Retrospective Evaluation of Safety and Efficacy for ScleroSafe Device - Case Report Summary

Using the ScleroSafe Device in treating Superficial Peripheral incompetent Varicose Veins

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1. Background

Varicose veins occur when the valves within the veins become congested, leaky and incompetent and blood pools downstream, away from the heart, causing swelling and malfunction of the vein. Common signs of chronic venous insufficiency are : skin changes, eczema, pain, and other symptoms in the legs such as feeling of heaviness, leg cramps and edema. Varicose veins are common and affect approximately 20 to 25% in females and 10 to 15% in males of western adults [1]. Sclerotherapy is the most commonly used procedure to treat peripheral varicose veins and is performed by injecting a sclerosing solution directly into the vein. Sclerotherapy has been used to treat various types and sizes of varicosities, and inspite of known / documented adverse events and certain complications , is still the most common varicose veins treatment modality in the western world . sclerotherapy is a commonly used treatment for telangiectasias, venulectasias, and reticular veins [2].

The goal of sclerotherapy is to cause endothelial irritation and vein wall damage in a controlled fashion. A sclerosing agent is used to create chemical irritation and damage to the endothelium, which, in turn, induces blood clot and light inflammation that evolves into fibrotic tissue and obliteration of the treated segment. The result is removal of abnormal/incompetent vessels that carry retrograde flow without damaging adjacent vessels that carry normal antegrade flow. The sclerosant effect results in a fibrous cord that is absorbed over time. The visual attributes of these incompetent veins fade often over months, enhancing skin appearance and potential improvement in leg symptoms [3].

The sclerotherapy is done under ultrasound imaging, the physician injects the sclerosing agent into the small or medium-sized varicose veins segments which causes obliteration of these segments.

The ScleroSafe administration of the Sclerosant is done simultaneously with aspiration of the blood from the treated segment. The administration of the sclerosing agent (polidocanol) performed in a manner consistent with the labeling for the drug. The active ingredient of the sclerosing agent is polidocanol – ethanol-based substance. Polidocanol is a detergent class FDA-approved sclerosant in the United States.

The ScleroSafe is intended for the delivery of sclerosant in the treatment of varicosities in superficial veins. Recommended sclerosant agents per ScleroSafe procedure are the FDA approved 1 % Polidocanol Asclera™ manufactured by Kreussler & Co. GmbH Wiesbaden, Germany [4, 5] and exact similar sclerosant trade name such as 1% Aetoxisclerol, also manufactured by Kreussler & Co. GmbH registered in Germany as approved sclerosing agent (BfArM) [6, 7].

The purpose of these case studies is to assess the efficacy and safety of the performance of the ScleroSafe device and the simultaneous aspiration and injection technique.

2. Materials and Methods

The ScleroSafe is a CE approved device. Twenty procedures of ScleroSafe were performed between January and June 2019 at Augusta-Krankenhaus Hospital, Dusseldorf Germany by trained physician Prof. Ralf R. Kolvenbach MD, PhD, FEBVS.

Twenty subjects (13 female, 7 male) with primary incompetent reticular veins (veins 2 to 3 mm in diameter) leg veins were treated with the new ScleroSafe Procedure kit (**Figure 1**). Diagnostic evaluation was performed prior and post-treatment using duplex ultrasonography and digital photographs of the selected treatment area.

Each subject's leg veins were evaluated. The clinical conditions prior to treatment were classified using the CEAP classification [8] and were recorded in **Table 1**.

ScleroSafe procedure was performed in accordance to IFU technique on only one leg in a single treatment session, by the same physician (**Figure 2**). Subjects were treated with no more than 10 ml of 1% Polidocanol (Aetoxisclerol Dexo Aethoxysklerol® (Kreussler & Co. GmbH, Wiesbaden, Germany) – similar to

ASCLERA. (ASCLERA and AETOXYSCLEROL are commercial names to Kreussler Pharma Polidocanol 1%)

Obliteration end point was assessed after treatment using duplex ultrasonography. The degree of severity of pain was measured using a numerical rating scale (NRS) marked 0-10 Pain Rating Scale (0 = No Pain; 1-3 = Mild Pain; 4-6 = Moderate Pain; 7-9 = Severe Pain; 10 = Very Severe pain) [9]. The results of each subject's clinical stage and symptom scores were recorded in **Table 2**.

