Annals of the Royal College of Surgeons of England (1989) *vol.* 71

Varicose veins: optimum compression after surgery and sclerotherapy

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Key words: VARICOSE VEINS; HIGH AND LOW COMPRESSION STOCKINGS

Summary

Graduated compression stockings are used in both surgical and non-surgical treatment of varicose veins. In a trial of high versus low compression stockings (40 mmHg vs *15 mmHg at ankle) after varicose vein surgery, both were equally effective in controlling bruising and thrombophlebitis, but low compression stockings proved to be more comfortable.*

In a further trial after sclerotherapy, high compression stockings alone produced comparable results to Elastocrepe® bandages with stockings.

It is concluded that after varicose vein surgery low compression stockings provide adequate support for the leg and that after sclerotherapy, bandaging is not required if a high compression stocking is used.

Introduction

Graduated compression stockings are used widely in the management of varicose veins. Alone they can produce relief of symptoms to the extent that no additional treatment may be required *(1)*. Stockings or bandages are recommended after surgery to reduce bruising and thrombophlebitis *(2)*, and compression is applied after sclerotherapy to occlude the superficial vein lumen *(3)*. The compression pressures produced by bandages are dependent upon the surgeon applying them *(4)* and fall rapidly with time *(5)*.

Graduated compression stockings have significant physiological benefits on venous function *(6)* and probably produce more uniform and sustained pressure than bandages.

A trial was conducted to compare the use of a stocking producing 15 mmHg compression at the ankle (provided by Brevet Hospital Products, Reading, UK) with one producing 40 mmHg compression (Brevet Varex®) after varicose vein surgery. In a further trial, the use of high compression stockings alone was compared with a combination of high compression stockings plus bandages after sclerotherapy.

All stockings were tested by the manufacturer, using the Hatra method to conform to the British Standard (BS 6612:85).

Patients and methods

Patients referred to the varicose vein clinic were considered for entry into the trial. Those with saphenofemoral or saphenopopliteal incompetence (as demonstrated clincially by Trendelenburg and tourniquet tests) were treated by flush ligation of the saphenofemoral and saphenopoliteal junction, respectively. Prominent superficial perforating veins were removed by local avulsions. Some patients with high thigh perforating veins considered unsuitable for sclerotherapy were treated by local avulsions.

Immediately after surgery crêpe bandages were firmly applied from toes to mid-thigh. They were removed the next morning and replaced with either high or low compression stockings. Patients were discharged the day after surgery and instructed to wear the stocking continuously for 10 days, until the sutures were removed, and then during the day for a further 4 weeks until review.

Patients with no evidence of saphenofemoral or saphenopopliteal incompetence, and some with residual varices following previous surgery, were treated by sclerotherapy. Up to six injections of sodium tetradecyl sulphate (STD) were made into each leg at each treatment session at the site of local incompetent varices, with the leg elevated. Sorbo-rubber pads were applied at the injection sites and secured with non-irritant tape. Patients were then randomised to receive either an Elastocrepe® bandage with a high compression stocking or high compression stocking only. Patients were instructed not to remove the compression until reviewed. At interim review after 3 weeks the compression was removed and the leg inspected to see if further injections were required. The same compression was then reapplied for a further 3 weeks without the pads.

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Randomisation in both groups was by numbered sealed envelopes attached to data collection proformas. The results of treatment were assessed at 6 weeks when patients were asked whether the compression had been uncomfortable, removed or had slipped down. The presence of significant thrombophlebitis was noted and the results of treatment were assessed jointly by surgeon and patient. Patients were assessed and treated by the consultant in charge of the clinic or his SHO or registrar.

Statistical comparisons were made using the χ^2 test.

Results

Data from the surgical trial is shown in Table I. Ninety-nine patients were entered, 51 were allocated to wear high compression stockings and 48 low compression. The two groups were comparable for age, sex, surgical procedure and number of avulsions.

TABLE I *Results of high versus low compression stockings in post-surgery patients*

	High Compression	*Low Compression*
Number	51	48
Sex	21 F 30 M	21 F 27 M
Age	Mean 40.5 years (range 23–74 years)	Mean 43.0 years (range 21–74 years)
Operation		
1 SF ligation and avulsions	32	37
2 SP ligation and avulsions	5	4
3 Avulsions alone	12	7
Number of avulsions	Mean 6.6 (range 2–20)	Mean 7.9 (range 2–21)
Result at 6 weeks		
Discomfort	18 (35.3%)	14 (29.2%)
Thrombophlebitis	5 (9.8%)	5 (10.4%)
Cost of stocking 1987	£8.20	£4.50

