



THE COMBINATION OF TREATMENT FOR GLAUCOMA

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KEYWORDS

Glaucoma;
trabeculectomy; IOP.

ABSTRACT

Glaucoma is the leading cause of permanent vision loss worldwide. Because the disease may be asymptomatic until an advanced stage, diagnosis is often delayed. An estimated 57.5 million people worldwide develop primary open-angle glaucoma (POAG). The purpose of this study was to determine the comparison of intraocular pressure reduction in open-angle primary glaucoma patients between monotherapy, double therapy, and triple combination therapy. This study is a type of observational analytical research with a cross sectional approach. Which is a research design in which data collection of both independent and dependent variables and factors that influence them are collected at the same time. The research was conducted at the Eye Clinic of RSPAL dr. Ramelan Surabaya. The population taken was a 53-year-old female patient diagnosed with open-angle primary glaucoma at the Eye Clinic of RSPAL dr. Ramelan Surabaya. The results showed that trabeculectomy had a statistically significant result that was very high on IOP reduction and decrease in the number of antiglaucoma drops. Untreated glaucoma can lead to permanent vision loss or blindness that occurs more quickly. The earlier treatment is given, the more vision loss can be delayed or reduced.

DOI:10.58860/ijsh.v2i9.75

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INTRODUCTION

Glaucoma is a worldwide leading cause of irreversible vision loss. Because it may be asymptomatic until a relatively late stage, diagnosis is frequently delayed. It is estimated that 57.5 million people worldwide are affected by primary open-angle glaucoma (POAG). People over 60 years of age, family members of those already diagnosed with glaucoma, steroid users, diabetics, as well as those with high myopia, hypertension, central cornea thickness of <5 mm and eye injury are at an increased risk of glaucoma. By 2020, it is expected that approximately 76 million people will suffer from glaucoma, with that number estimated to reach 111.8 million by 2040. The prevalence of glaucoma in Indonesia is estimated at 0.46%, or the equivalent of 4-5 people per 1000 population. According to data from the outpatient department of hospitals in Indonesia, the number of glaucoma visits increased from 65,774 in 2015 to 427,091 in 2017. Based on gender, glaucoma in Indonesia was reported more in women than men.

A 53-year-old female patient came to the RSPAL Eye Clinic, Dr. Ramelan Surabaya, with complaints of both eyes being red and blurry and feeling pain in both eyes, especially the right eye, since the last week (GALUH, 2022). Complaints of pain were also felt in the back of the head.

Patients often experience complaints of headaches that come and go for the last 2 years. The patient stated that he had a history of glaucoma in his parents. The patient denies any history of previous eye surgery, but the patient wears glasses due to high myopia OS. There were no other comorbid diseases found.

From the examination, VOD was found to be 1/60 and VOS 4/60. Examination of the anterior segment of OD revealed CVI, corneal edema, shallow anterior chamber, and mid-pupil mydriasis, and the lens was difficult to evaluate. OS anterior segment examination revealed

minimal CVI, others within normal limits. IOP measurements with Shiotz obtained TOD 3/10 (50.6), TOS 5/10. BP 130/100 mmHg.

After that, Glycerin 70 cc (BW 70 kg, dose 1 mg/kgBW, 1 mg=1cc) and Acetazolamide 250 mg 2 tablets were given. Patient prescribed timolol 0.5 ED 2 x gtt 1 ODS, PO Glauseta 250 mg 3 x 1 tablet, PO KCl 600 mg 1 x 1 tablet and PO Acid Mefenamate 500 mg 3 x 1 tablet.

Four days later, the patient was controlled with VOD 1.5/60 and VOS 4/60. Inspection anterior segment OD is still the same inspection of deep OS anterior segment normal limits. IOP measurement with Shiotz obtained TOD 3/10 (50.6) and TOS 19.3. After that, they were done giving Glycerin 70 cc (BW 70 kg, dose 1 mg/ kgBW, 1 mg=1cc) and Acetazolamide 250 mg 2 tablets. Thirty minutes later, the IOP evaluation check with Shiotz obtained TOD 5/10 (37.2) and TOS 10/10 (16.5). IOP 1 hour later, TOD 6/10 (31.8) and TOS 10/10 (16.5). IOP 1.5 hours later, TOD 8/10 (23.1). The patient was then allowed To go home And continue the medication that had been prescribed the moment visit First, with the addition of Latanoprost ED 1xgtt1 ODS and Pilocarpine ED 4 x gtt 1 OD.

