AN INNOVATIVE COMPRESSION SYSTEM PROVIDING LOW, SUSTAINED RESTING PRESSURE AND HIGH, EFFICIENT WORKING PRESSURE

Presenter: Josefin Damm, CEO, Co-founder & Co-inventor, PressCise AB, Sweden

Co-authors: T. Lundh, H. Partsch and G. Mosti
Conflict of interest to declare

Josefin Damm is CEO, Co-founder & Co-inventor
PressCise AB

Torbjörn Lundh is co-founder & co-inventor at PressCise AB
Optimal compression?

“Compression effectiveness” vs Pressure

25th Sep 2016
ICC-meeting
PressCise AB
No consistency of pressure

- Less than 10% reached the target pressure
- Pressures between 6 and 143 mmHg

Protz K et al. Compression therapy: scientific background and practical applications. JDDG 2014 794-801
Quantified compression treatment
Two components

Pre-defined pressure

Stiffness

Lundatex® medical

Lundatex® system

25th Sep 2016

ICC-meeting

PressCise AB
1st – apply a precise pressure

- Well-defined pressure – invariant of applier & leg shape
- Elastic and conformable – no pressure change during movement
- Safe and low pressure – 20 mmHg
- Possible to design different pressure levels

Lundatex® medical

25th Sep 2016
ICC-meeting
PressCise AB
Laplace

(1749–1827)

$$dF = -\sigma d\gamma t \left( \frac{\mathbf{r}''(s - ds)}{|\mathbf{r}''(s - ds)|} - \frac{\mathbf{r}''(s + ds)}{|\mathbf{r}''(s + ds)|} \right) \cdot \frac{|\mathbf{r}''(s)|}{|\mathbf{r}''(s)|}$$

$$\Rightarrow p = \sigma t \kappa$$
Bandage based on Laplace’s law

Pressure = \text{force} \times \text{overlap} \times \text{curvature}
At a constant force the pressure gets...

- High at sharp curvature
- Less at less curvature
- Low at small curvature
The force is adjusted to the changes in curvature when the guidelines are followed.

Result: Same well-defined pressure everywhere.
With unique elastic properties, force and curvature work together
The results show that for each 95% confidence intervals, independent of state and position, we get at most 5 mmHg from the target pressure.

- 21 nurses
- Different experience
- First time they used the bandage
- Pre-defined bandage pressure 50 mmHg
No consistency vs consistency of pressure

Wiklander et al. 2015
The pressure is precise, however – the stiffness is very low...

Dynamic measurement made with Picopress, Microlab Italia.
2nd – apply stiffness

➢ To increase the stiffness it is usually necessary to increase the baseline pressure, using stiff bandages

Picture borrowed from http://www.smith-nephew.com
Resting pressure and stiffness today

Large variance

Not very comfortable nor safe resting pressures

Large variance of SSI (static stiffness index)
A novel material & method that doesn’t change the resting pressure

- Patches of hook-and-loop are attached directly to the bandage, without adding any force
- The resting pressure stays unchanged
- The patches creates a ridged and stiff “shell” around the bandage
- At working or standing position the pressure is dramatically increased
- Easy pressure maintenance over time
The patches do not increase the resting pressure, but increases the standing and working pressure.
Pilot study – pressure measurement
Prof. Mosti & Prof. Partsch, Lucca, Italy

Baseline: The bandage provides a precise pressure in both resting (supine) and standing position.

Patches: Adding patches increases working pressure but keeps resting (supine) pressure low.

<table>
<thead>
<tr>
<th></th>
<th>supine</th>
<th>standing</th>
<th>supine</th>
<th>standing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
<td>20.00</td>
<td>19.00</td>
<td>26.00</td>
<td>57.00</td>
</tr>
<tr>
<td>25% Percentile</td>
<td>22.00</td>
<td>19.75</td>
<td>27.25</td>
<td>60.00</td>
</tr>
<tr>
<td>Median</td>
<td>23.00</td>
<td>22.50</td>
<td>29.50</td>
<td>65.50</td>
</tr>
<tr>
<td>75% Percentile</td>
<td>23.00</td>
<td>24.50</td>
<td>33.25</td>
<td>69.00</td>
</tr>
<tr>
<td>Maximum</td>
<td>24.00</td>
<td>28.00</td>
<td>40.00</td>
<td>75.00</td>
</tr>
<tr>
<td>Mean</td>
<td>22.50</td>
<td>22.63</td>
<td>30.63</td>
<td>65.13</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>1.195</td>
<td>2.973</td>
<td>4.534</td>
<td>5.743</td>
</tr>
<tr>
<td>Std. Error of Mean</td>
<td>0.4226</td>
<td>1.051</td>
<td>1.603</td>
<td>2.030</td>
</tr>
</tbody>
</table>
Easy self maintenance of pressure level over time
Pilot study – pressure measurement over 7 days

Pressure drop due to oedema reduction i.e. effective compression

Correction of FixPatch™ before bed rise every morning maintains the pressure over time
Conclusions

- Keeps the resting pressure at a safe and comfortable level
- Increases working & standing pressure only by adding stiffness
- Allows easy self maintenance of the pressure level over time
Thank you for your attention!

Next presentation: 27th September
Room: Hall Masaccio
Session: COURSE - Compression therapy for leg ulcers - Basic session (principles and practical session)
Time: 9:00 am – 1:00 pm
Presentation: 10:00 – 10:15 am

Contact:
josefin@presscise.com
www.presscise.com
No consistency of pressure

- 21 nurses, over 10 years of experience
- Applying bandages daily
- Target pressure 20-40 mmHg

- Not even half of them reached the target pressure
- Afraid of applying to high pressures?
- Larger variation after training