

Treatment of a Becker's Nevus Using a 694-nm Long-pulsed Ruby Laser

CHRISTOPHER A. NANNI, MD
TINA S. ALSTER, MD

Becker's nevus is an uncommon pigmented smooth muscle hamartoma that develops during adolescence and occurs primarily in young men. The nevus is characterized by hypertrichosis and hyperpigmentation and is usually located unilaterally over the shoulder, upper arm, and scapula. We describe a patient with a Becker's nevus who was treated with a long-pulsed ruby laser in order to decrease hair density and pigmentation. © 1998 by the American Society for Dermatologic Surgery, Inc. Dermatol Surg 1998;24:1032-1034.

Becker's nevus is an uncommon cutaneous hyperpigmentation with a male-to-female ratio of 4:1.¹ This pigmented lesion is usually not present at birth but develops slowly during puberty or during the second decade of life. Becker's nevi are typically located on the shoulder, chest, and proximal arm and generally demonstrate hypertrichosis.²⁻⁷ The lesion occurs with equal frequency in all races, and while concomitant malignancies have not been reported, it has been associated with various physical abnormalities such as limb defects and spina bifida.³ Histologically, Becker's nevi demonstrate slight hyperkeratosis, with elongation of the rete ridge pattern and basilar hyperpigmentation. Melanocytes are only mildly increased in number and smooth muscle hamartomas are occasionally evident within the reticular dermis.^{1,6,7}

Case Report

A 27-year-old man sought treatment for a "large hairy mole" that had been growing slowly over his left shoulder and scapula since the age of 17 years. While the lesion had not changed in size or color during the preceding 7 years, an increase in hair density was noted. In fact, the hypertrichosis associated with the nevus was more disturbing to the patient than was the underlying hyperpigmentation. The patient was otherwise healthy with no significant past medical or surgical history. The

pigmented lesion had not been treated previously. A skin biopsy confirmed the diagnosis of a Becker's nevus. There was no family or personal history of melanoma or dysplastic nevus syndrome.

Physical examination revealed a large, brown patch with hypertrichosis overlying the left proximal upper arm, shoulder, scapula, and mid back. Terminal brown hair shafts, coarser in texture than the surrounding body hair, were distributed within the borders of the pigmented patch (Figure 1). There was no evidence of limb defects or underlying bony or soft tissue abnormalities.

After a discussion of treatment options including electrolysis, waxing, excision and grafting, and laser-assisted hair removal, the patient elected to undergo therapy with a long-pulsed ruby laser (EpiLaser; Coherent/Palomar Medical Technologies, Palo Alto, CA). The 694-nm wavelength laser targets endogenous melanin located within hair follicles and shafts. The intense ruby light is avidly absorbed by melanin. The heat produced by the selective absorption results in thermal damage to the hair follicle.^{8,9} A 7- or 10-mm laser spot size is used with a fixed pulse duration of 3 msec to generate fluences up to 40 J/cm². In order to protect melanin-containing structures in the epidermis, a contact sapphire lens "cooling handpiece" is applied to the treatment area, which decreases skin surface temperature and helps to prevent unwanted thermal injury.⁸

The procedure for hair removal using the EpiLaser may be summarized as follows: 1) hair-bearing areas are shaved, 2) a treatment grid is drawn in red ink in order to provide the laser operator with an outlined area to treat, 3) the cooling tip is applied firmly to the treatment site, and 4) laser energy is then discharged to the area with nonoverlapping pulses. During the first laser treatment, a fluence of 18 J/cm² with a 10-mm spot was used, causing the patient only minimal pain, mild erythema, and a burning sensation that lasted 1-2 hours (Figure 2). He developed purpuric, nonblanching erythematous macules and fine epidermal crusting by the third postoperative day, which resolved completely after 2 weeks. A second and third treatment at 19 and 22 J/cm², respectively, was performed at 6-8-week time intervals with evidence of continued hair and pigment

From the Washington Institute of Dermatologic Laser Surgery, Washington, DC.

Address correspondence and reprint requests to: Tina S. Alster, MD, 2311 M Street, NW, Suite 200, Washington, DC 20037.



Figure 1. Becker's nevus in a 27-year-old male before treatment.

reduction (Figure 3). The patient tolerated the treatments well without the need for topical anesthetics or systemic analgesics. Hair density decreased by 50% after a single ruby laser treatment and continued to decrease with subsequent treatments until a 90% reduction in hair growth was achieved after the third laser session (Figure 4). The average of three manual hair counts was calculated within a 3 cm² area within each of three representative sections of the nevus as an indicator of hair density. The clinical reduction in hair and pigment continued to be evident 10 months after the final treatment. No scarring or skin textural changes were observed.

Discussion

Becker's nevi pose a significant treatment challenge to cutaneous surgeons due to their large size and degree

Figure 2. Erythema and perifollicular edema immediately after long-pulsed ruby laser irradiation at 18 J/cm².



