

Complications of varicose vein surgery

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A retrospective review was carried out of patients who had undergone surgery for varicose veins over an 8 year period between 1985 and 1993. We wished to determine the incidence of various complications so that the risks of surgery could be openly discussed with patients.

A total of 973 limbs were operated upon in 599 patients (413 F, 186 M; mean age 49 years). All patients were under the care of a single consultant vascular surgeon who was present at 92% of operations and all patients were reviewed postoperatively.

There was no perioperative mortality. Wound complications (haematoma, cellulitis or abscess) occurred in 2.8% of limbs and minor neurological disturbance (numbness or tingling) in 6.6%. Leakage of lymph from the groin occurred in five patients, all of whom had undergone exploration for groin recurrence. Major complications included three cases of deep venous thrombosis (0.5%), one pulmonary embolus, and one foot-drop. There was one major vascular injury, the common femoral vein being damaged in a patient having a third operation on the groin for persistent recurrence. Vein patch repair was performed and patency was maintained.

The overall incidence of major complications was 0.8%. Minor complications occurred in 17% of patients. It is unlikely that major complications can

be eliminated. In this retrospective review there will be some under-reporting, but we are confident that this is restricted to minor complications.

It is estimated that each year, throughout England and Wales, some 50 000 patients undergo surgery for varicose veins in NHS hospitals (1). A further 13 000 are treated in the independent sector (2). Varicose vein operations provide suitable training for the development of surgical skills but, within the NHS, such procedures are often delegated to inexperienced, unsupervised juniors (3). This might have an adverse effect on the frequency of complications and partly be responsible for the recognised high incidence of recurrent varicose veins after supposedly curative surgery. Bradbury *et al.* (4) have reported that up to 20% of varicose vein operations are performed for recurrent disease. This is associated with considerable economic impact and there is also a personal cost to the patient, because results after second operations are inferior to those of primary surgery (5).

There are few published series based on large numbers that allow for an accurate determination of the incidence of complications of varicose vein surgery (6). Some papers deal exclusively with specific complications such as major vascular injury (7,8). These reports depend on searching for cases where any guess as to the frequency of such mishaps is likely to be an underestimate.

In the past, varicose vein surgery might have been regarded as 'safe' from the medicolegal standpoint. Now it is a common source of litigation (9). Complaints range from relatively minor problems such as recurrent varices, venous flares or scarring, through nerve damage including foot-drop, to potentially lethal pulmonary embolism, or

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amputation because of arterial injury. Surgeons should be aware of the pitfalls, and have an idea of the risk of the various complications. They will then be in a position to give patients complete information when counselling them before obtaining consent for operation. Provision of details about risks appears not to frighten patients about to undergo inguinal herniorrhaphy (10).

Patients and methods

A retrospective analysis was carried out by reviewing the records of all patients operated on for varicose veins under the care of a single consultant vascular surgeon in the period between 1985 and 1993. Patients treated under the National Health Service were traced via the office diary of theatre lists until January 1990 and by the departmental computer from February 1990 onwards. Private patients were found by manual search of all case records. We believe that very few patients could have escaped these searches.

Over the 8-year period, 599 patients (973 limbs) were operated on with the consultant present in 92% of cases. Thirteen patients underwent two and one underwent three operations. Of the 973 limbs, 15 were operated on twice. Bilateral surgery was performed in 58% of patients. There were 413 females and 186 males (female to male ratio; 2.2:1). Mean age was 49.3 years (range 16–82 years).

Preoperative investigation and selection for operation

We are biased in favour of operation and against injection sclerotherapy because of the anticipated better long-term results of surgery (11). Operation was offered if symptoms were attributable directly to varicose veins and careful evaluation indicated that the patient was likely to benefit. Symptomatic criteria including aching discomfort, significant cosmetic disability or complications of venous disease. Sixty-nine limbs (7%) were or had previously been ulcerated.