The patients were followed up (reviewed) at 30 days post-treatment.

Figure 1. The ScleroSafe Device

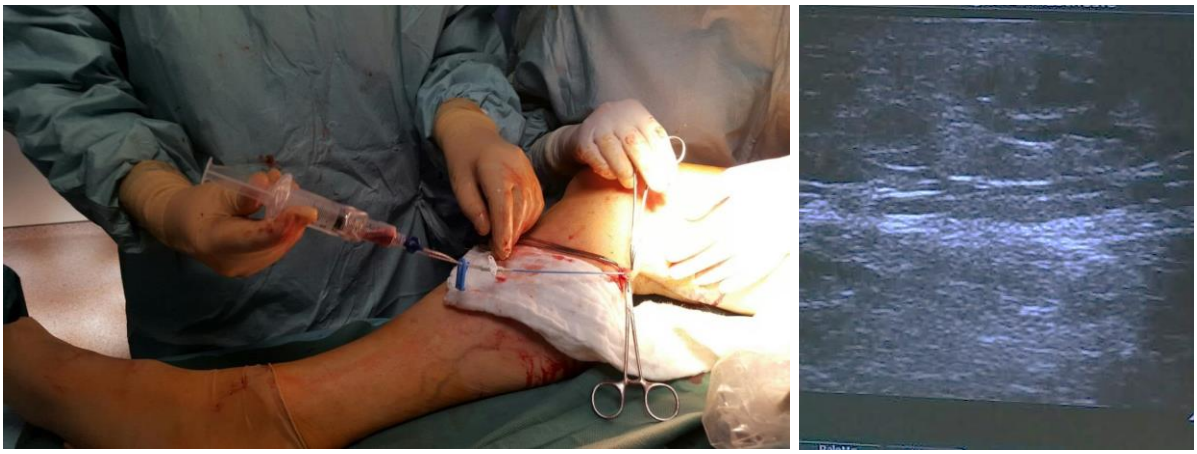

Figure 2. The ScleroSafe procedure: Syringes are mechanically connected to allow simultaneous injection and aspiration. Aspiration of blood from an accessory saphenous vein side -branch and simultaneous injection of liquid polidocanol.

Table 1. Subject's vein-characteristics prior to treatment

Case No.	Male/Female	Age	CEAP Classification prior to treatment	Etiological classification prior to treatment
1.	**Female**	46	C2 Varicose veins	Primary
2.	**Female**	62	C2 Varicose veins	Primary
3.	**Female**	65	C2 Varicose veins	Primary
4.	**Male**	70	C3 Edema	Primary
5.	**Female**	60	C2 Varicose veins	Primary
6.	**Female**	66	C2 Varicose veins	Primary
7.	**Female**	43	C2 Varicose veins	Primary
8.	**Female**	79	C3 Edema	Primary
9.	**Male**	65	C2 Varicose veins	Primary
10.	**Female**	57	C2 Varicose veins	Primary
11.	**Female**	62	C2 Varicose veins	Primary
12.	**Female**	69	C2 Varicose veins	Primary
13.	**Male**	93	C2 Varicose veins	Primary
14.	**Female**	33	C2 Varicose veins	Primary
15.	**Male**	52	C2 Varicose veins	Primary
16.	**Female**	77	C2 Varicose veins	Primary
17.	**Female**	65	C3 Edema	Primary
18.	**Male**	66	C2 Varicose veins	Primary
19.	**Male**	13	C2 Varicose veins	Primary
20.	**Male**	47	C2 Varicose veins	Primary

3. Results

All 20 subjects were treated with ScleroSafe using 1% POL. for veins 2 to 3 mm in diameter (**Table 2**).

Complete obliteration of the vein was achieved in 100% of the patients with no recurrence within 30 days after the treatment (assessed by duplex check at follow up session).

Pain level using pain rating scale (0-10) indicated minor pain level (mean of 0.9 in a 0-10 scale) during the procedure which subsided in 95 % of the patients to no pain at all during 30 days follow-up visit (one case of minor pain).

Common post treatment symptoms were expected, one patient experienced small haematoma at vein access site and two patients experienced mild phlebitis. These minor incidences to the treatment did not require any further treatment and were resolved within couple of days with no residual effect as detailed in **Table 2**.

30 days follow-up by duplex ultrasound of the treated veins demonstrated no blood flow. No recanalization was observed.

