

# CO<sub>2</sub> Laser Treatment of Epidermal Nevi: Long-Term Success

SARAH BOYCE, MD AND TINA S. ALSTER, MD

*Washington Institute of Dermatologic Laser Surgery, Washington, DC*

**BACKGROUND.** Epidermal nevi have been notoriously difficult to treat due to their large size and often conspicuous location. Variable results have been obtained with different laser treatments, and scarring and/or incomplete removal is typical after excisional or other destructive modalities.

**OBJECTIVE.** To outline the successful use of a short-pulsed CO<sub>2</sub> laser in the long-term eradication of epidermal nevi in three patients.

**METHODS.** Three females (ages 15–19) presented with extensive grouped verrucous papules and plaques on the face, trunk, and extremities. A pulsed CO<sub>2</sub> laser was used to vaporize the lesions using a 500 mJ pulse energy, 3 mm spotsize, and 7 watts of power.

**RESULTS.** All lesions healed without incident. No lesional recurrence was observed 10 to 13 months after treatment except in one small area on the ankle in one patient.

**CONCLUSIONS.** Carbon dioxide laser vaporization of epidermal nevi provides good clinical effect and offers unique advantages for the treatment of these lesions, including effective intraoperative hemostasis with excellent lesional visualization. It is also possible to treat widespread areas in one laser treatment session. While the results of this series clearly show the benefit of CO<sub>2</sub> laser treatment, epidermal nevi may not always respond so favorably, due in part to the variability in their depths of involvement.

S. BOYCE, MD AND T. S. ALSTER, MD HAVE INDICATED NO SIGNIFICANT INTEREST WITH COMMERCIAL SUPPORTERS.

EPIDERMAL NEVI ARE hamartomatous lesions that are typically present at birth, but can arise throughout childhood and rarely appear in adulthood.<sup>1</sup> There are various types of epidermal nevi, including verrucous epidermal nevus, ichthyosis hystrix, systematized nevus, and nevus unius lateris. These nevi can be found alone or in association with an epidermal nevus syndrome which can display neurologic, ocular, skeletal, and cardiovascular manifestations.<sup>2</sup> Although the exact mechanism underlying the development of epidermal nevi is unknown, it appears likely that there are somatic mutations.<sup>3</sup> When extensive, these somatic mutations may occur early in the late blastocyst, before embryonic development.<sup>4</sup>

The treatment of epidermal nevi has long been a frustrating endeavor. The size and location of these lesions often render them conspicuous or functionally impairing and can therefore significantly compromise a patient's quality of life. Many therapies have been attempted, including intralesional and topical steroids, topical and systemic retinoids, topical 5-fluorouracil, podophyllin, dermabrasion, cryotherapy, and excisional surgery.<sup>5,6</sup> However, these treatment options tend to either fall short of complete eradication of the

nevus or result in an unacceptable scar that can be as disfiguring as the nevus itself.

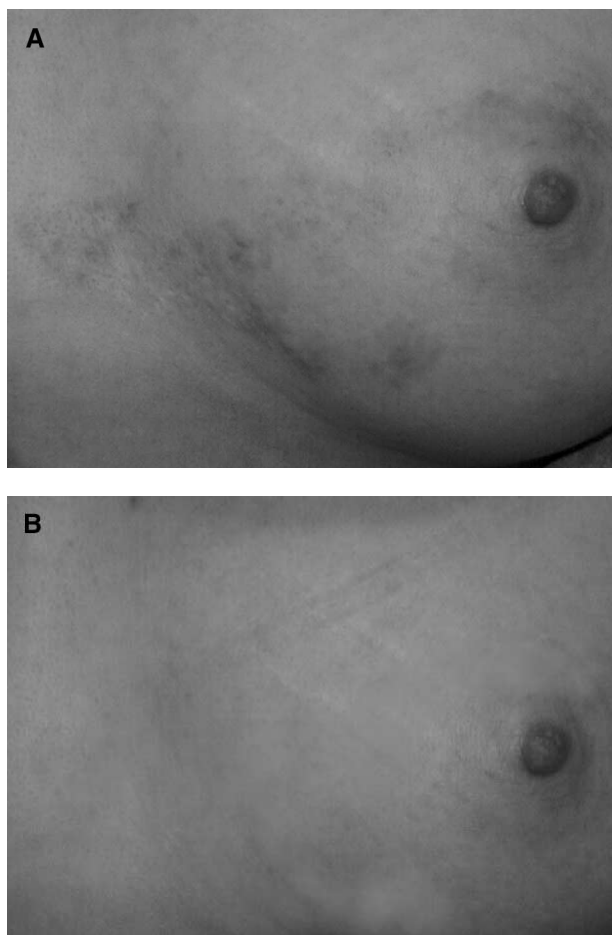
Variable results with laser treatment of epidermal nevi, including argon, Er:YAG, pulsed dye, and CO<sub>2</sub> lasers, have been demonstrated in the past.<sup>7–11</sup> Recent developments in CO<sub>2</sub> laser technology have made the modern pulsed and scanned CO<sub>2</sub> laser an excellent treatment choice for patients with epidermal nevi. We outline the successful use of a short-pulsed CO<sub>2</sub> laser in the long-term eradication of epidermal nevi in three patients.

