Dermatology Reports
https://www.pagepress.org/journals/index.php/dr/index

eISSN 2036-7406

Please cite this article as: Piccolo D, Retrosi C, Fusco I, et al. Evaluating the therapeutic efficacy of 595 nm pulsed dye laser system for treating capillary malformations. *Dermatol Rep 2024 [Epub Ahead of Print] doi: 10.4081/dr.2024.10029*

Submitted 24/04/24 - Accepted 24/11/24

Evaluating the therapeutic efficacy of 595 nm pulsed dye laser system for treating capillary malformations

Domenico Piccolo,[1] Chiara Retrosi,[2] Irene Fusco,[3] Tiziano Zingoni,[3] Claudio Conforti[2]

[1]Novea Skin Center - Dermo Aesthetic Laser Centers, Avezzano, L'Aquila; [2]IDI-IRCCS, Dermatological Research Hospital, Rome; [3]El.En. Group, Calenzano, Florence, Italy.

Correspondence: Irene Fusco, El.En. Group, 50041 Calenzano, Italy.

ORCID: 0000-0001-7264-8808

E-mail: i.fusco@deka.it

Key words: capillary malformations; pulsed dye laser; dermoscopy.

Conflict of interest: IF, TZ were employed by El.En. Group. The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Availability of data and materials: data that support the study findings are available on request from the corresponding author.

Ethics approval and consent to participate: the article is in accordance with the Declaration of Helsinki on Ethical Principles for Medical Research involving human subjects. Ethical approval is not necessary as the study device is already CE marked since 28/03/2013.

Consent for publication: The patient gave her written consent to use her personal data for the publication of this case report and any accompanying images.

Abstract

Capillary malformations are the most prevalent low-flow vascular abnormalities.

A case of a 30-year-old woman with a lateral capillary malformation was presented in this case report. Dermoscopic showed erythematous background and rare telangiectasic vessels for less than 5-10% of the entire area examined. She underwent a single treatment with a 595 nm pulsed dye laser. Excellent response at the end of the session and a clear reduction of the capillary malformation at clinical follow-up 2 months later was achieved. Dermatoscopic and 3D photographic evaluation before and after laser treatment also documented the disappearance of the erythematous background and telengectasic vessels.

Introduction

Capillary malformations (CMs) represent the most common low-flow vascular anomalies; they may be isolated or associated with other congenital anomalies as part of complex malformation syndromes.[1] Most CMs are found in the cephalic extremity; 85% are unilateral, and two main groups can be distinguished: medial and lateral congenital capillary malformations.

The morphologic features and site of the malformation, together with the presence of associated signs, are important to differentiate isolated forms of capillary malformation and complex malformative syndromes; dermatoscopic examination is a useful diagnostic aid that highlights vertically oriented punctiform or globular vessels in superficial capillary malformations (or papillary dermis) or horizontally oriented linear vessels of deep capillary malformations (or subpapillary dermis).[2,3] Beyond the role of dermoscopy for the diagnosis of CMs, the technique helps physicians evaluate the response to vascular laser treatment and select the best parameters according to patients' characteristics.

Case Report

We present a case of a 30-year-old woman with a lateral capillary malformation present since birth. She had undergone instrumental investigations (cephalic district MRI) during the first years of life to rule out malformative syndromes. Over the years she was treated with a single CO_2 ablative laser treatment with the aim of reducing the capillary malformation, but the treatment caused a scarring outcome inferior medial near the nasal dorsum (Figure 1a).

