Thieme

Trends in varicose vein therapy over the course of time

Therapie der Varikose im Wandel der Zeit

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ABSTRACT

The therapy of varicose veins has developed rapidly in the last two decade. Numerous new therapy methods have been added. Surgical treatment with crossectomy and saphenectomy has been a gold standard for many years. International guidelines (NICE, AVF) currently recommend endoluminal laser ablation, radiofrequency ablation or sclerotherapy treatment of varicose veins as first line treatment. The extent and establishment of these new techniques in clinical practice in Germany over the last 20 years to today is unknown. Therefore was a survey initiated about the therapy methods for primary varicose veins and recurrent varicose veins 20 years ago, 10 years ago and today. All phlebologists, who work in the certificated vein competence centres in Germany, were included in this study. (According to the German Society of Phlebology and the Professional Association of Phlebologists 149 centres (Stand 4/2017)). The Date from the electronical questionnaires was anonymized and evaluated.
These data provide evidence about an increasing trend of endovenous treatment (endovenous laser therapy, endovenous radiofrequency therapy, foam sclerotherapy, etc.) of varicosis in the last two decades. The numbers of classic surgical therapy have dropped significantly in the last 20 years.

ZUSAMMENFASSUNG

Insbesondere in den letzten zwei Dekaden hat sich die Therapie der Varikose rasant entwickelt. Es sind zahlreiche neue Therapiemodalitäten hinzugekommen. Während zuvor die operative Therapie der Varikose mittels Cross- und Saphenektomie als Standard galt, empfehlen internationale Leitlinien derzeit primär eine endoluminale Therapie der Varikose mittels endovenöse Laser-, Radiofrequenztherapie oder Sklerosierung (NICE, AVF).
Bisher fehlt ein Überblick über die Etablierung der Anwendung dieser neuen Therapieoptionen in Deutschland. In unserer Studie haben wir eine Befragung von Ärzten, deren Einrichtung als Venenkompetenzzentrums zertifiziert sind (Stand 4/2017–149), zu ihrem Vorgehen bei primärer Varikose und Rezidivvarikose vor 20 Jahren, 10 Jahren und heute, durchgeführt.
Die Daten zeigen einer zunehmenden Tendenz zur endovenösen Behandlung der Varikose. Die Zahlen der klassischen operativen Therapie sind im untersuchten Kollektiv in den letzten 20 Jahren deutlich gesunken.

Introduction

Primary varicose veins represent a degenerative condition of the superficial venous system of the legs which progresses over a lifetime, with the extent and severity of the clinical symptoms varying considerably [1]. As epidemiological studies have shown, primary varicose veins are very common [2] [3] [4] [5].

The following types of varicose veins can be distinguished: trunk varicose veins, tributary varicose veins, perforating varicose veins, reticular veins, and telangiectasia (spider veins). The diagnosis is made in accordance with the guidelines, from a thorough history, physical examination, and Doppler or colour-coded duplex ultrasound scanning. Imaging is essential, especially when planning therapeutic measures.

The CEAP classification has become established internationally to describe the severity of varicose vein disease [6] [7] (▶ **Table 1**). This classification encompasses the clinical picture, aetiology and pathophysiology of chronic venous insufficiency (CVI).

Left untreated, clinically relevant varicose veins, in particular those affecting trunk and perforating veins, lead to complications and sequelae such as chronic oedema, trophic changes in the skin, venous ulcers, incompetence of the deep veins or thromboembolic events [8] [9] [10]. The dynamics of the clinical progression of varicose veins varies from person to person and cannot be predicted in the individual case [11]. As the performance of the venous pump becomes more limited, high venous pressure develops and, as a result, the incidence of irreversible damage increases. Significant consequences and substantial costs thereby arise for the affected individual and the socioeconomic system [12] [13]. Early treatment of varicose veins is therefore worthwhile. The therapeutic options for varicose veins have seen rapid developments over recent years. They include conventional open surgery, sclerotherapy, and endovenous procedures such as laser therapy, radiofrequency ablation, vein glues, and the application of superheated steam.

