week 28, with concurrent resolution of the left medial heel and additional pressure injuries. **Case 2**, a 57-year-old wheelchair-dependent female with morbid obesity, T2DM, HFrEF, lymphedema, peripheral neuropathy, and refractory Charcot foot osteomyelitis, presented with a plantar midfoot ulcer of 2.5 years' duration.

CASE 1



CASE 2a



CASE 2b

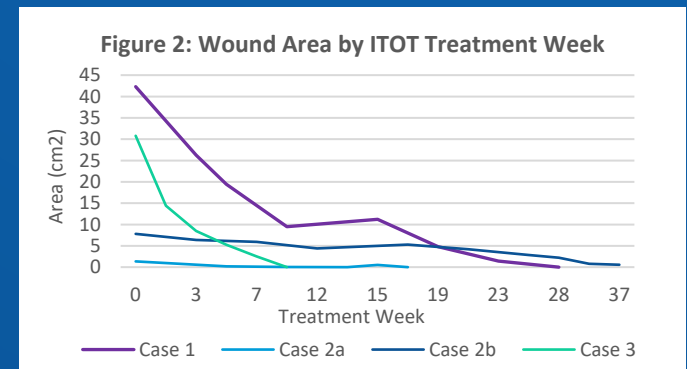


CASE 3



Her history included surgical reconstruction, hardware removal due to recurrent infections, failed surgical closure attempts, two 6-week courses of IV antibiotics, TCC offloading, and NPWT. She declined amputation. First ITOT Episode (**Case 2a**): The wound responded rapidly, decreasing in size to 0.1 cm x 0.1 cm by week 17, at which time ITOT was discontinued. Over the subsequent 5 months the wound reopened and deteriorated. A second course of ITOT was initiated (**Case 2b**) in conjunction with offloading and CTP applications. Her wound has progressed steadily, despite undergoing weight reduction surgery. She has avoided further hospitalization, and complete wound closure remains the treatment goal. **Case 3**, a 73-year-old male with HFrEF, CAD, T2DM, lymphedema, and PAD with h/o multiple revascularization procedures, and right BKA, presented with a non-healing left TMA wound. Initial treatment included debridement, NPWT, collagen, offloading, and multi-layer wraps. The final two months of treatment included 4 weeks of ITOT and 3 CTP applications, with continued compression and offloading. The wound achieved full closure at week 12 (week 8 post ITOT start), thereby avoiding major amputation.

Conclusion: ITOT therapy, as an adjunct to standard and advanced wound care, facilitated wound healing in three patients with complex, chronic wounds unresponsive to prior treatments. These cases highlight the potential of ITOT to promote closure and limb salvage in high-risk populations. Further studies are warranted to confirm these findings in larger cohorts.



*TWO2, AOTI, Inc, Oceanside, CA