

Dermatosis Papulosa Nigra Treatment with Fractional Photothermolysis

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Dermatosis papulosa nigra (DPN) is a benign skin condition characterized by multiple, small, hyperpigmented macules and papules found on the malar areas of the face, neck, and trunk. It is almost always seen in the black population.^{1,2} Prevalence of DPN in the black population has been reported to be between 10% and 35%, with many patients noting a family history of the lesions and the number of lesions increasing with age.^{3–6} Histologically, DPN is the same as seborrheic keratosis (acanthotic type).⁷

Although DPN is a benign skin condition, cosmetic disfigurement from the lesions may be substantial, causing patients concern and distress and leading them to seek out treatment. Effective treatments include curettage, cryotherapy, and electrodesiccation with curettage, but aggressive treatments have been associated with hypo- and hyperpigmentation, scarring, and keloid formation.⁸

Owing to the success of fractional photothermolysis in treating dermal and epidermal skin conditions,^{9,10} it was hypothesized that DPN could be treated with the 1,550-nm wavelength erbium-doped Fraxel SR 1500 laser (Reliant Technologies, Inc., Mountain View, CA).

Case Report

A 50-year-old Pakistani woman (Fitzpatrick skin type IV) was seen in our clinic with a 4-year

history of black papules and macules on both cheeks and temples. The lesions had increased in number and size over the previous 2 years. Shave biopsies of three different lesions from these areas were read as seborrheic keratoses. The clinical and pathologic appearance of the lesions confirmed the diagnosis of DPN. She had been treated with cryotherapy 2 years previously. She was not taking any medications, did not use sunscreen, and reported no other significant past medical history. She related that her father had similar lesions on his face. Physical examination revealed multiple, scattered, brown and black macules and smooth papules of varying sizes on both cheeks and temples (Figure 1).

Before treatment with the 1,550-nm wavelength erbium-doped Fraxel SR 1500 laser, the treatment area was cleansed using a mild soap (Cetaphil Gentle Skin Cleanser, Galderma Laboratories, L.P., Fort Worth, Texas). A topical triple anesthetic of 10% benzocaine, 6% lidocaine, and 4% tetracaine (New England Compounding Center, Framingham, MA) was applied under occlusion to the treatment area of the cheeks and temples for 1 hour before treatment. An ointment (LipoThene, Inc., Pacific Grove, CA) was then applied so that the laser handpiece could glide smoothly over the treatment area.

The patient underwent three treatments to the bilateral cheeks and temples with 4- to 5-week

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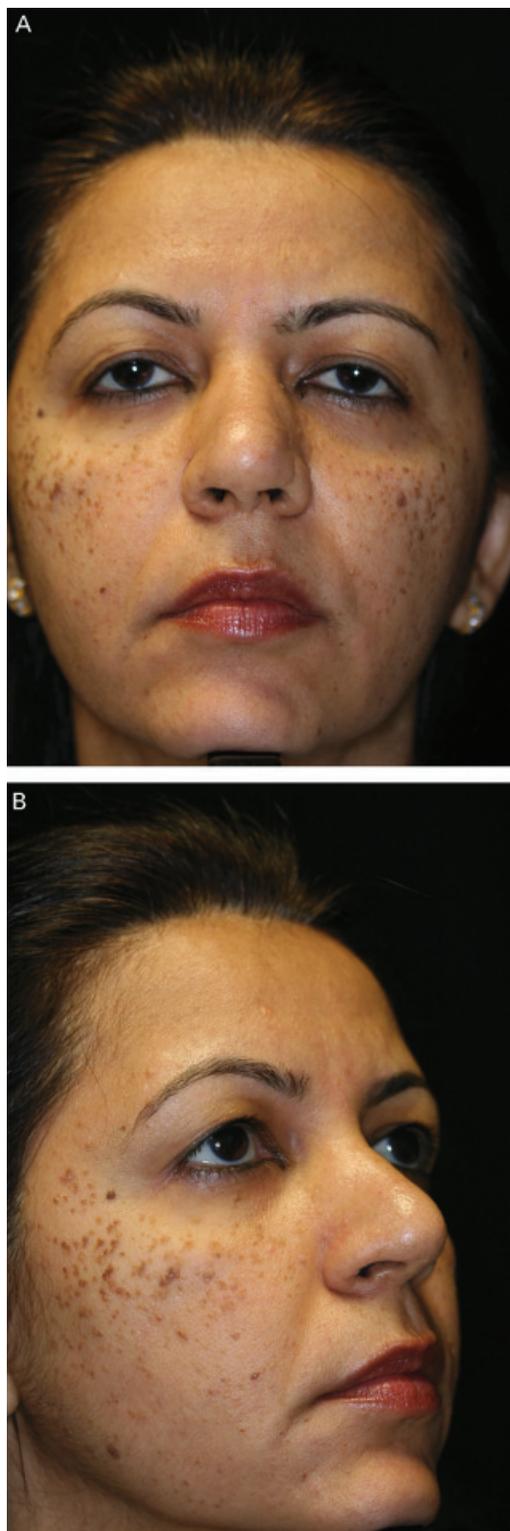


