

LAHORE GENERAL HOSPITAL PROTOCOL FOR TREATMENT OF NEOVASCULAR GLAUCOMA CAUSED BY RETINAL DISEASE

ABSTRACT

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Purpose: To evaluate efficacy of LGH (Lahore General Hospital) protocol for treatment of neovascular glaucoma caused by retinal diseases.

Material and Methods: This case series was performed on 9 consecutive eyes of nine patients with uncontrolled neovascular glaucoma at Department of Ophthalmology, Unit II, Lahore General Hospital/PGMI, Lahore. All nine patients completed six months follow up. Among them 6 patients were having PDR (proliferative diabetic retinopathy) and 3 patients having CRVO (central retinal vein occlusion). LGH protocol for treatment of neovascular glaucoma was: To give intravitreal injection of avastin and then PRP (Pan Retinal Photocoagulation) or Trabeculectomy with MMC (Mitomycin C), if PRP and intravitreal avastin fails to control the intra ocular-pressure (IOP).

Results: Three patients had IOP control after intravitreal injection of avastin and PRP, 5 patients had uncontrolled IOP after intravitreal avastin and two sessions of PRP, so they under went trabeculectomy with MMC. One patient had uncontrolled IOP despite of full treatment protocol. All other 8 patients' IOP remained stable for six months.

Conclusion: Significant decrease in intraocular pressure was achieved after observing LGH protocol for treatment of NVG (Neovascular Glaucoma) caused by retinal diseases.

Keywords: Neovascular glaucoma, Intra-ocular pressure, Trabeculectomy, Avastin, Pan Retinal Photocoagulation.

INTRODUCTION

The treatment of neovascular glaucoma has been perceived as one of the most challenging problems in ophthalmology. Some common causes of this serious secondary glaucoma are occlusive retinal vascular diseases such as central retinal vein occlusion (CRVO), proliferative diabetic retinopathy (PDR), central retinal artery occlusion (CRAO), inflammatory disease and intraocular tumours¹. Clinical symptoms are also well known and include redness, discomfort, painful sensation in the eyes, iris and /or angle neovascularization with the formation of peripheral anterior synechiae. The main problem in the treatment of this glaucoma is the control of intraocular pressure (IOP) and prevention of neovascularization and peripheral anterior synechiae that lead to angle closure and

IOP increase². The trigger for retinal neovascularization is retinal ischemia. In such conditions, many vascular endothelial growth factors (VEGF) are released to exert their proangiogenic activity³. A number of conservative and surgical modalities have been used in the treatment of NVG, however none of them alone being efficient enough. Topical anti-glaucoma medication is used in the treatment of different types of glaucoma but neovascular glaucoma is refractory to medical therapy.

There are some procedures like pan retinal photocoagulation, diode laser cyclo photocoagulation and surgical procedures like filtering surgery with or without mitomycin C and implantation of drainage implants for this type of glaucoma, but the choice of treatment modality depends on etiology and stage of glaucoma.

The treatment of NVG involves the treatment of the basic cause of disease, i.e. retinal ischemia and is usually achieved by laser

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photocoagulation if the clarity of optical medium allows it. Laser photocoagulation destroys the ischemic retinal areas and thus also decrease the concentration of proangiogenic factors (VEGF) by about 75 percent, the latter being responsible for neovascularization of the retina, iris, and angle^{2,3}. If laser procedure is hampered by poor media clarity, then other treatment modalities have been tried, including transconjunctival cyclo photocoagulation, diode laser photocoagulation of peripheral retina and filtering operations with mitomycin C or placement of drainage implants.

Concerning therapeutic modalities for neovascular glaucoma, intravitreal bevacizumab has recently been increasingly investigated as promising treatment option. There are many studies discussing its role and efficacy in the management of neovascular glaucoma⁴. Bevacizumab (Avastin) is in off-label use for the wet type of age related macular degeneration⁵, macular oedema (in CRVO and diabetic macular oedema)⁶⁻⁸, and for neovascular glaucoma of various etiology.

MATERIAL AND METHODS

This prospective interventional consecutive case series included 9 consecutive eyes of nine patients with neovascular glaucoma presented at of Department of Ophthalmology, Lahore General Hospital/PGMI, Lahore between April 2010 and July 2011.

Comprehensive eye examination at baseline and after treatment included best corrected visual acuity, applanation tonometry, slit lamp biomicroscopy, gonioscopy, and fundus examination. All nine patients completed six months follow up.

LGH protocol for treatment of neovascular glaucoma was: To give intra vitreal injection of avastin 1.25 mg/0.05 ml and then to do PRP after one week in two sessions or trabeculectomy with MMC after two weeks, if PRP and intravitreal avastin fails to control the intra-ocular pressure.

