Treatment of Essential Telangiectasias with an Intense Pulsed Light Source (PhotoDerm VL)

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BACKGROUND. The flashlamp-pumped pulsed dye laser (585 and 577 nm) has proven to be a very effective and safe treatment option, in the therapy of essential telanigiectasias (ETE). Nevertheless, the postoperative intracutaneous hematomata, which most patients see as cosmetically disfiguring, always has been a matter of concern.

OBJECTIVE. To test the efficacy and safety of a new, large spot size, intense pulsed light source, the PhotoDerm VL, which emits noncoherent light adjustable within the 515-1200-nm range, in the treatment of ETE.

METHODS. Fourteen patients were treated with the PhotoDerm VL. They suffered from ETE of the face, postoperative teleangiectasis of the nose, ETE of both legs, and poikiloderma of Civatte.

RESULTS. All treated lesions could be abrogated with excellent results by this new device. There were no unpleasant side effects of the treatment. Additionally, due to the large spot size (2.8 cm^2), a larger area could be treated within one session. No anesthesia was required.

CONCLUSION. The PhotoDerm VL is an innovative, highly effective, and comparably safe therapeutic alternative to the laser in the treatment of ETE. The rate of cosmetically relevant side effects is considerably smaller, the patient compliance is excellent, and the method can be applied easily in an outpatient setting.

Essential telangiectasias (ETE) of the face and the extremities often represent a very cosmetically detracting problem for the affected patient, who tries to cover the lesions by camouflage strategies. Medical intervention trials with tetracycline, erythromycin, retinoids, or cyproterone do not lead to an essential improvement of the clinical picture. Electrocautery bears a considerable risk of postoperative hypopigmented and atrophic scars. Sclerotherapy of facial teleangiectases may be applicable only for larger vessels.

Excellent results could be achieved by using the flashlamp-pumped pulsed dye laser (585- and 577-nm wavelength; 0.3-0.45 msec pulse duration). This device, which has become the "gold standard" for the treatment of juvenile and childhood port-wine stains, has proven to be safe and effective in many studies. An unwelcome side effect is the appearance of posttherapeutic intracutaneous purpura, which persists over 10-14 days and is difficult to cover with make-up. Many patients with a cosmetic problem in the first place are difficult to convince of accepting this side effect. Other side effects are pain during and after laser surgery, requiring local anesthesia, edema, bulla formation, and serous crusting. A recent study describes long-lasting and disfiguring hyperpigmentations after dye laser treatment of leg telangiectasias. Moreover, dye-resistant port-wine stains have been described recently.

We have been using the PhotoDerm VL, a recently introduced, large spot size, intense pulsed light source for the treatment of ETEs. This device emits noncoherent light of a broad wavelength spectrum. The major advantages of the PhotoDerm VL over the pulsed dye laser are the larger spot size (2.8 vs < 1 cm^2) and the slight erythema instead of the hematoma of the treatment area that lasts no longer than 48 hours.

Table 1. Clinical Data of 14 Patients Treated with the PhotoDerm VL

Patient	Sex	Age (Years)	Location	Parameters	No. of Treatments	Clearing
O.N.*	m	62	Nose	550/D/29.5/5	1	100%
P.P.*	f	75	Face	515/550/S/D/29.5-35.5/4-5	6	95%
I.S.*	f	54	Neck/EIC**	550/S/21.5-31/3-5	10	100%
W.M.*	m	41	Nose	550/S/35-38/5	2	85%
G.H.*	m	47	Legs	550/S/29-30/5	4	100%
U.H.	f	40	Face	550/S/28-29/5	2	90%
I.B.	m	56	Nose	550/570/S/D/28-40/4-5	6	60%
H.V.	f	62	Back	550/S/D/29-36/5	4	75%
E.N.	f	38	Face	550/S/26.5-33/4-5	3	100%
H.H.	m	54	Nose/face	550/S/D/30-42/4-5	8	80%
H.M.	f	50	Nose/face	550/S/D/30-34.5/4-5	5	100%
M.U.	f	55	Nose / face	515/550/570/S/D/23-37/3-5	5	100%

P.K.	m	44	Nose	550/D/34/5	1	90%
D.H.	m	46	Face	550/S/29-32/3.5-5	4	90%

* Patients of Figures 1-5. Parameters are: wavelength in nm; singe(S) or double (D) impulse; energy fluence in J/cm²; and impulse length in msec.
** Erythrosis interfollicularis colli.

