Sensory abnormalities and bruising after long saphenous vein stripping: Impact on short-term quality of life

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Background: We assessed the impact of postoperative sensory abnormalities and bruising after long saphenous vein (LSV) stripping on short-term quality of life (QOL).

Methods: Seventy patients with LSV incompetence were recruited before surgery. Surgery involved saphenofemoral disconnection, stripping of the LSV in the thigh, and multiple stab avulsions in all patients. Sensory abnormalities (subjective and objective) and bruising were recorded at two follow-up visits (mean, 8 and 47 days). The bruised area was traced manually, and the surface area was estimated by placing the tracing on a square chart. A QOL assessment was performed before surgery and repeated during the second visit by using the Aberdeen Varicose Veins Questionnaire. Minitab version 13.32 was used for statistical analysis.

Results: Eight patients either did not complete follow-up or were excluded from the final analysis. Final analysis was performed on 63 limbs in 62 patients (27 men and 35 women; age, 19-75 years). The overall incidence of postoperative sensory abnormality was 40% (25/63 limbs). This included numbness or decreased sensation in 36.5% (23/63), paresthesia in 8% (5/63), and dysesthesia in 1.6% (1/63). Irrespective of the presence of sensory abnormalities, QOL scores improved after surgery (mean change in QOL score, -7.58 and -7.52; SE, 1.1 and 1.3 in those with and without sensory abnormalities, respectively). There was no significant difference either in the degree of improvement in the QOL score (P = .972; t test) or in the proportion of patients with an improved score (P = .69; Fisher exact test) between the groups with and without sensory abnormalities. Postoperative bruising at first follow-up ranged from 28 to 1419 cm² (mean, 500.7 cm²; median, 438 cm²). Both groups—those who bruised less than the median value (438 cm²) and those who bruised more than the median value—showed improved postoperative QOL scores (mean change in QOL score, -7.64 and -7.46; SE, 1.3 and 1.3, respectively). There was no significant difference either in the degree of improvement in the QOL score (P = .924; t test) or in the proportion of patients with an improved score (P = .422; Fisher exact test). All patients with persistent bruising at the second follow-up (26%) also showed an improvement in the QOL score (mean change in QOL score, -10.29).

Conclusions: Conventional surgery for varicose veins with stripping of the LSV is associated with significant morbidity of sensory abnormalities and bruising. However, this does not adversely affect postoperative improvement in short-term QOL.

Varicose veins are the most common of all the vascular disorders that affect humans. Visible varicose veins affect 10% to 15% of men and 20% to 25% of women in the Western world. They constitute a major health problem and often cause prolonged discomfort and disability, with impairment in quality of life (QOL). The disease and its management are of significant clinical and economic importance to the health industry. They also have a major socioeconomic effect on society due to lost working days from disability and complications of the disease or its treatment.

A significant proportion of varicose veins result from superficial venous incompetence, and the long saphenous vein (LSV) is the most commonly affected. This may be treated either conservatively or by operation. Conventional surgery for LSV incompetence is performed for a broad spectrum of condition severities. It involves saphenofemoral disconnection, stripping of the vein in the thigh, and multiple stab avulsions of the varicosities. Conventional surgery has been shown to improve QOL. Although serious complications are rare, the operation itself may cause considerable early morbidity, including bruising, cutaneous nerve injury, hematoma, pain and discomfort in the groin and leg, and risk of groin wound and stab wound infection. Recovery may be prolonged and sometimes takes up to 6 weeks.

In many surgical units, it is not standard practice to perform a follow-up examination in the first few weeks after varicose vein operation. This makes it difficult to record morbidity in the early postoperative period and monitor its influence on postoperative recovery. Cross-sectional studies in patients who underwent LSV stripping to the ankle have shown no difference in the long-term QOL in those with or without features of saphenous nerve deficits. Recent years have seen the development of less invasive endovenous techniques to treat LSV incompetence, such as radiofrequency ablation, laser ablation, or foam sclerotherapy aiming to reduce the morbidity associated with conven-
ational surgery. However, the true extent of early morbidity after conventional varicose vein surgery and its effect on short-term QOL is not well documented in the literature. Early morbidity may adversely influence postoperative improvement in QOL. There is thus a need to investigate this further. Bruising is inevitable after varicose vein surgery and is an external manifestation of underlying soft tissue injury related to operative trauma. This can cause pain, discomfort, and some limitation of activity after surgery, and this may influence QOL after surgery. The extent of soft tissue injury is difficult to estimate quantitatively. Bruising has been reported as an outcome measure in the evaluation of newer modalities of treatment of LSV reflux. Nerve injury is a recognized morbidity after either conventional or endovenous surgery for LSV incompetence. The objective of this prospective study was to study the extent of bruising and the extent and pattern of sensory abnormalities that follow conventional LSV stripping and to investigate their effect on short-term QOL. This would enable an accurate estimation of such morbidity after conventional surgery and its influence on postoperative outcome and QOL.

