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ORIGINAL ARTICLE

EARLY POSTOPERATIVE COMPLICATION FOLLOWING FILTRATION SURGERY IN DR. KARIADI GENERAL HOSPITAL SEMARANG 2020-2022

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ABSTRACT

Introduction and Objective: *Filtration surgery is the most frequent surgery in managing glaucoma. Although trabeculectomy is generally a safe and effective procedure, complications can occur. The purpose of the study was to describe the early postoperative complications in patients who had undergone filtration surgery.*

Methods: *This study was a retrospective study that uses secondary data from electronic medical records of patients who had filtration surgery between January 1, 2020, and December 31, 2022, in Kariadi Hospital Semarang. Preoperative data include age, gender, visual acuity, intraocular pressure, and type of glaucoma. The incidence of early postoperative complications was described up to 3 weeks of follow-up.*

Results: *287 eyes were obtained from 266 patients who underwent filtration surgery. 168 eyes (58.5%) had phaco-trabeculectomy, 117 eyes (40.77%) had trabeculectomy and 2 eyes (0.7%) had ECCE-trabeculectomy. Primary angle closure glaucoma (126 eyes, 43.9%) was the most common type of glaucoma treated with filtration surgery. During the 3-week follow-up period, 93 eyes (32.4%) experienced an early complication with trabeculectomy being more common (17.42%) than combined surgery. The commonest complication found was hypotony in 69 eyes (24%). Other complications include hyphema (3.14%), transient intraocular pressure elevation (3.14%), bleb leakage (2.09%), suprachoroidal haemorrhage (0.7%), subhyaloid haemorrhage (0.35%) and retinal haemorrhage (0.35%).*

Conclusion: *This study found the most common early postoperative complication of filtration surgery was hypotony. This complication occurs frequently after trabeculectomy.*

Keywords*: filtration surgery, trabeculectomy, early postoperative complication*

INTRODUCTION

Glaucoma filtration surgery is a surgical procedure used to treat glaucoma, a condition that damages the optic nerve and can lead to blindness. Filtering surgery is effective for treating progressive glaucoma when medical or laser therapy fails to control intraocular pressure (IOP).[1] The surgery often consists of trabeculectomy alone or combined cataract extraction-trabeculectomy.[2] Both surgical methods are generally safe and effective but can have complications like other surgery.[1]

These complications are classified as either intraoperative or postoperative. Intraoperative complications begin from anesthesia-related, conjunctival buttonholes, scleral flap problems, and intraoperative bleeding.[3,4] Early postoperative complications include choroidal effusion, cystoid macular edema, hyphema, hypotony, hypotony maculopathy, infection, loss of vision, bleb leakage, suprachoroidal hemorrhage, aqueous misdirection, shallow or flat anterior chamber, and transient IOP elevation. Late postoperative complications include cataract, blebitis, endophthalmitis, hypotony, leakage or failure of the filtering bleb, eyelid retraction, and ptosis.[1,4]

Complications following filtration surgery were associated with an increased risk of vision loss. The early detection and management of these complications are critical for a successful surgical outcome. In some cases, additional surgery may be required to repair the complications and reduce the risk of vision loss.[4]

The purpose of this study is to describe the early postoperative complications during the 3-week follow-up period.

METHODS

A retrospective study was performed on 267 patients with various types of glaucoma who were unresponsive to medical or laser treatment and for whom the treatment option was filtration surgery including trabeculectomy alone or combined cataract extraction-trabeculectomy surgical intervention including phaco trabeculectomy and extraction cataract extracapsular (ECCE) -trabeculectomy.

The patient data were collected from the medical record in the hospital database who underwent trabeculectomy and combined cataract extraction-trabeculectomy between January 1, 2020, and December 31, 2022, in Dr. Kariadi Hospital Semarang Indonesia. Inclusion criteria were patients with a history of filtration surgery who were available for post-operative follow-up from day 1 to 3 weeks. Excluded from the study were the patients who had not been seen for follow-up and medical records with incomplete patient data.

Preoperative data were collected from the patients to obtain demographic characteristics including age at the time of surgery, gender, visual acuity (VA), IOP, and type of glaucoma. The Snellen chart, counting fingers, hand movement, and light perception were used to evaluate visual acuity. The IOP was measured using a noncontact tonometer. The diagnosis of glaucoma was determined based on the IOP, visual field test results, gonioscopy examination, and the appearance of the optic nerve. Baseline VA and IOP were determined in the immediate perioperative period. Visual acuity, IOP measurements, and ocular status were examined on

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routine post-operative visits (day 1, day 7, and week 3). Post-operative complications as well as the time of their occurrences were documented.

