Factors influencing the choice of treatment modality for individual patients with varicose veins

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ABSTRACT

INTRODUCTION There is evidence of effectiveness for a range of different treatment modalities for varicose veins but limited information about factors that influence treatment choice for individual patients.

METHODS A postal survey was sent to 438 UK members of the Vascular Society of Great Britain and Ireland.

RESULTS Overall, 251 responses were received (response rate 57%). A total of 222 respondents treated varicose veins using conventional surgery (84%), endothermal ablation (82%) and foam sclerotherapy (68%).

The clinical pattern of veins appeared to have the greatest influence on treatment choice. This was followed by guidance from the National Institute for Health and Care Excellence, patient expectations, facilities, cost and whether treatment was carried out in the public or private sector.

Respondents were asked to indicate whether each of 13 clinical 'scenarios' (eg very extensive varicose veins in both legs) would influence them towards or against using specified treatment modalities. 'Consensus' was defined as $\geq 80\%$ of responses either towards or against any treatment modality; and disagreement as 41–59% both towards and against any modality (i.e. $\sim 50:50$ split). There was consensus towards using endothermal ablation for truncal reflux, towards UGFS for localised varicose veins and towards conventional surgery for large, extensive, bilateral veins. There was consensus against UGFS for large truncal veins, and against surgery for obese patients and those with a history of venous thromboembolism. There were important disagreements about the influence of large or extensive veins, about whether patients were obese or slim and about a prior history of venous thromboembolism.

CONCLUSIONS Conventional surgery is still widely available in the UK. Disagreements about treatment choice in different clinical scenarios suggest substantial variation in the treatments patients are offered. Attention to identifying subgroups in trials would help to guide treatment choice for individual patients.

KEYWORDS

Varicose veins – Endothermal ablation – Laser ablation – Radiofrequency ablation – Foam sclerotherapy

Accepted 3 April 2017

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A range of treatments is now well established for varicose veins. The most popular are endothermal ablation (using endovenous laser ablation [EVLA] or radiofrequency ablation [RFA]), conventional surgery (proximal ligation, stripping and phlebectomies) and ultrasound guided foam sclerotherapy (UGFS).¹ The endothermal ablation techniques may be used with concomitant or subsequent phlebectomies, or UGFS.² Many procedures are carried out under local anaesthesia (LA) but general anaesthesia (GA) may be used for conventional surgery and for treating very extensive veins. In addition to this range of possible techniques, new methods are being adopted, notably mechanochemical ablation and the use of cyanoacrylate glue.^{3,4} However, very little is known about how vascular specialists choose which treatment modality they offer to individual patients.

An array of evidence and a diversity of other factors seem to influence which treatment any patient receives. Many

studies have now been conducted comparing the different treatment modalities for a variety of outcomes, including anatomical success (truncal ablation), patient satisfaction, quality of life and recurrence of varicose veins.^{5–10} Based on this evidence and other considerations, influential guidelines have been produced, for example by the National Institute for Health and Care Excellence (NICE) in the UK, by the Society for Vascular Surgery and the American Venous Forum in the US, and by the European Society for Vascular Surgery.^{11–15}

NICE recommends a hierarchy of first offering endothermal ablation, second UGFS and third surgery, depending on whether each treatment is 'unsuitable' for the patient.¹¹ This hierarchy was based as much on cost effectiveness considerations as on clinical evidence of comparative effectiveness and a subsequent UK cost modelling study has produced conflicting results.¹⁴ Some practitioners have a personal

preference for a particular treatment modality, often based on their wish for an office-based practice or on the facilities most readily available to them in hospital. Patients frequently have preconceived ideas about what treatment they want. Many present requesting ‘laser’, for example, because it sounds modern and attractive.

The clinical trials have understandably focused more on the overall outcomes from each type of treatment and less on the characteristics of individual patients (eg the size and extent of varicose veins, whether the patient is slim or very obese and co-morbidities such previous venous thromboembolism [VTE]), which may well influence the type of treatment chosen. Vascular specialists talk about these various influences but there is relatively little about them in the published evidence that is helpful in guiding practice. This study was designed to investigate practice among vascular specialists in the UK. It aimed to find out what treatment modalities they use and what influences their choice of treatment for individual patients.