METHODS

This prospective study was conducted in a teaching hospital between September 2003 and April 2004 after approval was obtained from the local research ethics committee and the hospital trust and involved patients from six vascular firms that routinely performed varicose vein surgery. All patients with varicose veins, either symptomatic or with skin changes, resulting from incompetence of the LSV as confirmed by handheld Doppler examination or duplex ultrasonography or both and requiring surgical intervention (both day cases and inpatients) were considered suitable for the study. Those with any of the exclusion criteria (Table I) were excluded (14 patients). Informed consent was obtained from patients both for participating in the study and for undergoing operation. Preoperative symptoms, indication for operation, and current medication were recorded. All patients completed the self-administered Aberdeen Varicose Vein Questionnaire2 (Appendix I) before surgery to obtain a baseline record of their QOL. All patients received a single subcutaneous dose of prophylactic tinzaparin sodium 3500 U before operation.

Surgery was performed under general anesthesia in all cases. A consultant surgeon or a final-year vascular trainee was always involved in the operation. Surgery was performed according to standard practice and involved saphenofemoral disconnection, stripping of the LSV in the thigh by using the Perforation-invagination (PIN) stripper from above downward, and multiple stab avulsions by using phlebectomy hooks at preoperatively marked sites of varicosities. The PIN stripper was brought out at or just below the knee level. If stripping was incomplete, then an attempt was made to remove the remaining LSV by using the retriever, but these patients were excluded from the analysis because they may have more bruising from the additional attempt at stripping. One patient with a duplicated LSV had both segments stripped and was excluded from the final analysis. The groin wound was closed in two layers by using absorbable sutures, and the avulsion sites and the stripper exit wound were approximated with Steri-Strips (3M Health Care, USA). After surgery, the entire leg was wrapped in an elastic compression bandage applied distal to proximal with the leg elevated to reduce the risk of postoperative bleeding. This was replaced by graduated compression stockings (thigh length) of an appropriate size according to calf circumference after 24 hours, usually by the district nurse at the patient’s residence.

Patients were followed up twice after surgery in the hospital, initially at the end of the first postoperative week and again 6 weeks after surgery. Each visit lasted approximately 30 minutes. At follow-up, dressings were removed to expose all the wounds, and the entire leg was examined over the front and back under adequate illumination. All areas of bruising were mapped out meticulously by using a standardized approach. With the patient supine, a tracing paper was placed over the bruised area, and its margins were traced onto the paper with a pencil. The paper was held by the patient or by an assistant when tracing large areas. Care was exercised to ensure that the same area was not mapped twice, especially when the bruised area extended from the front to the back across the sides of the limb. Bruising over the back was traced with the patient prone to ensure proper visualization and ease of mapping. The same technique was continued down the leg to include all areas of bruising. Finally, patients were asked whether they believed that any area had been missed, to ensure that all areas had been mapped. The surface area of bruising was estimated by placing each of the tracing papers over a square chart of the same size and manually counting the squares enclosed by the tracing.

Sensory abnormalities, both subjective and objective, that may indicate cutaneous nerve injury or inflammation were recorded at both follow-up visits. Subjective sensory abnormalities recorded were paresthesia and dysesthesia. For the purpose of the study, paresthesia was defined as “spontaneous abnormal sensation occurring in the absence of sensory stimulation,” usually described as “pins and needles” or a “tingling sensation,” and dysesthesia was defined as “unpleasant distorted sensation from actual sensory stimulation.” Patients were informed about the possibility of sensory abnormalities before surgery and were specifically asked at follow-up whether they had experienced any unpleasant, altered, or abnormal sensation in the leg or discovered any areas of numbness or decreased

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**Table I. Exclusion criteria**