## Case Reports

### *Patient 1*

A 16-year-old girl with grouped tan verrucous papules and plaques extending from her xiphoid process to the left nipple presented for diagnosis and treatment (Figure 1A). Biopsy confirmation of the clinical diagnosis of epidermal nevus was made. The areas were treated in two divided sessions with a pulsed CO<sub>2</sub> laser using a 3 mm collimated spot, 500 mJ pulse energy, and 7 W of power. Several laser passes (range two to five) were performed and partially desiccated tissue was completely removed with saline-soaked gauze between each pass. The wound was cleansed with a mild cleanser and a healing ointment applied twice a day until reepithelialization was complete (10 days). Mild residual erythema completely resolved within 6 weeks. No re-

Address correspondence and reprint requests to: Tina S. Alster, MD, Washington Institute of Dermatologic Laser Surgery, 2311 M St. NW, Suite 200, Washington, DC 20037, or e-mail: talster@skinlaser.com.



**Figure 1.** A) Epidermal nevus on the left breast before treatment. B) No lesional recurrence seen 13 months after CO<sub>2</sub> laser vaporization.

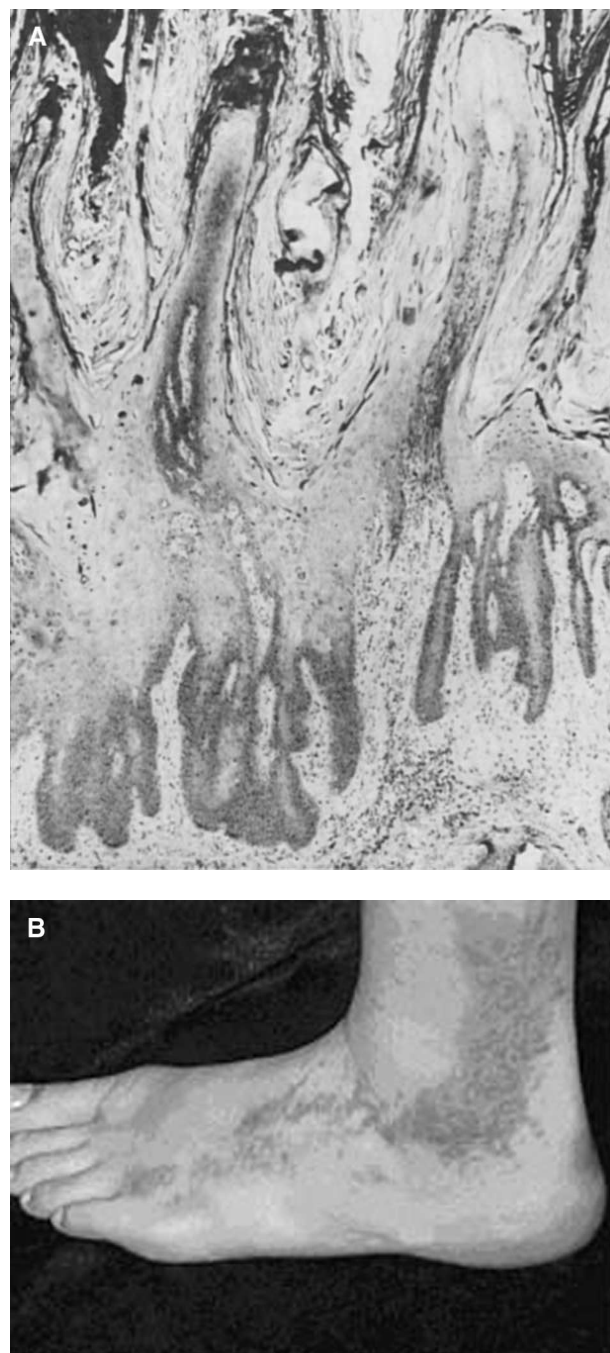
current lesions were observed at the 13-month follow-up visit (Figure 1B).

#### *Patient 2*

A 19-year-old woman presented with a flesh-colored verrucous 2 cm diameter plaque on the left cheek which appeared during childhood. Skin biopsy confirmed a histologic diagnosis of epidermal nevus. The lesion was treated in a single session with a pulsed CO<sub>2</sub> laser as described above (six to eight laser passes). The area healed without incident. Ten months after the procedure, no lesional recurrence was noted.

