Low-frequency, Therapeutic Ultrasound* Treatment Resolved Necrosis and Undermining in Nonhealing Trauma Wounds

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Background: Nonhealing wounds can develop necrosis, which promotes bacterial infection, inhibits the development of granulation tissue necessary for healing, and can lead to undermining that destroys underlying tissues. New treatments are needed for wounds that do not respond to conventional treatments. Low-frequency, therapeutic ultrasound (LFTU) waves delivered via sterile saline mist have proven efficacy in clinical studies of nonhealing wounds.[1,2]

Methods: We conducted this case series study to assess the clinical effectiveness of LFTU treatment for trauma-related, nonhealing wounds that developed necrosis and undermining despite standard wound care. We evaluated the effectiveness of LFTU through changes in wound bed characteristics, including percent granulation, size, and extent of undermining and exudate. Treatment with LFTU was an adjunct to standard care.

Results: Three consenting, female patients, 44-78 years old, received LFTU treatments 2-3 times weekly for 2-4 minutes per session. Wounds were due to lower-extremity injuries (2) and abdominal surgery (1). Patient comorbidities included serious psychiatric disorders, diabetes, irritable bowel syndrome, hypertension, lymphoma, and anemia. Patients also received appropriate moist dressings and antibiotic treatment (1 wound was MRSA-infected).

Treatment with LFTU successfully debrided wounds of necrotic tissues, rapidly increased granulation tissue development and decreased wound size. After 7-8 weeks of LFTU treatments, wounds were completely granulated, undermining was eliminated, and exudates and infections were cleared. All wounds resolved to closure.

Discussion: LFTU accelerated healing in nonresponsive trauma wounds through debridement of necrotic tissues and cleansing of undermined areas, allowing granulation tissue to develop and wounds to close.

References:

[1]Ennis WJ, Formann P, Mozen N, et al. Ultrasound therapy for recalcitrant diabetic foot ulcers: results of a randomized, double-blind, controlled, multicenter study. Ostomy Wound Manag 2005;51(8):24-39.

[2]Kavros SJ, Miller JL, Hanna SW. Treatment of ischemic wounds with noncontact, low-frequency ultrasound: the Mayo clinic experience, 2004-2006. Adv Skin Wound Care. 2007;20(4):221-6.

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Patient #1: Lower Left Leg

- 64-year-old woman with traumatic lower left leg wound.
- History of hypertension.
- Wound had undermining and necrotic tissue.
- Initial treatment: antimicrobial, bacteriostatic, and compression dressings, plus 1 pulsed lavage treatment.
- LFTU was initiated after 6 weeks of nonresponse to conventional treatment.
- Time to 100% granulation tissue: 3 weeks.
- Total LFTU treatments: 21.

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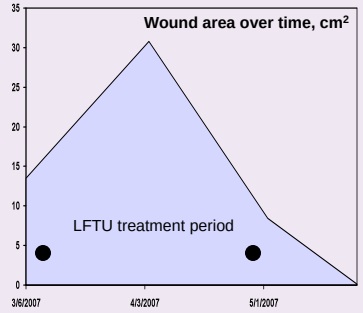

Patient #2: Abdomen

- 44-year-old woman with a 2-month history of nonhealing post-surgical incision with undermining from an abdominal hysterectomy.
- History of type 2 diabetes, irritable bowel syndrome, obsessive compulsive disorder, depression, panic disorder, and borderline personality disorder.
- Concomitant medications: omeprazole, ondansetron, cyclobenzaprine, and quetiapine.
- Wound became infected with methicillin-resistant *Staphylococcus aureus.*
- LFTU was initiated 2-3 times weekly for 4-minute sessions.
- Time to 100% granulation: 6 weeks.
- Total LFTU treatments: 19.

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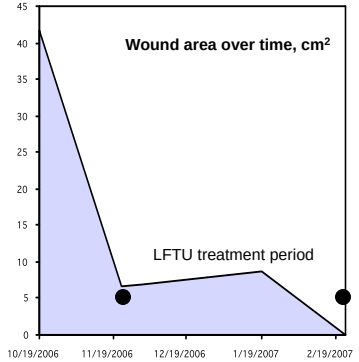
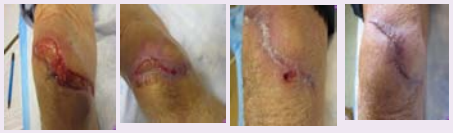


Patient #3: Right Knee

- 78-year-old woman with laceration wound to her right knee caused by a fall.
- History of dementia, squamous cell cancer (face), lymphoma, and hemolytic anemia.
- Patient presented too late for effective suturing. Wound was necrotic with signs of infection.
- Initial treatment: sharp debridement and wet-to-dry dressings
- LFTU was initiated 3 times weekly for 3-4–minute sessions with antimicrobial, bacteriostatic, and adhesive foam dressings.
- Time to 100% granulation: ~11 weeks.
- Total LFTU treatments: 26.



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