Methods

A postal questionnaire was sent to all 438 full (consultant) members of the Vascular Society of Great Britain and Ireland with addresses in the UK. It was accompanied by a personal letter from the senior author (BC) explaining the aims of the survey and a stamped addressed envelope for return. No reminders or second requests were sent.

Recipients were initially asked whether they treated varicose veins. There were then four further questions, shown in Figure 1. Finally, the questionnaire welcomed any additional comments.

Ranking of factors influencing treatment choice (question 2 in Fig 1) was done by frequency so the overall rank of a factor was determined by which rank was allocated to that factor by the largest number of respondents.

Analysis of the scenarios (question 3 in Fig 1) was done in an empirical way, by defining ‘consensus’ as those instances in which ≥80% of the respondents who proffered responses about each scenario agreed that the scenario influenced them either towards or against a specified treatment modality. ‘Disagreement’ was defined as those instances in which 41–59% of those proffering responses were influenced towards a treatment and 41–59% were influenced against its use (ie an approximate 50:50 split of opinions).

Results

Responses were received from 251 Vascular Society members (57% response rate). Of these, 222 treated varicose veins. (Some of those who did not treat varicose veins were vascular radiologists, not vascular surgeons.) The following results are based on the denominator of these 222 vascular specialists.

Table 1 shows the treatments that surgeons use. Conventional surgery was used by 186 surgeons (84%) and

endothermal ablation by 181 (82%). For endothermal ablation, 103 (57%) used only RFA, 31 (17%) used only EVLA and 47 (26%) used both. Endothermal ablation was used with phlebectomies under LA (56%) or GA (51%), or alone (50%), or with UGFS (35%). It is important to note that these figures describe how many surgeons use each treatment modality, not how frequently they are used.

Survey recipients were asked to rank the influence of various factors on their choice of treatment. The overall rankings are indicated in Table 2. The clinical pattern of venous disease appeared to have the greatest influence on treatment choice. This was followed by NICE guidance, patient expectations, facilities, cost and whether treatment was carried out in the public or private sector.

Table 3 lists the 13 specified clinical scenarios; the surgeons were asked which of these influenced them towards or against using different treatment modalities. The total number of instances where a surgeon indicated that his or

her choice of treatment would be influenced by a given scenario ranged from 1,109 for endothermal ablation with phlebectomies under LA to 1,388 for surgery. (Respondents chose to mark only some boxes, leaving others blank.) It seemed that some respondents did not fully understand how to answer the question, only marking boxes to indicate that scenarios influenced their use of specified modalities. It was assumed that these responses indicated a positive influence (ie an influence towards using that treatment). This is addressed in the Discussion.

Table 4 presents the responses to show those scenarios for which there was consensus (ie instances in which $\geq 80\%$ of respondents agreed that scenarios influenced them either *towards* or *against* using specified treatment modalities). There was consensus towards the use of endothermal ablation for patients with truncal reflux and against endothermal ablation for recurrent varicose veins without truncal reflux. There was consensus towards using UGFS for localised vari-

Table 1 Treatment modalities used by respondents. Note that none of the responses are mutually exclusive. (The percentages are based on the denominator of all 222 respondents who treated varicose veins.)

Treatment modality	Respondents using this modality
Surgery (ligation + stripping + phlebectomies)	186 (84%)
Total using endothermal ablation (either RFA or EVLA or both)	181 (82%)
RFA	150 (68%)
EVLA	78 (35%)
Endothermal ablation alone under LA ($\pm$ later phlebectomies or UGFS)	111 (50%)
Endothermal ablation with concomitant phlebectomies under LA	124 (56%)
Endothermal ablation with concomitant phlebectomies under GA	114 (51%)
Endothermal ablation with concomitant UGFS	77 (35%)
UGFS	152 (68%)

EVLA = endovenous laser ablation; GA = general anaesthesia; LA = local anaesthesia; RFA = radiofrequency ablation; UGFS = ultrasound guided foam sclerotherapy

Table 2 The number of respondents ranking each factor for its influence on treatment choice (eg 14 respondents ranked patient expectations as the most influential factor while 80 ranked this as third most influential). The overall ranking for each factor is shown in bold type.

