

[O11] CLINICAL AND MICROBIOLOGICAL OUTCOMES AFTER SEQUENTIAL LOW-FREQUENCY ULTRASOUND WOUND DEBRIDEMENT OF NEUROISCHEMIC DIABETIC FOOT ULCERS

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Aim: To evaluate the effectiveness of wound debridement with low-frequency-ultrasound used in combination with a super-oxidized solution to remove biofilms, and control bio-burden in neuroischemic diabetic foot ulcers.

Method: 17 outpatients (15 male, 2 female) with neuroischemic diabetic foot ulcers Texas 2D, which had been present for 7.26 ± 6.9 months, were involved in this single center prospective study. Ulcer treatment included weekly sessions with low-frequency ultrasound (LFUS) used in combination with a super-oxidized solution during six weeks treatment time. Moist wound dressings were applied between debridement procedures. Soft tissue punch biopsies (3mm) were taken before and after each debridement session for qualitative and quantitative microbiological analysis. Wound conditions were assessed weekly using a validated wound scoring method.

Results/Discussion: Analysis of tissue samples showed poly-microbial bacterial presence in 70% (n=12), and mono-microbial bacterial presence in 30% (n=5) of our patients. Seven different bacteria species were isolated including biofilm builders such as *Pseudomonas aeruginosa*. A significant reduction of bacterial presence was detected after each debridement session, with $5,7 \pm 1,6$ vs. $4,5 \pm 1,6$ Log CFU/g tissue ($p < 0.001$) after the first; $6,2 \pm 1,8$ vs. $4,4 \pm 1,9$ Log CFU/g tissue ($p = 0.005$) after the second, and $5,2 \pm 1,1$ vs. $4,1 \pm 1,7$ Log CFU/g tissue ($p = 0.008$) after the third debridement session. The mean total bacterial load reduction before and after debridement sessions was $5,57 \pm 1,1$ and $4,3 \pm 1,5$ Log CFU/g tissue ($p < 0.001$) respectively. The mean relative bacterial load reduction effect after each LFUS debridement session was $1,26 \pm 0,9$ Log CFU/g tissue after the first, $1,763 \pm 1,8$ Log CFU/g tissue after the second and $1,1 \pm 1,1$ Log CFU/g tissue after the third session. As a result of significant reduction of bacterial presence, wound conditions improved markedly showing significant differences in wound scoring (Wollina score) between patient admission and end of treatment with 2.58 ± 1.2 vs. 5.08 ± 1.92 scoring points ($p < 0.001$) respectively.

Conclusion: Sequential wound debridement of neuroischemic diabetic foot ulcers with LFUS used in combination with a super-oxidized solution reduces bacterial load significantly, not only right after debridement but also during the complete period of treatment in a cumulative way. Sequential wound debridement with LFUS improves wounds conditions, which can be associated with a decreased bacterial load. Measured effects of significant bacterial load reduction are independent to the bacterial species, acting in the same way against every type of bacteria, including resistant bacteria strains. Sequential wound debridement with LFUS can avoid the use of antimicrobials and antibiotics and therefore reduce the probability of bacteria to develop resistance.