Patients and Methods

The PhotoDerm VL (ESC Ltd., Yokneam, Israel and Needham, MA) is a high-intensity polychromatic pulsed light source optimized for noninvasive treatment of the full range of benign vascular lesions. The treatment parameters of the device can be varied over a wide range according to the size of vessels being treated, their depth, their blood contents, and the color of the skin. The light spectrum ranges between 515 and 1200 nm. The impulse length can be chosen between 2 and 25 msec, and fluence ranges between 3 and 90 J/cm². Single, double, and triple pulses may be applied. Different lower range cut~off filters between 515 and 590 nm can be chosen. The spot size is 2.8 cm². The device takes advantage of the dependence of the scattering and absorption coefficient of oxy- and deoxy-hemoglobin on wavelength and on the strong dependence of vessel cooling time (thermal relaxation time) on the size (diameter) of the vessel. Thus, small and shallow vessels typical to port-wine stains are treated most effectively by using short and single pulses and short wavelength. In the case of larger diameter vessels it is important to use longer impulses and longer wavelengths. Larger vessels also require a higher fluence (since a larger volume of blood needs to be heated). In order to ensure no epidermal damage with this higher fluence the light should be applied over a longer pulse duration, or by using a number of pulses (single, double, or triple pulses) with controlled delay between the pulses. This treatment mode takes advantage of the fact that larger vessels (>=1 mm) have a longer cooling time than the epidermis, which has a typical thickness of less than 0.1 mm.

To treat ETE, we used 515-, 550-, and 570-nm cut-off filters, single and double pulses, and fluences between 21.5 and 42 J/cm². The pulse length was adjusted between 3 and 5 msec. Depth of the vessels was estimated by clinical appearance and by epiluminescence microscopy (ELM). For superficial ETE, the 515 nm cutoff filter was used, and deep-seated vessels were treated under the use of the 570-nm filter with double pulses. A trial application with a single, 26 J/cm² fluence, 5-msec impulse was carried out in all cases.

Local anesthetics were not used on a regular basis. If the patient felt too uncomfortable, we gave oral analgesics in a single dose. Also, double impulses were used instead of a single pulse, as the fluence is divided into the number of pulses applied. As described by other investigators previously, treatment response was estimated by averaging the effect by three different, independent observing judges, who saw the patients before and after each treatment and compared the clinical picture with photographs that were taken before and after each session. The area of clearance was graded as follows: excellent, >=90%; good, 70-90%; fair, 50-70%; and poor <50%.

