

Does venous intervention combined with compression therapy improve outcomes for patients with venous ulceration?

KEY WORDS

- ▶ Compression therapy
- ▶ Endovenous intervention
- ▶ Varicose veins
- ▶ Venous leg ulcers

Venous leg ulceration (VLU) is the endpoint of the continuum of chronic venous disease. Traditional management of these ulcers has been conservative with the use of compression therapy, in the absence of good research evidence to support interventional management of the underlying superficial venous disease. This article provides a narrative literature review of the evidence from contemporary research to evaluate the effectiveness and efficacy of intervention for venous ulceration. It explains the link between varicose veins and leg ulceration and advocates the need for a more timely and assertive approach with regard to the management of patients with venous leg ulcers, to ensure that patients have access to timely, equitable and efficient care.

Chronic venous disease (CVD) refers to a continuum of disease which culminates in ulceration. A venous leg ulcer (VLU) is defined as a break in the skin on the lower limb which fails to heal within 2 weeks (National Institute for Health and Care Excellence (NICE, 2013). VLUs are a common cause of reduced quality of life and morbidity (Guest et al, 2018), with up to 3% of the population affected worldwide. A cycle of healing and recurrence is frequent (Philips et al, 2018), and recurrence rate can be as high as 70% within 3 months of healing (Chapman, 2017).

The widespread understanding is that VLU pathophysiology is caused by venous hypertension (Gohel, 2015). This is primarily due to the presence of underlying superficial venous reflux (Cooper et al, 2015). The current treatment paradigm emphasises a conservative approach with the application of compression therapy (Protz et al, 2016). Guest et al (2015) suggested that too many individuals languish without a definitive diagnosis and with suboptimal compression.

Over the last decade, evidence for the role of venous intervention has emerged (Gohel et al, 2018). The role of secondary care has not been clearly outlined (Gohel, 2015). Consequently, pathways of care and patient referral remain poorly defined (Elstone, 2018).

The focus of this narrative review is to analyse the research into the benefit of venous intervention for VLU patients.

SEARCH STRATEGY

The following databases were searched using the Healthcare Databases Advanced Search (HDAS): British Nursing Index (BNI), Cumulative Index to the Nursing and Allied Health Literature (CINAHL), Medline, US National Library of Medicine (PubMed), and EMBASE.

A population, intervention, comparison, and outcome (PICO) framework was used to generate search terms for the databases (Zakowski et al, 2004) (*Table 1*). The Boolean operators 'AND', 'OR', and 'NOT' were employed during the database searches. The references of the included studies were explored for additional relevant papers.

Inclusion criteria were quantitative studies only, published in English in peer-reviewed journals between 2007 and 2018. This was to include only studies of the most contemporary research advances (Coughlan and Cronin, 2017).

Papers retrieved numbered 1018, and 395 duplicates were removed. 611 papers were excluded for lack of relevance and age. From the remaining papers, 12 were selected for this review, according to the PRISMA preferred reporting criteria (Moher

Table 1. Search terms

PICO	Search terms
Population	'venous ulcer' OR 'varicose ulcer'
Intervention	'compression' OR 'compression bandages' OR 'Leg compression' OR 'leg compression'
Comparison	'venous surgery' OR 'sclerotherapy' OR 'ablation' OR 'laser' OR 'radiofrequency'
Outcome	'healing rates' OR 'safety' OR 'healing rates' OR 'safety' OR 'quality of healthcare'

et al, 2009) (Table 2). These were appraised using the Kmet quality assessment criteria (Kmet et al, 2004) (Table 3).

NARRATIVE REVIEW

The 12 studies selected for this review examine the measured benefit of venous intervention from a quantitative perspective.

In the early papers, a surgical approach was taken; however, over time minimally invasive modalities have evolved. Considering this body of evidence collectively, the papers represent a chronological pathway.

The earliest papers, Barwell et al (2004) and Gohel et al (2007), were seminal randomised controlled trials (RCTs) examining the effect of surgery and compression on healing and recurrence (the ESCHAR study). The latest paper by Gohel et al (2018) is a rigorous RCT examining the benefits of early venous reflux ablation for VLU patients (EVRA). The intervening papers employed varying modalities to add to the body of evidence. Over the past decade, there has been a fundamental shift away from surgery in favour of modern techniques, for example, ultrasound guided foam sclerotherapy (USGFS), radiofrequency ablation or endovenous laser therapy, in conjunction with compression (Davies and Bradbury, 2018).

