ORIGINAL ARTICLE

SUCCESS RATE OF GLAUCOMA DRAINAGE DEVICE IMPLANTATION IN KARIADI GENERAL HOSPITAL SEMARANG 2020 – 2022

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ABSTRACT

Introduction: *Glaucoma is a leading cause of irreversible blindness, and implantation of drainage devices is an effective treatment option for patients with advanced glaucoma. The purpose of this study was to investigate the success rate of glaucoma drainage devices implantation in Kariadi Hospital.*

Methods*: This was an observational analytic study with a retrospective design. All patients who received Virna implantation between January 2020 and December 2022 were included. Intraocular pressure (IOP) examination was performed at the baseline and at the first day, at the seventh day, at the first month, and at the third month after surgery. The success rate was divided into three groups: complete success if IOP was <21mmHg without medication, qualified success if IOP was <21mmHg with medication, and failure if IOP was >21mmHg with medication.*

Results: *This study included 42 patients (42 eyes) with an average age of 43.3 years. There were 16 male (38%) and 26 female (62%) patients in the group. From these patients, 11 (26.2%) had primary glaucoma and 31 (73.8%) had secondary glaucoma. There was a significant decrease in IOP from preoperative measurement (37.1±10.1mmHg) compared to IOP on the first day (13.0±6.0mmHg), on the seventh day (15.4±3.8mmHg), on the first month (18.2±4.4mmHg), and on the third month (23.4±8.9mmHg) after surgery (p<0.05). At three-month follow-up, the complete success was 14.29%, the qualified success was 50%, and the failure was 35.71%.*

Conclusion: *Glaucoma drainage device implantation was found to successfully reduce IOP in patients with advanced glaucoma. The qualified success rate was higher than complete success rate, suggesting that some patients may require medication to achieve target IOP levels.*

Keywords: *Glaucoma Drainage Device, Glaucoma Implantation, Intraocular Pressure*

INTRODUCTION

Glaucoma is a group of eye conditions that can cause damage to the optic nerve and ultimately lead to vision loss. Glaucoma can often be effectively managed with medications, laser therapy, or surgery. Intraocular pressure (IOP) is an important factor in the diagnosis and management of glaucoma. Elevated IOP is a significant risk factor for glaucoma, and reducing IOP is a key goal of glaucoma treatment.(1)

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Advanced glaucoma refers to a stage of glaucoma where there is a significant optic nerve damage and visual field loss. It is usually considered as a more severe stage of the disease, and it can be challenging to manage.(2)

Treatment for advanced glaucoma typically involves a combination of medications, laser therapy, and or surgery to lower the pressure within the eye. However, in some cases, these treatments may not be sufficient to cure the disease effectively, and vision loss may continue to progress despite the treatment.(3)

Glaucoma drainage devices (GDD), also known as glaucoma shunts or tubes, are small, implantable devices that are used for creating a new drainage pathway for aqueous humor, the fluid inside the eye. By diverting the flow of aqueous humor, the device can help reduce IOP and prevent further damage to the optic nerve.(4)

Regular monitoring of IOP is important for patients with glaucoma or other conditions that can cause the increasing IOP, as it can help to determine the effectiveness of treatment and identify the changes in the condition over time.(5)

This study was conducted to see the success rate of Intraocular pressure (IOP) reduction in advance glaucoma patients with glaucoma drainage devices implantation in Kariadi Hospital.

METHODS

This was a retrospective study using secondary data from medical records. The patients who receivedVirna implantation glaucoma drainage device during January 2020 to December 2022 in eye clinic at Kariadi Hospital were included. Furthermore, the data given include gender, age, glaucoma type, and IOP data at the baseline, at the first day, at the seventh day, at the first month, and at the third month after glaucoma drainage device implantation. The success rate of glaucoma drainage device implantation was divided into 3 groups. Those are complete success if IOP was <21 mmHg without medication, qualified success if IOP was <21 mmHg with medication and failed if IOP was >21 mmHg with medication. A paired T test with a significant value of $P<0.05$ was then used to analyze the differences in the baseline IOP and after glaucoma drainage device implantation. The data was analyzed with SPSS.

RESULTS

This study reported that 42 patients with advanced glaucoma who had glaucoma drainage device implantation surgery were included in the study. The patient's ages ranged from 20 to 72 years with an average of 43.36 ± 14.49 years and 61.9% of the samples were

female (table 1). Most of them had secondary glaucoma (73.8%) and took less than equal to 2 kinds of glaucoma medications (92,9%).

Table 1. Baseline Characteristics

Variable	N (42 Pts)	Mean	Median
Sex			
Male	16 (38.1%)		
Female	26 (61.9%)		
Age (yo)		43.36 ±14.49	46 (20-72)
Type of Glaucoma			
Primary	11 (26.2%)		
Secondary	31 (73.8%)		
Glaucoma Medications			
≤ two drugs	39 (92.9%)		
> two drugs	3 (7.1%)		

The baseline IOP examination revealed an average of 37.13 ± 10.04 mmHg. The lowest IOP was obtained atday one post operatively which was 13.08 ± 6.00 mmHg (table 2).

Table 2. Baseline and after GlaucomaDrainage Device Implantation IOP values

IOP	Mean (mmHg)	p Value
Baseline	37.13 ±10.04	
1 day	13.08 ±6.00	0,015*
1 week	15.46 ±3.80	0,036*
1 months	18.20 ±4.46	0,008*
3 months	23.45 ±8.93	0,027*

*Paired T- Test Analysis Sig p<0.05

All From the data obtained after analysis of paired T test, significantdifferences (p <0.05) were found at the first day, 1 week, 1 month and 3 months postoperatively. According to Table 3, the group with the largest number of qualified successes is 21 patients (50%).