Surgical treatment of primary varicose veins has been the gold standard for more than 100 years. The surgical technique was introduced by William Babcock in 1907 and the operation is still carried out in modified form today [14].

In 1915, Linser described the first successful sclerotherapy [15]. The first clinical attempts with endovenous catheters were carried out in the 1990 s. The first radiofrequency catheter was introduced in 1999, and a laser catheter was used to treat varicose veins in 2002. Another endovenous procedure, superheated steam, has been approved for the treatment of varicose veins in Germany since 2009. The use of cyanoacrylate glue for this purpose was approved throughout Europe in 2010.

Methods

In order to gain an overview of how the procedures have developed and become established in accredited German centres, we carried out a survey throughout Germany. Participants were asked to complete the questionnaire only once. All accredited vein centres of excellence were invited to participate (as per April 2017, 149 centres).

In Germany, varicose veins are treated by doctors from different specialties and subspecialties, including angiologists, phlebologists, general surgeons, vascular surgeons, and dermatologists. Since 2009, as part of the QM accreditation programme, the German phlebology societies Deutsche Gesellschaft für Phlebologie and Berufsverband der Phlebologists e.V certify dedicated vein centres that can demonstrate quality-oriented phlebological practice. Given the requirements for accreditation, we can assume that our colleagues in these centres a) have made progress in their medical knowledge through regular continuing professional development that may also influence their routine practice, and b) can be considered as being committed and interested, so that a good response to the survey can be expected.

▶ **Table 1** Clinical appearance of varicose veins according to the CEAP classification

Class	Clinical signs
C0	No visible signs of venous disease
C1	Telangiectasia (spider veins) or reticular veins
C2	Varicose veins without any signs of CVI
C3	Oedema
C4	Skin changes
C4a	Pigmentation or eczema
C4b	Lipodermatosclerosis or atrophie blanche
C5	Healed venous ulcer
C6	Active venous ulcer

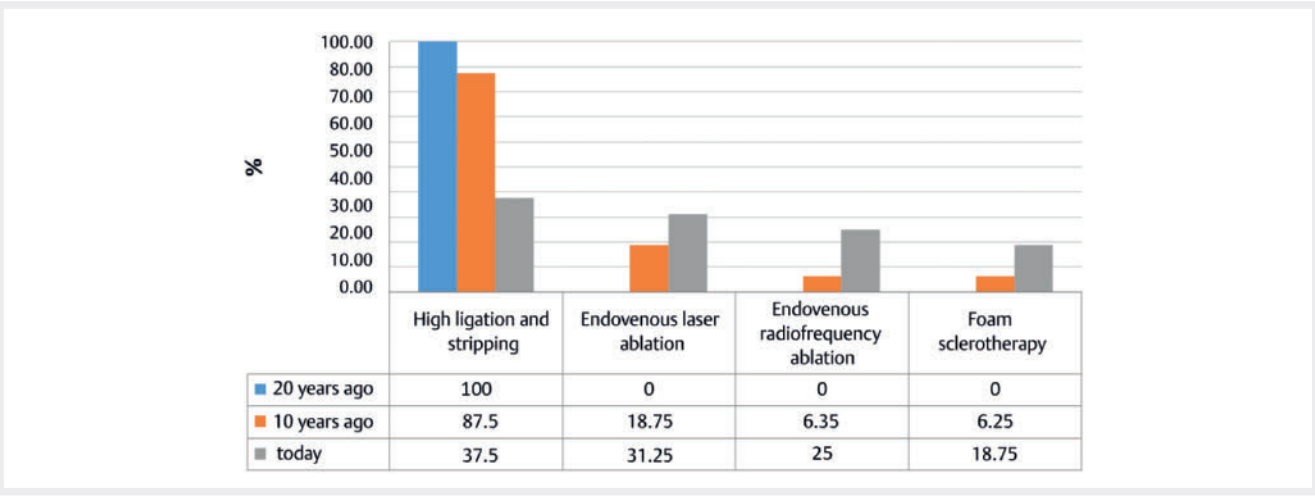
The first part of the questionnaire contained questions on the doctor's specialty, age, location, facilities, number of patients and other general aspects. The second part looked at the therapeutic methods used in practice and then focussed specifically on the methods used for primary and recurrent trunk varicose veins of the great saphenous vein (GSV) and the small saphenous vein (SSV) of different CEAP classes, as well as reticular veins and spider veins, 20 years ago, 10 years ago, and today. The full questionnaire is available from the corresponding author on request.

