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SURGICAL OUTCOMES OF COMBINED GONIOSCOPY ASSISTED TRANSLUMINAL TRABECULOTOMY AND CATARACT SURGERY

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Key words: *glaucoma, gonioscopy-assisted transluminal trabeculotomy, ab interno, cataract surgery, minimally invasive glaucoma surgeries*

Minimally invasive glaucoma surgeries (MIGS) are currently becoming prevalent. Trabeculotomy, classically performed with the 'ab externo' approach, can also be performed with clean a corneal approach in consideration of recent developments. The most significant advantage of this method, termed as "gonioscopy-assisted transluminal trabeculotomy" (GATT), is the ability to perform trabeculotomy without any conjunctival or scleral incisions. This approach both decreases the incidence of postoperative complications and protects the conjunctiva and sclera for possible subsequent filtration surgeries. GATT is a surgery with a learning curve, and it requires expertise in angle structures and gonioscopy. In experienced hands and convenient cases, high success rates have been reported [1-3]. In this study, the safety, success and complication rates of GATT combined with phacoemulsification and intraocular lens (IOL) implantation surgery were evaluated.

Purpose – to evaluate the success, safety and complication rates of gonioscopy-assisted transluminal trabeculotomy (GATT) combined with cataract surgery.

Material and methods

Study Design

The files of 35 patients who underwent GATT combined with phacoemulsification and IOL implantation surgeries at the Department of Ophthalmology, Faculty of Medicine, Uludag University (Bursa, Turkey), between November 2015 and August 2017 were reviewed retrospectively. The data on age; glaucoma type; preoperative and final visual acuity; intraocular pressure (IOP) preoperatively and 1st week, 1st month, 3rd months and 6th months postoperatively; the number of antiglaucoma medications used preoperatively and postoperatively; and postoperative complications were collected. Using these data, the differences in IOP and in the number of medications used postoperatively compared to the preoperative period were evaluated. A need for reoperation, a lack of a decrease in the number of medications used, and an IOP greater than 21 mmHg or deep hypotony 6th months postoperatively was considered to indicate surgical failure.

Surgical Procedure, Postoperative Care and Follow-up

All patients were operated under general or local anaesthesia by the same surgeon (M.B.). Corneal incisions were formed in the inferonasal/superonasal and temporal quadrants with a 20-gauge stiletto knife. After the ocular viscoelastic device was injected into the anterior chamber, an incision (goniotomy) of approximately 1-1.5 mm was formed in the angle under indirect gonioscopy using an indirect gonioscopy lens (Swan Jacob) through a temporal incision. A 5/0 prolene suture inserted from the inferonasal/superonasal incision to the anterior chamber was grasped and inserted into the goniotomy with the microforceps introduced into the anterior chamber from the temporal incision. The 5/0 prolene suture was pushed forward along Schlemm's canal circumferentially 360 degrees. Next, the distal edge of the suture, that protruded from the goniotomy,was held and 360-degree trabeculotomy was performed by pulling the proximal edge out of the temporal incision (traction). In 12 cases, because the suture could not be pushed forward, 180- or 270-degree trabeculotomy was performed instead of 360-degree trabeculotomy. In all patients, phacoemulsification and IOL implantation were performed after GATT, and an IOL was placed in the posterior chamber in the bag.

Postoperatively, steroid drops and antibiotic drops were prescribed to the patients. Steroid drops at gradually reducing doses were used for approximately 4 weeks, and antibiotic use was stopped in the first week postoperatively. Postoperative follow-ups were performed at the 1st week, 1st month, 3rd month and 6th month post-surgery. At every visit, visual acuity, IOP and the number of antiglaucoma medications used were recorded.

Statistical Analysis

The data on age, visual acuity, IOP and number of medications used are expressed as the means and standard deviations. The type of glaucoma, the decreases in IOP and in the number of medications used and complications are expressed as percentages. The postoperative IOP, visual acuity and number of medications used were compared to the preoperative values with the paired sample t test. P values below 0.05 were considered statistically significant.

