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Cutaneous lupus erythematosus—treatment with pulsed dye laser

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Summary Because of its vascular selectivity, the flashlamp-pumped pulsed dye laser (585 nm) is efficacious in the treatment of vascular lesions and is successfully used for the treatment of port-wine stains and haemangiomas in children. Based on the encouraging results with these cutaneous vascular disorders, the cutaneous lesions of patients with lupus erythematosus (LE) have now also been treated with the pulsed dye laser. Cutaneous lesions in lupus erythematosus are often difficult to treat with readily available local therapeutic methods. We report here on a group of 12 patients whose LE lesions were treated with the pulsed dye laser. In 10 patients, the LE was limited to the skin, while two patients had systemic LE (SLE). Even in the two patients with SLE, a significant improvement of skin lesions was achieved. After a mean number of 51 laser sessions, a median clearance rate of 70% was attained for nine patients. In one case, the laser treatment failed to clear the lesions. Two patients did not show any visible improvement of the lesions, but pain and itching were significantly reduced. There were few side-effects. No prolonged laser-induced scarring occurred and in only two patients was hyperpigmentation seen, which had resolved completely after 4 and 5 months, respectively. During a median follow-up of 7 months (range: 3–32 months), only one patient (after a complete clearance of the skin lesions) had a small relapse. In summary, the pulsed dye laser is an effective therapy for the treatment of superficial skin lesions in LE.

Key words: cutaneous lupus erythematosus, pulsed dye laser

Cutaneous lesions in lupus erythematosus (LE) often appear as infiltrated, inflamed patches in the facial area and cause considerable psychological distress to affected patients. These skin alterations are often difficult to treat with readily available local therapeutic methods. Even systemic therapy may fail in severely infiltrated lesions and is sometimes only reluctantly accepted by patients with purely cutaneous LE, because of possible side-effects. We report on a group of 12 patients whose cutaneous LE lesions were treated with the pulsed dye laser.

Methods

The mean age of the 12 patients was 44·1 years and the group consisted of nine women and three men (Table 1). All patients were treated with the pulsed dye laser at a wavelength of 585 nm and an impulse duration of 0·3–0·45 ms (Photo Genica V, Cynosure Inc., Bedford, MA, U.S.A.). We used handpieces with an impulse diameter of 5 mm, 7 mm and 10 mm. Depending on the spot-size used, the applied fluences were 3·4–3·5 J/cm^2 for the 10-mm handpiece, 3–7 J/cm^2 for the 7-mm handpiece and 6–7 J/cm^2 for the 5-mm handpiece. The treatment was well tolerated in most cases. No local anaesthetic measures were necessary. After treatment, the treated area was cooled for about 15 min. A test treatment in a concealed area was carried out in each patient before starting therapy. All patients were instructed to keep away from sunlight and not to interfere with treated sites. Concomitant oral medication was continued for each patient during laser therapy. The treatment was continued in each case until no further considerable visible improvement of the cutaneous lesions was achieved. All cases were photographically documented before and after therapy, using a Canon EOS 100 camera and Agfa films (CT100). Results were assessed independently by two doctors as a percentage of clearance rate compared with the original state.

