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Successful rate of glaucoma surgery in uveitis glaucoma

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ABSTRACT

Introduction: Glaucoma is one of the most common complications in uveitis. The surgical intervention has been known for a lower success rate in Uveitis Glaucoma (UG). However, it is still a treatment of choice when medical therapy no longer could control the intraocular pressure (IOP). This study aims to describe UG's demographic and clinical characteristics that received glaucoma surgery and the outcome.
Methods: Medical records of UG patients that received glaucoma surgery in 2018-2019 were reviewed. Age, gender, type and etiology of uveitis, duration of uveitis, intraocular pressure (IOP), visual acuity, gonioscopy, ocular characteristic, previous surgery and laser, current surgery, and complication were studied. Success was defined as IOP ≤21 mmHg or reduction >20% from baseline and >6mmHg with or without medication. Failure is defined in the presence of surgery complication that leads to a change of IOP, uncontrolled IOP that needs additional surgery, and visual acuity becomes no light perception (NLP).
Results: 48 patients (57 eyes) with UG underwent glaucoma surgery. The mean age was 47,23±14,62. Anterior uveitis was the most common type of UG, with a mean uveitis duration before surgery was 13,75±17,65 months. The mean initial IOP was 35,81±13,30 mmHg, at the final visit 15,09±3,36. The mean follow-up duration was 6,41±4,02 months. The overall partial success was 75,44% in one month, 67,74% in 6 months
Conclusion: A decrease in IOP was found in all surgery interventions, including Glaucoma Drainage Device (GDD) implant, trabeculectomy with 5-Fluorouracil (5FU), and combined trabeculectomy cataract surgery with or without 5FU, and cyclodestructive laser surgery. There was a high percentage of successful surgery but many losses to follow-up eyes in a short follow-up period.

Keywords: Glaucoma, Uveitis, Uveitis Glaucoma.
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INTRODUCTION

Glaucoma is a complication in 20-30% of uveitis cases. In open-angle uveitis glaucoma, increased IOP results from damage to endothelial cells of the trabecular meshwork and obstruction of aqueous humor outflow in the trabecular meshwork caused by chronic exposure to inflammatory cells, cytokines, iris pigments and corticosteroids. In closed-angle uveitis glaucoma, the increased IOP increases suction of aqueous humor outflow by the iris with the formation of pupillary cleavage and peripheral anterior synechiae.[1]

Uveitis glaucoma is one type of glaucoma that has complex difficulties in its management. Surgical treatment has a low success rate. The increased inflammatory activity of intraocular surgery and the rapid occurrence of conjunctival fibrosis influence the failure of the surgical outcome. However, surgical management remains the option if intraocular pressure cannot be controlled with maximum antiglaucoma drugs.[1–3]

Several surgical treatment options include surgical filtration trabeculectomy with or without antimetabolite administration, GDD placement, cyclodestructive procedure, and minimally invasive glaucoma surgery.[4] Previous literature states that GDD implants have a higher success rate than trabeculectomy with antimetabolites. This study aims to determine the demographic and clinical characteristics and the success of glaucoma surgery in uveitis glaucoma performed by a glaucoma surgeon at the National Eye Center of Cicendo Eye Hospital (PMN RSM Cicendo).

METHODS

This study is a retrospective study with data retrieval from the medical records of uveitis glaucoma patients who underwent both incision and laser surgery by the glaucoma unit of PMN RSM Cicendo from January 2018-December 2019. Inclusion criteria included all patients diagnosed with uveitis glaucoma who underwent glaucoma surgery with IOP >21mmHg. Exclusion criteria included uveitis glaucoma patients accompanied by other glaucoma diagnoses, patients who underwent follow-up < 1 month, additional surgery other than glaucoma surgery, and patients with incomplete medical records.

