Venous ulcer review

Clinical question: What is the best treatment for venous ulcers?

Results: Compression aids ulcer healing. Pentoxifylline can aid ulcer healing. Artificial skin grafts are more effective than other skin grafts in helping ulcer healing. Correction of underlying venous incompetence reduces ulcer recurrence.

Implementation: Potential pitfalls to avoid are:
- Failure to exclude underlying arterial disease before application of compression.
- Unusual-looking ulcers or those slow to heal should be biopsied to exclude malignant transformation.

Keywords: venous ulceration, ulcer healing

Venous ulceration

Definition: A skin defect in a limb with a venous abnormality.

Incidence: A 0.15% point prevalence with women outnumbering men 2.8:1.1

Economics: An unhealed leg ulcer costs approximately £1300 per year to treat.2

Levels of evidence used in this summary: Systematic reviews, meta-analyses, and randomized controlled trials.


Outcomes: Ulcer healing, time to ulcer healing, pain relief during treatment, and prevention of ulcer recurrence.

Consumer summary: A venous ulcer is a complication of varicose veins. Venous ulcers can be slow to heal and impact on patients’ quality of life. There is good evidence that compression helps heal ulcers. In patients who do not tolerate continuous compression, intermittent compression may help healing. In slow-healing ulcers, the use of pentoxifylline and bilayer artificial skin in conjunction with compression may aid healing. Surgery to incompetent veins reduces the risk of recurrence and endovenous surgery can speed ulcer healing.

The evidence

Does compression aid ulcer healing?

The following were analyzed:

Systematic reviews: 2
Meta-analysis: 0
Randomized controlled trials: 26
One systematic review concluded that ‘compression increases ulcer healing rates compared with no compression. Multicomponent systems are more effective than single component systems. Multicomponent systems containing an elastic bandage appear more effective than those composed mainly of inelastic constituents’.

The second systematic review concluded that ‘… patients with venous leg ulcers treated with four-layer bandages experience faster healing than those treated with short-stretch bandages’.

The randomized trials show a benefit of compression over no compression. They also tend to favor multilayer, long-stretch compression over short-stretch compression (Table 1).

**Conclusions**

Compression aids ulcer healing.

**Does intermittent pneumatic compression aid ulcer healing?**

The following were analyzed:

- Systematic reviews: 1
- Meta-analysis: 0
- Randomized controlled trials: 5

The systematic review concluded that ‘IPC may increase healing compared to no compression, but it is not clear whether it increases healing when added to treatment with bandages or if it can be used instead of compression bandages’.

**Randomized trials**

Two trials have shown a benefit for intermittent pneumatic compression (IPC) with a benefit for fast IPC over slow IPC in one trial. The other two trials didn’t show a benefit for IPC (Table 2).

**Conclusions**

IPC may help healing when continuous compression cannot be tolerated.

**Does pentoxifylline aid the healing of venous ulcers?**

The following were analyzed:

- Systematic reviews: 1
- Meta-analysis: 0
- Randomized controlled trials: 6

The systematic review concluded that ‘pentoxifylline is an effective adjunct to compression bandaging for treating venous ulcers and may be effective in the absence of compression’.

**Randomized trials**

All trials showed increased healing in the pentoxifylline group with no benefit shown for higher doses (Table 3).

**Conclusions**

Pentoxifylline 400 mg tds has a role in aiding the healing of venous ulcers.

**Does skin grafting aid ulcer healing?**

The following were analyzed:

- Systematic reviews: 1
- Meta-analysis: 0
- Randomized controlled trials: 11

The systematic review concluded that ‘… superficial venous surgery is associated with similar rates of ulcer healing to compression alone, but with less recurrence’.

**Randomized trials**

Increased healing was seen compared to no grafting with the greatest difference seen with artificial skin grafts (Table 4).

**Conclusions**

Artificial skin helps a greater proportion of ulcers heal than other skin grafts.

**Does surgery or endovenous therapy aid ulcer healing and prevent recurrence?**

The following were analyzed:

- Systematic review: 1
- Meta-analysis: 0
- Randomized controlled trials: 5

The systematic review concluded that ‘… superficial venous surgery is associated with similar rates of ulcer healing to compression alone, but with less recurrence’.

**Randomized trials**

Only endovenous surgery seems to aid ulcer healing, but all forms of surgery reduce ulcer recurrence (Table 5).

