

Eye 2019: One-year results of half-dose photodynamic therapy versus one-third-dose photodynamic therapy in chronic or recurrent central serous chorioretinopathy

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Abstract

To compare the efficacy of half-dose photodynamic therapy (PDT) and one-third-dose PDT in treatment in chronic or recurrence Central Serous Chorioretinopathy (CSC).

Methods:

A retrospective review of chronic or recurrence CSC patients, who were treated with half-dose or one-third dose PDT for 12 months follow-up. Best-Corrected Visual Acuity (BCVA), Central Retinal Thickness (CRT), and resolution of Subretinal Fluid (SRF) at baseline, 1, 3, 6, and 12 months' post-PDT were assessed.

Introduction:

Central serous chorioretinopathy (CSC) is characterized by an accumulation of subretinal fluid (SRF) in the posterior pole and is a common condition in middle-aged men with a so-called A-type personality. Although acute CSC could be resolved spontaneously, approximately half of the patients have recurrence or persistence of SRF and require treatment. To treat CSC is generally used Laser photocoagulation (LP). However, CSC with subfoveal or parafoveal leakage points and chronic CSC with broad and indistinct leakage is difficult to treat with LP because of the complication of scotoma. Choroidal neovascularization (CNV) is also known as a serious complication of LP.

Recently, photodynamic therapy (PDT) with verteporfin has been exposed to be effective in reducing SRF and improving visual acuity for chronic CSC. The post-PDT problems such as secondary CNV, pigmentary variations of the retinal pigment epithelium (RPE), and persistent choriocapillaris hypoperfusion have been informed. To reduce these side effects and to obtain the maximum effects, half-dose verteporfin PDT has been led successfully in chronic CSC without serious complications. However, the optimal dosage of verteporfin required to treat chronic CSC has not been established. The lowest dose of verteporfin required to treat acute CSC successfully was reported to be 30% of the conventional dosage. Thus, the purpose of this study was to prospectively compare the results of half-dose verteporfin for 3 mg/m² PDT (1/2 PDT) with those of one-third-dose verteporfin (2 mg/m²) PDT (1/3 PDT) for chronic CSC. The primary outcome measure was the disappearance rate of SRF. Secondary outcome

measures were the changes in best-corrected visual acuity (BCVA) and central retinal sensitivity. In addition, we studied the changes in the anatomical structure of the choroid after PDT to find the factors associated with the resolution of SRF.

Study design and patient recruitment:

This study was a prospective, non-randomized, consecutive, open-label case series conducted in the Department of Ophthalmology, Nagoya University Graduate School of Medicine. Sixteen eyes of 16 patients with chronic CSC were recruited from July 2009 to January 2010. The first ten patients received 1/2 PDT and the next six patients received 1/3 PDT. Because there was no previous report that showed the effects of 1/3 PDT on chronic CSC, we set the number of patients in the 1/3 PDT group (n=6) lesser than that of the 1/2 PDT group for n=10. CSC was diagnosed if SRF caused by idiopathic leakage from the RPE was present at the macula. Leakage from the RPE was detected by fluorescein angiography. Indocyanine green angiography (ICGA) was used to confirm the presence of choroidal vascular hyperpermeability.

The inclusion criteria were the following:

- Presence of SRF involving the foveal region persisting for 3 months or more.
- Leakage from the subfoveal, parafovea is difficult to treat the LP
- BCVA between 35 and 85 Early Treatment of Diabetic Retinopathy Study (ETDRS) letters.
- Age between 20 and 70 years.

The exclusion criteria were as follows:

- Focal thermal LP to treat CSC or previous PDT
- CNV or another maculopathy
- Choroidopathy that may affect the choroidal thickness
- Previous intravitreal injections of anti-vascular endothelial growth factor drugs
- Intake of medication such as corticosteroids, adrenergic agonists, or adrenergic antagonists.

Photodynamic therapy:

When performing 1/2 PDT and 1/3 PDT, only the dosage of verteporfin was changed from the conventional PDT recommended by the Age-Related Macular Degeneration with Photodynamic Therapy investigation.²¹ In 1/2 PDT 3 mg/m² of verteporfin was infused, and in 1/3 PDT 2 mg/m² of verteporfin was infused. After treatment, patients were instructed to avoid strong light for 5 days.

Results:

Half-dose and one-third dose PDT received 46 eyes and 20 eyes, respectively. The study displays the non-inferiority of the one-third-dose PDT compared with half-dose PDT in BCVA improvement (0.10 ± 0.04 vs. 0.17 ± 0.04 Log Mar, $P=0.293$) and CRT improvement (125.6 ± 24.6 vs. 139.1 ± 16.54 μm , $P=0.652$) at 12 months follow-up. The SRF recurrence rates of was significantly higher in one-third-dose of PDT related to half-dose PDT (40.0% vs. 15.2%, $P=0.027$) at 12 months follow-up. At 1 month, 7 eyes (70%) in the 1/2 PDT group had complete resolution of SRF compared with 2 eyes (33%) in the 1/3 PDT group. At 3 months, all 10 eyes (100%) in the 1/2 PDT group had complete resolution of SRF, and the same 2 eyes (33%) in the 1/3 PDT group maintained the complete resolution. The SRF disappearance rate of the 1/2 PDT group was significantly greater than that of the 1/3 PDT group at 3 months ($P=0.008$).

Conclusion:

One-third-dose PDT was non-inferiority in BCVA and CRT upgrading when compared with half-dose PDT. This study presented one-third-dose PDT which was a higher recurrence rate of disease. As CSC is a benign disorder and patients usually have a good baseline visual function, it is important to seek the best PDT protocol in order to obtain the maximum effect and the minimum complications. Half-dose PDT has been conducted to chronic CSC with relative safety, but treatment with verteporfin at less than 50% of the conventional dosage has not been attempted for chronic CSC. Previous studies have shown that cytotoxicity and vascular damage associated with PDT are dose-dependent. The mechanism of the action of PDT in CSC has not been fully understood, but the changes in choroidal structures after PDT in this study provide a useful clue.

This work is partly presented at [World Eye and Vision Congress on December 09-10, 2019](#)