

The Use of Technological Therapies in the Treatment of Severe Ankle Trauma Complications Following a Motor Vehicle Accident

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Objective: To report a successful case using technological therapies in the treatment of complications arising from severe ankle trauma following a motor vehicle accident.

Methods/Case Report: Female patient, 29 years old, with no known comorbidities, was admitted to a tertiary public hospital in Londrina, Paraná, Brazil, on April 6, 2024, following a motorcycle versus car collision. She presented with an open fracture of the left ankle and extensive laceration of the left leg, undergoing emergency surgery with external fixation on the same day. On April 9, 2024, she was transferred to a tertiary philanthropic hospital in the same city, where she exhibited an extensive surgical wound with diffuse hematomas, blisters, hematic and purulent exudate, foul odor, and necrotic areas along the surgical incision (Figure 1).



Figure 1 - April 9, 2024

On April 13, 2024, the patient underwent external fixator exchange and surgical debridement, revealing an extensive posterior leg wound (Figure 2). Hyperbaric Oxygen Therapy (HBOT) was initiated on April 14, 2024. On April 25, 2024, Negative Pressure Wound Therapy (NPWT) with non-silver foam was started. Four NPWT dressing changes were performed, the last on May 8, 2024, achieving wound leveling with the perilesional skin. On May 22, 2024, the external fixator was removed, and an Ilizarov fixator was applied. The patient was discharged after less than 30 days of hospitalization.

Following NPWT discontinuation, wound care continued with non-alginate hydrogel, sterile gauze, and bandaging every 24–48 hours. HBOT was concluded on June 17, 2024, after 47 sessions, with near-total wound epithelialization.

The Ilizarov device was removed on August 22, 2024, and a plate was placed on November 7, 2024, to treat pseudoarthrosis. Final discharge by the orthopedic team occurred in January 2025.



Figure 2 - April 13, 2024

Results: The patient showed excellent clinical recovery, with complete wound epithelialization within 3 months and orthopedic resolution in less than 12 months, without complications. A total of 47 HBOT sessions at 2 Atmospheres Absolute (ATA) for 90 minutes each and four NPWT dressing changes at -120 mmHg were performed, demonstrating a significant short-term improvement considering the trauma complexity. The sequence of photos below (Figure 3) shows the clinical progress in May and June, 2024.



Figure 3 - May and June, 2024

The last picture shows like is the patient in April, 2025 (Figure 4)



Figure 4 - April, 2025

Conclusion: The combination of technological therapies such as HBOT and NPWT proved effective in managing severe post-traumatic complications by promoting infection control, granulation tissue formation, and accelerated healing. This case reinforces the importance of multidisciplinary management and the use of advanced therapies for complex wounds, achieving better clinical outcomes and reducing hospitalization time.

Keywords: Hyperbaric oxygen therapy; Tissue compromise; Total mastectomy; Wound healing; Breast surgery complications