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## ORIGINAL ARTICLE

# Capillary Malformations Treated With Sequential Pulsed Dye and Nd:YAG Laser Therapy: A Retrospective Study<sup>☆</sup>

J. Alcántara-González,<sup>a,\*</sup> P. Boixeda,<sup>b,c</sup> M.T. Truchuelo-Díez,<sup>b</sup> N. Jiménez-Gómez,<sup>b</sup>  
B. Pérez-García,<sup>b</sup> L. Pérez-Carmona,<sup>a</sup> P. Jaén Olasolo<sup>b,c</sup>

<sup>a</sup> Servicio de Dermatología, Hospital Universitario de Torrejón, Torrejón de Ardoz, Madrid, Spain

<sup>b</sup> Servicio de Dermatología, Hospital Universitario Ramón y Cajal, Madrid, Spain

<sup>c</sup> Universidad de Alcalá, Alcalá de Henares, Madrid, Spain

Received 22 April 2017; accepted 16 October 2017

### KEYWORDS

Sequential  
dual-wavelength;  
Capillary  
malformation;  
Pulsed dye laser;  
Nd:YAG laser;  
Laser treatment

### Abstract

**Introduction and objective:** Capillary malformations are the most common vascular malformations in childhood. The current treatment of choice is pulsed dye laser (PDL) therapy, but this frequently does not result in complete resolution. The search for alternative treatment strategies thus continues. In this study we describe our experience with the use of sequential dual-wavelength PDL and Nd:YAG laser therapy in patients with capillary malformations.

**Material and methods:** We conducted a retrospective, descriptive study of patients with capillary malformations treated with dual-wavelength PDL and Nd:YAG laser therapy between 2006 and 2011. Four dermatologists rated the effectiveness of treatment on a scale of 10 to 0. We also investigated the potential value of the following factors as predictors of better treatment response: sex, malformation size and color, and presence of associated hypertrophy. Adverse effects were also analyzed.

**Results:** We studied 71 patients and most of them experienced a statistically significant improvement after treatment. More favorable responses were observed for violaceous malformations, lesions with associated hypertrophy, and smaller lesions. Adverse effects were reported for 26.76% of patients, and the most common effect was the appearance of isolated areas of skin atrophy.

**Conclusions:** We consider that sequential dual-wavelength PDL and ND:YAG laser therapy is an effective alternative for treating capillary malformations in selected patients.

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<sup>☆</sup> Please cite this article as: Alcántara-González J, Boixeda P, Truchuelo-Díez MT, Jiménez-Gómez N, Pérez-García B, Pérez-Carmona L, et al. Malformaciones capilares tratadas con aplicación secuencial de láser de colorante pulsado y Nd:YAG: estudio retrospectivo. <https://doi.org/10.1016/j.ad.2017.10.002>

\* Corresponding author.

E-mail address: [jalcantarag@hotmail.es](mailto:jalcantarag@hotmail.es) (J. Alcántara-González).

**PALABRAS CLAVE**

Doble longitud de onda secuencial;  
Malformación capilar;  
Láser de colorante pulsado;  
Láser de Nd:YAG;  
Tratamiento láser

## Malformaciones capilares tratadas con aplicación secuencial de láser de colorante pulsado y Nd:YAG: estudio retrospectivo

**Resumen**

*Introducción y objetivo:* Las malformaciones capilares son las malformaciones vasculares más frecuentes en la infancia. El tratamiento de elección sigue siendo el láser de colorante pulsado (LCP), sin embargo, la resolución completa con este habitualmente no se consigue, motivo por el que se siguen buscando otras alternativas terapéuticas. En este estudio comunicamos nuestra experiencia con el láser dual secuencial de LCP y Nd:YAG.

*Material y métodos:* Se efectuó un estudio retrospectivo y descriptivo de los pacientes con malformaciones capilares tratados con el láser dual de LCP y Nd:YAG desde 2006 hasta 2011. Cuatro dermatólogos valoraron el grado de eficacia en una escala del 10 al 0. Se analizó la posibilidad de factores predictores de mejor respuesta al tratamiento: sexo, color de la lesión, existencia de hipertrofia asociada y tamaño de la malformación. Se recogieron igualmente los efectos secundarios.

*Resultados:* Se incluyeron 71 pacientes, presentando el conjunto de ellos una mejoría estadísticamente significativa tras el tratamiento. Las malformaciones de coloración violácea que tenían hipertrofia asociada y las de menor tamaño se asociaron con una mejor respuesta. Se produjeron efectos adversos en un 26,76% de los pacientes, siendo la presencia de zonas atróficas puntuales el más frecuente.

*Conclusiones:* Consideramos que el láser dual de LCP y Nd:YAG es una alternativa eficaz para el tratamiento de malformaciones capilares en paciente seleccionados.

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**Introduction**

Capillary or venular malformations occur in approximately 0.1% to 2% of newborn infants and are the most common type of vascular malformations.<sup>1</sup> They can be found on any body part but occur most frequently on the head and neck.

Capillary malformations present as pink patches that tend to darken with age, acquiring a violaceous color and a pebbly appearance. They can also be associated with hypertrophy of the soft tissues and underlying bone.

The current treatment of choice for capillary malformations is pulsed dye laser (PDL) therapy, but in many patients this is ineffective or achieves only partial improvement. The search for alternative treatment strategies thus continues.

Good results have been achieved with other types of laser therapy, including Nd:YAG<sup>2-4</sup> and alexandrite.<sup>5-8</sup> Nd:YAG and alexandrite lasers both achieve greater penetration than PDL, which is one reason why hypertrophic lesions tend to respond better to these treatment options. Other light sources, such as intense pulsed light therapy,<sup>9-15</sup> have also been used, as well as laser therapy combined with antiangiogenic drugs.<sup>16</sup> Photodynamic therapy also appears to be effective.<sup>17</sup>

In this study, we describe our experience with the treatment of capillary malformations using dual-wavelength sequential pulses from a PDL and a Nd:YAG laser (Cynergy Multiplex, Cynosure, Inc., Westford, MA, United States).

**Materials and Methods****Study Population**

We conducted a retrospective, descriptive study of patients with capillary malformations treated with dual-wavelength PDL and Nd:YAG laser therapy in the laser therapy unit of Hospital Ramón y Cajal between 2006 and 2011. Patients with an incomplete clinical history or insufficient photographic documentation were excluded.

In order to identify factors that might have influenced the response to therapy, we collected the following data on each patient: sex, color of lesion (red, pink, or violaceous), associated soft-tissue hypertrophy, and size of lesion (maximum diameter <3 cm, 3-10 cm, or >10 cm).

**Procedure**

The patients or their guardians were informed of the likely benefits, risks, and potential complications of the treatment and the available alternatives. Written informed consent was obtained before treatment was started.

Anesthesia was used in some cases, depending on the size and site of the lesion and the age and tolerance of each patient. In cases in which anesthesia was indicated, the options used were anesthetic cream containing lidocaine and prilocaine (Eutectic Mixture of Local Anesthetics [EMLA], AstraZeneca, Wedel, Germany) applied under

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