Table 1. Data on the patients and their laser therapy

Patient	Sex M/F	Age (years)	Type of lupus erythematosus	Location and size	Number of laser sessions Applied impulse energy Impulse diameter	Treatment period (months)	Concomitant medication	Clearance rate	Side-effects	Follow-up (relapse-free period)
1	F	40	Chronic discoid	Face Total area≈ 3 cm^2	6 × 5·3-5·6 J/cm^2 7 mm	9	Chloroquine	90%	—	5 months
2	F	26	Subacute (no systemic involvement)	Face Total area:≈ 30 cm^2	6 × 3–7 J/cm^2 7 mm	5	Chloroquine	50%	—	Treatment interrupted patient moved to U.S.A.
3	M	43	Chronic discoid (with severe scarring)	Face Total area: ≈20 cm^2	4 × 3·4 J/cm^2 10 mm 6 × 5-6 J/cm^2 7 mm	19	—	No improvement	—	Treatment stopped
4	F	62	Chronic discoid	Face Total area: ≈9 cm^2	5 × 5·5–6 J/cm^2 7 mm	24	Topical steroids	No visible improvement, but significant reduction in pain	—	21 months
5	F	45	Chronic discoid	Face Total area: ≈12 cm^2	1 × 3·5 J/cm^2 10 mm 2 × 5·0–5·5 J/cm^2 7 mm	5	—	100%	Transient hyperpigmentation resolved completely after 4 months	32 months
6	F	51	Systemic Nonerosive arthritis ANA positive Photosensitivity Discoid lesions	Back Total area: ≈15 cm^2	7 × 5·5–6·3 J/cm^2 7 mm	36	Chloroquine Systemic steroids	70%	—	3 months
7	M	49	Chronic discoid	Face Total area: ≈14 cm^2	3 × 5·0 J/cm^2 7 mm	9	—	100%	—	6 months
8	F	61	Chronic discoid Systemic	Face & Back Total area: ≈15 cm^2	3 × 6·0–6·5 J/cm^2 5 mm	1	Chloroquine	70%	—	8 months
9	F	32	Kidney involved ANA positive Photosensitivity Facial erythema	Upper half of back Back of both hands Total area: ≈70 cm^2	8 × 6·0–6·5 J/cm^2 5 mm	8	Systemic steroids	80%	—	6 months small relapse after 6 months
10	M	47	Cutaneous	Left Shoulder Total area: ≈80 cm^2	9 × 6·5–7·0 J/cm^2 5 mm	6	—	50%	—	14 months
11	F	43	Chronic discoid Scarring alopecia	Left Cheek Scalp (parting area) Total area: ≈17 cm^2	2 × 6·5 J/cm^2 5 mm (Treatment to continue with 7-mm handpiece)	10	Chloroquine	No visible improvement, but significant reduction in pain and itching	—	Treatment to be continued
12	F	30	Chronic discoid	Face Total area: ≈32 cm	1 × 5·5 J/cm^2 7 mm	1	—	50%	Transient hyperpigmentation, resolved completely after 5 months	Treatment stopped by patient because of hyperpigmentation

M/F = male/female; ANA = antinuclear antibodies.

