



RESEARCH

The Comparison Between Results of Trabeculectomy With and Without Prior Anti-Vascular Endothelial Growth Factor In Patients With Neovascular Glaucoma at Undaan Eye Hospital Surabaya, Indonesia

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**Abstract**

Introduction: New intraocular medication and anti-vascular endothelial growth factor (VEGF) agents have been developed to manage neovascular glaucoma and surgery. However, no studies compare trabeculectomy with anti-VEGF to no anti-VEGF treatment in patients with neovascular glaucoma. **Purpose:** This study compares the decrease of intraocular pressure (IOP) between trabeculectomy with and without anti-VEGF in neovascular glaucoma. **Methods:** This observational study comprised 30 medical records of neovascular glaucoma, divided into 15 medical records of patients with anti-VEGF before trabeculectomy and medical records of patients operated with trabeculectomy without anti-VEGF, monitored between January 2021 and December 2021. Patients with incomplete medical records were excluded. Data collected are age, gender, risk factor, IOP preoperative, and during six months of follow-up IOP postoperative. Data analysis uses an Independent T-test and Mann-Whitney test. **Results:** From 30 samples, the mean IOP in trabeculectomy with the anti-VEGF group generally is 12.26 mmHg. Meanwhile, the mean IOP in trabeculectomy without the anti-VEGF group generally is 16.74 mmHg. The comparison between two groups shows that there are significant mean differences between them during 1-5 months follow-up (1 month: $p = 0.022$; 2 months: $p = 0.007$; 3 months: $p = 0.007$; 4 months: $p = 0.042$; and 5 months: $p = 0.029$). **Conclusions:** Trabeculectomy with prior administration of intravitreal anti-VEGF shows good IOP reduction and can be implemented in neovascular glaucoma (NVG) patients.

Keywords: neovascular glaucoma (NVG); secondary glaucoma; trabeculectomy, anti-vascular endothelial growth factor (VEGF)

Introduction

Neovascular glaucoma (NVG) is characterized by iris neovascularization and fibrovascular tissue proliferation in the anterior chamber angle with elevated intraocular pressure (IOP).^[1] It is often incurable and refractory to treatment.^[1] Retinal hypoxia is the leading cause of NVG.^[2] Diabetes mellitus, hypertension, central retinal vein occlusion (CRVO), proliferative diabetic retinopathy (PDR), and ocular ischemic syndrome are the most common risk factors.^{[1],[3],[4],[5],[6]} In contrast, ocular tumors and inflammation are the less common cause.^[7]

NVG is one of the rare pathologies. The prevalence is only 0.7%-5.1% of the overall Asian glaucoma population and approximately 5.8% of the population in China and 3.9% of the population in Europe are affected by NVG.^{[6],[8],[9]} Although the population of NVG is relatively small, it can cause irreversible blindness.^[6] The incidence of NVG in Dr. Cipto Mangunkusumo Hospital, Central Jakarta, Jakarta, Indonesia, was 8% in secondary glaucoma cases.^[10] The distribution of men is slightly higher than women in NVG.^[11] It is more common in the elderly, especially between 60-79 years (46.16%) and over 80 years (30.68%).^[11]

The successful management of NVG depends on the early identification of neovascularization, treating the underlying cause, reduction of vascular drive, and decreasing intraocular pressure.^[1] Furthermore, pan-retinal photocoagulation is the gold standard of vascular drive reduction.^[7] An early diagnosis followed

Table 1. The mean of IOP preoperative and postoperative

Medical Intervention	Preoperative (mmHg)	Postoperative (mmHg)
Trabeculectomy with anti-VEGF	43.56	12.26
Trabeculectomy without anti-VEGF	43.60	16.74

Table 2. The mean of IOP postoperative follow-up between two groups

Follow-up	Trabeculectomy With anti-VEGF (mmHg)	Trabeculectomy Without anti-VEGF (mmHg)	p-value
1 Week	19.75	27.97	0.436*
2 Weeks	20.00	22.2	0.512*
1 Month	13.33	18.94	0.022
2 Months	12.73	20.26	0.007
3 Months	14.06	23.38	0.007
4 Months	12.00	16.74	0.042
5 Months	14.28	21.58	0.029*
6 Months	12.26	16.74	0.057

