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Ultrasound-guided foam sclerotherapy of lower limb varicose veins: outcome and patient satisfaction

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Abstract:

Background: Varicose veins are defined as dilated, tortuous, and elongated superficial veins of the lower limbs with incompetent valves. Varicose veins are described by the World Health Organization (WHO) as dilatation of the veins, which are sometimes tortuous. Varicose veins are divided into primary and secondary varicose veins according to their etiology. Sclerotherapy could be a minimally invasive technique that uses an injection of a special chemical (sclerosant) into varicosity to wreck and scar the inside lining of the vein. Resulting in blockage of the treated vein.

Patients and Methods: This study was conducted at Sohag University hospitals to evaluate the efficacy, safety, and patient satisfaction following foam sclerotherapy for varicose veins. There have been 60 cases with lower limb varicosities whose mean age was 33.72 years (range, 20 – 52). Females represented 62% of cases, while the remaining cases were males. As regards the duration of varicosities during this study, it had a mean of 6.03 years (range, 1 – 12). The right leg was affected in 52% of cases, while the other cases had the left side affected. The large saphenous veins were treated with 3% Aethoxysclerol. Accessory great saphenous and short saphenous veins were treated with 2% Aethoxysclerol. Reticular veins and telangiectasia treated with 1% Aethoxysclerol

Results: The cosmetic appearance showed a major improvement ($p < 0.001$) after our intervention. Pain sensation was significantly decreased after the intervention. Only 25% of cases reported that sensation after 1 week, which percent decreased all the way down to 3, 3, and seven during the following visits respectively. Saphenofemoral reflux was present in 48% of cases before the intervention, and it decreased all the way down to 7, 3, 3, and seven of cases at the scheduled follow-up visits respectively. Complications were reported by 28% of cases, Skin hyperpigmentation was the most common complication (22%), followed by visual disturbances (8%), and thrombophlebitis(7%).

Conclusion: Ultrasound-guided foam sclerotherapy seemed to be a safe and effective procedure for the treatment of chronic venous insufficiency within the selected group of patients.

Keywords: Ultrasound-guided foam sclerotherapy, Superficial venous reflux, Radiofrequency ablation & Clinical, Etiological, Anatomical, and Pathophysiological(CEAP).

Introduction

Varicose veins are elongated, tortuous, and dilated lower-limb superficial veins with faulty valves. Varicose veins are described by the World Health Organization (WHO) as saccular dilatation of the veins, which are sometimes tortuous. [1]. Varicose veins are divided into primary and secondary varicose veins according to their etiology. Secondary varicose veins nearly always occur as a result of a change within the deep venous system's operation, whether it's an outflow obstruction, pump failure, or a mixture of the two. Primary varicose veins are caused by a variety of things that are unknown. [2]. Sclerotherapy may be a minimally invasive technique that uses an injection of a special chemical (sclerosant) into a venous blood vessel to break and scar the lining of the vein. Resulting in blockage of the treated venous blood vessel [3].

The results with foam sclerotherapy are excellent and this method of treatment offers a good alternative to surgery [4]. Ultrasound-guided foam sclera therapy (UGFS) is effective for every kind of pathological venous dilatation from major truncal varicose veins to the smallest telangiectasias [5]. UGFS is widely employed in most countries to eradicate superficial venous reflux (SVR). UGFS ends up in significant improvements in symptoms and venous hemodynamics and is additionally related to high levels of patient satisfaction [6]. Ultrasound is useful in guiding the injection of foamed sclerosants. Foam is extremely visible with ultrasound, allowing for a more accurate injection. It also enables immediate post-injection observation of vein compressibility as a predictor of treatment efficacy [1]. Foam sclerotherapy has potential benefits over other standard treatments for varicose veins like surgery and endovascular interventions. Surgery carries a risk of anesthesia and therefore the time of work of [2]. Most complications from sclerotherapy are minor and transient. They include hyperpigmentation, pain, and urticaria [8]. This study was done to explain the efficacy and safety of foam sclerotherapy within
the treatment of varicose veins and to see patient's satisfaction after UGFS for Varicose veins in terms of improvement in appearance, beneficial effect on lifestyle, and relief of symptoms.

Patients and Methods

This Prospective cohort study was done at the Radiology Department, Faculty of Medicine, Sohag University, and included 60 patients over 2 years (from October 2018 to September 2020).

