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Endovenous laser ablation of spermatic vein for the treatment of varicocele

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ABSTRACT

Introduction: Varicocele is a relatively complex pathology of the scrotum veins', known to be one of the easiest to treat. Modern treatment involves both surgical (open, laparoscopic and microsurgery) and interventional approach (either with coils and/or sclerosant injection). Our aim is to demonstrate the feasibility and the reliability of endovenous laser ablation (EVLA) of the spermatic vein for the treatment of varicocele.

Materials and methods: We consecutively and prospectively treated 11 patients (age range 24–45 years old, mean 31y) with left varicocele, phlebografically classified as Bahren type I and with indication for percutaneous treatment. Clinical success was evaluated by color doppler ultrasound (CDUS) one week, one months and three months after the procedures. We also evaluated the pain feeling for 48 h after the procedure on the basis of the visual analogue score (VAS) obtained through telephonic interview.

Results: Technical success was achieved in all cases. In all cases varicocele disappeared at CDUS at 1 and three months with reflux abolition. Two cases of small vein laceration were noted without sequelae, no other complication has been described. All patients reported improvements either regarding symptoms and/or spermiographic parameters.

Conclusions: In our experience, EVLA of spermatic vein is a feasible and safe treatment in patients with Bahren type I varicocele. The key advantage of this technique is the adoption of a standardized protocol, which remains one of the main problems in gaining scientific evidence in case of coil or sclerosant embolisation (type and number of coils, amount of sclerosant agent etc).

1. Background

Current treatment of varicocele involves both surgical (open, laparoscopic and microsurgery) and interventional approach (either with coils and/or sclerosant injection). Moreover, percutaneous embolization of the spermatic veins for treatment of varicocele represents a less invasive and effective alternative to surgery, with similar results in terms of outcomes and safety [1,2].

2. Objective

The aim of this study is to demonstrate the safety, feasibility and the reliability of endovenous laser ablation (EVLA) of the spermatic vein for the treatment of varicocele. EVLA has been first introduced in the treatment of venous insufficiency; more specifically from modern literature we would find practice of this technique for treatment of varicose veins usually long saphenous vein and short saphenous vein (both above and below the knee) with good results compared to ligation, phlebectomies and stripping [3,4]. In a scenario/context of varicose veins pathologies, including varicocele, EVLA may potentially overcome complications related to sclerosant injection (SIR), such as stroke, myocardial infarction and fatal pulmonary embolism, it has been reported in the treatment of varicose vein but it can be applicable to any sclerosant injection; it would also be able to avoid complications

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Fig. 1. Pre-procedural (A) and post-op (B) phlebographic imaging showing the refluxing flow into the distal portion of left internal spermatic vein, occluded after EVLA.

derived by the use of coils, such as migration and/or allergies [2,5–7]. Just one abstract from 2013 by Chamsuddin et al. reported efficacy of the EVLA in the treatment of both male varicocele and female pelvic congestion syndrome, authors did mention their 11 cases where treated with coils and/or foam sclerosant along EVLA [8]. We present a first report on the use of percutaneous EVLA alone to occlude the left spermatic vein in 11 patients with left testicular varicocele.

3. Materials and methods

We treated 11 patients (age range 24–45 years old, mean 31y) with left varicocele, phlebografically classified as Bahren type I and with indication for percutaneous treatment. The patients in this manuscript have given written informed consent to publication of their case details. Access was achieved through the right basilic vein in nine cases and through the right common femoral vein in two cases. Both veins were cannulated under ultrasound guidance and a 5 french MPA or Cobra C2 shaped catheter was easily advanced on a 0,035′ hydrophilic wire. Once the left spermatic vein was cannulated, a radial 1470 nm laser fiber (Biolitec AG, Germany) was inserted coaxially into a 5 french 70 or 90 cm long sheath till the distal portion of the vein (Figs. 1 and 2). Due to the fact that the tip of the fiber didn't present any radiopaque marker, we tested the length of the fiber inside the sheet in order to expose three cm outside its tip (Figs. 1 and 2). According to the manufacturer protocol, we applied an energy/cm of 50J at 5 W (power), in continuous wave fashion in three different locations of the left spermatic vein below L3 in order to avoid non-target damage of the crossing ureter. The procedure was performed with patients under conscious sedation, in outpatient fashion. Total occlusion of the spermatic vein at venographic control was considered as technical success. Clinical success was evaluated by color doppler ultrasound (CDUS) one week, one months and three months after the procedures. We also evaluated the pain feeling for 48 h after the procedure on the basis of the visual analogue score (VAS) obtained through telephonic interview after discharge.