**Conclusions**

Correction of venous incompetence is important to reduce the incidence of ulcer recurrence after healing.
Table 1: Randomized controlled trials showing the effect of compression on ulcer healing

<table>
<thead>
<tr>
<th>Author</th>
<th>Number randomized</th>
<th>Interventions</th>
<th>Outcome measures</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Continued)</td>
<td></td>
<td></td>
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<tr>
<td>Hendricks and Swallow⁵</td>
<td>21</td>
<td>Gp1: Unna’s boot Gp2: below-knee elastic compression stocking</td>
<td>Healing at 78 weeks</td>
<td>Gp1: 70% healed Gp2: 71% healed</td>
</tr>
<tr>
<td>Eriksson⁶</td>
<td>34</td>
<td>Gp1: inner stocking plus outer elastic bandage Gp2: hydrocolloid dressing plus elastic bandage</td>
<td>Healing at 12 weeks</td>
<td>Gp1: 41% healed Gp2: 53% healed</td>
</tr>
<tr>
<td>Kikta et al⁷</td>
<td>87</td>
<td>Gp1: Unna’s boot Gp2: no compression</td>
<td>Healing at 6 months</td>
<td>Gp1: 70% healed Gp2: 38% healed</td>
</tr>
<tr>
<td>Rubin et al⁸</td>
<td>36</td>
<td>Gp1: Unna’s boot Gp2: polyurethane foam dressing</td>
<td>Healing at 12 months</td>
<td>Gp1: 95% healed Gp2: 41% healed</td>
</tr>
<tr>
<td>Charles⁹</td>
<td>53</td>
<td>Gp1: short-stretch compression Gp2: usual care (no compression)</td>
<td>Healing at 3 months</td>
<td>Gp1: 71% healed Gp2: 25% healed</td>
</tr>
<tr>
<td>Cordts et al¹⁰</td>
<td>43</td>
<td>Gp1: hydrocolloid dressing plus cohesive elastic bandage Gp2: Unna’s boot</td>
<td>Healing at 12 weeks</td>
<td>Gp1: 50% healed Gp2: 43% healed</td>
</tr>
<tr>
<td>Travers et al¹¹</td>
<td>27</td>
<td>Gp1: single-layer elastic cohesive bandage Gp2: 3-layer compression</td>
<td>Mean percentage change at 7 weeks</td>
<td>Gp1: −90% Gp2: −83%</td>
</tr>
<tr>
<td>Danielsen et al¹²</td>
<td>43</td>
<td>Gp1: long-stretch, nonadhesive compression bandage Gp2: short-stretch, nonadhesive compression bandage</td>
<td>Healing at 6 and 12 months</td>
<td>Gp1: 39% healed at 6 months and 52% at 12 months Gp2: 25% healed at 6 months and 15% at 12 months</td>
</tr>
<tr>
<td>Gould et al¹³</td>
<td>46</td>
<td>Gp1: 3-component, long-stretch compression Gp2: 3-component, short-stretch compression</td>
<td>Healing at 15 weeks</td>
<td>Gp1: 58% healed Gp2: 35% healed</td>
</tr>
<tr>
<td>Morrell et al¹⁴,¹⁵</td>
<td>233</td>
<td>Gp1: 4-layer compression Gp2: standard community care</td>
<td>Healing at 12 months</td>
<td>Gp1: 65% healed Gp2: 55% healed</td>
</tr>
<tr>
<td>Scriven et al¹⁶</td>
<td>64</td>
<td>Gp1: 4-layer compression Gp2: short-stretch compression</td>
<td>Healing at 12 months</td>
<td>Gp1: 55% healed Gp2: 57% healed</td>
</tr>
<tr>
<td>Taylor et al¹⁷</td>
<td>36</td>
<td>Gp1: 4-layer compression Gp2: standard community care</td>
<td>Healing at 12 weeks</td>
<td>Gp1: 67% healed Gp2: 17% healed</td>
</tr>
<tr>
<td>Vowden et al¹⁹</td>
<td>149</td>
<td>Gp1: Charing Cross 4-layer compression Gp2: modified 4-layer compression bandage kit</td>
<td>Healing at 12 weeks</td>
<td>Gp1: 60% healed Gp2: 76% healed Gp3: 60% healed</td>
</tr>
<tr>
<td>Moffatt et al²¹</td>
<td>112</td>
<td>Gp1: 4-layer compression Gp2: 2-layer compression</td>
<td>Healing at 12 weeks</td>
<td>Gp1: 70% healed Gp2: 58% healed</td>
</tr>
<tr>
<td>O’Brien et al²²</td>
<td>200</td>
<td>Gp1: 4-layer compression Gp2: standard community care</td>
<td>Healing at 12 weeks</td>
<td>Gp1: 54% healed Gp2: 34% healed</td>
</tr>
<tr>
<td>Ukat et al²³</td>
<td>89</td>
<td>Gp1: 4-layer compression Gp2: short-stretch compression</td>
<td>Healing at 12 weeks</td>
<td>Gp1: 30% healed Gp2: 22% healed</td>
</tr>
<tr>
<td>Franks et al²⁴</td>
<td>159</td>
<td>Gp1: 4-layer compression Gp2: short-stretch compression</td>
<td>Healing at 24 weeks</td>
<td>Gp1: 69% healed Gp2: 73% healed</td>
</tr>
<tr>
<td>Nelson et al²⁵</td>
<td>387</td>
<td>Gp1: 4-layer compression Gp2: short-stretch bandage</td>
<td>Healing at 4 and 12 months</td>
<td>Gp1: 55% healed at 4 months and 78% healed at 12 months Gp2: 45% healed at 4 months and 72% at 12 months</td>
</tr>
</tbody>
</table>