The study included Patients with primary symptomatic varicosities due to great saphenous vein (GSV) reflux and/or lesser saphenous vein (LSV) reflux and/or incompetent perforators, Patients with varicosities related to isolated refluxing accessory saphenous veins or tributaries, and Patients with reticular vein and/or telangiectasia, and excluded patients with Pregnancy, Malignancy, coagulopathy, Breastfeeding, Recent or old DVT, Peripheral arterial disease, Known allergy to sclerosant material (Aethoxysclerol) and Lack of mobility. All patients were subjected to the Full history taking and clinical examination, and they were informed about the ultrasound-guided foam sclera therapy technique, they had Pretreatment Doppler scanning to identify sites of superficial venous reflux and incompetent perforators and to exclude possible DVT or phlebitis, the long course of refluxing vein is marked by ultrasound guidance, they were treated by ultrasound-guided foam sclerotherapy: The target vein cannulated under ultrasound guidance with an intravenous cannula or butterfly needle 18, 20, or 22G at multiple levels, Foam generated using Tessari method (This method includes mixing one part of the commercially

available sclerosant, Aethoxysclerol l-3%, with four parts of air using two syringes and a three-way tap. Great saphenous vein treated with 3% Aethoxysclerol. Accessory great saphenous and short saphenous veins treated with 2% Aethoxysclerol. Reticular veins and telangiectasia treated by 1% Aethoxysclerol), after cannulation, the limb is elevated prior to injection of foam then We manually compressed the saphenofemoral junction during injection into the GSV, the development of vasospasm in the target vein and the detection that the vein was completely filled by foam was used to judge satisfactory completion of the therapy session, then the Patients were asked to actively dorsiflex and plantarflex the ankle to maintain deep venous blood flow after each injection. Instructions given for patient immediately post-procedure: to walk for at least half-hour. To have plenty of fluids. To maintain external compression for 4 days. The anti-inflammatory medication was prescribed. Early follow-up 1–3 days post-injection and long follow-up to 6 months (by clinical examination and Doppler study).

Table (1): Criteria for successful and unsuccessful treatment:

	Post-treatment successful criteria	**Post-treatment unsuccessful criteria**
Doppler examination	• No reflux • Complete disappearance of treated vein or becoming fibrous cord or total occlusion (non-compressibility) of the treated venous segment.	• Reflux >1 second or unchanged. • Complete (or incomplete) patency and/or diameter unchanged.
Clinically	**No visible** varicose veins.	**No significant change** or **worsen** (i.e., varicose veins became larger and more visible).
symptoms	Confirmed **absent** or improved symptoms.	confirmed **No change** or worse symptoms

Statistical analysis

IBM's SPSS statistics were used for optimum statistical analysis of the collected data. Shapiro-Wilk test was used to examine the normality of the distribution of data. All tests were conducted with a 95% confidence interval. P-value < 0.05 was considered statistically significant. End-intervention questionnaire: The patients were asked to grade the improvement that they will experience in terms of symptoms, cosmoses and lifestyle.

Ethical considerations written informed consent obtained from each patient. The study was approved by the ethics committee of the Faculty of Medicine, Sohag University.

Results:

In this study, there were **60 patients** included and were divided into 23 males (38%) and 37 females (62%), the average age in this study was 33.72 years ± Standard deviation (SD) 6.87, the youngest was 20 years and the oldest was 52 years. The right side was affected in 31 patients (52%) while the left side was affected in 29 patients (48%). The average duration of the disease was 6.03 years ± SD 3.04, the least duration of the disease was one year, and the maximum was 12 years. Pre and post-treatment assessment of **bad cosmoses** was done to the 60 patients, the bad cosmesis was still found in 35 patients (58%) after one week, in 10 patients (17%) after one month, in 4 patients (7%) after 3 months

and in 6 patients (10%) after 6 months after receiving the treatment. These variations showed statistically significant differences after one week, one month, 3 months, and after 6 months on the bad cosmesis after receiving treatment (P<0.001), so the treatment **had an obvious effect** on decreasing bad cosmesis (table 2).

Table (2): Pre- and post-treatment assessment of bad cosmesis in the studied patients:

Bad cosmesis	All patients (n= 60)	p
Basal	100% (60)	-
One week	58% (35)	**< 0.001**
One month	17% (10)	**< 0.001**
Three months	7% (4)	**< 0.001**
Six months	10% (6)	**< 0.001**

Pre and post-treatment assessment of **pain** was done to 52 patients and the pain was still present in 22 patients (37%) after one week, in 2 patients (3%) after one month, in 2 patients (3%) after 3 months, and in 4 patients (7%) after 6 months from receiving the treatment. These variations showed statistically significant differences after one week, one month, 3 months, and 6 months after receiving the treatment on the severity of the pain (P<0.001), so the treatment had an obvious effect on decreasing the pain (table 3).

