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The Flashlamp-pumped Dye Laser and Dermabrasion in Psoriasis – Further Studies on the Reversed Köbner Phenomenon

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Eleven patients with chronic plaque psoriasis were treated with the flashlamp-pumped pulsed dye laser and 6 of the same patients were at the same time treated by dermabrasion. Complete remissions were observed in 3 patients following laser-treatment and in 5 of 6 after dermabrasion. The observation periods were from 4 to 9 months. Our data suggest that the mechanism of the reversed Köbner phenomenon, which is thought to be responsible for the results of dermabrasion, is partly due to destruction of the dermal papillary vasculature. Partial responses were seen in 6 laser-treated and in one patient treated by dermabrasion. Two patients showed no response to laser treatment. These clinically unsatisfactory results can be explained by the great variety in thickness of plaques and in variability of penetration of the laser light. Measurements of absorption and scattering properties of plaques scheduled for laser treatment could probably allow improvements in the technique by optimizing laser beam diameter and pulse duration as well as wavelength and energy levels. The use of the dye laser is far less traumatic to the patient than dermabrasion. ***Key word: vasculature.***

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Surgical management of psoriasis was first reported by Kiil et al. (1), who in 1985 used the dermatome. We have since 1989 successfully used dermabrasion for the same purpose, inducing long-lasting remissions (2). Laser therapy by carbon dioxide laser vaporization has also been in use sporadically since 1986 (3). In our hands, however, this did not give as even a treatment as dermabrasion and was followed by minor recurrences within the treated area. Recently the first data on therapy with flashlamp-pumped pulsed dye laser has appeared, offering an alternative therapy for chronic plaque psoriasis and a demonstration of the pivotal role of the vasculature in the pathophysiology of the disease (4). We as well have tried the flashlamp-pumped dye laser for the same purpose in order to explain our prior good results by dermabrasion and also to study this in general non-eroding procedure in psoriasis. In this paper we give a report on 11 psoriasis patients followed from 4 to 9 months after therapy.

PATIENTS AND METHODS

Eleven patients with stable chronic plaque psoriasis, which had not responded sufficiently to topical group III or IV steroids and/or dithranol or tar, were recruited for the study. Four of the patients had previously been treated successfully by dermabrasion. We used a flashlamp-pumped dye laser (Chromos 585, SLS (Wales) Ltd, UK), emitting light at a wavelength of 585 nm, a beam diameter of 5 mm and energy fluences ranging from 2 to 7 J/cm^2. Computer simulations using the Monte Carlo method were used to calculate the optimal laser pulse duration of 200 μs. The psoriatic plaques treated were located on the elbows, knees, lower legs and lower back. Prior to treatment the psoriatic plaques were treated with peanut oil to enhance light penetration through stratum corneum. Only one series of laser treatment was given to each patient using contiguous but not overlapping spots. All lesions were photographed prior to treatment and follow-up photographs were taken in all cases at various intervals from 1 week to 8 months. Until the final examination only an emollient was allowed for topical use.

Six patients were treated either simultaneously (5 patients) or shortly before with dermabrasion of similar or larger plaques located on another extremity or at least 15 cm away from the laser-treated area. The procedure used has previously been described (2). Dermabrasion was performed with a 20,000 rpm diamond wheel after local anaesthesia with 1% lidocaine and application of dichlorotetrafluoroethane (Frigiderm®) spray. Laser therapy was given without anaesthesia, and no dressing or bandage was used on the treated areas.

RESULTS

Two patients showed superficial haemorrhagic ulcerations from 1 to 3 weeks after treatment with 5 and 6 J/cm^2. In all other cases only a bluish-brown bruising was noted following the laser treatment. Dermabraded areas healed within 3 to 4 weeks. The clinical outcome of laser therapy and dermabrasion can be seen in Table I and results of laser treatments besides in Fig. 1. Complete remissions were found in 3 of 11 patients after laser and in 5 of 6 after dermabrasion. In these cases no psoriasis could be found in treated areas at the end of the observation period (Fig. 2A). Fig. 2B shows the same area as in Fig. 2A prior to laser therapy. Reductions in the size of the plaque with areas totally clear from psoriasis within the lesion were recorded as partial response. This was found in 6 laser treated patients and in the one remaining patient treated with

Table I. *Clinical results of laser treatment and dermabrasion of psoriasis*

Pat no.	Sex/ age	J/cm^2	Results of laser therapy	Results of dermabrasion	Observation period (months)
1	F/44	4	PR	–	6
2	F/50	2–4	NR	–	7
3	M/29	5–7	PR	CR	4
4	F/44	3–5	PR	–	7
5	M/63	6	PR	CR	5
6	M/41	5	NR	PR	6
7	F/52	3–4	PR	CR	6
8	M/47	4	CR	–	6
9	M/56	3–4	PR	CR	6
10	M/60	5–6	CR	–	9
11	M/56	5	CR	CR	9

CR = complete remission; PR = partial response; NR = no clinical response.