The questionnaire was sent electronically (via email). After the first transmission, two reminders were sent at intervals of 6–8 weeks. The questionnaires could be sent back by email, fax or post, as the participants preferred. All the accredited vein centres were invited to participate in the study. The analysis was performed anonymously with descriptive statistics. Mean values and standard deviation, or median and quartiles were calculated for numerical data – depending on the distribution. Categorical data were presented as absolute and relative frequencies.

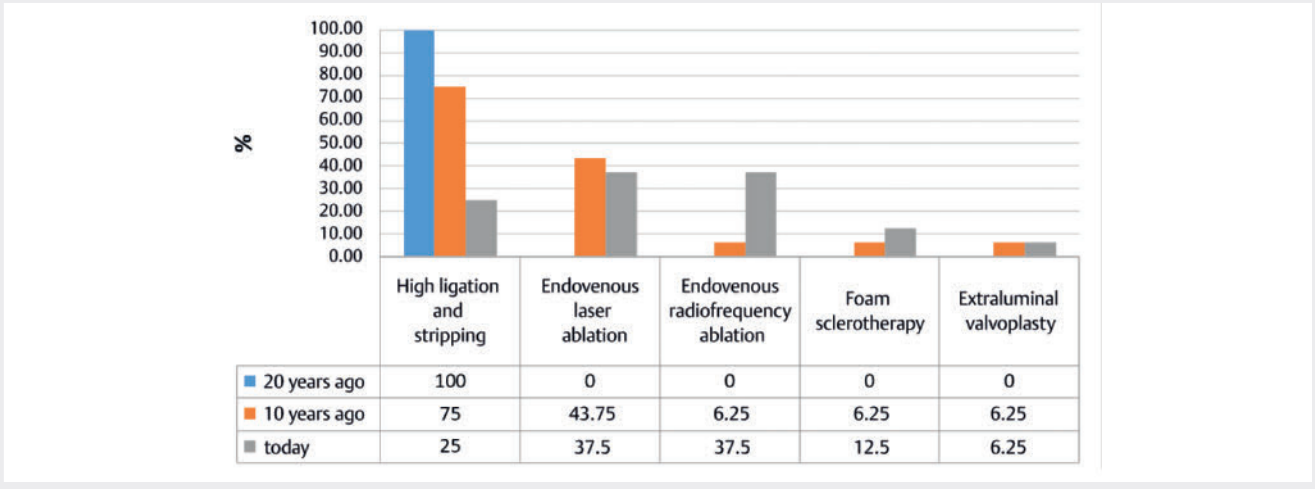
The survey "Treatment of varicose veins over the course of time" was approved by the Ethics Committee (opinion No. 17–6041), and was registered as Study No. DRKS00012601 in the German clinical study register.

The aim of the study was to address the following questions:

- Which therapeutic procedures were used to treat primary varicose veins or recurrences 20 years ago and 10 years ago, and which are used today?
- What are the indications for using the different types of therapy in Germany?
- Are there any differences in the use of the therapeutic options related to age, specialty, or geographical location?



▶ **Fig. 1** Treatment of GSV trunk varicose veins > 10 mm, CEAP C2-C3.



▶ **Fig. 2** Treatment of GSV trunk varicose veins ≤ 10 mm, CEAP C2-C3.

