Treatment of Minocycline-Induced Dermal Pigmentation Deposition with the Q-Switched Alexandrite Laser

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The views expressed in this article are those of the authors and do not necessarily reflect the official policy or position of the Department of the Navy, the Department of Defense, or the United States government. John Linabury is a military service member. This work was prepared as part of his official duties. Title 17, USC, x 101 provides that “Copyright protection under this title is not available for any work of the United States Government.” Title 17, USC, x 105 provides that “Copyright may be due to medications. Knowledge of these etiologies reduces the time to correct identification and, if available, treatment. Minocycline is a commonly used medication and rarely causes pigment changes.

Minocycline is utilized for both antimicrobial and anti-inflammatory properties, commonly employed for use in acne, rosacea and autoimmune diseases. Minocycline hydrochloride-induced pigmentation (MIP) is a rare side effect that presents with cutaneous deposition of a black oxidized form of minocycline resulting in a blue, gray, or brown pigmentation.³⁻⁷ Three clinical distributions and histologic variations of MIP exist. Pigment deposition can have a permanent effect on numerous tissues, the most noticeable being the sclera, dermis, and fingernails. Immediate discontinuation of the medication is recommended if MIP is suspected; however, full resolution is rare. Lasers have been used to reduce the appearance of cutaneous pigments, including MIP.

We discuss several laser regimens employed in the literature and describe a regimen with the Q-switched alexandrite laser (Accolade, Cynosure, Westford, MA) that successfully treated a case of MIP, further refining the treatment of MIP.

Case Report
An 80-year old female, skin type II, with a past medical history of recurrent mycoplasma pneumonia treated with minocycline intermittently over a six-year period presented with blue-grey macules across the facial skin, sclera, and fingernails. The grey-blue discoloration of her bilateral thumbnails was first noted two months after starting minocycline when her dosage was increased from 100 mg daily to 100 mg twice daily. Over the following months, additional grey-blue macules appeared on the facial skin, sclera and fingernails. The minocycline was discontinued two years prior to her presentation with a persistence of her pigmentation. The patient was referred to this specialty laser clinic by her medical dermatologist for treatment of her blue-grey discoloration.

Physical examination revealed 3 mm to 9 mm, grey-blue macules across the bilateral eyelids and eyebrows, sclera, perioral area, and fingernails (Figures 1, 2). A test spot to the left thumbnail was successful. Subsequently, the patient’s fingernails, eyebrows and perioral areas were treated with a Q-switched (QS) alexandrite laser (Accolade, Cynosure, Westford, MA) at the following settings: 4 mm spot size, 5 J/cm², 1Hz. Significant improvement was noted by the patient and during skin examinations with a 75% clearance during the first treatment and nearly full resolution with the second treatment one month later. Figures 1 and 2 demonstrate the comparison.

The patient did not report any side effects from the treatments. The patient was advised of the benign nature of her scleral pigmentation and advised against laser treatments of the sclera due to a risk of blindness. She was referred back to her medical dermatologist for further medical dermatologic care.

Discussion
Minocycline hydrochloride is a semi-synthetic tetracycline derivative with antimicrobial and anti-inflammatory applications.³⁻⁷ Minocycline hydrochloride-induced pigmentation (MIP) is a rare but known complication of the sustained use...
of minocycline. Minocycline is the most common medication in the tetracycline class associated with cutaneous manifestations. Three types of MIP have been differentiated both clinically and histologically, shown in Table 1. Our patient had clinical findings consistent with type 1 MIP. Minocycline dosages of 100 mg daily over two months increases the risk of MIP, as do cumulative doses in excess of 100 g.4-6 Ingestion over four years carries a 20% incidence of MIP, with subsequent discontinuation is recommended.2,5

Pigment-complex dissolution to smaller fragments is mediated by the mechanism is extracellular and intracellular.1,2,5,6 The putative mechanism is extracellular and intracellular pigmen-complex dissolution to smaller fragments for lymphatic removal.2,5 755-nm alexandrite laser in this study. Nd:YAG laser and post-operative hypopigmentation was effective in clearing MIP to the upper lip following carbon-dioxide laser resurfacing. The degree of procedural discomfort was not noted.3 Similar results were obtained by Green et al. with the application of the Nd:YAG laser (Medlite, Continuum Biomedical), obtaining 90% clearance after five sessions and complete clearance in eight sessions. A transient desquamation was noted with the procedure.4

Izikson et al. applied a fractional photothermolysis regimen after two initial Nd:YAG laser treatment sessions proved ineffective. Four fractional photothermolysis sessions using a 1550-nm diode laser (Reliant Fraxel, Cynosure) and cooling device (Zimmer) resulted in near-complete clearance. Pain was managed with topical anesthesia, and side effects were notable for transient edema and erythema.11

Conclusion
We report a case of type 1 MIP successfully treated with the 755-nm QS alexandrite laser in two treatment sessions spaced one month apart with minimal discomfort. The treatment of MIP with lasers is an exciting new use of the technology that dermatologists should be aware of. Additional studies are needed to fully assess the effectiveness of various types of laser for the treatment of MIP.

Table 1. Clinical and histologic traits of MIP types

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<thead>
<tr>
<th>Type</th>
<th>Clinical Appearance</th>
<th>Histologic Appearance</th>
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<tbody>
<tr>
<td>1</td>
<td>Bluish-black pigments</td>
<td>Found intracellularly with macrophages</td>
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<td>Predilection for previously inflamed tissue</td>
<td>Stains positive for extracellular iron and melanin</td>
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<td></td>
<td>Facial involvement most commonly noted</td>
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<td></td>
<td>Resolution may be protracted</td>
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| 2    | Bluish-gray pigments | Stains melanin in both basal keratinocytes and dermal macrophages |
|      | Deposition in normal skin | |
|      | Frequently affects legs and forearms | |
|      | Resolution may be protracted | |

| 3    | Muddy-brown pigments | Stains melanin in both basal keratinocytes and dermal macrophages |
|      | Deposition in sun-exposed areas | |
|      | Least common | |
|      | Persists indefinitely | |

References


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