Journal of Phlebology and Lymphology

Endovascular Laser in the Treatment of surface venous insufficiency of Lower Limbs

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Published: 24 August 2009
Journal Phlebology and Lymphology 2009; 2:10-12

Received:12 November 2008
Accepted: 24 August 2009

Abstract

The aim of this current study was to evaluate the efficiency in terms of vein occlusion of endovascular therapy in the treatment of insufficiency of the saphenous vein and its branches using high-power, 810-nm wavelength laser diodes.

From June 1st 1999 to December 30th 2002, 136 women and 79 men with ages ranging from 25 to 79 years old were consulted and a total of 365 lower limbs were treated. A high-power 810-nm wavelength diode laser was employed using a semi-rigid fiber optic quarz system of 400 and 600 microns. For statistical analysis percentages were used.

In the three-month control examinations, six cases (1.64%) presented with a flow in the saphenous vein with re-interventions necessary in three cases; in the other three cases a progressive evolution to fibrosis of the vein was observed. In the other 359 cases (98.35%) fibrosis of the veins were evidenced. In conclusion, endovascular treatment by laser is satisfactory in the approach of the superficial varicose veins of the lower limbs.

Introduction

Endovenous techniques such as radiofrequency ablation (RFA) and endovenous laser therapy (EVLT) have emerged as minimally invasive percutaneous procedures for the ablation of incompetent greater saphenous veins in patients with varicosity and venous insufficiency [(1-4)].

This technique appears to be very successful in reducing symptoms, resolving varicose veins and healing ulcers [(3)]. Intravascular blood plays a key role in homogeneously distributed thermal damage of the inner vein wall during EVLT [(5)]. However, It is still not clear whether high doses of energy are associated with successful EVLT, particularly when doses of more than 80 J/cm are delivered [(2)].

Early reports suggest that both these techniques, provide excellent technical success rates wich few major complications. complication such as deep venous thrombosis or pulmonary embolism with the use EVLT [(1)].

The aim of this current study was assess safety and efficiency of endovascular therapy by evaluating residual flow which may be the cause of pulmonary embolism of therapy in the treatment of insufficiency of the saphenous vein and its branches using high-power 810 nm wavelength laser diodes in an uncontrolled series from a single center.

Method

From June 1st 1999 to December 30th 2002, 136 women and 79 men with ages ranging from 25 to 79 years old were consulted and a total of 365 lower limbs were treated. Was made clinical examination and a colored echo-Doppler investigation. One hundred and fifty-eight patients presented with distal saphenous vein

insufficiency and 207 were treated for ostial reflux, 54 of the short saphenous vein and 153 of the greater saphenous vein. Patients suffering from chronic venous insufficiency with trophic disorders, ulcers, peripheral arteriopathies, chronic diseases or deep venous thrombosis or who were pregnant or breast-feeding were not considered for the study.

The procedure was performed in the out-patients' clinic or during a short period in hospital. In cases of ostial insufficiency, local anesthesia using 1-% lidocaine hydrochloride without epinephrine in the inguinal fold or in the popliteal fossa was performed with neuroleptoanesthesia (analgesic) support, to continue with the rest of the procedure. These patients stayed in hospital for only three or four days in the postoperative period.

For another group of patients with ostial competence, but with saphenous vein or perforating or side branches insufficiency, Klein's tumescent anesthesia (20 cc of 2% lidocaine hydrochloride with epinephrine, 10 cc of 1/6 m bicarbonate and 450 cc of ClNa saline solution) was infiltrated along the varicose veins. All these cases were treated in the out-patients' clinic.

A high-power 810-nm wavelength diode laser using a quartz semi-rigid fiber optical system of 400 and 600 microns in thickness depending on vessel size as evaluated by Doppler was utilized with the point on the contact plane in a continuous surgical manner.

Initially, the insufficient veins were marked with the patient in the upright position using dermographic markers. Anesthetic infiltration was achieved and dissection of the crest of the greater saphenous vein was performed ligating its branches and the proximal saphenous vein where it joins the common femoral vein and subsequently its distal end was repaired.