Table (3): Pre- and post-treatment assessment of pain in the studied patients:

Pain	All patients (n= 60)	p
Basal	87% (52)	-
One week	37% (22)	**< 0.001**
One month	3% (2)	**< 0.001**
Three months	3% (2)	**< 0.001**
Six months	7% (4)	**< 0.001**

The average number of sessions done to all patients in this study was 1.67 ± SD0.752, the minimum number of sessions was one session and the maximum was 3 sessions, the average volume of injected foam was 11.33 ml ± SD 4.011, the minimum injected amount was 5 ml and the maximum was 22, the average concentration of Aestheox1sklerol was 0.02 ± SD 0.006, the minimum concentration was 0.01 and the maximum was 0.03. The 60 patients were classified according to **Clinical-Etiological-Anatomical-Pathophysiological (CEAP) classification**; there were 7 patients (12%) C-1, 42 patients (70%) C-2, 7 patients (12%) C-3, one patient (2%) C-4, one patient (2%) C-5 and 2 patients (3%) C-6 (Table 4).

Table (4): number of sessions, volume and concentration of injection, and CEAP classification of the studied patients:

		All patients (n= 60)				
		Mean & SD	**Median**	**Minimum**	**Maximum**	**IQR**
Number of sessions		1.67 ± 0.752	1.50	1.00	3.00	1.00, 2.00
volume of injected foam (ml)		11.33 ± 4.011	10.00	5.00	22.00	9.00, 14.00
concentration of Aestheox1sklerol		0.02 ± 0.006	0.02	0.01	0.03	0.02, 0.03
CEAP	**1**	12% (7)				
	2	70% (42)				
	3	12% (7)				
	4	2% (1)				
	5	2% (1)				
	6	3% (2)				

Pre and post-treatment assessment of

Long saphenous vein reflux
was done to 29 patients (48%), the reflux was still found in 6 patients (10%) after one wee-k, in 2 patients (3%) after one month, in 2 patients (3%) after 3 months and in 4 patients (7%) after 6 months from recei-ving the treatment. These variations sh-owed statistically significant differences after one week, one month, 3 months, and after 6 months after the Long saphenous vein reflux after receiving treatment (P<0.01), so the treatment **had an obvious effect** on decreasing the Long saphenous vein reflux (Table 7).

Table (5): Pre- and post-treatment assessment of long saphenous vein reflux in the studied patients:

Long saphenous vein reflux	All patients (n= 60)	P
Basal	48% (29)	-
One week	10% (6)	**< 0.001**
One month	3% (2)	**< 0.001**
Three months	3% (2)	**< 0.001**
Six months	7% (4)	**< 0.001**

Pre and post-treatment assessment of

short saphenous vein reflux
was done to 8 patients (13%), the reflux was found neither after one week nor after one month, 3 months, and 6 months from receiving the treatment. These variations showed statistically significant differences after one week, one month, 3 months, and after 6 months on the short saphenous vein reflux after receiving treatment (P<0.01), so the treatment **had an obvious effect** on decreaseng the short saphenous vein reflux (Table 8).

Table (6): Pre- and post-treatment assessment of short saphenous vein reflux in the studied patients:

Short saphenous vein reflux	All patients (n= 60)	p
Basal	13% (8)	-
One week	0% (0)	**0.008**
One month	0% (0)	**0.008**
Three months	0% (0)	**0.008**
Six months	0% (0)	**0.008**

Pre and post-treatment assessment of

posterior accessory saphenous vein (PASV) reflux was done to 8 patients (13%), the reflux was found in 2 patients (3%) after one week of treatment, but after one month, 3 months, and 6 months from receiving the treatment there were no cases with PASV reflux. These variations showed statistically significant differences after one week, one month, 3 months, or 6 months on the **PASV reflux** after receiving the treatment (P<0.01), so the treatment **had an obvious effect** on decreasing the PASV reflux (Table 7).

Table (7): Pre- and post-treatment assessment of PASV reflux in the studied patients:

APSV reflux	All patients (n= 60)	p
Basal	13% (8)	-
One week	3% (2)	**0.031**
One month	0% (0)	**0.008**
Three months	0% (0)	**0.008**
Six months	0% (0)	**0.008**

Pre and post-treatment assessment of

telangiectasia was done to 9 patients (15%), the telangiectasia was still found in 5 patients (8%) after one week of treatment, but after one month, 3 months, and 6 months from receiving the treatment there were no cases with telangiectasia.

These variations showed statisti-cally significant differences after one month, 3 months, or 6 months on the telangiectasia after receiving the treatment (P<0.05) but not after one week of receiving the treatment (P>0.05), so the treatment **had an obvious effect** on decreasing the **telangiectasia** (table 8).

