

Critical evaluation of bandage alternative characteristics: a case series

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Abstract

Aim: Traditionally compression is seen as the gold standard for treatment of swelling and venous leg ulcers (VLU). Velcro adjustable wraps have been marketed as a bandage alternative. Although there is a growing body of evidence to support impact on wound healing, little focus has been on matching product to patient presentation and ability to utilize the device effectively.¹⁻³ This case series demonstrates that although each product demonstrated ability to produce the marketed level of compression, realistic utilization of the product varied based on patient limb characteristics and functional level.

Method: Three different adjustable Velcro wraps were reviewed. Each product was applied per the manufacturer's instructions. Resting pressures for each device were measured using a validated tool on a normal volunteer. Five patients who had previously been wrapped were issued the products and instructed with application/use. Evaluation of performance of each device were documented by the patient and the clinical staff to include ease of application, volume containment, and any undesirable characteristics.

Results / Discussion: Marketed compression profile was demonstrated in each device. However, there were significant differences in the patients' ability to effectively apply the product and for the product to adequately maintain compression for the limb.

Conclusion: This small case series demonstrates that although the Velcro adjustable compression wraps on the market demonstrate the ability to produce the marketed compression, the realistic operational use of these products is not equal. A larger study to further identify specific performance characteristics of these products could maximize health care dollars by better matching a product to an individual patient.

Methods

Adjustable Velcro wraps chosen for this case series were those garments currently covered by Medicare for patients with open ulceration. Currently there are five products on the market that meet this criteria. The products reviewed are identified and pictured below. The products were categorized according to application method and product design in Table 1. Each product was applied per

the manufacturer's instructions to a healthy volunteer by a clinician. Using a validated tool*, interface pressure and static stiffness

was measured for each device.⁵ The results of the findings are detailed in Table 2.



Manufacturer's Images

Product Characteristics and Pressure Measurements - Table 1

Device ID**	Application Method	Sizes Available Circumference (cm) Min / Max ankle Min / Max Calf	Foot coverage
A	overlapping	S, M, L, XL, XXL Lengths: Avg / Tall Ankle: 11 / 38 Calf: 28 / 68 *extender piece available	Available but not included Comes with liner
B	interlacing	S, M, L, XL, XXL Full calf: M, L, XL Lengths: short / long Ankle: 19 / 42 Calf: 26 / 64	Circular knit anklet and separate liner included
C	interlacing	S, M, L, XL, XXL Full calf: M, L, XL Lengths: Reg / Tall	Available but not included Comes with liner
D	overlapping	XS, S, M, L, XL Lengths: Reg / Tall Ankle: 21 / 50 Calf: 36 / 68	Available but not included Comes with liner
E	interlacing		Compression anklet and separate liner included

Table 2

Device ID**	Resting Pressure (mmHg)	Working Pressure (mmHg)	Static Stiffness (working - resting pressure)
A	41	57	16
B	42	56	14
C	42	53	11
D	55	66	11
E	40	51	11

* Each product was applied by a single clinician on a healthy volunteer per the manufacturer's instructions and pressure measurements document. This task was repeated 3 times. Above represents average of three trials.⁵

Product Choice

Matching product characteristics to patient's need ...

Product A



Patient with weakness one hand and unable to manage interlacing straps



Available size for thigh coverage - also overlapping straps for containment for larger limb



Patient with spongy/redundant tissue - overlapping straps provided structure for better containment



Product B



Chosen due to normal shape limb, with minimal foot involvement. Patient with good dexterity able to manage 2 hand application

Product C



Chosen due to price and ease of donning in elderly patient



Product D



Chosen due to limb shape and presence of spine affording increased stability and ease of adjustment for all day wear

Product E



Chosen due to minimum number of straps - normal shape/size leg accommodated

Real Life Patient / Caregiver Application

Despite repeated instruction, application of Velcro adjustable garments can vary. Ongoing education and monitoring of patients is necessary.



Incorrectly applied, interlacing wraps have potential for further skin trauma due to gapping and areas of low pressure.

Although instructed with proper application, patient re-applied improperly at home with resulting wounds/blisters in area of skin left exposed.



Wraps that lack a vertical spine may slip and bunch with wear.

Product A provided better containment with overlapping straps and posterior spine design.



1st visit post instruction

Even with less than perfect application note skin intact and even compression.

2nd visit after instruction.

Although not perfectly donned, there is less risk for re-ulceration with this style garment. It is essential to follow up use/care of all compression products to ensure proper use.

Discussion

In an ever changing health care market there is a push for effective products that are easy to apply, by all skill levels, allowing non-wound care specialized health care staff, patients and patient caregivers to assist in the daily management of lower extremity edema and/or wound care management. Adjustable Velcro wraps have been shown to meet this need as they are user friendly, easily adjustable and have been shown to provide the necessary compression profile associated with wound healing.^{1,4}

Additionally, adjustable Velcro compression wraps are seen by many as a preferable product for patients with fragile skin and those with physical limitations as they allow for easy application when compared to utilization of traditional compression stockings.

This small case series demonstrates that although the Velcro adjustable compression wraps on the market demonstrate the ability to provide optimal compression levels, the realistic operational use of these products is not equal. Patient characteristics that impacted effective operational use of the product included limb shape/contour, limb size and tissue density, patient's/caregiver's physical ability to manage the particular application method and patient's activity level. For completeness all Velcro products were included in healthy findings, but neither author had a significant amount of patients using product D and E to include in conclusions. Product D has previously had limited marketing exposure to broad population and Product E is new to the market, both should be included in further study.

The findings of the authors of this small case series conclude proper adjustable Velcro choice is dependent on the following characteristics:

■ Limb size/shape

Regularly shaped, average size limb with minimal swelling are equally contained by all products. Limbs with irregular contour, excessive size, dense swelling appeared better contained by products with posterior 'spine' to provide vertical stability throughout the day and overlapping straps that afforded additional containment. Additionally, those products with overlapping straps that afforded additional containment. Additionally, those products with overlapping straps eliminate the potential for skin trauma with exposed tissue seen when the interlacing garments were inappropriately applied by patients/caregivers.

■ Tissue texture

Limbs with marked tissue texture changes were better contained with overlapping straps which afforded additional containment.

■ **Physical ability of patient/caregiver utilizing the product**

Products with overlapping straps allowed for user application error not to impact functional characteristics –overlapping characteristics provided double coverage to prevent undue loss of pressure in areas –the overlapping straps afforded better coverage even when the patient did not perfectly apply the product.

As with any product, compression can only be effective if the patient utilizes it correctly on a consistent basis. To achieve this a compression product needs to be correctly applied and it needs to be comfortable. As such, different patients will benefit from different products.

Conclusion

The authors of this case series concluded that the product with the most desired qualities, consistently, is product “A” for the patient population treated by the authors including those with chronic edema with/ without wounds. The other products have good features but don’t perform consistently per the authors’ limited “real life” research. A larger study, with larger sample size, to further track specific performance characteristics, including edema management, wound healing, ease of appropriate application, and wear comfort, could maximize proper utilization of health care dollars by better matching a product to an individual patient. ■

References

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Product Identification

Product A ReadyWrap™	Lohmann& Rauscher
Product B CircAid® JuxtaLite®	Medi
Product C CompreFlex™ Lite	Sigvaris
Product D FarrowWrapLite®	Jobst®
Product E Compression Wrap	Juzo