(Continued)
Table 1 (Continued)

<table>
<thead>
<tr>
<th>Author</th>
<th>Number randomized</th>
<th>Interventions</th>
<th>Outcome measures</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nelson et al37</td>
<td>133</td>
<td>Gp1: 3-layer compression Gp2: 4-layer compression</td>
<td>Healing at 52 weeks</td>
<td>Gp1: 80% healed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Gp2: 65% healed</td>
</tr>
<tr>
<td>Polignano et al28</td>
<td>68</td>
<td>Gp1: 4-layer compression Gp2: Unna’s boot</td>
<td>Healing at 24 weeks</td>
<td>Gp1: 74% healed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Gp2: 66% healed</td>
</tr>
<tr>
<td>Polignano et al29</td>
<td>56</td>
<td>Gp1: short-stretch compression Gp2: multilayer high compression system</td>
<td>Healing at 12 weeks</td>
<td>Gp1: 17% healed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Gp2: 44% healed</td>
</tr>
<tr>
<td>Blecken et al30</td>
<td>12</td>
<td>Gp1: adjustable compression boot system Gp2: 4-layer compression</td>
<td>Healing at 12 weeks</td>
<td>Gp1: 93% healed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Gp2: 51% healed</td>
</tr>
<tr>
<td>Milic et al31</td>
<td>150</td>
<td>Gp1: tubular compression device (35–40 mm Hg) Gp2: 2medium-stretch compression bandages (20–25 mm Hg)</td>
<td>Healing at 500 days</td>
<td>Gp1: 33% healed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Gp2: 33% healed</td>
</tr>
</tbody>
</table>

Abbreviation: IPC, intermittent pneumatic compression.

The practice

Potential pitfalls

There is a small rate of malignant transformation in ulcers (4.4%), 75% basal cell carcinoma, and 25% squamous cell carcinoma.64 Ulcers in unusual locations, with irregular edges, those with islands of epithelium that do not persist, or those slow to heal should be biopsied.64

Management

Venous leg ulceration can often be managed in the community or in nurse-led venous ulcer clinics. Indications for specialist referral are detailed below.

Table 2 Randomized controlled trials showing the effects of intermittent pneumatic compression on ulcer healing

<table>
<thead>
<tr>
<th>Author</th>
<th>Number randomized</th>
<th>Interventions</th>
<th>Outcome measures</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smith et al33</td>
<td>45</td>
<td>Both groups had same dressings and stockings. Sequential IPC for up to 4 h in one group</td>
<td>Healing</td>
<td>48% healed in IPC group and 4% in control group</td>
</tr>
<tr>
<td>McCulloch et al34</td>
<td>22</td>
<td>Both groups had the same dressings and Unna’s boots. IPC for 60 min twice weekly in one group</td>
<td>Healing</td>
<td>100% healed in IPC group and 80% in control group</td>
</tr>
<tr>
<td>Schuler et al35</td>
<td>53</td>
<td>Unna’s boots versus elasticated stockings plus IPC for 60 min in the morning and 120 min in the evening</td>
<td>Healing</td>
<td>71% healed in IPC group and 75% in Unna’s boot group</td>
</tr>
<tr>
<td>Rowland36</td>
<td>16</td>
<td>Crossover trial of dressing alone with dressing and IPC for 60 min twice daily for 2–3 months</td>
<td>Healing</td>
<td>No ulcers healed in either arm before crossover</td>
</tr>
<tr>
<td>Kumar et al37</td>
<td>47</td>
<td>Both groups had 4-layer bandaging IPC for 60 min twice daily for 4 months in one group</td>
<td>Healing</td>
<td>87% healed in IPC group and 92% in control group</td>
</tr>
<tr>
<td>Nikolovska et al38</td>
<td>104</td>
<td>Both groups had same dressings Fast IPC for one group and slow IPC in the other group</td>
<td>Healing at 6 months</td>
<td>86% healed with fast IPC and 61% with slow IPC</td>
</tr>
</tbody>
</table>