Clinical examination was aided by hand-held Doppler throughout the study period. Where imaging was required for preoperative investigation, this was almost exclusively by radiology rather than by duplex Doppler ultrasound. The latter is still not available locally. We now refer more patients elsewhere for duplex imaging for recurrent varices, but during the study period we relied on varicography. In all, 120 patients (20%), including almost every patient with recurrent varicose veins and those where hand-held Doppler examination indicated reflux in the popliteal fossa, underwent varicography. Phlebography was used in 42 patients (7%) when it was felt necessary to look for evidence of previous deep venous thrombosis.

Operative procedures

Operations were carried out along standard lines, with particular emphasis on the need to achieve flush

saphenofemoral and saphenopopliteal ligation. At the groin the cribriform fascia was separated to expose 1 cm of femoral vein above and below the junction to verify that no other branches were entering the femoral vein separately. Formerly we used black silk for this ligature but now use polyglactin (Vicryl[®], Ethicon Ltd). When stripping the long saphenous vein we aimed to strip to 10 cm below the knee, but never stripped to the ankle.

Operations varied between primary procedures and those for recurrence. Primary surgery was performed in 492/599 patients (82%). Of the 814 limbs in this group, 712 (87%) required saphenofemoral ligation, 22 (3%) saphenopopliteal ligation, and 51 (6%) both saphenofemoral and saphenopopliteal ligation. Phlebectomies alone were performed in 29 limbs (4%). Overall, saphenopopliteal ligation was necessary in 73/814 (9%) of limbs. This is a lower incidence than the 14% recorded by Rivlin (12) and the 13% noted by Larson *et al.* (13).

Long saphenous stripping was undertaken in 498 of the 763 limbs (65%) in which the saphenofemoral junction was ligated. Our policy was generally to strip the long saphenous vein but for a time, in the late 1980s, we were influenced by the arguments for conservation, often preserving one vein in bilateral cases. By contrast, in only five of 73 (7%) limbs where saphenopopliteal ligation was carried out was short saphenous stripping performed. During most of the study period our policy was not to strip the short saphenous vein because of the risk of sural nerve injury, but more recently we have adopted the inversion stripping technique for the short saphenous vein, as described by Oesch (14). This is claimed to avoid this complication. Imaging of the saphenopopliteal junction is essential and we favour preoperative assessment rather than intraoperative films as advocated by Hobbs (15). This provides for consideration of any unusual anatomy demonstrated, the implications of which should be discussed with the patient before operation.

In 58% of limbs, an Esmarch tourniquet was applied after downward passage of the stripper and after phlebectomies of upper- or mid-thigh varices. This allowed the remaining phlebectomies on the lower thigh and the calf to be undertaken in a bloodless field. This technique and its advantages have been described previously (16). On completion of the phlebectomies, the long saphenous vein was stripped downwards. As much blood as possible was expressed from the track of the stripper and the upper end of the track was closed securely with a catgut pursestring suture. This locked any haematoma in the thigh, which may help reduce complications in the groin wound. The groin was closed with interrupted catgut to Scarpa's fascia and subcuticular polydioxanone (PDS[®], Ethicon Ltd) to the skin. The phlebectomy incisions were closed with adhesive paper tape (3M Micropore), care being taken to ensure they were not so tight as to be likely to cause skin blistering. Crêpe bandages were applied before removal of the tourniquet and the following day, when the wounds were dry, the bandages were replaced by antiembolism stockings.

Patients were not routinely given subcutaneous heparin. The taking of the oral contraceptive pill or hormone replacement therapy was not regarded as a contraindication to surgery, but these patients received low dose heparin (5000 units twice a day) while in hospital.

Formerly, patients stayed 2 to 3 nights in hospital, but now 80% are day patients, including bilateral and recurrent cases. Increasingly we use local anaesthesia, in 25% of all patients, but the vast majority of patients in this series received general anaesthesia. Since 1990 all patients have received a detailed set of instructions to read before surgery.

Operative procedures for recurrent varicose veins

Operations for recurrence were performed in 107/599 patients (18%). Of the 159 limbs operated on in this group, 111 (70%) required operation on the long saphenous system, 17 (11%) the short saphenous system, and 20 (12%) required operation on both. Phlebectomies only were performed in 11 limbs (7%).

