Case Report

Intravitreal Bevacizumab for Ahmed Glaucoma Valve Implantation in Neovascular Glaucoma: A Case Report

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Objective: *To report the short-term efficacy and safety of intravitreal Bevacizumab injection in conjunction with implantation of Ahmed glaucoma valve in a patient with refractory neovascular glaucoma (NVG) caused by proliferative diabetic retinopathy (PDR).*

Material and Method: *A patient with NVG and vitreous hemorrhage caused by PDR was initially treated with 1.25 mg intravitreal Bevacizumab injection. One week after injection, intraocular pressure (IOP) did not improve with partial regression of the anterior segment new vessels. The patient underwent pars planar vitrectomy with panretinal photocoagulation (PRP) combined with trabeculectomy. Despite the initial good response, the patient developed recurrent hyphema and vitreous hemorrhage with uncontrolled IOP on full medications. Ahmed glaucoma valve implantation combined with the second intravitreal injection of 1.25 mg Bevacizumab was performed.*

Results: *At 48 hours postoperative, IOP markedly decreased. Iris neovascularization was not visible. The rapid resolution of hyphema and vitreous hemorrhage was noted. At 6 weeks follow-up, the patient gained visual acuity (VA) from hand motion to 20/100. The IOP was 8 mmHg with no recurrence of iris rubeosis. Vitreous hemorrhage had cleared revealed the view of fundus with full PRP and no new retinal vessels. At 8 weeks postoperative, there was small recurrent iris neovascularization without any rise in IOP. No intervention was done except careful follow-up. At 3 months, the patient retained VA of 20/100 with the IOP of 9 mmHg. Small iris rubeosis presented with no changes in appearance. No serious ocular or systemic adverse effects occurred after intravitreal Bevacizumab injections.*

Conclusions: *Ahmed glaucoma valve implantation in combination with intravitreal Bevacizumab injection is effective in controlling IOP in refractory neovascular glaucoma. This approach may increase visual outcome in cases with extensive neovascularization, before PRP takes effect, weeks later. The long-term efficacy and safety of this anti-proliferative agent in glaucoma drainage implants still requires further investigation.*

Keywords: *Bevacizumab, Ahmed glaucoma valve, neovascular glaucoma*

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Neovascular glaucoma occurs as a result of iris and anterior chamber angle rubeosis, which in the majority of cases, in response to retinal ischemia[1]. Retinal ischemia stimulates the release of many angiogenic factors, with vascular endothelial growth factor (VEGF) is the most studied factor. There have been evidences that VEGF level was elevated in aqueous humor and in vitreous of patients with rubeosis and neovascular glaucoma[2,3].

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Bevacizumab is a recombinant humanized anti-VEGF antibody that binds all VEGF isoforms[4] resulting in decrease angiogenesis and blocking increased vascular permeability. Recent reports have shown regression of iris neovascularization after intravitreal Bevacizumab injection in neovascular glaucoma[5-10]. In the present study, the short-term efficacy and safety of intravitreal injection of Bevacizumab in Ahmed glaucoma valve implantation was evaluated.

Case Report

A 55 year-old priest presented to the

Department of Ophthalmology, Priest Hospital with a 2-week history of red, painful right eye with marked decreased vision. The patient had diabetes for 15 years without adequate control. He had received diode cyclophotocoagulation for blind painful left eye from neovascular glaucoma caused by proliferative diabetic retinopathy (PDR). 8 months earlier, he received pars planar vitrectomy and retinal photocoagulation for PDR with vitreous hemorrhage in the right eye, followed by phacoemulsification with intraocular lens implantation 3 months before presentation.

On examination, the uncorrected visual acuity (UCVA) was hand motion in the right eye and no light perception in the left. Biomicroscopy revealed mild corneal edema, anterior chamber inflammation with 4+cells and extensive iris neovascularization with ectropion uveae in the right eye. The peripheral anterior synechiae with 360 degrees of angle closure and small hyphema in the inferior angle were demonstrated by gonioscopy. The intraocular pressure was 48 mmHg in the right. Vitreous hemorrhage precluded a view of the retina.