Figure 1. (A–B) Dermatitis papulosa nigra on the face before treatment with fractional photothermolysis.

intervals between treatments. Energy fluence was started at 60 mJ for the first treatment and then increased to 70 mJ for the remaining two treatments. Total kilojoules were 2.42 to 2.94 kJ. The treatment level selected on the device monitor for all treatments was 7, which correlates to 20% surface coverage. Eight to 10 passes with the laser were performed during each treatment. A cold-air cooling system (Cryo 5, Zimmer Medizin Systems, Irvine, CA) was used to cool the skin during treatment to minimize patient discomfort (fan power 4, 10–14 cm from the skin). The patient was advised to use a broad-spectrum sunscreen with ultraviolet (UV)A and UVB protection (minimum sun protection factor 45) daily on the treated areas. She was advised to abstain from any unnecessary sun exposure for 7 days after treatment.

Photographic documentation using identical camera settings, lighting, and patient positioning was obtained at baseline, before each treatment, and 1 month after the last treatment. An independent evaluation of the effects of the treatment on the patient was performed using the following well-established quartile-grading scale: grade 1 (<25%; minimal to no improvement), grade 2 (26–50%; moderate improvement), grade 3 (51–75%; marked improvement), and grade 4 (>75%; near total improvement). During treatment, the patient experienced mild pain, with moderate postprocedural erythema and edema that resolved in 24 to 48 hours. At the 1-month follow-up visit after the third treatment, the evaluating physician noted grade 4 improvement, with no postprocedural complications or recurrence (Figure 2). The patient's degree of satisfaction paralleled the physician's assessment of improvement.

Discussion

Fractional photothermolysis involves the process of separating a laser beam into smaller beams to deliver microscopic treatment zones (MTZs). Hundreds to thousands of these MTZs are created