SF=saphenofemoral. SP=saphenopopliteal

TABLE II *Results of stockings versus bandages and stockings in compression sclerotherapy patients*

	Stocking alone	*Bandage and stocking*
Number	31	31
Sex	21 F 10 M	24 F 7 M
Age	Mean 39.3 years (range 24–67 years)	Mean 39.7 years (range 17–71 years)
Number of injections	Mean 3.2 (range 1–6)	Mean 3.6 (range 1–6)
Result at 6 weeks		
Discomfort	8 (25.8%)	12 (38.7%)
Slipped down	13 (41.9%)	10 (32.2%)
Thrombophlebitis	9 (29.0%)	13 (41.9%)
1. Good	24 (77.4%)	21 (67.8%)
2. Fair	7 (22.6%)	9 (32.2%)
Cost 1987	£8.20	£10.30

TABLE III *Effect of removing compression in sclerotherapy patients*

	Thrombophlebitis	*Good result*
Compression removed $n=18$	6 (33.3%)	11 (61.1%)
Compression maintained $n=44$	15 (34.1%)	33 (75.0%)

A large number of patients in the high compression group found the stockings uncomfortable. The incidence of local thrombophlebitis in the two groups was almost identical.

Table II shows the data from the compression sclerotherapy trial. Fewer patients (62) were recruited, but the groups were again comparable for age, sex and number of injections. A similar number of each group removed their compression during the 6 weeks of treatment. A stocking alone slipped down more frequently than a bandage and stocking, but was more comfortable. Results were assessed as good if all the veins were obliterated, and fair if some residual veins persisted but the leg was generally improved. No patient had a poor result without improvement. This probably reflects the beneficial effects of compression alone. As continuous compression is considered important after sclerotherapy, the results were compared in those who had removed their compression ($n=18$) with those who followed the instructions and had not ($n=44$) (Table III). The incidence of thrombophlebitis in these two groups was the same, but there were more good results in the group which had uninterrupted compression.

The differences in these results do not reach statistical significance. To show a significant difference at the 10% level would require at least 250 patients in each group, which would be difficult to achieve in a reasonable time-scale. The results, however, do support the hypotheses that after surgery a low compression stocking is preferable to a high compression stocking, and that after sclerotherapy a stocking alone is preferable to a stocking and bandage combined.

Discussion

There can be little doubt that some form of compression is required after treatment of varicose veins both by surgery and sclerotherapy, but there is little consensus of opinion as to the pressure required or for how long.

Different authors have recommended support after surgery for periods ranging from 5 days to 5 weeks *(2, 7, 8)*, to control discomfort, thrombophlebitis, bruising and ankle swelling. Our choice of 6 weeks was somewhat arbitrary and based on previous practice. It is possible that a shorter period of 2–3 weeks may be adequate. Perhaps the duration of compression should depend on the individual, and patients then allowed to discard their stockings when they feel they no longer need them. Our results indicate that, after surgery, low compression stockings are more comfortable than high compression stockings and equally effective on controlling thrombophlebitis. Bruising and ankle oedema were not a problem in these patients after surgery. We did not attempt to assess the results of surgery at the 6 week review as this is too early to do so, and probably dependent on the skill of the surgeon in avulsing all the varices rather than the compression used.

After sclerotherapy, Fegan *(3)*, recommended 6 weeks' compression with a bandage and stocking but gave no guidelines as to the pressures required. Fentam *et al. (4)* investigated the pressures required to occlude a superficial vein model and the pressures achieved by bandaging. They concluded that pressures of 30–50 mmHg were needed and could be achieved by bandages with a pad. There was, however, considerable variation in the pressure achieved by different surgeons. Raj *et al. (5)* showed that the pressures beneath bandages fall to zero after 6–8 h, suggesting that bandaging alone is inadequate to maintain compression.

With regard to the duration of compression, it has been suggested that using bandages for as little as 3 days may be adequate *(9)*. Reddy *et al. (10)* conducted a trial to compare periods of 1, 3 and 6 weeks' bandaging, concluding that 3 weeks produced optimal results.

These different results can probably be explained by differences in bandaging technique betwen individual surgeons. Graduated compression stockings are designed to produce reproducible and maintained pressures. Scurr *et al. (11)* have shown that stockings alone produced better results than bandaging alone after sclerotherapy.

The results of this trial have demononstrated that bandages are not required after sclerotherapy if a high compression stocking is used. The optimum period of compression has not been determined.

Present practice in this unit, therefore, is to apply a low compression stocking after varicose vein surgery, and a high compression stocking alone after sclerotherapy. Good results have been produced with minimal cost.

We would like to thank Brevet Hospital Products for their support and for supplying both high and low compression stockings.

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Received 11 May 1989