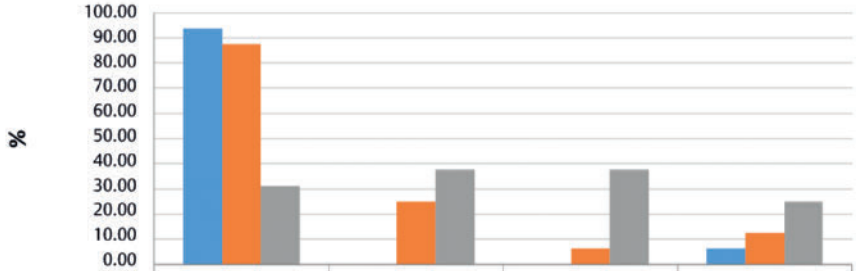
The primary outcome measure of this study was defined as the predominantly used procedure for the treatment of primary varicose veins or recurrent saphenofemoral or saphenopopliteal incompetence.

Results

Sixteen of the 149 doctors invited returned the completed questionnaire. All 16 participants were over the age of 41 at the time of the survey and had more than 20 years' clinical experience of treating varicose veins. Most of the doctors (76 %) put phlebologist as their main job title, 6.25 % were angiologists and 18.75 % vascular surgeons. Secondary (sub)specialties were angiology (6.25 %), vascular surgery (25 %) and dermatology (12.5 %), and tertiary specialties were general surgery (6.25 %) and general (internal) medicine (6.25 %). 75 % ran their own private practice. The location of the practice was in postcode districts 8- in 31.25 %, with the same percentage (31.25 %) in postcode districts 9-. The remainder were found in postcode districts starting with 1-, 4- and 5-.

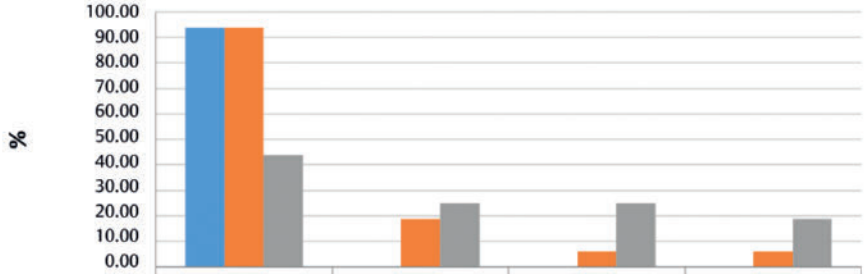
87.5 % of the doctors performed high ligation and stripping, 75 % carried out revision (redo) surgery for recurrent saphenofemoral or saphenopopliteal incompetence. 18.75 % carried out extraluminal valvuloplasty. Only 6.25 % carried out the conservative haemodynamic correction of venous insufficiency (CHIVA). Endovenous laser ablation (EVLA) was performed by 50 % of the doctors and radiofrequency ablation (RFA) by 62.5 %. Only 6.25 % applied glue for endovenous adhesive closure. Sclerotherapy was used by 68.75 % for trunk veins, by 93.75 % for tributary veins, and 100 % used liquid sclerotherapy for reticular veins and spider veins. None of the doctors who responded used superheated steam therapy. Some 25 % performed laser therapy for reticular veins and spider veins. We have presented graphs showing the results of the questions on the therapeutic methods used in the various indications 20 years ago, 10 years ago, and today (▶ **Fig. 1**–▶ **Fig. 10**).

Primary trunk varicose veins of the GSV or SSV Twenty years ago, the doctors participating in this study carried out high ligation and stripping for primary trunk varicose veins of the GSV and SSV, irrespective of their diameter and CEAP class. The number of con-