Factor	Rank					
	1	2	3	4	5	6
Clinical pattern of venous reflux and varicose veins in that patient	151	41	9	4	4	6
NICE recommendations on varicose veins	40	67	50	22	17	11
Patient expectations	14	50	80	44	14	4
Facilities readily available	33	23	40	54	40	13
Cost	8	12	15	48	83	30
NHS or private practice	7	8	13	13	24	112

NHS = National Health Service; NICE = National Institute for Health and Care Excellence

Table 3 The proportions of respondents (based on a denominator of all 222 respondents) who indicated that any of the 13 clinical scenarios influenced them towards or against using specified treatment modalities

Clinical scenario	Endothermal ablation (LA) alone		Endothermal ablation (LA) + phlebectomies		Endothermal ablation (GA) + phlebectomies		UGFS		Surgery	
	Towards	Against	Towards	Against	Towards	Against	Towards	Against	Towards	Against
Slim patient	27%	14%	33%	11%	17%	17%	18%	18%	27%	17%
Obese patient with a large adipose thigh and leg	40%	14%	23%	16%	18%	22%	28%	19%	8%	45%
Localised VVs (in a small area only)	12%	20%	16%	18%	5%	25%	55%	5%	23%	19%
Very extensive VVs in one leg	14%	20%	24%	14%	38%	11%	12%	24%	39%	12%
Very extensive VVs in both legs	15%	21%	17%	18%	38%	11%	11%	24%	42%	10%
Very large incompetent truncal vein	32%	15%	18%	17%	17%	19%	6%	32%	47%	12%
Very large VVs	14%	18%	19%	15%	31%	13%	8%	29%	47%	10%
GSV truncal incompetence	51%	7%	27%	14%	20%	17%	10%	23%	21%	17%
SSV truncal incompetence	51%	6%	30%	12%	18%	18%	13%	22%	21%	19%
GSV and SSV truncal incompetence	43%	9%	25%	14%	27%	16%	10%	23%	23%	18%
Recurrent veins with residual truncal incompetence	38%	10%	30%	11%	24%	15%	33%	14%	20%	23%
Recurrent veins without major truncal incompetence	3%	32%	2%	27%	3%	29%	58%	5%	36%	19%
History of VTE	26%	19%	18%	18%	8%	27%	13%	28%	8%	36%

GA = general anaesthesia; GSV = great saphenous vein; LA = local anaesthesia; SSV = small saphenous vein; UGSF = ultrasound guided foam sclerotherapy; VTE = venous thromboembolism; VVs = varicose veins

Table 4 Scenarios for which there was consensus (ie $\geq 80\%$ of the respondents agreed that these scenarios influenced them either towards or against using specified treatment modalities). The denominator was the total number who proffered a response for each scenario.

Treatment modality	Scenarios influencing respondents <i>towards</i> using this treatment	Scenarios influencing respondents <i>against</i> using this treatment
Endothermal ablation alone under LA	SSV reflux (89%) GSV reflux (88%) GSV + SSV reflux (83%)	Recurrence without truncal reflux (91%)
Endothermal ablation + phlebectomies under LA	None	Recurrence without truncal reflux (92%)
Endothermal ablation + phlebectomies under GA	None	Recurrence without truncal reflux (92%) Localised VVs (85%)
UGFS	Localised VVs (92%)	Very large trunk (82%)
Surgery	Very large VVs (82%) Very extensive bilateral VVs (80%)	Obese (85%) History of DVT/PE (82%)

DVT = deep vein thrombosis; GA = general anaesthesia; GSV = great saphenous vein; LA = local anaesthesia; PE = pulmonary embolism; SSV = small saphenous vein; UGSF = ultrasound guided foam sclerotherapy; VVs = varicose veins

cose veins but against UGFS for very large truncal veins. There was consensus towards surgery for very large and for very extensive bilateral veins but there was consensus against using surgery for obese patients and those with a history of VTE.

The scenarios for which there was disagreement (ie 41–59% of respondents were influenced towards and 41–59% against the use of treatments) are listed in Table 5. Being obese or slim were scenarios for which respondents disagreed in terms of whether this influenced them towards or

Table 5 Scenarios for which there was disagreement (ie 41–59% of the respondents were influenced towards and 41–59% against using specified treatment modalities). The denominator was the total number who proffered a response for each scenario.