The early postoperative complications included choroidal effusion, hyphema, hypotony, infection, bleb leakage, suprachoroidal hemorrhage, aqueous misdirection, shallow or flat anterior chamber, and transient IOP elevation. Hyphema was defined as an accumulation of red blood cells in the anterior chamber. Hypotony was defined as an intraocular pressure (IOP) less than 6.5 mmHg, which is more than 3 standard deviations below the mean IOP. Bleb leak was defined as a positive result of Seidel testing. Endophthalmitis was defined as the presence of hypopyon and vitreous inflammation. Blebitis was defined as localized mucopurulent material in or around the bleb without evidence of hypopyon. Aqueous misdirection was defined as an increase in intraocular pressure (IOP), a very shallow anterior chamber, and a normal posterior segment in the presence of a patent peripheral iridotomy. Suprachoroidal hemorrhage, choroidal effusion, and retinal detachment were determined by funduscopic examination and the appearance of B-scan ultrasonography. All available follow-up information for each patient was recorded.

During 3 years (2020-2022), all filtering glaucoma surgery were performed and managed by 3 glaucoma specialists. All surgeons used a fornix-based approach. The following are the general steps involved in the fornix-based approach of trabeculectomy: anesthesia, conjunctival dissection, scleral flap creation, fistula creation, iridectomy, closure of scleral flap and conjunctiva, and post-operative therapy with antibiotic, anti-inflammatory topical and antiglaucoma medication if necessary.

The study was approved by the research ethics committee of the Medical Faculty at Diponegoro University. Data were analyzed using the statistical software program SPSS V23.0. Patient characteristics were described using descriptive statistics. The complications were defined as being present or absent at any time of follow-up and the number of occurrences.

RESULTS

A total of 277 patients were registered for filtration surgery; 10 patients were excluded, and 267 patients (287 eyes) were included in this study. The patient demographic characteristics are shown in Table 1.

Table 1. Patient Demographic characteristics

Demography Characteristic	Frequency (%)
No. eyes	287 (100)
Age (Mean SD) (yo)	54.97
Laterality, No. of eyes	
Right	157 (54.7)
Left	130 (45.3)
Gender	
Male	121 (42.2)
Female	166 (57.8)
Type of Glaucoma	
PACG	126 (43.9)
POAG	58 (20.2)
Secondary Glaucoma	54 (18.8)
APAC	25 (8.7)
JOAG	19 (6.6)
OHT	2 (0.7)
NTG	1 (0.3)
PAC	1 (0.3)
Combined Mechanism	1 (0.3)
Type of Surgery	
Trabeculectomy	117 (40.8)
Phaco-trabeculectomy	168 (58.5)
ECC-Etrabeculectomy	2 (0.7)
Complication	
No	194 (67.6)
Yes	93 (32.4)

Most of the patients were female (57.8%) and the mean age was 54.97 years old. The youngest patient was 13 years old and the oldest was 89 years old. This study included 21 patients who underwent bilateral surgery.

Primary angle closure glaucoma (43.9%) was the most common type of glaucoma. The second most common type was primary open-angle glaucoma (20.2%). The most common procedure in this study was phaco-trabeculectomy in 168 eyes (58.5%), followed by trabeculectomy alone in 117 eyes (40.8%) and ECCE-trabeculectomy in 2 eyes (0.7%).

In the trabeculectomy and phacotrabeculectomy groups, the mean postoperative IOP was lower than the preoperative IOP at every time point. However, the mean postoperative IOP in the ECCE trabeculectomy group increased one week after surgery. (Table 2).

Table 2. Preoperative and Postoperative IOP (mmHg)

	Trab	Phaco-Trab	ECCE-Trab	Total
Pre-op	31.29 ± 11.52	27.83 ± 10.34	26.20 ± 7.91	29.23 ± 10.93
1-Day	12.41 ± 9.13	13.98 ± 7.77	18.80 ± 2.12	13.35 ± 8.36
1-Week	10.57 ± 7.78	13.59 ± 8.19	27.25 ± 14.07	12.45 ± 8.26
3-Week	20.41 ± 10.59	16.61 ± 7.45	15.45 ± 5.86	18.14 ± 9.02

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All of the total 287 eyes, 93 eyes (32.4%) had early postoperative complications. The types of complications were summarized in Table 3. The most common complication in our study was hypotony due to overfiltration, which was observed in 69 eyes (24%). In the trabeculectomy group, the prevalence of hypotony was higher than in the combined surgery group. The second most common complications were hyphema (3.14%) and transient IOP elevation (3.14%). Other complications found include bleb leakage (2.09%), suprachoroidal hemorrhage (0.7%), subhyaloid hemorrhage (0.35%), and retinal hemorrhage (0.35%).

