FOOT AND ANKLE

Compression stockings in the management of fractures of the ankle
A RANDOMISED CONTROLLED TRIAL

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In this randomised controlled trial, we evaluated the role of elastic compression using ankle injury stockings (AIS) in the management of fractures of the ankle. A total of 90 patients with a mean age of 47 years (16 to 79) were treated within 72 hours of presentation with a fracture of the ankle, 31 of whom were treated operatively and 59 conservatively, were randomised to be treated either with compression by AIS plus an Aircast boot or Tubigrip plus an Aircast boot. Male to female ratio was 36:54. The primary outcome measure was the functional Olerud–Molander ankle score (OMAS). The secondary outcome measures were; the American Orthopaedic Foot and Ankle Society score (AOFAS); the Short Form (SF)-12v2 Quality of Life score; and the frequency of deep vein thrombosis (DVT).

Compression using AIS reduced swelling of the ankle at all time points and improved the mean OMAS score at six months to 98 (95% confidence interval (CI) 96 to 99) compared with a mean of 67 (95% CI 62 to 73) for the Tubigrip group (p < 0.001). The mean AOFAS and SF-12v2 scores at six months were also significantly improved by compression. Of 86 patients with duplex imaging at four weeks, five (12%) of 43 in the AIS group and ten (23%) of 43 in the Tubigrip group developed a DVT (p = 0.26).

Compression improved functional outcome and quality of life following fracture of the ankle. DVTs were frequent, but a larger study would be needed to confirm that compression with AISs reduces the incidence of DVT.

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Fractures of the ankle are common, with over 60 000 occurring annually in the United Kingdom. They are more frequent in young men and older women, and occupy acute trauma beds at a cost to the NHS of £8.5 million per day.

Treatment is non-operative or operative, depending on the fracture, the peripheral circulation, the condition of the skin and the patient’s general health. Standard treatment includes immobilisation in a cast for undisplaced or stable fractures (Weber type A and some B), or open reduction and internal fixation for displaced, unstable fractures (Weber C and some B). Recently, pneumatic orthotic boots have increasingly replaced plaster casts when the ankle is immobilised.

Swelling occurs within hours of fracture, impairing immobilisation and delaying surgery in those with unstable ankles. Early surgery reduces hospital stay and post-operative complications. Long-term outcomes are often poor, with > 70% of patients reporting persistent pain, stiffness and swelling of the ankle at two and five years follow-up. Functional outcome and health-related quality of life scores are also subsequently impaired.

Despite the swelling and risk of deep vein thrombosis (DVT), treatment with compression is not routine in these patients. Preventing oedema may reduce pain, improve range of movement and accelerate the return to normal function. Pressures between 18 mmHg and 35 mmHg at the ankle are needed to treat oedema in patients with venous insufficiency.

There is inevitable injury to the surrounding soft-tissues with inactivation of the calf-muscle pump, increasing the risk of DVT.

Compression stockings reduce venous stasis and the risk of DVT. Compression is well established in the treatment of venous leg ulcers and may well improve healing for all wounds of the leg. Engineered compression stockings are a novel technology using a laser profile of the leg to produce an elastic stocking that fits the patient precisely. This technology was licensed to Advanced Therapeutic Materials Ltd, (Coventry, UK) who supply specifically-designed ankle injury stockings (AIS) with a wide elastic range so that they can be applied using a ‘hospital butler’ (a metal-framed stocking applicator). We undertook a randomised controlled trial (RCT) to evaluate...
Participants and setting. The study had ethical approval. Cast boot in 90 patients with ankle fractures. The study had a single-blinded RCT to compare compression by AIS plus an Aircast boot (DJO Global, Vista, California) with Tubigrip (Mölnlycke Health Care, Gothenburg, Sweden) and an Air-cast boot (DJO Global, Vista, California) with Tubigrip. The study was not suitable for any reason.

Patients and Methods

This was a single-centre prospective, randomised, stratified, single-blinded RCT to compare compression by AIS plus an Aircast boot (DJO Global, Vista, California) with Tubigrip (Mölnlycke Health Care, Gothenburg, Sweden) and an Aircast boot in 90 patients with ankle fractures. The study had ethical approval.

