

## CLINICAL STUDY

**Long term results of compression sclerotherapy**

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*Department of Surgery, Faculty of Medicine, University Hospital, Bratislava, Slovakia. [bl@fmed.uniba.sk](mailto:bl@fmed.uniba.sk)***Abstract****Aims:** To compare the short and long term results of different techniques of compression sclerotherapy.**Patients and methods:** In the past 10 years the authors treated 1622 pts due to chronic venous insufficiency. There were 3 groups of patients: 1) Pts treated by Sigg's technique using Aethoxysclerol, 2) Pts treated by Fegan's technique with Fibrovein, and 3) Pts treated by Fegan's procedure, but using a combination of both sclerosants. In all cases, the techniques of empty vein, bubble air, uninterrupted 6-week compression and forced mobilisation were used.**Results:** In the group of pats. treated by Sigg's procedure, the average cure rate was 67.47 % after 6 months, 60.3 % after 5 years of follow-up. In Fegan's group this rate was 83.6 % after 6 months and 78.54 % after 5 year assessment. Statistically, significant differences were found only by the disappearance of varices and reduction of pain in favour of Fegan's technique. In the group of pts treated by Fegan's (Aethoxysclerol + Fibrovein) this rate after 5 years was 86 %. The only statistically significant difference was found by the disappearance of varices in favour of Fegan's technique using a combination of 2 detergent sclerosants.**Conclusions:** Sclerotherapy is effective when properly executed in any length of vein no matter how dilated it has become. The recurrences are attributed more to inadequate technique than to the short-coming of the procedure. Sclerotherapy is miniinvasive, with few complications, and can be repeated on out-patient basis. (Tab. 1, Ref. 22.)**Key words:** sclerotherapy, chronic venous insufficiency, varicose veins.

Several new methods of treatment of varicose veins have recently been proposed. Most techniques are based on the preservation of unimpaired venous segments with selective ligation or occlusion (surgery or compression sclerotherapy) of the incompetent segments. The impact of noninvasive investigations in detecting the incompetent venous segments and perforators has made these new selective methods feasible.

Sclerotherapy has been used for a long time in many European countries in the treatment of varicose veins in spite of the fact, that it has often been excluded from the international scientific world and from university hospitals (1). All treatments presently available, including surgery and sclerotherapy are palliative and not etiologic.

**Patients and methods**

We treated 1622 patients due to chronic venous insufficiency (CHVI) in the past 10 years (1991–2000). In this prospective randomised study there were 3 groups of patients:

1) Pts treated by Sigg's technique using Aethoxysclerol (Kreussler), n=454,

2) Pts treated by Fegan's technique with sodium tetradecyl sulfate (S.T.D., Fibrovein) n=876,

3) Pts treated by Fegan's procedure but using a combination of 2 sclerosants (Aethoxysclerol + Fibrovein) n=292.

In all cases the techniques of empty vein, bubble air, uninterrupted 6-week compression (stockings 44 mmHg) and forced mobilisation were used. Sigg's technique is based on total sclerotherapy of entire varicose veins without any apparent patho-

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**Tab. 1. The results of compression sclerotherapy.**

	6 months		5 years		
	Sigg Aetoxysklerol 454 patients		Fegan S.T.D. 876 patients		Sigg Aetoxysklerol 354 pts
					Fegan S.T.D. 482 pts
					STD + Aetoxy.292 pts
Disappearance of varices	53.9 % 245/454 pts	84.1 % 397/472 pts	45.9 % 208/454 pts	79.61 % 376/472 pts	86 % 165/192 pts
Reduction of edemas	72 % 219/304 pts	76 % 146/192 pts	61 % 185/304 pts	64 % 123/152 pts	74 % 27/36 pts
Reduction of eczemas	79.5 % 140/186 pts	79 % 126/159 pts	76 % 134/176 pts	82 % 130/159 pts	92 % 61/96 pts
Healed ulcers	91.3 % 63/69 pts	97 % 70/72 pts	82 % 57/69 pts	89 % 64/72 pts	95 % 144/152 pts
Relief of night cramps, pains, fatigue, heaviness	73 % 223/306 pts	86 % 327/380 pts	69 % 211/306 pts	73 % 277/380 pts	79 % 180/228 pts
The number of treated symptoms	1319/890	1275/1066	1309 795	1235 970	709 612
Average cure rate	67.47 %	83.60 %	60.3 %	78.54 %	86 %

physiological orientation, but Fegan prefers permanent obliteration of superficial veins at the point of abnormal venous flow from the deep to the superficial venous system in the site of incompetent perforators. Both techniques treat the veins from their distal to ward their proximal part. Incompetent perforators were identified by phlebography, Duplex scan sonography and clinically.

