Comparison of sub-bandage pressure Measurements of four compression systems from initial application to 24 hours.

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Aim: To show initial pressure and pressure losses after 24hrs for four (4) different compression bandage systems.

Background: There is a general belief that sub-bandage pressures are maintained for 5-7 days with certain systems only. All systems will lose pressure over time when swelling is reduced, and the following study showed pressure losses even in healthy volunteers with the systems that were tested (Table 1).

Early statements by Stemmer have resulted in clinicians striving to achieve initial sub-bandage ankle pressures of 40mmHg which they sometimes believe to be constant. This theory has been challenged by newer research based on fluctuations in sub-bandage pressures and the effectiveness of higher intermittent pressures (Partsch 2006).

Rationale: Bandages are often applied with incorrect pressures, due to bandagers being overcautious and assuming that bandages would be too tight. All systems should be applied according to manufacturers’ recommendations bearing in mind that compression bandages vary in their mode of action, and bandage characteristics may vary according to their construction.

Correct bandage application for effective compression is a skill that can be mastered with practice, and should rely on the expertise of the bandager. This is reinforced by the latest World Union of Wound Healing Societies consensus document on compression, which also cautions practitioners against relying on bandage markers which can lead to over extension, especially around the foot, leading to pain (Consensus document 2008).

Short stretch bandages are applied at full stretch with the roll held close to the limb, whilst elastic bandages are pulled out, held away from the limb and applied at mid stretch (see demonstration photos below).

Application of cohesive short stretch bandage

Application of long stretch bandage

It is well documented and researched that compression should deliver a high therapeutic working pressure to reduce oedema (Mortimer, Levick), prevent venous reflux (Mosti, Mattaliano, Partsch 2008) and a tolerable resting pressure to ensure patient comfort and concordance. This difference in working and resting pressures is termed “stiffness index”.

Method: Four different compression bandage systems were applied by experienced bandagers according to manufacturers’ instructions on 15 healthy volunteers. Measurements were taken after initial bandage application and 24 hours later using a new pressure monitor (Picopress) with a sensor on the medial lower leg at 81 in the supine and standing position.

Pressure loss results (N=15)

The highest stiffness index was recorded with the cohesive short stretch bandage system

Table 1. Timed & position bandage pressures (mmHg).

<table>
<thead>
<tr>
<th>System</th>
<th>Supine 0.00hr</th>
<th>Supine 24 hrs</th>
<th>Pressure Loss (Δ)</th>
<th>Standing 0.00hr</th>
<th>Standing 24 hrs</th>
<th>Pressure Loss (Δ)</th>
<th>Stiffness Index at 24 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actico cohesive 2 component short stretch compression (Activa Healthcare)</td>
<td>63.87</td>
<td>36.07</td>
<td>27.80</td>
<td>67.03</td>
<td>44.44</td>
<td>22.59</td>
<td>8.75</td>
</tr>
<tr>
<td>Coban 2 – 2 component compression (1M)</td>
<td>43.25</td>
<td>27.64</td>
<td>15.61</td>
<td>44.92</td>
<td>30.27</td>
<td>14.65</td>
<td>2.63</td>
</tr>
<tr>
<td>K2 – 2 component compression (Urgo)</td>
<td>47.25</td>
<td>31.89</td>
<td>15.36</td>
<td>50.08</td>
<td>36.56</td>
<td>13.52</td>
<td>4.67</td>
</tr>
<tr>
<td>Profore – 4 component compression (Smith &amp; Nephew)</td>
<td>51.17</td>
<td>37.18</td>
<td>13.99</td>
<td>54.58</td>
<td>42.09</td>
<td>12.49</td>
<td>4.91</td>
</tr>
</tbody>
</table>

Pressure loss results (N=15)

The highest stiffness index was recorded with the cohesive short stretch bandage system

Sub bandage pressure loss is a positive result of effective compression for oedema reduction and venous return.

Reasons for sub bandage pressure loss

Benefits of pressure loss

Reduction of oedema

Therapeutic effect on limb size

Alteration of limb shape (pictures 1 & 2)

Improved limb shape & condition

Picture 1

Picture 2

Effects of compression with Actico® cohesive short stretch compression (A. Clements)

Markings were drawn on the legs to indicate bandage position on application in order to assess bandage slippage after 24 hours

All volunteers found the short stretch bandage system to be most comfortable during the day and even at night with tolerable resting pressures.

Despite the pressure losses, no bandage slippage was observed and this could be attributed to the cohesive component of the bandage systems and correct application methods.

Footnote: Bandage application, testing and monitoring were supervised by Prof. Hugo Partsch. Data analysis was conducted by Prof. Hugo Partsch. Bandage pictures kindly supplied by Anne Clements and Hildegard Charles.

References:

Mortimer PS, Levick JR (2004) Chronic peripheral oedema; the critical role of the lymphatic system, Clinical Medicine, 4 (5); 448-453.


Anne Clements and Hildegard Charles.