	980 nm	1320 nm
BMI < 25	410 limbs	130 limbs
BMI ≥ 25	95 limbs	38 limbs
Power (W)	12,25	8,1

TABLEAU 5 : Data of patients treated with 980 nm and 1320 nm lasers.

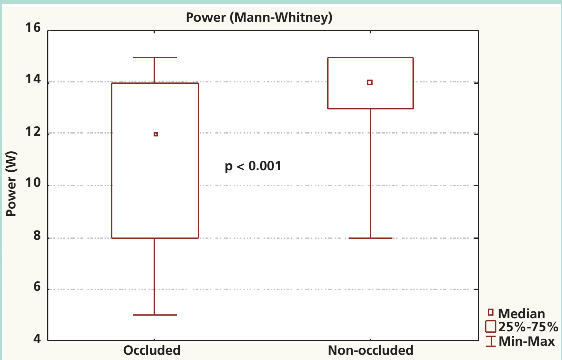

FIGURE 4 : Occlusion plotted against power (Mann-Whitney).

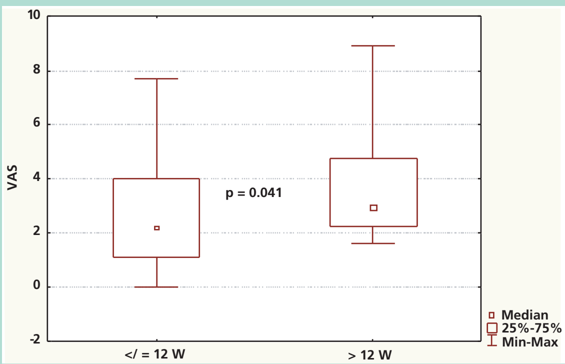

FIGURE 5 : Postprocedural pain evaluated by patient plotted against power.

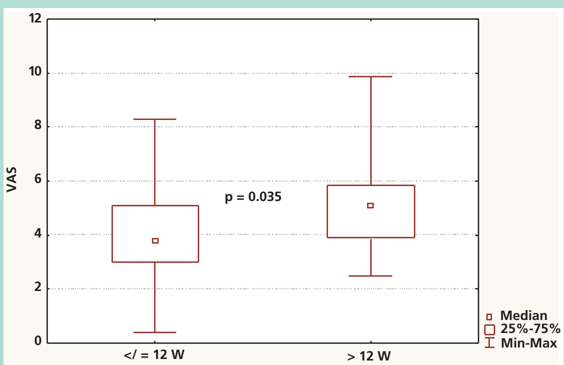

FIGURE 6 : Bruising evaluated by physician plotted against power.

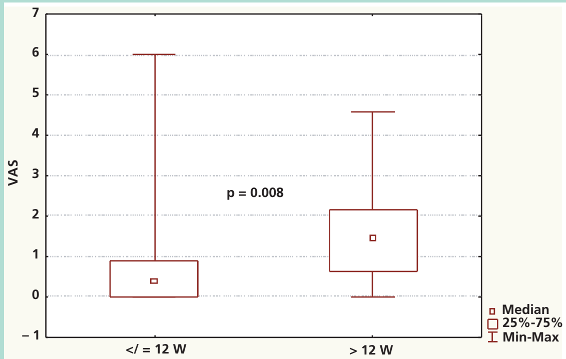

FIGURE 7 : Induration evaluated by physician plotted against power.

- Immediate post-operative sequelae at D5 were significantly more favorable in lower power group (5 to 12 W) compared to 15 W group :

– pain (p = 0.041) : median [inter-quartile range] : 2.2 [1.1-4.0]) vs. 2.9 [2.25-4.75] **(Figure 5)** – bruising or hematoma (p = 0.035) : 3.8 [3.0-5.1] vs. 5.1 [3.9-5.85] **(Figure 6)** ;

– induration (p = 0.008) : 0.4 [0-0.9] vs. 1.45 [0.65-2.15] **(Figure 7)**.

- In both cohorts, no statistically significant difference was observed in terms of usual daily activities, sleep-related difficulties and prolonged standing position. The degree of phlebitis of GSV and eventual pain killer medication was same in both groups. QoL 1 month after procedure was also similar.

Discussion

- The amount of applied energy is of paramount importance during endovenous laser treatment. Undertreatment can result in a clinically unsatisfactory outcome, and overtreatment leads to adjacent tissue destruction without additional shrinkage and fibrosis of the targeted tissue. To establish the optimal parameters, it is necessary to determine the response of venous tissue to different thermal insults over different time periods. Furthermore, laser wavelength can also play an important role. One randomized and single-blinded study compared 810 nm and 980 nm diode lasers. Ecchymosis and superficial phlebitis was more often present when 810nm laser was used [15]. In order to minimize complications and side-effects, longer-wavelength lasers were developed [16].
- Some studies have recommended application of higher power (30 W) in order to administer high amount of laser energy to the venous wall [17, 18].
- In other studies [19, 20, 21], satisfactory outcome with low rate of complications and side effects was obtained by using quite low amounts of diode laser energy (35-39 J/cm) and power (11-12 W).

• **The results of our study showed that the clinical outcome does not improve by using higher laser power (15 W).** Moreover, using this power setting might amplify the deleterious effect of the thermal laser treatment without increasing the therapeutic effect. Higher power produces substantial carbonisation of the fiber tip with additional temperature elevation and possible wall perforation. Higher power can also result in desintegration of the fiber tip due to carbonisation process. The current study showed significantly higher rate of side-effects for 15 W power group compared to lower power groups.

• Not only the total amount of energy per centimeter of vein length (LEED) can influence the final result but also the energy deposition pattern. **We found that "slow" heating using a low or medium power (8 to 12 W) with slow pull-back speed of 0.2 to 2 mm/sec lead to the best outcome** with minimum complications.

Conclusions

Based on our observations, we recommend low or medium power settings (8 to 12 W) with slower pull-back speed of laser fibre to achieve sufficient energy per centimeter of the vein and the optimal clinical outcome with minimal side-effects. Theoretical danger of prolonged heating of surrounding tissues can be successfully managed with ultrasound guided tumescence.

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