Participants and setting. Patients aged between 16 and 90 years who had, within the previous 72 hours, sustained a fracture of the ankle were identified in the accident and emergency department (A&É) or the fracture clinic at the University Hospital of South Manchester and were provided with an information leaflet about the study. After a detailed explanation, and after receipt of informed consent, both dorsalis pedis and posterior tibial arteries were studied at the ankle by handheld Doppler (Huntleigh, UK) to ensure bi- or tri-phasic Doppler waveforms, indicating normal arterial pressures, before randomisation.

Exclusion criteria included a previous fracture or surgery of the ankle; other injuries or conditions that impaired mobility; peripheral arterial disease or an abnormal Doppler waveform; malignancy or any other chronic debilitating illness and if the treating orthopaedic surgeon thought that the patient was not suitable for any reason.

Consecutive eligible patients were randomised to be treated by either compression using AIS plus an Aircast boot or Tubigrip plus an Aircast boot, (this Tubigrip is part of the Aircast boot system) using a bespoke computer-based minimisation procedure stratified for immobilisation alone or open reduction, and age < 60 or ≥ 60 years.

Ankle injury stockings (AIS). We examined 500 legs in healthy volunteers to produce 12 sizes, fitting most legs. The pressure profiles chosen for the study were 25 mmHg at the ankle, 17 mmHg at the mid-calf and 10 mmHg in the upper calf, equivalent to well-fitting European Class II stockings.

Tubigrip. Tubigrip was chosen as a control on the uninjured leg as it is commonly used under plaster casts in clinical practice. The appropriate size (small, medium or large) of Tubigrip (D, E, F) were applied to the fractured leg.

The AIS or a Tubigrip were fitted as soon as possible following presentation in A&E or the fracture clinic. The uninjured leg was measured (Fig. 1) to obtain the appropriate size of AIS or Tubigrip from the 12 options of size and shape manufactured for the study. The AIS was applied with a ‘hospital butler’ (metal applicator) using Entonox for analgesia (Fig. 2). The AIS or Tubigrip were removed before, and refitted immediately after, surgery in patients undergoing open reduction and remained in place until the Aircast boot was removed, typically six weeks, post-operatively.

Aircast boots. Stable undisplaced fractures (Weber A and some B) were immobilised in an Aircast boot. Patients were provided with crutches and did not bear weight until clinical bony union as judged by the orthopaedic surgeon. Patients with unstable or displaced fractures (Weber C and some B) underwent open reduction and internal fixation. Immediately after fixation, the AIS or Tubigrip was reapplied and the ankle immobilised in a below-knee Aircast boot until bony union.

The boot was inflated to achieve a firm and comfortable fit, and re-inflated by the patient as necessary. There were no pressure gauges at the time of this study, but the manufacturer now sets a target of 5 mmHg to 10 mmHg for the pneumatic devices. The pressure applied to the ankle is unknown, but is likely to be < 10 mmHg.

Patients undergoing surgery were given prophylactic low molecular weight heparin (dexane 20 mg) daily, starting pre-operatively and continuing during their stay in hospital.

Patients were assessed independently by a research nurse (TZ) who was blinded to the treatment allocation at two, four, eight and 12 weeks and at six months. The circumference of the foot, calf and ankle were measured in both legs at the fixed landmarks (over the navicular bone in the foot, 5 cm above the medial malleoli and the maximum diameter of calf), with the circumferences in the injured leg calculated as a ratio of those in the normal leg. Patients were provided with a diary to document all analgesics taken, as well as the time to walking unaided, climbing stairs without support, and return to work. The functional outcome, assessed by the Olerud–Molander ankle score (OMAS)9–12 and quality of life (QoL) questionnaires (Short Form 12 version 2, SF12v2)20 were mailed with follow-up appointments, to be completed on the appropriate date.

Anteroposterior (AP) and lateral radiographs at two and six weeks were assessed for standard signs of bony union by the influence of compression on recovery following a fracture of the ankle.
the treating orthopaedic consultant, who arranged additional radiographs as required. The American Orthopaedic Foot and Ankle Society score (AOFAS), range of movement of the ankle assessed by goniometry, and circumferences of the foot, calf and ankle were recorded at each visit by the blinded research nurse (TZ).

Duplex ultrasound imaging of the deep veins in the calf and thigh was undertaken by an experienced vascular technologist at four weeks. Failure to fully compress the vein on applying pressure using the ultrasound transducer was taken to indicate the presence of a DVT, with fresh thrombus having similar echogenicity to blood and old thrombus to that of the surrounding muscle. All patients underwent a standard physiotherapy protocol to encourage weight-bearing, recovery of proprioception and movement of the ankle, starting one week after removal of the Aircast boot and continuing for 16 weeks.

