compression therapy in post-TRAUMA INFLAMMATION & OEDEMA

Sergio Gianesini, MD, PhD, FACS
University of Ferrara (ITALY)
USUHS University (BETHESDA, USA)

NO CONFLICT OF INTERESTS

...GUYS.. here I thought we were friends ;)

v-WIN Foundation, ONLUS
LEADING CAUSE OF MORBILITY and MORTALITY

Champion HR.
Major trauma in geriatric patients

STANDARDIZED TRAUMA

Physiological - SCORE - Anatomical

TRAUMA & INJURY Severity SCORE

Jvali R. Comparison of Injury Severity Score, New Injury Severity Score, Revised Trauma Score and Trauma and Injury Severity Score for Mortality Prediction in Elderly Trauma Patients
Indian J Critical Care Med 2019
TRAUMATIC OEDEMA

10.5% documented LYMPHATIC lesions

23.6% consequence of DVT

65.9% edema related to INFLAMMATION.

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Table 1. Systemic and Localized Causes of Edema

<table>
<thead>
<tr>
<th>Cause</th>
<th>Mechanism of action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Systemic</strong></td>
<td></td>
</tr>
<tr>
<td>Allergic reaction, urticaria, and angioedema</td>
<td>Increased capillary permeability</td>
</tr>
<tr>
<td>Cardiac disease</td>
<td>Increased capillary permeability from systemic venous hypertension; increased plasma volume</td>
</tr>
<tr>
<td>Hepatic disease</td>
<td>Increased capillary permeability from systemic venous hypertension; decreased plasma oncotic pressure from reduced protein synthesis</td>
</tr>
<tr>
<td>Malabsorption/protein-calorie malnutrition</td>
<td>Reduced protein synthesis leading to decreased plasma oncotic pressure</td>
</tr>
<tr>
<td>Obstructive sleep apnea</td>
<td>Pulmonary hypertension resulting in increased capillary hydrostatic pressure</td>
</tr>
<tr>
<td>Pregnancy and premenstrual edema</td>
<td>Increased plasma volume</td>
</tr>
<tr>
<td>Renal disease</td>
<td>Increased plasma volume; decreased plasma oncotic pressure from protein loss</td>
</tr>
<tr>
<td><strong>Localized</strong></td>
<td></td>
</tr>
<tr>
<td>Cellulitis</td>
<td>Increased capillary permeability</td>
</tr>
<tr>
<td>Chronic venous insufficiency</td>
<td>Increased capillary permeability caused by local venous hypertension</td>
</tr>
<tr>
<td>Compartment syndrome</td>
<td>Increased capillary permeability caused by local venous hypertension</td>
</tr>
<tr>
<td>Complex regional pain syndrome type 1</td>
<td>Neurogenically mediated increased capillary permeability</td>
</tr>
<tr>
<td>(reflex sympathetic dystrophy)</td>
<td></td>
</tr>
<tr>
<td>Deep venous thrombosis</td>
<td>Increased capillary permeability</td>
</tr>
<tr>
<td>Iliac vein obstruction</td>
<td>Increased capillary permeability caused by local venous hypertension</td>
</tr>
<tr>
<td>Lipedema</td>
<td>Accumulation of fluid in adipose tissue</td>
</tr>
<tr>
<td>Lymphedema</td>
<td>Lymphatic obstruction</td>
</tr>
</tbody>
</table>

---

*Information from references 1 through 13.*
OEDEMA
Venous-lymphatic trauma component
INFLAMMATION
increased capillary permeability
OEDEMA
OEDEMA
Venous-lymphatic trauma component
increased capillary permeability
abnormal loss of plasma proteins
INFLAMMATION
OEDEMA
OEDEMA

Venous-lymphatic trauma component

Increased capillary permeability

Abnormal loss of plasma proteins

Swelling

Cellulitis/infection

INFLAMMATION

OEDEMA
Venous-lymphatic trauma component

increased capillary permeability

abnormal loss of plasma proteins

cellulitis/infection

reduced mobility

swelling

OEDEMA

Venous-lymphatic trauma component

increased capillary permeability

INFLAMMATION

abnormal loss of plasma proteins

swelling

less lymphatic pump

reduced mobility

cellulitis/infection

Venous-lymphatic trauma component

increased capillary permeability

increased interstitial pressure

less lymphatic pump

reduced mobility

swelling

abnormal loss of plasma proteins

cellulitis/infection

INFLAMMATION

OEDEMA

Compression therapy after ankle fracture surgery: a systematic review.