Results and discussion

The average age of the 35 patients who underwent GATT combined with phacoemulsification and IOL implantation surgery at the Department of Ophthalmology, Faculty of Medicine, Uludag University (Bursa, Turkey), between November 2015 and August 2017 was 63.6±16 years (range: 28- 82 years). The type of glaucoma was primary open-angle glaucoma (POAG) in 33 of the 35 patients (94.3%), pseudoexfoliative glaucoma in one patient and irido-corneal dysgenesis in one patient. The patient characteristics are presented in Table 1.

Table 1

Characteristics of the study patients

Age (yrs)	
Mean±SD Range	63.6±16 28-82
Type of glaucoma, n (%)	
Primary open angle Pseudoexfoliative Irido-corneal dysgenesis	33 (94.3) 1 (2.9) 1 (2.9)
Preoperative IOP (mmHg)	
Mean±SD Range	33.4±10.7 19-60
Preoperative antiglaucoma medications (n)	
Mean±SD Range	2.7±0.6 0-3
Preoperative visual acuity (logMAR)	
Mean±SD Range	1.54±1.2 0.15-3.1

yrs – years; n – number; SD – standard deviation; IOP – intraocular pressure

The average preoperative visual acuity of the patients was logMAR 1.54±1.2. The average postoperative visual acuity was logMAR 0.39±0.37. A significant increase in visual acuity was detected post-surgery (P<0.05).

The average preoperative IOP was 33.4±10.7 mmHg. The decrease in the average postoperative IOP was 23.6±10.9 mm Hg (66.5±12.2%) on the 1st day, 21.3±9.3 mm Hg (64.6±11.9%) in the 1st week, 22.7±10.1 mm Hg (65±10.8%) in the 1st month, 21.2±8.3 mm Hg (65.4±8.3%) in the 3rd month and 23.7±11.8 mm Hg (%65.2±10.9) in the 6th month. Compared to the preoperative period, IOP was significantly lower at all postoperative follow-up times (P<0.05) (Table 2).

The numbers of antiglaucoma medications and active ingredients used were reduced significantly in the postoperative period compared to the preoperative period (both P<0.05) (Table 3). The average decrease in the number of antiglaucoma medications was 2.5±0.8, and the average decrease in the number of active ingredients was 3.4±1.2.

Table 2

Preoperative and postoperative IOP levels

Time point	**Mean IOP (mmHg)± SD**	**Patients (n)**	**P value***
Preoperative	33.4±10.7	34	
Postoperative			
1 day	10.6±2.9	33	0.000
1 week	10.6±2.4	29	0.000
1 month	11.2±2.8	31	0.000
3 months	10.5±2.1	24	0.000
6 months	11.2±2.3	19	0.000

*** Comparisons of IOP between the preoperative and postoperative measurements were performed with paired samples t tests IOP – intraocular pressure; SD – standard deviation; n – number**

Table 3

Preoperative and postoperative antiglaucoma medications

n=34	**Medications (n, mean±SD)**	**Active ingredients (n, mean±SD)**	**P value***
Preoperative	2.7±0.6	3.7±0.8	0.000
Postoperative	0.2±0.4	0.4±0.7	0.000

*** Comparisons of the numbers of medications and ingredients between the preoperative and postoperative measurements were performed with paired samples t tests n – number; SD – standard deviation**

The most frequent complication was hyphaema. In 10 of the 35 patients (28.6%), hyphaema was observed, but due to the limited severity of this complication, no layer of blood formed in the anterior chamber. Hyphaema was resolved within a maximum of one week. Prolonged hyphaema did not develop in any of the patients. Transient IOP spikes did not occur in any patients. Complications reported previously, such as Descement's membrane detachment, corneal oedema and iridodialysis were not observed. During the follow-up examinations, cystoid macular oedema emerged in one patient, and this condition was considered to be relevant to the present retinal vein occlusion in the patient. Deep hypotony developed in only one patient (2.9%); in this case, the surgery was considered to have failed. No patients required reoperation.

