

Original Article

A Randomised Controlled Trial of the Effect of Esmarch Tourniquet Use on Blood Loss, Bruising and Quality of Life in Elective Varicose Vein Surgery

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ABSTRACT

Objective: To assess the effect of tourniquet use on bleeding, bruising and quality of life in varicose vein surgery.

Method: A prospective randomised trial of 49 patients undergoing varicose vein surgery was carried out. All patients were having single leg surgery as a day case. Blood loss was assessed by weighing swabs. Bruising was measured at 10 days, and quality of life assessed with SF36 questionnaires.

Synthesis: In the tourniquet group blood loss was significantly reduced but not the area of bruising. The SF36 scores showed deterioration in the non-tourniquet group at 10 days but this was not present at 6 weeks. We saw no complications of tourniquet use but the study was limited by disappointing recruitment reducing the power.

Conclusion: Tourniquet use may be of clinical value. A larger study is required to assess the significance.

Keywords: Varicose veins, Tourniquet, Quality of life

surgery [6] and all three have not been assessed together. The fact that tourniquet use is associated with a reduction in blood loss does not in itself mean that its use is appropriate; the amount of reduction should be significant enough to outweigh the potential cost in terms of time and complications. Complications might include neuropraxia, ischaemic events or deep venous thrombosis. As services are increasingly restricted it is important to understand the impact of procedures on patient's quality of life, especially where a proportion of the patients are having the treatment for largely cosmetic reasons, as is the case in varicose vein surgery. Our hypothesis was that tourniquet use would result in reduced bruising and improved quality of life for our patients in addition to a reduction in blood loss. The tourniquet chosen was selected for the lack of need for extra equipment such as air cylinders and its ability to be sterilised easily. In previous studies different types of tourniquet have been used [2,4,5].

The first aim of the present study was to confirm that blood loss was reduced with tourniquet use and that this could be accurately recorded by using a fluid collection system (Infla-tec, UK). The second aim was to see whether tourniquet use reduced postoperative bruising and whether this was related to blood loss. Our third aim was to assess quality of life in this group of patients and its relationship to blood loss and bruising.

Introduction

The use of tourniquets in varicose vein surgery has been reported previously. However, their use has not been widely adopted [1]. The influence of tourniquets on blood loss has been described in several reports [2–4] and the effect on bruising has been reported once [5], but change in quality of life has not been reported after

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Method

The local research ethics committee approved the study and all patients gave written informed consent before entering the trial. We carried out a prospective

randomised trial of tourniquet use versus no tourniquet use in patients undergoing single leg long saphenous ligation, stripping to the knee [7] and avulsions. Patients were assessed in a socialist weekly varicose vein and ulcer clinic using the hand-held Doppler probe. All had documented reflux at the sapheno-femoral junction. No patients underwent surgery for recurrent disease, or ulceration. All patients attended for day case surgery and were therefore ASA grade 1 or 2. Patients with a history of peripheral neuropathy or peripheral vascular disease were excluded. Patients were randomised by coin toss to undergo surgery with or without tourniquet. We recorded the patient's age, sex, the grade of surgeon, tourniquet time, blood loss and the number of stab avulsions required.

An Esmarch tourniquet was used for this trial. Following sapheno-femoral ligation and passage of a stripper down the long saphenous vein, the tourniquet was applied to the elevated leg. Stripping was carried out after tourniquet application in an antegrade fashion, but to minimise the size of the incision at the knee a tie was used to retrieve the stripper and vein through the groin. Blood was collected into a plastic tray (Infla-tec, Fig. 1), and then mopped up using swabs that were then weighed. At the end of the procedure all limbs were dressed with Steristrips and bandaged with Velband and adhesive low-stretch bandages prior to tourniquet removal. Patients were immediately mobilised and all were discharged the same day.

Patients attended for follow-up at 10 days when the dressings were removed. The wounds were assessed after bandage removal and the bruising was measured using a wound-mapping grid. Quality of life was measured by the administration of an SF36 (Medical

Outcomes Trust/QualityMetric permission granted) quality of life questionnaire preoperatively and at 10 days and 6 weeks postoperatively.

Statistics

Results were analysed in all patients who attended follow-up but not in those with no follow-up data. Demographic data were analysed using a *t*-test as these data were parametric; other data were analysed using the Mann-Whitney *U*-test for non-parametric data. Statistical analysis was carried out by a hospital statistician using SPSS (v10.0.5 Statistics Packages for Social Sciences, Chicago, IL) software.

Results

Forty-nine patients were recruited over an 18 month period from January 1998, representing about a quarter of the potential patients. There were 30 patients randomised to tourniquet and 19 to surgery without tourniquet. Operative details were available for all patients. The groups were not significantly different in size despite appearances (Table 1). There was no significant difference in median age between the two groups (tourniquet group 47 years, range 21–70 years; no-tourniquet group 42 years; range 32–66 years; $p = 0.23$, *t*-test). Whilst both groups were female-predominant, this was more marked in the no-tourniquet group. The number of stab wounds made did not vary significantly between the tourniquet group (median 13, range 3–50) and the no-tourniquet group (median 14, range 3–31; $p = 0.57$, Mann-Whitney *U*-test). Blood loss was significantly reduced by tourniquet use (average 23 ml, range 4–110 ml) compared with those in whom no tourniquet was used (average 91 ml, range 10–339 ml; $p < 0.001$, Mann-Whitney *U*-test). There was no significant difference in the amount of bruising with a tourniquet (average 74 cm², range 14–200 cm²) compared with no tourniquet (average 55 cm², range 10–150 cm²; $p = 0.5$, Mann-Whitney *U*-test). The only significant difference in SF36 scores between the two



Fig. 1. Infla-tec tray for assessing blood loss.

Table 1. Results

	Tourniquet	No tourniquet	Significance
Number	30	19	$p = 0.3$
Blood loss (ml)	23	91	$p < 0.001$
Bruising (cm ²)	74	54	NS
Quality of life score			
Preoperative	124	121	NS
10 days postoperative	121	112	$p < 0.05$
Six weeks postoperative	124	121	NS
Grade of surgeon			
Consultant	8	8	
Registrar	4	0	
SHO	18	11	

groups postoperatively was at 10 days, with those in the tourniquet group having slightly higher functional scores (Table 1).

Discussion

The wide variation in our data reflects the varying extent of varicose veins as indicated by the varying number of stab avulsions required. The number of recruited patients was less than expected and the main reason for refusal was the additional 10 day follow-up, our normal practice being to discharge patients without follow-up after this type of surgery. Although not statistically different, the numbers in each group would ideally have been better balanced.

The data reflect the results of trainee surgeons in the main and are representative of normal NHS practice. We have shown, as have others, that the use of a tourniquet significantly reduces intraoperative blood loss in single leg long saphenous surgery. The volumes of blood lost are small, so the clinical significance of this difference is doubtful. If a tourniquet were used with bilateral disease or for recurrent veins the difference in reduction of blood loss might be clinically more significant. We have failed to show that this has any impact on postoperative bruising or quality of life. We saw no complications of tourniquet use but would expect these to be uncommon and potentially hard to detect. The limited change in quality of life may be related to trial size, or to the SF36 being too blunt an instrument to detect differences.

Conclusions

The use of a tourniquet significantly reduces bleeding at the cost of a minimal increase in operating time. Tourniquet use has short-term impact on quality of life after single leg varicose vein surgery. No significant complications were seen in this small study.

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