Table (8): Pre- and post-treatment assessment of telangiectasia in the studied patients:

Telangiectasia	All patients (n= 60)	p
Basal	15% (9)	-
One week	8% (5)	0.125
One month	0% (0)	**0.004**
Three months	0% (0)	**0.004**
Six months	0% (0)	**0.004**

Pre and post-treatment assessment of

venous ulcer was done to 3 patients (5%), the ulcer was still found in 3 patients (5%) after one week and also after one month from receiving the treatment but not after 3 months and 6 months from receiving the treatment. These variations did not show any statistically significant differences after one week, one month, 3 months, or 6 months on the venous ulcer after receiving treatment (P>0.05) due to the small number of patients affected (table 9).

Table (9): Pre- and post-treatment assessment of venous ulcer in the studied patients:

Venous ulcer	All patients (n= 60)	p
Basal	5% (3)	-
One week	5% (3)	1.000
One month	5% (3)	1.000
Three months	0% (0)	0.250
Six months	0% (0)	0.250

Pre and post-treatment assessment of **incompetent perforators** was done to the 60 patients (100%), there were 35 patients (58%) who had no perforators, 10 patients (17%) had one perforator, 12 patients (20%) had 2 perforators, 3 patients (2%) had 3 perforators. After receiving the treatment, incompetent perforators were assessed there were 58 patients (97%) who had no incompetent perforators after one week, one month, 3 months, and six months from receiving the treatment, and 2 patients (3%) had just one incompetent perforator after one week, one month, 3 months and six months from receiving the treatment. These variations showed statistically significant differences after one week, one month, 3 months, and 6 months on the incompetent perforators after receiving treatment (P<0.01), so the treatment **had an obvious effect** on decreasing the incompetent perforators (table 10)

Table (10): Pre- and post-treatment assessment of incompetent perforators in the studied patients

Incompetent perforators		All patients (n= 60)	P
Basal	**0**	58% (35)	-
	1	17% (10)	
	2	20% (12)	
	3	5% (3)	
One week	**0**	97% (58)	**< 0.001**
	1	3% (2)	
One month	**0**	97% (58)	**< 0.001**
	1	3% (2)	
Three months	**0**	97% (58)	**< 0.001**
	1	3% (2)	
Six months	**0**	97% (58)	**< 0.001**
	1	3% (2)	

Post-treatment complications were assessed in this study and there were 17 patients (28%) who had complications, 13 patients (22%) had Skin Hyperpigmentation, 4 patients (7%) had Thrombo-

phlebitis and 5 patients (8%) had Visual disturbance. But **no cases** had neither DVT, Stroke, Migraine nor Skin necrosis (Table 11).

Table (11): post-treatment complications in the studied patients:

	All patients (n= 60)
Complications	28% (17)
Skin Hyperpigmentation	22% (13)
Thrombophlebitis	7% (4)
DVT	0% (0)
Visual disturbance	8% (5)
Stroke	0% (0)
Migraine	0% (0)
Skin necrosis	0% (0)

Case presentation

Female patient 35 years old, had right visible varicosities and pain for 3 years, its CEAP classification was C2 Ep As Pr, her Doppler findings showed Evidence of refluxing posterior accessory saphenous vein with related subcutaneous varicosities. Two incompetent perforators are also seen. Her treatment was UGFS that was done for refluxing vein and two incompetent perforators, through 2 sessions. The volume of injected foam (ml) was 15 ml and the concentration of Aestheoxysklerol was 2%. Her Post-treatment assessment showed the complete disappearance of a treated vein and incompetent perforators. Nearly No visible varicosities could be detected. The patient satisfaction was excellent and there were no complications.

