ORIGINAL RESEARCH

# Radiofrequency and laser ablation for chronic venous insufficiency: A single-centre, retrospective study at a multispeciality, private hospital in Nairobi, Kenya

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## Abstract

### Background
Chronic venous disease can be defined as any long-term morphological or functional abnormality of the venous system manifested by symptoms or signs indicating the need for care. There are limited data from sub-Saharan Africa regarding the management of this condition with venous ablation. This is an early report of the experience of a single centre with a relatively new technique.

### Methods
We retrospectively reviewed cases of radiofrequency ablation and laser ablation for venous insufficiency between February 2016 and December 2020. Patients were selected based on symptoms; the Clinical, Etiological, Anatomical, Pathophysiological (CEAP) classification system; and duplex ultrasonographic findings of reflux at the saphenopopliteal junction and saphenofemoral junction. Most procedures were day cases performed under spinal anaesthesia.

### Results
There were 139 patients who underwent treatment. Of these, 27% were men, and 73% were women. The majority of patients, 54%, were classified as CEAP C3, with CEAP C5 accounting for the smallest proportion at 7%. Most patients (89%) underwent successful bilateral greater saphenous vein thermal ablation, and 53% underwent bilateral greater and lesser saphenous vein thermal ablation.

### Conclusions
Venous ablation therapy is a safe, efficacious, day procedure associated with rapid recovery.

**Keywords:** chronic venous disease, venous insufficiency, radiofrequency ablation, laser ablation, venous ulcer, Kenya

## Introduction

*Chronic venous disease* has been used to describe both visual and functional manifestations of abnormalities in the peripheral venous system. It can be defined as any morphological or functional abnormality of the venous system of long duration, manifested by symptoms or signs indicating the need for investigation or care.[1] These manifestations can have significant effects on quality of life.[2] There is a paucity of data from sub-Saharan Africa regarding the management of this condition with venous ablation.

The standard of care has historically been surgical venous stripping of the superficial veins of the lower limbs. This method has its challenges and limitations. The new standard of management is endovenous thermal ablation. This is a minimally invasive ambulatory outpatient procedure. It is an alternative to surgical stripping, comparable in efficacy, that eliminates reflux and alleviates symptoms and signs of saphenous disease.

Risk factors for the development of chronic venous disease include advanced age, family history of venous disease, prolonged standing, increased body mass, smoking, sedentary lifestyle, lower extremity trauma, prior venous thrombosis (superficial or deep), presence of an arteriovenous shunt, pregnancy, and high oestrogen states.[3],[4]

## Methods

This was a hospital-based, retrospective, observational study of patients diagnosed with chronic venous insufficiency attending The Karen Hospital, a 102-bed multispeciality, private hospital in Nairobi, Kenya. Between February 2016 and December 2020, 139 procedures were performed by 4 physicians and 1 surgeon. The numbers per operator were 65, 37, 23, 9, and 5, respectively. All operators underwent stepwise training for both radiofrequency and laser ablation treatment of varicose veins. This involved simulation training, online modules, specialist centre visits, proctorship, and industry support. Additionally, 1 nurse and 1 sonographer underwent training. Ethical approval was granted by the hospital's ethics committee.

Patients included in this analysis either presented with symptoms to a Karen Hospital outpatient clinic or were evaluated during numerous screening camps. They were assessed according to the Clinical, Etiological, Anatomical, Pathophysiological (CEAP) classification system for chronic venous disorders as follows: C0 (no varicose veins), C1 (telangiectasis), C2 (trunk varicose veins), C3 (oedema related to varicose veins), C4 (skin pigmentation), C5 (healed venous ulcer), and C6 (active venous ulcer). Patients with C3 and above, along with significant reflux, were offered thermal ablation.

The diagnosis of chronic venous insufficiency was confirmed by the presence of venous reflux on duplex ultrasonography (duration of retrograde flow >500 ms) for superficial and perforating veins. Doppler ultrasonography was also performed to exclude any deep vein thrombosis and to determine suitability for thermal ablation. Blood tests, including haemogram, urea, creatinine, electrolytes, and international normalized ratio assessment, were performed. Anaesthetic review for operative suitability was also performed.

