Combined Photodynamic Therapy and Intravitreal Bevacizumab Injection for the Treatment of Adult Coats' Disease: A Case Report

Jongshin Kim¹, Kyu Hyung Park^{1,2}, Se Joon Woo^{1,2}

¹Department of Ophthalmology, Seoul National University College of Medicine, Seoul, Korea

²Department of Ophthalmology, Seoul National University Bundang Hospital, Seongnam, Korea

A 68-year-old woman presented with a visual field defect in her right eye. The fundus of her right eye showed multiple telangiectatic vessels, retinal hemorrhages, and subretinal exudates in the inferior peripheral retina. Nine months later, the subretinal exudates extended to the fovea despite treatment with laser photocoagulation. Cryotherapy was not possible at the time because of the posterior location of the retinal telangiectatic vessels. She was treated with a combination of photodynamic therapy (PDT) and intravitreal bevacizumab injection: three injections were given at 2-month intervals. After this combined therapy, her right fundus revealed a significant regression of abnormal retinal vessels and subretinal exudates. A fluorescein angiography showed no leakage from the abnormal retinal vessels. At 9 months after the combined therapy, she was able to maintain a stable visual acuity and visual field. This is the first case report that demonstrates the efficacy of the combined treatment of PDT and intravitreal bevacizumab injection in Coats's disease. This combined therapy is a kind of treatment modality for adult Coats' disease in cases which cryotherapy cannot be employed and are refractory to laser photocoagulation.

Key Words: Bevacizumab, Coats' disease, Photodynamic therapy

Coats' disease is an idiopathic condition characterized by telangiectatic and aneurysmal retinal vessels and chronic accumulation of subretinal exudates [1]. It is predominantly unilateral occurring mostly in young males, and can cause severe visual loss resulting from exudative retinal detachment [2]. Less commonly, it presents in adulthood and progresses at a slower rate, but with similar features [3].

Current treatment options for patients with Coats' disease are ablation of abnormal retinal vessels, either by laser photocoagulation or by cryotherapy, and surgery for retinal detachment. Recently, the dysregulation of vascular endothelial growth factor (VEGF)-mediated angiogenesis was suggested to be a component in Coats' disease and a few pediatric patients with the disease have been reported to respond well to anti-VEGF therapy [4,5]. However, the involvement of the macula as a result of subretinal exudates or exudative

retinal detachment can produce poor visual acuity despite proper treatment [2]. In this article, we report the first case of an adult patient with macula-threatening Coats' disease, treated with a combined treatment of photodynamic therapy (PDT) and intravitreal bevacizumab injection.

Case Report

A 68-year-old woman presented with symptoms of a constricted visual field in her right eye. Although the best-corrected visual acuity (BCVA) was 20/25 in both eyes, a fundus examination revealed multiple telangiectatic and aneurysmal retinal vessels, retinal hemorrhages, and subretinal exudates at the inferior mid-periphery of her right eye. A fluorescein angiography showed early and persistent leakage in the abnormal vessels at the inferior mid-periphery and hypofluorescence corresponding to the subretinal exudates in the right eye. With the diagnosis of adult Coats' disease, scatter laser photocoagulation was applied to the abnormal retinal vessels.

At 9 months after presentation, a fundus examination revealed about 1 disc diameter extension of the subretinal exudates to the fovea. PDT was used to treat the 2 large active

Received: October 25, 2009 Accepted: March 26, 2010

Reprint requests to Se Joon Woo, Department of Ophthalmology, Seoul National University Bundang Hospital, #166 Gumi-ro, Bundang-gu, Seongnam 463-707, Korea. Tel: 82-31-787-7377, Fax: 82-31-787-4057, E-mail: sejoon1@daum.net

© 2010 The Korean Ophthalmological Society

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/3.0/>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

Fig. 1. Serial montage fundus photographs (left) and fluorescein angiographs (middle and right) of the right eye. (A) Two days before photodynamic therapy (PDT). The subretinal exudates were threatening the fovea. Dotted circles indicate PDT treatment areas. Fluorescein angiography reveals dye leakage from the abnormal retinal vessels and hypofluorescence corresponding to the subretinal exudates. (B) Six months post-PDT, significant regression of the abnormal retinal vessels and subretinal exudates was observed. (C) Nine months post-PDT, the subretinal exudates shrank to become more distant from the fovea.

areas of abnormal telangiectatic and aneurysmal retinal vessels (Fig. 1A). After the PDT treatment, intravitreal bevacizumab was injected in order to decrease exudation and to block the regeneration of abnormal retinal vessels which were obliterated by PDT.

