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EVALUATION OF TELANGIECTASIA TREATMENT RESULTS USING AN ELECTRO-OPTICAL SYNERGY METHOD

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ELOS technology uses a simultaneous activity of a semi-conductor laser light and bipolar current of high radiofrequency (RF). The laser energy is absorbed by hemoglobin in the dilated vessels through a selective photothermolysis. Energy of the radiofrequency current, conducted through the skin, heats the vessel up until it reaches the temperature which destroys it. This technology is the basis of safe and effective ablation of small vascular lesions up to 4 mm in diameter.

The aim of the study was evaluation of treatment results with application of a combined percutaneous technique using synergistic RF frequency activity and a diode laser.

Material and methods. One -hundred and fifty women ages 23 to 68 years (mean=41.1) qualified for the treatment. None of the patients had a history of deep venous insufficiency. Electro-optical synergy (ELOS) technology was used as a treatment approach. The time for the procedure ranged from 10 to 30 minutes (average=18 min.). Treatment results were evaluated after 30 days using both a four-point medical evaluation scale and a four-point subjective assessment-of-satisfaction scale. The degree of pain accompanying the procedure was also determined.

Results. In a medical evaluation, after all procedures were complete, 102 very good results were obtained (68%) and we did not succeed in 48 cases (32%). In a subjective evaluation, 120 (80%) very good or good and 25 (16.6%) unsatisfactory assessments were obtained. The results of the treatment were assessed as satisfactory by 5 patients (3.4%).

Conclusions. 1.The ELOS technique is an efficient and safe method of telangiectasia treatment. 2,The ELOS technique gives a high percentage of good and very good treatment results, both in medical evaluations and patients' subjective assessments.

Key words: telangiectasia, treatment, ELOS

Isolated telangiectasias, also called "spider veins", affect approximately 10% of the population over 40 years of age, and this percentage increases in the later decades of life (1). Such changes are several times more frequently observed among women than in men. Various forms of telangiectasias are prevalent among nearly all patients with symptomatic lower limb varices, and they can occur together with other forms of venous insufficiency.

The prevalence of isolated telangiectasias largely constitutes an aesthetic problem. In many cases, this condition is not tolerated, particularly by women, because it significantly influences their self-esteem and psychological comfort, thus becoming not only a cosmetic issue but also a medical one (2). Among some patients, telangiectasias can also be a source of pain, particularly if they occur near the popliteal fossa. For the above reasons, treatment of this pathology has both aesthetic and medical indications.

Obliteration techniques, electrocoagulation with high-frequency currents (RF), and percutaneous laser irradiations (3) are all used to treat telangiectasias.

The purpose of this study was to evaluate the results of a combined therapy involving

application of a percutaneous technique using synergistic RF frequency activity and a 900 nm diode laser (electrooptical synergy –ELOS) (4).

MATERIAL AND METHODS

One-hundred and fifty women ages of 23 to 68 years (mean=41.1) qualified for treatment. The patients applied for treatment because of aesthetic discomfort. The coexistence of pain was confirmed in 12 women (9%). By USG-Doppler examination, evidence of discrete venous insufficiency within the superficial system was observed in 33 women (21%). This finding did not correlate with the occurrence of clinical symptoms consistent with venous insufficiency. None of the patients had traits consistent with deep venous insufficiency.

ELOS technology was applied during the treatment (Polaris' Aurora system, Israel) (fig. 1).

Both the magnitude of each impulse and the number of impulses delivered were selected based on parameters such as the diameter of the vessel being irradiated, the extensiveness of the pathology, and skin phototype. The power of the RF impulses varied from 65 to 100 J/cm^2 (average 72 J/cm^2) and the power of laser impulses varied from 70 to 120 J/cm^2 (average 84 J/cm^2).

The number of impulses applied during a single procedure varied from 112 to 325 (average 182). The time required for the procedure ranged from 10 to 30 minutes (average 18 min).