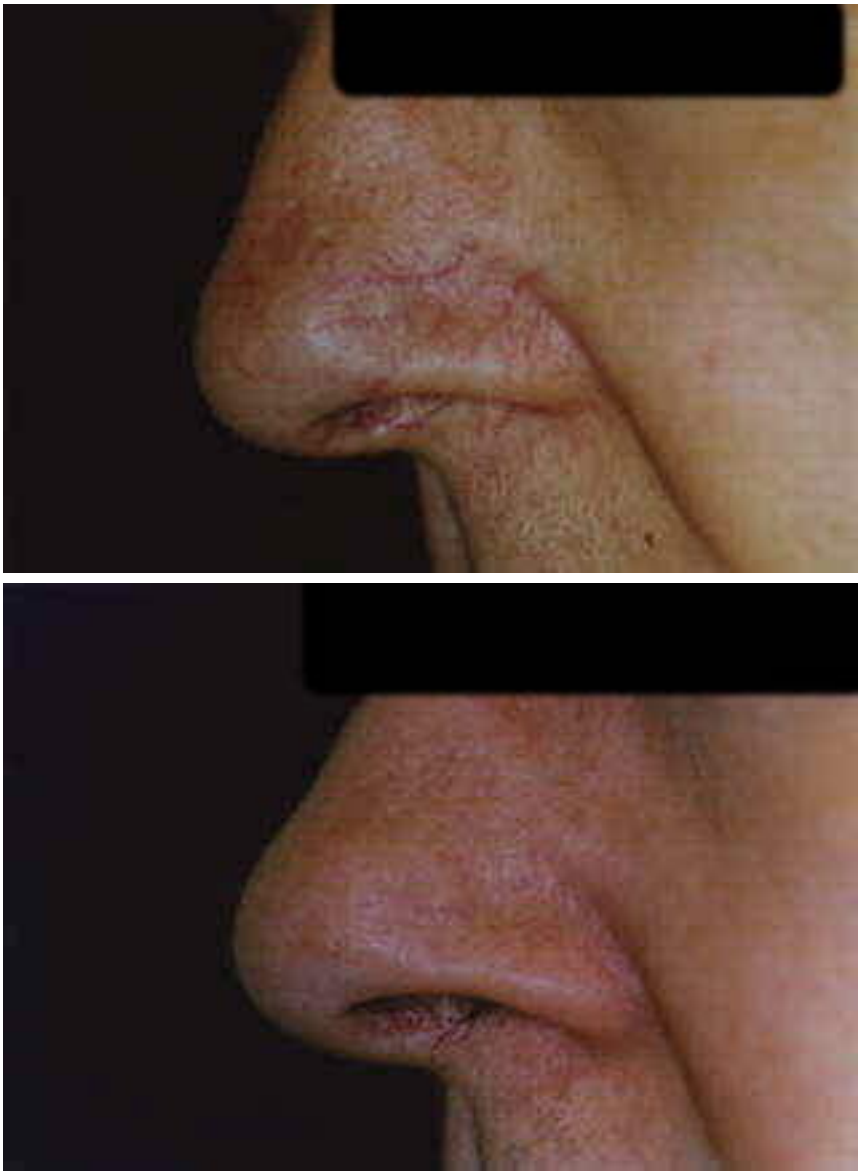
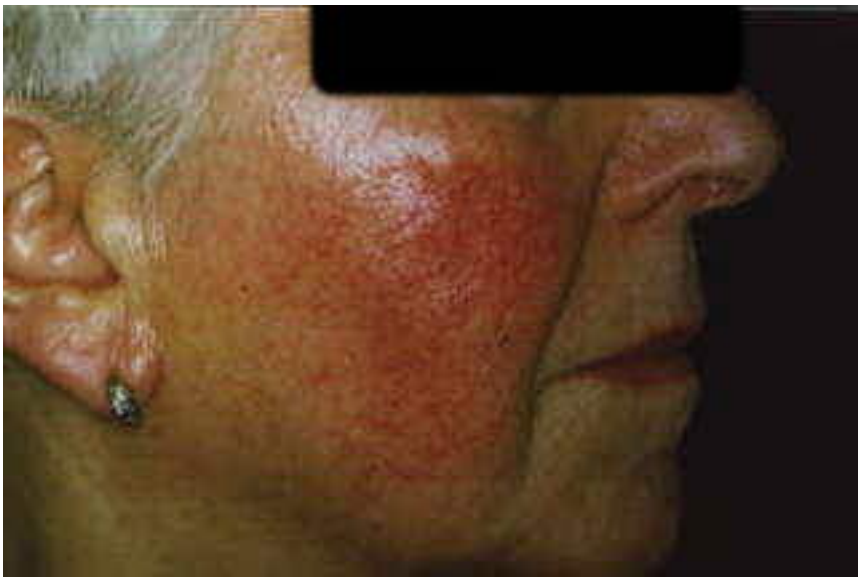


Figure 1. A) ETE of the nose (patient O.N.). B) Complete clearing of the lesions after one treatment.