The accuracy of injecting the sclerosant into the perforating vein in order to close it permanently is questionable. Despite the lack of accuracy of the clinical diagnosis of incompetent perforating veins, the migration of the sclerosing solution in isolated segments (digital compression or applying a soft rubber ring) of injected superficial vein in a raised leg can reliably close the perforator or complex of perforators. The localisation of incompetent perforating veins, by this technique could yield a perfect result in 90 out of 100 patients (2, 3). The incompetent perforating veins could be always found near the skin changes (eczema, ulceration, hot spot) or in typical places on the leg (Cockett, Boyd, Dodd, Hunter, perineal group, lateral peroneal group of perforators and close to the lateral malleolus).

*Statistical analysis.* We used the computer program Mikulecky et al 1998 (20). The program includes test of homogeneity, test of differences, chi-square test with Yates correction. Statistical results were considered significant when p value was greater than 0.05.

## Results

All patients underwent the phlebological protocol, where we marked the localisation of varices, ulcers, eczemas, pigmentation and perforators. To assess the therapeutic results of CHVI it is necessary to evaluate each single sign. After six months all patients were checked. In some complicated cases we used photodocumentation to assess the treatment – effect eventually safely recognised the recurrence. Without this protocol or photodocumentation we would not have been able to distinguish recurrence from the newly developed pathological reflux due to the progression of CHVI. Control investigation was done by independent group of surgeons. The results were considered as good in cases of the disappearance of varices and eczemas, reduction of edemas, healed ulcers and relief of symptoms (pain, fatigue, tiredness, cramps). In the group of pts treated by Sigg's procedure (Aethoxysclerol n 454 pats) the average cure rate was 67.47 % after 6 months, 60.3 % after 5 years follow-up. In Fegan's group (Fibrovein n 876 pts) this rate was 83.6 % after 6 months and 78.54 % after a 5-year assessment. Statistically significant differences ( $p < 0.05$ ) were found only by the disappearance of varices and reduction of pain in favour of Fegan's technique. In the group of pats. treated by Fegan's (Aethoxysclerol + Fibrovein, n 292 pts) this rate after 5 years was 86 %. Again the only statistically significant difference was found by the disappearance of varices in favour of Fegan's technique using a combination of 2 detergent sclerosants (Tab. 1). More significant complications ( $p < 0.001$ ) were found by using S.T.D (local necrosis, hyperpigmentation and teleangiectasis). More significant complications such as hypotension and collapse occurred in the group of patients where Aethoxysclerol was used ( $p < 0.05$ ). We noticed swellings of the ankle and foot appear when sclerosant is injected into this sensitive area. Postsclerotherapy hyperpigmentation is due to secondary haemosiderin deposition (4, 5). Pigmentation and staining lasts 6–12 months (6). In our material only 3 % of patients have pigmentation persisting after 1 year. Teleangiectatic matting-fine red teleangiectasias depends on post-treatment inflammation-sclerophlebitis which could be limited by proper post-treatment compression (at least 35 mmHg stockings). Cutaneous necrosis may occur with the injection of any sclerosing agent. It is due to either extravasation of a sclerosant into the perivascular tissues or injection into a dermal arteriole or an arteriole feeding a telangiectatic or varicose vein. The only effective treatment is a prolonged compression until the defect heals. Superficial sclerophlebitis occurs when inadequate compression is given after treatment. In all cases we evacuated the thrombus with a thick needle and syringe and increased compression. Arterial injection which we never encountered is the most feared complication and is a true sclerotherapy emergency (7, 8).