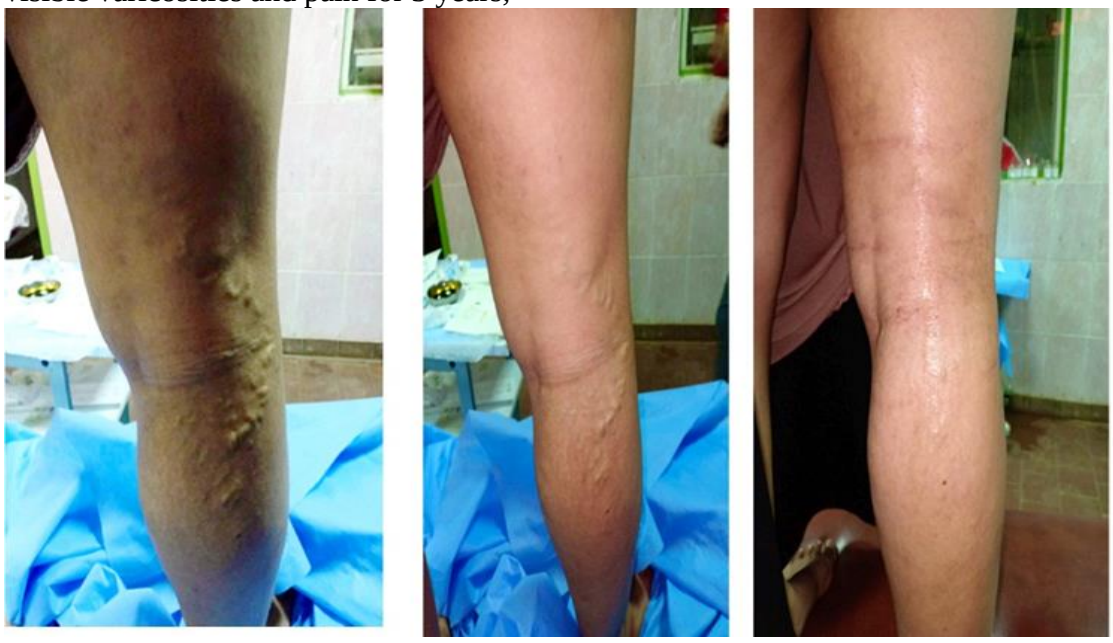

Figure (1): the stated case shows (A) visible subcutaneous varicosities at the posterior aspect of the leg and thigh. (B) After one session of UGFS. (C) After two sessions of UGFS, the total disappearance of varicosities. (D) Ultrasound examination revealed total occlusion of the vessel without any signs of revascularization.

Discussion

Chronic venous insufficiency could be a quite common medical problem Surgical therapy remains the first treatment option at all stages of the disease above clinical state C1. Surgery has never been required - for telangiectasias.

There's a large armamentarium of therapeutic options in additional advanced clinical states of venous insufficiency. [9]

The selection of the best approach depends on many factors: stage of the venous lesion in keeping with the CEAP

classification, location of this lesion, cost of the treatment, complaints, concomitant diseases, and obesity, willingness to resume work, prejudice against some methods of treatment or their complications, etc.[10] Rasmussen et al. in their investigation comparing UGFS, radiofrequency ablation (RFA), endovenous laser ablation (EVLA), and surgery reported the highest recurrence of reflux in treated GSVs 1 year after foam sclerotherapy. These authors however recognized this method as the least traumatic, the most affordable, and straightforward to repeat.[11] The treatment itself is comparatively easy to perform, effortless, and may be conducted in an outpatient clinic.[12] This study was conducted at Sohag University Hospitals planning to evaluate the efficacy, safety, and patient satisfaction following foam sclerotherapy for varicose veins. We included a complete of 60 cases with lower limb varicosities whose mean age was 33.72 years (range, 20 – 52). Another study hand-ling the identical perspective included a complete of 52 cases with GSV incompetence and with or without concomitant varicose veins were treated with US-guided foam sclerotherapy. The mean age was 54 (from 30 to 65) years. [13]

Within the current study, females represented 62% of cases, while the remaining cases were males. Another study also reported female predominance. Authors included 46 (88.5%) females and 6 (11.5%) male patients.[13] This was further confirmed by another study which reported that 82% of the included cases were females. [14] Conversely, another study reported a high predominance of males, as they represented 74% of the study cases.[15] Regarding CEAP classification, class 2 was the m-ost common class encountered (42 cas-es – 70%), followed by class 1 and thr-ee (12% for each), class 6 (3%), whereas class 4 and 5 were present in 2% of cases for every. In another study, CEAP classification was as follows; class 2 (9.52%), class 3 (36.51%), class 4 (46.03%), and class 5 (7.94%). [17]

The cosmetic appearance showed a significant improvement ($p < 0.001$) after our intervention. All cases reported bad cosmoses before the intervention, which decreased down to 58, 17, 7, and 10% at 1-week, 1-, 3-, 6-month follow-up visits respectively. Although there was a small rise at the 6-month visit, it was also significantly better than the basal value.

In the current study, most symptoms showed a significant improvement compared to the baseline values during the scheduled follow-up visits. Moreover, edema showed significant improvement 1 month after intervention, and that improvement was also noticed through the following visits. Unlike the other complaints, it did not show significant change after 1 week ($p = 0.06$). This could be explained by the occurrence of post-procedural inflammation and tissue response which may delay the resolution of the preexisting edema.