Data collection included age, gender, type of uveitis, etiology of uveitis, uveitis activity, preoperative steroid prophylaxis, duration of uveitis before surgery, recurrent episodes of uveitis, visual acuity, preoperative IOP, postoperative IOP, anterior chamber angle, type of uveitis surgery, number of antiglaucoma drugs before and after surgery, duration of the usage of antiglaucoma medications before surgery, previous surgery history, and postoperative complications.

The classification and activity of uveitis were assessed based on the Standardization

of Uveitis Nomenclature (SUN) criteria.[6] Visual acuity was evaluated from the understanding of distant vision, with the best correction grouped according to the classification of visual impairment. IOP was measured preoperatively first postoperative day, 1st week, 1st month, 3rd month, 6th month, 9th month, and 12th month with an applanation tonometer. Angle and peripheral anterior synechiae (PAS) assessments were performed using a four mirror. The optic nerve was assessed by cup/disk ratio using a slit lamp biomicroscope with a posterior pole lens.

Three operators from the glaucoma unit performed the surgery. The operation was an absolute success if the postoperative IOP was 21 mmHg or a decrease in IOP >20% and >6 mmHg without antiglaucoma drug therapy and partial success. The patient continued to require antiglaucoma drug therapy. Patients requiring additional surgery and experiencing surgical complications that affect IOP and changes in visual acuity to NLP due to none other than glaucoma are included in the criteria for failure. Patients requiring additional laser or sutureless system procedures were not included in the failure criteria. According to the world glaucoma association guidelines, postoperative IOP and best corrective visual acuity (BCVA) examinations were performed one day, one week, one month, three months, six months, nine months, and 12 months after surgery. This data was analyzed using descriptive analysis with Microsoft Excel 2010.[5]

RESULTS

57 cases out of 48 patients fulfilled the inclusion and exclusion criteria. The average age of the patients was 47.23±14.62 (20-72) years, with cases in women as many as 62.5%. The clinical characteristics of uveitis in patients can be seen in Table 1. Anterior uveitis is the most common type of uveitis. HSV was the etiology of uveitis in 9 of 19 patients (47%) with uveitis whose etiology was identified.

Table 2 shows the preoperative ocular characteristics of patients with uveitis glaucoma. 54.4 were included in the visual acuity <3/60 group, and 8.7% of patients with initial visual acuity of NLP. Pupil cleavage was obtained as much as

Table 1. Characteristics of uveitis glaucoma patients receiving glaucoma surgery

Characteristics	Amount	Percentage
Type of Uveitis		
Uveitis Anterior	27	47.4%
Uveitis Intermediate	2	3.5%
Panuveitis	22	38.6%
Uncomplete diagnose	6	10.5%
Laterality[b]		
Bilateral	28	58.3%
Unilateral	20	41.7%
Etiology[a]		
CMV	1	2.1%
CMV+Rubella	1	2.1%
Toxoplasma	1	2.1%
HSV	9	18.8%
HIV	1	2.1%
TBC	1	2.1%
RA	1	2.1%
VKH	4	8.3%
Not found	9	18.8%
Not examined	20	41.7%

[a]n=57 eyes [b]n=48 patients

CMV: Cytomegalovirus. HIV: Human Immuno-deficiency Virus. TBC: Tuberculosis. RA: Rheumatoid Arthritis. VKH: Vogyt Koyanagi Hoyt

Table 2. Preoperative ocular characteristics in uveitis glaucoma patients receiving glaucoma surgery

Preoperative Ocular Characteristics	Amount n=57	Percentage
Visual acuity		
>6/12	4	7.0%
6/12-6/18	3	5.3%
6/18-6/60	8	14.0%
6/60-3/60	6	10.5%
<3/60	31	54.4%
NLP	5	8.8%
Gonioscopy		
Open-angle	18	31.6%
Closed angle	35	61.4%
PAS	12	21.1%
Not examined	4	7.0%
Posterior synechiae	47	84.5%
Seclusio Pupillae	14	24.6%
Iris Bombe	6	10.3%
Lens		
Clear	2	3.5%
Pseudophakia	5	8.8%
Complicated Cataract	50	87.7%

24.6%. A total of 87.7% had complicated cataracts. Table 3 shows that as many as ten eyes had previous glaucoma surgery. On average, before undergoing surgery, they had received medical treatment for 11.84±18.87 months. Table 4 shows that the combination of trabeculectomy with lens extraction and intraocular lens implantation is the most common surgical procedure.

