

The Ascent of Endovenous Laser Surgery For Varicose Veins

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Introduction

In the third world among the most common diseases affecting the lower limbs is chronic venous insufficiency affecting mainly the lower socio-economic class-manual labourers, factory workers, retail salespersons and often home-bound uneducated mothers. Most higher socioeconomic class with chronic venous insufficiency originate from prolonged hours at desk bound jobs like managers, clerks, lecturers, teachers and other sedentary occupations. Perhaps pregnancy and obesity transcend class or occupations.

Characteristic leg complaints associated with varicose veins include itching, aching pain, night cramps, fatigue, heaviness or restlessness. Symptoms arise from pressure of somatic nerves¹. The most obvious signs of chronic venous diseases are varicose veins and venous ulcers². The other signs include oedema, venous eczema, hyperpigmentation, haemorrhage, atrophic blanche (white scar tissue) and lipodemertosisclerosis (induration caused by fibrosis of the subcutaneous fat)^{3,4}.

Although not restricted to the elderly, the prevalence of chronic venous disease, especially leg ulcers, increase with age^{4,5,6}. Active or healed venous leg ulcers occur in approximately 1% of the general population, and the management represents a major economic cost with considerable consequences on the patients quality of life^{4,5,7}. Risk factors for chronic venous disease include heredity, age, female sex, obesity (especially in women), pregnancy, prolonged standing and greater height^{5,8,9,10,11}.

Management of varicose veins has progressed rapidly since the end of the last millennium. Classical varicose vein surgery, involving high ligation, stripping and multiple avulsions, is the commonest varicose vein surgical procedure performed. Non-surgical transcatheter-guided sclerotherapy, monopolar or bipolar radiofrequency ablation and endovenous lasers have been developed. These techniques have made great strides in becoming widely accepted and have in many situations replaced the older ligation and stripping¹²⁻¹⁶. Endolaser vein surgery (ELVeS) is a recently introduced new modality in the Far East (Malaysia). This paper arises to evaluate differences in the demography and outcome of ELVeS in the multiracial society.

Endovenous laser treatment of saphenous veins developed during the 1990s. However it took until 2001 when Min, Navarro and Bone published their first relevant paper about endovenous laser treatment of the great saphenous veins that brought the technique to the attention of the whole phlebology community. Today, endovenous laser treatment of saphenous veins offers the patient an outpatient procedure that frequently enables him or her to return to occupational activity the same day or the day after the procedure.

Additionally, because no relevant injury to the shin happens during endovenous laser treatment, the cosmetic outcome is usually excellent.

Mode of Action of Endovenous Laser Treatment

The final goal of endovenous laser treatment is the ablation of pathological reflux of blood by durable occlusion of the vein lumen. In general, this can be achieved either by shrinkage of the vein until the vein lumen has vanished completely, or by substantial damage to the endothelium and inner vein wall leading to secondary occlusion of the lumen by a clot, similar to the effect of a sclerocent agent.

How Endovenous Laser Works

Following percutaneous entry into the saphenous vein, a fine laser fibre is inserted into an introducer sheath and advanced towards the saphenofemoral or sapheno-popliteal junction. Once in position (confirmed by ultrasound and the laser aiming beam) the near infrared laser energy is delivered in short pulses causing thermal damage and contraction of the vein wall. Due to the application of tumescent local anaesthesia, damage of surrounding structures is inhibited. The laser treatment is performed along the entire vessel length. The irreversible thermal damage, induced by the laser energy then leads to a complete occlusion of the vein. The complete procedure takes about 30-45minutes; the patient can return to normal activities immediately with the exception of vigorous gym workouts. Residual vein laser treatment involves multiple avulsions of veins or following sclerotherapy (in the same time).

Effectiveness of Endovenous Laser Treatment

Immediate success of the small saphenous and great saphenous veins is 100% and 97% respectively. Long term results are still missing to date. The largest study reporting on 121 procedures at 24 months showed an occlusion rate of 93.4%. Early recanalization depends on the power (in Watts) of the laser used.