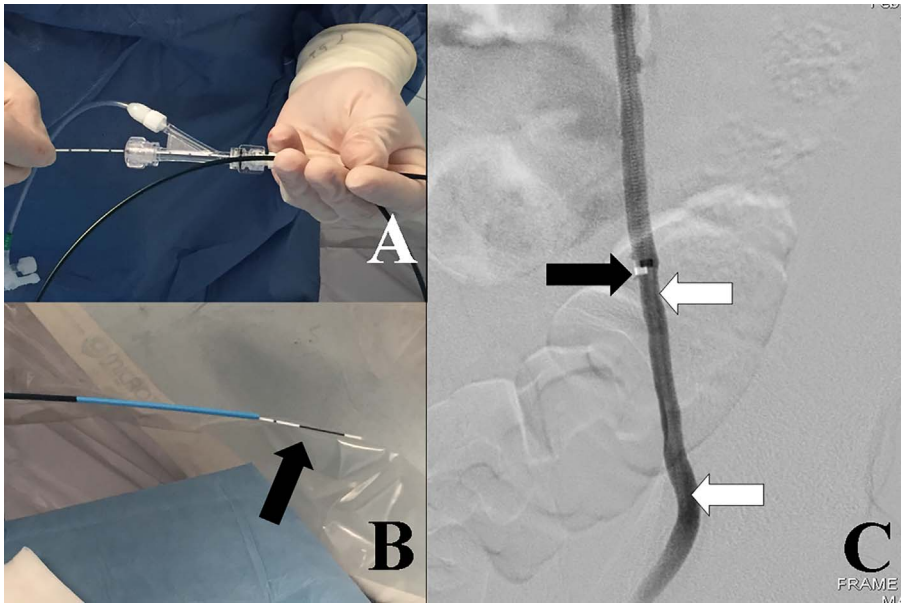

Fig. 2. Laser fiber (A) coaxially inserted into the vascular sheet, with the tip (B)(black arrow), also well seen (C)(white arrows) after contrast injection outside the radiopaque marker of the distal portion of the sheet (black arrow); note that the laser fiber is not provided with radiopaque markers.

4. Results and limitations

Technical success was achieved in all cases. In all cases varicocele disappeared at CDUS at 1, three and six months, when available, with reflux abolition. In one case, a small vein laceration was noted without sequelae; no other complication has been described. All patients reported improvements either regarding symptoms and/or spermiographic parameters. We believe there is no need for concomitant use of coils and/or sclerosant, where imaging is revealing no reflux to the spermatic vein. Main limitation of our study is the narrow population investigated, limited to Bahren type 1 for this first trial; hereafter we are currently awaiting laser's manufacturer to develop a dedicated radio-opaque marker for fiber's tip.

5. Conclusions

EVLA is widely used in the treatment of varicose veins of lower extremities. Initially, bare fibers were used to performing trans-venous laser- treatments [9]. These fibers rapidly carbonize resulting in a small high-temperature zone (up to1000 °C) on the distal tip, called "hot spot". The hotspot may come into contact with the venous wall, causing a contact-lesion, ranging from a burn to a perforation of the vein itself. To overcome these problems, new fiberoptics have been developed specifically for EVLA [9,10]. In particular radial fiber types emit laser-light laterally and circumferentially, with an angle close to 70° from the fiber axis. Radial fibers, when used with recommended power settings, do not carbonize; thus, the 1470 nm laser-light can penetrate the venous wall, being absorbed by water, its cromophore. Based on in-vitro or in- vivo histological studies, the resulting thermal damage is uniform, deep, and circumferential, and without contact- lesions [10,11] and this explains the high success-rate observed; the absence of contact-lesions may justify the lower ecchymosis burden and the modest post-operative pain observed with radial fibers. We believe there is no need of concomitant tumescent anaesthesia within the procedure: the radial laser fiber action, as mentioned above, are less invasive and there is less risk of non-target injuries. Hence for safety reasons our procedure involved a 10–15 min of deep sedation at this stage. The use of EVLA is indicated for venous insufficiency thus its use for varicocele treatment cannot be theoretically considered as an off label one.

In our experience, EVLA of spermatic vein is a feasible and safe treatment in patients with Bahren type I varicocele. The key advantage of this technique is the adoption of a standardized protocol, which remains one of the main problems in gaining scientific evidence in case of coil or sclerosant embolisation (type and number of coils, amount of sclerosant agent etc). Furthermore, there would be room for improvement with a dedicated endovascular laser fiber with radiopaque markers. We believe that a wider population with a long-term comparison with other available techniques would provide more glances regarding our approach to vein's care, particularly varicocele.

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Conflict of interest

All authors declare that they have no conflicts of interest.

Ethical approval statement

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent

Informed consent was obtained from all individual participants included in the study.

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