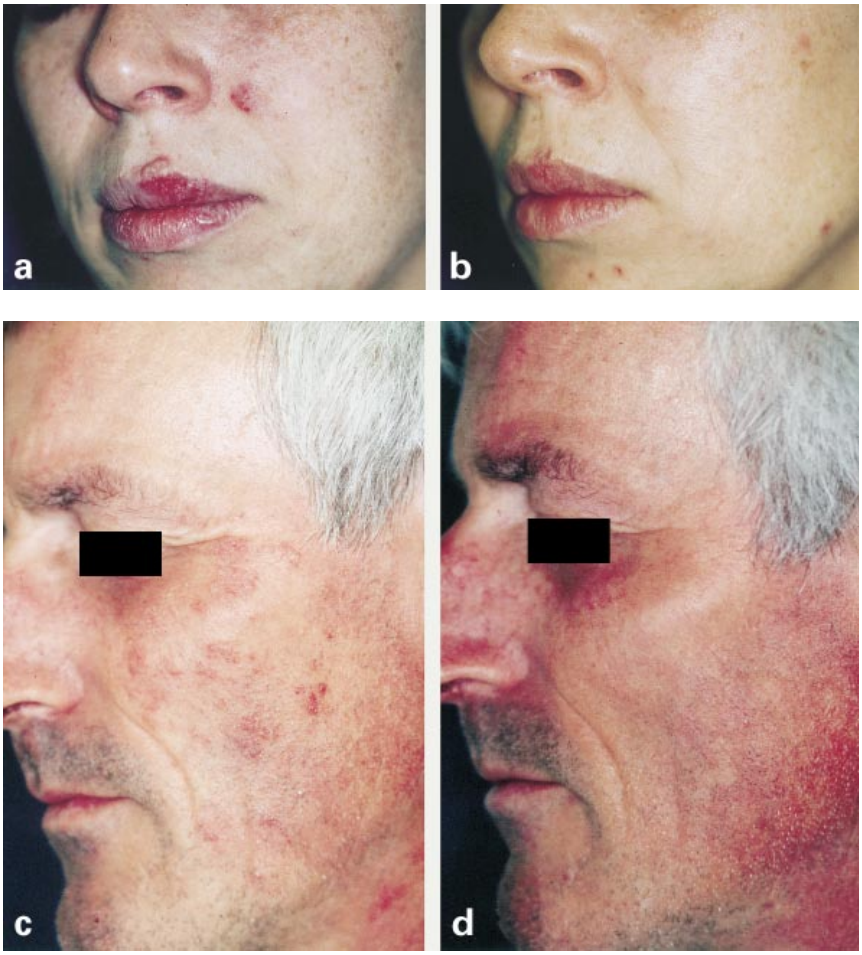

Figure 1. (a) Patient 1: Lesions of discoid lupus erythematosus on the face. (b) Patient 1: Result after six treatments with the pulsed dye laser. (c) Patient 7: Lesions of discoid lupus erythematosus on the face. (d) Patient 7: Result after three treatments with the pulsed dye laser.

Results

Ten patients had merely cutaneous LE and there were two cases with systemic LE (SLE). The mean duration of illness of the 12 patients was 6·8 years and the mean size of the cutaneous LE lesions amounted to 26·4 cm^2 (Table 1). Besides the clinical aspect, the diagnosis was confirmed by skin biopsy specimens and direct immunofluorescence for all patients. In two cases with cutaneous LE, the results of direct immunofluorescence were negative. Positive results for antinuclear antibodies were found in both patients with SLE and in six cases with disease limited to the skin (Table 1). Eight patients had taken systemic medication before laser therapy, in most cases chloroquine, which had been taken by seven patients. Five patients continued the chloroquine treatment during laser therapy (Table 1). Immediately after treatment, purple erythematous maculae, oedema and occasional crusts developed in the treated areas. These laser-induced skin changes healed completely after 6–14 days. After a mean number of 5·1 laser sessions (1–10 treatments per patient), a median 70% clearance of the lesions was achieved for nine patients. There were few side-effects, no laser-induced scarring occurred and only two patients developed transient (for more than 3 months) hyperpigmentation, which had resolved after 4 and 5 months, respectively (Table 1). Figure 1 shows good results in patients 1 and 7, who presented with discoid LE lesions on the face, after six and three laser sessions, respectively.

During a median follow-up of 7 months (range 3–32 months) of eight patients, relapse was seen in only one case (patient 9), 6 months after complete remission of lesions. In one case, the laser therapy was interrupted; in patient 2, a significant clearance of 50% had been achieved after six laser sessions. Nevertheless the treatment could not be continued because the patient moved to the U.S.A. In two cases, the laser therapy was discontinued. Patient 3 had severely

destructive and scarring cutaneous LE of the facial area. After 10 laser sessions, no visible improvement of the lesions could be achieved. As a result, the therapy was discontinued. Transient hyperpigmentation, which resolved completely after 4 months, caused patient 12 to stop the treatment after one session. A clearance of 50% had been achieved by then.

Patient 4 did not show any clearly visible improvement of the lesions after five laser sessions, but the patient noticed a significant reduction in pain, which had been very distinct before treatment. After successful treatment of the cutaneous lesions on the back of patient 6, slight visible scarring occurred in the treated area; whether this was caused by laser therapy or the natural history of the disease is uncertain. In patient 11, after two laser sessions, no significant changes have been seen, but as in case 4, sensitivity to pain and itching have clearly been reduced. The laser therapy is ongoing.

The clearances achieved with the 10-mm handpiece were significantly lower than those with the 7-mm handpiece. As a result, in two cases (patients 3 and 5), the therapy was switched over from the 10-mm to the 7-mm handpiece after one and four sessions, respectively. No difference was observed between the clearances achieved with the 5-mm handpiece or the 7-mm handpiece. Neither the respective duration of illness nor the size of the patients' skin lesions had any significant effect on the clearance rates achieved by laser therapy.

