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## Original article

# Low-fluence photodynamic therapy in chronic central serous chorioretinopathy<sup>☆,☆☆</sup>

R. Alcubierre\*, L. Arias, D. Lorenzo, O. Pujol, M. Rubio

Sección de Retina, Departamento de Oftalmología, Hospital Universitari de Bellvitge, L'Hospitalet De Llobregat, Barcelona, Spain

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### ABSTRACT

**Objective:** To evaluate safety and efficacy of low-fluence photodynamic therapy (LFPDT) with verteporfin in patients affected with chronic central serous chorioretinopathy (CCSC), in terms of visual acuity (VA) and macular morphology measured with optical coherence tomography (OCT).

**Methods:** A retrospective, non-randomized and interventionist analysis was performed on 16 eyes in 15 patients with CCSC treated with LFPDT. Best corrected visual acuity (BCVA) with ETDRS optotypes and central foveal thickness (CFT) in OCT were evaluated as outcome measures.

**Results:** The mean follow-up was 10.8 months. The mean BCVA improved from 58.12 to 68.68 ETDRS letters, and CFT decreased from 280.5 to 172.18  $\mu\text{m}$ , with subretinal fluid resolution in 14 eyes (87.5%), two of them after a second LFTPD. No complications related to treatment were recorded.

**Conclusions:** LFPDT with verteporfin can be useful in CCSC to stabilize or improve BCVA, reabsorb subretinal fluid and reduce CFT. Randomized studies with a longer follow-up are required to assure the role of this treatment and to optimize parameters for higher efficacy and safety in CCSC patients.

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## Tratamiento de coriorretinopatía serosa central crónica mediante terapia fotodinámica de baja fluencia

### RESUMEN

**Objetivo:** Evaluar la seguridad y la eficacia en términos de agudeza visual (AV) y morfología macular mediante tomografía de coherencia óptica (OCT) de la aplicación de terapia fotodinámica de baja fluencia (LFPDT) con verteporfina en pacientes afectados de coriorretinopatía serosa central crónica (CCSC).

**Método:** Análisis retrospectivo e intervencionista de casos consecutivos, no randomizados. Se siguieron un total de 16 ojos de 15 pacientes afectados de CCSC tratados con LFPDT.

#### Palabras clave:

Coriorretinopatía serosa central

Terapia fotodinámica

Fluido subretiniano

Tomografía de coherencia óptica

Baja fluencia

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\* Corresponding author.

E-mail address: alcubierre82@gmail.com (R. Alcubierre).

Se evaluaron mejor agudeza visual corregida (MAVC) mediante escala de optotipos ETDRS y grosor foveal central (CFT) en OCT como indicadores de resultados.

**Resultados:** El seguimiento medio fue de 10,8 meses. La MAVC media mejoró de 58,125 a 68,68 letras ETDRS, y el CFT se redujo de 280,5 a 172,18 micras, con desaparición del fluido subretiniano en 14 de los casos (87.5%), en 2 de ellos tras una segunda aplicación de LFPDT. No se registraron complicaciones asociadas al tratamiento.

**Conclusiones:** LFPDT con verteporfina puede ser útil en CCSC para estabilizar o mejorar MAVC y reabsorber el fluido subretiniano y reducir el CFT. Se requieren estudios randomizados con seguimiento más prolongado para confirmar el papel de este tratamiento y optimizar los parámetros que permitan mayor eficacia y seguridad en su aplicación en pacientes afectados de CCSC.

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## Introduction

Idiopathic central serous chorioretinopathy (CSC) consists in an alteration characterized by the accumulation of transparent fluid in the posterior pole of the fundus.<sup>1</sup> There is a chronic variant which is also known as retina diffuse pigment epitheliopathy in which a diffuse alteration of the RPE pigmentation is identified in association with the chronic presence of subretinal fluid (SRF).<sup>2</sup> Even though CSC is generally a self-limited disease with good visual prognosis, the cases exhibiting chronic characteristics usually associate a significant long-term visual compromise.<sup>3,4</sup>

The origin of the disease remains unclear, although the findings made with fluorescein angiography (FA) and indocyanine green showing the presence of leak points at the level of the retina pigment epithelium (RPE) associated to choroidal vascular hyper permeability<sup>5,6</sup> have been demonstrated. Increased choroidal hydrostatic pressure is deemed to be the cause of the alteration of the RPE barriers and the exit of fluid into the subretinal space.

Various treatment modes have been suggested to diminish the visual involvement in these patients. The efficacy of argon laser photocoagulation on the leak points is controversial because, although it has proven to accelerate the reabsorption of SRF,<sup>7-9</sup> but has not evidenced long-term vision improvements or diminished the amount of relapses, without forgetting the well-known complications associated to its application such as the inadvertent coagulation of the fovea, the induction of choroidal neovascularization (CNV) or the progressive enlargement of the RPE atrophy area caused by the laser.<sup>7,10,11</sup>

In recent years, and with the premise of reducing the vascular flow in a hyper-permeable choriocapillary layer, numerous papers have described benefits of photodynamic therapy treatment (PDT) with verteporfin to achieve anatomical and functional recovery in CCSC cases.<sup>12-19</sup> The application of PDT at standard doses for CNV (according to the criteria of the 1999 TAP study group)<sup>20</sup> has achieved promising results but is not free of complications, notably the appearance of CNV, severe choroidal ischemia and RPE atrophy.<sup>21-24</sup> In order to minimize the risk of said complications, the following steps endeavored to modify the usual PDT parameters. Accordingly, it has been suggested to reduce the verteporfin dose,<sup>25-27</sup> and

this paper presents the application of LFPDT, which consists in a modification of the standard parameters, applying a fluence of 25 J/cm<sup>2</sup> and an intensity of 300 mW/cm<sup>2</sup>. This involves a 50% reduction of the laser beam applied to the retina in order to minimize undesirable effects on a healthy retina.

## Subjects, material and methods

A retrospective and interventionist analysis of non-randomized consecutive cases was performed comprising 16 eyes of 15 patients diagnosed with chronic central serous chorioretinopathy between 2007 and 2009 in the Bellvitge University Hospital.

Inclusion criteria:

- (1) diagnosis by means of ophthalmological assessments confirmed with FA and OCT,
- (2) clinic comprising at least 5 months,
- (3) age over 18,
- (4) absence of a spontaneous improvement or induced by means of empirical treatment,
- (5) signature of informed consent.

Exclusion criteria:

- (1) previous laser photocoagulation treatment,
- (2) liver insufficiency, known allergy to fluorescein or other conditions making PDT contraindicated.

Prior to the treatment a full ophthalmological assessment was made, including best corrected visual acuity (BCVA) utilizing ETDRS optotypes at 4 m, FA and OCT. The follow-up was made assessing BCVA and OCT (Figs. 1 and 2). As the study was retrospective, the results of the first control made between month 3 and 6 after the application of PDT and a second control between month 9 and 12 post-treatment were grouped. The patients were treated with LFPDT with verteporfin applying the laser centered on the fovea because all the cases exhibited subfoveal SRF with multiple leak points, varying the size of the spots in order to act thereupon in a single session, always respecting one disc diameter of distance from the optic nerve (Fig. 3). The usual protocol was followed, modifying the fluence and intensity parameters 50% as described in Table 1.

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