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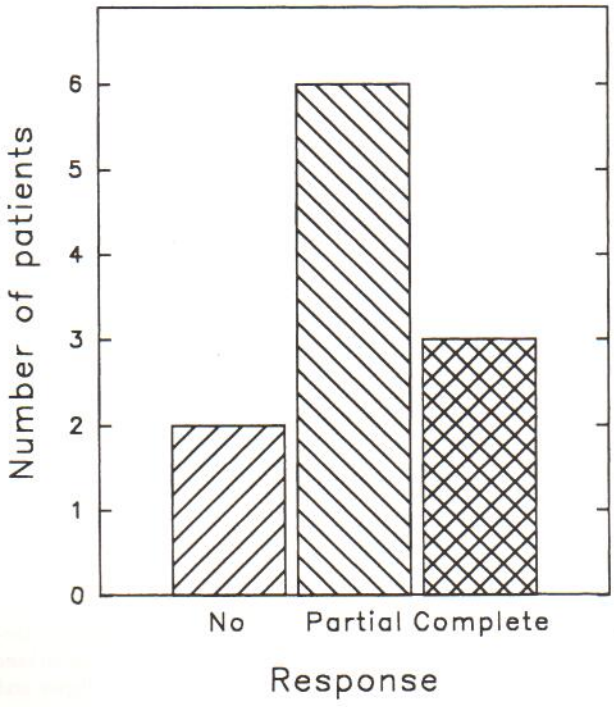

Fig 1. Clinical responses following flashlamp-pulsed dye laser treatment of psoriasis.

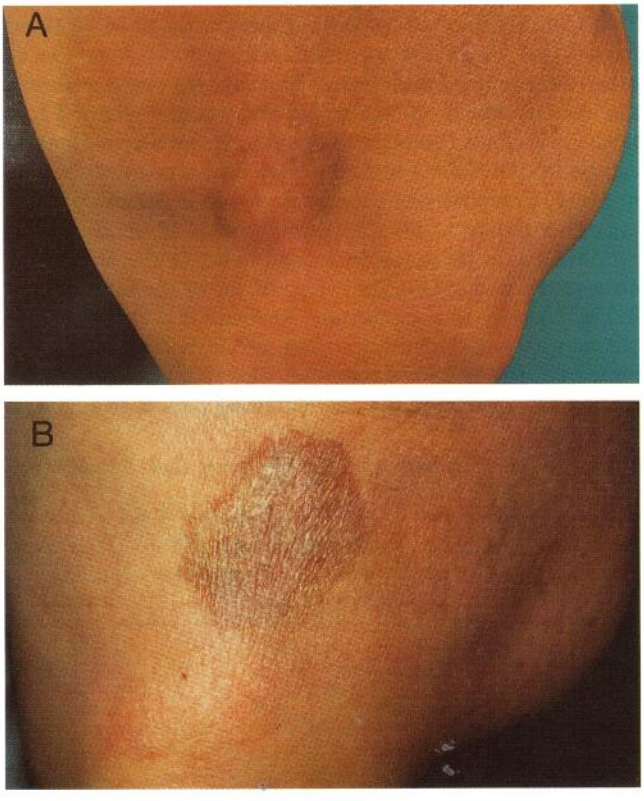

Fig 2. (A) Laser-treated area after 10 weeks. Only a slight post-inflammatory hypopigmentation can be seen. (B) The same area as in A, showing the psoriasis plaque immediately prior to laser therapy.

