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# Approach to Using Silver Dressings for Chronic Wound Care

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## INTRODUCTION

Management of infection and biofilm are necessary for wound bed preparation.<sup>1</sup> Silver has a broad spectrum of antimicrobial activity including activity against MRSA and VRE.<sup>2</sup> Although use of silver has been described in history since the ancient times,<sup>3</sup> it really became more popular after 1970's when silver was used in treatment of burns using either 0.5% silver nitrate solution or topical cream like silver sulfadiazine.<sup>4</sup> Recently, there is a newer class of silver dressings available in a variety of forms like transparent dressings, gauze, island dressings, foams, and absorptive filler. Silver dressings are also available with various combinations like collagen, hydrofiber, alginates, foam, honey and hydrogels.<sup>4</sup> These dressings are designed to provide the antimicrobial activity of topical silver in a more convenient application.<sup>4</sup> These silver dressings differ considerably in the amount of silver ions and their physical and chemical properties.<sup>2,4</sup>

## MECHANISM OF ACTION

Silver ions bind to the bacterial wall at multiple sites, causing membrane damage and cytoplasm leakage, which makes some silver dressings bactericidal.<sup>4</sup> Silver ions also bind to the cell proteins, causing cell death and destroying cell DNA.<sup>4</sup>

## NEWER SILVER DRESSINGS AND EVIDENCE

Newer silver dressings have silver in form of complexes of silver salts or nanocrystalline silver metal. It may be found as element Ag or ion Ag<sup>+</sup>.<sup>4,5</sup> Sibald et al studied the use of nanocrystalline silver primary dressing on chronic venous stasis ulcer patients who failed multilayer compression therapy. Study results found that silver dressings reduces bacterial counts, increases lymphocyte count and improves healing rates<sup>4,6</sup> in a statistically significant way. Castellano et al. compared eight silver containing dressings and concluded that dressings with higher concentration of silver ions may be more appropriate for wounds that contain 10<sup>5</sup> organisms.<sup>4,7</sup> Similarly, Gago et al compared healing of venous ulcers with silver dressing and concluded that patients who had higher concentration of silver in dressing showed reduced healing time and quicker resolution of infection.<sup>4,8</sup> While Parson's et al found that there was no correlation between antibacterial effect and silver content of dressings.<sup>2</sup>

## CASE STUDY

In a recent case, a 60 year old female who works as a cashier and stands on her feet all the time presented to my office. The patient had a history of hypertension, a history of venous stasis and a history of ulcers in the past which were treated with compression therapy. The patient was not wearing stockings and she developed ulcer on left ankle which started from rubbing of shoes. She initially presented with a blister which progressively got worse. So she was sent to the wound care center for a complete comprehensive evaluation. Upon deeper examination, the patient had normal arterial doppler with triphasic blood flow.

On admission we started the patient on calcium alginate with silver and conducted debridement. Her ABI Right measured 1.02 with the left being non compressible. So, we obtained a wound culture, started the patient on Cefdinir 300mg 1 tab PO BID X10 days for one week. Ultimately, the wound got worse so we then started the patient on Dakin's solution 0.25% daily for 1 week (see Figure 1).



Figure 1: A 6.6 cm X 2.7 cm X 0.4 cm wound

At the two week mark, we started the patient on silver powder mixed with iodine-based gel with a compression dressing 3 times per week.

At the one month mark, the wound was still worse with a wound size of 6.8cm x 3 cm x 0.3cm with 100% soft necrotic tissue and purulent drainage. The patient was started on 0.25% Dakin's solution with daily dressing changes. In addition the patient was admitted to hospital where a culture was run for multidrug resistant pseudomonas and the patient was also started on IV Merrem® for four weeks (see Figure 3).

At the two month mark, the patient was discharged from a rehab facility after 4 weeks of IV Merrem®. The wound size was now smaller at 5cm x 1.5cm



Figure 2: Wound has increased in size to 6.9 cm X 2.6cm X 0.2cm with continued purulent drainage.



Figure 5: Wound at ~12 week mark



Figure 3: Wound at the one month mark with 100% soft necrotic tissue



Figure 6: Wound at ~ 3.5 month mark



Figure 4: Wound at 8 week mark



Figure 7: Wound at discharge (~4.5 month mark)

x 0.2cm with 30% of the wound area having commenced epithelialization. In addition, there was 50% granulation tissue and minimal slough. We then started the patient on Collagen Silver Dressing and a compression bandage (see Figure 4).

At the approximate three month mark since presentation, we continued the patient on Collagen-Silver and a compression bandage. The wound continued to epithelialize (~ 80%) and the wound size had now diminished to 1cm x 0.3cm x 0.1cm (see Figure 5)

At the three and a half month mark, the wound has achieved significant epithelialization. The patient was started on amylectin lotion and continued use of a compression bandage. The wound size is now measured at 0.8cm X 0.3cm X 0.1cm with 80 -90% epithelialization (see Figure 6). About a week after this visit, the patient's wound had epithelialized 100% and now measured 0.1cm x 0.1cm x 0.1cm and was managed with amylectin lotion and a compression bandage.

After a few more weeks of treatment and follow up, the patient was discharged from our care with a class II compression stocking (see Figure 7).

## CONCLUSION

Choice of wound dressing should be based on the wound type and clinical parameters such as exudate handling effects and presence of biofilm or critical colonization.<sup>4</sup> Dry wounds should receive moist dressings and wet wounds should receive absorbent dressings. Based on clinical studies, general recommendation can be made that dressings with higher silver can be used in refractory wound with recurrent biofilm and in clinically infected wounds.<sup>4,7</sup> Clinically, 10 minute 0.25% acetic acid or 0.25% Dakin's solution soaks are recommended to treat biofilms prior to the application of silver based dressings. Dressing with lower concentration of silver or combination of collagen and silver could be considered in wounds that are stalling or suspected of being colonized or critically colonized.<sup>4,7,8</sup> Studies are not able to recommend specific length of time for use of silver dressings but it is prudent to not use silver dressings for more than 9 -12 weeks. Long term use of silver may be associated with systemic toxicity though Sibald et al found that there was only a slight increase in blood silver concentration indicating that nanocrystalline silver dressings are not systemically toxic<sup>6</sup> while silver sulfadiazine does contain fast release silver which was easily absorbed by tissues and was associated with systemic toxicity.<sup>4,9</sup>

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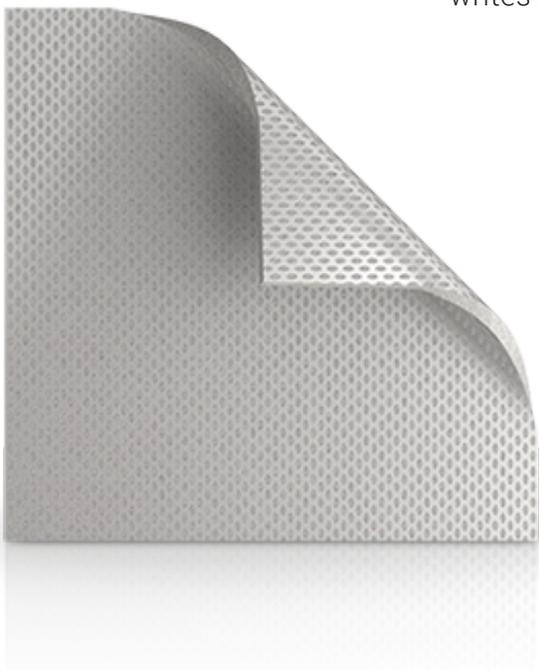


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