

Therapeutic Benefits of Silver-Thread Compression Stockings: A Case Study

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Antibacterial and healing benefits of silver ions have been documented.¹⁻⁴ Silver has been shown to be a powerful bactericidal agent when used in the treatment of burns, cuts, wounds, and draining skin lesions. Therapeutic doses of silver can effectively reduce bio-burden, and in theory, aid wound healing.¹⁻³ For patients with recurrent leg ulcers, silver is only a part of the treatment. It is also possible that reduction in bacterial load on intact skin might protect against future skin breakdown and ulceration as it is well established that *Staphylococcus aureus* colonization is increased in patients with atopic dermatitis.⁵⁻⁸

Compression therapy has been used in the treatment and prevention of venous edema.⁹⁻¹⁰ Graduated compression stockings are also utilized to decrease the frequency of recurrence of leg ulcers¹⁰⁻¹² by reducing the pressure within the veins and increasing venous return.¹³ Lifelong compression therapy has been an essential component in venous ulcer management.¹¹ Noncompliance is often a problem¹⁴ due to compression garments being difficult to put on, and becoming hot and uncomfortable during their use.^{11, 12} By combining silver with compression, stockings could be cooler to wear, increasing compliance and leading to edema prevention and a decrease in wound recurrence. Evidence supporting the use of silver-thread compression garment is limited to a single study addressing cutaneous microcirculation.¹⁶

An 89-year-old Caucasian female presented to the Wound Center at Akron General Medical Center on November 2, 2007. Her chief complaint was pain, swelling and weeping fluid in the right lower extremity starting three months earlier with coincident cracks in the skin surface. History included hypertension, peripheral vascular disease, coronary artery disease, chronic venous stasis leg ulcers, lymphedema, pain in

legs, frequent skin tears, dryness and episodes of memory loss related to a previous CVA. The patient lived in a long-term care facility. Her primary leg ulcer opened approximately two months prior to this presentation and measured 1.3cm X 0.8cm X 0.1cm. There was a moderate amount of serosanguineous drainage. Wound edges were flat and intact and the wound bed was filled with beefy red granulation tissue. Skin on the affected extremity was erythematous and cool to touch. Pulses via Doppler were weak. Treatment included hydrating ointment to intact skin, alginate silver dressing to the wound (changed three times weekly), light compression, elevation of affected extremity when in bed, frequent ambulation with physical therapy, and compression pumps 40 minutes nightly.

At the follow-up visit on November 16, 2007 the initial wound was healed; however, a new wound (1cm X 0.5 cm X 0.1 cm) had opened with serosanguineous drainage. Dermatitis skin



changes throughout the right leg developed, and the swelling had significantly increased. Additionally, she reported moderate pain to the affected extremity. The patient was treated using a silver alginate dressing to the open wound with

changes three times weekly, topical corticosteroid cream twice daily and a four-layer compression device, which decreased the edema. Though the ulcer subsequently healed, skin changes including scaling, weeping and hemosiderin

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pigmentation were present at the follow-up visit on November 30, 2007.

At that time the patient was placed in the Juzo® silver compression garment. After seven days of use the scaling



resolved, weeping decreased significantly, skin color changes returned to baseline and the edema remained unchanged. Additionally, the patient reported an absence of pain.

After wearing the Juzo® silver compres-

sion garment made with X-Static® the silver fiber for an additional seven weeks, removing the garment nightly, this patient had no recurrence in ulcers, skin tears, lymphedema, scaling or weeping in the legs.

Statements from the patient and her family included: "The stockings are comfortable to wear." and "My mother's legs are doing great." The Juzo® silver compression garments made with X-Static® the silver fiber were effective in healing the patient's skin, controlling episodes of lymphedema, and preventing recurrent venous stasis ulcers, skin tears and pain.

Factors contributing to success of this therapeutic regimen could be attributed to: The use of silver in the compression garment, compliance with wearing the garment, comfort of the garment and assistance with application by staff at the long term care facility.