A week then, the patient control with VOD 5/15 ph 5/12 f and VOS 5/60 S-6.50 □ 5/10 ph fixed, Add +1.50. Inspection anterior segment OD is still The same with edema minimal cornea, so the lens can evaluated And obtained turbidity on the lens. Inspection of deep OS anterior segment normal limits. IOP measurement with a non-contact tonometer, TOD 52.5, and TOS 14.0. The patient continues the same medicine.

3 days then , the patient control with VOD 5/30 ph 5/15 f and VOS 5/60 S-6.50 □ 5/6.5 ph fixed . Inspection anterior segment ODS is still The same as the visit before. IOP measurement with a non-contact tonometer, TOD 53.5, and TOS 15. The patient continued the same medicine And planned an OD trabeculectomy with target IOP < 30 before action (KOD 8.01 / 7.95 > NE 17.5; Axial length 24; Deviation 0.06).

Four days later, the patient came For OD trabeculectomy was performed. VOD 5/20 ph 5/12 f, check anterior segment OD still The same with previously, TOD 43.3. Before action, trabeculectomy was performed, giving Glycerin 70 cc (BW 70 kg, dose 1 mg/ kgBW, 1 mg=1cc) and Acetazolamide 250 mg 2 tablets. TOD post 60 minutes 25.3. TOD post 90 minutes 14.3. Medications prescribed post trabeculectomy include combination Dexamethasone, Neomycin Sulfate, Polymyxin B Sulfate ED 6 x gtt 1 OD, Pilocarpine ED 4 x gtt 1 OD, PO Ciprofloxacin 500 mg 2 x 1 tablet, and PO Acid Mefenamate 500 mg 3 x 1 tablet, Timolol 0.5 ED 2 x gtt 1 OS, Latanoprost ED 1 x gtt 1 OS, drug other stopped.

One day, the patient was controlled with VOD 2/60 pH 5/40. Inspection Anterior segment OD has obtained bleb forms with protrusions, seams Intact, still obtained exists edema cornea and pupillary mydriasis. IOP measurement with a non-contact tonometer, TOD 7.3 and TOS 22.3. The drug previously continued.

Six days then, the patient control with VOD 5/60 ph 5/15 f. Inspection anterior segment OD is still The same as the visit before. IOP measurement with a non-contact tonometer, TOD 8.0, and TOS 21.3. The drug previously continued.

Seven days later, the patient was controlled with VOD 5/20 pH 5/15. Inspection Anterior segment OD showed bleb (+) and pupillary mymydriasis. IOP measurement with a non-contact tonometer, TOD 8.3, and TOS 18.7. Prescribed medications include: _ combination Dexamethasone, Neomycin Sulfate, Polymyxin B Sulfate ED 4 x gtt 1 OD, Pilocarpine ED 4 x gtt 1 OD, PO Prednisone 3 x 2 tablets, PO Vitamin C 50 mg 3 x 2 tablets.

14 days then , the patient control with VOD 5/9 ph still and VOS 5/40 S -6.00 5/6 f. Inspection Anterior segment OD is the same as the visit before. IOP measurement with a non-contact tonometer, TOD 9.3, and TOS 20.7. Prescribed medications include _ Latanoprost ED 1 x gtt 1 OS and PO Optimax 1 x 1 tablet.

10 days then , the patient control with VOD 5/30 S +1.00 / C - 0.50 x 90 5/15 f and VOS 5/40 S -6.00 5/6 f. Inspection Anterior segment OD is obtained in the presence of bleb formation, posterior synechiae (+), pupillary mydriasis with decline reflex light, turbidity on the lens (+), and COA impression. IOP measurement with a non-contact tonometer, TOD 13 and

TOS 19.7. Prescribed medications include. Sodium Diclofenac ED 4 x gtt 1 OD, Lyters ED 4 x gtt 1 ODS, Timolol 0.5% ED 2 x gtt 1 OS, Latanoprost ED 1 x gtt 1 OS.

4 days then , the patient control with VOD 5/15 ph 5/10 and VOS 5/60 S -6.00 5/6 f. Inspection anterior segment OD 00 5/8 ph 5.7.5 f. Inspection Anterior segment OD is the same as the visit before. IOP measurement with a non-contact tonometer, TOD 13 and TOS 19.7. Prescribed medications include _ Sodium Diclofenac ED 4 x gtt 1 OD, Lyters ED 4 x gtt 1 ODS, Timolol 0.5% ED 2 x gtt 1 OS, Latanoprost ED 1 x gtt 1 OS.