Currently, with the new definitions, glaucoma surgery approaches are categorized into 'ab interno' and 'ab externo'. The conjunctival and scleral dissections performed in the 'ab externo' approaches may lead to conjunctival scarring, which reduces the success of the surgery. Recently, the applications of 'ab interno' approaches have become prevalent. These are also referred to as MIGS. 'Ab interno' methods are performed through the clear cornea via small corneal incisions. Because they do not require conjunctival dissection, they allow for possible subsequent filtration surgeries. 'Ab interno' methods can be roughly categorized into three types: subconjunctival, suprachorodial and Schlemm's canal approaches. In the 'ab interno' methods with Schlemm's canal approach, the aqueous humour in the anterior chamber is drained through Schlemm's canal and collector canals. Trabectome (Neomedix, Tustin, CA), iStent (Glaukos Corporation, Laguna Hills, CA), Hydrus (Ivantis, Irvine, CA), excimer laser trabeculostomy and GATT are the 'ab interno' methods that provide drainage to Schlemm's canal and collector canals. While the trabecular meshwork is bypassed in some of these methods, in GATT, the trabecular meshwork is opened circumferentially. GATT was defined by Grover et al. in 2014 [1]. In this method, 360-degree disruption of the trabecular meshwork was not performed 'ab externo', as it had been defined previously; instead, it was performed 'ab interno' under gonioscopy via temporal and superonasal/inferonasal paracentesis with a microcatheter or suture. The main advantage of this method is the ability to perform trabeculotomy without conjunctival and scleral incisions. This technique provides protection of the conjunctiva and sclera for possible filtration surgeries if necessary.

'Ab externo' metal trabeculotomy (McPherson or Harms) enables reaching only 120 degrees; therefore, it does not provide sufficient results for adults. 'Ab externo' circumferential 360-degree trabeculotomy provides much more effective results [4]. Chin et al. modified the conventional 'ab externo' 360-degree suture trabeculotomy and reported higher success rates in both the POAG and secondary open-angle glaucoma (SOAG) compared to metal trabeculotomy (in POAG, 84% versus 31%; in SOAG, 89% versus 50%) [4]. In their study, in the 12th month postoperatively, the average IOP was 13.1 mmHg, and the average number of medications used was 0.5. In the POAG patients who underwent GATT, Grover et al. reported a decrease of 7.7±6.2 mm Hg (30±22.7%) in IOP and a decrease of 0.9±1.3 in the number of the medications used in the 6th month postoperatively as well as, a decrease of 11.1±6.1 mm Hg (39.8±16%) in IOP and a decrease of 1.1±1.8 in the number of the medications used in the 12th month postoperatively; in the secondary glaucoma group, they reported a decrease of 17.2±10.8 mm Hg (52.7±15.8%) in IOP and a decrease of 2.2±1.5 in the number of the medications used in the 6th month as well as a decrease of 19.9±10.2 mm Hg (56.8±17.4%) in IOP and a decrease of 1.9±2.1 in the number of the medications used in the 12th month postoperatively [1]. The rate of failure was 9% (8 patients out of 85) [1]. In the current study, POAG patients represented the majority; at the end of the 6th month post-surgery, the average IOP was 11.2±2.3 mm Hg, and the average number of antiglaucoma medications used was 0.2±0.4. Additionally, in the 6th month postoperatively, decreases of 23.7±11.8 mm Hg (65.2±10.9%) in the average IOP and 2.5±0.8 in the average number of antiglaucoma medications used were observed. The failure rate was 2.9%.

It's generally believed that even when 360-degree ('ab externo or 'ab interno') trabeculotomy is performed, similar to other nonfiltrating surgeries, the IOP-decreasing effect of trabeculotomy is not as significant as that of trabeculectomy. Therefore, trabeculotomy is not recommended in advanced glaucoma cases. However, in the current study, in patients who underwent GATT combined with cataract surgery, an IOP decrease of 20 mm Hg and 65% was obtained. In the current study, a more significant IOP decrease was obtained than in the study of Grover et al. because POAG patients with higher preoperative IOP were enrolled. According to our results, reconsideration of this general belief is recommended.

It is known that postoperative complications such as bleb leaks, hypotony, shallow anterior chamber, and choroidal detachment occur less often in trabeculotomy than in trabeculectomy, similar to other nonfiltrating surgeries. The results of the current study also support this perspective. In the current study, only one patient with POAG developed deep hypotony. This case was considered as a surgical failure. During the follow-ups, to recover that patient's IOP to the normal level, topical and oral steroid application, subtenon steroid injection and administration of autologous serum into the anterior chamber were attempted. However, deep hypotony could not be avoided with any of those treatments.