Figure 3. Significant reduction in hair density and pigmentation 2 months after second long-pulsed ruby laser treatment (19 J/cm²).

of hair density. These nevi are not only cosmetically undesirable but are also psychosocially distressing, as traditional surgical therapies have been either unsuccessful or have resulted in scarring. Less invasive treatments such as camouflage makeup, wax epilation, and shaving are temporary remedies and are time consuming to perform. The hyperpigmentation in Becker's nevi has been treated successfully with Q-switched (QS) ruby (694 nm) and frequency-doubled Nd:YAG (532 nm) laser irradiation; however, recurrence rates have been high and the terminal hairs within the nevi were typically unaffected.¹⁰⁻¹²

Laser-assisted hair removal using red and infrared wavelengths of light has revolutionized the treatment of unwanted hair growth.^{8,9,13-16} One of the known side

Figure 4. Ninety percent reduction in hair density and pigmentation 6 months after third laser treatment (22 J/cm²).



effects of laser-assisted hair removal is hypopigmentation.^{8,9} Because the laser's target is follicular melanin and laser light must first penetrate the epidermis in order to reach the hair follicle, epidermal melanin is often injured during the hair removal process, resulting in a decrease in pigmentation.^{8,9,20} Therefore, laser-assisted hair removal using a wavelength within the red electromagnetic spectrum results in decreased hair density and simultaneous skin lightening.^{8,9} While hypopigmentation is generally considered a complication of ruby laser-assisted hair removal, we utilized this side effect to our advantage in order to impact both the unwanted hair growth and the hyperpigmentation associated with our patient's Becker's nevus. Three consecutive laser treatments using the laser parameters and time intervals outlined resulted in remarkable long-term hair and pigment reduction.

This report indicates that long-pulsed ruby laser irradiation is an effective and rapid method to treat the hypertrichosis and hyperpigmentation characteristic of a Becker's nevus. Long-term evaluation will be necessary to determine whether the favorable results observed in this patient will be permanent.

References

1. McKee PH. Pathology of the Skin. London: Mosby-Wolfe, 1996: 1.20-1.
2. Becker SW. Concurrent melanosis and hypertrichosis in distribution of nevus unius lateralis. *Arch Dermatol* 1940;60:115.
3. Bart RS, Kopf A. Extensive melanosis and hypertrichosis (Becker's Nevus). *J Dermatol Surg Oncol* 1977;3:397.
4. Glinik SE, Alper JC, Bogaars JA. Becker's melanosis: associated abnormalities. *J Am Acad Dermatol* 1983;9:509-15.
5. Copeman PWM, Wilson Jones E. Pigmented hairy epidermal nevus (Becker). *Arch Dermatol* 1965;92:249-51.
6. Slipman N, Harrist T, Rhodes A. Congenital arrector pili hamartoma. A case and review of the spectrum of Becker's melanosis and pilar smooth muscle hamartoma. *Arch Dermatol* 1985;211: 1034-7.
7. Urbanech RW, Johnson WC. Smooth muscle hamartoma in Becker's nevus. *Arch Dermatol* 1978;114:104-6.
8. Grossman MC, Dierickx C, Farinelli W, et al. Damage to hair follicles by normal-mode ruby pulses. *J Am Acad Dermatol* 1996; 35:889-94.
9. Lask G, Elman M, Slatkine M, et al. Laser-assisted hair removal by selective photothermolysis: preliminary results. *Dermatol Surg* 1997;23:737-9.
10. Nelson JS, Applebaum J. Treatment of superficial cutaneous pigmented lesions by melanin-specific selective photothermolysis using the Q-switched ruby laser. *Ann Plast Surg* 1992;29:231-7.
11. Goldberg DJ. Benign pigmented lesions of the skin: treatment with the Q-switched ruby laser. *J Dermatol Surg Oncol* 1993;19: 376-9.
12. Tse Y, Levine VJ, McClain SA, Ashinoff R. The removal of cutaneous pigmented lesions with the Q-switched ruby laser and the Q-switched neodymium:yttrium-aluminum-garnet laser: a comparative study. *J Dermatol Surg Oncol* 1994;20:795-800.
13. Alster TS. Manual of Cutaneous Laser Techniques. Philadelphia: Lippincott-Raven Publishers, 1996:128-34.
14. Goldberg DJ, Littler CM, Wheeland RG. Topical suspension-assisted Q-switched Nd:YAG laser hair removal. *Dermatol Surg* 1997;23:741-5.
15. Grossman MC, Wimberly J, Dwyer P, et al. PDT for hirsutism. *Lasers Surg Med* 1995;7(Suppl):47.
16. Nanni CA, Alster TS. Optimizing treatment parameters for hair removal using a topical carbon-based solution and 1064-nm Q-switched neodymium:YAG laser energy. *Arch Dermatol* 1997;133: 1546-9.
17. Nanni CA, Alster TS. A practical review of laser-assisted hair removal using the Q-switched Nd:YAG, long-pulsed ruby, and long-pulsed alexandrite lasers. *Dermatol Surg* 1998: In press.
18. Nanni CA, Alster TS. Efficacy of multiple hair removal sessions using the Q-switched Nd:YAG, long-pulsed ruby, and long-pulsed alexandrite laser systems. *J Am Acad Dermatol* 1998: In press.
19. Nanni CA, Alster TS. Complications of laser-assisted hair removal using the Q-switched Nd:YAG, long-pulsed ruby, and long-pulsed alexandrite lasers. *Dermatol Surg* 1998: In press.
20. Anderson RR, Parrish JA. Selective photothermolysis: precise microsurgery by selective absorption of pulsed radiation. *Science* 1983;220:524-7.