WOUND HEALING

ASSESSMENT OF BACTERIAL BIOFILM PRODUCTION AND DRUG RESISTANCE PROFILE FOR THERAPEUTIC MANAGEMENT OF INFECTED CHRONIC ULCERS

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Introduction: Bacterial biofilm is a key factor contributing to delayed wound healing and associated with increased antimicrobial drug resistance. The necrotic tissue and debris promote bacterial attachment, and Chronic ulcers (CU) are susceptible to infection due to impaired host immune response. Therefore, establishing the role of pathogenic biofilms in CU will help to guide a more efficient diagnosis and targeted therapeutic intervention.

Objective: In this study we aimed at developing a novel clinical protocol for the rapid microbiological assessment of biofilm production and antibiotic tolerance and at exploring their role in sustaining bacterial invasion and persistence in patients with CU.

Materials and Methods: 150 patients were enrolled in the study. Microbial identification was performed by MALDI-TOF and drug susceptibility was determined by broth microdilution tests. Biofilm production of was assessed by the clinical BioFilm Ring Test (cBRT). The antibiotic susceptibility profile on biofilm-growing bacteria was further obtained by the Anti-Biofilm Test (ABT).

Results: A total 246 bacterial strains were identified. Gram-negative bacteria were the most represented microorganisms (61%). Nevertheless, considering individual bacterial species, Staphylococcus aureus was the most common pathogen (35.8%), followed by Pseudomonas aeruginosa (16.7%). 78.7% of the strains were moderate/high biofilm producers, while most of the weak biofilm producer bacteria were found in polymicrobial colonization in association with strong biofilm producer strains. The level of biofilm production correlated with a consistent reduction of the effective antibiotic options. Aminoglycosides were the most active antibiotics against biofilm-growing Gram-negative bacteria, whereas oxacillin and fusidic acid showed a good penetration in Staphylococcus aureus biofilm.

Conclusions: Moderate/high biofilm producers were isolated in most CU thus promoting bacterial persistence and antimicrobial tolerance. The assessment of biofilm strength combined with the antibiotic profiling of biofilm growing bacteria may help direct a targeted therapeutic intervention in CU, improving the clinical outcome of these difficult infections.