A Novel Stocking to Improve Venous Return Compared to the Class 1 Compression Stocking

Arjun C. Paramasivan, MBChB
Kandasamy Sampathkumar, MBBS, FRCS (Tr & Orth)
NO CONFLICT TO DISCLOSE

A novel stocking to improve venous return compared to the class 1 compression stocking.

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Our disclosures are in the Final AOFAS Mobile App.
We have no potential conflicts with this presentation.
Venous thromboembolism (VTE) is a serious risk of major orthopaedic surgery, associated with significant morbidity and mortality \(^1, 2, 3, 4\). Current clinical practice promotes the use of mechanical thromboprophylaxis. Class 1 compression stockings are commonly used as they encourage early ambulation and have few complications \(^5\).
Class 1 compression stockings work well during movement, however their effectiveness deteriorates when partially or fully immobile. The novel device uses compression and toe movements.

- Repetitive flexion and extension of the toe:
  - Stimulates the plantar venous plexus
  - Activates the foot and calf pumps when patient is bed-bound
  - Results in an increase in venous velocity.
Purpose

• The purpose of this study is to determine if the addition of a novel device to the conventional class 1 compression or thrombo-embolic deterrent (TED) stockings improved venous return.

• Prospective study: 10 healthy volunteers

• Primary outcome measure: Ejected venous volume (ml)
Methods

• Duplex Ultrasound Scanning
• Doppler Waveform recorded
• Venous haemodynamic parameters measured to calculate ejected venous volume:
  1. Peak venous velocity
  2. Intensity weighted mean velocity
  3. Blood vessel cross-sectional area
Methods

• Study groups:
  1. Femoral venous return volume at resting position (supine)
  2. Femoral venous return volume with compression stockings (supine)
  3. Femoral venous return volume with novel and compression stockings (supine)
## Results

### Right Leg (n=10)

<table>
<thead>
<tr>
<th></th>
<th>Baseline (ml)</th>
<th>TED (ml)</th>
<th>TED + Novel Device (ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5.84±0.60</td>
<td>6.02±0.51</td>
<td>12.58±1.82</td>
</tr>
</tbody>
</table>

- Baseline vs TED $p=1.000$
- Baseline vs TED + Novel Device $p=0.004$
- TED vs TED + Novel Device $p=0.006$

![Graph](image)
## Results

**Left Leg (n=10)**

<table>
<thead>
<tr>
<th></th>
<th>Baseline (ml)</th>
<th>TED (ml)</th>
<th>TED + Novel Device (ml)</th>
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<tbody>
<tr>
<td></td>
<td>6.43±0.62</td>
<td>6.02±0.43</td>
<td>11.74±1.65</td>
</tr>
</tbody>
</table>

Baseline vs TED \( p=1.000 \)
Baseline vs TED + Novel Device \( p=0.015 \)
TED vs TED + Novel Device \( p=0.014 \)

![Ejected venous velocity in left leg](chart.png)
### Results

**Right and Left Legs (n=20)**

<table>
<thead>
<tr>
<th></th>
<th>Baseline (ml)</th>
<th>TED (ml)</th>
<th>TED + Novel Device (ml)</th>
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</thead>
<tbody>
<tr>
<td><strong>Baseline</strong></td>
<td>6.13±0.43</td>
<td>6.02±0.32</td>
<td>12.16±1.20</td>
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<tr>
<td><strong>Baseline vs TED</strong></td>
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<td><strong>Baseline vs TED + Novel Device</strong></td>
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<tr>
<td><strong>TED vs TED + Novel Device</strong></td>
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</tbody>
</table>

- Baseline vs TED: \( p=1.000 \)
- Baseline vs TED + Novel Device: \( p<0.001 \)
- TED vs TED + Novel Device: \( p<0.001 \)

![Ejected venous velocity in right and left legs](chart)

- Ejected venous velocity in right and left legs.
Discussion

• The addition of the novel device to the class 1 compression stocking has resulted in a significant improvement in venous return.

• These preliminary results demonstrate excellent potential to provide improved care for patients susceptible to VTE.

• The next phase would be to recruit larger sample sizes and investigate clinical efficacy of the novel device in DVT outcome studies.