Apart from van Gent et al (2015), the remainder of the papers were either non-randomised or observational studies. The latter studies were either prospective cohort or retrospective case-control in design. Although they provide evidence of association between factors, Harrison et al, (2017) state they fail to show that an observed relationship is causative, and the findings must be considered with caution, partly due to the high risk of systematic bias.

The RCTs by Gohel et al (2007) and van Gent et al (2015) reported long-term follow-up and compared the benefit of surgery combined with compression, with compression alone. Gohel et al (2007) randomised 500 patients after prospective observational studies — the largest sample size in this review.

Gohel et al (2018) randomised 450 patients to either venous intervention with radiofrequency ablation, laser ablation or USGFS in combination with compression or to compression alone. Although the remaining studies make no explicit

reference to the calculation of their sample sizes, the authors applied statistical tests to their data, raising questions about the validity and generalisability of the results (Parahoo, 2014).

The studies by Marrocco et al (2010), Harlander-Locke et al (2012), Alden et al (2013), and Marston et al (2017) are non-randomised studies which used radiofrequency ablation in conjunction with compression. All reported a clinical benefit in undertaking venous intervention.

The observational studies by Raju et al (2013) and Sinabulya et al (2017) used laser therapy in conjunction with compression. Both reported positive outcomes; however, neither had a control group with compression alone. Although their results add to a growing body of knowledge, the risk of systematic bias remains high and the external validity is questionable.

The remaining research studies by Pang et al (2010), Kulkarni et al (2013) and Lloret et al (2015) are observational, prospective cohort studies, designed to consider the benefit of USGFS in conjunction with compression. There is little evidence of blinding, either of the patients or the clinicians. As a consequence, the risk of performance and detection bias is increased (Harrison et al, 2017). Blinding would be potentially problematic with regards to undergoing an invasive intervention; therefore, Goodman and Gilchrist (2013) acknowledge that this process is not always practical or ethical, especially regarding intervention, even within an RCT.

When appraising the quality of the methodology, ethical considerations must be considered, to ensure professional integrity. Ethical principles are relevant to all research regardless of their participants, situation or conditions (Parahoo, 2014). Seven of the twelve papers declared ethical approval and individual patient consent, including the three RCTs. Marrocco et al (2010), Harlander-Locke et al (2012), Kulkarni et al (2013), Raju et al (2013), and Marston et al (2017) all obtained patient consent but were not explicit about seeking ethical approval. The study by Raju et al (2013) does not discuss ethical considerations and was consequently ranked lowest according to the Kmet assessment tool. This furthermore raises concerns regarding the rigour and integrity of the methodology. Gohel et al (2018) provided the most detailed discussion of consent

Table 2. The 12 studies, selected according to the PRISMA preferred reporting criteria (Moher et al, 2009)