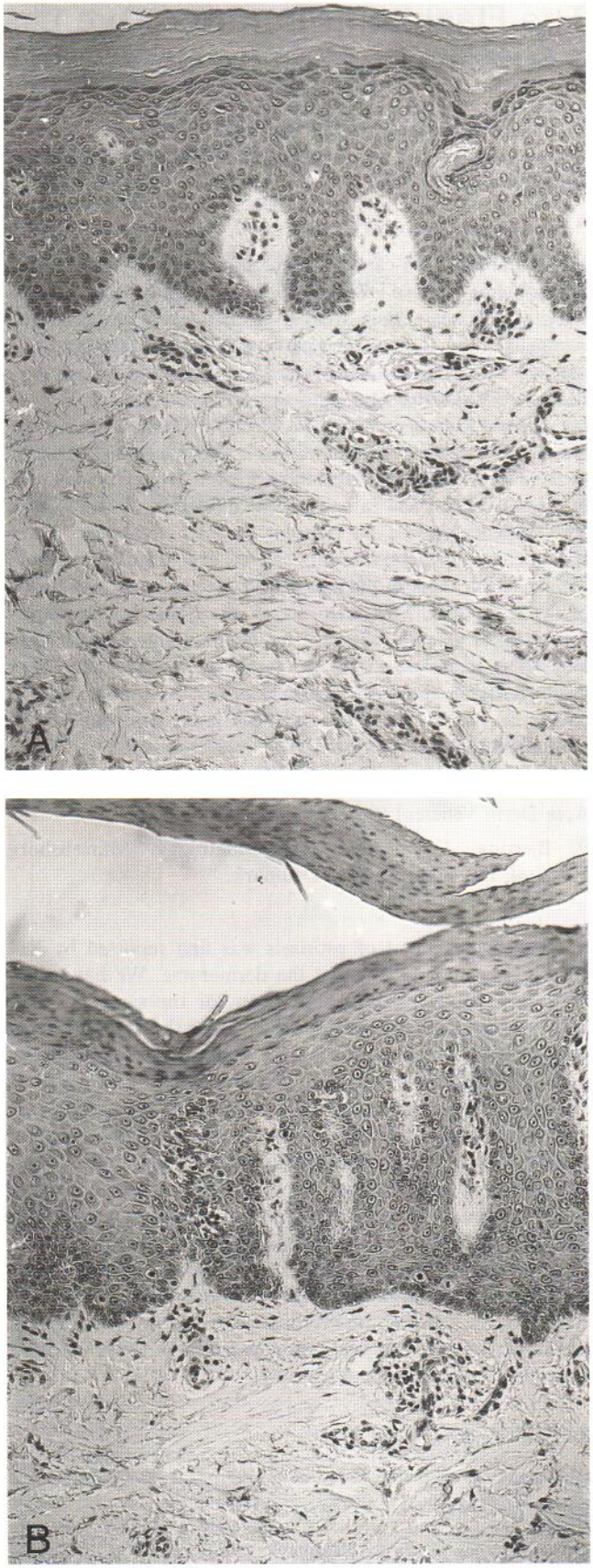

Fig 3. (A) Histology of laser-treated skin area, showing a normally structured epidermis with a normal stratum granulosum. There are only a few perivascular lymphocytes and still fewer histiocytes. The endothelial cells are slightly prominent and swollen. Haematoxylin-eosin, ×125. (B) Histology of non-treated psoriasis adjacent to the treated area, showing typical psoriasis. Hematoxylin-eosin, ×125.

dermabrasion. Two laser-treated patients showed no response. A slight redness was present after laser therapy during the first months and followed by a slight to moderate post-inflammatory hyper- and hypo-pigmentation (Fig. 2A). In laser therapy complete responses were found after from 4 to 7 J/cm^2 and no response after 2–5 J/cm^2. Figs. 3A and 3B give a picture of the histology of punch biopsies taken at 10 weeks from a laser-treated plaque and from adjacent non-treated psoriasis (pat.# 10). The untreated area showed histologically typical psoriasis, while the laser-treated area in clinical remission was without characteristics of the disease.

All therapy was given without complications. Patients in complete response were fully satisfied with both therapies, while patients with only partial response did not find the procedures worth while. In contrast to dermabrasion, most patients with partial responses from laser therapy got worse during the observation period.

DISCUSSION

Our data confirm the results of Katugampola et al. (4), showing that selective photothermolysis of the upper dermal vasculature can induce complete remissions of psoriatic plaques. They brought only one of 8 patients into complete remission, administering laser treatment with an energy fluency of 8.5 J/cm^2 on three occasions at 2-week intervals, while we used one administration of 2 to 6 J/cm^2. The use of the flashlamp-pumped dye laser does not in general at present seem to be a practical solution for therapy and does not compete with other surgical approaches (1–4). This can also be seen from the present study. The reason could be the great variety in thickness of psoriatic plaques. This results in a similar great variability in the penetration of the laser light. When dermabrasion is used a good result seems to demand total destruction of the papillary dermis. Due to the potential risk of scarring deep dermabrasion should be avoided. The present data on the use of the flashlamp-pumped dye laser, which selectively destructs the vessels in the upper dermis, suggest that the importance in surgical therapy, which – when successful – induces a reversed Köbner phenomenon (5), lies in the role of the vascular bed. It is substantiated by the high selectiveness of laser procedure (6). The present insufficiency of laser therapy in psoriasis is probably only due to technical reasons, and it would seem worth while to invest efforts in individualization of the different laser parameters for each treated plaque. Prior or concurrent measurements of absorption and scattering properties of the involved skin areas may provide information on variabilities in light absorption and scattering and allow optimization of laser beam diameter and duration as well as wavelength and energy levels. There is no bleeding associated with the treatment, and the patients only reported a moderate, short-lasting pain, which does not require local anaesthetic. No bandage is needed after treatment. The use of the dye laser is thus far less traumatic to the patient than the use of any other surgical procedure.

REFERENCES

1. Kiil J, Kiil J, Søgaard H. Surgical treatment of psoriasis. Lancet 1985; 2: 16–18.
2. Zachariae H, Søgaard H. Treatment of psoriasis by dermabrasion. J Eur Acad Derm Venereol 1995; 5: 229–233.
3. Bekassy Z, Astedt B. Carbon dioxide laser vaporization of plaque psoriasis. Br J Dermatol 1986; 114: 489–492.
4. Katugampola G, Rees A, Lanigan S. Laser treatment of psoriasis. Br J Dermatol 1995; 113: 909–913.
5. Eyre R, Krueger G. Response to injury of skin involved and non-involved with psoriasis and its relation to disease activity. Br J Dermatol 1982; 106: 153–159.
6. Anderson R, Parrish J. Selective photothermolysis: precise microsurgery by selective absorption of pulsed radiation. Science 1983; 220: 224–227.