

A Comparison of Fuzzy Wale Longitudinal Elastic Compression* to Elasticated Tubular Bandage** Compression as a Tool in Reducing Lower Extremity Edema.

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Key point:

Patients' wearing fuzzy wale longitudinal elastic compression experienced a reduction in calf diameter by 2.7 cm compared to a 1.5 cm reduction with traditional elasticated tubular bandage compression.

Introduction:

There are multiple compression therapy products and each has a certain advantage depending on the condition of the patient. There is a subset of these patients with edema that can either not tolerate 1,2 or don't require higher levels of compression. Elasticated tubular bandage compression have historically been used in this circumstance to treat up to moderate amounts of edema. To this point, the authors were interested in comparing this typical therapy with a newer compression option (fuzzy wale longitudinal elastic compression). The authors, moreover, looked to understand if this type of compression would reduce the amount of edema in a uniform manner along the lower extremity from the calf to the foot. Other elements were assessed related to compression dressing comfort (itching) and wear ability (not rolling down) are also an important aspect assessing the usability of any compression dressing.

Methods:

Nineteen patients presenting with deep pitting lower extremity edema were randomly selected into two cohorts of the study. Patients were directed into each of their cohorts by a coin flip. The first cohort treatment was with fuzzy wale longitudinal elastic compression and the second with elasticated tubular bandage compression. To insure proper compression was provided patients were deselected from the cohorts if they had calf circumference measurements of less than 15½ inches (Cohort 1) or 18 inches (Cohort 2). Each of the patients wore this compression throughout the day until the endpoint at 14 days (+/- 1 day). Each subject in Cohort 1 was provided a fuzzy wale longitudinal elastic compression stocking at the first visit and instructed to wear them all hours (with the exception of bathing). Each subject in Cohort 2 was dispensed an elasticated tubular bandage at the first and second (at 7 (+/- 2) days) visit and instructed to wear them all hours (with the exception of bathing).

Cohort 1 subjects were sized with a single yellow (medium) fuzzy wale longitudinal elastic compression fitting a minimum calf size of 15 3/5. Cohort 2 compression levels to sizes were based on manufacturer*** recommendations insuring that the compression amount (from the elasticated tubular bandage) was as high for this product line as possible.

Methods Continued:

Recommended product guidance (which was employed) represented the highest level of compression for a calf circumference of 18 inches or greater was two "E" stockings (often referred to as double high compression).

For both cohorts at the beginning point, week one, and endpoint of the study the circumference (in centimeters) of the patient's calf, narrow ankle, wide ankle and foot were measured. Lower extremity edema was verified through manual circumference measurements of the mid-foot (taken at the widest mid-foot area), narrow ankle (taken at the narrowest position immediately above the medial and lateral malleoli), wide ankle (taken at the widest point of the ankle, and calf (taken at the widest portion of the calf). For each cohort the total volume of fluid loss and percentage reduction in volume was calculated based on the beginning and ending calf measurements.