<table>
<thead>
<tr>
<th>Reason for Exclusion</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>Unable to attend the hospital for follow-up</td>
<td></td>
</tr>
<tr>
<td>Unable to complete QOL questionnaire because of a lack of command over the language</td>
<td></td>
</tr>
<tr>
<td>Evidence of pre-existing subjective or objective sensory abnormality</td>
<td></td>
</tr>
<tr>
<td>Taking regular anticoagulant medication</td>
<td></td>
</tr>
<tr>
<td>History of bleeding diathesis</td>
<td></td>
</tr>
</tbody>
</table>

QOL, Quality of life.
sensation in the limb after surgery. These were recorded, and attention was paid to these areas during sensory testing. Objective sensory examination was then performed by assessing touch sensation by using a wisp of cotton wool. Patients were asked to close their eyes and say “yes” if they felt that the sensation was normal, “dull” if they felt that the sensation was decreased, and “different” if they felt that it was altered. All areas were tested meticulously with a uniform approach from the groin to the foot across the front and then the back of the leg to ensure consistency in the method and to reduce the chances of missing any part of the limb during sensory testing. Any areas mentioned as dull or different were again tested in a haphazard fashion before the examination was completed, to confirm the accuracy of the abnormal finding and decrease the chances of a predictable response. Finally, patients were asked to look at any abnormal areas discovered during the examination, and these areas were again tested to confirm the abnormal finding. The area of the detected sensory abnormality was recorded as involving the anterior, medial, posterior, or lateral aspects of the upper third, middle third, or lower third of the thigh, leg, or foot. All patients completed the Aberdeen Varicose Vein Questionnaire during the second follow-up visit. The QOL score was calculated by using the prescribed method. The statistical software used for analysis was Minitab (version 13.32). All data were collected by a single observer who was not actively involved in any of the operations performed. A review was performed halfway through the study to confirm that the methods adopted were consistently observed and adequate for the purposes of the study.

RESULTS

Seventy patients with LSV incompetence were identified as suitable and recruited before surgery. Eight patients either did not complete both follow-up visits or were excluded from the final analysis (two patients could not attend follow-up for social reasons, and five patients with an incompletely stripped LSV and one patient with a duplicated LSV—both segments completely stripped—were excluded from the analysis). The two follow-up visits were conducted at a mean of 8 and 47 days. Fifty-nine patients attended the first follow-up, and 62 patients attended the second follow-up. Thus, the final analysis was performed on 63 limbs in 62 patients (27 men and 35 women; age range, 19-75 years; median age, 48 years). One patient had bilateral surgery for LSV incompetence. Most of these patients belonged to CEAP class 2. (class 2, 44/62, 71%; class 3, 8/62, 13%; class 4, 10/62, 16%). Fifty-eight patients underwent operation as day cases and 4 as inpatients.

The overall incidence of postoperative sensory abnormality at second follow-up was 40% (25/63 limbs). There was no significant difference in the incidence of sensory abnormality between men and women (men, 8/27; women, 17/35; \( P = 0.132 \); \( \chi^2 \) test). Areas of numbness, decreased sensation, or both were found in 36.5% (23/63) of the limbs (Table II). The most commonly affected area in the thigh was below the groin wound (8/11 patients with an affected thigh segment), and that in the leg was the medial aspect of the upper two thirds of the leg (10/15 patients with an affected leg segment). This constituted 13% (8/63) and 16% (10/63), respectively, of all limbs that underwent operation. Only two cases involved the foot in its medial aspect.

Paresthesia (usually described by patients as “pins and needles” or “tingling sensation”) affected 8% (5/63) of the limbs. Of these, three limbs had associated numbness or decreased sensation over the same areas. One patient (1.6%) complained of dysesthesia over an area of decreased sensation on the medial aspect of the upper third of the thigh below the level of the groin wound.

The Aberdeen Varicose Vein Questionnaire gives a single summary score, within a range of 0 to 100, as a measure of QOL, with 0 being the best and 100 being the worst. The overall QOL for the entire sample improved significantly after surgery (mean change in QOL score [postoperative score minus preoperative score], −7.54; SE, 0.865; 95% confidence interval [CI] for difference, −9.27 to −5.812; \( P < .001 \); \( t \) test). There was no significant difference in the postoperative improvement in QOL between men and women (mean change in QOL score, −6.15 and −8.61; SE, 1.5 and 1.0, respectively; 95% CI for difference, −1.00 to 5.92; \( P = .16 \); \( t \) test). The sample was divided into those with sensory abnormalities (group 1) and those without sensory abnormalities (group 2) for analysis. There was no significant difference between group 1 and group 2 either in the degree of improvement in the QOL score or in the proportion of patients with an improved score (Table III).