In another study, the majority of patients (96%) reported an improvement in symptoms. In a semi-quantitative fashion, 33 (66%) patients reported > 50% improvement, while 15 (30%) patients reported < 50% amelioration. Only two patients felt that the procedure provided no benefit. [19]

Another study reported that there was a significant improvement in the Aberdeen Varicose Vein Symptom Severity Score as it decreased from 18.9 down to 9.7 after long-term follow-up [20]. In another study, improvements in symptoms and quality of life were 100%. [15]

In terms of expectations, one study shows that exceeded 25% while unmet in 10%. [18] Regarding patient satisfaction, it was subjectively categorized in a previous study as ‘excellent, ‘good’, ‘average’ and ‘poor’. 14 (28%) patients considered foam sclerotherapy to be an excellent treatment, while 27 (54%) de-

cided it was good, and nine (18%) patients subjectively confirmed the procedure to be average. No patient thought that it was a poor intervention.[19]
Furthermore, other authors reported that assessment of patients' satisfaction demonstrated that 94.4% reported satisfaction with the treatment outcomes, 88.9% stated that they would undergo the procedure again if necessary, and 77.8% said that they would recommend the treatment to a friend.[16] As regard venous reflux in the short saphenous vein in our study, it was present in 13% of cases before the intervention, and it was not detected in any of the included cases after the intervention (0% - $p < 0.001$). Furthermore, large saphenous reflux was present in 48% of cases before the intervention, and its incidence decreased down to 10% after 1 week. The following visits also showed a significant decrease dow-n to 3, 3, and 7% respectively ($p < 0.001$). Furthermore, Saphenofemoral reflux was present in 48% of cases before the intervention, and it decreased down to 7, 3, 3, and 7% of cases at the scheduled follow-up visits respectively ($p < 0.001$). On the other hand, although saphenopopliteal reflux disappeared after the interventtion, that improvement was statistically insignificant ($p = 0.008$). As regard venous ulcer improvement, it didn't show a major change within the current study ($p > 0.05$). Nevertheless, it had been present in 5% of cases before the intervention, while it absolutely was absent after 3 months. In another study, the assessment of the patient's presenting venous ulcers because the main complaint (10 cases) demonstrated that upon the primary follow-up, 7 were completely healed, 2 presented improvement although hearing wasn't - complete, and 1 healed but presented recurrence. Thus, the venous ulcers reepithelialization rate was 70%, with 30% presenting recurrence or improvement without complete reepithelialization. [16] O'Hare reported a 91.2% rate of healing in 24 weeks,[23] Kulkarni 71.1% in 24 weeks,[24] and Cam-pos 91.3% after one year. [25]
Incompetent perforators showed a major decrease after intervention ($p < 0.001$). It had been absent in 97% after the intervention. Although the reticular vein did show any significant improvement after intervention ($p > 0.05$), the prevalence of telangiectasia decreased significantly from 15% before the intervention, all the way down to 0% after 1 month ($p = 0.004$).
In a previous study, treatment was more likely to be effective for great saphenous compared to small saphenous veins. [14] Others have reported better outcomes for small compared to large diameter veins [26, 27] although satisfactory results for giant veins have also been reported. [3, 28] In another study, Dopp-ler examination follow-up showed complete occlusion of the treated vein following 79% of procedures (n = 100). Partial occlusion of the treated vein was evident following 14% of procedures (n = 18) and a patent treated vein was seen after 6% of procedures (n = 8). [17]
In another study, 177 patients with varicose veins, who were recruited from 3 different practices in Italy, were accustomed assess the efficacy and safety of ultrasound-guided foam sclerotherapy. Complete obliteration of the treated vein was detected in 161 (91%) patients at 1 month. This percentage was diminished to 67% between 66 patients who had another follow-up visit at 138 (mean) days. [29]
Rabe et al. reported occlusion of great saphenous vein 3 months after sclerotherapy in 70% of cases [30], whereas Bountouroglou et al. noted success in 87% [31]. Both authors used 3% foamy polidocanol for sclerotherapy. consistent with Gonzalez-Zeh et al. and Figueiredo et al., patent Great saphenous vein 6 months after foam sclerotherapy was detected in 11.3% and 22% respectively

[32, 33]. When it involves complicatio-ns encountered in our study, it had bee-n reported by 28% of cases. Skin hyper-pigmentation was the most common c-omplication (13 cases – 22%), followed by visual disturbances (5 cases – 8%), and thrombophlebitis (4 cases – 7%).
Regarding complications in other stud-ies, six (11.5%) patients felt moderate pain at the location of injection as it w-as administered. every week and a mo-nth after sclerotherapy thrombophlebi-tis of a part of the treated vein or its tri-butaries were present in 11 (21%) cases. During follow-up, hyperpigmentation, which disappears with time, was detected on the skin of the thigh or calf in 9 (17%) cases. Serious complicat-ions like DVT, embolism (PE), yspnea, anaphylaxis, or neurological abnormali-ties (vision disorders, vertigo, and loss of consciousness, stroke, or transient is-chemic attacks) weren't recorded.[13]

Limitations of the study First of all, it's a single-center study. Besides, it included a comparatively small sample size. Additionally, it's not a comparat-ive study. These considerations should be kept in consideration in performing future studies.