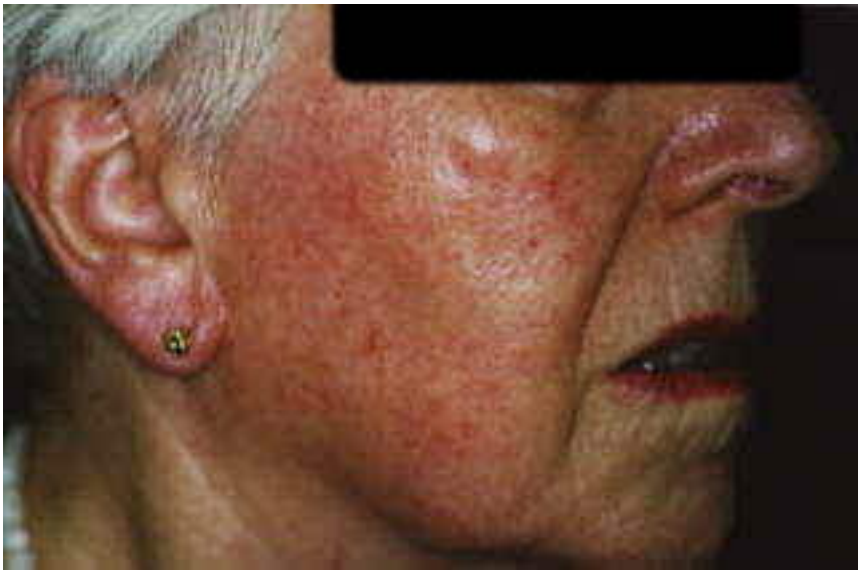


Figure 2. A) ETE of the face (patient P.P.). B) After six treatment sessions, the lesions are almost completely gone.

Results

Fourteen patients (13 with ETE, one patient with a large scale poikiloderma of Civatte, an actinic dermatitis, presenting as diffuse teleangiectases of photoaged skin of the neck) were treated during one to 10 sessions (for parameters see Table 1). Figures 1-5 demonstrate the clinical results of four of these patients. The overall response of the teleangiectatic lesions to PhotoDerm VL treatment was very good. Ten of the 14 patients showed excellent results, three showed good results, and only one patient responded fairly with a clearing of 60% after six treatment sessions. The actinic dermatitis of the neck, which is often non- or slow responding, cleared completely. Scarring or other permanent side effects were never observed. Transient hypopigmentations were seen only in profoundly tanned patients (three of 14), and transient hyperpigmentations only when high fluency had been applied (two of 14, fluence >=40 J/cm²). Each patient underwent a trial application with minimal energy fluency. A slight erythema, which lasted only for 48 hours, was the typical side effect. Some patients showed a discrete swelling of the treated region (especially in the upper chin region), which we treated with the local application of cool packs, which may also prohibit purpura. Intense exposure to sun light (sunbathing) should be prohibited for about 6 weeks, as it enhances the risk of pigmental changes. Table 1 summarizes the overall response and all treatment parameters.