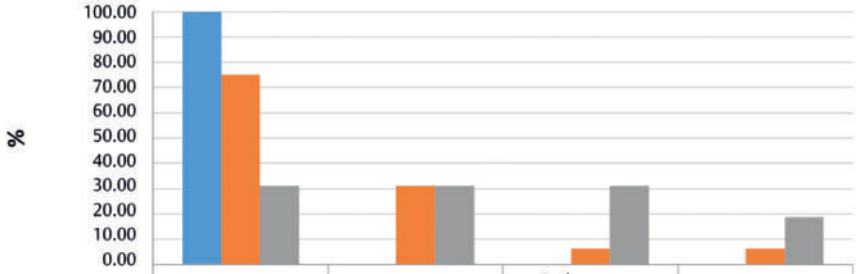
	High ligation and stripping	Endovenous laser ablation	Endovenous radiofrequency ablation	Foam sclerotherapy
20 years ago	93.75	0	0	6.25
10 years ago	87.5	25	6.25	12.5
today	31.25	37.5	37.5	25

▶ **Fig. 3** Treatment of GSV trunk varicose veins, CEAP C4-C6.



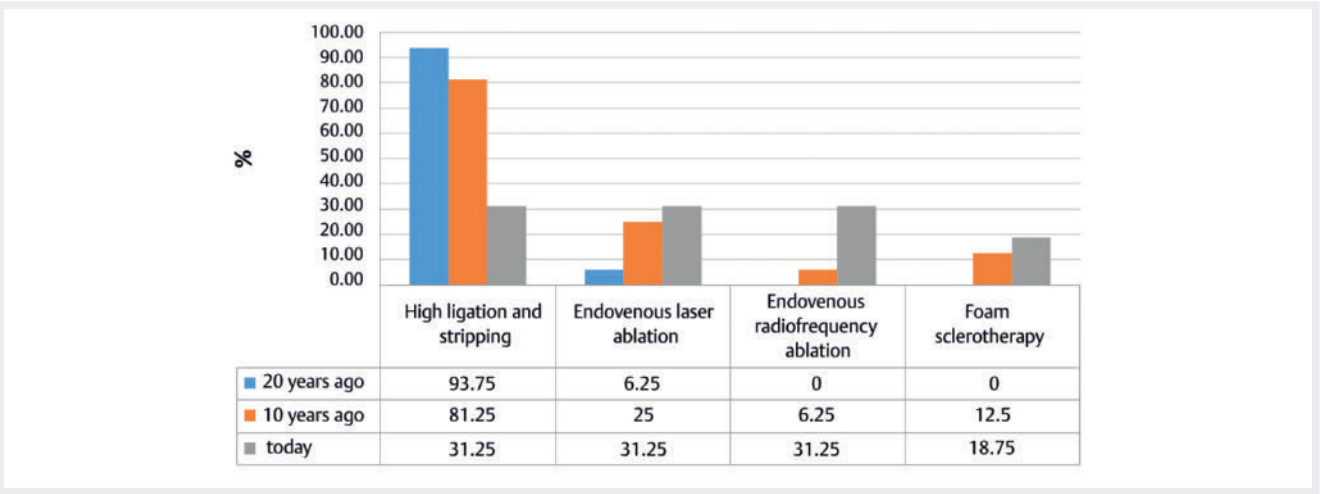
	High ligation and stripping	Endovenous laser ablation	Endovenous radiofrequency ablation	Foam sclerotherapy
20 years ago	93.75	0	0	0
10 years ago	93.75	18.75	6.25	6.25
today	43.85	25	25	18.75

▶ **Fig. 4** Treatment of SSV trunk varicose veins > 10 mm, CEAP C2-C3.



	High ligation and stripping	Endovenous laser ablation	Endovenous radiofrequency ablation	Foam sclerotherapy
20 years ago	100	0	0	0
10 years ago	75	31.25	6.25	6.25
today	31.25	31.25	31.25	18.75

▶ **Fig. 5** Treatment of SSV trunk varicose veins ≤ 10 mm, CEAP C2-C3.



▶ **Fig. 6** Treatment of SSV trunk varicose veins, CEAP C4-C6.

ventional operations has fallen in the last two decades. Today, more than half of them perform an endovenous procedure on trunk varicose veins of the GSV and SSV for all classes and diameters. In most cases this consists of laser therapy or radiofrequency ablation, but less often foam sclerotherapy (▶ **Fig. 1**–▶ **Fig. 6**).