Study	Design	Sample	Method	Findings	Conclusions
Alden et al, 2013	Retrospective cohort study	86 patients, 95 ulcers	Radiofrequency ablation and foam sclerotherapy as endovenous methods, in conjunction with compression therapy	Ulcers in the endovenous ablation group healed faster 9.7% vs 4.2% per week ($p=0.001$)	Minimally invasive endovenous ablation is safe and leads to faster healing and decreased ulcer recurrence
Gohel et al, 2007	RCT	C5 or C6 patients, healed or active ulceration	Consecutive patients referred. 1,418 patients screened. Robust randomisation with groups well matched. One group to surgery and compression and the other to compression alone. 54 patients lost to follow-up, 27 in each arm	Ulcer healing at 3 years: 89% in the compression group and 93% in the compression plus surgery group ($p=0.85$). Recurrence at 4 years was 56% in the compression-only cohort and 31% in the surgery and compression cohort ($p<0.001$). Patients in the compression and surgery group had an increased proportion of ulcer-free time compared with the compression group 78% vs 71% ($p=0.007$)	Surgical correction of superficial venous reflux in addition to compression does not improve ulcer healing but reduces recurrence of ulcers at 4 years and results in a greater proportion of ulcer-free time. 85% of patients with VLU would benefit from surgery and all should undergo duplex ultrasound
Gohel et al; EVRA, 2018	RCT	450 patients	Patients randomised to two groups: compression with early endovenous ablation at 2 weeks (EVRA GROUP) or compression with deferred endovenous ablation	Rate of healing at 24 weeks 85.6% in the early treatment group and 76.3% in the deferred group ($p=0.001$). (Hazard ratio for ulcer healing, 1.38; 95% CI, 1.13 to 1.68). Median ulcer-free time was 306 days in EVRA group and 278 days in the deferred group ($p=0.002$)	Authors concluded that early endovenous ablation of superficial venous reflux results in faster healing of venous leg ulcers than deferred interventional management. Patients in the early intervention group also had increased ulcer-free time during the first year after randomisation.
Harlander-Locke et al, 2012	Prospective observational study	110 ulcers in 88 limbs	Patients with no improvement in ulcer size after 5 weeks of conservative treatment underwent endovenous intervention with radiofrequency ablation of their superficial venous system. They were cared for in a wound care centre after treatment	140 consecutive ablation procedures were performed on 110 venous ulcers in 88 limbs. Following successful ablation, the healing rate improved from 1 cm a month to 4.4 cm ($p>0.05$). After 6 months, 76.3% of patients healed. 12 patients did not heal, 2 died and 4 were lost to follow-up. Of the healed ulcers, 4 patients with 6 ulcers recurred (7.1%).	Authors suggest a measurable and significant reduction in ulcer size and ultimate healing following successful ablation of incompetent superficial veins in patients who have not progressed well in conservative compression.
Kulkarni et al, 2013	Prospective cohort study	200 legs (196 patients)	Patients presenting to a vascular secondary care service underwent ultrasound guided foam sclerotherapy and compression therapy. Venous duplex assessment was performed pre- and post-treatment. 24-week ulcer healing and 1- and 4-year recurrence rates were calculated using Kaplan-Meier survival analysis	Complete occlusion of the underlying superficial venous system was achieved in 185/200 (92.5%) limbs. The 24-week healing rate was 71.1%, the 1-year recurrence rate 4.7% and 4-year recurrence 28.1%.	That foam sclerotherapy was effective in the removal of superficial venous reflux and may contribute to similar ulcer healing and long-term recurrence rates when compared with those following surgical intervention.
Lloret et al, 2015	Observational cohort study	180 patients	180 patients with VLUs were treated with ultrasound guided foam sclerotherapy and compression therapy. Median follow up was 30 months	172 ulcers (95.6%) healed during the study. The overall healing rate was 79.4%. 1, 2, 3, ulcer recurrence rates were 8.1%, 14.9% and 20.8% respectively.	VLUs treated with ultrasound guided foam sclerotherapy were associated with a higher healing rate and low mid-term recurrence rate
Marrocco et al, 2010	Retrospective cohort study	356 patients seen in a treatment centre	75 patients with venous disease underwent 83 procedures. 52 healed (C5) and 31 with active ulceration (C6). Radiofrequency ablation was the method of endovenous ablation used. Follow up was between 1–17 months	83.9% of the ulcer cohort healed at 6 months (C6) and in the C5 group of 52 patients, 50 remained healed at 6 months giving a 3.8% recurrence rate	An assertive interventional approach to patients with severe venous disease and active or healed ulcerations resulted in excellent healing rates and ulcer-free limbs
Marston et al, 2017	Retrospective cohort study	173 limbs, 72 active ulceration and 101 healed	Patients received radiofrequency ablation (EVFA) as a venous intervention for superficial venous reflux. All were retrospectively reviewed from the hospital notes. Patients were managed weekly in a wound care centre and returned once healed for 6-month follow-up	Median follow-up was 25.2 months. Venous ulcers healed after EVFA in 57% at 3 months, 74% at 6 months and 78% at 12 months. Ulcers recurred in 9% of patients at 1 year after EVFA, 20% at 2 years and 29% at 3 years. VLUs recurred significantly more in patients with deep venous reflux	Venous ulcers recurred in a small minority of patients following endovenous ablation with EVFA. EVFA leads to high rates of vein closure with a low rate of complications
Pang et al, 2010	Prospective cohort study, quantitative	130 patients (132 limbs), consecutive patients	Study used ultrasound guided foam sclerotherapy as the mode of endovenous ablation. Good inclusion and exclusion criteria. Follow-up was 12–32 months post-treatment. Median 16 months	Healing was observed in 67/82 (82%) in those patients with active ulceration at a median of 1–2 months following USGFS. Of 49 limbs treated for healed ulceration and 67 with active ulcers that healed post-ablation, there were 5 recurrent ulcers during follow-up	Healing rates after USGFS are comparable to those obtained following surgery but the authors suggest that recurrence may be lower. USGFS is a safe and effective alternative to surgery for this cohort of patients
Raju et al, 2010	Prospective observational cohort study	192 consecutive limbs	30 patients with active venous ulceration and superficial venous reflux were treated with endovenous laser ablation (EVLA). 89 patients underwent deep venous iliac vein stent placement. No specialised wound care was given post-treatment and 38% of those treated did not have compression post-intervention	By 14 weeks post-EVLA, 81% of the small ulcers had healed. Larger ulcers were slower in healing ($p=0.001$). 5-year healing rate was 75%. Quality of life measures improved significantly post-EVLA	Most of the VLUs in this study achieved long-term healing with EVLA. They suggest that small ulcers post-EVLA require no long-term specialised wound care or conservative compression. Healing was better in limbs without underlying deep venous reflux from a previous deep vein thrombosis
Sinabulya et al, 2017	Retrospective and prospective cohort study	86 legs operated on for active ulceration and 109 legs operated on for healed ulceration were followed up from a possible cohort of 228 patients	Consecutive patients underwent EVLA. These were retrospectively identified from medical notes and prospectively invited for follow-up in clinical practice. Clinical examination following history taking and then duplex ultrasound was performed to evaluate the superficial and deep venous system. Health-related quality of life was measured with a validated tool, EQ 5D	Follow-up was for a mean of 41 months. Average patient age 66 years. 84% of patients healed after EVLA, after 3.5 years in a group of 170 patients. 16% were lost to follow-up. All 86 legs operated on for active ulceration (C6) healed with a recurrence rate of 16% (14 patients). 109 legs treated for healed ulceration (C5) and there was ulcer recurrence in 16% (17 legs)	EVLA for patients with active and healed ulceration achieves good healing and low ulcer recurrence rates, with a low rate of complication. EVLA can be offered safely elderly patients with significant comorbidities
van Gent et al, 2015	Prospective randomised trial	10-year follow-up of a possible 197 legs in the original study	The original study randomly allocated patients with active venous ulceration to one of two groups, compression alone or compression and surgical intervention within 5 working days of randomisation. All patients in the original trial were invited back for follow-up (mean 97 months). This involved clinical examination and duplex ultrasound. Generic quality of life was assessed with Aberdeen Varicose Vein Questionnaire (AVVQ) and SF 36. Power calculations were performed, and analysis was done by intention-to-treat	After a mean 97 months follow-up, 80 of the original 196 legs (41%) could be assessed. 'Ulcer-free' incidence was higher in the surgical group (58.9%) than in the conservative compression-only group (39%) ($p=0.007$, 95% CI: 1.24–3.88). Observed ulcer recurrence was 48.9% for the surgical group and 94.3% for the compression-only group. There was no difference in quality of life scores between the two groups	Undergoing surgical venous treatment for patients with active venous ulceration leads to a significantly higher probability of being ulcer-free, when compared to conservative treatment with compression therapy alone. The benefit remains evident after 10 years

