How Successful is Varicose Vein Surgery? A Patient Outcome Study Following Varicose Vein Surgery using the SF-36 Health Assessment Questionnaire

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Objective: Assessment of outcome after varicose vein surgery.
Design: Prospective study using the Health Assessment Questionnaire (SF36) which considers different aspects of overall health.
Setting: University Hospital and Community.
Materials: 150 patients undergoing varicose vein surgery.
Chief outcome measures: SF36 questionnaires were sent pre-operatively and at 1 and 6 months post surgery.
Main results: Eighty-nine (59%) patients answered all three questionnaires. Pre-operatively their overall health was similar to that of the general population. The "cost" to the patient of the operation was demonstrated by an increased pain and reduced role function at 1 month post-operation (p < 0.01). By 6 months post-operation, when compared with preoperative values, all dimensions except social function and health perception were improved (p < 0.01). Overall symptoms improved (p < 0.01) by 1 month and were further improved at 6 months.
Conclusions: The general good health of varicose vein patients may justify the low priority given to their treatment, but the improvement in symptoms and general health that relatively simple surgery provides should ensure its continued provision as a health care service.

Introduction

In the English national health service (NHS), over 42,000 people undergo elective surgery for varicose veins each year.¹ A successful outcome is usually only judged by clinical examination at a subsequent follow-up appointment and rarely is a formal assessment of the patient’s views made. This, however, is likely to change with the development in the NHS of a competitive internal market demanding that service providers, in order to secure purchaser funds, demonstrate the effectiveness of the care they provide. In procedures, such as varicose vein surgery which are undertaken primarily to improve the quality of life, the patient’s own evaluation of the outcome should be part of any measure of effectiveness.

The Health Assessment Questionnaire (SF-36) is a health survey questionnaire which is considered to be easy to use, valid, reliable and sensitive.²,³ It is being used widely in the United States and is now being adapted to, and is gaining popularity in, Europe.⁵,⁶,⁷ The SF-36 asks 35 health status questions divided into eight health dimensions (physical function, social function, physical role limitation, emotional role limitation, mental health, energy and fatigue, pain, general health) for which individual scores are calculated. There is one additional question about health change. Although a potentially powerful tool, the SF-36 has not been used in Great Britain to assess patient outcomes following surgical procedures.

This paper reports a patient outcome study following varicose vein surgery using the SF-36 questionnaire as well as symptom related questions.

Patients and Methods

Methods

Patients were surveyed, via a self-completed questionnaire, before and 1 and 6 months after their
operation. Clinical information on patients was collected from the case notes. The questionnaire comprised Brazier et al.'s 5 anglicised version of SF-36 and questions specific to varicose vein symptoms. Responses to questions on each scale of SF-36 were used to calculate the eight scores as percentages. 8 On all scales a high score represents good health and a low score poor health. The seven symptom-related questions were constructed similarly to the SF-36 questions. On a 5 point scale ("not at all" to "extremely"), patients were asked how much they had been bothered over the previous month by the following symptoms related to their varicose veins: i. pain or aching; ii. throbbing; iii. tiredness; iv. appearance; v. skin problems (itching or rashes); vi. swelling; and vii. ulcers. A score was calculated by the same method used to calculate SF-36 scores. Patients were asked additional questions about other diseases or conditions on each questionnaire and preoperatively for occupation and at 6 months about their evaluation of the success of the operation.

Patients

One hundred and fifty patients who underwent varicose vein surgery (elective operations given OPCS 3 codes L85 or L87) at two NHS hospitals in Nottingham, over a 6-month period ending in September 1992 were recruited. This represented 89% of eligible patients of participating surgeons. Patients missed were mainly those admitted at short notice due to cancellations. Preoperatively deep to superficial venous system incompetence at the saphenofemoral or saphenopopliteal junctions was determined clinically in all cases, with the assistance of hand held Doppler or ultrasound Duplex scanning only in cases where other perforators were suspected but not demonstrated clinically.

Patients were sent a questionnaire, a letter explaining the study and an SAE before their operation. Where possible those patients who came in at short notice or those who had not returned the questionnaire by the time of admission were contacted on the ward. One hundred and thirty-one (87%) patients returned the preoperative questionnaire. There were no significant difference in age or gender between recruited and non-recruited patients or between those who responded and those who did not respond to the preoperative questionnaire. Thirty five patients had their procedure as a day case, the rest staying in hospital 1 to 3 days. Fifty-five (42%) had the left leg operated on, 41 (31%) the right and 34 (26%) both. The side was not listed in one case. Twenty-eight (21%) patients reported that it was not their first varicose vein operation. Of 165 varicose vein operations, all had vein avulsion and most some other procedure, namely a long saphenous vein ligation (105), short saphenous vein ligation (15) or above knee strip (21). No sclerotherapy was performed.