At 2 months post-PDT, a second intravitreal bevacizumab injection was given. At 4 months post-PDT, a third intravitreal bevacizumab injection was given and an additional scatter laser photocoagulation was applied to the area where the pre-existing abnormal retinal vessels and subretinal exudates had been located. At 6 months post-PDT, a fundus examination of the right eye showed a significant regression of the abnormal retinal vessels and subretinal exudates (Fig. 1B). At 9 months post-PDT, the subretinal exudates withdrew further from the fovea and the patient's visual acuity remained stable with a BCVA of 20/25 in both eyes (Figs. 1C

and 2).

Discussion

The conventional treatment for Coats' disease involves laser photocoagulation or cryotherapy to ablate abnormal telangiectatic vessels and preserve visual acuity. The subretinal exudates regress after laser photocoagulation or cryotherapy. However, in our case the high intensity laser photocoagulation applied to the abnormal retinal vessels was not absorbed sufficiently, due to the massive retinal exudates.

We thought that PDT would be more effective than laser photocoagulation at obliterating the multiple abnormal retinal vessels that were surrounded by the massive retinal exudates. Laser photocoagulation is not an efficient treatment modality if subretinal exudates obscure a target tissue.

Fig. 2. Sequential changes in the distance between subretinal exudates and the fovea before and after photodynamic therapy (PDT). After PDT, the lesion-to-fovea distance increased gradually. DD=disc diameter.

However, PDT utilizes an exogenous agent, photosensitizing the abnormal retinal vessels that are surrounded by exudates and the interaction between the laser beam and the agent produces a photochemical reaction that results in cellular damage and vascular thrombosis of target tissue [6].

We considered that an additional use of anti-VEGF agent could prevent the regeneration of abnormal retinal vessels that were obliterated by PDT and could suppress exudation induced by inflammatory cytokines. Abnormal retinal vessels and exudates in Coats' disease may impair the oxygenation of the outer retina, and the secondary over-expression of VEGF that gets produced as a result may cause microvascular changes [4]. This mechanism suggests that anti-VEGF is a potentially good treatment modality for Coats' disease, which was evident in case reports [4,5]. In addition, anti-VEGF had a synergistic effect on PDT for the treatment of choroidal neovascularization. Costa et al. [7] suggested that anti-VEGF might prolong choriocapillaris hypoperfusion induced by PDT, thus leading to a secondary effect on perfusion of choroidal neovascularization.

We are unable to comment on the potential long-term effect of the combined treatment of PDT and intravitreal bevacizumab injection, based on this single case. Further research is needed to determine the efficacy of this combined therapy for the treatment of Coats' disease. However, we are optimistic about the role of this combined treatment in cases of Coats' disease that are refractory to conventional laser photocoagulation or cryotherapy-based treatment, and in vision-threatening conditions needing urgent treatment.

In conclusion, combined treatment of PDT and intravitreal bevacizumab injection is a kind of treatment modality for cases of adult Coats' disease which cannot be treated by cryotherapy and are refractory to laser photocoagulation.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

References

1. Coats G. Forms of retinal diseases with massive exudation. *Roy Lond Ophthalmol Hosp Rep* 1908;17:440-525.
2. Shields JA, Shields CL, Honavar SG, Demirci H. Clinical variations and complications of Coats disease in 150 cases: the 2000 Sanford Gifford Memorial Lecture. *Am J Ophthalmol* 2001;131:561-71.
3. Smith LM, Brown GC, Brucker AJ, et al. Coats' disease diagnosed in adulthood. *Ophthalmology* 2005;112:1072-8.
4. Sun Y, Jain A, Moshfeghi DM. Elevated vascular endothelial growth factor levels in Coats disease: rapid response to pegaptanib sodium. *Graefes Arch Clin Exp Ophthalmol* 2007;245:1387-8.
5. Cakir M, Cekiç O, Yilmaz OF. Combined intravitreal bevacizumab and triamcinolone injection in a child with Coats disease. *J AAPOS* 2008;12:309-11.
6. Miller JW, Walsh AW, Kramer M, et al. Photodynamic therapy of experimental choroidal neovascularization using lipoprotein-delivered benzoporphyrin. *Arch Ophthalmol* 1995;113:810-8.
7. Costa RA, Jorge R, Calucci D, et al. Intravitreal bevacizumab (Avastin) in combination with verteporfin photodynamic therapy for choroidal neovascularization associated with age-related macular degeneration (IBeVe Study). *Graefes Arch Clin Exp Ophthalmol* 2007;245:1273-80.