Table 3. Kmet Scores of the twelve selected studies

Author	Year	Kmet Score
Gohel et al (EVRA)	2018	1
Gohel et al (ESCHAR)	2007	0.95
Lloret et al	2015	0.9
van Gent et al	2015	0.87
Pang et al	2010	0.86
Marston et al	2017	0.8
Sinabulya et al	2017	0.77
Kulkarni et al	2013	0.72
Alden et al	2012	0.68
Marrocco et al	2010	0.63
Harlander-Locke et al	2012	0.63
Raju et al	2013	0.59

and ethical considerations and was of high methodological quality, according to the Kmet assessment tool.

Although this cohort of studies essentially examines a similar hypothesis, it is difficult to compare the clinical outcomes and variable data obtained, especially when different modalities are considered. As Goodman and Gilchrist (2013) observed, no study is perfect and most can be refined, improved or prolonged. Three emergent themes can be considered in further detail.

HEALING RATES

The primary reason to consider an intervention is the benefit it provides over compression in healing rate. Intervention offers a more permanent resolution of superficial venous reflux than compression, which offers a temporary solution (Gohel et al, 2018). For most papers, this was the main hypothesis.

Gohel et al (2007) established that there was no substantial improvement in ulcer healing rates for the cohort randomised to surgery plus compression (93% vs 89%, $p=0.85$). This study was devised and powered to evaluate ulcer recurrence as opposed to healing. The statistical power of this research was additionally reduced by a high cross-over rate, as approximately one quarter of patients randomised to surgery later refused it. This finding led many to conclude that surgery does not have a role in treating ulceration. It also highlights the need for minimally invasive techniques.