Table 3. Classification of the success of glaucoma drainage device implantation in 3 months post operatively

Classification	N	%
Complete success	6	14.29
Qualified success	21	50
Failed	15	35.71

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DISCUSSION

Glaucoma drainage devices are one of the treatment options available for patients with glaucoma. These devices are designed to help lower intraocular pressure in the eye, which is a major risk factor for glaucoma. Studies have shown that glaucoma drainage devices can successfully cure glaucoma in certain patients. Another study published in 2022 reported that the Baerveldt glaucoma implant was effective in reducing IOP and improving visual function in patients with refractory glaucoma.[1,2]

In a long time, GDD have been reserved for patients diagnosed with refractory glaucoma. GDD occupy an important place in the surgical management of glaucoma that is not responding to medications and trabeculectomy operations. In certain conditions, such as neovascular glaucoma, pediatric glaucoma, iridocorneal endothelial syndrome, penetrating keratoplasty with glaucoma, glaucoma after retinal detachment surgery, it has become the preferred operation.[6]

It is important to note that not all patients with glaucoma are candidates for drainage devices, and success rates can vary depending on various factors such as the patient's age, the severity of their glaucoma, and the type of device used. Additionally, like any medical procedure, there are potential risks and complications associated with glaucoma drainage devices, such as infection, erosion of the device, and cataract formation.[5]

In this study, it is stated that there was a decrease in the patient's intraocular pressure after implantation of the glaucoma drainage device. The decrease in intraocular pressure was measured up to the third month after the GDD implantation procedure and obtained complete success criteria of 14.29%. The category of qualified success that was found was 50% of patients. The number of patients who failed was 35.7%.

According to a 2019 study conducted at Ciptomangunkusumo hospital. Within 18 months, the overall Virna Glaucoma Implantation (VGI) success rate varies from 70-80%. VGI security is demonstrated by nerve response on rabbits and material inspection, as well as the lowest amount of complications in glaucoma patients.[7]

The use of glaucoma drainage devices is typically reserved for patients with more advanced or refractory glaucoma who have not responded adequately to other treatment options such as medications or laser surgery. These devices may also be considered for patients who are unable to tolerate or comply with other treatments, or for those who have a high risk of complications with traditional glaucoma surgery. Other criteria that may impact the decision to utilize a glaucoma drainage device include the patient's age, overall health, and other ocular

problems they may have. For example, patients with a history of ocular inflammation or scarring may be less likely to benefit from the device, as it may be more difficult to achieve adequate drainage. These may include infection, inflammation, device erosion, and the need for additional surgeries.[8,9]

In this study, 11 (26.2%) of the patients had initial glaucoma and 31 (73.8%) had secondary glaucoma. Secondary glaucoma patients included 16 with neovascular glaucoma (51.6%), 13 with post vitrectomy (41.9%), and others with iridocorneal endothelial syndrome and panuveitic glaucoma.

Neovascular glaucoma (NVG) is a severe form of glaucoma that arises due to abnormal blood vessel growth in the iris and angle structures of the eye. It is a secondary ocular disorder resulting from a variety of ocular pathologies, and nearly in all cases, retinal ischemia is the underlying mechanism, characterized by the development of rubeosis iridis and elevated intraocular pressure (IOP). Visual outcomes in NVG can vary depending on the extent of pre-existing optic nerve damage and the duration of elevated IOP. Early intervention with GDD in NVG can prevent further vision loss and improve quality of life. As with any surgical procedure, there are potential complications associated with GDD implantation in NVG. These can include postoperative hypotony (low IOP), tube obstruction, corneal decompensation, choroidal effusion, and infection.

The timing of postoperative follow-up visits will depend on various factors, including the type of device implanted, the patient's individual risk factors, and the presence of any postoperative complications. Generally, patients are scheduled for follow-up visits at day 1, week 1, month 1, month 3, month 6, and month 12 postoperatively. Additional visits may be required if there are concerns regarding device function or IOP control.[10]

The patient is checked on post-operative day one after GDD surgery, with special care paid to tube location and wound architecture. Topical antibiotic and steroids are started 4 times daily and continued for 5-6 weeks. Initial follow-up is at week one and further frequency of visits depends on the clinical status of the eye. For valved implants, pre-operative glaucoma medications are discontinued to prevent hypotony. For non-valved implants, the glaucoma medications are usually continued until a fibrous capsule form around the plate.[6]

This study is retrospective without a control group. As known, retrospective studies do not have a diverse distribution of data, resulting in homogeneous data in the follow-up. The strengths of the study include that all patient had Virna implantation glaucoma drainage device during January 2020 to December 2022 in Kariadi Hospital.

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CONCLUSION

Glaucoma drainage devices have emerged as a promising treatment option for reducing IOP and preserving vision in patients with advanced or refractory glaucoma. The group with the qualified success category has the most of these things. Glaucoma drainage device implantation and glaucoma medication can work together to reduce IOP and effectively manage glaucoma. Glaucoma medication helps to manage the production and outflow of aqueous humor, while the drainage device offers a physical pathway for aqueous humor to bypass natural drainage system. It is hoped that further cohort research can be carried out a more accurate description of the success rate of GDD implantation. In addition, a control group might be used as a comparison.

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