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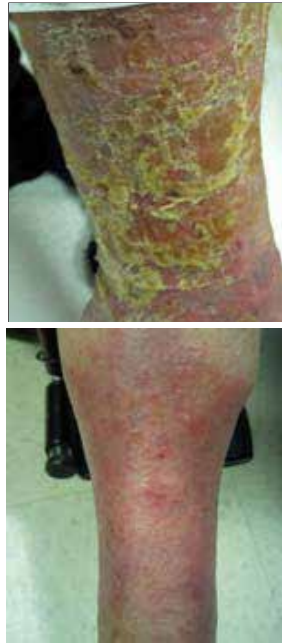
X-Static® Silver Fiber Manufactured by Noble Biomaterials, Inc

Introduction:

Graduated compression therapy is an essential component in decreasing recurrence of venous ulcers. Noncompliance is a problem due to garments becoming hot and uncomfortable during use. Therapeutic doses of silver can effectively reduce bio-burden, and in theory, aid wound healing. By combining silver with compression, stockings could be cooler to wear, increasing compliance and leading to edema prevention and a decrease in wound recurrence. It is also possible that reduction in bacterial load on intact skin might protect against future skin breakdown and ulceration as it is well established that *Staphylococcus aureus* colonization is increased in patients with atopic dermatitis. Evidence supporting the use of silver-thread compression garments (STCG) is limited to a single study addressing cutaneous microcirculation. This information report describes three patients' experiences when using STCG. Patients were identified following a retrospective chart review indicating multiple episodes of ulcer recurrence despite prescribed compression. Patients were asked to try a STCG and provide feedback on application, comfort, and ulcer recurrence.

Case #1

An 89-year-old Caucasian female. Chief complaint was pain, swelling and weeping fluid in the right lower extremity starting three months earlier with coincident cracks in the skin surface. History included hypertension, peripheral vascular disease, coronary artery disease, chronic venous stasis leg ulcers, lymphedema, pain in the legs, frequent skin tears, dryness and episodes of memory loss related to a previous CVA. The patient lived in a long-term care facility. Several small wounds were treated with a silver alginate dressing, topical corticosteroid and four-layer compression. Though these wounds subsequently healed, skin changes including scaling, weeping, hemosiderin pigmentation and moderate pain developed. At that time the patient was placed in the STCG. After seven days of use the scaling resolved, weeping decreased significantly, skin color changes returned to baseline and the edema remained unchanged. Additionally, the patient reported an absence of pain.



Case #2

A 52-year-old Caucasian female. Chief complaint was severe pain, swelling and a non-healing wound to her left lower extremity. History included multiple DVT's, recurrent venous stasis leg ulcers of 6 years duration, factor V deficiency, plantar warts, and skin dryness. Her primary leg ulcer opened approximately four months prior to this presentation and measured 1.3cmX 2.0cmX 0.1cm. Patient was treated with hydrating cream to the intact skin, foam dressing with a non-adherent contact layer to the wound and a four-layer compression wrap. Two weeks after beginning treatment, the patient was placed in the STCG. Three weeks after initiation of STCG therapy, wound is pinpoint, resolving after 11 weeks of therapy.



Case #3

A 48-year-old Caucasian male. History included morbid obesity and venous stasis ulcers of three years duration without periods of healing. The primary leg ulcer measured 2.1cmX1.4cmX0.1cm and was treated with a silver alginate dressing and short stretch compression. After two months of treatment he was placed in the STCG (40-50 mmHg). Wounds resolved after 18 weeks of treatment and remained closed for two months. At that time the patient stopped using the STCG and new wounds developed within three weeks. Primary ulcer measured 2.5cmX2.0cmX0.1cm. There were three additional wounds, swelling, dryness and hyperpigmentation of the skin. The wound progressed to healing after 10 months of treatment. The patient was counseled and placed in the STCG at the time of healing.



Outcomes:

- Case#1:** Remained ulcer free for 38 weeks (average recurrence 12 weeks). Statements from the patient and her family included: "The stockings are comfortable to wear." and "My mother's legs are doing great." The STCG was effective in healing the patient's skin, controlling episodes of lymphedema, and preventing recurrent venous stasis ulcers, skin tears and pain. Factors contributing to success of this therapeutic regimen could be attributed to: The use of silver in the compression garment, compliance with wearing the garment, comfort of the garment and assistance with application by staff at the long term care facility.
- Case#2:** Remained ulcer free for 3 years (average recurrence 6 – 9 months) with STCG. Patient states: "I don't go without my stockings. I can even wear them in the summer when we go to the beach. They are much more comfortable than the ones I used to use."
- Case#3:** Remained ulcer free for 11 months. Previously had only been ulcer free for < 1 month (without the use of STCG) in a 5-year venous ulcer history. Patient states: "I learned my lesson. I tried going without my stockings because my legs are so large, I had trouble getting them on. My wounds came back right away. I asked my wife to help me and now I have been wearing them everyday. I don't get as hot in these stockings (STCG) and they helped my legs not to swell up all the time."