Gohel et al (2018) demonstrated a 24-week healing rate of 85.6% in the intervention group compared to 76.3% in the compression group. Greater numbers of patients healed their ulcers with intervention (hazard ratio for healing, 1.38; 95% CI, 1.13 to 1.68; $p=0.001$). The median time to healing was 56 days (95% CI, 49 to 66) in the intervention group and 82 days (95% CI, 69 to 92) in the compression group. These findings strongly support the value of endovenous management. This study detailed clearly defined outcome measures along with comprehensive inclusion and exclusion criteria, and the baseline characteristics of both groups were extremely similar. Consequently, Weiß et al (2018) concluded that this study had high internal validity.

The result from the remaining RCT undertaken by van Gent et al (2015) concluded that the incidence of being 'ulcer free' was greater in the surgical group (58.9%) than in the compression group (39%) ($p=0.007$, 95% CI, 1.24 to 3.88). This finding also supports interventional management over conservative treatment.

The study by Alden et al (2013) concluded that patients receiving USGFS healed at a faster rate than those treated with compression alone (9.7% vs 4.2%; $p=0.001$). These results are comparable with those obtained by Pang et al (2010), who also deduced that healing was achieved in 82% of patients in 1–2 months post intervention. Kulkarni et al (2013) also utilised USGFS and reported a 24-week healing rate of 71.1%. Lloret et al (2015), reported a similar 24-week healing rate of 79.4%. These results must be considered with caution as the studies had no compression-alone comparison groups and compression is an independent variable in healing. All the included studies demonstrated a positive benefit on healing rates. Only Gohel et al (2018) robustly tested this hypothesis so that their results have a stronger degree of external validity and generalisability in wider practice.

ULCER RECURRENCE

For individuals with ulceration, the risk of ulcer recurrence remains high, owing to the chronicity of venous disease. The long-term use of compression therapy has been shown to reduce the risk of recurrence (O'Meara et al, 2012). Nevertheless, concordance with conservative management is considered to be poor (NICE, 2013).

Gohel et al (2007) demonstrated 4-year recurrence rates of 31% in the surgery and compression group, compared with 56% in the compression only group ($p<0.001$). Van Gent et al (2015) also utilised surgery and confirmed similar recurrence rates at 10 years; 58% for the intervention cohort and 39% for the compression group ($p=0.007$). These significant results demonstrated the additional benefit surgery could bring to patients in practice. However, in this cohort, many patients were unsuitable for surgery or unwilling to contemplate it.

With the advent of minimally invasive techniques, further opportunities evolved in practice. Marston et al (2017) used radiofrequency

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- Pang et al (2010), Alden et al (2013), Kulkarni et al (2013) and Lloret et al (2015) all showed reduced recurrence using USGFS. Alden et al (2013) revealed a 1-year follow up recurrence rate of 27.1% vs 48.9% in the compression-only group ($p < 0.015$). This contrasts with Kulkarni et al (2013), who reported a 1-year recurrence rate of 4.7% and Lloret et al (2015) who found a recurrence rate at 1 year of 8.1%. The lack of randomisation within these observational studies affects their ability to prove the hypothesis that intervention produces a valid benefit. Greenhalgh (1997) suggested that a lack of control over the variables within observational studies reduces their integrity, reliability and validity. Consequently, how can clinicians know whether the benefit of intervention is due to chance or compression therapy only?
- Gohel et al (2018) demonstrated recurrence rates of 11.4% for the interventional group and 16.5% for the compression cohort, with a median ulcer-free time of 306 days in the intervention group, and 278 days in the deferred group ($p = 0.002$). The findings from this methodologically robust study support the use of endovenous intervention to reduce VLU recurrence rates in clinical practice.

SAFETY AND EFFICACY

With any invasive intervention comes a degree of risk. Practitioners must minimise related sequelae and avoid harm. Consideration must also be given to the enduring benefit of any invasive intervention.

Gohel et al (2007) and van Gent et al (2015) both reported no harm related to intervention. On long-term follow-up, Gohel et al (2007) reported mortality of 17% at 4 years and van Gent et al (2015) 23.5% at 10 years. These deaths were not related to the intervention, however, but to ulceration as a marker of morbidity (Pang et al, 2010). 653 of the 1418 patients screened by Gohel et al (2007) were unsuitable for surgery.