Postoperative follow-up

All patients were seen between 3 and 9 days after surgery. We deliberately removed the subcuticular suture from the groin at this time because of the possible complication of late sepsis around the PDS, which may take up to 4 months to degrade. Patients removed the paper tapes at 10 days and wore antiembolism stockings for about 4 weeks. As regards further follow-up, practice changed during the study period. From 1985 to 1990, all NHS patients were reviewed at 4–6 weeks. From 1991 there was pressure to reduce follow-up visits in favour of new attendances, so the second visit was dropped. Private patients continued to be seen at 4–6 weeks. Wound and other complications are therefore more likely to have been recognised in this latter group and there is probably some under-reporting of complications in NHS patients treated since 1991. However, we continued to follow-up patients with ulcers,

lipodermatosclerosis or eczema until healing or until definite improvement (about 10% of the total population studied) and we followed up all those having operation for recurrence (18%); this was to obtain a postoperative record of the venous refill time for research purposes. Hence, knowing the numbers operated year by year we are confident that 65–70% of all patients have been subject to late review. Morbidity may have been missed in the 30–35% not seen at 1 month, but this is likely to have been minor rather than major morbidity.

Only a few of the patients having primary procedures have been recalled for assessment of recurrence. Of the patients having surgery for recurrence, half have been reviewed subsequently for further recurrence and this will be reported separately. This paper deals with complications other than recurrence.

Results

The incidence of complications is shown in Table I and Table II. Complications are expressed either as a percentage of the number of patients or the number of limbs. For a complication such as pulmonary embolism, it is justified to use patients as the denominator, but in determining wound infection or major vessel injury, it is more appropriate to consider the number of limbs as in bilateral cases the risk of a complication is doubled.

Many of the wound infections were trivial but 2/24 patients had a haematoma or abscess necessitating readmission to hospital. The incidence of a wound complication in the NHS patients was 5.2% (18/349) and 2.4% (6/250) among those treated privately, but statistical comparison is inappropriate. Leakage of lymph from the groin occurred in five patients undergoing groin re-explorations for recurrence, and lymph leakage from phlebectomy sites occurred in two patients. Of these seven patients, two required readmission for this reason. Superficial thrombophlebitis in the long saphenous vein was recorded twice, once in the thigh in an unstripped vein and once in the calf in the residual unstripped

Table I. Minor complications

	<i>Patients</i> (<i>n</i> = 599)	%	<i>Limbs</i> (<i>n</i> = 973)	%
Wound	24	4.0	27	2.8
Neurological	64	10.7	64	6.6
Lymphatic	8	1.3	8	0.8
Leakage from groin fistula	5			
Leakage from phlebectomy site	2			
Lymphoedema	1			
Superficial thrombophlebitis in LSV	2	0.3	2	0.2
In unstripped LSV	1			
In LSV in calf below stripped LSV	1			
Blister on ankle from tight bandage	2	0.3	2	0.2
Chest infection	2	0.3		
Total	102	17	103	10.6

LSV = Long saphenous vein

Table II. Major complications

		<i>Patients</i> (<i>n</i> = 599)	%	<i>Limbs</i> (<i>n</i> = 973)	%
Thromboembolic (total)		3	0.50	3	0.31
DVT only (no PE)	2				
DVT and PE	1				
Neurological		1	0.17	1	0.10
Major vessel injury		1	0.17	1	0.10
Total		5	0.83	5	0.51

DVT = Deep vein thrombosis; PE = Pulmonary embolism

segment. No instances of blistering caused by the tapes used to close the phlebectomies were noted, but there were two limbs where blistering around the ankle was caused by a crêpe bandage which had been applied too tightly. No cases of tattooing from preoperative markings were observed. Mild chest infection occurred in two patients. Bruising was often mentioned in the follow-up note, but it is impossible to quantitate as a certain amount of bruising is regarded as normal.