These case reports demonstrate successful and effective results using minimally invasive ScleroSafe procedure for leg varicosities.

Table 2. Obliteration effectiveness and pain scores during the procedure and at 30 days post-treatment as determined by physician evaluator (duplex)

Case No.	**Key outcomes**Safety/ Obliteration effectiveness/ Adverse events	**Severity of pain (0-10)**	**30-day follow-up**
1.	Complete Obliteration * Phlebitis - **no treatment required**	2	No recurrence, No Haematoma or phlebitis
2.	Complete Obliteration	2	Same
3.	Complete Obliteration	1	Same
4.	Complete Obliteration * Haematoma at injection site - **no treatment required**	2	Same
5.	Complete Obliteration	1	Same
6.	Same	1	Same
7.	Same	0	Same
8.	Same	1	Same
9.	Same	1	Same
10.	Same	1	Same
11.	Same	1	Same
12.	Same	1	Same
13.	Complete Obliteration *Phlebitis - **no treatment required**	0	Same
14.	Complete Obliteration	0	Same
15.	Same	1	Same
16.	Same	1	Same
17.	Same	1	Same
18.	Same	0	Same
19.	Same	0	Same
20.	Same	1	No recurrence, No Haematoma or phlebitis *Minor pain

*****The reported event would consider a complication if it was a clinically significant adverse event attributed to the treatment and required additional significant treatment

3. Discussion

The ScleroSafe technique - withdrawal of blood while sclerosant is being discharged offer several advantages, including (a) Minimal dilution of the Sclerosant (b) Reduction of intraluminal pressure, preventing sideways escape of sclerosant into the deep system via available collateral vessels , thus , preventing DVT and (c) Homogeneous mixing of the drug with blood at the infusion site minimizing superficial Thrombophlebitis inflammation (clot formation accompanied by an inflammatory infiltrate) due to trapped coagulum as well as preventing Post-sclerotherapy hyperpigmentation (discoloration).

This article details the case reports evaluating the safety and efficacy of the SceroSafe device. The ScleroSafe procedure kit was successfully used in eliminating the treated congested reticular veins. No incidence of complications and no adverse events were occurred in the context of the treatments*. No discoloration, Matting were detected. The treated veins were completely obliterated, giving a very even, flat skin, minimum pain was reported by patient during treatment (**Figure 3)**.

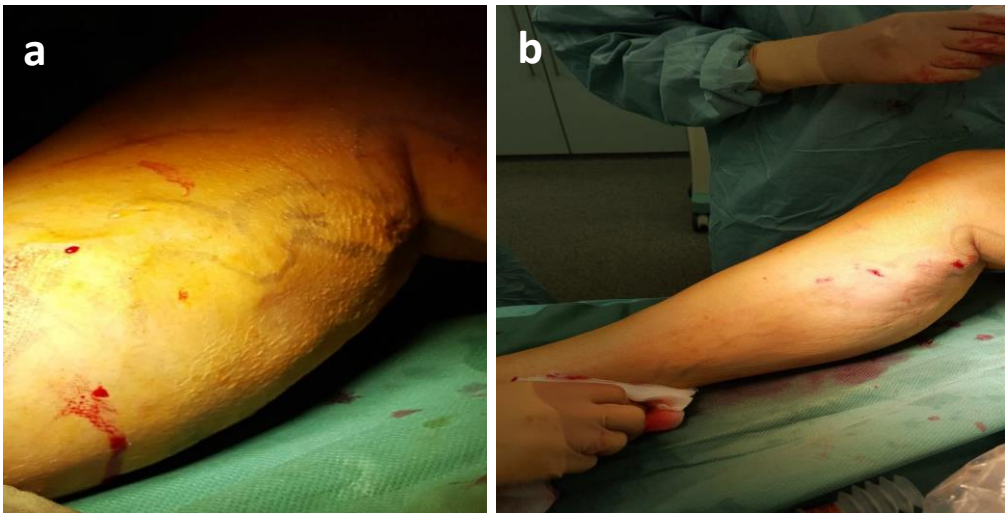

Figure 3. Example of (a) Before and (b) After the procedure

4. Conclusion

The case studies demonstrated good safety and performance profile. The primary end point of vein obliteration was met.

In summary, the ScleroSafe device is safe and effective in treating Peripheral Varicose Veins.

5. References

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