Minocycline-induced pigmentation resolves after treatment with the Q-switched ruby laser

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Accepted for publication 30 October 1995

Summary
Four patients with minocycline-induced cutaneous pigmentation were treated with the Q-switched ruby laser. The pigmentation resolved and there was no adverse effects.

Minocycline-induced skin pigmentation has been reported in 2.4%, 3.7% and 5.7% of acne vulgaris patients and 28% of rosacea patients. Pigmentation fades spontaneously after discontinuing the drug. However, some pigmentation often remains and is a cosmetic problem. Q-switched ruby laser therapy is effective in treating dermal pigmentation, particularly blue–black tattoos and some pigmented lesions.

We treated four patients who had minocycline skin pigmentation on the face, lips and lower limbs with the Q-switched ruby laser. All started laser therapy within a month of discontinuing minocycline. The pigmentation resolved in all patients.

Case reports

Patient 1
A 45-year-old female developed brown pigmentation of the lips more prominent on the lower lip and navy-blue pigmentation of the buccal mucosa. She had taken minocycline MR (modified release) 100 mg daily for 8 months for hidradenitis suppurativa. No other sites were affected. She was not taking other medication. The right half of her lower lip was treated with the Q-switched ruby laser (694 nm, 25–28 ns, 6-mm spot size, Lambda Photometrics, U.K.) at a fluence of 7.5 J/cm². After 2 months the pigmentation had resolved in the treated sites and there was no improvement in non-treated areas. The remaining sites on the lips were treated at the same fluence with similar resolution of pigment after one treatment. There were no adverse effects.

Patient 2
A 76-year-old male developed patches of grey–black pigmentation on the temples, the crown of his scalp and neck (Fig. 1a). He had taken minocycline 50 mg once daily for 15 years for rosacea. He was not taking other medication. The temples, neck and scalp were treated with the Q-switched ruby laser at an energy fluence of 5 J/cm² on four occasions at 3-month intervals without adverse effects. The grey–black pigmentation resolved without adverse effects revealing marked solar elastosis (Fig. 1b).

Patient 3
A 56-year-old male developed blue–grey pigmentation over 8 months on the lateral and inferior orbital areas. He had solar elastosis also in these areas. He had taken minocycline 100 mg daily for 5 years for rosacea. He was not taking other medication. The pigmentation almost completely resolved after one treatment with the Q-switched ruby laser at a fluence of 5 J/cm². Residual areas were treated at the same fluence 2 months later and pigmentation completely resolved without adverse effects.

Patient 4
A 55-year-old female developed blue–black pigmentation localized to a previous site of trauma on her right leg. She had been taking minocycline 50 mg twice daily for 14 months for rosacea and was not on other medication. Test areas were treated with the Q-switched ruby laser at fluences of 5, 7.5 and 10 J/cm². The best response was at 10 J/cm². The rest of the area was treated at this energy fluence and completely resolved. There were no adverse effects.

Discussion
Cutaneous pigmentation, either localized or diffuse, is the most common adverse effect of minocycline therapy.
In one series eight of 54 patients (14.8%) were affected.³ Pigmentation appears insidiously and is often not noticed by patients. Patients with acne vulgaris develop localized pigmentation in comedones and scars. Pigmentation may occur after a brief course of treatment.² However, in a series of 700 patients with acne vulgaris, pigmentation only appeared after a cumulative dose in excess of 70 g.¹

Patients with rosacea more commonly develop diffuse minocycline-induced pigmentation.³ These patients are older, are more likely to have solar elastosis, and usually have received higher cumulative doses of minocycline than have acne patients. Pigmentation is more likely to occur after a cumulative dose of 100 g.²,³ Minocycline-induced pigmentation is blue–grey,²,³ although a muddy brown colour may occur on sun-exposed sites.²,⁷,¹₀,¹₁

Two of our patients developed minocycline pigmentation in areas of solar elastosis. Both patients had rosacea and had received high cumulative doses of minocycline. One patient developed pigmentation at a site of trauma on her right leg. Another patient developed pigmentation on the lips and buccal mucosa but not in areas of hidradenitis suppurativa. Although minocycline-induced pigmentation may resolve within 12 months,² pigmentation often persists for much longer.²,¹₁,¹² The complete resolution in our patients was consistent with a response to laser therapy rather than natural resolution because of the time course of the effect and the response to the test site illustrated in case 2 (Fig. 1a). Our patients requested treatment rather than await spontaneous resolution because the intensity and sites of pigmentation were of cosmetic concern. We chose to treat the patients with a Q-switched laser because of the composition and location of minocycline-induced pigmentation.

The colour of minocycline pigmentation will be blue–grey or muddy brown depending on which histological features predominate. Histological features include:

- Increased melanin in the basal cell layer and macrophages,⁷,⁸,¹₂ and pigment distributed within macrophages and rarely among dermal collagen fibres.⁵,¹₀,¹₃,¹₄
- X-ray microanalysis of cutaneous pigments demonstrate iron and smaller quantities of calcium, sulphur and chloride.¹₃ A minocycline derivative chelated to iron or calcium and oxidized to a coloured quinone structure may also be present.¹₄ Therefore several pigments may contribute to the colour. The colour depends also on the number of macrophages and their location in the dermis.

The Q-switched ruby laser uses very high energy pulses which produce specific thermally mediated injury to pigment and pigment containing cells. Case 4 had three energy fluence test areas and 10 J/cm² was the most effective. Energy fluences were selected empirically in the other patients similar to doses used to treat tattoos and pigmented lesions. In tattoos, although pigment-containing cells remain in the dermis after treatment some pigment is phagocytosed and some is extruded through the epidermis. Changes in particle size and in pigment granule structure alter optical properties making pigmentation less obvious.⁴,¹₅ It is likely that our patients with minocycline pigmentation had a similar response to laser therapy.

We report another clinical indication for Q-switched laser therapy. Treatment was well tolerated. Hypopigmentation and scarring did not occur. We advocate Q-switched laser therapy for the treatment of minocycline pigmentation.

References

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