Of the major complications, thromboembolism was the most frequent. The one pulmonary embolus which occurred was in a 62-year-old male. He was readmitted, anticoagulated and made an uneventful recovery. Another man, aged 58 years, with a previous history of deep vein thrombosis and pulmonary embolism was not given prophylaxis to cover surgery. He was admitted 22 days after operation with lower limb swelling. Phlebography showed calf and popliteal vein thrombosis. He was anticoagulated and now requires below-knee compression stockings. A third patient, a 66-year-old female, was referred back 6 months after surgery with persistent ankle swelling. Phlebography showed evidence of earlier calf vein thrombosis. In view of the late presentation, she was not anticoagulated but now wears a compression stocking to control oedema.

The one case of major vessel injury occurred in a 58-year-old female with recurrent varicose veins undergoing a third operation on the right groin. Duplex ultrasound had shown a persistent small communication between the superficial and deep veins. There was dense fibrosis from previous surgery. The common femoral vein was damaged and full dissection of the vein was necessary to control it above and below the injury, and to control the profunda vein. A vein patch repair was performed. Subsequently, she has complained of recurrent varices and swelling of the thigh, but repeat duplex scans have shown the common femoral vein to be patent. It is likely that the mild thigh swelling is due to lymphoedema, three operations having resulted in significant damage to the lymphatics. The recurrent varices have been left untreated and, 3 years later, she was finding compression hosiery unbeneficial.

There was one major neurological complication, a foot-drop in a 42-year-old male. Preoperative examination showed long and short saphenous incompetence. Varicography indicated that the saphenopopliteal junction was

6 cm above the knee crease. At operation the nerve trunks had to be retracted to expose the saphenopopliteal junction to achieve flush ligation of the short saphenous vein on the popliteal vein. Postoperatively, the patient complained of numbness on the dorsum of the foot and dragging of his toes. There was weakness of the extensor hallucis longus and of dorsiflexion of the ankle. It appeared that nerve injury had been caused by the retraction. Electromyography indicated damage to the common peroneal nerve but confirmed it was intact and that there was evidence of re-innervation. Follow-up lapsed 2 years later when the patient felt that he had almost completely recovered.

Discussion

Publications dealing with the complications of varicose vein surgery have generally concentrated on particular aspects such as vascular or nerve injury (7,8,17-19). Accounts of major vascular damage may strike the practising surgeon with terror or amazement, but they do not provide an estimate of risk, as they are based on case reporting (7,8). The papers on neurological sequelae have been based on prospective studies, looking at nerve injury in relation to stripping of the saphenous veins (17-19), but they do not give information on more serious complications such as foot-drop, which undoubtedly occur from time to time. By contrast, Hagemüller presents figures from his own unit and produces projections on a national basis (6). We felt it would be useful to have an estimate of all complications occurring in our department, not only for audit purposes, but also to enable us to provide patients with accurate information of potential complications and outcomes before operation. Many patients, and probably many medical practitioners, regard varicose vein surgery as essentially safe. In reality there are serious risks, including those of loss of limb and loss of life. Although some may believe the provision of such detail to patients to be excessively defensive, we consider it an essential part of obtaining fully informed consent. It has enabled us to improve the accuracy of information on the advice sheets which we have provided for patients since 1990.

Any retrospective study such as this is open to the criticism that some adverse events, particularly minor ones, may have been under-recorded. However, our

follow-up and data collection is as comprehensive and complete as is practically possible with 65–70% of patients reviewed at 4–6 weeks postoperatively, so we believe it unlikely there is serious under-reporting. Furthermore, postoperative problems are nearly always referred back to this hospital as there is no other hospital in the vicinity. No clinically important episode could have been overlooked by our comprehensive review of every set of notes. Referral for postoperative complications may have been made to another department without informing our team, as occurred in one case, but we detected the complication during review of all the notes.

The incidence of wound complications was 2.8% of all limbs (4% of patients) and is within the limits usually cited for clean surgery (20). No attempt was made to distinguish between haematoma, cellulitis or abscess, as in varicose vein surgery infection is usually preceded by haematoma formation.

