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308-nm Excimer Laser for the Treatment of Scalp Psoriasis

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The Cutting Edge: Challenges in Medical and Surgical Therapeutics

REPORT OF A CASE

A 49-year-old white woman presented with a 20-year history of scalp psoriasis. Over the years, she had tried numerous topical treatments, such as 0.05% clobetasol propionate solution with 0.005% calcipotriene solution for 3 months, as well as various tar- and salicylic acid-based shampoos, with no success. She stated that the itching associated with her scalp psoriasis had worsened over the past year, often keeping her awake at night. She had abandoned medical treatment for 6 months. She was otherwise in good health and was not taking any medications. There was no family history of skin disease. Physical examination revealed thick, hyperkeratotic, scaly, erythematous, confluent plaques almost completely covering the scalp, including the postauricular area, clinically consistent with scalp psoriasis.

THERAPEUTIC CHALLENGE

Our challenge was to find a safe, effective treatment for the patient's scalp psoriasis, thereby relieving the itching caused by her condition.

SOLUTION

We opted to treat the patient with a 308-nm excimer laser (Xtrac; PhotoMedex, Radner, Pa) that has a fiber-optic handpiece connected to a scalp delivery device (PhotoMedex) (**Figure 1**). The scalp delivery device functions by displacing hair that is interfering with access of the laser beam to the scalp. It looks and operates like a blow-dryer but does not deliver any heat to the scalp.

With full approval of our institutional review board, informed consent was obtained. The patient's scalp was mapped using clear plastic templates. Immediately before treatment, a score of 9 was noted on the modified Psoriasis Area and Severity Index (PASI), which is used to assess erythema, induration, and scaling (0, none; 1, slight; 2, moderate; 3, severe; and 4, very severe). Half of the large psoriatic plaque was treated with the 308-nm

excimer laser using the scalp delivery device; the other half served as a control. Mineral oil was applied to both areas before the treatment began. A 2.5-cm spot size was used, with pulses delivered in a 25% overlapping fashion. The initial dose administered was 200 mJ/cm², and subsequent doses were increased incrementally by 50 to 200 mJ/cm² based on the patient's tolerance, ie, the sensation and/or clinical appearance of burning. Her final dose was 3600 mJ/cm². The psoriatic plaque was to be treated 2 times per week, every 48 to 72 hours, for up to 30 treatments or until clinical clearing was noted (modified PASI score, ≤3). Our patient required only 22 treatments before clearing occurred. The average time of each painless treatment was less than 10 minutes. Between treatments and during the follow-up period, only the use of over-the-counter antidandruff shampoos was allowed.

Clinical improvement was defined as any reduction in the baseline modified PASI score. Our patient experienced clinical improvement as early as treatment 8. Remarkably, a 90% improvement in her modified PASI score was noted at treatment 23 (**Figure 2** and **Figure 3**), representing approximately 11 weeks of treatment (modified PASI score, 0). At this point, she reported significant improvement in her pruritus. Conversely, the untreated side (**Figure 2** and **Figure 4**) remained thick, scaly, and extremely itchy. The entire procedure was extremely well tolerated. A subtle, transient, mild burning sensation occurred only when higher fluences were used. The patient discontinued treatment after her condition cleared. In the follow-up period assessments were performed every 3 weeks, and no further treatments were administered to either the treated or the untreated side of her scalp. The area that was treated with the excimer laser was still free of psoriasis after 10 weeks.

COMMENT

Psoriasis of the scalp is a common yet difficult condition to treat. Overlying dense hair, inaccessibility to UV exposure, and noncompliance with treatment that often



Figure 1. The 308-nm excimer laser with a fiber-optic handpiece that interfaces with the scalp delivery device.



Figure 2. Scalp psoriatic plaque showing the control side (left) and the treated side (right) after 23 treatments.

involves messy, malodorous topical medications are factors that frequently limit therapeutic success. Psoriasis of the scalp often brings patients to dermatologists because of itching, scaling, hair loss, and bleeding.¹ Topical medications, such as tar shampoos, steroid solutions, and oils, have been the mainstays of the treatment of scalp psoriasis. Unfortunately, some patients simply do not respond to this form of therapy, and compliance requires a lot of time and motivation. Aside from topical medications, few treatment modalities exist for the treatment of scalp psoriasis. Phototherapy, while excellent for body psoriasis, proves relatively ineffective for the scalp in patients without closely shaved heads, because the hair causes mechanical hindrance for light access. Even when traditional phototherapy can be used for the treatment of scalp psoriasis, noninvolved areas of the scalp and face are often inadvertently exposed. Systemic therapies that are used to control psoriatic lesions elsewhere on the body will improve scalp lesions but are rarely indicated solely for scalp psoriasis.² It is clear that new and innovative treatment modalities are required for the treatment of scalp psoriasis.