Pang et al (2010), Alden et al (2013) and Lloret et al (2015) all assessed USGFS and concluded that it

was clinically safe and effective to use with active ulceration, with minimal side effects. Kulkarni et al (2013) reported complete occlusion of the treated veins in 92.5% of the treated limbs, and only two associated deep vein thromboses (DVT).

Using radiofrequency ablation, Harlander-Locke et al (2012) and Marston et al (2017) reported rates of vein closure of 100% and 97.7% respectively. Marston et al (2017) also reported DVTs in two limbs (1.2%) and low complication rates. The remaining modality of endovenous laser therapy also produced successful closure rates: Sinabulya et al (2017) recorded a DVT rate of 1% and concluded that this treatment was safe for elderly, comorbid patients.

The RCT by Gohel et al (2018) used all the modern techniques as the independent variable. All modalities were safe and clinically effective in practice and associated with low rates of procedural pain and DVT. It therefore remains unclear which is the most efficacious method of venous intervention in practice.

RECOMMENDATIONS AND APPLICATIONS

This narrative review highlights growing evidence to support the use of intervention to permanently treat the underlying superficial venous reflux found in VLU patients. A decade ago, Gohel et al (2007) concluded that surgical intervention would facilitate lower recurrence rates but failed to show any benefit with regards to healing rates. It was therefore perceived that intervention was only appropriate following complete healing. In the interim, minimally invasive modalities have been introduced, which have been endorsed by NICE (2013) as safe and effective. These have essentially replaced surgery, and offer intervention to a larger cohort of patients with comorbidities. However, there is minimal evidence that these UK guidelines have caused a substantial change in practice (Davies et al, 2018).

Following Gohel et al (2007), many non-randomised studies have reported clinical benefits of intervention, but systematic reviews have considered their methodologies weak and their results of low value (Malas et al, 2014; Kheirelseid et al, 2016; Montminy et al, 2018). These limitations affect the validity of these studies and their generalisability to practice. All the included studies

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suggest that endovenous intervention would facilitate improved healing rates and assist with lowering ulcer recurrence, in addition to being safe and efficacious. The results of the study by Gohel et al (2018) provide level-one evidence that a change to current practice can be more confidently recommended.

27% of the patients screened by Gohel et al (2018) had had ulceration for greater than 6 months and were consequently excluded. This suggests that timely referral to secondary care is not occurring and is failing to be a fundamental part of pathways of care. Conservative management in compression therapy has been the prevailing paradigm of care, often under the guidance of nursing teams in primary care. These practitioners may not be comfortable or familiar with referring patients to secondary care services. The NHS RightCare scenario of 'Betty's Story' highlights the suboptimal management of an individual with a VLU in the community, with consideration given to intervention only after 2 years (NHS England, 2017). With a view to venous intervention, clinical commissioning groups (CCGs) have been rationing venous treatment (Smith et al, 2015). The evidence of this review supports the timely treatment of VLU patients.

With a view to the future, the authors of the EVRA study (Gohel et al, 2018) have undertaken a long-term follow-up of their cohort to consider the outcomes up to five years later. This will hopefully provide additional evidence to support a fundamental shift in practice for individuals with VLUs. Further research evidence is required to indicate the most efficacious modality of intervention.

CONCLUSIONS

This narrative review has considered the evidence from contemporary research papers that evaluate the effectiveness and efficacy of intervention for venous ulceration. The traditional paradigm of management is conservative compression therapy, which is effective but only temporarily reduces underlying venous hypertension. Venous intervention offers a more permanent solution. Considering the evidence presented here, it seems that the treatment paradigm should change to

support the routine consideration and use of intervention. It is timely to ask whether practitioners should continue to treat patients only conservatively, without fully investigating their underlying venous system?

If suitable, compression therapy should be commenced early in primary care, to aid healing. Local and national pathways of care should be developed to reflect the evidence of recent research, especially with regard to the results from Gohel et al (2018) advocating early venous ablation. This will facilitate choice for patients and practitioners to consider referral to secondary care. Patients have a right to equitable and efficient care; however, such a change in practice will require a significant dissemination of the evidence, to educate patients, professionals and commissioners.

Endovenous intervention may not always be clinically indicated following a detailed consultation and examination. Experience and sound clinical judgement remain fundamental in patient selection, for conservative or interventional management or a combination of both. A more timely and assertive approach to the investigation of VLUs would additionally facilitate a reduction in the burden of wound care on community services.

This narrative review suggests the need to contemplate a qualitative study with the following research question: For primary care practitioners, what are the barriers to effective early referral to secondary care for individuals with venous leg ulceration?

WUK