Abbreviation: IPC, intermittent pneumatic compression.
Table 3 Randomized controlled trials showing the effect of pentoxifylline on ulcer healing

<table>
<thead>
<tr>
<th>Author</th>
<th>Number randomized</th>
<th>Interventions</th>
<th>Outcome measures</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colgan et al40</td>
<td>80</td>
<td>All had 2-layer compression</td>
<td>Healing at 24 weeks</td>
<td>Gp1: 60% healed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gp1: 400 mg tds pentoxifylline</td>
<td></td>
<td>Gp2: 29% healed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gp2: placebo</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barbarino41</td>
<td>12</td>
<td>All had 2-layer compression</td>
<td>Healing</td>
<td>Gp1: 66% healed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gp1: 400 mg tds pentoxifylline</td>
<td></td>
<td>Gp2: 17% healed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gp2: placebo</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dale et al42</td>
<td>200</td>
<td>All had compression</td>
<td>Healing at 24 weeks</td>
<td>Gp1: 64% healed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gp1: 400 mg tds pentoxifylline</td>
<td></td>
<td>Gp2: 52% healed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gp2: placebo</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Falanga et al43</td>
<td>129</td>
<td>All had compression</td>
<td>Healing at 24 weeks</td>
<td>Gp1: 73% healed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gp1: 800 mg tds pentoxifylline</td>
<td></td>
<td>Gp2: 75% healed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gp2: 400 mg tds pentoxifylline</td>
<td></td>
<td>Gp3: 63% healed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gp3: placebo</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belcaro et al44</td>
<td>172</td>
<td>All had 2-layer compression</td>
<td>Healing and reduction</td>
<td>Gp1: 65% healed,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>in ulcer size</td>
<td>87% size reduction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gp1: 400 mg tds pentoxifylline</td>
<td></td>
<td>Gp2: 27% healed,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gp2: placebo</td>
<td></td>
<td>47% size reduction</td>
</tr>
<tr>
<td>Nikolovska et al45</td>
<td>80</td>
<td>All had hydrocolloid dressing</td>
<td>Healing at 24 weeks</td>
<td>58% healed in</td>
</tr>
<tr>
<td></td>
<td></td>
<td>One group had 400 mg tds pentoxifylline</td>
<td></td>
<td>pentoxifylline group</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>and 28% in no tablet group</td>
</tr>
</tbody>
</table>

Abbreviations: Gp1, group 1; Gp2, group 2; Gp3, group 3.

Table 4 Randomized controlled trials showing the effect of different types of skin grafting on ulcer healing

<table>
<thead>
<tr>
<th>Author</th>
<th>Number randomized</th>
<th>Interventions</th>
<th>Outcome measures</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poskitt et al47</td>
<td>53</td>
<td>Both groups received compression</td>
<td>Healing at 6 and 12</td>
<td>Gp1: 64% healed at 6 weeks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>weeks</td>
<td>and 72% at 12 weeks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gp1: pinch skin grafts</td>
<td></td>
<td>Gp2: 29% healed at 6 weeks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gp2: porcine dermis</td>
<td></td>
<td>and 46% healed at 12 weeks</td>
</tr>
<tr>
<td>Mol et al48</td>
<td>11</td>
<td>GP1: human skin equivalents</td>
<td>Healing at 20 days</td>
<td>Gp1: 80% healed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GP2: punch grafts</td>
<td></td>
<td>Gp2: 71% healed</td>
</tr>
<tr>
<td>Teepe et al49</td>
<td>47</td>
<td>Both groups received short-stretch bandages</td>
<td>Healing at 6 weeks</td>
<td>Gp1: 25% healed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Gp2: 22% healed</td>
</tr>
<tr>
<td>Warburg et al50</td>
<td>31</td>
<td>Both groups received compression</td>
<td>Healing at 12 months</td>
<td>Gp1: 33% healed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Gp2: 38% healed</td>
</tr>
<tr>
<td>Falanga et al51</td>
<td>309</td>
<td>All received compression</td>
<td>Healing at 6 months</td>
<td>Gp1: 63% healed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Gp2: 49% healed</td>
</tr>
<tr>
<td>Lindgren et al52</td>
<td>27</td>
<td>Both groups received compression</td>
<td>Healing at 8 weeks</td>
<td>Gp1: 13% healed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Gp2: 17% healed</td>
</tr>
<tr>
<td>Tausche et al53</td>
<td>92</td>
<td>GP1: autologous epidermal equivalents derived from hair follicles</td>
<td>Healing at 6 months</td>
<td>Gp1: 42% healed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GP2: meshed skin autograft</td>
<td></td>
<td>Gp2: 34% healed</td>
</tr>
</tbody>
</table>