Discussion

Cutaneous lesions in LE show different localizations in the various forms of the disease. In the cutaneous varieties of LE, erythematous scaly plaques, which are more or less infiltrated, often occur in the facial area. Skin lesions in SLE are found on the face, chest, back or limbs.[1] For local treatment, topical steroids, possibly under occlusion, and intralesional steroid injections are used. These local therapeutic methods often do not have a significant effect. Even systemic mono- or combination therapy with antimalarial drugs, glucocorticoids or azathioprine may fail to clear deeply infiltrated plaques. Furthermore, patients with forms of LE limited to the skin may be reluctant to accept these systemic therapies because of possible side-effects. Cryotherapy has also been used.[1] Nevertheless, persistent telangiectasia may occur in the resulting cryo-induced hypopigmented scars.[2] Treatment with the pulsed dye laser (585 nm) enables local therapy with few side-effects. Atrophic or hypertrophic scarring occurs in only 0·1–3% and 0–1%, respectively.[3]

So far, there have been only two short reports[4,5] about the treatment of LE lesions with the pulsed dye laser and one case report from our group.[6] Nunez *et al.*[4,5] report a group of four patients whose cutaneous LE lesions were treated successfully in three to six sessions with the pulsed dye laser. No scarring or pigmentary disorders occurred. Post-treatment histological examination revealed a reduction in cutaneous vessel diameter. Owing to its vascular selectivity, the pulsed dye laser is very effective in removing telangiectasia of various origins.[7] The argon laser has also been used in the treatment of chronic discoid LE because of its vascular destructive effect.[8]

The reasons for the development of LE are still mainly unknown. A major factor in the pathogenesis of LE, besides infectious diseases and medication, is exposure to ultraviolet (UV) radiation.[1,9–12] Recent investigations have revealed that in a group of over 200 LE patients, cutaneous lesions could be provoked by UV irradiation in 45% of cases.[11] Fifty-three per cent of these patients showed positive reactions to UVA and UVB, 33% were positive to UVB only, and in 14% of the cases, positive skin reactions could be provoked by UVA alone. The activation of a photo-sensitizing substance in the serum and lymphocytes of LE patients could be demonstrated by irradiation at a wavelength of 360–400 nm,[13] as opposed to 585 nm with the dye laser, but the pathogenic course of UV-induced LE still remains poorly understood.[10] However, a test treatment in a concealed area should be carried out before starting therapy. The exact mechanism causing the effectiveness of light at a wavelength of 585 nm (pulsed dye laser) in the treatment of cutaneous LE lesions is still unclear. With laser therapy, the applied light is monochromatic, and there is strong evidence that the induced pathogenic mechanisms are different from those caused by irradiation over a UV spectrum.

Until now, we have treated 12 patients altogether with, to some extent severely, infiltrated LE lesions with the pulsed dye laser. In summary, a median clearance rate of 70% was attained for nine patients. In three patients, the pulsed dye laser failed to clear the lesions, but pain and itching were significantly reduced in two cases. There were few side-effects. No laser-induced scarring occurred and in only two patients was transient hyperpigmentation (longer than 3 months) observed, which had resolved completely after 4 and 5 months, respectively.

Patient 3, who presented with extensive discoid lesions, severely scarred in appearance on the facial area, provides an example of the limits of treatment with laser therapy. In this case, even after 10 laser sessions, no significant clearance of the severely scarred lesions could be achieved. The laser therapy was therefore stopped. Owing to the limited penetration depth of the pulsed dye laser with a mean of 0·7 mm,[14] the failure of laser therapy in this case might be attributed to the depth of the discoid lesions. In addition, the number of cutaneous vessels, which are targeted by this laser, is significantly reduced in the scarred tissue. There was no difference in the results achieved using the 5-mm or the 7-mm handpiece. The 7-mm handpiece, with its larger impulse diameter, allows for the treatment of an extended area with fewer impulses and is therefore more comfortable for the patient. The results using the 10-mm handpiece were not as good, but we used this handpiece in only two patients. We believe this was because of the lower energy density of the 10-mm handpiece, which is limited to a maximum of 4·0–4·5 J/cm^2. We therefore recommend the use of a 7-mm handpiece with an energy density of 5·0–5·5 J/cm^2.

The pulsed dye laser is an effective measure for the treatment of superficial cutaneous LE lesions and should be considered as an alternative treatment option with minor side-effects. Although in our group of patients the duration of illness or the size of the skin lesions had no obvious effect on the achieved clearance rates, treatment should be started as early as possible because the progressive course of the disease may result in extension of scarring.

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