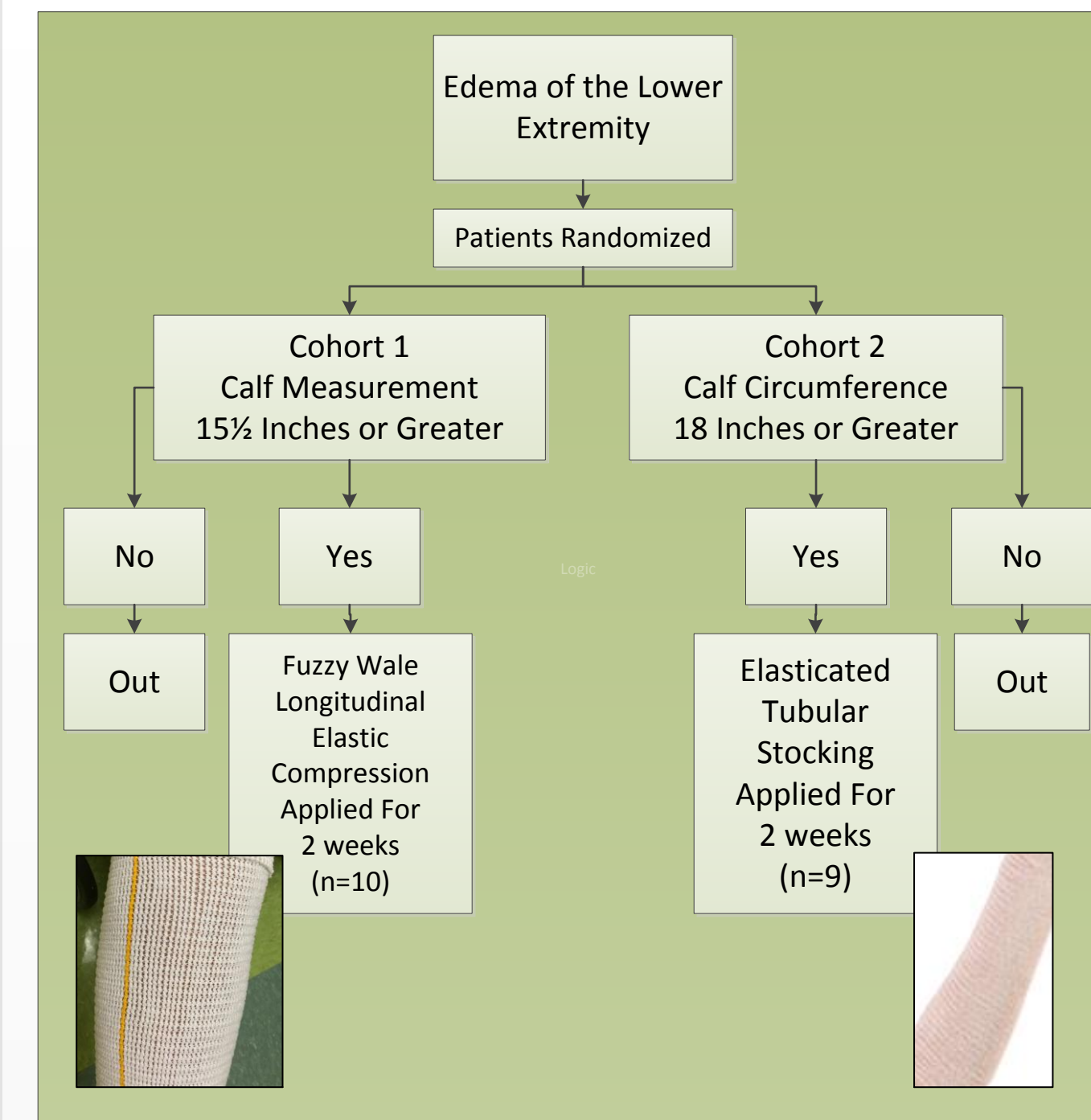
Results:

The population of cohort 1 (average age 65, 8 male & 2 female) consisting of seven venous leg ulcers and three surgical patients. In two weeks of wearing single medium "yellow" fuzzy wale longitudinal elastic compression the average reduction in measurements include reductions of 2.7 cm calf, 1.3 cm narrow ankle, 1.9 cm wide ankle, and 2.7 cm at the foot. Two of the ten patients had previous compression. Secondary observations for cohort 1 noted that of all ten fuzzy wale longitudinal elastic compression dressings none over two weeks would roll down or caused itching.

| Fuzzy Wale Longitudinal Elastic Compression Medium (Yellow) | | | | | | | | | | | Inches | Cm |
|---|--------|--------|--------|--------|--------|--------|------|--------|--------|--------|-----------|-----------|
| Cohort 1 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Avg Total | Reduction |
| Calf | 0.5 | 1 | 1.5 | 1 | 1.5 | 1.25 | 1 | 1 | 1.75 | 1 | 1.05 | 2.667cm |
| Ankle (N) | 0.25 | 0.75 | 0.25 | 0.5 | 1.5 | 0.5 | 0.75 | 0.25 | 0.5 | 0.5 | 0.525 | 1.3332cm |
| Ankle (W) | 1 | 0.75 | 0.5 | 1.25 | 1.75 | 1 | 0.5 | 1 | 0.5 | 0.25 | 0.75 | 1.905cm |
| Foot | 0.5 | 0.5 | 1.25 | 0.5 | 0.25 | 0 | 1.25 | 0.5 | 1.25 | 0 | 1.05 | 2.667cm |
| Calf at Start | 18 1/2 | 19 1/2 | 15 1/2 | 17 1/2 | 19 1/4 | 18 1/4 | 19 | 16 1/4 | 16 1/2 | 15 3/4 | 17.6 | |
| Size | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | | |

The population of cohort 2 (average age 64, 3 male & 6 female) consisting of seven venous leg ulcers and two surgical patients. Patients in this cohort wore double high "E" elastic stockings with the exception of two patients (4,7) who had pain with "double high" level compression, so these patients were moved to "double medium" F elasticated tubular bandage. At two weeks the average reduction in measurements include reductions of 1.5 cm calf, 1.5 cm narrow ankle, 1.7 cm wide ankle, and 0.3 cm at the foot. Three of the ten patients had previous compression. Secondary observations for cohort 2 noted that four of the elasticated tubular bandages rolled down and two patients experienced itching.

| Double High* Elasticated Tubular Bandage | | | | | | | | | | | Inches | Cm |
|--|--------|--------|-----|------|--------|--------|--------|------|--------|--|-----------|-----------|
| Cohort 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | Avg Total | Reduction |
| Calf | 0.25 | 0.75 | 0 | 1 | 1.75 | 0.75 | 0.5 | 0.25 | 1 | | 0.61 | 1.5494cm |
| Ankle (N) | 0.5 | 1 | 1/4 | 0.5 | 0.75 | 1 | 0.75 | 1 | 0.25 | | 0.61 | 1.5494cm |
| Ankle (W) | 1 | 0.5 | 3/4 | 1.25 | 0 | 0.5 | 1.25 | 0.5 | 0.25 | | 0.66 | 1.6764cm |
| Foot | 0 | 0.25 | 1/4 | 0.5 | 1 | 0.5 | 0.25 | 0.25 | 0.25 | | 0.1 | 0.254cm |
| Calf at Start | 18 3/4 | 18 3/4 | 18 | 22 | 19 3/4 | 19 1/2 | 18 1/2 | 19 | 18 1/2 | | 19.19 | |
| Size | E | E | E | F | E | E | F | E | E | | | |



Results:

Comparatively, over 2 weeks the percentage reduction in volume of the calf was 8.44% in patients' wearing fuzzy wale longitudinal elastic compression versus 4.5% in patients wearing elasticated tubular bandage compression. There similar variance between the foot circumference reduction measurements with an average reduction of 2.7cm for cohort 1 and 0.25cm for cohort 2.

| Cohort | Calf Radius (cm3) | Volume (cm3) | Percentage Reduction in Volume |
|--------------------------|-------------------|--------------|--------------------------------|
| Cohort 1 Pre-application | 7.11 | 7397 | |
| Cohort 1 2 Weeks On | 6.68 | 6773 | 8.44% |
| Cohort 2 Pre-application | 7.76 | 8383 | |
| Cohort 2 2 Weeks On | 7.52 | 8005 | 4.5% |

Calculations

The legs was modelled as truncated cones with constant ankle radius $r_2=3.64$ cm, and constant height, $h=78.7$ cm. The radius of the calf, r_1 , was measured on the patients.

The volume of the calf, V , is given by: $V = \frac{1}{3}h\pi(r_1^2 + r_2^2 + r_1r_2)$

Discussion

There are multiple compression therapy products and each has a certain advantage depending on the condition of the patient. As discussed, there is a subset of patients with edema that cannot tolerate or don't require higher levels of compression. In this study, the authors looked to understand how of these similar tubular compression tools compare. To our knowledge, there are no previous studies that have looked to compare how these two types of compression improve the reduction of fluid volume in the lower extremity and foot. To this point, circumferential measurements of each cohort (along the lower extremity and foot) show a unique advantage in the use of fuzzy wale longitudinal elastic compression (Cohort 1). This series of measurements, moreover, shows a significant advantage in the reduction of foot related edema in Cohort 1 patients. The benefit of this type of compression is, therefore, to target patients with edema at the calf and foot. Especially in patients with foot based wounds with significant edema that cannot tolerate multilayer compression devices.

References

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- Hafner J, Schaad I, Schneider E, Seifert B, Burg G, Cassina PC. Leg ulcers in peripheral arterial disease (arterial leg ulcers): impaired wound healing above the threshold of chronic critical limb ischemia. J Am Acad Dermatol. 2000;43(6):1001-8.

*EdemaWear® and EdemaWear® Lite™, Compression Dynamics LLC, Omaha Nebraska , 68102

Tubigrip™ *Mölnlycke Health Care