Data Analysis

The data was analyzed using SPSS 16 (statistical package for social sciences). The data were described in terms of mean \pm SD (standard

Table-1: Etiology of neovascular glaucoma.

Etiology	Number of patients	Age (years)		Gender
PDR	6	Pt 1	57	F
		Pt 2	49	M
		Pt 3	63	F
		Pt 4	58	F
		Pt 5	65	M
		Pt 6	60	M
		Mean age: 58.66		
CRVO	3	Pt 1	50	M
		Pt 2	50	F
		Pt 3	60	F
		Mean age: 53.33		
Total	9			

deviation) for quantitative variables. Frequencies and percentages were given for qualitative variables. Paired sample t-test was used to compare pre and post treatment IOP. A *p*-value of <0.05 was considered statistically significant.

RESULTS

The baseline characteristics and etiology of NVG are summarized in table-1. Total nine patients diagnosed as NVG were included in the study. Five (55.6%) cases were women and four (44.4%) cases were men. Ages ranged from 49 years to 65 years with mean age of 56.6 years (SD =8.2).

In 6 (66.7%) patients etiology of neovascular glaucoma was PDR and in three patients it was CRVO. In 3 (33.3%) patients, good intraocular pressure control was achieved after intravitreal avastin and after one week two sessions of PRP, among them two patients having NVG due to PDR and one patient having NVG due to CRVO. In 5 (55.6%) patients good IOP control achieved after intravitreal injection of avastin, after one week two sessions of PRP and trabeculectomy

with MMC after two weeks, among them 4 patients having NVG due to PDR and one patient having NVG due to CRVO. In 1 (11.1%) patients IOP remain controlled despite full treatment, in this patient NVG was due to CRVO. No side effects or complications associated with the administration of bevacizumab were observed.

It was observed that in two different groups of patients depending on treatment (Intravitreal Avastin and PRP / Intravitreal Avastin, PRP and

neovascular glaucoma. Intravitreal Avastin is a useful adjunct in the management of refractory neovascular glaucoma, producing rapid relief of pain and decrease in IOP¹². We also found it to produce fast and considerable regression of iris and/ or angle neovascularization. Although the effect of bevacizumab was partial and temporary, it may provide an additional tool in patient preparation for the next step in the treatment algorithm for neovascular glaucoma. Because of

Table-2: Comparison of pre and post treatment intra ocular pressure in both treatment groups.

Treatment groups	Pre treatment IOP	Post treatment IOP	p-value
Intravitreal Avastin and PRP (n=3)	53.33 ± 7.63	13 ± 2.64	<0.001
Intravitreal Avastin, PRP and Trabeculectomy with MMC (n=6)	55.67 ± 4.80	22.33 ± 6.66	<0.001

Values are expressed as mean ±SD

trabeculectomy with MMC) there exists significant decrease in pre-treatment and post treatment IOP. Comparison of pre and post treatment IOP in both the treatment groups is given in table-2.

DISCUSSION

Bevacizumab has recently come in the focus of interest of researchers. Study reports discuss its role in various diseases. Intravitreal Avastin has a role in regression of iris neovascularization and IOP control in neovascular glaucoma cases and also in increasing the success rate of trabeculectomy with mitomycin C⁹. In PDR patients with refractory neovascular glaucoma 23 g pars plana vitrectomy and Ahmed valve implantation are safe and effective¹⁰. The biological effects on angle neovascularization after intravitreal avastin reduce vascular permeability, decrease inflammatory reaction, loss of vascular function and endothelial cell degeneration¹¹. Giansanti et al⁵ and Avery et al⁷ think that bevacizumab has considerable effects in the wet form of age-related macular degeneration. Other authors like Arevalo et al⁶ find bevacizumab very useful in reduction of diabetic macular edema and other types of edema like those in occlusive retinal diseases⁸. Al-Aswad^{1,2} reports favorable results of bevacizumab as one of therapeutic options for

its temporary effects the duration of which showed inter-individual variation, bevacizumab can only have an adjunctive role in the treatment of neovascular glaucoma. Central retinal artery occlusion may be relatively common complication following intravitreal injection of Avastin in patients with neovascular glaucoma, particularly when it was associated with ocular ischemic syndrome¹³. Our study suffered from small number of study patients (n=9) and follow up period of six months. The study should be extended to a greater series of patients to allow for valid conclusions to make. However, it should be noted that the satisfactory IOP control was achieved in eight patients and that no side effects or complications were recorded during the study and follow up period, which is consistent with literature data^{1,2,4}.

CONCLUSION

Significant decrease in intraocular pressure was achieved after observing Lahore General Hospital protocol for treatment of neovascular glaucoma caused by retinal diseases.

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