PHILIPPINE JOURNAL OF
Ophthalmology

VOL. 35 • NO. 2 JULY – DECEMBER 2010

CASE REPORT

Pegaptanib sodium for macular edema due to retinal-vein occlusion among patients intolerant to intravitreal triamcinolone acetonide

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ABSTRACT

Objective

To report the efficacy and safety of intravitreal pegaptanib sodium (IVP) on macular edema (ME) due to branch retinal-vein occlusion (BRVO) among patients intolerant to intravitreal triamcinolone acetonide (IVTA).

Methods

Four eyes with ME due to BRVO were included in this interventional case series. The main outcome measures were best-corrected visual acuity (BCVA), central macular thickness (CMT), intraocular pressure (IOP), and adverse effects.

Results

There was a significant decrease in mean CMT from 524.50 ± 141.12 to 293.75 ± 130.75 microns ($p = 0.009$) after IVP injection. BCVA improved in all 4 eyes after IVP. Mean IOP after IVP was 13.60 ± 3.21. No ocular or systemic complications were observed.

Conclusion

IVP appears to be safe and effective in decreasing retinal thickness and improving VA in eyes with ME due to BRVO. IVP is a potential treatment for eyes that are intolerant to IVTA.

Keywords: *Retinal-vein occlusion, Macular edema, Intravitreal triamcinolone acetonide, anti-vascular endothelial growth factor (anti-VEGF)*

PHILIPP J OPHTHALMOL 2010; 35(2): 79-81

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The authors have no proprietary or financial interest in any product used or cited in this study.

MACULAR edema (ME) is a cause of poor visual acuity in patients with branch retinal-vein occlusion (BRVO). Grid laser photocoagulation is currently the only evidence-based treatment. However, scotomas and accidental photocoagulation of the fovea may occur with this mode of therapy. Intravitreal triamcinolone acetonide (IVTA) is an alternative treatment but is associated with increased intraocular pressure (IOP), cataract formation, inflammation, endophthalmitis, and transient clouding of vision.

Intravitreal injection of vascular endothelial growth factor (VEGF) antibodies is a relatively new approach for the treatment of ME due to retinal diseases. Several reports have demonstrated the safety and effectivity of intravitreal VEGF inhibitors, ranibizumab and bevacizumab, in treating ME in BRVO.[1-2] We report the safety and efficacy of pegaptanib sodium (Macugen; OSI-Eyetech, Pfizer, NY, USA) in treating ME due to BRVO in eyes intolerant to IVTA.

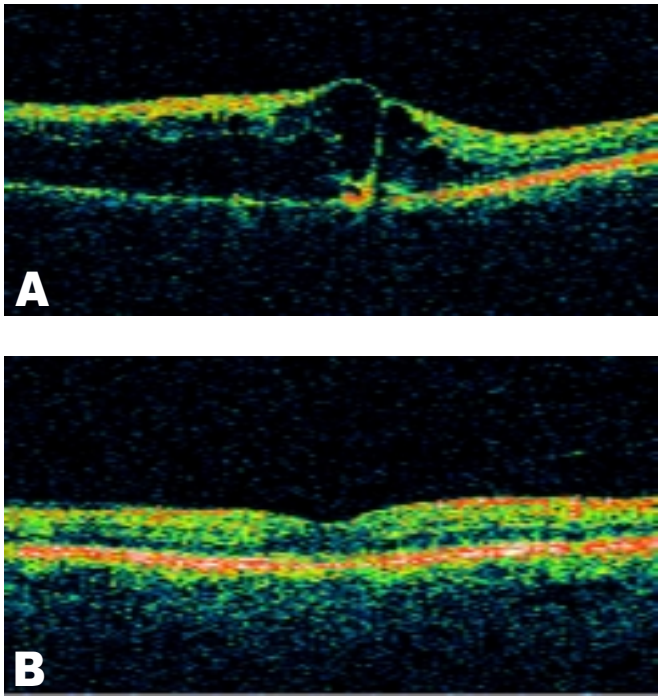

Figure 1. Preinjection optical coherence tomography (OCT) through the fovea of Case 1 revealing retinal thickening and cystoid macular edema from retinal vein occlusion (**A**). Repeat OCT showed return of the normal foveal contour after 3 pegaptanib injections (**B**).