10 days then , the patient control with VOD 5/15 S -1.00 5/9 ph bright and VOS 5/60 S -6.00 5/8 ph 5.7.5 f. Inspection Anterior segment OD is the same as the visit before. IOP measurement with a non-contact tonometer, TOD 12.3, and TOS 17.5. Prescribed medication _ The same as the visit previously added with PO Optimax 1 x 1 tablet.

2 weeks then , the patient control with VOD 5/15 S -1.00 5/9 ph still and VOS 5/60 S -6.00 5/9 ph 5.7.5, Binoculars 5/7.5, Add +2.50. Inspection Anterior segment OD is the same as the visit before. IOP measurement with a non-contact tonometer, TOD 13.3 and TOS 21.3. The medication prescribed is the same as the previous visit (Singhal, Tien, & Hsia, 2016).

The purpose of this study was to determine the comparison of intraocular pressure reduction in open-angle primary glaucoma patients between monotherapy, double therapy, and triple combination therapy.

This study is expected to provide information about the comparison of monotherapy, double therapy, triple combination therapy in glaucoma patients can also add insight, knowledge, sources of information and sources of material for further research that has a relationship with the comparison of monotherapy, double therapy, triple combination therapy in glaucoma patients.

METHOD

This study is a type of observational analytical research with a cross sectional approach. Which is a research design in which data collection of both independent and dependent variables and factors that influence them are collected at the same time. The research was conducted at the Eye Clinic of RSPAL dr. Ramelan Surabaya. The population taken was a 53-year-old female patient diagnosed with open-angle primary glaucoma at the Eye Clinic of RSPAL dr. Ramelan Surabaya.

RESULT AND DISCUSSION

In this case, the diagnosis of glaucoma was made based on the patient's symptoms and the Intra intra-ocular pressure (Senthil et al., 2016). The patient also claims her parents have a history of glaucoma. However, the patient denies any history of previous eye surgery, and the patient uses glasses because of high myopia in her left eye (Rahayu & Kalandra, 2021). The etiology of glaucoma is based on the type of glaucoma, whether it is open angle or closed angle. Open-angle glaucoma is thought to result from an ineffective drainage system of the aqueous humor in the eye. In glaucoma, resistance to drainage of aqueous humor most often begins in Schlemm's canal in the juxtacanalicular trabecular network (Buffalo et al., 2020). Angle-closure glaucoma occurs when the eye's drainage system is suddenly blocked due to the closure of the angle formed between the cornea and iris (Sun et al., 2017). In most cases, angle-closure glaucoma is associated with a thickening of the lens with age that causes a gradual increase in a relative pupillary block and then pushes the iris anteriorly.

The pathophysiology of open-angle glaucoma is still unclear. However, increased IOP is associated with retinal ganglion cell death. 2 theories explain the effect of IOP on the pathogenesis of glaucoma, namely, the vascular theory (indirect) and the mechanical theory (direct) (Yadav, Sharma, & Londhe, 2020). Based on the vascular theory, increased IOP causes capillary compression resulting in impaired blood flow to the optic disc and chronic ischemic

injury to the optic nerve (Hayreh, 2016). Meanwhile, according to mechanical theory, increased IOP causes mechanical stress to the posterior structures of the eye, especially the lamina cribrosa. This lamina is the weakest point of the eye wall. Stress caused by increased IOP can result in compression, deformation, and remodeling of the lamina cribrosa. This vascular suppression and disturbance pathologically will cause excitotoxicity, which damages the optic nerve with excess accumulation of glutamate in the retina, excessive expression of transforming growth factor β_2 (TGF- β_2), accumulation of peroxynitrite toxin from increased activity of nitric oxide synthesis, nerve damage by immune mediation, and oxidation stress.

To diagnose glaucoma, we need to pay attention to the symptoms and history of illness. In open-angle glaucoma, the disease progresses slowly so that many patients experience no symptoms (Samuelson et al., 2021). As the disease progresses, patients may complain of blurred, foggy, and dark vision. In its late stages, glaucoma can cause a complete loss of light perception. Patients tend to complain that they often do not see things, so they stumble quickly. The patient may notice that while reading, there are some missing words, and visual acuity does not improve after correction (CHEN et al., 2016). Another complaint that can occur is a headache that its location cannot explain. In angle-closure glaucoma, acute angle closure can occur, causing the patient to experience a sudden loss of vision. Symptoms can include unilateral blurred vision and halos or rainbows around lights due to corneal edema. Acute angle closure glaucoma patients also often experience pain around the eyes, accompanied by nausea and vomiting. The majority of cases of angle-closure glaucoma are unilateral. The pain experienced by patients is usually dull and localized to the eye. However, it may radiate to the retrobulbar space and other periocular areas such as the eyebrows, head, paranasal sinuses, maxillary, and auricular areas (Ferreira, Soares, & Amarante, 2021). The eyes may appear red, swollen, accompanied by watery eyes.