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### Table 4 (Continued)

<table>
<thead>
<tr>
<th>Author</th>
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<th>Outcome measures</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Krishnamoorthy et al</td>
<td>53</td>
<td>All received 4-layer compression Gp1: Dermagraft, weekly for 12 applications Gp2: Dermagraft at 0, 1, 4, and 8 weeks Gp3: Dermagraft at 0 weeks Gp4: No Dermagraft</td>
<td>Healing at 12 weeks</td>
<td>Gp1: 38% healed Gp2: 38% healed Gp3: 7% healed Gp4: 15% healed</td>
</tr>
<tr>
<td>Liu et al</td>
<td>10</td>
<td>Both groups had ulcers debrided and multilayer compression bandaging Gp1: keratinocytes cultured on porcine gelatin microbeads Gp2: keratinocytes cultured on porcine collagen pads</td>
<td>Healing at 12 weeks</td>
<td>25% healed in both groups</td>
</tr>
<tr>
<td>Navrátilová et al</td>
<td>50</td>
<td>Gp1: cryopreserved cultured epidermal keratinocytes Gp2: lyophilized cultured epidermal keratinocytes</td>
<td>Healing at 90 days</td>
<td>Gp1: 84% healed Gp2: 80% healed</td>
</tr>
<tr>
<td>Omar et al</td>
<td>18</td>
<td>Both groups received 4-layer bandaging Gp1: Dermagraft Gp2: no graft</td>
<td>Healing at 12 weeks</td>
<td>Gp1: 50% healed Gp2: 13% healed</td>
</tr>
</tbody>
</table>

**Abbreviations:** Gp1, group 1; Gp2, group 2; Gp3, group 3; Gp4, group 4.

### Table 5 Randomized controlled trials showing the effect of different types of surgery and endovenous therapy on ulcer healing and recurrence

<table>
<thead>
<tr>
<th>Author</th>
<th>Number randomized</th>
<th>Interventions</th>
<th>Outcome measures</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guest et al</td>
<td>76</td>
<td>Gp1: compression alone Gp2: compression and superficial venous surgery ± perforator surgery</td>
<td>Healing</td>
<td>Gp1: 64% healed Gp2: 68% healed</td>
</tr>
<tr>
<td>Zamboni et al</td>
<td>45</td>
<td>Gp1: compression alone Gp2: compression and minimally invasive surgical hemodynamic correction of reflux</td>
<td>Healing and recurrence</td>
<td>Gp1: 96% healed, 38% recurrence Gp2: 100% healed, 9% recurrence</td>
</tr>
<tr>
<td>Van Gent et al</td>
<td>200</td>
<td>Gp1: compression alone Gp2: compression and subfascial endoscopic perforating vein surgery</td>
<td>Healing and recurrence</td>
<td>Gp1: 73% healed, 23% recurrence Gp2: 83% healed, 22% recurrence</td>
</tr>
<tr>
<td>Gohel et al</td>
<td>500</td>
<td>Gp1: compression alone Gp2: compression and superficial venous surgery</td>
<td>Ulcer healing and ulcer recurrence at 3 years</td>
<td>Gp1: 89% healed, 56% recurrence Gp2: 93% healed, 31% recurrence</td>
</tr>
<tr>
<td>Viarengo et al</td>
<td>52</td>
<td>Gp1: compression alone Gp2: endovenous laser therapy and compression</td>
<td>Healing at 12 months</td>
<td>Gp1: 24% healed Gp2: 82% healed</td>
</tr>
</tbody>
</table>

**Abbreviations:** Gp1, group 1; Gp2, group 2.
Treatment
A 4-layer compression, if tolerated.
- Short-stretch compression or intermittent compression if 4-layer not tolerated.
- Pentoxifylline (400 mg three times daily) and skin grafting should be considered if ulcers are slow to heal.
- Incompetent veins should be treated to reduce the risk of ulcer recurrence.

Indications for specialist referral
Worsening despite treatment or slow healing.
- Unusual appearance of ulcer.

References