Table 3. Early postoperative complication following filtration surgery

Complication	Number of Complications (n=287)			
	Trab (%)	Phaco-trab (%)	ECCE-trab (%)	Total (%)
Hypotony	41 (14.29)	28 (9.76)	0	69 (24)
Hyphema	6 (2.09)	2 (0.7)	1 (0.35)	9 (3.14)
Transient IOP elevation	3 (1.05)	6 (2.09)	0	9 (3.14)
Bleb Leakage	1 (0.35)	5 (1.74)	0	6 (2.09)
Suprachoroidal hemorrhage	1 (0.35)	1 (0.35)	0	2 (0.7)
Subhyaloid Hemorrhage	1 (0.35)	0	0	1 (0.35)
Retinal Hemorrhage	0	1 (0.35)	0	1 (0.35)

DISCUSSION

This study showed 32.4% complication rate during the first 3 weeks after filtration surgery, and the rate was comparable among eyes that underwent trabeculectomy, phaco trabeculectomy, and ECCE-trabeculectomy. The Tube Versus Trabeculectomy (TVT) Study and the Primary Tube Versus Trabeculectomy (PTVT) Study reported 37% and 34% of early postoperative complications, respectively, within one month of trabeculectomy, while the Collaborative Initial Glaucoma Treatment Study (CIGTS) reported 50% of complications within one month of trabeculectomy. [3,5,6] Other studies in Thailand found that 56.7% of patients showed early postoperative complications during the first 3-months of follow-up.[7]

In this study, we found that trabeculectomy had a higher rate of early postoperative complications (17.42%) than phacotrabeculectomy (14.6%) and ECCE-trabeculectomy (0.35%). It was similar to other studies that found postoperative complication rates in trabeculectomy (16.9%) and phaco trabeculectomy (15.68%) in the first month of follow-up.[8]

The rate of complications varied between studies. This may be due to differences in patient demographics such as race and type of glaucoma, surgical technique and the usage of antimetabolite use, type and duration of preoperative glaucoma medication use, varying definitions of complications, and duration of follow-up.

We revealed that hypotony (24%) was the most common early complication in this study, followed by hyphema (3.14%) and transient IOP elevation (3.14%), bleb leakage (2.09%), suprachoroidal hemorrhage (0.7%), and subhyaloid hemorrhage (0.35%) and retinal hemorrhage (0.35%).

Hypotony was a significant complication in several studies including our study (24%) and it occurred more frequently in the trabeculectomy group (14.29%). Jung et al. reported that 18.3% of patients developed hypotony, with trabeculectomy (10.45%) being more common than phaco trabeculectomy (7.84%).[8] Another study also showed a higher incidence of overfiltration with hypotony in the trabeculectomy group than in phacotrabeculectomy group.[9]

As in previous studies, hypotony in our study was transient and can be managed conservatively. In our study, the prevalence of hypotony was higher because we included all patients who had hypotony at any follow-up visit. Another study ruled out hypotony on the first day after trabeculectomy.[8]

Hyphema was the second most common early complication (3.14%) in our study. It was lower than in other Thai studies (12.4%).[7] We found, as in many previous reports, that hyphema resolved spontaneously within several weeks of the surgery.[7,10]

In our study, 3.14% of patients observed transient IOP elevation following filtering surgery. It is similar to other studies that found 5.7% had an increase in IOP of 5 mmHg or greater above the baseline IOP on postoperative day 1.[11]

In a Thai study using a fornix-based conjunctival flap technique, the rate of bleb leak was 8.8%.[7] In our study, the bleb leak rate was lower (2.09%). The variation is most likely because of differences in surgical techniques, particularly conjunctival closures, and surgical skill.

This study's limitations include that it is a retrospective study performed at a single institution. This study only looks at the early postoperative complications of filtering surgery. Further study is required to assess the factors that could impact surgical complications.

CONCLUSION

From 287 eyes of glaucoma that underwent filtering surgery at Dr. Kariadi Hospital, we found that the incidence of early postoperative complications in our study was 32.4%. Hypotony was the most common complication.

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