Local Outcomes in Penang

281 cases comprised a diverse mix of Chinese (61.9%), Indians (22.4%), Malays (6.0%) and foreigners (Indonesian Chinese and Caucasians) were undertaken at the Penang Adventist Hospital (see Table I). The female:male ratio depicted the disease condition affected the females more commonly. Overall, the average age of cases were 52.6 years – this ranged from the youngest 48.1 years in the Malays to the oldest of 52.9 years in the Chinese.

Table I : Demography of Varicose Veins in Penang Adventist Hospital

Ethnicity	Sex		Total No.	Ave. Age	Ave. BMI
	Male	Female			
Chinese	60	114	174 (61.9%)	52.9	24.7
Indian	25	38	63 (22.4%)	51.9	28.2
Malay	8	9	17 (6.0%)	48.1	32.5
Others	12	15	27 (9.6%)	55.2	25.5
Total/Average	105 (37.4%)	176 (20%)	281	52.6	26.0

Looking at the frequency of lower limbs lasered, 52% of the cases involved the left lower limb and 48% the right. The BMI shows an average of 26.3 with an unusual high value of 32.5 in the Malays compared to Chinese 24.7 and Indians 28.2.

Table II describes the presentation of complaints in both groups with pain being the most important (70.9%) followed by swelling (68.0%), cramps (65.1%), heaviness (60.7%), ulceration (57.9%), lipodermatosclerosis (28.1%), superficial thrombophlebitis (24.9%), eczema (22.7%), cellulitis (10.0%), and bleeding (6.0%). Generally, the Indians have the worst symptomatology of thrombophlebitis, cellulitis, eczema and venous ulcerations compared to all the different races. Post-operation symptoms showed significant improvement in the endovenous laser treatment for pain, swelling, cramps and heaviness ($p < 0.05$).

Table II : Presentation of Chronic Venous Insufficiency Pre and Post-ELVeS

Clinical Presentation	Chinese %		Indian %		Malay %		Others %		Total %	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Pain	73.0	8.6	92.1	22.2	82.4	29.4	73.9	17.4	76.9	17.4
Swelling	66.1	7.5	73.0	14.3	82.4	29.4	69.6	21.7	68.0	13.9
Cramps	63.8	4.5	27.6	6.3	70.6	11.7	65.2	8.7	65.1	7.5
Heaviness	55.7	0.0	27.6	3.2	70.6	11.7	65.2	4.3	60.7	4.6
Thrombophlebitis	20.7	0.0	28.6	0.0	52.9	0.0	30.4	0.0	24.9	0.0
Cellulitis	8.0	0.0	17.5	0.0	11.7	0.0	4.3	0.0	10.0	0.0
Eczema	19.5	0.0	30.0	0.0	35.3	0.0	13.0	0.0	22.7	0.0
Ulceration	21.3	0.0	39.7	0.0	17.6	0.0	17.4	0.0	57.9	0.0

Lipo-dermatosclerosis	21.8	0.0	50.8	0.0	29.4	0.0	17.4	0.0	68.1	0.0
Bleeding	7.5	0.0	1.6	0.0	5.9	0.0	8.7	0.0	6.0	0.0

The occupation of all patients with varicose veins who underwent endovenous laser therapy were depicted in Table III. Housewives were the most common group of people involved -105/281 (37.3%). All races have about equal proportion of housewives. The next commonest occupation involved salespersons, mainly Chinese 41/174 (23.6%) comparing sundry shop or mini-market owners or cashiers. Of the blue collar worker comprising labourers, tailors, seamstresses, hotel staff, drivers, farmers and others, the Indians predominate 11/63 (17.5%). Coming to the food-related workers like restaurant workers, coffee-shop owners or hawkers, the Indians again formed the majority 9/63 (14.3%). Among white-collar workers including managers, teachers, retired lecturers or professional, the foreigners dominate 3/27 (48.1%). Lastly, among factory workers like operators and technicians, the Indians again formed the largest in proportion 13/63 (20.6%). In brief, while the Chinese formed the majority by proportion for housewives and salespersons, the Indians predominate in the percentage of blue-collar workers, food-related workers and factory workers. White-collar workers predominated among foreigners by proportion.

