The Use of pure Hypochlorous Acid (pHA) based Wound Cleanser as a Wound Bed Preparation and Cleansing Agent for Use with Skin Substitutes

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Introduction

The use of skin substitutes is a widely adopted practice in the management of wounds including diabetic foot ulcerations. Their use can dramatically reduce healing times with health, economic, and quality of life benefits. The wound bed should be cleansed before advanced grafts are used. The healing may take weeks while the dermal defect is repaired, wound cleansing is of critical importance until the wound is healed. A pure hypochlorous acid preserved wound cleanser (HAPWOC) is evidence-based and supported by new consensus guidelines. Here, the author presents a case series that captures the experience of the use of HAPWOC with a bioactive human allograft skin substitute.

Methods

The author presents three cases of diabetic foot ulcerations that were treated at the author's institution. The wounds failed standard wound care. Advanced tissue techniques with a bioactive human allograft skin substitute were used to aid in wound closure. For each case, the author prepared and provided a final wash to the wound with pHA based cleanser, and then applied the skin substitute per manufacturer's directions of use. Patients in this case series were offloaded with a CAM walker. The wounds were seen weekly, the wounds cleansed again with pHA and at our discretion, reapplication of the skin substitute until wound closure.

Pathogenic Bacteria	Log^{10} Control	Vashe Log Reduction	Time Kill @ Second Contact (% Kill)
Methicillin Resistant Staphylococcus aureus (MRSA)	6.20	≥5.20	≥99.999%
Vancomycin Resistant Enterococcus faecalis (VRE)	6.20	≥5.20	≥99.999%
Escherichia coli	6.28	≥5.28	≥99.999%
Acinetobacter baumannii	6.15	≥5.15	≥99.999%
Bactericides fragilis	6.66	≥5.66	≥99.999%
Candida albicans	6.63	≥5.63	≥99.999%
Enterobacter aerogenes	6.43	≥5.43	≥99.999%
Enterococcus faecium	6.08	≥6.08	≥99.999%
Haemophilus influenzae	6.59	≥5.59	≥99.999%
Klebsiella oxytoca	6.18	≥5.18	≥99.999%
Micrococcus luteus	6.04	≥6.04	≥99.999%
Proteus mirabilis	6.40	≥5.40	≥99.999%
Pseudomonas aeruginosa	6.11	≥5.11	≥99.999%
Serratia marcescens	6.08	≥5.08	≥99.999%
Staphylococcus epidermidis	6.69	≥5.69	≥99.999%
Staphylococcus haemolyticus	6.57	≥5.57	≥99.999%
Staphylococcus hominis	6.68	≥5.68	≥99.999%
Staphylococcus saprophyticus	6.68	≥6.68	≥99.999%
Staphylococcus pyogenes	6.53	≥5.53	≥99.999%
Klebsiella pneumoniae	6.70	≥5.70	≥99.999%
Micrococcus luteus	6.04	≥6.04	≥99.999%
Proteus mirabilis	6.40	≥5.4	≥99.999%

Figure 1: In vitro time kill assay test results measuring pathogenic colony log reductions in hypochlorous cleansing solution (courtesy of Urgo Medical North America)

Results

We achieved total wound closure in all three patients.

Representatative Cases

52-year-old male with chronic diabetic ulceration sub-IP joint of great toe x 8 months that failed standard wound care. PMHx: DM2, peripheral neuropathy, HTN, CAD, hyperlipidemia, and chronic nicotine use. Wound bed preparation with HAPWOC prior to application of human allograft. DFU closed with 3 human allografts.

Representatative Cases

78-year-old male with a chronic non-healing wound. PMHx: DM2, ESRD on HD, PAD, neuropathy, HTN, CAD, and MI. Prior diabetic foot infection, taken to the OR for an open 5th ray amputation. Patient referred to the author for 2nd opinion. Non-invasive vascular studies: ABI of 0.36, toe pressure of 17 mmHg, arteriogram with intervention including angioplasty and stent placement. Wound bed preparation with HAPWOC prior to application of human allograft. Wound closed with 8 human allografts.

Non-healing wound upon presentation to the author and before arteriogram with intervention

Representatative Cases Continued

Discussion

The author believes that the synergy of the non-cytotoxic, effective pHA based cleanser coupled with the regenerative properties of the allograft skin substitute provided the best possible care for these challenging wounds. The pHA cleanser is a quickly acting cleanser, with no lingering cytotoxicity and product incompatibility based on our understanding of the product chemistry.

Trademarked Items

pHA Cleanser: Vashe Wound Cleanser, Urgo Medical North America

References

International Wound Infection Institute (IWII) Wound Infection in Clinical Practice. *Wounds International* . 2022.

Ericksson E., Liu PY, Schultz GS, et al. Chronic Wounds: Treatment consensus. Wound Rep Reg, 2022; 1-16.doi:10.1111/wrr.12994

Harriott MM, Bhindi N, Kassis S, Summitt B, Perdikis G, Wormer BA, Rankin TM, Kaoutzanis C, Samaha M, Stratton C, Schmitz JE. Comparative Antimicrobial Activity of Commercial Wound Care Solutions on Bacterial and Fungal Biofilms. Ann Plast Surg. 2019 Oct;83(4):404-410.

Robson MC. Treating chronic wounds with hypochlorous acid disrupts biofilm. Wound Prevention and Management 2020;66 (5):9-10.

Sauer K, Thatcher E, Northey R, Gutierrez AA. Neutral super-oxidised solutions are effective in killing P. aeruginosa biofilms. Biofouling 2009;25(1):4554.

Armstrong DG, Bohn G, Glat P, et al. Expert recommendations for the use of hypochlorous solution: science and clinical application. Ostomy Wound Manage. 2015;61(5):S2–S19.