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ORIGINAL RESEARCH

Evaluation of Efficacy of Subconjunctival Injection Bevacizumab (Avastin) in the Treatment of Neovascular Glaucoma

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ABSTRACT

Neovascular glaucoma (NVG) is a potentially devastating sequel of serious underlying ocular/systemic diseases. The ocular diseases responsible for neovascularization of iris (NVI)/ neovascularization of the angle (NVA) ultimately leading to NVG are almost always ischemic in nature.

Under hypoxic conditions, diffuse angiogenic factors, including vascular endothelial growth factor (VEGF), have been detected in human retina and vitreous promoting new vessel growth. Three important common conditions responsible for NVG are diabetic retinopathy, central retinal vein occlusion (CRVO), and carotid artery obstructive diseases. No treatment has been found to be effective. We have studied these cases with subconjunctival injection Avastin with excellent results.

Keywords: Avastin, Bevacizumab, Neovascular glaucoma, New vessels at the angle, New vessels on iris, Subconjunctival.

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INTRODUCTION

New and uncontrolled blood vessel development in the iris and angle structure is a pivotal process in the pathogenesis of underlying ocular or systemic disease. Bevacizumab, a humanized monoclonal antibody to VEGF, was designed for intravitreal applications and approved for the treatment of colorectal cancer.[1-3]

Bevacizumab has been used with promising results as a systemic or intravitreal treatment for exudative age related macular degeneration.[4,5]

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It has become abundantly clear that wherever NVI progresses to NVG, there is almost always widespread posterior segment hypoxia or localized anterior segment hypoxia. Rather than compiling lists of entities that can cause NVI, it now seems more rewarding to review the major groups of disorders that can lead to NVG. In one review of patients with NVG admitted in the 1960s to a Danish hospital, 43% had glaucoma attributed to diabetic retinopathy, 37% had glaucoma attributed to CRVO, and the rest had miscellaneous causes. Surprisingly, despite the widespread use of Pan Retinal Photocoagulation (PRP), the picture has not changed greatly.[6]

In cases of CRVO, proliferative diabetic retinopathy, and carotid artery obstructive diseases, the main growth factor is VEGF, the new blood vessels grow in the angle of anterior chamber on the surface of the iris and block the drainage of aqueous humor resulting in increase in intraocular pressure (IOP), which causes pain and inflammation and blind eye in about half the people affected. Laser of the retina is the main treatment for the condition, which is very difficult to carry out as the cornea becomes cloudy and pupil cannot be dilated and, hence, not very successful.

The aim of this work was to study and evaluate the effect of subconjunctival Bevacizumab (Avastin) in NVG. [7-26]

MATERIALS AND METHODS

Ten patients with unilateral NVG were chosen from outpatient department clinic of KEM hospital between the period of April 2016 and October 2017. The mean age of patient was 40 ± 14 years. The off-label use of Bevacizumab as well as its potential risks, benefits, and adverse effects were discussed with each patient before signing the informed consent. Pregnant, lactating, and nursing women were excluded.

All eyes had new vessels on the iris, and increased IOP due to carotid artery obstruction in one, proliferative diabetic retinopathy in 4, and chronic iridocyclitis in 2 and due to CRVO in three patients, with very poor vision to nil vision. All eyes received a subconjunctival injection of 2.5 mg (0.1 mL) Bevacizumab.

Baseline assessment of patients was carried out in the OPD of KEM Hospital, which included history and

Table 1: Neovascularization as a percentage of NVI+ NVA in 10 patients after 2.5 mg subconjunctival Bevacizumab injection over a 6-month follow-up. Neovascularization as a % of NVI + NVA

Case no	*Pre-Avastin injection (%)*	*2 weeks post-Avastin injection (%)*	*3 months (%)*	*6 months (%)*
1	80	40	60	60
2	30	25	20	20
3	40	25	30	30
4	40	20	30	30
5	25	10	20	20
6	30	20	20	20
7	70	40	30	30
8	60	40	30	30
9	60	40	30	30
10	30	20	10	10

Table 2: Decrease in IOP levels in the 2.5 mg (0.1 mL) subconjunctival injection Avastin over a 6-month follow-up

Case no	*Pre-avastin injection (mm Hg)*	*2 weeks post-avastin injection (mm Hg)*	*3 months (mm Hg)*	*6 months (mm Hg)*
1	50	15	7	7
2	48	16	8	8
3	60	14	8	8
4	50	6	6	10
5	60	10	10	6
6	38	10	12	12
7	38	12	10	10
8	42	12	6	10
9	58	12	10	7
10	48	6	10	8

external ocular examination including recording of visual acuity, IOP, slit lamp biomicroscopy, and fundoscopy.

RESULTS

Patients were followed on a weekly basis. All patients tolerated subconjunctival Avastin well. Improvement was noted in all 10 patients in the first week, showing conspicuous regression of new vessels on iris. The extent of regression of new vessels was significant in the second week. The IOP also significantly reduced. Four patients showed marked reduction in IOP after 2nd dose of subconjunctival Avastin after follow-up of 1 month duration (Table 1).

None of the 10 eyes showed significant ocular or systemic adverse events that could be related to subconjunctival Avastin injection during 6 months follow-up.

DISCUSSION

The subconjunctival injection is a widely used method of delivering drugs in the eyes. It seems as a good mode of inhibiting NVI and NVA. This type of delivery is easy and simple to perform and has minimal related complications.

Traditionally, NVG has been a very serious condition and the eye condition often does not recover sight, but with these treatments, sight is more likely to improve, if diagnosed and treated early. Patient received a subconjunctival injection of 2.5 mg (0.1 mL) Avastin.

The NVI and NVA were seen to be dramatically regressed a week after injection in five cases along with reduced IOP (Table 2); however, one patient with painful blind NVG showed a slight increase in pressure after 2nd week of Avastin and was treated with timolol maleate 0.5% eye drops. No infection or inflammation was observed in any of the patients. There was increased IOP in one patient after 2 months when subconjunctival Avastin was given. No relapse was seen within the follow-up of 2 to 3 months in other cases. Hence, it was concluded that subconjunctival Bevacizumab injections may offer an additional and an effective strategy for the treatment of NVG.

CONCLUSION

Bevacizumab can be used safely and effectively for NVG. It can be an effective treatment in regression of NVI and NVA with significant decrease in IOP levels. It was well tolerated over the follow-up period in this study. Further controlled and long-term studies of this new treatment are needed to fully evaluate the long-term effects of this new treatment.

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