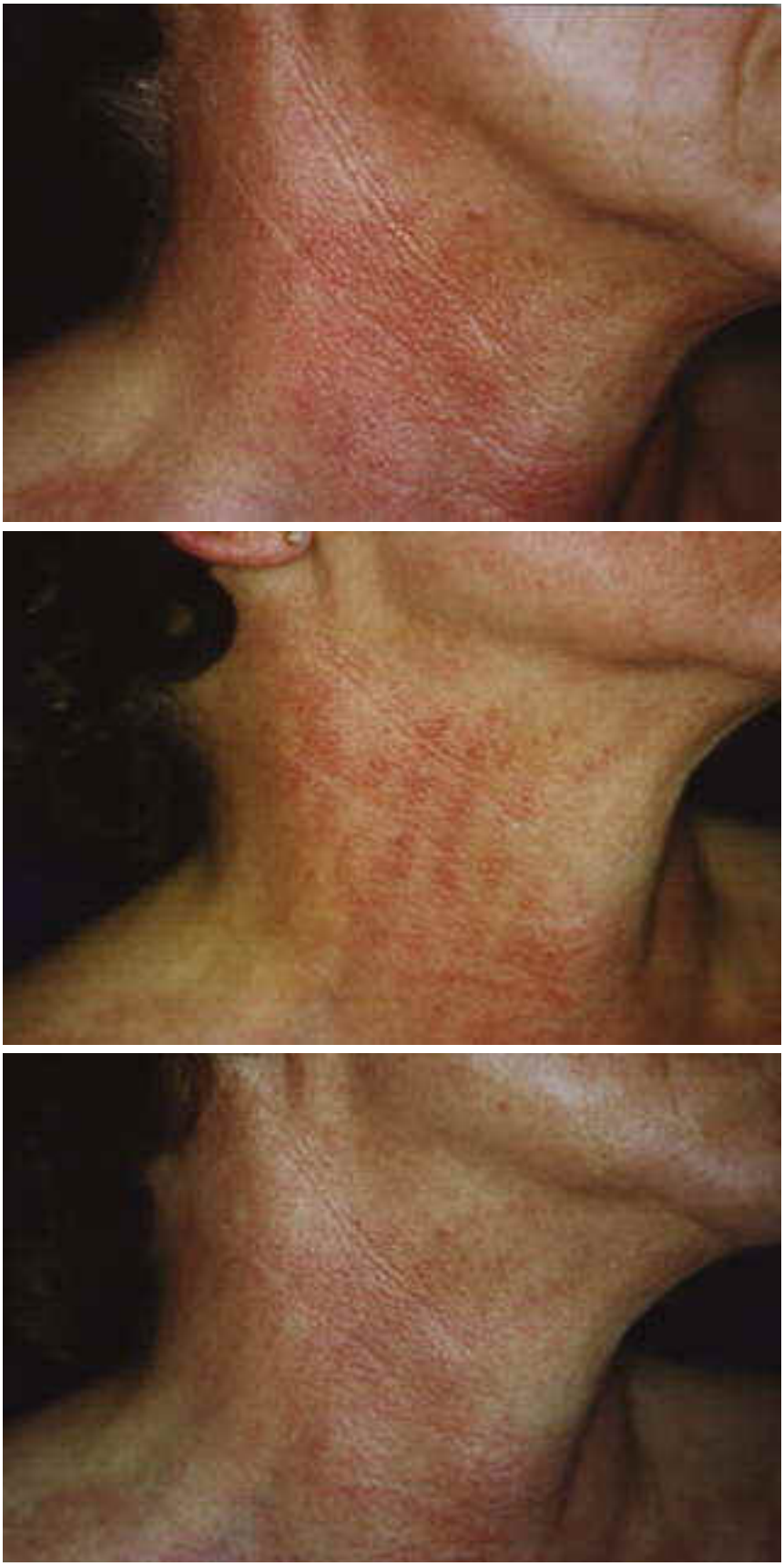