Recurrent saphenofemoral (GSV) or saphenopopliteal (SSV) incompetence Twenty years ago, the participating doctors treated recurrent saphenofemoral or saphenopopliteal incompetence surgically. The number of conventional operations for this purpose has fallen in the last two decades and foam sclerotherapy is the method most commonly used today for clinically relevant recurrence in the GSV or SSV. An endovenous procedure (RFA or EVLA) took second place for treating recurrent saphenopopliteal incompetence. After foam sclerotherapy, conventional surgery and endovenous procedures were equally frequent choices for recurrent saphenofemoral incompetence (▶ **Fig. 7**–▶ **Fig. 8**).

Tributary varicose veins > 3 mm in diameter The practice of more than half the doctors 20 years ago was to carry out a mini-phlebectomy for relevant tributary varicose veins measuring > 3 mm in diameter, with liquid sclerotherapy in second place. Foam sclerotherapy was given as the preferred method of treatment for relevant branch varicose veins today (▶ **Fig. 9**).

81.25 % of the responding colleagues treated trunk varicose veins together with tributary varicose veins, reticular veins and spider veins in one session (▶ **Fig. 10**).

The results showed no trends in preferred treatment with respect to location, age or specialty.

Discussion

The treatment of varicose veins has changed considerably worldwide in the last two decades, and high ligation and stripping as carried out by Babcock in 1907 is no longer standard treatment according to the current literature from Europe and the USA. Numerous methods have become established as alternatives to conventional varicose vein surgery, most of which are based on a catheter system. These therapeutic procedures are recommended in the current international guidelines as the treatment of choice for clinically relevant varicose veins [16] [17], but are not undisputed with respect to their clinical benefit and the frequency of recurrence [18] [19].

Although the guidelines define therapeutic endovenous procedures as the treatment of choice for varicose veins in several indications [20], the National Association of Statutory Health Insurance Funds (GKV) catalogue recognises only conventional surgery for treatment. Reimbursement of costs for endovenous procedures is for the most part regulated by contracts for integrated care or approved only in individual treatment decisions. Private health insurers essentially bear the costs of all therapeutic procedures in terms of the individual contract with the person insured.

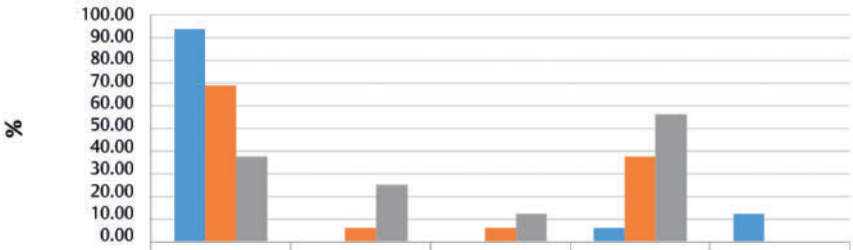
The study carried out by us showed that the responding experts today prefer endovenous methods as the treatment of choice in many indications. There is very little difference between the use of endovenous radiofrequency ablation and laser therapy. The two therapeutic methods are used to the same extent for different indications and varicose vein diameters.

The therapeutic method preferred is also independent of the doctor's specialty. Surgeons working in phlebology have increased their use of endovenous methods and reduced the number of open operations for varicose veins in just the same way as their colleagues from general (internal) medicine.

Foam sclerotherapy is not used so commonly in the treatment of primary trunk varicose veins of the GSV and SSV, but is the treatment of choice for recurrent saphenofemoral or saphenopopliteal incompetence.

