Initial and permanent vein lumen minimization obtained with endovenous occlusion techniques by using hyaluronan solution instead of tumescent fluid

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Tumescent anaesthesia is usually applied prior to thermo-occlusive methods, but the benefit of vein lumen reduction is lost within hours to days due to rapid fluid resorption. Consequence: Painful inflammatory reactions, indurations and discolorations. Incidence is increasing with vein diameter.
study

endoluminal treatment + perivenous gel cover

- 48 patients (33 f, 15 m, 46 – 74 y.)
- saphenous insufficiency (GSV, intrafascial)
- diameter: 7.2 – 23.9 mm, distance to skin > 8 mm
- laser 1470 nm (radial, Biolitec, n = 24)
- microfoam (Aethoxysklerol, 1%, catheter, n = 24)
- hyaluronan: 2% solution, crosslinkage: 1%
- no external compression applied
- clinical + sonog. examinations after 2 and 8 w.
injection tool

- hollow needle, ID: 0.6 mm, Luer-Lock
- catheter: PTFE; ID: 0.8 mm, OD: 1.3 mm
- flexible, working length: 200 mm
- tip switchable sharp/blunt
injection before foam sclerotherapy

flexible cannula/catheter: coaxial approach

gel deposit

vein

skin

scheme of vein compression cross-sectional view

hyaluronan

vein before compression

compressed vein

hyaluronan
injection before laser/RF

For use with laser or RF, a small amount of diluted local anaesthetic has to be placed around the target vein:

hyaluronan

anesthetic fluid
results

catheter application of gel:
• technically successful in the first attempt during catheter withdrawal in 45/48 cases (93.7%)
• 3 cases received additional needle injections
• all diseased veins occluded (n=48, week 2)

reduction of vein cross section:
• 50 – 81%, mean: 68.2% (week 2)
• 62 – 84%, mean: 73.1% (week 8)
results

**gel volumina:**
- laser: mean 1.9 ml/cm (1.4 – 2.9 ml/cm)
- sclerofoam: mean 2.1 ml/cm (1.3 – 3.1 ml/cm)

**application time:**
- laser: mean 6.7 s/cm (3.5 – 13.7 s/cm)
- sclerofoam: mean 3.8 s/cm (2.2 – 8.8 s/cm)

**complications:**
- no major adverse events (infection, DVT, embolism)
- no problems related to vein compressing medium
<table>
<thead>
<tr>
<th>segments</th>
<th>with hyaluronan</th>
<th>without</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>visible small hematoma (week 2)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>laser</td>
<td>2/24 8.3%</td>
<td>9/24 9.5%</td>
</tr>
<tr>
<td>sclerofoam</td>
<td>0</td>
<td>2/24 8.3%</td>
</tr>
<tr>
<td><strong>minor discomfort not limiting any activities</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>laser</td>
<td>2/24 8.3%</td>
<td>14/24 58.3%</td>
</tr>
<tr>
<td>sclerofoam</td>
<td>1/24 4.1%</td>
<td>15/24 62.5%</td>
</tr>
<tr>
<td><strong>pain (oral analgetics)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>laser</td>
<td>0</td>
<td>8/24 33.3%</td>
</tr>
<tr>
<td>sclerofoam</td>
<td>0</td>
<td>5/24 20.8%</td>
</tr>
</tbody>
</table>
### results

<table>
<thead>
<tr>
<th>segments</th>
<th>with hyaluronan</th>
<th>without</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>dyscolorations (week 8)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>laser</td>
<td>0</td>
<td>9/24</td>
</tr>
<tr>
<td>sclerofoam</td>
<td>0</td>
<td>8/24</td>
</tr>
<tr>
<td><strong>mini-thrombectomies (aspiration), related to...</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>laser</td>
<td>0</td>
<td>6/24</td>
</tr>
<tr>
<td>sclerofoam</td>
<td>0</td>
<td>2/24</td>
</tr>
</tbody>
</table>

**Note:** The results are based on 24 segments for each treatment group.
visual comparison

no hyaluronan

hyaluronan

no hyaluronan
conclusions

Hyaluronan injection used with catheter sclerotherapy or endovenous laser provides...

- invisible „internal“ vein compression
- effective and save prevention of symptoms
- improvement of patient comfort
- optimized aesthetic results

Replacement of tumescent fluid is therefore recommended for saphenous veins > 6 mm.

Read more: www.venartis.org (non-commercial)