The OMAS and SF-12 scores were designed to be completed independently by the patient. All other outcome measures, including range of movement, the circumferences of the calf and ankle, AOFAS and wound assessments, were performed by the same blinded research nurse (TZ). The staff in the fracture clinic removed the Aircast boot and AIS or Tubigrip before the research nurse performed the measurements using the same standard techniques.

The vascular technician undertaking duplex imaging was also blinded, as above. The radiographs at six weeks were reported twice by a consultant orthopaedic surgeon (NK) and a consultant musculoskeletal radiologist, both blinded to the treatment allocation.

**Outcome measures**

**Primary.** The OMAS, a validated patient questionnaire, assessing function with a score from 0 (totally impaired) to 100 (completely unimpaired) based on pain, stiffness, swelling, stair-climbing, running, jumping, squatting, use of walking aids and activities of daily living was used. This score was chosen as the primary outcome measure as it is completed by the patient and measures functional recovery.

**Secondary.** The AOFAS score, a well-validated objective clinical score for outcomes in foot and ankle injury.
- The SF-12v2, a validated clinical score for quality of life.\(^{20}\)
- The incidence of deep vein thrombosis (DVT) on duplex imaging at four weeks.

Wound healing at two weeks following surgery was assessed using an objective score based on clinical signs of infection: erythema, warmth, tenderness, discharge, systemic symptoms and the use of antibiotics.\(^{22}\)

**Statistical analysis.** In similar previous studies, the mean and standard deviation (SD) of the OMAS score was 70 (SD 15) at six months.\(^{9-12}\) An 80\% power to detect a clinically relevant difference of 10 in the OMAS score between the groups (i.e. 80 \textit{versus} 70) at six months using a simple two-sample \(t\)-test at a 5\% level of significance would be achieved by recruiting 37 patients in each group (total 74). The sample size was inflated by 10\% to adjust for stratifying factors and an additional 10\% to compensate for loss to follow-up. A total of 90 patients (45 in each arm) were recruited.

Longitudinal regression modelling (using generalised estimating equations with a first-order autoregressive correlation structure) based on the intention to treat was used to compare the OMAS, AFOAS and SF-12v2 scores, range of movement of the ankle, the circumferences of the calf and ankle over the duration of the study. This is an efficient way to assess repeated measurements over time, and enables patients with missing data at any time to be included in the analysis.\(^{23}\)

Wound healing, pain, the use of crutches and stairs, and return to work were compared using the Mann–Whitney \(U\) test. The chi-squared test was used to compare individual components of the OMAS. This study was not powered to detect statistically significant changes in the frequency of DVT, but DVT was included to guide power calculations for subsequent RCTs. All data were analysed using SPSS versions 15 and 16 software (SPSS Inc., Chicago, Illinois), and \(p < 0.05\) was considered statistically significant.

**Results**

Over a period of 18 months, 110 patients were assessed for eligibility, 90 of whom met the inclusion criteria and were randomised to be treated with either AIS plus an Aircast boot (\(n = 44\)) or Tubigrip plus an Aircast boot (\(n = 46\)) (Fig. 3). The characteristics of the two groups were similar (Table I). The circumscriptions of the injured ankle and calf were expressed as a ratio...
to the contralateral leg, with 1.00 indicating no swelling. The mean (95% CI) ratios in the AIS and Tubigrip groups were similar before treatment at 1.10 (95% CI 1.07 to 1.12) for the ankle and 1.03 (95% CI 1.02 to 1.04) for the calf (Fig. 4). AIS markedly reduced swelling within hours of application, and by four weeks the mean ratio of the circumferences of the ankles with AIS had returned to normal, at 1.00 (95% CI 0.99 to 1.02) compared with a mean of 1.08 (95% CI 1.06 to 1.09) for those with Tubigrip (p < 0.001, longitudinal regression analysis) (Fig. 4). Subsequently, the mean circumference of the calf remained smaller with AIS at all follow-up intervals. Reduced swelling was associated with an improved range of movement of the ankle in the AIS group (p < 0.001, longitudinal regression analysis) (Table II).

