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Successful Treatment of Cutaneous Siderosis with Pulsed Dye Laser

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A 52-year-old woman was referred to dermatology clinic for brown discoloration at the site of IV iron infusion for iron deficiency anemia 4 months prior (Figure 1). Two hours into infusion of 1000mg of ferric carboxymaltose, the site appeared discolored and slightly swollen. On examination, she had an approximately 9x10cm well-demarcated and homogenous light brown patch involving her right antecubital fossa.

Pulsed dye laser (PDL) was the only laser available in clinic for treatment. She was counseled on the risks, including dyschromia and scarring, and agreed to a trial of the treatment. Initial test spots were performed with 595 nm PDL with the following settings: 7mm spot size, 7 to 10.5 J/cm^2, and 0.45 milliseconds. She experienced mild blistering in the areas of higher fluence shortly after the procedure but was enthusiastic about the effect in the test spots (Figure 2). The remainder of the patch was treated with a 7mm spot size, 8.5 J/cm^2, and 0.45 milliseconds pulse duration in segments over multiple visits for patient comfort.

This case presents a patient who experienced extravasation of iron into dermal tissue with subsequent hyperpigmentation, termed cutaneous siderosis, which happens in 1.6-1.8% of patients treated with IV iron.[1,2] Laser therapy has been the preferred treatment modality for cutaneous siderosis, with recent use of Quality-switched (Q-switched) lasers that have shown promising outcomes.[1] Interestingly, we present an event of clinical resolution following treatment with PDL, traditionally indicated for erythematous and vascular disorders such as erythematotelangiectatic rosacea and capillary malformations.[3]

Understanding the basic properties of ferric carboxymaltose, specifically its absorption band of 470-500nm, allows clinicians to identify appropriate lasers to treat the residual hyperpigmentation.[1] Heidemeyer et. al describes the importance of laser selection directed toward iron's major absorption peak of 415 nm, as well as consideration for depth of penetration based on wavelength.[1]

Lasers depend on selective photothermolysis, or using light wavelength, amount of energy, and pulse duration to destroy a specific chromophore. [3] PDL is typically used for the treatment of vascular abnormalities by targeting hemoglobin.[3] We suspect the beneficial effect of PDL for cutaneous siderosis, seen in our case is due to the chromophore of iron being targeted by PDL in the visible spectrum. [3]

It is important to note that scarring and hyperpigmentation, when PDL was used in patients with port wine stains, were reported in up to 4% and 27% of cases, respectively.[4] These risks are more common in patients with skin of color, increased redness of the vascular lesion, and with higher laser doses.[4] Paradoxical darkening is a risk seen in tattoo removal using Q-switched laser, described by Eklund et. al.[5] This is proposed to be due to laser's reduction of chromophores, including ferric oxide found in reddish hues, to ferrous oxide. [3,5] Notably, our patient did not develop these complications. A limitation of this report is the low generalizability of our single case. Future studies should assess a larger volume of individuals of varying races, genders, and lesions that vary in size, location, and depth.

Abbreviations
iron deficiency anemia (IDA)
Quality-switched (Q-switched)
pulsed dye laser (PDL)

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