Physical examinations that need to be carried out include visual inspection, intraocular pressure, visual fields, and funduscopy (Schuster, Erb, Hoffmann, Dietlein, & Pfeiffer, 2020). Visual inspection can be done using the Snellen chart. In acute angle closure glaucoma, corneal edema can occur so that visual acuity does not improve, even though a pinhole or correction has been given. Also, we need to measure intraocular pressure. There are various ways to perform tonometry, such as digital finger tonometry, applanation tonometry, Schiottz tonometry, non-contact tonometry, rebound tonometry, and hand-held tonometry (Da Silva & Lira, 2022). The Goldmann application tonometry is the tool most frequently used in practice and clinical trials (Wong et al., 2018). Intraocular pressure has an average range between 10-21 mmHg. In the setting of acute closed glaucoma, intraocular pressure can reach 50 mm Hg and above. Intraocular pressure fluctuates throughout the day. Therefore, intraocular pressure should be measured several times and at different times of the day to determine whether there is an increase or not. Aqueous humor is produced by following circadian rhythms so that intraocular pressure will increase at night until you wake up. In normal eye conditions, this diurnal variation is around 3-4 mmHg, but in glaucoma, the variation will reach more than 10 mmHg. Visual field examination was performed using Standard Automated Perimetry (SAP) with a white-on-white stimulus. The examination can be adjusted according to the degree of visual field loss using a particular program that evaluates the sensitivity of the central threshold at 24 degrees, 30 degrees, and 10 degrees, and with various stimulus sizes. Goldmann perimetry is an alternative when the patient is unable to perform SAP or if such equipment is not available.

The goal of glaucoma treatment is to reduce intraocular pressure so that damage to the optic nerve does not progress (Sihota, Angmo, Ramaswamy, & Dada, 2018). In patients with

open-angle glaucoma, management can be carried out with topical drugs such as latanoprost or timolol, laser therapy, or surgery. The usual initial therapy for glaucoma is prostaglandin analogs such as latanoprost. This class of drugs is usually given once a day at night. Prostaglandin analogs increase uveoscleral and trabecular outflow, thereby lowering intraocular pressure (Aihara, 2021). Potential side effects include conjunctival hyperemia, increased eyelash growth, reduced periorbital fat, and increased pigmentation of the iris and periocular skin. Another treatment option is beta-blockers such as timolol. This class of drugs is usually given 1-2 times a day. Beta-blockers work by reducing the production of aqueous humor. The main local side effect of beta blocker eye drops is dry eyes. Other alternatives are alpha-adrenergic agonists such as brimonidine, parasympathomimetics such as pilocarpine, and carbonic anhydrase inhibitors such as brinzolamide.^{10,11} For glaucoma cases, it is recommended to use a combination of drugs from different classes. However, it must consider the side effect profile and mechanism of action. After instilling the medicine, the eyes should be kept closed for several minutes, and the lower conjunctival sac should not be touched. This is expected to reduce drug outflow through the tear ducts and absorption through the nasal mucosa, thereby reducing the possibility of systemic side effects.⁸ The most frequently used intraocular surgery for glaucoma is trabeculectomy, which involves the creation of a partial-thickness scleral flap over a sclerectomy into the anterior chamber, where an extra canal is created between the anterior chamber and the subconjunctival space. The procedure is to remove a part of the trabecular meshwork, and a scleral flap is used to cover the sclerotomy, so between the anterior chamber and the subconjunctival space, a fistula is created. The study by Binibrahim et al. shows that trabeculectomy has very high statistically significant results toward IOP reduction and a decrease in the number of antiglaucoma drops. Untreated glaucoma can cause permanent vision loss or blindness to occur more quickly. Adequate management of glaucoma can delay further vision loss but will not restore lost vision (Kyari, Adekoya, Abdull, Mohammed, & Garba, 2018).

CONCLUSION

Glaucoma is a challenging disease since untreated glaucoma can cause permanent vision loss. It is highly crucial to determine which type of glaucoma to be able to give treatment. The earlier treatment can be given, the more vision loss can be delayed or reduced. In this case, the patient has been treated one week after the symptoms first occurred and has recovered after a few weeks of treatment. This proves that the sooner treatment can be given, the more vision loss can be delayed or reduced.

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