The antimicrobial efficacy of a silver alginate dressing against a broad spectrum of clinically relevant wound isolates

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Abstract

Wound dressings impregnated with silver have a role to play in aiding to reduce both the dressing and wound microbial bioburden. It is therefore imperative that antimicrobial wound dressings have efficacy on a broad range of clinical significant microorganisms. Accordingly, this study aimed to determine the antimicrobial efficacy of a silver alginate dressing against 115 wound isolates that had been isolated routinely from patients at West Virginia University Hospital. Standardised corrected zones of inhibition (CZOIs) were performed on all clinical isolates. It was found that the silver alginate dressing was able to inhibit the growth of all microorganisms tested. In particular, the silver alginate dressing inhibited the growth of Candida albicans and yeasts with CZOI of 3–11·5 mm. All meticillin-resistant Staphylococcus aureus (MRSA) strains were found to be sensitive to the silver alginate dressing with a CZOI range calculated at 3–7·8 mm. Sensitivity to the silver alginate dressing was also evident for S. aureus and vancomycin-resistant Enterococci. CZOIs of 4·25 mm were calculated for Enterococcus faecium and 9·8 mm for viridans streptococcus. The bacteria which demonstrated the highest tolerance to ionic silver included Enterobacter cloacae and Acinetobacter baumannii. Contrary to this the most responsive microorganisms to ionic silver included strains of staphylococci, viridans streptococcus and Candida albicans. No antibiotic-resistant isolates, as identified by Kirby Bauer Clinical Laboratory Standards Institute classification system, were found to be resistant to ionic silver. When a selected number of microorganisms were grown in the biofilm phenotypic state enhanced tolerance to silver was observed, compared to their non biofilm counterparts. Overall, this study has demonstrated the broad antimicrobial activity of a silver alginate dressing on wound isolates grown in the non biofilm and biofilm state. This finding is clinically relevant as both the non biofilm and biofilm phenotypic states of microorganisms are evident in wounds and therefore significant to delayed healing. Consequently, it is imperative that antimicrobial wound dressings demonstrate antimicrobial activity against microorganisms in both phenotypic states

Key Sound bites

- Overall this study demonstrated the broad antimicrobial activity of a silver alginate dressings on wounds isolates (bacteria) grown in the Biofilm and Non-Biofilm state.
- SeaSorb Ag offers equivalence to market leader with data to reinforce the benefit of SeaSorb Ag antimicrobial activity

Availability of papers

- Poster published at SAWC and the corresponding paper in the International Wound Journal.
In vitro antimicrobial efficacy of a silver alginate dressing on burn wound isolates

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Objective:

To test the antimicrobial effectiveness of a silver alginate dressing on opportunistic pathogens, namely meticillin-sensitive Staphylococcus aureus (MSSA) and meticillin-resistant Staphylococcus aureus (MRSA), Klebsiella spp., Enterococcus faecalis, Enterococcus faecium, Pseudomonas aeruginosa, Escherichia coli, Enterobacter sakazakii, Enterobacter cloacae, Serratia marcescens, Chryseobacterium indologenes, Proteus vulgaris and Acinetobacter baumannii.

Method: In total, 40 microorganisms were isolated from patients attending three burn centres in the US and evaluated for their susceptibility to a silver alginate wound dressing, employing a corrected zone of inhibition assay, conducted on Mueller Hinton agar (MHA).

Results: The sizes of the corrected zones of inhibition varied between and within genera. For example, all Acinetobacter baumannii strains were found to be sensitive to ionic silver at pH 7, with a mean of 2.8mm, compared with 3.5mm at pH 5.5. The silver alginate dressing also demonstrated activity on all strains of Enterobacter and Escherichia coli, with susceptibility to the silver alginate dressing enhanced at pH 5.5. For Enterococcus spp. the average corrected zone of inhibition at pH 7 was 3.6mm, versus 4.9mm at pH 5.5. All strains of Pseudomonas aeruginosa were found to be sensitive to the silver alginate dressing. The average corrected zone of inhibition was 6.9mm at pH 7, compared with 8mm at pH 5.5. For MRSA and Staphylococcus aureus, it ranged from 4.5mm to 7.5mm at pH 7. When the pH was decreased to 5.5, the corrected zone of inhibition increased.

Conclusion: This study demonstrates the activity of a silver alginate dressing on a wide range of burn isolates, including antibiotic-resistant bacteria, isolated from three different burn centres in the US. It also highlights the possible importance of pH and its potential effects on antimicrobial performance and microbial susceptibility. However, more extensive testing is required to substantiate this.

Conflict of interest: SLP is employed by Advanced Medical Solutions Ltd.

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- Poster published at SAWC Fall 2010 and the corresponding paper in the journal of Wound care March 2011