Results of the treatment were evaluated after 30 days. Cases with no visible improvement were withdrawn from further trials of this method of treatment. In the remaining cases, further proceedings depended on the results of the first treatment. If alterations subsided, the treatment was discontinued; in cases of visible improvement, the procedure was repeated 2-3 times.

Results were evaluated on 30 day of each application. An exemplary effect of ELOS application is shown in fig. 2.

A four-point medical evaluation scale and a four-point scale for subjective assessment of satisfaction with treatment effectiveness were used to evaluate the results (fig. 3). The degree of pain accompanying the procedure was also determined by means of a 10-point pain visualization scale, where "0" indicated the absence of pain and "10" indicated unbearable pain. The occurrence of other undesirable phenomena accompanying the treatment was also determined and their course was analyzed.

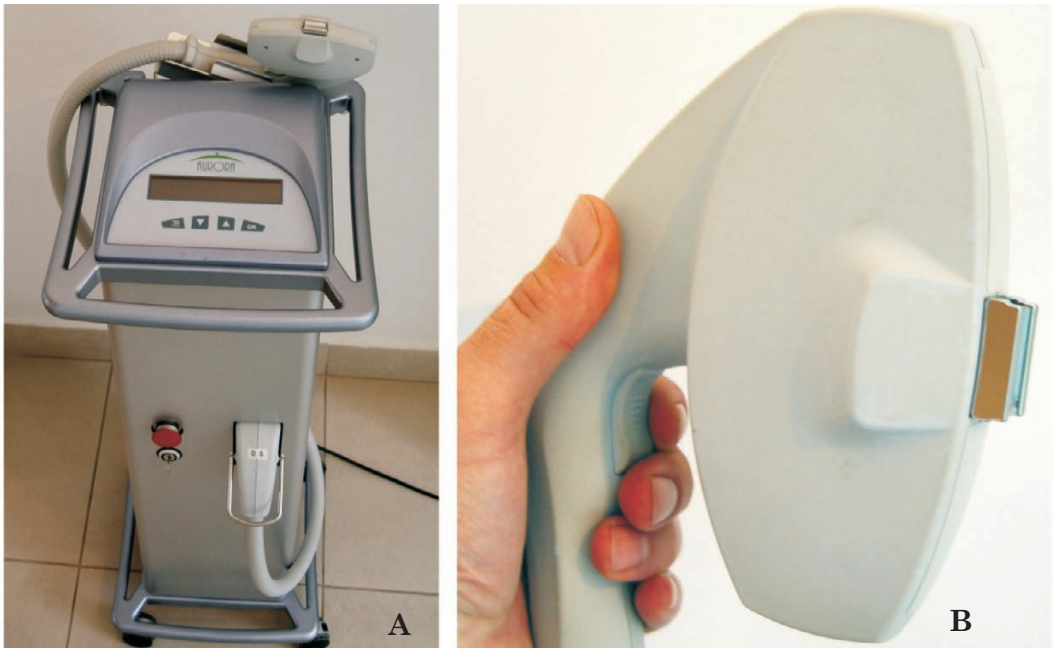

Fig. 1. ELOS system apparatus (Aurora, Polaris). A – central unit: RF generator and diode laser, B – irradiation head

