How Do Compression Stockings Actually Work?

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Conflicts of Interest
None

Clinical Relevance
Chronic venous disease affects 25 million people in U.S.
(Varicose veins / leg edema / ulcers )
Compression therapy is mainstay of non-operative treatment

Venous Physiology
The Significance of Veins
The venous system contains 60-70% of blood as it moves through the circulatory system.
40% in the legs!!
The rest of the blood

Venous Pressure
Venous pressure at the ankle
Recumbent 10 mmHg
Standing 90 mmHg
- Valvular insufficiency
- Venous obstruction
- Muscle pump dysfunction
Worse HTN
Edema
Discomfort

Pressure with CVI
Increased pressures + decreased refill time
Coleridge Smith PD. Vasc Med 2:203-13, 1997
Compression Therapy

Provide controlled graduated external pressure to reduce venous hypertension
- overcome venous outflow obstruction
- limit retrograde flow 2x valvular reflux in superficial veins
- improve muscle pump function
Improve blood flow cephalad
Reduce blood volume / prevent edema
Diminish sequelae of venous hypertension

Stockings Characteristics

- To be effective, it is important that compression be graduated
- Strongest at the ankle and decreasing in the proximal direction

Clinical Recommendations

Guideline 9.1 Moderate pressure (20 to 30 mm Hg) for patients with symptomatic varicose veins. [GRADE: 2 C]
Guideline 9.3 Primary therapeutic modality for healing venous ulcers. [GRADE: 1B]

Compression Recommended

Compression Stockings

Challenges to these simplistic conclusions!
Superficial Vein Compression

Deep veins more affected by even low compression
Compression changes leg geometry


Graduated Compression?

<table>
<thead>
<tr>
<th>Brand</th>
<th>Ankle (30 mmHg)</th>
<th>Calf (20 mmHg)</th>
<th>% Reduction Ankle to Calf</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>23.2 ± 0.3</td>
<td>21.2 ± 0.3</td>
<td>-8%*</td>
</tr>
<tr>
<td>B</td>
<td>23.9 ± 0.3</td>
<td>15.8 ± 0.2</td>
<td>-34%</td>
</tr>
<tr>
<td>C</td>
<td>23.3 ± 0.3</td>
<td>14.0 ± 0.2</td>
<td>-40%</td>
</tr>
<tr>
<td>D</td>
<td>25.7 ± 0.2</td>
<td>16.4 ± 0.4</td>
<td>-36%</td>
</tr>
<tr>
<td>E</td>
<td>27.7 ± 0.3</td>
<td>16.3 ± 0.2</td>
<td>-41%§</td>
</tr>
<tr>
<td>F</td>
<td>26.9 ± 0.4</td>
<td>16.2 ± 0.2</td>
<td>-40%</td>
</tr>
</tbody>
</table>

*P < 0.001  A vs all other brands;  §P < 0.03  E vs A, B, C

Rarely getting the 30 – 20 mm Hg gradient


Conclusions

Compression is effective in treatment of venous insufficiency
Degree of compression is important
Biomechanical mechanisms still need to be better defined

Occupational Leg Oedema is More Reduced by Antigraded than by Graduated Stockings

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% volume decrease compared to no stockings

Anti-GRAD provided greater reduction volume, easier to put on, more comfortable

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