The mean OMAS score improved progressively over time in both groups (p < 0.001) (Fig. 5a) (Table III), but was significantly better for patients treated with AIS at all time points (p < 0.001). At four weeks after the start of treatment, the mean OMAS score for those treated with AIS was 43 (95% CI 38 to 49) rising to a mean of 88 (95% CI 83 to 93) at 12 weeks compared with a mean of 24 (95% CI 18 to 31) and 58 (95% CI 52 to 64), respectively, for those treated with Tubigrip (p < 0.01). By six months there was still a marked difference in OMAS score, with AIS achieving a mean of 98 (95% CI 96 to 99) compared with a mean of 67 (95% CI 62 to 73) for the Tubigrip group (p < 0.001).

The mean with AOFAS scores were also significantly better in those treated with AIS at all time intervals until six months (p < 0.001, longitudinal regression analysis) (Fig. 5b) (Table II). The different subcomponents of the AOFAS score were also significantly improved with AIS: at six months 97% of those in the AIS group complained of no pain, compared with 33% in the Tubigrip group (p < 0.001, chi squared test); 95% of patients in the AIS group had no limitation of daily activities, compared with 63% of those in the Tubigrip group (p < 0.001). All patients in the AIS group but only 81% of those in the Tubigrip group were able to walk less than six blocks (p = 0.005). As it would be inappropriate to modify a validated score, we told our United Kingdom-based patients that ‘a block’ was equivalent to the length of a football pitch. The range of movement of the ankle was also significantly improved in AIS group (p < 0.001).

The mean SF-12v2 score had improved by four weeks to 83 (95% CI 79 to 87) in the AIS group and to a mean of 74 (95% CI 70 to 78.5) in the Tubigrip group (p < 0.001) (Fig. 5c) (Table III). The mean scores continued to improve significantly in the AIS group to 108 (95% CI 104 to 112) and 116 (95% CI 114 to 117) at 12 weeks and six months, respectively, compared with 92 (95% CI 88 to 96) and 99 (95% CI 94 to 103) in the Tubigrip group (p < 0.001).

The wound inspection score, in which a higher score indicates poor healing or signs of infection, was recorded in 28 of the 31 patients undergoing open reduction and fixation: healing appeared better, with a mean score of 1.55 (95% CI 1.19 to 1.90), in the 12 patients in the AIS group compared with a mean of 3.27 (95% CI 2.19 to 4.34) in the 16

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### Table I. Randomisation

<table>
<thead>
<tr>
<th></th>
<th>Compression (Ankle injury stockings)</th>
<th>No compression (Tubigrip)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(n = 44)</td>
<td></td>
<td>(n = 46)</td>
</tr>
<tr>
<td>Age (years)</td>
<td>46.4 (16 to 79)</td>
<td>47.0 (16 to 77)</td>
</tr>
<tr>
<td>F:M ratio</td>
<td>25:19</td>
<td>29:17</td>
</tr>
<tr>
<td>Height (m)</td>
<td>1.69 (1.44 to 1.94)</td>
<td>1.70 (1.25 to 1.98)</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>81.4 (58 to 128)</td>
<td>80.6 (49 to 127)</td>
</tr>
<tr>
<td>BMI</td>
<td>29 (19 to 43)</td>
<td>28 (17 to 40)</td>
</tr>
<tr>
<td>Lifestyle: inactive</td>
<td>25 (57)</td>
<td>22 (48)</td>
</tr>
<tr>
<td>Fractured leg: left</td>
<td>23 (52)</td>
<td>15 (33)</td>
</tr>
<tr>
<td>Weber classification A (%)</td>
<td>19 (43)</td>
<td>17 (37)</td>
</tr>
<tr>
<td>B (%)</td>
<td>20 (46)</td>
<td>22 (48)</td>
</tr>
<tr>
<td>C (%)</td>
<td>5 (11)</td>
<td>7 (15)</td>
</tr>
<tr>
<td>Open reduction (%)</td>
<td>13 (30)</td>
<td>17 (37)</td>
</tr>
</tbody>
</table>

All values are mean (range) with no important differences between the two treatment groups.

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Graph showing the mean (95% confidence interval (CI)) circumference of the injured ankle, expressed as a ratio to the normal contralateral ankle, which was similar shortly following injury. Compression by ankle injury stockings (AIS) subsequently achieved near-normal ankle circumference at all time points, a significant reduction compared with the tubigrip, which provided no compression (p < 0.001, longitudinal regression analysis).
Patients recorded the time, in days, from injury in their diary until they no longer required each of the following:

- Painkillers: were discontinued in a mean of 40 days (3 to 182) for the AIS and 52 days (7 to 182) for the Tubigrip group (p = 0.44, Mann–Whitney U test).