Winge R

8 studies (451 patients)

Bandages, GCS, IPC:

- significant effect on EDEMA (7 studies)
- significant reduction in PAIN (2 studies)
- positive effect on ANKLE ROM (1 study)
- effect on WOUND HEALING (2 studies)
- length of stay reduction (1 study)
- reduction in time to surgery (2 studies).

<table>
<thead>
<tr>
<th>Study</th>
<th>Bandage</th>
<th>Length of Stay</th>
<th>Interventions</th>
<th>Outcome</th>
<th>significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rohmer-Spengler et al. [7]</td>
<td>58</td>
<td>36:19</td>
<td>52-week</td>
<td>Edema reduction: in bandage group: −23% (p &lt; 0.017) after 2 days and −22% (p &lt; 0.017) 2 days post-op. No difference after 6 weeks</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>Sultan et al. [10]</td>
<td>90</td>
<td>36:54</td>
<td>24-week</td>
<td>Edema reduction: after 4 weeks edema is gone in intervention group with an ankle circumference ratio of 1.0 (95% CI 0.99–1.02) compared to control: 1.08 (95% CI 1.06–1.09)</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>Dodds et al. [15]</td>
<td>137</td>
<td>12:01</td>
<td>Till discharge</td>
<td>Time to surgery: control: 2 (0–10) days, intervention: 1 (1–3) days² p = 0.0025</td>
<td>p = 0.0025</td>
</tr>
<tr>
<td>Keehan et al. [16]</td>
<td>24</td>
<td>9:3</td>
<td>Till discharge</td>
<td>Time to surgery: intervention group: 2.3 days. Control: 4.6 days, p = 0.024</td>
<td>p = 0.024</td>
</tr>
<tr>
<td>Mora et al. [9]</td>
<td>24</td>
<td>18:6</td>
<td>Till surgery</td>
<td>Edema reduction: decrease in % intervention/control Day 1: 2.6 ± 0 p = 0.003 Day 2: 4.4 ± 0.7 p = 0.001 Day 3: 4.9 ± 1.6 p = 0.03</td>
<td>p = 0.003</td>
</tr>
<tr>
<td>Thorudmar et al. [11]</td>
<td>25</td>
<td>NA</td>
<td>Till surgery</td>
<td>Edema reduction: volume difference (IPPC-control) Day 1–2: −121 ml p = 0.027 Day 1–3: −63 ml p = 0.049</td>
<td>p = 0.027</td>
</tr>
<tr>
<td>Stöckle et al. [20]</td>
<td>60</td>
<td>44:16</td>
<td>6-day</td>
<td>Edema reduction: average decrease in %, cool packs/AV impulse Pre-OP: 10.53 p = NA Post-OP: 45.74 p = NA</td>
<td>p = 0.027</td>
</tr>
<tr>
<td>Airaksinen et al. [12]</td>
<td>34</td>
<td>43:7</td>
<td>14:20</td>
<td>Edema reduction: volume decrease intervention/control Day 5: 170 ml/15 ml p &lt; 0.001 Ankle joint mobility: difference in increase intervention/control: Day 5: 11.9 ± 1° p &lt; 0.001 Pain: drop in VAS-score intervention/control: 1.6 ± 0.3 p &lt; 0.001</td>
<td>p &lt; 0.001</td>
</tr>
</tbody>
</table>

* Ages are represented as means unless otherwise stated.
Bandages, GCS, IPC: from 10 mmHg to 130 mmHg.

- significant effect on **EDEMA** (7 studies)
- significant reduction in **PAIN** (2 studies)
- positive effect on **ANKLE ROM** (1 study)
- effect on **WOUND HEALING** (2 studies)
- **length of stay** reduction (1 study)
- reduction in **time to surgery** (2 studies).

*methodological limitations*
Graduated compression stockings effects on chronic venous disease signs and symptoms during pregnancy.

