Endovenous laser ablation of varicose veins with the 1470-nm diode laser

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Background: Endovenous laser ablation (EVLA) is one of the most accepted treatment options for varicose veins. In previous studies conducted with a laser at 810 to 1320 nm, paresthesia, pain, and ecchymosis were common adverse effects. We hypothesized that a lower linear endovenous energy density (LEED), as used with the 1470-nm diode laser fibers, would lead to a reduction in adverse events.

Methods: We conducted a prospective, nonrandomized observational cohort study of 312 consecutively treated lower limbs in 286 patients. Of these, a bare laser fiber (ELVeS-plus kit) was used to treat 168 legs in 150 patients (group 1), and a radial fiber (ELVeS-radial kit) was used in 144 legs in 136 patients (group 2). Laser treatment was performed in the great saphenous vein. Follow-up for all patients was 3 months. The primary end point was the occurrence of ecchymosis and bruising. This was correlated to the reduced LEED needed with the 1470-nm diode laser.

Results: Laser fiber (odds ratio [OR], 22.3; 95% confidence interval [CI], 20.2-24.5) and body mass index (OR, 0.35; 95% CI, 0.15-0.55) were identified as independent parameters for LEED. In group 2 compared with group 1, LEED in the great saphenous vein could be reduced from 79.4 ± 9.1 to 57.4 ± 10 J/cm (P < .0001). LEED was an independent parameter for skin bleeding (OR, 1.04; 95% CI, 1.017-1.088). Ecchymosis and bruising were significantly less frequent in group 2 than in group 1 (P < .001). The need for analgesia was low, with 103.08 ± 15.34 mg diclofenac sodium in group 1 vs 82.08 ± 18.86 mg in group 2 (P < .04). Occlusion with elimination of reflux was achieved in 100% of group 1 and group 2 (P < 1). No recanalization occurred at follow-up.

Conclusion: Endovenous laser treatment of varicose veins in the great saphenous vein with the 1470-nm diode laser is safe and highly effective. The lower energy level needed using the radial laser fiber significantly minimized adverse effects compared with the bare laser fiber. (J Vasc Surg 2010;51:1474-8.)

Varicose veins are a common disease in Western countries, with a prevalence of up to 20% in men and >25% in women.1 In the last decade, the spectrum of treatment for varicose veins has been broadened. New, less invasive treatment options than surgery have been introduced, such as ultrasound-guided foam sclerotherapy, radiofrequency ablation, and endovenous laser ablation (EVLA). The first report on EVLA was published in 1999.2 Several studies have since been published reporting different regimens for the energy per surface area (J/cm), pulse duration, and wavelength of the laser. The published data on efficacy and safety of laser treatment arise from a laser with a wavelength between 810 and 1320 nm and show 90% to 100% occlusion.3-7

A new-generation laser with a longer wavelength of 1470 nm was recently introduced. Some have hypothesized that efficacy would be higher due to higher specificity for the interstitial water in the vessel wall of this laser and lower absorption by hemoglobin.8-9 However, data are scarce. We assessed the efficacy and safety of the new laser with 1470-nm wavelength in a prospective study in consecutive patients and compared efficacy and safety of the 1470-nm bare fiber vs the 1470-nm radial laser fiber. We also studied the lower linear endovenous energy density (LEED) used with the different 1470-nm laser fibers and its correlation to the observed postinterventional skin bleeding.

METHODS

Patients. Our prospective, nonrandomized study included consecutive patients who underwent EVLA of incompetent varicose veins. All patients who presented at our vascular diagnostics unit were referred by their general practitioners for symptoms suggestive of symptomatic varicose veins. All patients gave informed consent for the procedure. The study protocol was approved by the institutional ethics committee of the University of Freiburg Medical School.

All patients were seen by a vascular physician who specialized in venous disease. The baseline examination included history, physical examination, and venous duplex ultrasound imaging of the lower extremity veins. Inclusion criteria for the study were varicose veins with ultrasound-documented reflux in the great saphenous vein (GSV) judged suitable for endovenous treatment. We excluded patients from EVLA treatment if the average size of the varicose vein was >2 cm or if there was extreme tortuosity.

Examinations and procedures. Venous ultrasound imaging was performed at each presentation (HDI 5000, linear array, 4-7 MHz [ATL, Bothell, Wash] and zone