- Crutches were no longer required at mean of 40 days (21 to 130) for the AIS compared with a mean of 52 (7 to 182) for the Tubigrip group (p = 0.21, Mann–Whitney U test).

- Patients were able to use stairs without support at a mean of 52 days (3 to 110) and 61 days (3 to 182) for the AIS and Tubigrip groups, respectively (p = 0.058, Mann–Whitney U test).

- The time to return to work and to normal activities was a mean of 40 days (3 to 182) and 52 days (3 to 182), respectively, for AIS compared with 52 days (3 to 182) and 70 days (3 to 182), respectively, for the Tubigrip group (p = 0.27 and p = 0.01, Mann–Whitney U test).

Of the 86 patients who attended for duplex imaging at four weeks, 15 (18%) had a DVT; five (12%) of these were in the Tubigrip group (p = 0.009, Mann–Whitney U test).

### Table II. Comparison of the range of movement of the ankle at different stages between the ankle injury stocking (AIS) and the Tubigrip (º, mean, 95% CI)

<table>
<thead>
<tr>
<th>Inversion/eversion</th>
<th>AIS</th>
<th>Tubigrip</th>
<th>AIS</th>
<th>Tubigrip</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 weeks</td>
<td>55º (49 to 61)</td>
<td>30 (24 to 35)</td>
<td>24º (23 to 26)</td>
<td>17 (15 to 19)</td>
</tr>
<tr>
<td>8 weeks</td>
<td>73º (68 to 79)</td>
<td>52 (47 to 57)</td>
<td>32º (31 to 34)</td>
<td>25 (23 to 27)</td>
</tr>
<tr>
<td>12 weeks</td>
<td>91º (88 to 94)</td>
<td>68 (64 to 72)</td>
<td>37º (35 to 38)</td>
<td>27 (25 to 29)</td>
</tr>
<tr>
<td>6 months</td>
<td>96º (94 to 98)</td>
<td>78 (73 to 83)</td>
<td>40º (38 to 42)</td>
<td>31 (29 to 33)</td>
</tr>
</tbody>
</table>

* p < 0.001 comparing AIS with no compression (generalised estimating equations analysis).
AIS group and ten (23%) in the Tubigrip group (p = 0.26, Mann–Whitney U test). Only patients undergoing open reduction were prescribed low molecular weight heparin (LMWH): five (17%) of these 29 patients suffered a DVT, similar to ten (18%) of the 57 treated conservatively. The peroneal vein was involved in nine patients, the posterior tibial vein in six, the gastrocnemius vein in five, and the superficial femoral, popliteal and soleal veins each in one patient only. In some patients, more than one vein was involved.

One patient in the Tubigrip group suffered a superficial wound infection, which healed after antibiotic treatment. One in the AIS group required removal of a screw, and one in the Tubigrip group underwent revision surgery. In all, nine (10.4%) of 86 patients (four AIS, five Tubigrip) had maceration of the skin around the heel, which recovered without intervention. This maceration was minor and probably would not have been noticed under a plaster cast.

**Discussion**

AIS applied as soon as possible following a fracture of the ankle rapidly reduces swelling. The movements of the ankle, pain, and both OMAS and AOFAS scores recovered more rapidly at all time points from four weeks to six months. In the only previous RCT dealing with the use of elastic stockings following injury to the ankle, in which only 20 patients were randomised and used elastic stockings delivering only 18 mmHg at the ankle, swelling was reduced but the functional outcome was not measured.

Persistent stiffness and a restricted range of movement of the ankle are known to impair the function of the calf-muscle pump and may cause venous insufficiency and even venous ulceration. Whether some of the late complications of a fracture of the ankle were due to DVT remains uncertain, but duplex imaging in our study identified a higher than expected frequency of DVT, at 18%.

AISs were measured to fit the normal uninjured leg, but as they were developed with a wide elastic range, the increase in the pressure due to swelling of the ankle would be small, although this cannot be accurately measured. The subsequent reduction in swelling due to compression would result in this pressure falling close to the prescribed range (25 mmHg at the ankle). There was no likelihood of pressure damage, as pressures of 40 mmHg at the ankle are prescribed for patients with venous leg ulcers.