Table III : Occupation- Rlated Cause of Varicose Vein in ELVeS Cases

Occupation	Chinese		Indian		Malay		Others		Total	
	M	F	M	F	M	F	M	F	M	F
Housewives	-	68	-	21	-	6	-	10	-	104
Salesperson	23	18	2	1	-	1	2	1	26	21
Blue-collar workers	17	7	10	1	3	-	1	-	31	8
Food-related workers	8	13	7	2	2	-	-	-	18	15
White-collar workers	7	4	2	4	-	-	9	4	18	12
Factory workers	5	4	4	9	3	2	-	-	12	15
Total	60	114	25	38	8	9	12	15	105	176

By percentage, the venous ulcers occurred most commonly in Indians 25cases (39.5%) followed by Malays 3 cases (17.6%) and Chinese 33 cases (21.0%). Interestingly the males were more commonly afflicted with venous ulcers 29/105 (27.6%) compared to females 35/176 (19.9%). The commonest sites of venous ulcers were the medial malleolus 42/64 (65.6%), then lateral malleoli 14/64 (21.9%) and dorsum foot/anterior leg/shin (12.5%). Simultaneous lateral and medial malleoli ulcers were present in 10 cases (3.5%).

Of the venous ulcers (Table V), the occupation most frequently afflicted was the food-related group of restaurant workers, hawkers or coffee-shop owners 16/33 (47%), followed by blue collar workers 9/38 (24%), salespersons 22/47 (21%) and housewives 22/104 (21%). Indians were the most common race involved with venous ulcers. Perhaps the poor socio-economic status, high body mass index (28%) and nature of occupations (food-related workers and blue-collar workers) may explain their predisposition. Of note, the venous ulcer infections are chronic and often severe needing therapeutic intravenous antibiotics. These infections denote the chronicity of the ulcers and antibiotics abuse in the community and lack of understanding both by patients or employers.

Table V : Venous Ulcerations in Different Occupations

Occupation	Number	Percentage (%)
Food-related workers *	16	47% (16/35)
Blue-collar workers	9	24% (9/38)
Salespersons	10	21% (10/17)
Housewives	22	21% (22/104)
Factory worker	4	15% (4/27)
White collar worker	4	13% (4/31)

- Food-related worker: Chinese 21, Indians 9, Malays 2

The complications of endovenous laser are shown in Table VI.

Table VI : Complications of ELVeS

Complication	Numbers (%)
Pain	75 (26.7%)
Induration	57 (20.3%)
Bruising	46 (16.4%)
Paraesthesia	33 (11.7%)
Phlebitis	11 (11.7%)
Laser burns	7 (3.9%)
Hyperpigmentation	5 (2.5%)
Residual VV (Incomplete lasered veins)	11 (3.9%)

Pain is usually common (26.7%) when high energy was delivered. They are usually well controlled by NSAIDS or cox-inhibitor. The pains described may be due to induration, phlebitis or paraesthesia.

Bruising is usually common and harmless resolving in about 2-3 weeks. Mostly, the echymosis is due to laser-induced perforation of the vein wall. Paraesthesia 11.7% (33/281) was common and usually last longest (2 weeks to 4 months). Laser burns 7 cases (3.9%) were mild and resolved with primary healing. They occurred mainly in the learning curve. They prevent an ulcer or erythema.

Hyperpigmentation (2.5%) were only evident in very fair skin individuals. Recurrent venous ulcers (3.5%) occurred in those who did not wear leg stocking, returned to their same occupation or continue to choose a sedentary lifestyle.

Satisfaction

Generally 91.8% (245/267) experienced satisfaction with 4.7% (122/267) being very satisfied. There was 4.9% (13/267) who experienced dissatisfaction.

Conclusion

In conclusion, the greatest benefit of the endovenous laser, apart from curing varicose veins cosmetically is the treatment of venous ulcers very effectively. Endovenous laser combined with sclerotherapy has thus given varicose veins and venous ulcer treatment a new dimension. There is indeed a paradigm shift not only in the way surgeons treat varicose veins but the request by patients, be it young or old, demanding early ambulation, less pain or avoiding general anaesthesia. Stripping, high ligation and subfacial ligation and other modalities of venous treatments maybe making its exit slowly.