Cataract surgery reduces IOP through several mechanisms. The anatomic changes occurring in the anterior chamber, the changes in the trabecular meshwork induced by inflammation and ultrasonic vibrations and increased traction on zonules are a few of these mechanisms resulting in an increase in outflow [5]. Whether cataract surgery combined with GATT has an additional IOP-decreasing effect is contraversial. Grover ('ab interno') and Shinmei ('ab externo') did not detect any significant difference in the IOP decrease between the trabeculotomy and combined surgery groups in their studies [1, 6]. Chiara et al. noted that combined 'ab externo' trabeculotomy and cataract surgery provided a further decrease of 1-2 mm Hg in IOP compared to trabeculotomy alone [7]. Tanito et al., in their study evaluating patients who underwent combined surgery determined the rates of cases with an IOP under 21 mm Hg, 17 mm Hg and 15 mmHg at the end of one year post-surgery to be 95.8%, 58.7% and 30%, respectively [8]. In the current study, only patients who underwent GATT combined with cataract surgery were evaluated. Because no comparison to the patients who underwent GATT alone was made, no data on whether cataract surgery had any additional positive effect on the IOP decrease were collected. In the current study, the IOP of all patients was under 15 mmHg in the 3rd and 6th months postoperatively.

Inability to stop anticoagulation medication, haemorrhagic diathesis, IOL instability, closed angle and serious endothelial compromise were defined as absolute contraindications for GATT, and prior keratoplasty and inability to elevate the head postoperatively were defined as relative contraindications by Grover et al. [1].

Trabeculotomy (GATT and 'ab externo') can be safely performed on all glaucoma types except for closed angle glaucoma. Hepşen et al. showed that in pseudoexfoliative glaucoma, modified 360-degree suture trabeculotomy is efficient [9]. It has been reported that in uveitic glaucoma, trabeculotomy can safely be performed if the uveitis is under control [1, 6]. Shinmei et al. indicated in their studies that although preoperative IOP was higher in uveitic glaucoma cases than POAG, postoperative IOP after trabeculotomy was at similar levels to that after POAG [6]. In the current study, the majority of the patients had POAG, although one patient had pseudoexfoliative glaucoma and one patient had iridocorneal dysgenesis. The success rate was 97.1%.

Hyphaema and transient IOP spikes are the most common complications that develop after trabeculotomy [1, 6]. Hyphaema emerges when Schlemm's canal is filled with blood due to reflux from episcleral veins after the circumferential rupture of the trabecular meshwork [10]. Transient IOP spikes are related to prolonged hyphaema and can be eliminated by washing out the anterior chamber [6, 10]. Descement's membrane detachment, corneal oedema, iridodialysis and cystoid macular oedema are among the complications that may emerge after trabeculotomy.

Combined surgeries have some disadvantages, such as longer operation duration, slower visual recovery and more difficult IOP control due to higher inflammation levels in the postoperative period. In cases of cataract surgeries combined with trabeculectomy, the rates of postoperative complications such as hypotony, bleb leakage, shallow anterior chamber, choroidal detachment, hyphaema and sclerostomy site blockage were demonstrated to be increased in several previous studies [11].

However, this case is not valid for trabeculotomy. Performing cataract surgery in the same session may increase the complications specific to cataract surgery (posterior capsule rupture, zonular dialysis), but because it is a safer surgery, the rates of these complications frequently observed in filtrating surgeries do not increase when combined with trabeculotomy. Inatani et al. expressed that hyphaema and transient IOP spikes, which were observed frequently with trabeculotomy alone, were observed less often with combined surgeries [10]. The reasons for this finding were reported to be washing out the blood reflux during the cataract surgery and avoiding reflux from episcleral veins, depending on occurrence of high pressure in the anterior chamber [10]. In their study comparing combined surgery to trabeculotomy alone, Shinmei et al. reported 10.9% versus 6.5% of cases with prolonged hyphaema and 30.4% versus 37% of cases with transient IOP spikes [6]. In two patients who underwent combined surgery, captured haemorrhage between the capsule and the IOL was observed [6]. It was stated as a rare complication, and the importance of performing anterior capsulorhexis of a sufficient size was emphasized to prevent this complication [6].