A 45.61% of procedures used the antimetabolite 5FU as an additional procedure. In patients who received GDD implant procedures, 4 received Baerveldt implants. IOP reduction was found in each type of procedure. Figure 1 illustrates the IOP changes in each type of procedure. There was a decrease in IOP with an initial IOP average of 35.81±13.30 mmHg in subsequent follow-up on the first day, first week, first month, 3rd month, 6th month, 9th month, and 12th month consecutively in mmHg 21.95±9.93, 18.09±11.65, 17.49±7.06, 16.93±7.43, 17.35±7.91, 16.19 ±7.87, 15.09±3.36. The mean patient follow-up was 6.41±4.02 months. Partial success in the first month was obtained in 43 of 57 eyes. In six months, as many as 21 of 31 eyes, and 7 of 11 in twelve months. There were 15 eyes lost to follow-up, 27 eyes scheduled for further control, and four undergoing additional glaucoma surgery.

A high partial success rate was found in patients with previous glaucoma surgery at one and 6-month follow-ups. Figure 2 shows the change in BCVA after glaucoma surgery with two patients experiencing a change in BCVA to NLP. The mean number of preoperative antiglaucoma medications was 1.96±0.33, and at the last follow-up, 1.18±0.78. Discontinuation of Carbonic Anhydrase Inhibitor (CAI) is the most common. Complications of procedure in this study were hyphema and coagulum, which were obtained in the first postoperative week follow-up. Hypotonia occurred in 3 patients, but pressure returned within one month of follow-up.

DISCUSSION

The surgical management of glaucoma in uveitis glaucoma has a low success rate. Several previous studies have found factors that increase the risk of glaucoma surgery failure in uveitis patients,

Table 3. Previous history of glaucoma surgery

Previous history of glaucoma surgery	Amount n=57	Percentage
Combination of trabeculectomy +lens extraction+implantation LIO+5FU	1	1.8%
Trabeculectomy	2	3.5%
Trabeculectomy	3	5.3%
Trabeculectomy+5FU	4	7.0%
LPI	2	3.5%

LPI: Laser Peripheral Iridectomy.
MMC: Mitomycin C

Table 4. Characteristics of glaucoma surgery

Characteristics of Glaucoma Surgery	Amount n=57	Percentage
Type of Surgery		
GDD implant	5	8.7%
Trabeculectomy + 5FU	18	31.6%
Combination of trabeculectomy +lens extraction + implantation LIO	23	40.4%
Combination of trabeculectomy +lens extraction+implantation +LIO +5FU	8	14.0%
TSCPC	3	5.3%
Synechiolysis		
Yes	21	36.8%
No	36	63.2%
Complication		
Hyphema & coagulum	4	7.0%
Hypotonia	3	5.0%