Procedures were performed as day cases under spinal anaesthesia. There were 114 radiofrequency ablations performed using 7F ClosureFast RFA radiofrequency ablation catheters (Medtronic, Minneapolis, MN, USA) and 25 procedures used 6F ELVeS Radial fibre laser catheters (biolitec, Vienna, Austria). Veins were initially mapped by a sonographer; however, as experience increased, this step was omitted. Ultrasound-guided puncture was carried out using a 6F radial sheath system.

The position from the junction with the deep system was confirmed by ultrasonography, and then the catheter was inserted and directed towards the saphenopopliteal and saphenofemoral junctions. Catheter placement was confirmed under ultrasound guidance 2 cm away from either junction, and tumescent local anaesthesia (lignocaine, sodium bicarbonate) was infiltrated along the vein. The catheter was withdrawn according to the catheter markings at 20- or 40-second intervals at 120° ablation for the radiofrequency catheter. Laser ablation was performed by withdrawing the catheter at 2-second intervals, guided by a beeping sound from the machine. The sheath was removed before the final 2 ablations, guided by the catheter markings. Phlebectomy was performed in 4 of 24 patients (16.7%) with active ulcers.

**Table. Clinical, Etiological, Anatomical, Pathophysiological (CEAP) classifications of patients who underwent venous ablation at the Karen Hospital, Nairobi, Kenya, February 2016 through December 2020 (N=139)**

| CEAP Class | n (%) |
|---|---|
| C3 | 75 (54) |
| C4 | 30 (22) |
| C5 | 10 (7) |
| C6 | 24 (17) |

Dressings were applied to the access sites, followed by leg compression using orthopaedic padding and crepe bandaging from the foot to thigh. Patients were discharged once they were able to walk; at discharge, patients were prescribed 1 g oral paracetamol 3 times daily as required for pain control for 5 days. Compression bandages were removed after 48 hours, and patients were advised to wear compression stockings daily for 1 month. All patients were reviewed 1 week after discharge to check puncture sites and healing progress. Venous Doppler ultrasonography was also performed to exclude deep vein thrombosis, superficial vein collapse, and venous ulcer progression.

## Results

There were 139 patients who underwent treatment between February 2016 and December 2020. Of these, 27% were men, and 73% were women. The majority of patients, 54%, were classified as CEAP C3, with CEAP C5 accounting for the smallest proportion at 7% (Table). Most patients (89%) underwent bilateral greater saphenous vein ablation in 1 sitting, and 53% underwent bilateral greater and lesser saphenous vein ablation.

There were 2 periprocedural complications: (1) an introducer wire fracture and (2) thermal damage to the introducer sheath, which were both managed successfully. In 1 patient, there was poor accessibility to the greater saphenous vein, and therefore the greater saphenous vein was ligated. Postprocedural complications included 4 patients (3%) with deep vein thrombosis.

Minor nerve damage was noted in 6 patients (4%), characterized by partial loss of sensation over the shin. Cellulitis was reported in 3 patients (2%). Three patients (2%) had recurrent greater saphenous reflux and required repeat procedures. Two patients (1%) classified as CEAP C6 had recurrent ulcers 6 months after their respective procedures.

## Discussion

Our findings demonstrate that laser or radiofrequency ablation can be performed safely as an outpatient day procedure. Previous studies have shown thermal ablation to be safe and effective, with the advantage (over surgery) of faster recovery.[5] The outcomes at 6 months were good, with only 3 of 139 patients (2%) presenting with recurrence. A randomized controlled trial of surgery vs endovenous laser ablation for treating symptomatic great saphenous varicose veins showed

that clinical recurrence was more frequent following surgery than following endovascular laser ablation at 5 years.[6]

A systematic review and meta-analysis of randomized controlled trials evaluating long-term outcomes of endovenous management of lower extremity varicose veins found that endovenous laser ablation and radiofrequency ablation are as effective as conventional surgery for treating saphenous venous insufficiency.[7] Good clinical outcomes were shown after radiofrequency ablation with respect to CEAP and quality of life outcomes.[8]

## Conclusions

Venous ablation therapy is a safe, efficacious, day procedure associated with rapid recovery.

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