The patient came to our clinic to permanently treat the vascular malformation as it was causing significant cosmetic discomfort. The lesion clinically appeared as a mildly erythematous-reddish patch starting from the left lacrimal groove to the left cheekbone and cheek (Figure 1a). A pulsed dye laser (PDL) was selected from the available laser therapies since, nowadays, it targets hemoglobin more effectively and produces good results.[4] A single treatment with 595 nm PDL (SynchroVasQ, Deka Mela Srl, Florence, Italy) was performed with the following parameters: Fluence 9.0 J/cm^2, 10 mm spot size, and 0.50-ms pulse width). An excellent response at the end of the session and clear reduction of the capillary malformation at clinical follow-up 2 months later was achieved (Figure 1b). Dermoscopic examination (DermLite3G, 20×) showed shaded erythematous background and rare telangiectasic vessels for less than 5-10% of the entire area examined (Figure 1c). Also, it documented the disappearance of the erythematous background and telengectasic vessels (Figure 1d). For a better and more objective evaluation of the patient in terms of vascularity and tissue texture changes, the clinical images before (Figure 1e) and after laser treatment (Figure 1f) were acquired also using the 3D digital camera (Vectra H2, Canfield, USA), which reconfirms a visible reduction a of the patient's capillary malformation.

Discussion

Standard therapies for vascular malformations include 577, 585, or 595 nm pulsed dye laser[5,6] by setting fluences from a minimum of 7 J/cm^2 to a maximum of 11 J/cm^2.

To date, there are no precise algorithms in the literature on how to set up the PDL to achieve the best response without side effects; a detailed dermatoscopic analysis of the capillary malformation is

useful to select the right laser parameters: in fact, based on the erythema observed upon dermoscopy and the percentage of skin affected by the flat capillary malformation, higher or lower fluences and larger or smaller spot sizes can be chosen.

Based on our experience, we recommend using low fluences (7-8 J/cm^2) and larger spots if at dermoscopic analysis an intense red-purple background and obvious telangiectasias are found and also if the area involved by CMs at dermoscopy is greater than 30%; instead, as in the case of our patient, if the area affected by the capillary malformation at dermoscopy examination is lower than 5/10%, the background is faintly erythematous, and telangectasias are not particularly evident, we recommend to use higher fluences up to 10-11 J/cm^2 and spots of smaller diameter as the hemoglobin target is less evident.

In conclusion, dermoscopy is a non-invasive tool useful not only for the diagnosis of melanocytic lesions and inflammatory conditions but it has new applications also in laser treatment; its role is crucial to select the correct laser parameters, to evaluate the response to the treatment and to avoid side effects laser related. Further studies with larger cases are needed to confirm our findings and to create specific algorithms for PDL treatment.

Conclusions

For the management of capillary malformations, PDL treatment with the study device at a wavelength of 595 nm has proven to be an effective, safe, and tolerated therapeutic procedure.

References

1. Mulliken JB, Young A. Vascular Anomalies: Hemangiomas and Malformations. Philadelphia: Saunders; 2013. pp 508-11.
2. Vàzquez-Lòpez F, Coto-Segura P, Fueyo-Casado A, Pérez-Olivia N. Dermoscopy of port-wine stains. Arch Dermatol 2007;143:962.
3. Piccolo V, Russo T, Moscarella E, et al. Dermoscopy of Vascular Lesions. Dermatol Clin 2018;36:389-95.
4. Richards KA, Garden JM. The pulsed dye laser for cutaneous vascular and nonvascular lesions. Semin Cutan Med Surg 2000;19:276-86.
5. Brightman LA, Geronemus RG, Reddy KK. Laser treatment of port-wine stains. Clin Comet Investing Dermatol 2015;8:27-33.
6. Liu L, Li X, Zhao Q et al. Pathogenesis of Port-Wine Stains: Directions for Future Therapies. Int J Mol Sci 2022;23:12139.

Figure 1. (a) Clinical appearance before laser treatment of the capillary malformation as an erythematous plaque of several centimeters DM at the left hemivolve; **(b)** clinical appearance after laser treatment of CM; **(c)** dermoscopy features show shaded erythematous background and rare telangiectasic vessels; **(d)** Dermoscopy features after laser treatment with the disappearance of the erythema and telengectasic vessels; Clinical image before **(e)** and after laser treatment **(f)** acquired the Vectra H2 digital camera.