Postoperative bruising at first follow-up was recorded in 58 patients. Three patients did not attend the first follow-up, and in another patient who attended at 17 days, the bruising had started to fade and was not recorded. The extent of bruising ranged from 14 to 202 cm² (mean, 500.7 cm²; median, 438 cm²). For the purpose of analysis, these patients were divided into two groups: those who bruised less than the median value of 438 cm² (group A) and those who bruised more than the median value (group B). There was no significant difference between group A and group B either in the degree of improvement in the QOL score or in the proportion of patients with an improved score (Table IV). All patients attended the second follow-up. Persistent bruising was noted in 26% (16/62) of patients. The extent of bruising ranged from 14 to 202 cm².

Table II. Distribution of numbness or decreased sensation in the limb after LSV stripping

<table>
<thead>
<tr>
<th>Segment involved</th>
<th>No. affected limbs</th>
<th>% Affected limbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thigh alone (above the knee)</td>
<td>8</td>
<td>35%</td>
</tr>
<tr>
<td>Leg alone (between knee and ankle)</td>
<td>10</td>
<td>43%</td>
</tr>
<tr>
<td>Thigh and leg</td>
<td>3</td>
<td>13%</td>
</tr>
<tr>
<td>Leg and foot</td>
<td>2</td>
<td>9%</td>
</tr>
</tbody>
</table>

LSV, Long saphenous vein.
(mean, 61.6 cm²; median, 50.5 cm²). All of them showed an improvement in the postoperative QOL score (mean change in QOL score, −7.58; median change for the entire sample, −7.54). There was no significant difference in the degree of improvement in the QOL score between those with and without bruising at second follow-up (mean change in QOL score, −10.29 and −6.58; SE, 1.6 and 1.0, respectively; 95% CI for difference, −7.58 to 0.16; P = .06; t test).

## DISCUSSION

This was a clinical study with a simple method and is easily reproducible. A single independent observer gathered all the data during the study in a prospective manner. This study confirms previous observations that QOL improves significantly after superficial venous surgery. The objective of the study, however, was to estimate the effect of sensory abnormalities and bruising after LSV stripping on the postoperative improvement in QOL. The Aberdeen Varicose Vein Questionnaire is disease specific and well validated for use in this context. It addresses the main aspects of the disease that affect QOL (13 questions, each of which have 2-4 graded responses) and is easily completed in a few minutes. In this study, all patients completed the questionnaire during the hospital visit to ensure a high response rate. There were no missing responses in any of the completed questionnaires. A simple scoring method yielded a single summary QOL score for statistical analysis.

Nerve injury is a recognized morbidity after varicose vein surgery. The most commonly affected nerve is the saphenous nerve, which is at risk of injury during stripping of the LSV, particularly when the vein is stripped to the ankle. The saphenous nerve is closely related to the LSV in its course across the medial surface of the tibia; it usually lies in front of, but may be posterior to, the vein. The nerve bifurcates over the LSV approximately 2 to 3 inches above the ankle. Passage of a stripper has a risk of damaging the nerve in this situation and sometimes results in avulsion of part or all of the nerve. Permanent damage to the nerve is uncommon. The incidence of such injury reported in literature is very variable. One study that involved a combined external and invaginated technique for stripping the LSV from groin to ankle reported that only 1 of 68 patients experienced permanent saphenous nerve damage. Manifestations of saphenous nerve injury are, however, common, even at long-term follow-up after LSV stripping. A cross-sectional study of patients who had undergone primary LSV stripping to the ankle over a 12-year period showed that 40% of patients reported symptoms consistent with saphenous nerve injury at some time after operation. In the same group, saphenous nerve deficits were identified in 58% of patients. In our study, the LSV was stripped to the level of the knee or to just below the knee. This would be expected to reduce the risk of cutaneous nerve injury after surgery. Such injury could manifest as numbness, decreased sensation, paresthesia, or dysesthesia. In our study, the overall incidence of postoperative sensory abnormality was 40%, and 36.5% of the limbs had areas of numbness, decreased sensation, or both on clinical examination. The most commonly affected areas were below the groin wound and the medial aspect of the upper two thirds of the leg. This is probably due to injury to the cutaneous nerve twigs during groin dissection or stab avulsion of varicosities by using hooks.

