Time for a change in paradigm in clinical wound care: a review of literature and role of acetic acid dressing

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Introduction

The balance between anti-bacterial activity and tissue toxicity with the final impact on wound healing for every antimicrobial agent ever proposed has been raised in literature but difficult to quantify in clinical practice.
Acetic acid (AA) is suggested as a promising prospect for wound antisepsis according to a recent published consensus on wound antisepsis[1].
AA is not commonly used in New Zealand for burn care.
We would like to investigate the medical literature on the role of AA in burn and outline our proposal to address any paucity of information.

Method

A Pubmed search using keywords 'antimicrobial acetic acid' and 'wound' was performed.
307 articles were produced but after initial review only 17 were suitable for analysis

Results

1 RCT[2] compared use of 1% AA and saline dressings in 32 patients with chronic wound with pseudomonas aeruginosa infection.

- 2x shorter duration to eliminate P aeruginosa
- 3x shorter duration to eliminate multidrug-resistant P aeruginosa

A prospective review of 100 patients with chronic infected non healing wound treated with 1% AA dressing[3]

- 28% showed no bacterial growth after 7 days of treatment
- 64% showed no bacterial growth after 14 days of treatment

A clinical study compared the use of Flammazine against suprathel-acetic acid matrix in 20 burn patients[4].

- Better antiseptic effectiveness in suprathel-acetic acid matrix but did not reach statistical significance

10 in-vitro studies investigated the effectiveness of acetic acid as an antiseptic dressings

- 1 showed biofilm prevention in concentration as low as 0.16% AA
- Compares favourably to silver dressings such as Acticoat
- Several studies showed that AA is effective in eradicating a wide range of pathogens including multidrug resistant pseudomonas aeruginosa, methicillin-resistant staphylococcus aureus (MRSA) and fungus

Bacteria	MIC of acetic acid (%)	MBC of acetic acid (%)
Streptococcus	0.0625	0.125
Staphylococcus aureus	0.625	0.125
Pseudomonas aeruginosa	0.125	0.25
Klebsiella	0.125	0.25
Acinetobacter	0.125	0.25
Escherichia coli	0.125	0.25
Enterococcus	0.125	0.25
MRSA	0.125	0.25
Proteus mirabilis	0.25	0.5
Citrobacter	0.25	0.5
Fungal	**MIC of acetic acid (%)**	
Candida albicans		
Standard strain	0.5	
Clinical isolate	0.5	
Aspergilus niger	0.5	
Aspergillus fumigatus	0.5	
Cryptococcus neoformans	0.5	

Table 1. MIC and MBC of acetic acid[3]
MIC- minimum inhibitory concentration
MBC – minimum bactericidal concentration

Adverse effect

- >2% can cause pain
- >5% can cause burning sensation

Suggested mechanism of action

AA lowers pH levels of the wound
- an acidic wound environment supports control of infection, toxicity of bacterial metabolites, protease activity inhibition, release of oxygen, and epithelialization as well as angiogenesis

Conclusion

Acetic acid is effective against a wide range of pathogens relevant in burn wounds. It has been shown in studies to be well tolerated at 1% concentration, is safe and comparable to silver dressings such as Acticoat.

Future research

A randomised controlled trial comparing AA against silver dressing and saline dressing as control.

References

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