Saliba Júnior OA

EDEMA

70.00% vs. 33.33%; p.0.0045

knee length GCS
20–30 mmHg
Impact of compression stockings on leg swelling after arthroscopy

Tischer T

23-32 mmHg vs NO compression

p < .05

10 days

23-32 mmHg vs NO compression

Post-op day: 1, 2, 7, 14, 30

<table>
<thead>
<tr>
<th>Pain level</th>
<th>MECS (n = 43)</th>
<th>No MECS (n = 42)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L  M  H</td>
<td>L  M  H</td>
</tr>
<tr>
<td><strong>Pain at rest (VAS)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-operative</td>
<td>15 17 7</td>
<td>17 10 8</td>
</tr>
<tr>
<td>Day 1 postoperative</td>
<td>8 13 18</td>
<td>5 15 15</td>
</tr>
<tr>
<td>Day 2 postoperative</td>
<td>12 18 9</td>
<td>13 14 7</td>
</tr>
<tr>
<td>Day 7 postoperative</td>
<td>10 21 8</td>
<td>12 16 6</td>
</tr>
<tr>
<td>Day 14 postoperative</td>
<td>19 17 3</td>
<td>19 13 2</td>
</tr>
<tr>
<td>1 month postoperative</td>
<td>25 9 0</td>
<td>22 8 1</td>
</tr>
<tr>
<td><strong>Pain at walking (VAS)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-operative</td>
<td>8 14 17</td>
<td>5 15</td>
</tr>
<tr>
<td>Day 1 postoperative</td>
<td>2 9 28</td>
<td>1 9 24</td>
</tr>
<tr>
<td>Day 2 postoperative</td>
<td>4 16 19</td>
<td>4 18 12</td>
</tr>
<tr>
<td>Day 7 postoperative</td>
<td>6 21 12</td>
<td>8 14 12</td>
</tr>
<tr>
<td>Day 14 postoperative</td>
<td>13 20 6</td>
<td>16 15 3</td>
</tr>
<tr>
<td>1 month postoperative</td>
<td>24 7 3</td>
<td>18 13 0</td>
</tr>
</tbody>
</table>

L low pain (VAS 0–2), M moderate pain (VAS 3–5), H high pain (VAS 6–10)

23-32 mmHg vs NO compression

p<NS

Post-op day: 1, 2, 7, 14, 30

..but assessment at knee level and below (Tischer > edema at the thigh)

Table 2 Pre- and postoperative mean (SD) knee circumference, calf circumference and ankle circumference (cm) in patients treated with medical elastic compression stocking (MECS) or no stocking

<table>
<thead>
<tr>
<th></th>
<th>MECS (n = 43)</th>
<th>No MECS (n = 42)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean knee circumference pre-operative</td>
<td>43 (SD 4)</td>
<td>42 (SD 6)</td>
</tr>
<tr>
<td>Mean knee circumference day 1 postoperative</td>
<td>46 (SD 4)</td>
<td>46 (SD 5)</td>
</tr>
<tr>
<td>Mean knee circumference at day 2 postoperative</td>
<td>48 (SD 4)</td>
<td>47 (SD 4)</td>
</tr>
<tr>
<td>Mean knee circumference at day 7 postoperative</td>
<td>47 (SD 4)</td>
<td>47 (SD 4)</td>
</tr>
<tr>
<td>Mean knee circumference at day 14 postoperative</td>
<td>46 (SD 4)</td>
<td>45 (SD 6)</td>
</tr>
<tr>
<td>Mean knee circumference at 1 month</td>
<td>45 (SD 4)</td>
<td>44 (SD 6)</td>
</tr>
<tr>
<td>Mean calf circumference pre-operative</td>
<td>38 (SD 3)</td>
<td>38 (SD 3)</td>
</tr>
<tr>
<td>Mean calf circumference at day 1 postoperative</td>
<td>38 (SD 3)</td>
<td>38 (SD 4)</td>
</tr>
<tr>
<td>Mean calf circumference at day 2 postoperative</td>
<td>39 (SD 3)</td>
<td>39 (SD 3)</td>
</tr>
<tr>
<td>Mean calf circumference at day 7 postoperative</td>
<td>39 (SD 3)</td>
<td>40 (SD 3)</td>
</tr>
<tr>
<td>Mean calf circumference at day 14 postoperative</td>
<td>38 (SD 3)</td>
<td>38 (SD 3)</td>
</tr>
<tr>
<td>Mean calf circumference at 1 month</td>
<td>37 (SD 4)</td>
<td>38 (SD 3)</td>
</tr>
<tr>
<td>Mean ankle circumference pre-operative</td>
<td>22 (SD 2)</td>
<td>23 (SD 4)</td>
</tr>
<tr>
<td>Mean ankle circumference at day 1 postoperative</td>
<td>22 (SD 2)</td>
<td>22 (SD 2)</td>
</tr>
<tr>
<td>Mean ankle circumference at day 2 postoperative</td>
<td>22 (SD 2)</td>
<td>23 (SD 2)</td>
</tr>
<tr>
<td>Mean ankle circumference at day 7 postoperative</td>
<td>23 (SD 2)</td>
<td>24 (SD 2)</td>
</tr>
<tr>
<td>Mean ankle circumference at day 14 postoperative</td>
<td>23 (SD 2)</td>
<td>23 (SD 4)</td>
</tr>
<tr>
<td>Mean ankle circumference at 1 month</td>
<td>22 (SD 2)</td>
<td>23 (SD 2)</td>
</tr>
</tbody>
</table>