Excimer lasers share the common feature of producing photons from unstable excited gas dimers. The term *excimer* is derived from the union of *excited* and *dimer*. For the 308-nm excimer laser, the gas dimer is xenon chloride. Decomposition of this short-lived unstable dimer is responsible for the production of a collimated beam of photons with a wavelength of 308 nm. The



Figure 3. Scalp psoriatic plaque showing the treated site (right posterior auricular area) after 23 treatments.



Figure 4. Scalp psoriatic plaques showing the untreated, control site (left posterior auricular area) after 23 treatments.

prototype 308-nm excimer laser used in this case has the ability to produce 20- to 40-nanosecond trains of pulses with a repetition rate of up to 200 Hz. The mechanism of action is not entirely known, but we speculate that it may be similar to that of narrowband 311-nm UV-B phototherapy, which operates within the action spectrum for psoriasis.³ The laser has the advantage of being able to deliver light to specific areas, in a user-friendly, highly efficient manner, without exposing normal skin to potentially harmful radiation.

The 308-nm excimer laser was first reported to be useful in the treatment of psoriasis in 1997.⁴ Since then, dose-response relationships have been investigated. For truncal psoriasis, it has been demonstrated that fluence is the single most important determinant in clinical clearing.⁵ The number of treatments, on the other hand, is not as important. Also, for trunk psoriasis, different plaque characteristics can be somewhat predictive of response. Thicker, scaly plaques tend to respond more slowly. This finding parallels what we noted in the present case. Our patient, who had extremely thick scaly plaques, required 23 treatments before clearing was noted.

Potential adverse effects with the 308-nm excimer laser include pain, burning, blistering, and discoloration. Our patient reported no adverse effects other than some mild transient burning at higher fluences. Also, she experienced no adverse effects from the use of the scalp blower delivery device, which worked very well in parting the hair.

The 308-nm excimer laser has been approved by the Food and Drug Administration for the treatment of plaque psoriasis. This case report represents the first effort at treating scalp psoriasis with the 308-nm excimer laser coupled to a unique scalp delivery device. This special system provided a user-friendly, novel, safe, and effective treat-

Submissions

Clinicians, local and regional societies, residents, and fellows are invited to submit cases of challenges in management and therapeutics to this section. Cases should follow the established pattern. Submit 4 double-spaced copies of the manuscript with right margins nonjustified and 4 sets of the illustrations. Photomicrographs and illustrations must be clear and submitted as positive color transparencies (35-mm slides) or black-and-white prints. Do not submit color prints unless accompanied by original transparencies. Material should be accompanied by the required copyright transfer statement, as noted in "Instructions for Authors." Material for this section should be submitted to George J. Hruza, MD, Laser and Dermatologic Surgery Center Inc, 14377 Woodlake Dr, Suite 111, St Louis, MO 63017.

ment for our patient with recalcitrant scalp psoriasis. Large-scale trials will be necessary to further substantiate our observations and optimize dosimetry for the treat-

ment of scalp psoriasis using this novel treatment modality.

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REFERENCES

1. King L, Webb B, Zanolli M. Experience in treating recalcitrant scalp psoriasis with automated shampooing and debridement. *J Am Acad Dermatol.* 1999;41:638-640.
2. Boyd A. Scalp psoriasis. *Am Fam Physician.* 1988;38:163-169.
3. Parish JA, Jaenicke KF. Action spectrum for phototherapy of psoriasis. *J Invest Dermatol.* 1981;76:359-362.
4. Kemeny L, Bonis B, Dobozy A, Bor Z, Szabo G, Ignacz F. 308-nm excimer laser therapy for psoriasis. *Arch Dermatol.* 2001;137:95-96.
5. Asawanonda P, Anderson RR, Chang Y, Taylor CR. 308-nm excimer laser for the treatment of psoriasis: a dose-response study. *Arch Dermatol.* 2000;136:619-624.

Correction

Error in 2 Authors' First Names. In the Cutting Edge article titled "A Semisynthetic Bilaminar Skin Substitute Used to Treat Pediatric Full-Body Toxic Epidermal Necrolysis," published in the February 2004 issue of the ARCHIVES (2004;140:160-162), the names of the second and third authors were reported incorrectly. The authors' correct names are Udo Kontny, MD, and Marcus Krüger, MD, respectively.