Full topical medications and oral Acetazolamide were administered with uncontrolled IOP of 34 mmHg. After discussion of the risks and benefits of the treatment, the priest signed the consent form before receiving intravitreal injection of Bevacizumab (1.25 mg/ 0.05 ml). One week after injection, IOP sustained in the range of 30-38 mmHg with partially regressed of anterior segment new vessels. The patient, thus, underwent pars planar vitrectomy with full scatter panretinal photocoagulation (PRP) combined with trabeculectomy. Two days postoperatively, VA improved to counting fingers. The intraocular pressure decreased to 19 mmHg. Iris neovascularization had disappeared. Despite an initial good response, recurrent vitreous hemorrhage and hyphema were detected on postoperative day 5. The filtering bleb showed signs of early bleb failure with shallow bleb and hypervascularity. The intraocular pressure was 36 mmHg on full medications.

Ahmed glaucoma valve implantation combined with the second intravitreal Bevacizumab injection was performed. 48 hours later, IOP decreased to 7 mmHg without glaucoma medications. Iris neovascularization was not visible by slit-lamp examination. The hyphema and vitreous hemorrhage had resolved rapidly. At 6 weeks follow-up, uncorrected postoperative VA improved to 20/100. The bleb was seen over Ahmed glaucoma valve with minimal anterior chamber cells/flare. The IOP was 8 mmHg with no recurrence of iris rubeosis. Vitreous hemorrhage had cleared revealed the view of fundus with full PRP and no new retinal vessels. At 8 weeks postoperative, small recurrent iris neovasucularization appeared. IOP was still controlled at 9 mmHg. No intervention was performed, except careful follow-up and aggressive control of diabetes and other metabolic disturbances. Three months after surgery, the patient retained acuity of 20/100. The IOP was 9 mmHg with no glaucoma medications. Small iris rubeosis presented with no changes in appearance. Hyphema or vitreous hemorrhage did not recur. No serious ocular or systemic adverse effects occurred after both injections of intravitreal Bevacizumab.

Discussion

Intravitreal Bevacizumab injection was first reported in 2005 to have favorable outcome for macular edema from central vein occlusion and for neovascular age-related macular degeneration[11,12]. The subsequent studies showed promising results of intravitreal Bevacizumab in the treatment of ocular neovascular diseases e.g., neovascular age-related macular degeneration, macular edema, ischemic occlusive disease, and neovascular glaucoma due to central retinal vein occlusion and diabetic retinopathy[5-10,13-16]. In neovascular glaucoma, many case reports found regression of ocular neovascularization and IOP lowering effect of intravitreal Bevacizumab injection[5-10]. Although some cases had recurrent neovascularization which required repeated injections[6,8] and the long-term efficacy and safety have not yet been reported.

The current study demonstrated the case of refractory neovascular glaucoma that had favorable short-term response with intravitreal injection of Bevacizumab in combination with aqueous shunt surgery. Previous studies reported rapid improvement of IOP control within 48 hours to one week after initial injection of intravitreal Bevacizumab [10,16], while refractory IOP and partial response of neovascularization were found within one week after injection in the present case. These findings are in accordance with other cases[8,10] and may be explained by the late stage of the disease with circumferential synechial angle closure, inadequate control of diabetes prior to Bevacizumab injection, and most importantly, the assumed decreased retention time of intravitreal Bevacizumab in post-vitrectomized eye. Nevertheless, another benefit of intravitreal Bevacizumab injection may be obtained in terms of preoperative injection to facilitate vitreoretinal surgery and PRP or glaucoma shunt surgery.

Panretinal photocoagulation is still the standard and definite treatment of neovascularization of the retina[18]. However, in NVG caused by severe PDR, the final unfavorable visual outcomes were still not uncommon. The author suggests the alternative management of NVG, particularly the late stage NVG with angle closure or with vitreous hemorrhage, by using intravitreal anti-VEGF agents, preferably before or at the time of performing glaucoma shunt surgery, to speed the disease resolution while waiting for the effect of PRP. This approach might maintain the long-term favorable outcome.

Conclusion

The author proposed that intravitreal injection of Bevacizumab in combination with glaucoma drainage device implantation may be used as an alternative or adjuvant treatment in neovascular glaucoma. However, the long-term efficacy and safety of this anti-proliferative agent in glaucoma drainage implants still requires further investigation.