Note: NS = not significant

23-32 mmHg vs NO compression

p<NS

Post-op day: 1, 2, 7, 14, 30

GCS:
- 69% increased knee stability
- 60% felt a reduction in knee swelling
- 38% reduction in knee pain

..but assessment at knee level and below (Tischer > edema at the thigh)
Effective Treatment of Posttraumatic and Postoperative Edema in Patients with Ankle and Hindfoot Fractures
Rohner-Spengler M

median EDEMA:

MULTILAYER > COLD PACK > IMPULSE

![Changes in Postoperative Edema](image)
GCS, foot impulse devices or IPC should be offered to all patients undergoing hip fracture surgery based on individual patient factors.

The evidence supporting these recommendations is very limited.
Global guidelines trends & controversies in lower limb venous and lymphatic disease

Sergio Gianesini, MD, PhD, FACS
University of Ferrara (ITALY)
UCES University (ARGENTINA)
USUHS University, Bethesda (USA)
SECTIONS
1. Lower limb venous ultrasound
2. Endovenous saphenous ablation
3. Bandaging, Adjustable Compression Wraps, Intermittent Pneumatic Compression
4. Graduated Elastic Stockings
5. Sclerotherapy for varicose veins
6. Aesthetic phlebology
7. Acute and chronic deep venous disease
8. Venous Active Drugs - Ulcer management
9. Lower limb lymphedema
10. Venous thrombosis management
POST-PREOCEDURAL COMPRESSION
POST-PREOCEDURAL COMPRESSION

24 hours

Timing is everything

3 weeks
POST-PREOCEDURAL COMPRESSION

*NICE, EUR and LATAM don’t specify

GLOBAL 2019: based on the physician indication

16 mmHg

40 mmHg
INTERMITTENT PNEUMATIC COMPRESSION for reducing TRAUMATIC OEDEMA


Myerson MS. Clinical applications of a pneumatic intermittent impulse compression device after trauma and major surgery to the foot and ankle. Foot Ankle. 1993 May;14(4):198-203.


Pneumatic thigh compression reduces calf volume and augments the venous return

Thigh compression \rightarrow Venous dilation \rightarrow After load microcirculation resistance
NEWS

• Interface pressure in B and B1

• Compliance assessment

• IPC proper use
  Only 19% of trauma patients are receiving proper IPC

• IPC protocols
How do we define a “long-haul” flight?
PROLONGED FLIGHT

BRITISH JOURNAL OF HEMATOLOGY 2011: NO indication to GCS to everybody (1C). Patients at risk of DVT should wear GCS if >3 hrs.
BRITISH JOURNAL OF HEMATOLOGY 2011:
NO indication to GCS to everybody (1C).
Patients at risk of DVT should wear GCS if >3 hrs.

NICE: recommends in all patients at risk
NICE: recommendes in all patients at risk

ACCP 2012: for patients at risk, in >3 hrs, 15-30 mmHg (GRADE 2C)

BRITISH JOURNAL OF HEMATOLOGY 2011: NO indication to GCS to everybody (1C). Patients at risk of DVT should wear GCS if >3 hrs.
PROLONGED FLIGHT

NICE: recommends in all patients at risk

BRITISH JOURNAL OF HEMATOLOGY 2011: NO indication to GCS to everybody (1C). Patients at risk of DVT should wear GCS if >3 hrs.