Elastic compression rapidly reduces swelling and improves venous return and perfusion in the dependent limb, with compression being a vital component in the treatment of venous ulcers. These results suggest that in ambulant patients compression reduces the consequences of venous hypertension in an immobilised limb, and may augment healing of the soft-tissues and bones.

The frequency of DVT in our study, at 18%, was similar to that reported previously in patients undergoing open reduction for a fracture of the ankle or following Achilles tendon repair. However, the study was not sufficiently powered, based on this DVT frequency, to assess the contribution of AIS to the frequency of DVTs.

This is the first RCT with an adequate sample size to evaluate the role of compression in the management of a fracture of the ankle. Our outcome measures (the subjective (OMAS), objective (AOFAS) and quality of life (SF-12v2)) were validated scores.

The choice of Aircast boots in this study may be considered a limitation, as immobilisation by plaster cast is still standard practice. However, they can easily be removed to inspect for pressure damage, as compression stockings delivering 25 mmHg at the ankle may carry a risk of pressure ulceration under a plaster cast. Nevertheless, Aircast boots are increasingly being used as recovery is similar to that in patients who are immobilised in a plaster cast.

In conclusion, AIS applied early following a fracture of the ankle reduces swelling and improves functional outcome. There were no significant complications associated with AIS use in this study, but a larger definitive study is required to determine whether AIS reduces the frequency of DVT.

We are grateful to the nurses in our accident and emergency department and fracture clinic for their help in recruiting patients. In addition, we wish to thank J. Longson, who developed our physiotherapy protocol, and G. Hodhody, who contributed towards electronic management of data. M. J. S designed and coordinated the study, T. Z. conducted blind follow-up assessments, B. Almusalam helped with data collection and electronic management of data, J. M undertook statistical analyses and N. K advised on ankle fracture care. C. N. M. was the chief investigator, and all authors contributed to the final manuscript. This trial was funded by grants from the Manchester Surgical Research Trust (MSRT) and the University Hospital of South Manchester Endowment Fund. DJO Global (Vista, California) supplied Aircast boots (Global) Advanced Therapeutic Materials (ATM) Ltd supplied AIS (Coventry, West Midlands, UK) Huntleigh supplied a hand held Doppler (Cardiff, UK) Limbo Products supplied shower bags to cover Aircast boots (Wessex, UK). The researchers were independent of the funding sources. Competing interests: CNM was part of the team that developed engineered elastic stockings for medical applications and has shares in ATM Ltd. No other author or staff involved in the conduct of this research had any financial interests. However, it is possible that the supplier of products used in this research may promote their products as a result of this research.

### Table III. Mean Olerud–Molander Ankle (OMAS), Short Form-12 version 2 (SF-12v2) and American Orthopaedic Foot and Ankle Score (AOFAS) (95% CI) at different stages between the Tubigrip and the ankle injury stocking (AIS)

<table>
<thead>
<tr>
<th>Time</th>
<th>OMAS AIS</th>
<th>Tubigrip</th>
<th>AOFAS AIS</th>
<th>Tubigrip</th>
<th>SF12v2 AIS</th>
<th>Tubigrip</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 weeks</td>
<td>43 (38 to 49)</td>
<td>24 (18 to 31)</td>
<td>73 (67 to 78)</td>
<td>55 (50 to 61)</td>
<td>83 (79 to 87)</td>
<td>74 (70 to 79)</td>
</tr>
<tr>
<td>8 weeks</td>
<td>74 (68 to 80)</td>
<td>44 (38 to 50)</td>
<td>89 (86 to 93)</td>
<td>75 (72 to 78)</td>
<td>100 (96 to 103)</td>
<td>84 (80 to 88)</td>
</tr>
<tr>
<td>12 weeks</td>
<td>88 (83 to 93)</td>
<td>58 (52 to 64)</td>
<td>96 (92 to 100)</td>
<td>82 (76 to 86)</td>
<td>108 (104 to 112)</td>
<td>92 (88 to 96)</td>
</tr>
<tr>
<td>6 months</td>
<td>98 (96 to 99)</td>
<td>67 (62 to 73)</td>
<td>99 (96 to 100)</td>
<td>84 (81 to 87)</td>
<td>116 (114 to 117)</td>
<td>99 (94 to 103)</td>
</tr>
</tbody>
</table>

*p < 0.001 compared with liner (no compression) (generalised estimating equations analysis)*
References