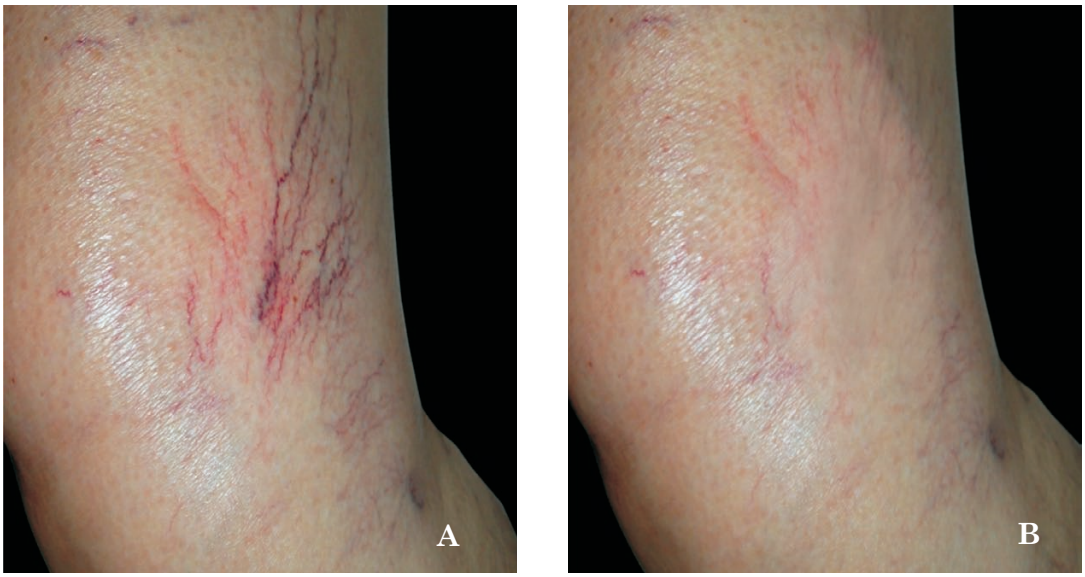

Fig. 2. Scales for ELOS technique evaluation of treatment results. A – telangiectasia of the right thigh before intervention, B – condition 30 days after irradiation (120/85 J/cm^2)

Medical evaluation of treatment results scale

Result	Criteria
Very good	total disappearance of irradiated alterations
Good	slightly visible "shadows" in irradiated area
Satisfactory	visible improvement in irradiated area: fewer alterations and their blanching
Unsatisfactory	lack of improvement after irradiation

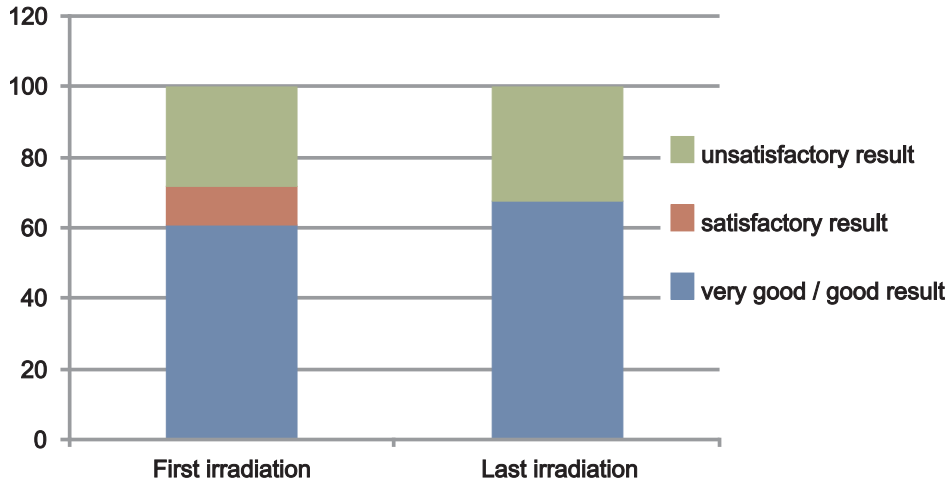

Fig. 3. Treatment results according to a medical evaluation

Technique of the procedure

The procedure is performed in a recumbent position, and both patient and doctor wear protective eyeglasses.