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การศึกษาผลของการรักษาโรคต้อหินชนิด Neovascular โดยการผ่าตัดใส่ Ahmed Glaucoma Valve ร่วมกับการฉีดยา Bevacizumab ในน้ำวุ้นตา: รายงานผู้ป่วย

นิศา โสธรวิทย์

วัตถุประสงค์: *เพื่อศึกษาและรายงานผลการรักษาโรคต้อหินชนิด Neovascular glaucoma ที่เกิดจากโรคเบาหวานของจอประสาทตา โดยการผ่าตัดใส่ท่อระบายน้ำในตา Ahmed Glaucoma Valve ร่วมกับการฉีดยา Bevacizumab ในน้ำวุ้นตาเพื่อช่วยควบคุมความดันตา*

วัสดุและวิธีการ: *ผู้ป่วยพระสงฆ์ อายุ 55 ปี เป็นโรคเบาหวานของจอประสาทตาร่วมกับ พบต้อหินแทรกซ้อนทั้งสองตา และตาบอดจากต้อหิน Neovascular glaucoma ก่อนมารับการรักษา ในตาซ้ายร่วมกับมองเห็นระดับ เห็นมือโบกไปมา ในตาข้างขวาที่มีอาการ ตรวจพบความดันตาสูงอยู่ในระดับสูงมาก ได้รับการวินิจฉัยว่าเป็นต้อหินชนิด Neovascular glaucoma ร่วมกับเลือดออกในน้ำวุ้นตา ผู้ป่วยได้รับการฉีดยา Bevacizumab 1.25 มิลลิกรัมในน้ำวุ้นตา 1 สัปดาห์ก่อนการผ่าตัดน้ำวุ้นตาเพื่อนำเลือดออกร่วมกับการผ่าตัดต้อหิน (Trabeculectomy) และยิงเลเซอร์จอประสาทตา (Full scatter panretinal photocoagulation) พบว่าหลังการผ่าตัดยังพบมีความดันตาสูงควบคุมไม่ได้ และมีเลือดออกซ้ำในน้ำวุ้นตา และในช่องหน้าตา จากการที่มีเส้นเลือดผิดปกติเกิดซ้ำ ผู้ป่วยจึงได้รับการผ่าตัด ใส่ท่อระบายน้ำในตา (Ahmed glaucoma valve) ร่วมกับการฉีดยาต้านการเกิดเส้นเลือดผิดปกติในน้ำวุ้นตา (Intravitreal Bevacizumab) ซึ่งเป็นนวัตกรรมใหม่ในการรักษาต้อหินที่ดื้อต่อการรักษาโดยเฉพาะต้อหินชนิด Neovascular เพื่อลดความดันตา และรักษาเส้นเลือดผิดปกติให้ฝ่อลงเสริมกับการรักษาด้วยเลเซอร์ซึ่งจะเห็นผลช้ากว่า*

ผลการศึกษา: *พบว่า 48 ชั่วโมงหลังการผ่าตัด ความดันตาลดลงเป็นปกติ เส้นเลือดผิดปกติในช่องหน้าของตาได้ฝ่อตัวลง ผลตรวจติดตามที่ 6 สัปดาห์ ความดันตาลดลงที่ 8 มม.ปรอทโดยไม่ต้องหยอดยารักษาต้อหิน ตรวจไม่พบเส้นเลือดผิดปกติในช่องหน้าตาและที่จอประสาทตากลับเป็นซ้ำ และผู้ป่วยมีการมองเห็นดีขึ้นระดับ 20/100 ในผู้ป่วยรายนี้ไม่พบภาวะแทรกซ้อนหลังการฉีดยา Bevacizumab ในน้ำวุ้นตา*

สรุป: *การผ่าตัดใส่ท่อระบายน้ำในตา (Ahmed glaucoma valve) ร่วมกับการฉีดยา Intravitreal Bevacizumab สามารถรักษาโรคต้อหินชนิด Neovascular ที่ดื้อต่อการรักษาได้ การรักษาโดยวิธีดังกล่าวควรได้รับการศึกษาถึงผลการรักษาในระยะยาวต่อไป*