*Mann Whitney test; p < 0.05 (significant)

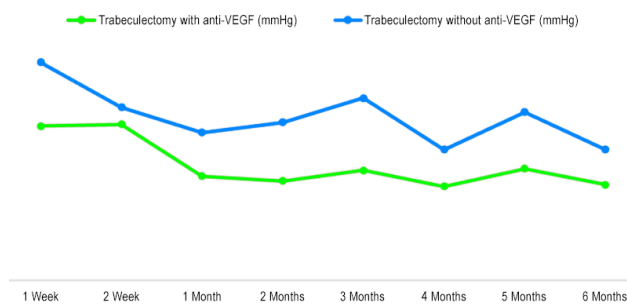


Figure 1. The mean IOP postoperative follow-up.

by an applicable treatment such as pan-retinal photocoagulation or prior administration of anti-vascular endothelial growth factor (VEGF) with or without hypotensive ocular therapy shows good visual function and can improve the quality of life of patients.^{[3],[12]}

In addition, retinal hypoxia induces the production of VEGF that can lead to angiogenesis.^[13] In aqueous humor, the VEGF concentration of NVG is 40 times higher than primary open-angle glaucoma and 113 times higher than cataract patients.^[14] This elevated VEGF in NVG has a significant role in using anti-VEGF as the adjuvant therapy of NVG.^{[15],[16]}

Methods

An observational study of NVG patients at Undaan Eye Hospital, Surabaya, East Java, Indonesia, who underwent trabeculectomy with and without prior administration of anti-VEGF was included from January to December 2021. This study was approved by the Health Research Ethics Committee (162/EC/KEPK/FKUA/2023) at Faculty of Medicine, Universitas Airlangga, Surabaya, East Java Indonesia.

The sample was determined by purposive sampling technique. There are 30 medical records of NVG, divided into 15 medical records of trabeculectomy patients with prior administration of intravitreal anti-VEGF and medical records of trabeculectomy patients without anti-VEGF. Patients with incomplete medical records and lost follow-up appointments during the last six months were excluded. Data collected are age, gender, risk factor, intraocular pressure preoperative, and during six months of follow-up IOP postoperative. Furthermore, data analysis uses an Independent T-test and Mann-Whitney test.

Results

Table 1 shows that the mean IOP of NVG patients was higher in trabeculectomy without prior administration of anti-VEGF, as much as 16.74 mmHg. Furthermore, in Table 2, there were differences between trabeculectomy with prior administration of anti-VEGF or without anti-VEGF in one month to five months follow-up (p < 0.05). Figure 1 illustrates that the lowest reduction of IOP was in trabeculectomy with the anti-VEGF group during four months of follow-up.

Discussion

Anti-VEGF has a significant role in inhibiting the primary mediators in neovascularization.^{[5],[15],[17]} It has become a hot topic worldwide and is used as an adjuvant therapy in NVG. In addition, the successful management of anti-VEGF in lowering intraocular pressure and in regressing neovascularization in NVG has been reported in many studies.^{[2],[18],[19],[20]} Similar to our study, there were differences between trabeculectomy and prior administration of anti-VEGF in one to five months follow-up (p < 0.05). In contrast, there was no difference in the one-week, two weeks, and six months follow-ups. This finding may be due to the iris neovascularization regression, which may continue until eight to ten weeks after intraocular injection and return to the previous condition in six months after administration.^{[18],[21],[22]} This situation explains that the effects of anti-VEGF are transient and require recurrent injections.^{[18],[23],[24]} Another study^[11] reported that the effect of anti-VEGF generally induces temporary regression between four and six weeks. Besides, further studies of anti-VEGF are needed to evaluate the surgical outcomes of NVG in many stages.

Conclusions

Postoperative intraocular pressure of trabeculectomy with prior administration of anti-VEGF at Undaan Eye Hospital, Surabaya, East Java, Indonesia, shows better reduction of intraocular pressure than a group without anti-VEGF.

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