TSCPC: Transscleral Cyclophotocoagulation

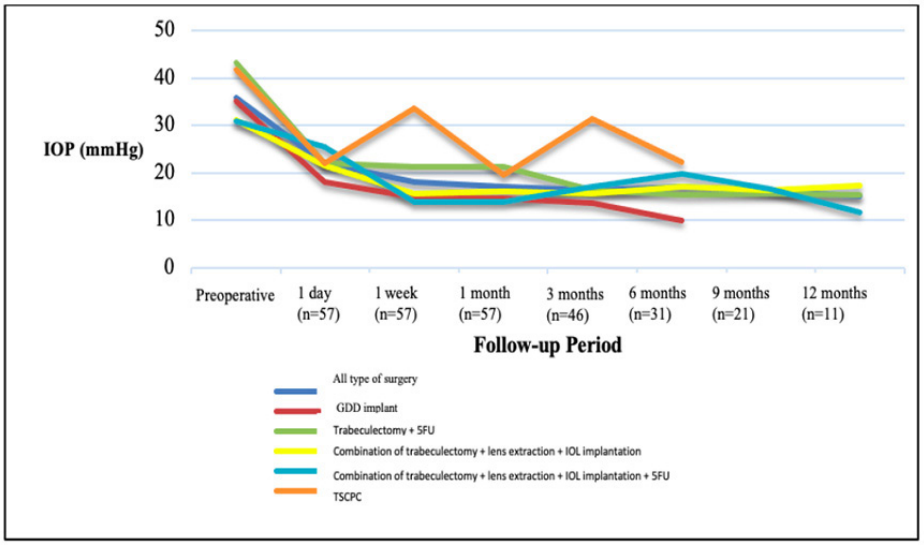

Figure 1. IOP reduction after glaucoma surgery

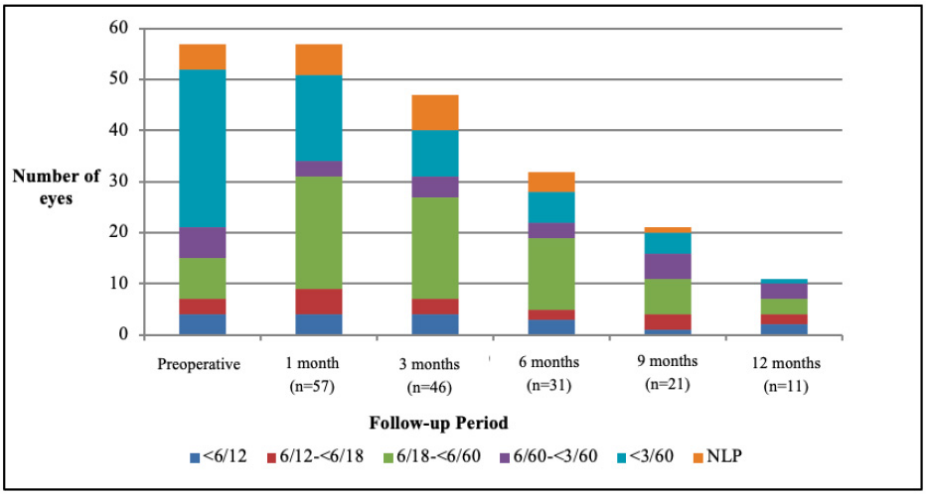

Figure 2. Changes in BCVA after glaucoma surgery

including young age, male, etiology of uveitis, chronic uveitis, and postoperative inflammation.[6–11]

The etiology of uveitis provides an overview of the mechanism of increased IOP that occurs. HSV and toxoplasmosis increase IOP in acute inflammation without angle closure. Increasing IOP in VKH includes the formation of extensive posterior synechiae, which causes pupillary cleavage and iris bombe to close the angle and increase IOP.[6–10] In another study, chronic idiopathic anterior uveitis with open-angle was the most common. High IOP is associated with the presence of PAS, steroid, and immunomodulatory therapy. This study showed that anterior uveitis was the most common, but 47.7% were not examined. The presence of PAS is 21% indicates uveitis is already a chronic stage with changes in ocular structure.

Preoperative steroids are generally given as prophylaxis to prevent severe inflammation after intraocular surgery in patients with uveitis. Another opinion was expressed by Kwon et al., who found that active uveitis at the time of surgery was not a risk factor for the failure of the procedure, both trabeculectomy and GDD implant placement, but the recurrence of postoperative uveitis was associated with the risk of failure. In this study, 73.68% received preoperative steroid administration with methylprednisolone and prednisolone acetate. Eye drops were the most widely used steroid, 42.1%, and surgery was performed when the inflammatory activity was no longer active. Postoperative uveitis recurrence was found in 28% of cases.