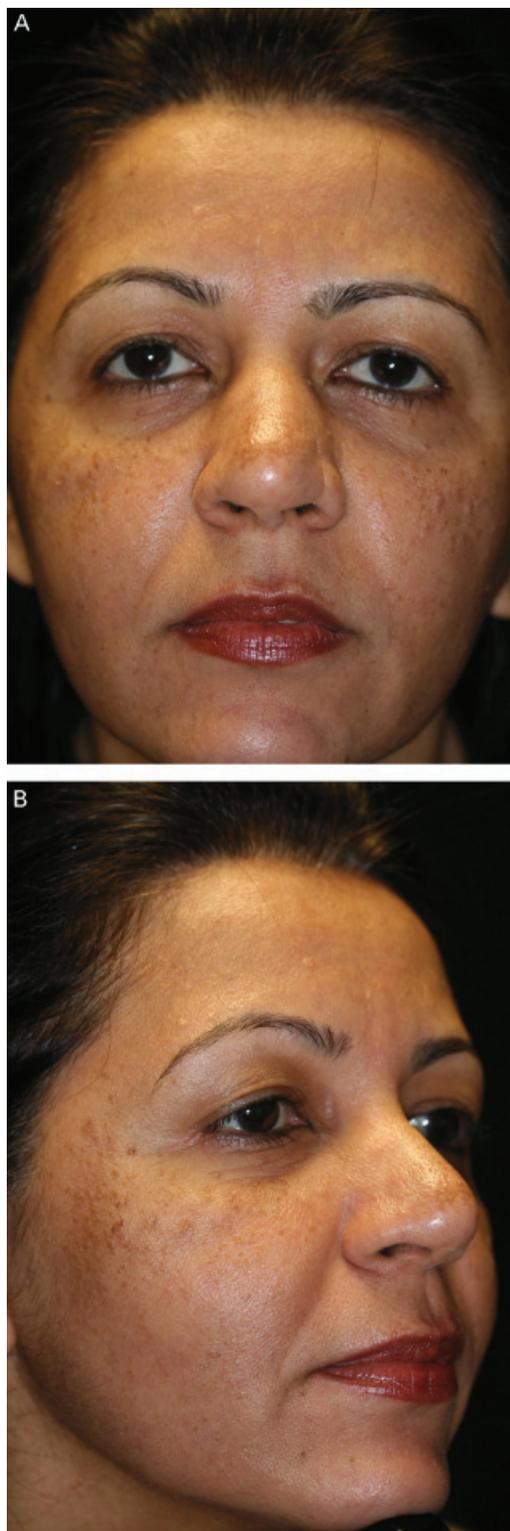


Figure 2. (A–B) 1 month after completing three treatments. The physician and patient reported greater than 75% improvement in dermatosis papulosa nigra.

where thermal injury to the skin is produced. Fractional photothermolysis targets tissue water, allowing it to work at various depths in the skin. For this reason, epidermal keratinocytes, collagen, and blood vessels at various depths in the skin are affected.¹¹ As a result of the small cross-sectional area of the MTZs, a limited number of the keratinocytes within the target area are removed in a single session.¹² With multiple treatment sessions, the entire target area is eventually treated.¹² The erbium-doped 1,550-nm fractionated laser that was used to treat this patient is able to treat skin to a depth of 382 to 1,379 μm using energy fluences of 4 to 70 mJ. High energy settings (60–70 mJ) were chosen to treat this patient, as deeper penetration for papular lesions was desired. The treatment level was also high (7), to cover a larger surface area per treatment.

We believe that a transport system known as transepidermal elimination, which is induced by fractional photothermolysis, improved this patient's DPN.¹⁰ In this transportation system, microepidermal necrotic debris is eliminated transepidermally through epidermal vacuoles.¹⁰ A portion of the vacuolar content was found to be dermal in origin.¹⁰

Although cryotherapy, curettage, and electrodesiccation are commonly mentioned as treatment options for DPN, few studies or reports exist on the topic. One article investigating light abrasive curettage for the treatment of DPN describes persistent hypo- and hyperpigmentation 8 weeks after the treatment.⁸ Fractional photothermolysis may be a superior treatment modality for DPN. Although we found that fractional photothermolysis required several treatments to achieve the best results, the risk of dyspigmentation is lower than that seen in other treatment modalities. A recent study investigating the potential complications of fractional photothermolysis found that only 0.73% of 961 patients developed postinflammatory hyperpigmentation after treatments to the face.¹³ Some patients with DPN may have thicker lesions, which may

not respond as well to treatment with fractional photothermolysis.

Recently, the 1,064-nm neodymium-doped yttrium aluminium garnet laser was reported to effectively treat DPN in two patients with no reported adverse effects.¹⁴ The 532-nm diode laser has been reported to be an effective and safe treatment modality for the treatment of DPN. Repeat treatments and additional sessions may be needed.^{15,16}

This case demonstrates marked improvement of DPN on the face of a Southeast Asian woman after a series of fractional photothermolysis treatments. Because this is the first report of fractional photothermolysis for the treatment of DPN, recurrence rates are unknown. We feel that this technology is a good treatment option for DPN, because fractional photothermolysis has a broad safety profile,¹³ which is especially important for darker skin types. Controlled studies are warranted to better understand the efficacy, longevity, and optimal laser settings for the treatment of DPN by fractional photothermolysis.

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