ACCP 2012: for patients at risk, in >3 hrs, 15-30 mmHg (GRADE 2C)

EUROPE 2018: in all patients at risk (2B), but the guidelines are also recommending GCS in healthy subjects at risk of developing edema (1B)
PHLight study

Sergio Gianesini, MD PhD FACS
University of Ferrara (ITALY)
USUHS University (Bethesda, USA)
not graduated ankle-socks

15 – 20 mmHg below-knee GCS

Volume variation

-3.1±14.4 mL

-0.1±0.6%

P<0.0001

P=0.3964

15 – 20 mmHg below-knee GCS

not graduated ankle-socks

VOLUME

<table>
<thead>
<tr>
<th>SOCK</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>Total Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>P Level</td>
<td>&lt;0.0001</td>
<td>&lt;0.0001</td>
<td>&lt;0.0001</td>
<td>&lt;0.0002</td>
<td>&lt;0.0001</td>
<td>&lt;0.0001</td>
<td>&lt;0.0001</td>
<td>&lt;0.0001</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>% Variation mean ±SD</td>
<td>10.7±3.2</td>
<td>-4.8±1.6</td>
<td>6.7±2.6</td>
<td>8.2±3.9</td>
<td>6.2±4.4</td>
<td>5.2±1.9</td>
<td>3.8±2.3</td>
<td>5.3±2.8</td>
<td>5.2±1.1</td>
</tr>
</tbody>
</table>

GCS

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>Total Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>P Level</td>
<td>&lt;0.0001</td>
<td>&lt;0.0001</td>
<td>&lt;0.0001</td>
<td>0.01</td>
<td>&lt;0.0001</td>
<td>&lt;0.0006</td>
<td>&lt;0.0001</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>% Variation mean ±SD</td>
<td>2.3±1.3</td>
<td>2.8±1.9</td>
<td>2.4±1.4</td>
<td>1.7±2.7</td>
<td>1.2±2.1</td>
<td>-1.5±2.4</td>
<td>-1.7±0.9</td>
<td>-1.7±1.5</td>
</tr>
<tr>
<td>Comparison between the volume variation sock vs GCS</td>
<td>&lt;0.0001</td>
<td>&lt;0.0001</td>
<td>&lt;0.0001</td>
<td>&lt;0.0001</td>
<td>&lt;0.0001</td>
<td>&lt;0.0001</td>
<td>&lt;0.0001</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>
not graduated ankle-socks
15 – 20 mmHg below-knee GCS
Graduated compression lower limb volume control in different muscle pump activation conditions and related limb shape impact

Sergio Gianesini, MD PhD FACS
University of Ferrara (ITALY)
USUHS University (Bethesda, USA)

J Vasc Surg VL 2019
Table 2. Bioimpedance values. Rate of extracellular water out of total body water.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Pre-sampling (%)</th>
<th>Post-sampling (%)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>WALKING NO GCS</td>
<td>40.54±1.58%</td>
<td>40.50±1.65%</td>
<td>ns</td>
</tr>
<tr>
<td>WALKING GCS</td>
<td>40.55±1.66%</td>
<td>40.45±1.71%</td>
<td>0.017</td>
</tr>
<tr>
<td>STANDING NO GCS</td>
<td>40.55±1.71%</td>
<td>40.53±1.76%</td>
<td>ns</td>
</tr>
<tr>
<td>STANDING GCS</td>
<td>40.36±1.58%</td>
<td>40.43±1.64%</td>
<td>ns</td>
</tr>
<tr>
<td>SITTING NO GCS</td>
<td>40.29±1.59%</td>
<td>40.33±1.60%</td>
<td>ns</td>
</tr>
<tr>
<td>SITTING GCS</td>
<td>40.27±1.55%</td>
<td>40.24±1.50%</td>
<td>ns</td>
</tr>
</tbody>
</table>

*T-test student test and or Mann Whitney as appropriate.

Biopemdance showed an extracellular water reduction only while walking with GCS.
A progressive compression was present in 33% of cases, but the clinical effect was present in **ALL** the cases.
THE PERFECT STORM of ORANGES & APPLES

Always report INTERFACE PRESSURE In

Università degli Studi di Ferrara

v-WIN Foundation, ONLUS

B & B1
Incidence of incorrectly sized graduated compression stockings and lower leg skin irregularities in postoperative orthopedic patients.

52 patients (total hip/knee arthroplasty)

Incorrectly fitting: 10%

Edema, erythema, ecchymosis, blistering, breaks in the skin: 4%
flow velocity increase in the compressed thigh, but also in the caval vein
The Italian version of the lower extremity functional scale was reliable, valid, and responsive. Cacchio A

### The Lower Extremity Functional Scale

We are interested in knowing whether you are having any difficulty at all with the activities listed below because of your lower limb problem for which you are currently seeking attention. Please provide an answer for each activity.

