A Comparison of In Vitro Antimicrobial Activity of Iodoform Gauze and Silver-Containing Sodium Carboxymethyl Cellulose Wound Dressings

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Introduction

The risk of infection in acute and chronic cavity wounds such as abscesses, fistula's and late stage pressure ulcers is significant and needs to be controlled using topical antimicrobial therapies in addition to antibiotics when clinically appropriate.

Impregnated dressings such as iodoform gauze are widely used to facilitate drainage and provide antimicrobial protection in acute cavity spaces following incision and drainage, and they are also used to pack tracking wounds where infection is a risk. More recently, a sodium carboxymethyl cellulose dressing containing ionic silver with superior fluid handling and antimicrobial properties to traditional iodoform gauze has been designed in strengthened ribbon form for the management of a wide variety of cavity wounds such as excised abscesses, fistulae, pilonidal sinuses, post-surgical wounds and tunneling pressure ulcers. It is also available as silver-containing 100% Hydrofiber® dressing for wounds that are not at risk of infection.

In this study, a simulated cavity wound model was used to compare the antimicrobial effectiveness of iodoform gauze packing strip and a silver-containing 100% Sodium CMC ribbon dressing* 100% silver-containing CMC ribbon dressing against pathogenic and antibiotic-resistant bacteria over a seven-day test period.

Materials & Methods

The antimicrobial activity of 100% silver-containing CMC ribbon dressing (ConvaTec Inc) and iodoform gauze packing strips (Dynarex) was evaluated against antibiotic resistant bacteria using a simulated wound fluid model. Overnight cultures of challenge organisms; Community-acquired methicillin-resistant Staphylococcus aureus (CA-MRSA, strain USA300) and multi-resistant (extended spectrum beta-lactamase) P. aeruginosa (NCTC 13437) were separately prepared in MRD to obtain a working concentration of approx.1x10³/ml. A 1.0 ml volume of each challenge suspension was then separately added to a 9ml volume of simulated wound fluid contained within a 30ml sterile universal container (such that each model contained approx. 1x10⁷ cfu/ml of challenge organism [see figures 1 & 2]). Samples of 100% silver-containing CMC ribbon dressing was then separately added to a 9ml volume of simulated wound fluid contained within 35cm (or 30cm) were then separately transferred to the inoculated containers (n=5 for each model). The antimicrobial activity of each dressing was determined by comparing the growth curves for both pathogens were similar to those seen in the presence of the non-antimicrobial control dressing. 100% silver-containing CMC ribbon dressing.

Results

In marked contrast, we observed no antimicrobial effect with isofom gauze packing strip against both pathogens in this in vitro model and the populations of CA-MRSA and P. aeruginosa were observed to increase during the test period. In the presence of the iodoform gauze packing strip, the growth curve for both pathogens were similar to those seen in the presence of the non-antimicrobial control dressing. 100% silver-containing CMC ribbon dressing.

Figure 1. 100% silver-containing CMC ribbon dressing Packaged Within the Simulated Wound Fluid Model

Figure 2. Iodoform Gauze Packing Strip Packaged Within the Simulated Wound Fluid Model

Figure 3. Antimicrobial Efficacy of 100% silver-containing CMC ribbon dressing and iodoform gauze packing strip Against CA-MRSA (USA300)

Discussion

Despite the modern era of wound care, gauze dressings are still widely used worldwide, often impregnated with antimicrobial agents to prevent wound infection. One of the oldest impregnated dressings is iodoform gauze which was first used in the early 20th Century as an antiseptic dressing. Plugging of body cavities with iodoform gauze following surgery was described as early as 1902, and was noted to prevent infection and inflammation in many cases. Prolonged use of iodoform gauze has been associated with toxicity.

Despite iodoform gauze having an extensive history as an antiseptic dressing, iodoform is not a potent antimicrobial agent and today many other agents exist that have greater antimicrobial potency. Ionic silver is one such agent and is now widely used in many forms of antimicrobial dressing.

Due to the continued extensive use of iodoform gauze in wound care, we undertook an in vitro study using a stringent simulated wound fluid model to compare the antimicrobial efficacy of an iodoform gauze packing strip against a modern, silver-containing hydrofiber ribbon dressing (100% silver-containing CMC ribbon dressing). The outcome of this study was that 100% silver-containing CMC ribbon dressing was more effective in this in vitro model than iodoform packing strips at killing the selected challenge organisms, which are emerging antibiotic-resistant pathogens. We believe this dressing combines superior infection and exudate control properties for the management of a wide variety of cavity wounds.

References


*Hydrofiber® (ConvaTec Inc.)
**AQUACEL® Ag with strengthening fiber

AP-01350-US