Treatment modality	Scenarios influencing respondents <i>towards</i> using this treatment	Scenarios influencing respondents <i>against</i> using this treatment
Endothermal ablation alone under LA	History of VTE 57%	Extensive unilateral VVs 58% Extensive bilateral VVs 57% Very large VVs 57%
Endothermal ablation + phlebectomies under LA	Obese 59% Very large VVs 55% Very large trunk 52% History of VTE 50%	Localised VVs 53% Extensive bilateral VVs 52%
Endothermal ablation + phlebectomies under GA	GSV reflux 54% Slim 50%	Obese 56% Very large trunk 52% SSV reflux 51%
UGFS	Obese 57%	Slim 51%
Surgery	GSV + SSV reflux 56% GSV reflux 55% Localised VVs 54% SSV reflux 52%	Recurrence with residual trunk 54%

GA = general anaesthesia; GSV = great saphenous vein; LA = local anaesthesia; SSV = small saphenous vein; UGFS = ultrasound guided foam sclerotherapy; VTE = venous thromboembolism; VVs = varicose veins

against endothermal ablation with concomitant phlebectomies or UGFS. Opinions on whether to use endothermal ablation under LA for extensive varicose veins or surgery for recurrent varicose veins with a residual trunk were also almost evenly divided.

The final question on the survey concerned two further methods for closing varicose veins. Twenty-seven surgeons (12%) indicated they used mechanochemical ablation and eight (4%) stated they used cyanoacrylate glue.

Discussion

The results of this survey suggest considerable variation in the treatment that patients with varicose veins are offered by different surgeons in the UK. There also appear to be substantial differences of opinion about the influence of various clinical scenarios on surgeons' treatment choice. There is no reason to believe that this kind of variation does not exist elsewhere in the world.

There were a number of possible methodological approaches to investigating this issue. Delphi consensus or semistructured interviews were alternatives but a survey of all consultant members of the Vascular Society was chosen since it gave access to the widest possible range of opinion in the UK. The survey was by post (rather than electronic) because the Vascular Society was prepared to provide a list of postal addresses but not email addresses. No reminders or second questionnaires were sent owing to possible sensitivities regarding anonymity of responses or suggestions of harassment.

A surprising finding was that marginally more vascular specialists use conventional surgery than any other treatment modality. Interpreting this finding is difficult because the

percentage of respondents using each treatment gives no information about how frequently it is used or on how many patients. It may be explained largely by the fact that varicose veins in the UK are treated almost exclusively by vascular surgeons, for whom conventional surgery has always been part of training. Another factor may be the capital cost of moving to endothermal ablation in cash-limited NHS hospitals (even though the overall costs may be lower in the long term).

In addition, despite NICE referral recommendations, there have been widespread restrictions by local healthcare payers in referring people with varicose veins for treatment in the NHS. Typically, only those with CEAP (Clinical, Etiological, Anatomical and Pathophysiological) categories 4–6 are allowed to be referred, which means that a high proportion of patients presenting for treatment have large and extensive varicose veins.¹⁵ Our survey responses showed that nearly half of all the respondents still favour conventional surgery when varicose veins are very large and when they are very extensive, in both legs.

It is important to acknowledge limitations of the survey. It was challenging to investigate all the various combinations and patterns of treatment that may be used. In particular, either RFA or EVLA may be used alone, or with phlebectomies, or with UGFS – either concomitantly, or at planned subsequent attendances, or after review.² Any of these may be done under LA or (especially for extensive veins) under GA. These numerous approaches have differing implications for patients, for the health system and for costs; the cost differences are clearly a major issue, which many healthcare commissioners do not seem to have fully grasped. In the interests of designing a questionnaire that was not excessively long, not all of the possible approaches were included.

Nevertheless, we believe that the range of choices offered provides information about most of the treatment regimes that are commonly used.

Another limitation of the study was the fact that a few respondents did not seem to understand the need to indicate whether clinical scenarios influenced them *towards* or *against* the use of specified treatment modalities. The small number means that this problem is unlikely to have influenced any of the main observations of the study. The questionnaire had been piloted with independent vascular surgical colleagues (particularly asking them to advise on this question) and they had approved our questionnaire design. They were also asked to comment on the scenarios, which were devised by the senior author (BC) based on uncertainties in his own clinical practice, lack of good guidance in the published literature and conversations with other venous specialists.