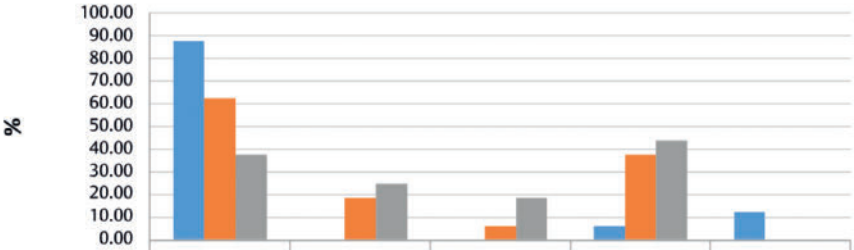
Our data show that superheated steam application is not used in the accredited vein centres in Germany. CHIVA and endovenous cyanoacrylate glue are used only in isolated cases.

Limitations The small number of completed questionnaires returned means that the survey results are unfortunately not representative but can only indicate a trend. The poor response rate also makes it impossible for us to make a meaningful comparison between doctors working in an outpatient or inpatient setting, i. e. between private practices and hospitals.



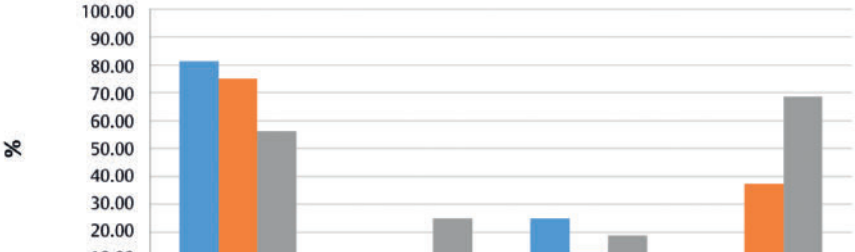
	Surgical treatment	Endovenous laser ablation	Endovenous radiofrequency ablation	Foam sclerotherapy	Liquid sclerotherapy
20 years ago	93.75		0	6.25	12.5
10 years ago	68.75	6.25	6.25	37.5	0
today	37.5	25	12.5	56.25	0

▶ **Fig. 7** Treatment of recurrent saphenofemoral incompetence.



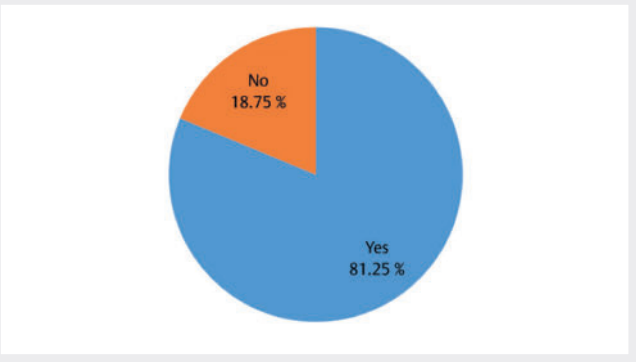
	Surgical treatment	Endovenous laser ablation	Endovenous radiofrequency ablation	Foam sclerotherapy	Liquid sclerotherapy
20 years ago	87.5	0	0	6.25	12.5
10 years ago	62.5	18.75	6.25	37.5	0
today	37.5	25	18.75	43.75	0

▶ **Fig. 8** Treatment of recurrent saphenopopliteal incompetence.



	Surgical treatment	CHIVA	Liquid sclerotherapy	Foam sclerotherapy
20 years ago	81.25	6.25	25	0
10 years ago	75	6.25	12.5	37.5
today	56.25	25	18.75	68.75

▶ **Fig. 9** Treatment of tributary varicose veins > 3 mm.



▶ **Fig. 10** Treatment of varicose veins in one session.

CONCLUSIONS

The results of the survey have allowed us to gain a (non-representative) view of how the treatment of varicose veins has developed in Germany over the last 20 years, especially in dedicated centres. There is a clear trend towards doctors preferring endovenous therapy. In recent years, catheter-based therapeutic methods have become accepted as standard procedures in the treatment of varicose veins. The large number of methods available today (if carried out correctly) allows doctors and patients to choose the most appropriate procedure for the vascular changes present.

Conflict of interest

The authors declare that they have no conflict of interest.

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