The skin is covered with gel to facilitate cooling and electrical conduction. The irradiation head should be placed perpendicularly to the skin surface above the target vessel. Applying pressure on the head is not advisable, as it pushes blood out of the vessel and thus reduces the effectiveness of the procedure. At first, 2-3 testing irradiations are performed, using energy doses appropriate for the patient's

skin type as recommended by the producer. Skin reactions such as erythema or slight swelling around the vessel suggest efficacy; therefore, if these signs develop within 5 minutes, irradiations are continued without changing energy doses (5). If no skin reactions are observed within 5-10 minutes, the irradiation power should be increased by 10-15 J/cm^2. Energy doses can be increased gradually, allowing 5-minutes breaks to evaluate efficacy. The vessel is irradiated along its course, and the irradiation fields may overlap. Immediately after the procedure, the skin may be cooled down with cold compresses, and for 3 days, the irradiated areas should not be heated (by exposure to hot baths or saunas, for example) and the patient should not take anticoagulants (acenocoumarol, aspirin, ticlopidine etc.).

If erythema persists, a steroid ointment can be used. The irradiated area should not be exposed to sunlight for 4 weeks after the procedure to prevent secondary burns and melanosis (6). The use of sunscreen cosmetics with an SPF of 30 or higher is recommended.

RESULTS

After the first irradiation, the results were evaluated as very good or good in 90 cases (61%). In 80 cases, the doctor together with the patient decided that further treatment was not necessary. In 10 cases, further treatment was needed. In 16 cases (11%), the evaluating doctor found the result satisfactory and decided to continue the treatment. In the remaining 42 cases (28%), no significant improvement was observed and therefore further trials were ceased.

In a medical evaluation, after all irradiations were finished, 102 very good results (68%) were obtained altogether, and in 48 cases (32%), the treatment was not successful.

In a subjective evaluation given by the patients after the treatment was finished, 120 (80%) very good or good and 25 (16.6%) unsatisfactory assessments were obtained. The result of the treatment was assessed as satisfactory by 5 patients (3.4%).

Evaluation of pain caused by the procedure varied across the patients. On a 10-point scale, scores varied from 2 to 8 (with an average of 4.5). Patients unequivocally agreed that the procedure was unpleasant; however, in none of the cases did pain lead to discontinuation of the procedure or to refusal of another irradiation.

We observed 3 cases of undesirable complications (2%); specifically, these patients developed burn blisters, which appeared in the 103rd day after irradiation and healed spontaneously after 14-21 (average 16) days. The healing proceeded with no complications and small scars did not cause aesthetic discomfort for these patients.

DISCUSSION

The prevalence of telangiectasias and their negative aesthetic implications are the reason why many patients seek methods to eliminate them. To this end, cosmetics producers propose various procedures and beauticians, dermatologists and other specialists of aesthetic medicine, widely defined, undertake removal of these alterations.

Due to the complex nature of this pathology and the possibility of various complications during interventional therapies, the treatment of telangiectasias should be reserved for venology, angiology and vascular surgery specialists (7).

The treatment of telangiectasias is symptomatic and the progress of venous insufficiency usually makes complete recovery impossible (8). Given the limited efficacy of treatment and the frequency of disease recurrence, patients should be informed in detail about the course and method and anticipated results of treatment, paying special attention to recurrence risk.

Because several treatment methods are available, it is advisable to establish a treatment strategy that initially uses minimally invasive techniques without breaching the continuity of the integumentary system. If these methods are ineffective, little invasive methods (pharmacology obliteration, diathermocoagulation) are recommended, whereas in cases of advanced alterations of a longer diameter, microsurgery procedures are indicated (microphlebectomy) (9, 10).

Percutaneous closures of telangiectasias use the phenomenon of energy absorption. Energy is transmitted through laser radiation (visible light 532-900 nm wavelength) or radio frequency waves (RF) by the hemoglobin in blood cells inside the vessel (11). The local increase in temperature above 40 °C causes denatur-