One month after operation, a questionnaire was sent to the 131 patients, with a reminder 2 weeks later to non-responders. One hundred and three patients (69% of recruited patients) responded. A further questionnaire was sent at 6 months to the patients who had completed the 1 month questionnaire. Three weeks after mailing, if the questionnaire was not returned, a postal reminder was sent followed by a telephone interview. The 6 month questionnaire was returned by 89 (59% of recruited) patients who comprise the group of complete responders (those that completed all three questionnaires). Forty-two patients did not return one or both of the postoperative questionnaires. These comprise the group of non-responders. At 6 months postoperation attempts were made to contact the non-responders to the 1 month questionnaire in order to identify any difference between responders and non-responders. Thirteen of the 28 non-responders were interviewed by telephone. They answered the symptom questions, one question about general health, and the evaluation of the success of their operation, only.

Statistical analysis

The normality of the distributions of the differences between preoperative and 1 and 6 month postoperative scores were tested by the Kolmogorov-Smirnov Goodness of Fit test. 10 Symptom scores were normally distributed and statistical analysis was as matched pairs using a t-test. Of the SF-36 dimensions, only the difference in mental health scores was normally distributed. Non-parametric tests 10 were used for all of the SF-36 dimensions for consistency. Mann-Whitney U test was used to compare complete responders to non-responders. Wilcoxon Matched Pairs Signed Ranks Test was used to compare the scores at different time points. The mean scores of the preoperative varicose vein population was standardised to the standard population 5 for age and gender. The standardised means were then compared to the standard values using normal deviates. Effect size, a method of standardising the presentation of health change 11 which can be used to compare different measures or populations, was calculated as the (mean
**Table 1. Preoperative SF-36 health dimensions of the 131 patients who responded to the preoperative questionnaire**

<table>
<thead>
<tr>
<th>Health dimension</th>
<th>Mean, Median</th>
<th>Patients scoring 100% n (%)</th>
<th>Age / gender standardised mean†</th>
<th>Standard population mean§</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical function</td>
<td>86.6, 90.0</td>
<td>36 (28)</td>
<td>87.0</td>
<td>86.2</td>
</tr>
<tr>
<td>Social function</td>
<td>87.4, 100.0</td>
<td>72 (55)</td>
<td>87.1</td>
<td>87.0</td>
</tr>
<tr>
<td>Physical role</td>
<td>78.5, 100.0</td>
<td>87 (67)</td>
<td>76.9</td>
<td>82.2</td>
</tr>
<tr>
<td>Emotional role</td>
<td>83.1, 100.0</td>
<td>95 (73)</td>
<td>84.6</td>
<td>81.6</td>
</tr>
<tr>
<td>Mental health</td>
<td>72.8, 72.0</td>
<td>3 (2)</td>
<td>74.3</td>
<td>72.5</td>
</tr>
<tr>
<td>Energy</td>
<td>59.1, 60.0</td>
<td>2 (2)</td>
<td>57.7</td>
<td>60.8</td>
</tr>
<tr>
<td>Pain</td>
<td>73.6, 77.8</td>
<td>30 (23)</td>
<td>73.8*</td>
<td>79.0</td>
</tr>
<tr>
<td>Health perception</td>
<td>75.8, 77.0</td>
<td>12 (9.2)</td>
<td>77.1*</td>
<td>71.2</td>
</tr>
</tbody>
</table>

* Significantly different from the standard population
† Data for standardisation was obtained from the authors
§ Postoperative score minus mean preoperative score) divided by standard deviation of the preoperative mean.

**Results**

Patients undergoing varicose vein surgery had similar scores to the standard population on most dimensions. The varicose veins patients scored significantly higher on General Health Perception and significantly lower on Pain (Table 1). There was no significant difference in age or gender between complete responders and non-responders to the postoperative questionnaires (Table 2). Non-responders had significantly lower preoperative scores for symptoms and four of the health dimensions. While the non-responders who were contacted by telephone at 6 months had similar preoperative symptom scores to non-responders who were not contactable by telephone (i.e. lower than complete responders), they had similar symptom scores (mean 89) at 6 months to the complete responders. There was also no significant difference between the complete responders and the non-responders contacted by telephone in their evaluation of the success of the operation.