Conclusion

Ultrasound-guided foam sclerotherapy appeared to be a safe and effective proc-edure for the treatment of chronic ven-ous insufficiency in the selected group of patients. The complications were simple and most of the patients reported good satisfaction with the therapy outc-omes.

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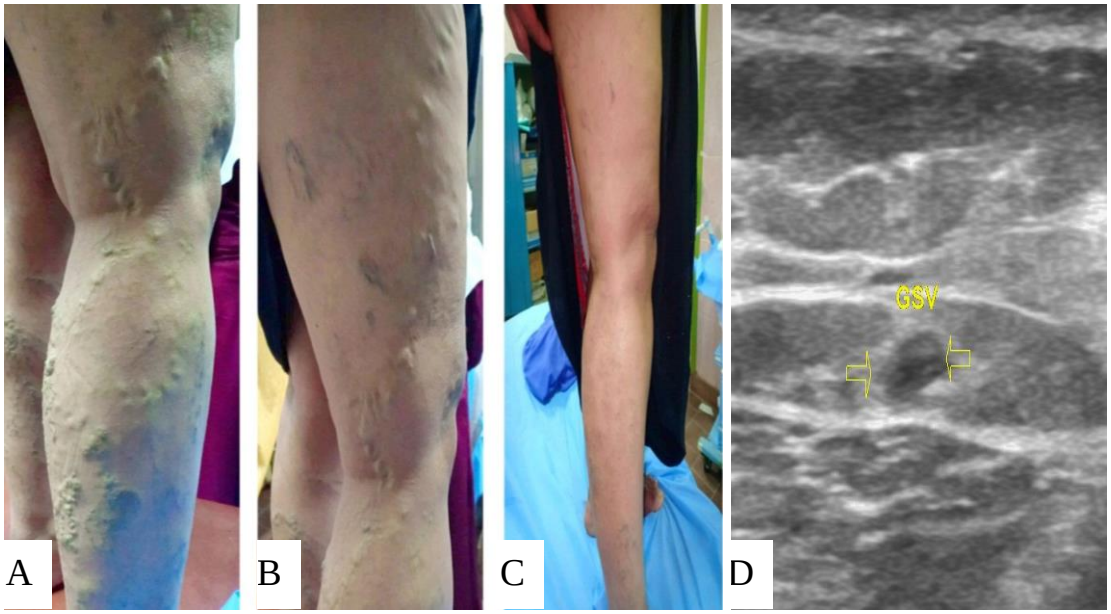
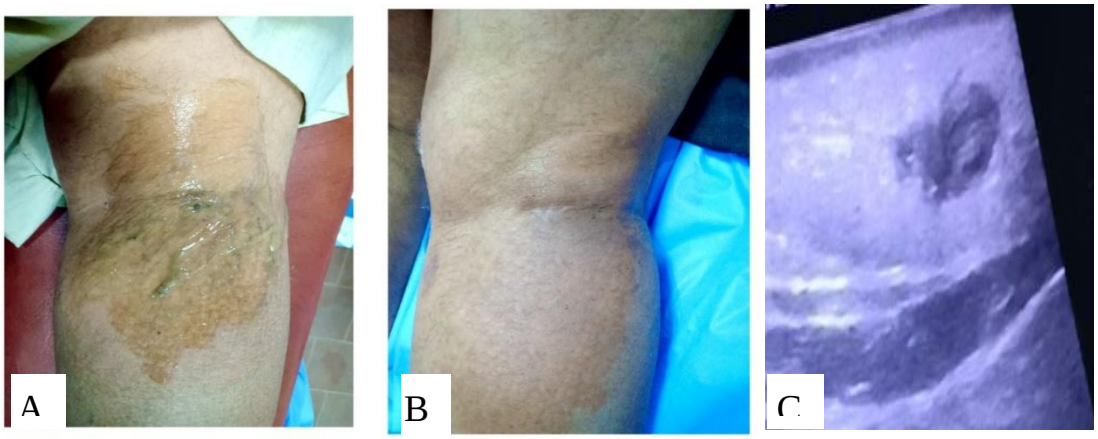
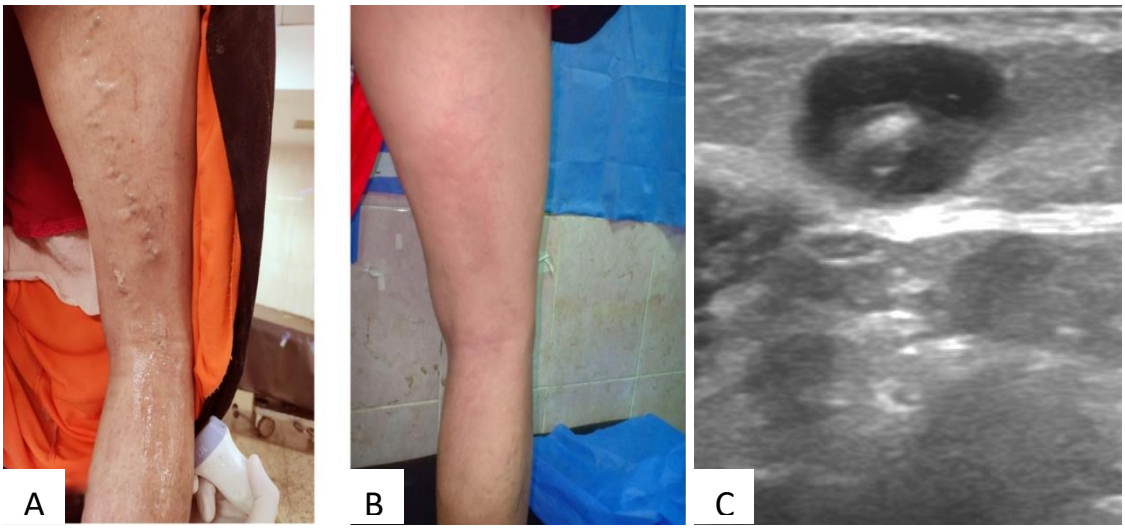