ation of the vessel wall, its fibrousness and obliteration. Lasers of various wavelengths and powers are used during the procedure, particularly diode and Nd:YAG lasers (12). To improve treatment results and reduce the risk of complications, a 900 nm wavelength diode laser light is used in combination with energy from a high-frequency current RF (13). The laser initially heats the vessel, which causes a decrease in the electric resistance along the vein axis. As a result, the energy of the current supplied by the two electrodes flows through the vessel, overheating and destroying it without causing epidermal or cutaneous damage (14). Due to the higher resistance of the epidermis and skin, conduction in these tissues is significantly limited, and therefore the risk of burning is reduced. An energy dose given in a single impulse is usually 140 – 200 J/cm2 in magnitude (15). The ELOS system (Aurora™, Polaris™) used by the authors works by virtue of such energy doses. The synergy created by the use of this dual-mode energy transmission into the vessel wall is the reason the total energy dose absorbed by the vessel is smaller, rendering the therapeutic effect more intense (5). This permits a reduction in the risk of burning, which is more frequent during other percutaneous methods (laser or electrocoagulation).

The ELOS system is used both in telangiectasia treatment and in aesthetic dermatology procedures that aim to rejuvenate the skin (16, 17), as well as for photodepilation (18).

Due to frequent coexistence of telangiectasias with other pathologies of the venous system, particularly more advanced forms of venous insufficiency, patients who schedule a medical appointment because of "spider veins" should have a basic examination done (USG of the venous system) to evaluate the coexistence of superficial and/or deep system insufficiency and to establish the progression of disease processes (19). According to the literature (22, 21), among nearly 50% of patients who schedule a medical appointment because of isolated "spider veins", variously intensified traits of superficial or deep venous system insufficiency are diagnosed. In our trial, this percentage amounted to 21% and it only concerned the superficial system and had a clinically "dumb" character. Nevertheless, it should be emphasized that patients with traits of chronic venous insufficiency should be particularly monitored and informed about the possibility of disease progression and the occurrence of its clinical symptoms. In our study, patients were advised to use class 1 compression tights or stockings preventively.

Laser obliteration is a rather painful intervention and therefore to reduce negative sensations the skin is cooled down with cold gel prior to the procedure (22). Some lasers are equipped with a cooling head and a cold blow to increase the comfort of the procedure (12). In our study, most of the patients evaluated the procedure as painful; however, this did not discourage them from continuing treatment.

Complications connected to photocoagulation are usually provoked by using excessively high-energy doses, resulting in blisters and a grayish discoloration of the epidermis during the procedure (Nikolsky's sign) (1, 5, 23). The above-mentioned laser burn symptoms lead to cutaneous defects and long-healing burns, which may turn into unaesthetic scars and changes in the form of keloids. In our study, only three cases of slight burns were observed, and all healed without complications.

We think it is safest to begin irradiations using the smallest energy doses possible to avoid the risk of burning, increasing the power of the impulse during the next procedure if necessary.

It is estimated that properly performed photocoagulation is efficient in nearly 80% of cases (1, 13). In the present study, the percentage of positive results as assessed by objective medical evaluation was around 70%. Interestingly, patients themselves evaluated treatment results significantly better (68% vs., 89%), and the percentage of failures according to patient evaluations was almost two times smaller than in it was in medical evaluations (16.6% vs., 32%). It seems that a psychological placebo effect could be at work here: patients subjected to painful treatment for aesthetical ailments hoped to see a positive effect and therefore seemed to notice improvement even when objective medical evaluations negated positive treatment results.

The ELOS technique evaluated here is simple to apply, quite efficient, loaded with a slight percentage of undesired symptoms. This method does not require either a pressure system appliance or any special proceedings

after the procedure. Given the above advantages, it seems that the ELOS technique could be considered a "first choice" method in most cases of isolated telangiectasias.

In summary, it should be emphasized that the treatment of telangiectasias is difficult, treatment results are often unsatisfactory, and the risk of recurrence or complications is considerable (24). Applied methods do not prove to be efficient in all cases, and they are not free of complications. Moreover, the patient must be well-informed prior to treatment to avoid disappointment with therapy results.

CONCLUSIONS

1. The ELOS technique is an efficient and safe method of telangiectasia treatment.
2. The ELOS technique gives a high percentage of good and very good treatment results, both in medical evaluation and patients' subjective evaluations.

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