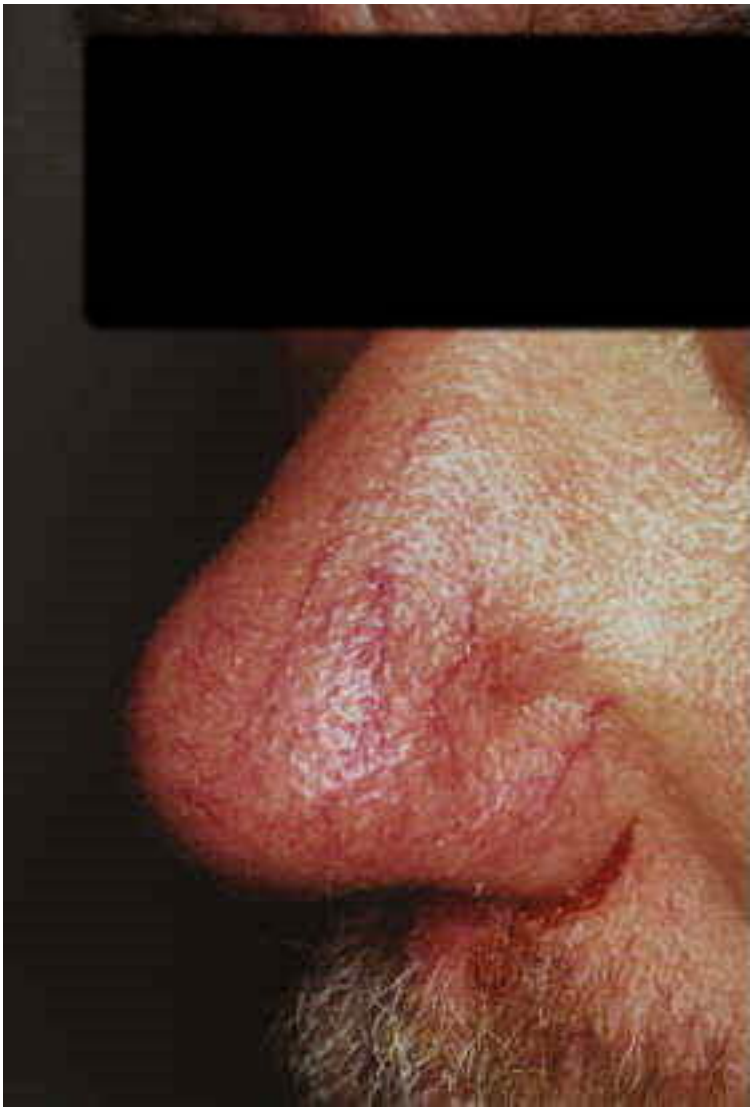