**Today, do you or would you have any difficulty at all with:**

<table>
<thead>
<tr>
<th>Activities</th>
<th>Extreme Difficulty or Unable to Perform Activity</th>
<th>Quite a Bit of Difficulty</th>
<th>Moderate Difficulty</th>
<th>A Little Bit of Difficulty</th>
<th>No Difficulty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Any of your usual work, housework, or school activities.</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
<td>☐</td>
</tr>
<tr>
<td>2. Your usual hobbies, recreational or sporting activities.</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
<td>☐</td>
</tr>
<tr>
<td>3. Getting into or out of the bath.</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
<td>☐</td>
</tr>
<tr>
<td>4. Walking between rooms.</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
<td>☐</td>
</tr>
<tr>
<td>5. Putting on your shoes or socks.</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
<td>☐</td>
</tr>
<tr>
<td>7. Lifting an object, like a bag of groceries from the floor.</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
<td>☐</td>
</tr>
<tr>
<td>8. Performing light activities around your home.</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
<td>☐</td>
</tr>
<tr>
<td>9. Performing heavy activities around your home.</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
<td>☐</td>
</tr>
<tr>
<td>10. Getting into or out of a car.</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
<td>☐</td>
</tr>
<tr>
<td>12. Walking a mile.</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
<td>☐</td>
</tr>
<tr>
<td>13. Going up or down 10 stairs (about 1 flight of stairs).</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
<td>☐</td>
</tr>
<tr>
<td>14. Standing for 1 hour.</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
<td>☐</td>
</tr>
<tr>
<td>15. Sitting for 1 hour.</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
<td>☐</td>
</tr>
<tr>
<td>16. Running on even ground.</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
<td>☐</td>
</tr>
<tr>
<td>17. Running on uneven ground.</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
<td>☐</td>
</tr>
<tr>
<td>18. Making sharp turns while running fast.</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
<td>☐</td>
</tr>
<tr>
<td>20. Rolling over in bed.</td>
<td>☐</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
<td>☐</td>
</tr>
</tbody>
</table>

**Minimum Level of Detectable Change (90% Confidence): 9 points**

**SCORE: 0** / 80 (fill in the blank with the sum of your responses)
PHLEB-Ortho STUDY
(Knee arthroplasty/Hip replacement)

18-21 mmHg

23-32 mmHg

PRELIMINARY DATA

30 days
CIRCUMFERENCE
LEG VOLUME
US subcutaneous thickness
APG

Ankle ROM

CIVIQ 20
VVSYMQ
LOWER EXTREMITY FUNCTIONAL SCALE
## STUDY POPULATION

<table>
<thead>
<tr>
<th>Age mean±st. dev</th>
<th>GROUP 18-21 mmHg (group A)</th>
<th>GROUP 23 -32 mmHg (group B)</th>
<th>P*</th>
</tr>
</thead>
<tbody>
<tr>
<td>69±13</td>
<td>71±14</td>
<td>67±13</td>
<td>0.55</td>
</tr>
<tr>
<td>M/F</td>
<td>2/12</td>
<td>1/6</td>
<td>1/8</td>
</tr>
<tr>
<td>BMI mean±st. dev</td>
<td>27±3</td>
<td>27±3</td>
<td>27±3</td>
</tr>
<tr>
<td>CEAP</td>
<td>C1 n°12</td>
<td>C1 n°4</td>
<td>C1 n°8</td>
</tr>
<tr>
<td></td>
<td>C2 n°2</td>
<td>C2 n°2</td>
<td>C2 n°0</td>
</tr>
<tr>
<td>KNEE (n°)</td>
<td>6</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>HIP (n°)</td>
<td>8</td>
<td>6</td>
<td>2</td>
</tr>
</tbody>
</table>
Two-tailed paired Student-T Test

LEG VOLUME (mL)

<table>
<thead>
<tr>
<th>Group</th>
<th>Volume (mL)</th>
<th>Percentage Change</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>T0 (18-21 mmHg)</td>
<td>2241 ± 327</td>
<td>-11 mL (0.5%)</td>
<td>&lt;0.4967</td>
</tr>
<tr>
<td>T1 (18-21 mmHg)</td>
<td>2230 ± 310</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T0 (23-32 mmHg)</td>
<td>2616 ± 469</td>
<td>-179 mL (-6.8%)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>T1 (23-32 mmHg)</td>
<td>2437 ± 457</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PHLEB-Ortho study
PHLEB-Ortho study

