Use of the 595nm Laser as a Treatment for Purpura

At short pulse durations, the pulsed dye laser can produce purpura, at long pulse durations, it may actually treat the condition.

By Brian O’Neal, DO, MPH and Eric C. Parlette, MD

Purpura is caused by the presence of extravasated erythrocytes in the dermis. Clinically, purpura initially appears dusky with a purple or dark red hue that evolves to a reddish-pink, and finally to a grayish yellow. This changing color is attributed to the byproducts of hemoglobin breakdown: bilirubin and hemosiderin. Purpura can result from any trauma to blood vessels that permits the escape of erythrocytes into the dermis. In the dermatology clinic, sources of trauma include both traditional and laser surgery and injection-based procedures. Patients and physicians have long sought an efficient treatment to hasten the resolution of purpura. Several topical formulations have been developed that claim to enhance the clearance of purpura, though clinical evidence is sparse. A trial of topical vitamin K oxide gel suggested some hastening of clearance of purpura compared to placebo.1

Target: Hemoglobin

The 595nm pulsed dye laser (PDL) has been used to treat vascular lesions for more than two decades. The 595nm wavelength is selectively absorbed by hemoglobin and epidermal and dermal pigment (requiring the use of a flattening handpiece that eliminates the interference of this competing chromophore).

Treatment of vascular lesions using the 595nm PDL with short pulse durations less than 6ms leads to abrupt heating of target vessels and subsequently produces significant purpura. As a result, despite the long-term efficacy of PDL for eradicating vascular lesions and port-wine stains, patients and physicians were often dissatisfied with short-term results.2

Use of the 595nm PDL with longer pulse durations (greater than 6ms) delivers the same amount of energy over time but provides a more gradual dispersion of energy and subsequently no purpura.1,3 Long-pulse PDL or subpurpuric treatment offers similar efficacy to short-pulse therapy for all but the deepest vessels.3

The patient is shown before and after treatment with 595nm PDL with a 10mm spot, fluence of 7J/cm2, 10ms pulse duration, 30/20ms DCD.
Subpurpuric PDL treatment of vascular lesions has given way to the possibility of using long-pulse PDL therapy as a treatment for existing purpura, with studies demonstrating benefit. This intervention may be particularly useful in the surgical setting to speed clinical clearing of post-procedural purpura.

Long-pulse (>6ms) 595nm PDL therapy may accelerate breakdown of erythrocytes and hemoglobin to aid resolution of purpura. Furthermore, gentle dermal heating from the laser may stimulate further inflammatory response and accelerate macrophage migration to further support resolution of purpura.

—Ashish Bhatia, MD and Jeffrey T. S. Hsu, MD

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