SF-36 scores of complete responders are shown in Table 3. At 1 month post-operation the patients' ability to interact socially and their physical role function was markedly reduced. Their mental health had improved; their pain was greater than before the operation but their perceived general health was similar to preoperative levels. At six months when compared with preoperative values all dimensions except Social Function and Health Perception were significantly improved. This improvement is illustrated in Fig. 1 as effect size.

Symptoms significantly improved from preoperative scores (mean 61.4 CI 57.8,65.0) at 1 month (mean 78.9 CI 75.8,82.1 t = −8.5) and at 6 months (mean 88.3 CI 85.2,91.4 t = −12.5). The effect size at 6 months was 1.6 of a standard deviation. The improvement in specific symptoms is illustrated in Fig. 2. When preoperative scores were divided into quartiles, patients with the worst symptoms made the largest improvement.

**Table 2. Preoperative characteristics and scores of the 131 patients who responded to the preoperative questionnaire grouped by subsequent response**

<table>
<thead>
<tr>
<th>Female/Male (n)</th>
<th>Complete responders n = 63/26 Mean, Median</th>
<th>Non-responders n = 35/7 Mean, Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>44.7, 44.0</td>
<td>42.2, 42.0</td>
</tr>
<tr>
<td>Symptom score</td>
<td>61.4, 64.2</td>
<td>51.0*, 53.6</td>
</tr>
<tr>
<td>SF-36 Health Dimensions</td>
<td>88.8, 95.0</td>
<td>82.0, 90.0†</td>
</tr>
<tr>
<td>Physical function</td>
<td>89.9, 100.0</td>
<td>82.3, 88.9†</td>
</tr>
<tr>
<td>Social function</td>
<td>83.8, 100.0</td>
<td>67.1, 100.0†</td>
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<td>Physical role</td>
<td>85.4, 100.0</td>
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<td>73.1, 76.0</td>
</tr>
<tr>
<td>Mental health</td>
<td>58.4, 60.0</td>
<td>60.6, 60.0</td>
</tr>
<tr>
<td>Energy</td>
<td>77.0, 77.8</td>
<td>66.4, 66.8†</td>
</tr>
<tr>
<td>Pain</td>
<td>77.3, 82.0</td>
<td>72.6, 75.0</td>
</tr>
</tbody>
</table>

* Responders and non-responders significantly different (t-test p < 0.01)
† Responders and non-responders significantly different (Mann-Whitney p < 0.01)
Table 3. SF-36 scores of complete responders (patients who completed three questionnaires)

<table>
<thead>
<tr>
<th></th>
<th>Preoperative Median (1st quartile)</th>
<th>1 month Median (1st quartile)</th>
<th>6 months Median (1st quartile)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical function</td>
<td>95.0 (85.0)</td>
<td>95.0 (85.0)</td>
<td>100.0 (90.0)**†</td>
</tr>
<tr>
<td>Social function</td>
<td>100.0 (88.9)</td>
<td>88.9 (66.7)**</td>
<td>100.0 (88.9)†</td>
</tr>
<tr>
<td>Physical role</td>
<td>100.0 (75.0)</td>
<td>75.0 (0.0)**</td>
<td>100.0 (100.0)‡</td>
</tr>
<tr>
<td>Emotional role</td>
<td>100.0 (100.0)</td>
<td>100.0 (66.7)</td>
<td>100.0 (100.0)**†</td>
</tr>
<tr>
<td>Mental health</td>
<td>72.0 (66.0)</td>
<td>80.0 (68.0)*</td>
<td>82.0 (72.0)**</td>
</tr>
<tr>
<td>Energy</td>
<td>60.0 (45.0)</td>
<td>60.0 (45.0)</td>
<td>70.0 (60.0)**†</td>
</tr>
<tr>
<td>Pain</td>
<td>77.8 (66.7)</td>
<td>77.8 (44.4)**</td>
<td>88.9 (77.8)**†</td>
</tr>
<tr>
<td>Health perception</td>
<td>82.0 (72.0)</td>
<td>82.0 (67.0)</td>
<td>82.0 (67.0)</td>
</tr>
</tbody>
</table>

* Significant difference from preoperative score (Wilcoxon Matched pairs p < 0.05)
** Significant difference from preoperative score (Wilcoxon Matched pairs p < 0.01)
† Significant difference from 1 month score (Wilcoxon Matched pairs p < 0.05)
‡ Significant difference from 1 month score (Wilcoxon Matched pairs p < 0.01)

Improvements. Twenty patients (22%) reported no varicose veins symptoms at all at 6 months and few had severe symptoms. At 6 months 56 (64%) regarded the outcome of the operation as very successful, 19 (22%) as fairly successful, 11 (13%) as somewhat successful and one (1%) that it made no difference. No one indicated that the operation had made their condition worse.