Flexion-extension width

18-21 mmHg

14° (32%) ± 8

p<0.01

7° (16%) ± 9

p<0.10

42 ± 9

48 ± 11

T0 T1

23-32 mmHg

44 ± 10

58 ± 8

T0 T1

Two-tailed paired Student-T Test
PHLEB-Ortho study

VFI

Two-tailed paired Student-T Test

18-21 mmHg

23-32 mmHg

p<0.8146

p<0.08
Leg Subcutaneous Thickness (cm)

<table>
<thead>
<tr>
<th></th>
<th>T0</th>
<th>T1</th>
<th>p&lt;0.05</th>
<th>T0</th>
<th>T1</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-21 mmHg</td>
<td>±0.35</td>
<td>±0.38</td>
<td>p&lt;0.2418</td>
<td>±0.41</td>
<td>±0.35</td>
</tr>
<tr>
<td>23-32 mmHg</td>
<td>0.76</td>
<td>0.61</td>
<td></td>
<td>0.84</td>
<td>0.61</td>
</tr>
</tbody>
</table>

Thigh Subcutaneous Thickness (cm)

<table>
<thead>
<tr>
<th></th>
<th>T0</th>
<th>T1</th>
<th>p&lt;0.2339</th>
<th>T0</th>
<th>T1</th>
<th>p&lt;0.004</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-21 mmHg</td>
<td>±0.54</td>
<td>±0.52</td>
<td></td>
<td>±0.40</td>
<td>±0.41</td>
<td></td>
</tr>
<tr>
<td>23-32 mmHg</td>
<td>1.4</td>
<td>1.2</td>
<td></td>
<td>1.2</td>
<td>1.0</td>
<td></td>
</tr>
</tbody>
</table>

Two-tailed paired Student-T Test
## QoL

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>18-21 mmHg</strong></td>
<td>21.6±7.3</td>
<td>39.8±7.1</td>
<td>0.01</td>
<td>48.6±7.9</td>
<td>71.3±5.3</td>
<td>0.003</td>
<td>4.5±1.2</td>
<td>3.3±0.8</td>
<td>0.03</td>
</tr>
<tr>
<td><strong>23-32 mmHg</strong></td>
<td>25.5±7.4</td>
<td>49.1±8.3</td>
<td>0.003</td>
<td>46.8±13.3</td>
<td>80.1±22.9</td>
<td>0.005</td>
<td>4.3±0.7</td>
<td>1.75±1.9</td>
<td>0.008</td>
</tr>
</tbody>
</table>
PHLEB-Ortho study

LEFS

83%  
\( p < 0.01 \)

92%  
\( p < 0.0003 \)

18-21 mmHg

T0: 22 ± 7.3
T1: 40 ± 7.1

23-32 mmHg

T0: 26 ± 7.5
T1: 49 ± 8.3
PHLEB-Ortho study

- LEFS:
  - T0: 22 mmHg (±7.3)
  - T1: 40 mmHg (±7.1)
  - 83% improvement, p<0.01

- PHLEB-Ortho study:
  - T0: 26 mmHg (±7.5)
  - T1: 49 mmHg (±8.3)
  - 92% improvement, p<0.0003

18-21 mmHg < 23-32 mmHg (p: NS)
COMPRESSION in post-trauma inflammation & oedema

450,000 times

40% of the top shared healthcare web links contain "FAKE NEWS"

Connecting the Experts, Informing the Patients
The spread of medical fake news in social media.


450,000 times

40% of the top shared healthcare web links contains "FAKE NEWS" & they are shared more than

FAKE NEWS

40%

ACKNOWLEDGMENTS

Connecting the Experts, Informing the Patients

INTERNATIONAL consensus document & communication campaign for

INTERNATIONAL meeting

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v-WINter international meeting in Phlebology, Lymphology & Aesthetics

January 2021

189 Countries
EXPO 2020-2021
DUBAI, UAE

WHY DUBAI؟
المعرفة

Following the evidence, for globally validated patient information

A STUNNING CITY..

..in a charming scenario..

..perfect for tourism..

..and for networking!

*meeting in conjunction with VAICON 2021 – Chandigarah (INDIA)
ONE registration, TWO meetings
International Union of Phlebology

25-31 October 2021

ISTANBUL 2021

UIP WORLD CONGRESS OF PHLEBOLOGY