Few, if any, prospective studies have studied sensory abnormalities after LSV stripping and their influence on postoperative change in QOL. This study has accurately recorded the pattern of sensory abnormalities in the early postoperative period that follows saphenofemoral disconnection and successful LSV stripping above the knee by using the PIN stripper in a single attempt combined with stab avulsion of varicosities. A relatively high incidence of

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**Table III. Comparison of QOL scores between group 1 and group 2**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group</th>
<th>Mean change</th>
<th>SE</th>
<th>95% CI for difference</th>
<th>P value</th>
<th>Statistical test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree of improvement in</td>
<td>1 (n = 25)</td>
<td>−7.58</td>
<td>1.1</td>
<td>−3.62 to 3.49</td>
<td>.972</td>
<td>t test</td>
</tr>
<tr>
<td>QOL score</td>
<td>2 (n = 37)</td>
<td>−7.52</td>
<td>1.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proportion of patients with</td>
<td>1</td>
<td>25/25 with improved QOL score</td>
<td></td>
<td></td>
<td>.69</td>
<td>Fisher exact test</td>
</tr>
<tr>
<td>improved QOL score</td>
<td>2</td>
<td>32/37 with improved QOL score</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**QOL,** Quality of life; CI, confidence interval.

**Table IV. Comparison of QOL scores between group A and group B**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group</th>
<th>Mean change</th>
<th>SE</th>
<th>95% CI for difference</th>
<th>P value</th>
<th>Statistical test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree of improvement in</td>
<td>A (n = 29)</td>
<td>−7.64</td>
<td>1.3</td>
<td>−3.91 to 3.55</td>
<td>.924</td>
<td>t test</td>
</tr>
<tr>
<td>QOL score</td>
<td>B (n = 29)</td>
<td>−7.46</td>
<td>1.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proportion of patients with</td>
<td>A</td>
<td>27/29 with improved QOL score</td>
<td></td>
<td></td>
<td>.422</td>
<td>Fisher exact test</td>
</tr>
<tr>
<td>improved QOL score</td>
<td>B</td>
<td>24/29 with improved QOL score</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**QOL,** Quality of life; CI, confidence interval.
such abnormalities did not adversely influence the improvement in QOL that occurs after superficial venous surgery. Bruising is inevitable after varicose vein surgery. Although it disappears in most cases, it causes pain, discomfort, and some limitation of activity in the early weeks of surgery and may be expected to adversely influence QOL. There are not many studies that have addressed this issue adequately, partly because bruising is not easy to measure. The manual method adopted for this study was quite time consuming but was simple and very accurate. Affected areas were mapped out with great care to avoid tracing the same area twice, especially in cases of extensive bruising. Even at the second follow-up (mean, 47 days), one fourth of patients exhibited persistent bruising. However, postoperative bruising did not impair the improvement in QOL after surgery. Thus, although bruising is unavoidable in varicose vein surgery, it did not seem to contribute significantly to postoperative morbidity.

Conventional surgery for varicose veins with stripping of the LSV is associated with the risk of morbidity such as bruising and cutaneous nerve injury. However, this does not seem to influence the outcome in the early postoperative period with regard to QOL. Careful patient selection, preoperative counseling, and informed consent regarding the nature of the operation and the possible side effects probably helped patients to prepare adequately for what to expect after surgery for varicose veins and possibly led to a better acceptance of associated morbidity. This may be a factor that contributed to the observation that QOL improved despite such morbidity after varicose vein surgery in these patients.

The authors thank the Centre for Health Services Research, University of Newcastle, for their advice on tools for assessment for QOL and the scoring method; the Day Surgery Unit and Outpatient Department at Freeman Hospital, Newcastle Upon Tyne, UK, where the follow-up clinics were held; and consultants and colleagues who contributed to the study.

REFERENCES

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Appendix I

The Aberdeen Varicose Vein Questionnaire is a validated disease-specific questionnaire that measures health-related QOL for patients with varicose veins.\textsuperscript{2,3} Previous studies have confirmed its reliability, internal consistency, validity, responsiveness, and practicality. It was designed in 1993 and consists of 13 questions, 12 of which are multiple-choice questions with 2 to 4 graded responses relating to all aspects of the problem of varicose veins. These include an assessment of pain, ache, ankle swelling and itching, the need for painkillers or compression therapy, the presence of skin changes such as telangiectasia, rash, eczema, or ulceration, cosmetic aspects of the disease, interference with activities, and a scoring grid to record the extent of varicosities objectively. The scoring method is simple and gives a single index for health-related QOL for patients with varicose veins. This single index score can vary from 0 to 100, where 0 denotes the best possible QOL and 100 denotes the worst.