Figure 3. A) Extensive erythrosis interfollicularis colli (patient I.S.). B) After three sessions, the lesion is cleared considerably. C) Result after 10 treatments with the PhotoDerm VL.



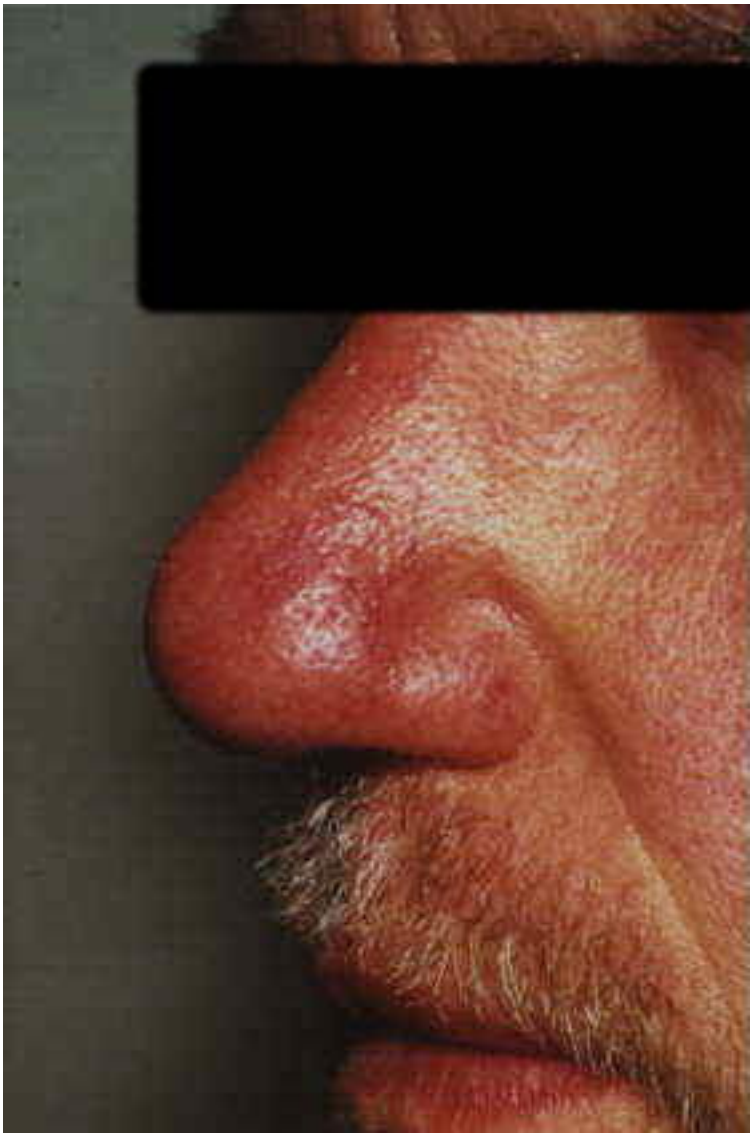
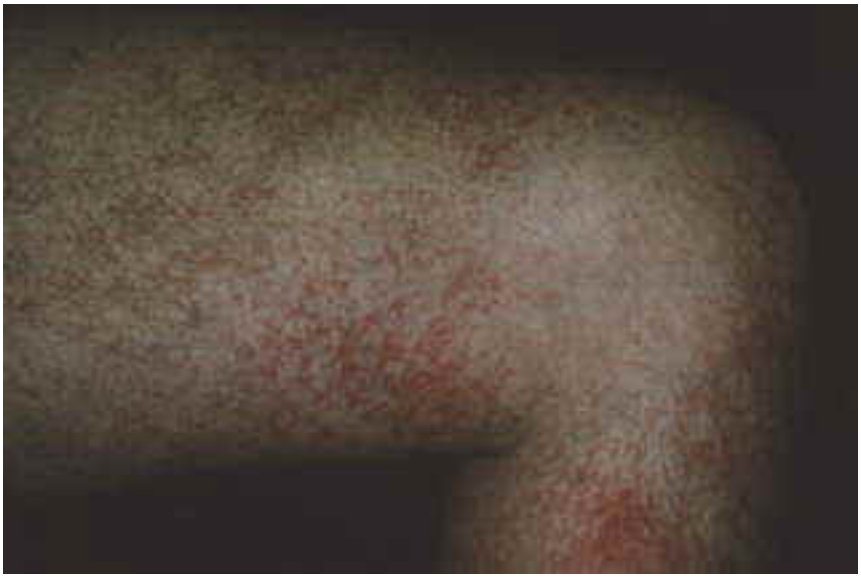


Figure 4. A) Disfiguring telangiectasia of the nose, which appeared 1 month after septorhinoplasty (patient W.M.). B) Status after two treatment sessions with the PhotoDerm VL.