![Fig. 1. Health status change in patients who have undergone varicose vein surgery at 6 months.](image-url)


Discussion

This paper reports a prospective patient outcome study following varicose vein surgery. It assessed the outcome of a common, but usually simple operation, with regard to specific symptoms as well as to the general health of the patient.

Patients in this study were very healthy preoperatively, with over one-half of patients gaining the maximum score of 100% on three of the dimensions of SF-36 (Table 1) and therefore could not improve. Thus, SF-36 was less sensitive to changes after treatment than it would have been with a less healthy group of patients. On symptom specific questions no one had the maximum preoperative score and a much larger improvement postoperatively was measured. However, a key quality of any generic health assessment questionnaire is comparability between different conditions, this is likely to make them less sensitive to any particular condition than condition specific questions.

Considering the patients' general health as well as specific symptoms, most of the patients with varicose veins in this study were relatively healthy, scoring higher than the standard population on general health perception and lower only on pain (Table 1). Also, the preoperative symptom characteristics of most patients fell into categories considered medically as relatively minor (29% report no pain at all and 32% no physical limitation). Only 6% of patients had ulcers. This is in contrast to Garrett et al. who found that varicose vein patients scored significantly lower than their general population on several parameters. Postoperatively the general health of these patients did improve after the operation, particularly in the dimensions of physical function, energy and pain where the magnitude of change was about 0.4 of a standard deviation (Fig. 1). (In clinical terms, an effect size of 0.2 is considered to be a slight, 0.5 as a moderate and >0.8 as a large change in health.)

There was also a significant improvement in symptoms (Fig. 3) as reflected in subjects' evaluation of the success of the operation. There was, however, a "cost" to the patient of the operation as demonstrated by the increased pain and reduced role function at 1 month postoperatively.

Although it has been reported that the SF-36 health survey questionnaire is well adapted to the busy clinical setting, to our knowledge, this is the first time it has been so used for a surgical procedure in the U.K. In this respect the form was found to be easy to use and patients had no difficulty in filling it in. There were difficulties in maintaining compliance and, despite a reminder, some patients did not return the

![Fig. 2. Change in symptoms improvement at 6 months.](Eur J Vasc Endovasc Surg Vol 9, April 1995)
questionnaire postoperatively. From the information
given by the non-responders contacted by telephone,
non-response seemed to be due more to inertia than
dissatisfaction. Complete responders were, however,
healthier preoperatively than non-responders but this
does not mean that they necessarily had a better
outcome. From the group of complete responders, it
was the patients with lower preoperative scores who
tended to make larger improvements than patients
with higher scores. Non-responders interviewed by
telephone had postoperative symptom scores equal to
the complete responders, despite their lower preoper-
ative scores.

The question is whether such information is
useful to the purchasers and providers of health care.
There is no evidence that varicose vein symptoms
resolve without medical intervention, but at present
purchasers have almost no information on patient
assessed outcomes of the treatment they receive. Of
the few who have considered the outcome of surgery
for varicose veins, most have concentrated on clinical
signs by grading the appearance of the varicose veins
and assessing post-surgery recurrence rates.12, 13, 14
The wide range of reported recurrence rates
(1–74%12, 13) indicates that varicose veins signs are
extremely difficult to measure and classify. This
produces difficulties in obtaining comparable preoper-
ative base lines as well as post-operative assessment
of results. In contrast, valid and reliable means of
determining patient determined outcomes, as used in
this study, allow an accurate and comparable assess-
ment of what is being purchased.

With regard to the providers of health care, it is
important to use this data for audit as there is always
room for improvement. While 65% of total responders
regarded the operation as very successful, there
were 15% who were less enthusiastic. To this end each
consultant who entered patients into the study has
been supplied with a confidential summary of the
health improvement that can be given to a large
number of people by these relatively simple surgical
procedures indicates that, despite suggestions to the
contrary,1 they do have a valid place in the surgical
portfolio.

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