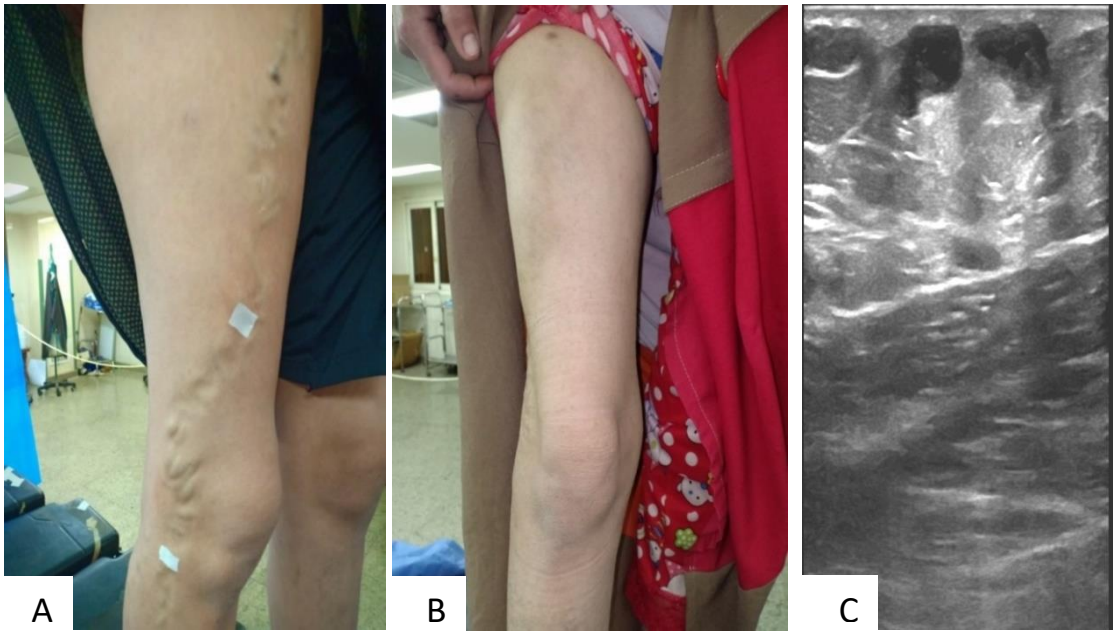
Figure(2). **[33] Case no. 2: (A) (B)** marked visible varicosities. (C) After three sessions of UGFS, Showing significant improvement. (D) Ultrasound study, the GSV thrombosed and non-compressible with marked reduction in diameter.



Figure(3). **[35] Case no. 4: (A)** subcutaneous varicosities at posterior aspect of upper leg. (B) After one session of UGFS, total disappearance of varicosities. (C) Ultrasound examination, the treated vein totally thrombosed with fibrosis changes.



Figure(4). [37] **Case no. 6: (A**) Large sized subcutaneous varicosities seen at posterior aspect of thigh. (B) No visible varicose vein after UGFS. (C) Ultrasound showing complete thrombosis of treated vein.



Figure(5). [38] **Case no. 7: (A)** subcutaneous varicosities related to refluxing large anterior accessory saphenous vein with abnormal course. (B) Disappearance of varicosities after UGFS. (C) Ultrasound image showing complete thrombosis of a treated vein with fibrosis changes.