Table 1. **Demographics, pre- and postinjection visual acuity and central macular thickness of patients who received intravitreal pegaptanib for macular edema due to branch-vein occlusion.**

	Case 1	Case 2	Case 3	Case 4
Age/Sex	77/M	87/F	76/F	56/M
Initial visual acuity	20/40	20/50	20/400	20/200
Final visual acuity	20/25	20/30	20/60	20/60
Initial CMT[1] (μm)	488	372	712	526
Final CMT (μm)	188	175	426	386
Number of injections	3	3	1	2
Follow-up (weeks)	28	36	24	18

Recorded 6 weeks after injection
[1]Central macular thickness

METHODOLOGY

We reviewed the medical records of 4 consecutive eyes of 4 patients with angiographically proven BRVO and ME that were intolerant to previous IVTA treatment. The following data were collected at baseline and at last follow-up visit: age, gender, previous treatment and complications, best-corrected visual acuity (BCVA), pre- and postinjection intraocular pressures (IOP), adverse events, and central macular thickness measured by optical coherence tomography (Stratus OCT, Carl Zeiss Meditec, Jena, Germany) at baseline and 6 weeks after intraviteal pegaptanib sodium (IVP).

All intravitreal injections were performed in the operating room using topical anesthetic and aseptic technique. Povidone iodine (5%) was instilled and washed prior to injection. Pegaptanib sodium (3 mg/0.09 ml) was injected intravitreally using the prefilled syringe and needle, through an inferior transscleral puncture located 3.5 mm posterior to the limbus. Topical gatifloxacin (Zymar, Allergan, Irvine, CA) was instilled 4 times daily for 1 week postinjection. A paired t-test was used to analyze the difference in CMT.

RESULTS

The mean age of the 4 patients (2 males and 2 females) was 74 ± 13 years. All 4 eyes had received prior IVTA treatment and developed complications or IVTA intolerance, such as IOP rise or inflammation. The mean postinjection IOP after IVP at the last visit was 13.60 ± 3.21 mm Hg. None of the eyes developed postoperative IOP rise.

The mean baseline CMT was 524.50 ± 141.12 microns; the mean CMT at the last follow up visit was 293.75 ± 130.75 microns. There was a significant decrease in mean CMT of 230.75 microns after IVP treatment (p = 0.009; 95% CI, 110.18 to 351.32). The mean number of injections was 2.25 ± 0.96. Visual acuity had improved for all eyes at last visit. No ocular or systemic complications developed in any eye. The mean follow-up period was 26.5 ± 7.5 weeks.

DISCUSSION

Hypoxia due to decreased blood flow in BRVO induces excess production of VEGF, which is a major contributor to the development of ME by promoting vascular permeability.[1, 3] Pegaptanib sodium is an RNA aptamer that selectively inhibits the VEGF 165 isoform. Due to

selective VEGF inhibition, only ischemia-induced pathological neovascularization is reduced by IVP, leaving physiological vascularization unimpaired.[4] Although treatment with nonselective inhibitors did not appear to worsen perfusion dynamics after vein occlusion,[5] possible suppression of collateral vessel formation by early use of nonselective VEGF inhibitors may have a detrimental effect on the long-term outcome in patients with retinal vascular occlusive disease. Moreover, nonselective inhibitors have been associated with a slightly increased risk of stroke.[6] Pegaptanib sodium is currently the only selective inhibitor of VEGF available. In a Medline search of published literature on pegaptanib, there has been no systemic adverse event reported with intraocular use. Its safety record, along with a longer half-life compared with other anti-VEGF, makes it ideal to use in the treatment of ME in BRVO where multiple injections may be needed to avoid recurrent ME and vision loss.

Our results showed that pegaptanib sodium produced significant anatomic and visual improvements in eyes with ME and BRVO previously intolerant to IVTA. Just as with other anti-VEGF drugs, multiple injections are often necessary to resolve ME in BRVO. Injection of anti-VEGF provides a temporary reduction in edema, and may need to be performed until recanalization of the occluded vessel and return of normal retinal hemodynamics. The selective nature of pegaptanib sodium may potentially decrease retinal edema without compromising the angiogenic processes that lead to venous re-anastomosis. This is an advantage as fewer injections may be needed if return of normal circulation patterns is indeed faster with pegaptanib than with other nonselective VEGF inhibitors, such as bevacizumab and ranibizumab.

The limitations of this report include a small sample size and lack of comparison with nonselective VEGF drugs.

In conclusion, IVP is a promising safe and effective treatment for ME in BRVO and may be an alternative in eyes intolerant to IVTA. Larger randomized clinical trials are recommended to determine its long-term effects.

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