

A comparative test of a new compression system with a predefined pressure - independent of girth, shape of the leg and time -

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Introduction

Compression therapy is used in managing conditions that heavily affect a patient's quality of life, but the intended dosage is rarely met. Heyer et al. (2017) conducted tests on bandage appliers and found that the pressures applied ranged from 6 to 173 mmHg. Applying the correct pressure and achieving a graduated compression profile may seem impossible for most appliers. It's sometimes advocated to apply bandages with higher pressure than the desired dosage, to compensate for the pressure drop experienced during oedema reduction. This unquantified higher pressure may, however, cause pain or tissue damage. An ideal compression product should maintain a safe and tolerable low resting pressure and a high, effective working pressure.

The aim was therefore to compare a new compression system to traditional four-component and zinc-based systems over four consecutive days.

Methods

The study comprised three healthy subjects. A new compression system composed of an elastic stocking based on a patented technology, and designed for 20 mmHg of well-defined resting pressure, was used as a first layer. A second layer of special non-stretchable patches was applied to achieve a high working pressure.

The new compression system was self-applied by one of the subjects. For comparison, the four-component and zinc-based systems were applied on two subjects by the same highly-experienced applier.

Each of the systems were applied daily for four consecutive days. Pressures were recorded at the ankle (B1) and calf (C) at 8 am, noon and 5 pm each day.

Results

The new compression system was highly consistent in maintaining pressure levels over time. In contrast, both the four-component and zinc-based systems exhibited high variability in initial pressure levels, with a noticeable drop over time and they did not achieve the intended graduated profile. (Table 1)

Table 1. Interface pressures at the ankle (B1) and calf (C) for all three systems at 8 am, noon and at 5 pm for four consecutive days.

| | | Supine position | | | | | |
|---------|-----------------|-------------------|-----|-------------|-----|-------------|-----|
| Product | Sensor Position | 8 am | | Noon | | 5 pm | |
| | | Mean (mmHg) | SD | Mean (mmHg) | SD | Mean (mmHg) | SD |
| New | B1 | 22.5 | 1.0 | 22.0 | 0.7 | 21.4 | 0.5 |
| New | C | 22.6 | 1.5 | 22.1 | 1.9 | 21.5 | 1.0 |
| Zink | B1 | 21.6 | 3.0 | 17.9 | 3.0 | 21.5 | 6.2 |
| Zink | C | 26.9 | 7.8 | 19.6 | 4.0 | 22.5 | 7.1 |
| 4-layer | B1 | 36.8 | 4.6 | 30.5 | 6.5 | 29.1 | 5.7 |
| 4-layer | C | 39.1 | 9.5 | 28.4 | 4.7 | 28.5 | 6.7 |
| | | Standing position | | | | | |
| Product | Sensor Position | 8 am | | Noon | | 5 pm | |
| | | Mean (mmHg) | SD | Mean (mmHg) | SD | Mean (mmHg) | SD |
| New | B1 | 39.3 | 2.4 | 39.5 | 1.7 | 41.2 | 3.3 |
| New | C | 42.8 | 2.9 | 45.0 | 3.8 | 45.1 | 3.5 |
| Zink | B1 | 25.3 | 4.6 | 23.8 | 4.0 | 23.1 | 4.3 |
| Zink | C | 30.5 | 3.9 | 28.1 | 4.0 | 26.6 | 6.0 |
| 4-layer | B1 | 39.3 | 8.7 | 36.1 | 9.0 | 30.8 | 9.8 |
| 4-layer | C | 40.1 | 7.7 | 36.4 | 6.6 | 32.6 | 8.9 |

Discussion

In comparison to the traditional compression products, the new compression system is unique both in that the initial pressure was applied with minimal variability, and that it was maintained over time. This may help reduce the risk of complications and may lead to more effective treatment.

Conclusion

Defined dosage in compression treatment can now be achieved both at the time of application, as well as maintained over time.