Glaucoma filtration surgery is the most common procedure and has high success in controlling IOP. According to several previous studies, a study that assessed the success of trabeculectomy within 20 years showed that young patients with glaucoma uveitis were risk factors for trabeculectomy failure.[12,13] Almobarak et al. showed the cumulative probability of a successful Trabeculectomy with MMC of 60% at 36 months. Glaucoma surgery with a GDD implant is the choice of primary and secondary procedures in patients with uveitis glaucoma. One study showed that the success of GDD implants did not differ between uveitis and non-uveitis patients.[14,15] Kwon et al. found that overall partial success in uveitis glaucoma patients did not differ significantly between trabeculectomy and GDD implants, 67% and 75%. Similar results were also obtained by Chow et al. but found a lower Baerveldt failure rate than trabeculectomy or Ahmed implants.[13,16–21] This study showed a higher partial success of 75.44% in the 1st month, 67.74% in the 6th month, and 72.72% in the 12th month. There were differences in the number of patients in each follow-up period and the number of patients lost to follow-up, 15 eyes or 26.31%. In 4 eyes with Barveldt implants, one of them showed absolute success in the first month. The trabeculectomy + 5FU procedure had a large partial success in the first and sixth months but had more failures than other procedures, with three eyes at the first-month follow-up and three at the sixth-month follow-up. The use of 5FU in this study was found to be 45.61%. Similar results were obtained in patients with a history of previous glaucoma surgery, namely greater partial success in the first and sixth months.

A complicated cataract is a complication that is quite common in uveitis patients. Cataract surgery before glaucoma filtration surgery carried a risk of re-inflammation and increased IOP. However, glaucoma filtration surgery risks increasing cataract progression if performed before cataract surgery. Combining these two procedures spontaneously is the middle way that many choose. The study found that the combination of phaco-trabeculectomy had a cumulative probability of success of 71% in 5 years without postoperative antiglaucoma drugs. 61% fall into the category of partial success. However, adding 5 FU to the combined procedure did not increase the success rate in this study.

The number of patients receiving this combination therapy also affects visual acuity. Refer to graphic 2; we can see the patients with vision category <3/60 had a smaller proportion than during the preoperative and postoperative periods. The primary tube vs. trabeculectomy study had 29% postoperative complications in the tube group and 41% in the trabeculectomy group. Hypotonia is a feared complication of glaucoma surgery, especially in uveitis glaucoma patients, because chronic inflammation has damaged the function of the ciliary body. In uveitis glaucoma patients, hypotonia occurs in 0-36%. Baerveldt implants have a risk of persistent hypotonia and occur in 30% of cases. Excessive over-filtration can cause a shallow anterior chamber, choroidal effusion, suprachoroidal hemorrhage, and maculopathy.[13,18,19,22] This study showed that complications of hypotonia occurred in 3 patients. One patient with postoperative hypotonia for Baerveldt type GDD implantation changed visual acuity from LP to NLP. Hyphema and coagulum occurred in 4 patients, and the condition improved within one month of control.

This study's limitations are that the data collection is varied with a short follow-up period. This study is a retrospective study that relies on the completeness of medical records so that incompleteness affects the results. Optic nerve examination was not performed because it was performed on only a few patients.

CONCLUSION

Anterior uveitis is the most common type, with HSV being the most identified etiology. Most of the characteristics are closed-angle ocular and complicated cataracts. IOP reduction occurred in every procedure, including filtration trabeculectomy surgery with 5FU administration, combination trabeculectomy and cataract surgery, GDD, and TSCPC. Absolute and partial success has a high percentage but short follow-up time, variation, and many follow-up loss cases.

ETHICAL STATEMENT

Research Ethics Committee of Universitas Padjadjaran, Bandung, Indonesia, has approved and reviewed this study.

CONFLICT OF INTEREST

The author reports no conflicts of interest in this study.

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