The greater saphenous vein was then punctured in the pre-malleolus region by an 18G needle. Using this needle, a 600-μm pre-carbonized semi-rigid quartz fiber optic cable was inserted into the vein. When a distal puncture was impossible, the pre-malleolar saphenous vein was carefully dissected. It is always important to check that the optic fiber cable is really inside the vein and that it can be easy moved inside the vein without any difficulties whatsoever. Additionally, the transdermal illumination of the laser tip (red point of 635 nM diode) must be checked to the inguinal fold, emerging through the sectioned and repaired distal saphenous vein or up to the previously marked point of reflux, for example the perforating veins of the Hunter canal, as diagnosed using the echo-Doppler. Where necessary, the procedure was performed guided by echo-Doppler.

With the insufficient side and perforating veins the procedure was similar using the necessary punctures to achieve the treatment of all the varicose veins and to block the reflux points with the power varying between 4 and 10 watts depending on requirements.

In cases where dissection of the pre-malleolar saphenous vein had been necessary to, it was sutured in a similar way to the inguinal incision and afterwards covered with a transparent adhesive bandage. After an aseptic wash using saline solution, a medium elastic restriction with bands of medium elasticity or a sterilized stocking was placed to protect the entire treated limb. The patients were discharged or soon as they recovered from the anesthesia, returning to their normal life within 48 hours. The treatment was controlled by echo-Doppler examinations. With control follhow-up examinations perform three months after the primary procedure.

The development of this technique was approved by the Bio-ethical Committee of the Central Military Hospital of Buenos Aires and all the patients were duly informed of the procedure and signed a written consent agreement.

Results

The three-month control duplex examinations, the flow had returned to the saphenous vein in six cases (1.64%) and in three cases re-interventions with surgery were required; in the other three an evolution which appeared to be fobrosis was observed , further examinations after approximately one year demonstrated complete resolution of the problem . In 359 of the cases (98.35%) the treatment was considered successful as Doppler showed complete occlusion the saphenous vein with the formation of fibrosis. The examinations of the first cases, after an evolution of three and a half years, showed absence of any vein in the saphenous region in all the cases evaluated.

Discussion

The present study showed that the endovascular treatment with laser is a satisfactory alternative for superficial varicose veins of the lower limbs and protect of pulmonary embolism, but also shows that occasionally in some cases occlusion may not occur or recanalization of the saphenous vein may take place. The parameters influencing failure and recanalization rates of endovenous laser treatment of the greater saphenous vein are still to be determined [(6)]. One of the reasons for failure is related with the quantity of energy utilized [(2,6)].

It was observed in this study that there is a direct relationship between the time of exposure of the tissue to the light of the laser with the effect that it produces. However, it is necessary to keep a velocity of fiber extraction constant at 5 seconds per cm, so that it takes approximately 5 minutes to treat the whole greater saphenous vein.
The laser energy was delivered in a continuous manner and simultaneously the fiber optic cable was gradually removed, compressing the venous passage to be treated so that the lumen of the bloodless vein closed. The laser used from 10 to 14 watts according to the degree of insufficiency of the vein being treated.

In the present study the crest of the saphenous vein was tied because it was believed that the question of the vertical reflux would not be totally solved by endovenous treatment without the ligation of the insufficient crost with the possibility of evolution to pulmonary embolism of seen in anecdotal observation . Moreover, because of the possible anatomic variations where the veins meet in Scarpa's triangle, it has been suggested that the crest of the saphenous vein should be ligated two or three centimeters from the ostium of the femoral vein.
One study has shown the progression of a thrombus to the femoral vein and this possibility should be remembered [(1)]. The ligature of the crest of the saphenous vein can avoid this complication and improve the success of the procedure. Another study showed the development of an arteriovenous fistula after the endovascular procedure [(7)]. The safety and the efficacy of the procedure must be valorized in evaluations of this technique, but also possible complications must be considered [(8-10)]

Conclusion

It was concluded that the endovascular laser with surgical ligation of the saphenofemoral junction is satisfactory in the treatment of the superficial varicose veins of the lower limbs and protect of pulmonary embolism.

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