#### *Patient 3*

A 15-year-old Brazilian girl reported a lesion involving her entire leg at birth which was biopsy proven to be consistent with an epidermal nevus (Figure 2A). She had previously undergone electrodesiccation and cryosurgery, with lesional recurrence noted within 6



**Figure 2.** A) Hyperkeratosis, papillomatosis, and acanthosis with elongation of the rete ridges was consistent with the diagnosis of epidermal nevus. B) Extensive epidermal nevus involving the lateral ankle, leg, and hip before CO<sub>2</sub> laser treatment. C) Six months after CO<sub>2</sub> laser treatment, no recurrence was seen. D) Minimal lesional recurrence was noted 12 months postoperatively.

months. On examination, the verrucous papules and plaques were grouped in a linear fashion extending from her lateral foot to the upper thigh and hip (Figure 2B). Shave excision of the larger plaques was performed followed immediately by pulsed CO<sub>2</sub> laser ab-

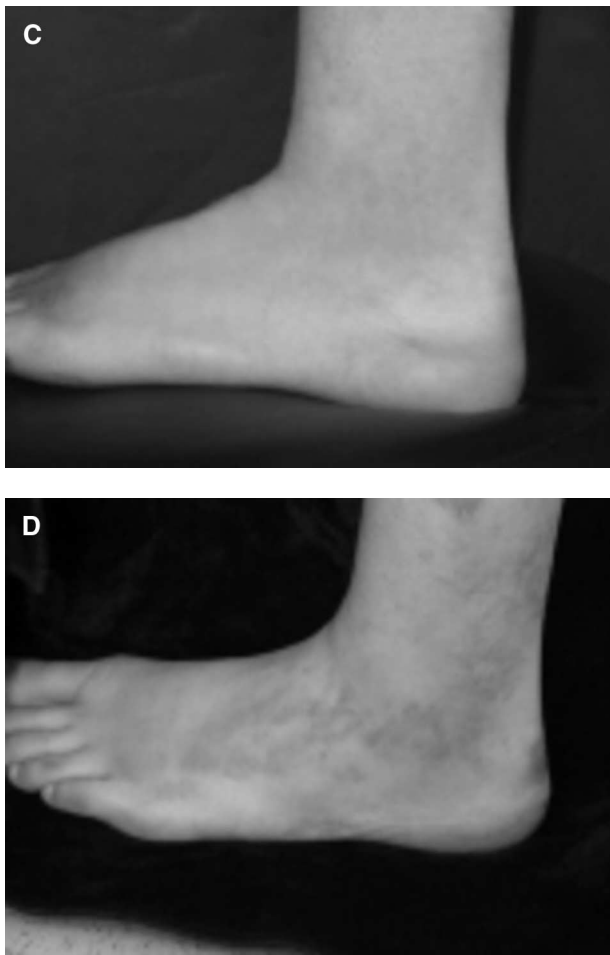


Figure 2. Continued.

lation of the base (range two to four passes) until no lesional remnants were observed. The treated areas reepithelialized within 2 weeks, leaving erythematous patches that eventually resolved. Six months after treatment, no recurrence was seen, but the patient's skin was noted to be extremely dry and itchy (Figure 2C). The patient was instructed to use a lactic acid-containing lotion twice a day. Twelve months postoperatively, minimal recurrence was noted in the ankle region only (Figure 2D).

### Conclusion

Patients with epidermal nevi often seek treatment from dermatologic surgeons for the cosmetic aspect of their cutaneous condition. After a multidisciplinary examination to rule out neurologic, ocular, skeletal, and cardiovascular complications of epidermal syndrome, it is incumbent upon the physician to offer the most prudent and effective therapy for the cutaneous manifestations about which the patient initially sought treatment.

The use of intralesional and topical steroids results in decreased erythema and inflammation, but results are usually temporary. Retinoids are of questionable efficacy and are also a temporary solution for a chronic problem.<sup>5,12</sup> Topical 5-fluorouracil, podophyllin, and liquid nitrogen are limited to treatment of the epidermis.<sup>12</sup> Since signaling occurs between the epidermis and dermis during development, a dermal contribution to these nevi is probable. It has been reported that at least a partial dermal excision is needed to prevent recurrence.<sup>13</sup> Although dermabrasion and excisional surgery can provide the deeper dermal treatment needed to effect lesional eradication, they can result in problematic scarring.

CO<sub>2</sub> laser vaporization offers unique advantages for the treatment of epidermal nevi. First, the short-pulsed nature of the newest systems permit precise tissue ablation, with thin areas of the nevus requiring one or two laser passes and thicker, dense portions necessitating additional passes. The CO<sub>2</sub> laser also produces effective intraoperative hemostasis with excellent lesional visualization. In the case of extensive epidermal nevi, CO<sub>2</sub> laser treatment is preferable, as surgical excision of widespread areas may not be feasible and the use of topical therapies becomes exceedingly cumbersome. While the results obtained in these three patients are nice examples of the benefit of CO<sub>2</sub> laser treatment, epidermal nevi may not always respond so favorably, due in no small part to the fact that there is great variability in their depths of involvement.

Unfavorable scarring remains a potential complication of CO<sub>2</sub> laser treatment; however, the risk is minimized with the latest short-pulsed systems because of controlled tissue heating. The creation of a limited and protective amount of dermal fibrosis that occurs as a result of laser skin resurfacing may be responsible for the reduced risk of lesional recurrence and/or may discourage further lesional growth due to decreased dermoepidermal signaling.

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