## Discussion and conclusions

The objective of sclerotherapy is not only to produce complete endothelial damage (stripping) and subsequent fibrosis of the entire vein wall without recanalisation, but also to locate the points of abnormal flow from the deep to superficial veins, and the veins at these sites must be permanently obliterated by the injection of a sclerosant. Pathologically it is the process of controlled thrombosis by the application of continuous pressure. By closing the most distal leaking points from the deep system the proximal superficial veins can regain the normal size of lumen and the secondary incompetent but not permanently damaged valves can regain their normal functions (9). There are many techniques of sclerotherapy (Swiss-Sigg's, French-Tournays, British-Fegan's), but a lack of long term comparative studies. The literature consists mainly of reports and studies of small groups of patients with short follow-up periods. The first and most important objective in any therapy is to diminish or alleviate global or local venous hypertension by interrupting (cutting) the leaking point via the crosses or perforating veins into the superficial network. Unless the vein is completely stripped of endothelium, the fibroblast will not cross the lumen to unite with that on the opposite side of the treated vein. The empty vein technique is necessary to allow the destruction of intima; there is minimal dilution of sclerosant and a lower concentration can be injected compared with what would be required with a vein distended with blood (11). External compression and internal decompression - walking - also stimulates fibrosis (9, 12). In an inadequately or non-compressed vein the endothelial proliferation from either end of the injected segment together with proliferation of undestroyed islands of intima flow split to form sinuses as the thrombus retracts, thus allowing the recanalisation of the segment and clinical recurrence of the treated venous segment. When veins that have been treated by sclerotherapy do persist, treatment failure should be, almost invariably, attributed to inadequate technique and not to the shortcoming of the procedure. (11). 37 % of patients with long saphenous vein reflux had no sapheno-femoral junction incompetence. This indicates that in such circumstances saphenofemoral ligation alone is unlikely to control varices associated with long saphenous vein reflux. It also suggests that the development of primary varicose veins may be an ascending rather than a descending phenomenon (15). The varicose veins in the groin region, lower third of the thigh and along the axis of the small saphenous vein may be treated under ultrasound control (13, 14)

Surgeons and dermatologists with an interest in phlebology should strive to perceive veins as a complete system with varices, telangiectasis and reticular veins, not as separate skin disorders, but as a manifestation of venous hypertension due to valvular incompetence (16). Duplex ultrasonography of recurrent varicose veins suggests an important role for deep venous incompetence and shows that re-exploration of the groin is unnecessary in over half of limbs with recurrent veins (18). Forty per cent of patients with varicose veins and no evidence of deep venous disease had incompetence of perforators with moderate

to severe haemodynamic impact and their limbs. On clinical examination they are indistinguishable from those with deep venous disease, although they have patent deep veins with competent popliteal valves (20). Duplex sonography of the deep venous system focused on the popliteal vein is important since the popliteal vein incompetence is an indicator of poor response to any therapy of venous ulcerations (20). Surgical repair of deep valves (transplantation, valvuloplasty.) should be proposed for young patients with severe thrombotic disorders, which resist any procedures in superficial or perforator veins (surgical or sclerotherapeutic) or local medical treatment (22). From the current attitudes of British and Irish vascular surgeons to venous sclerotherapy we noticed that 18.3 % of surgeons have never injected varicose veins, 77.1 % have reserved sclerotherapy for post-operative residual varicose veins. Primary varicose veins without proximal incompetence were treated by injection by 69.7 % and recurrent varicose veins without proximal incompetence by 64 %. The median time advised for compression was 2 weeks. The median number of patients treated with sclerotherapy was 11–50 per year compared with 51–150 per year who were treated by surgery (23). To accomplish good results and a satisfactory average cure rate it is necessary to follow the basic principles of an effective and reliable technique of compression sclerotherapy stressed by Fegan.

Sclerotherapy is effective when properly executed in any length of vein no matter how dilated it has become. The average cure rate is high when using the Fegan's technique with combination of 2 sclerosants (synergic effect?). The recurrences are attributed more to inadequate technique than to the shortcoming of the procedure. The goals and results of sclerotherapy and surgery are the same, sclerotherapy is mini-invasive, with few complications, and could be repeated on an out-patient basis.

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