The survey has shown some important areas of consensus, with $\geq 80\%$ of surgeons agreeing that truncal reflux influences them towards the use of endothermal ablation while recurrent varicose veins influence most towards UGFS. These findings come as no surprise and neither does the consensus towards using UGFS to treat localised varicose veins but against UGFS for very large truncal veins.

There was, however, disagreement among respondents about the use of endothermal ablation for a very large truncal vein. This is a controversial issue. Some studies have found no influence of truncal vein size on outcomes but a pooled analysis in 2016 by Van der Velden *et al* of recanalisation in 15 studies found vein diameter to be a strong predictor of recanalisation one year after endothermal ablation.¹⁶ There was also disagreement about using endothermal ablation when varicose veins are very large (but consensus towards choosing conventional surgery for very large varicose veins and for very extensive bilateral veins).

There was disagreement about the influence of body mass (described as 'obese with a large adipose thigh and leg' or 'slim') on using endothermal ablation. This divided opinion reflects the evidence, which provides no strong steer. A retrospective cohort study by Merchant and Pichot documented an association between body mass index (BMI) and recurrence after five years,¹⁷ and Fernández *et al* also found BMI $>30\text{kg/m}^2$ to be associated with increased recanalisation.¹⁸ By contrast, Theivacumar *et al* reported no influence of BMI on early truncal occlusion rates after laser ablation¹⁹ and the analysis of 15 trials by Van der Velden *et al* showed that BMI was not a predictor of truncal ablation at one year.¹⁶

There was consensus against the use of surgery for obese patients; this is in tune with evidence that surgical wounds in the groin have a particular risk of complications in obese people.²⁰ There were disagreements on the influence of obesity and leg size on using UGFS. Application and retention of compression bandages and/or stockings can be difficult in obese patients. There is also widespread uncertainty about the effect of compression on outcomes, and the best type and duration of compression. The evidence is poor and

practice varies substantially, after both endothermal ablation and UGFS.^{21,22}

A previous history of VTE deserves comment. This would influence 82% of respondents against using surgery but there was no consensus about its influence on choosing UGFS and an almost equal division of opinion about using endothermal ablation under LA. Overall, the published evidence suggests little difference in the risk of VTE between endothermal ablation and surgery.¹⁵ However, a report published in 2015 by O'Donnell *et al* using a large database of healthcare claims has suggested that the risk of thromboembolism may be higher after endothermal ablation than after surgery and lowest with sclerotherapy.²³ This, too, is an area in which more data would be useful.

The NICE clinical guideline on management of varicose veins was ranked as the second most influential factor in choosing treatments, after the clinical pattern of venous disease.¹¹ The NICE recommendations offer a hierarchy for selection of treatment modality (endothermal ablation first, UGFS second and surgery third) but no suggestions are made about how to select the treatment most appropriate for each patient. That was part of the stimulus for this survey. The differences in opinion about some of the clinical scenarios suggest that the same patient might well be offered different treatments by different specialists and this variation could be similar in other parts of the world. It is unclear how much difference these variations in treatments make to outcomes but they could potentially be important and they may have cost implications for health services.

Cost considerations were an important factor in the NICE recommendations for a hierarchical approach to treatment.¹¹ However, they did not fully take account of all the possible variations in treatment strategy, which clearly have different cost implications, especially when patients attend repeatedly. Furthermore, a subsequent systematic review and cost modelling study in the UK reached different conclusions about the costs of treatment modalities, namely that UGFS was dominant (least costly), and it highlighted the difficulties in calculating the cost effectiveness of the different modalities.¹⁴

Conclusions

This survey demonstrates consensus in some predictable areas, such as a preference for using endothermal ablation for truncal reflux, and UGFS for localised and recurrent varicose veins. It has also shown that conventional surgery remains a widely available treatment option in the UK, used especially for very large or very extensive bilateral varicose veins. However, it has exposed widespread differences of opinion about the influence of the size and extent of veins, about body mass and leg size, and about a history of VTE on choice of treatment. Prospective definition of subgroups in future studies, focusing on the areas of uncertainty, would support better informed choices of treatment modalities, based on better evidence.

Acknowledgements

The authors would like to thank all members of the Vascular Society who responded to this questionnaire.

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