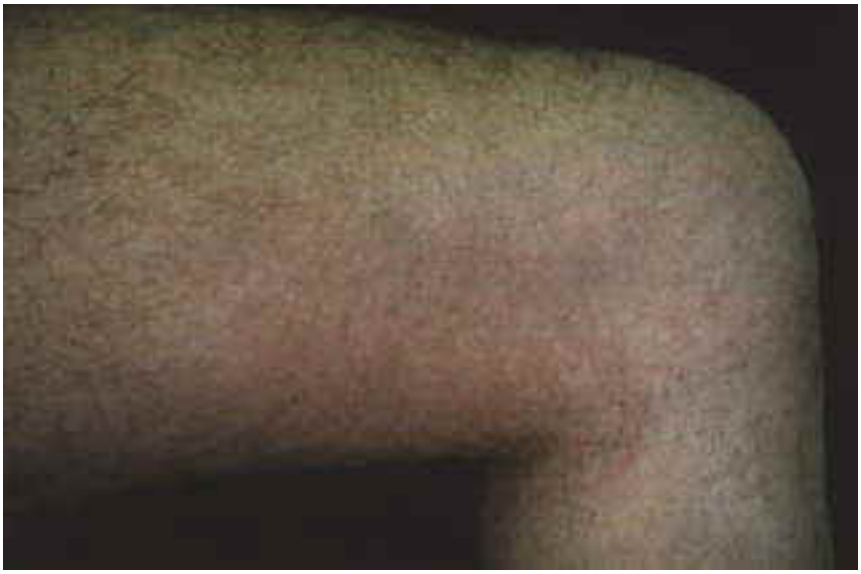


Figure 5. A) Large ETE of the lower extremities (patient G.H.). B) The lesions are nearly gone after four treatments.

Discussion

The flashlamp-pumped pulsed dye laser has proven to be a safe, highly effective, and cosmetically satisfying device in the treatment of teleangiectasia. Nevertheless, some "resistant" cases have been reported. The underlying principle of selective photothermolysis targets the oxygen-saturated hemoglobin in the erythrocytes and leads to a distinctive damage of the vessel. The energy conductance to the surrounding tissue is minimal, leading to a very low risk of posttherapeutic scarring. Moreover, pigmental changes are very unlikely, while transient hypopigmentations are more often described than hyperpigmentations. A cosmetically disturbing feature of dye laser treatment is the typical postoperative appearance of dark purpural macules, which represent hemorrhage and/ or thrombosis of the vessels. These iatrogenic lesions last for approximately 2 weeks and are very difficult to camouflage. Because of this side effect and due to economic aspects, some laser surgeons still tend to use the argon laser. The considerably higher risk of scarring and the higher risk of lasting pigmental changes that are associated with the use of the argon laser in the treatment of teleangiectasia seem to us very problematic. Simultaneous cooling and lasing may reduce the risk of side effects. The smaller penetration depth of argon and dye laser systems (1 and 1.2 mm, respectively) limit the versatility of these devices, because deeper-seated vessels are not reached. Moreover, larger vessels (>4 mm) do not respond to the dye laser treatments. Due to these circumstances we prefer the PhotoDerm VL device to the dye laser for the treatment of ETE. Especially dark, large, and deep-seated vessels respond more readily to the PhotoDerm VL than to the dye laser. The cosmetic results are excellent and the treatment is as safe as the dye laser when applied properly. One major advantage is the absence of purpura after treatment. Moreover, one single impulse treats an area of 2.8 cm^2 while the dye laser spot is <l cm^2, and the argon laser spot even smaller (0.03 cm^2) . This allows the complete treatment of even large lesions during one session. As the response rate in some cases seems to be slower than it is with other devices, including the pulsed dye laser, the overall treatment period may be as long or even longer as with lasers using smaller spot sizes. Nine of our 14 patients were treated with four or more PhotoDerm sessions; the treatment interval was in general 4 weeks.

The side effect of Photoderm VL treatment is typically a slight erythema, which lasts up to 48 hours and which may be camouflaged by make-up on the first postoperative day. Sun exposure should be prohibited for at least 4 weeks postoperatively to avoid dyspigmentation. Local anesthesia is almost never required. Cool-packs should be applied topically for about 30 minutes immediately after surgery. Other indications for the PhotoDerm VL are benign hemangiomatous malformations, nevi flammei, erythrosis interfollicularis colli, red keloids, and hypertrichosis. Especially, port-wine stains of the extremities, which do not respond properly to dye laser treatment, may be treated more effectively with the PhotoDerm VL. The flexibility that the physician has in choice of optimal treatment parameters (wavelength, energy fluence, impulse length, impulse frequency, and impulse mode [single, double, or triple impulse]) demands the PhotoDerm VL in the hands of an experienced laser surgeon. The individual skin type, the grade of tanning, and pigmentation have to be taken painstakingly into account. Therefore, multicenter studies comparing the PhotoDerm with the hitherto applied laser systems, and defining the most effective parameters in a large patient group, are warranted.

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(References: Please contact the authors)

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