Leakage of lymph from the groin only occurred in re-explorations, with an incidence of 5/111 limbs. Re-exploration of the groin for recurrence is a potentially dangerous procedure. Unnecessary re-exploration is best avoided as there is a higher risk of haematoma formation, infection, lymphatic fistula and venous injury than in primary surgery. Management of a lymphatic leak can be difficult. Some respond quickly to a few sutures placed under local anaesthesia, but we have encountered leaks from the groin lasting 4–6 weeks. The perpetually wet groin and leg is of equal embarrassment to the patient and the surgeon. Rarely, lymph leaks also occur from phlebectomy sites as occurred in 2/599 patients (0.3%). One patient was obese, the other had eczema.

Repeated operations on the groin cause major interruption to the lymphatics and are a recognised cause of lymphoedema (21). This complication has been recorded once in our series, after a third operation on the groin.

We found minor neurological disturbance in 6.6% of limbs. Negus (18) recorded an incidence of 4.2% in a retrospective study on patients having limited long saphenous vein stripping to below the knee. In a prospective controlled study, Holme *et al.* (17) found saphenous nerve injury in 7% of patients having stripping to below the knee and in 39% of patients having stripping to the ankle. Our figure is comparable and we tend to make direct enquiry because often the symptom is not volunteered.

The literature does not provide data on the incidence of major neurological injury. Foot-drop is known to occur and we record one instance. Particular risks arise in re-explorations of the popliteal fossa for previous inadequate saphenopopliteal ligation or, as in the case reported here, in primary operations where the saphenopopliteal junction is higher than usual above the knee crease. The problem usually comes from retracting the nerve trunks in order to expose the saphenopopliteal junction. The surgeon also needs to be aware of the rare anatomical variant in which the short saphenous vein terminates in the sciatic nerve (22). This has been encountered twice in the present series.

We report a low incidence of thromboembolic

complications, suggesting that the risk of deep venous thrombosis in varicose vein surgery is about 1:200 and the risk of pulmonary embolism 1:600. Hagemüller (6) suggests a much lower incidence at 0.15% for deep venous thrombosis and 0.06% for pulmonary embolism. We consider the risk low enough not to justify routine anticoagulation, although this has been advocated (23).

This series suggested no link between thromboembolism and use of the oral contraceptive pill or hormone administration. All three patients who developed deep vein thrombosis or pulmonary embolism were relatively elderly and one had a past history of thromboembolic disease. This particular patient did not receive heparin. We now administer enoxaparin 40 mg daily for 1 week to all patients with a previous history of thromboembolism, starting the day before operation.

Hagemüller (6) has suggested that, in the Federal Republic of Germany, about 50 femoral vein injuries occurred annually from varicose vein surgery. He estimated about 50 000 varicose vein operations per annum, giving a risk of 0.1%. There was one such injury in the present report, making the risk in our hands approximately 1:1000 for each limb or 1:600 individual patients.

The femoral vein injury in this series occurred in a groin being explored for the third time. The connection between the superficial veins and the femoral vein was only 2–3 mm diameter on duplex examination and we now regard connecting vessels less than 5 mm to be insignificant. In the light of this experience a third operation is probably never justified. The femoral vein is mainly at risk in re-exploration or where the patient is very obese. In very thin patients there is danger that the common femoral vein can be mistaken for the long saphenous vein.

Hagemüller (6) reported an annual incidence of 10 cases of arterial injury after varicose vein surgery in the Federal Republic of Germany. This gives an incidence of 0.02%, implying that venous injury is five times more common than arterial injury. Ligation of the femoral or popliteal arteries as well as arterial stripping are described (24). It has been suggested that these catastrophes occur in operations carried out by inexperienced surgeons who are still in training, but anecdotal evidence suggests this may not be true and that consultant surgeons may be equally at fault (25).

Other complications are recognised but are beyond the scope of this paper as they would require careful prospective study. These include residual and recurrent varicosities, keloid scars and the troublesome venous flares which sometimes appear around the phlebectomy scars.

This paper shows that the risks of varicose vein surgery are not trivial and that a complication of some sort occurred in 107/599 patients (18%). Many of the minor complications and even some of the major ones are probably not preventable. In view of the much greater readiness of the public to seek redress in the courts for postoperative complications, the wary surgeon will spell out the risks before the event.

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