The authors underlined that there was no significant difference between the two groups in terms of complications, and that the two groups were equal in terms of safety. In the current study, hyphaema (28.6%) was the most frequent complication; however, this complication did not cause any IOP increase in any of the patients, and it did not require anterior chamber lavage. Hyphaema was resolved via topical treatment within a maximum of one week.

Conclusion

As a result, if it is performed on convenient patients, GATT effectively provides an IOP decrease. While performing GATT in the same session with cataract surgery does not reduce the effectiveness of GATT, the combined surgery decreases the incidence of complications, especially hyphaema. Therefore, GATT combined with cataract surgery is a surgical procedure that can safely be performed on convenient patients.

REFERENCES:

1. Grover D.S., Godfrey D.G., Smith O. et al. Gonioscopy-assisted transluminal trabeculotomy, ab interno trabeculotomy: technique report and preliminary results // Ophthalmology, 2014, v.121, p.855-861.
2. Grover D.S., Godfrey D.G., Smith O. et al. Outcomes of gonioscopy assisted transluminal trabeculotomy in eyes with prior incisional glaucoma surgery // J. Glaucoma, 2017, v.26(1), p.41-45.
3. Grover D.S., Smith O., Fellman R.L. et al. Gonioscopy assisted transluminal trabeculotomy: ab interno circumferential trabeculotomy for the treatment of primary congenital glaucoma and juvenile open angle glaucoma // Br. J. Ophthalmol., 2015,v.0, p.1-5.
4. Chin S., Nitta T., Shinmei Y. et al. Reduction of intraocular pressure using a modified 360-degree suture trabeculotomy technique in primary and secondary open-angle glaucoma:A pilot study // J. Glaucoma, 2012, v.21, p.401-407.
5. Kung J.S., Choi D.Y., Cheema A.S. et al. Cataract surgery in the glaucoma patient // Middle East Afr. J. Ophthalmol., 2015, v.22(1), p.10-17.
6. Shinmei Y., Kijima R., Nitta T. et al. Modified 360-degree suture trabeculotomy combined with phacoemulsification and intraocular lens implantation for glaucoma and coexisting cataract // J. Cataract. Refract. Surg., 2016, v.42, p.1634-1641.
7. Chiara E., Nishida A., Kodo M. et al. Trabeculotomy ab externo: an alternative treatment in adult patients with primary open-angle glaucoma // Ophthalmic. Surg., 1993, v.24, p.735-739.
8. Tanito M., Ohira A., Chihara E. Surgical outcome of combined trabeculotomy and cataract surgery // J. Glaucoma, 2001, v.10, p.302-308.
9. Hepşen İ.F., Güler E., Kumova D. et al. Efficacy of modified 360-degree suture trabeculotomy for pseudoexfoliation glaucoma // J. Glaucoma, 2016, v.25, p.e29-e34.
10. Inatani M., Tanihara H., Muto T. et al. Trasient intraocular pressure elevation after trabeculotomy and its occurence with phacoemulsification and intraocular lens implantation // Jpn. J. Ophthalmol., 2001, p.288-292.
11. Johnson S.M. Combined cataract and trabeculectomy surgery. In: Johnson SM, Cataract surgery in the glaucoma patient / Johnson SM. Springer, LLC, 2009, p. 59-71.

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KATARAKTA CƏRRAHİYYƏSİ İLƏ YANAŞI KOMBİNƏEDİLMİŞ QONİOSKOPİK TRANSLÜMİNAL TRABEKULOTOMİYANIN NƏTİCƏLƏRİ

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Açar sözlər: *qlaukoma, qonioskopik translüminal trabekulotomiya, ab interno, katarakta əməliyyatı, minimal invaziv qlaukoma cərrahiyyəsi*

XÜLASƏ

Məqsəd – katarakta cərrahiyyəsi ilə birgə qonioskopik translüminal trabekulotomiyanın (QTT) müsbət nəticələrini, təhlükəsizliyini və fəsadlarını qiymətləndirmək.

Material və metodlar

Retrospektiv tədqiqat Türkiyə, Bursa Uludağ Universitetinin Tıb Fakültəsinin Oftalmologiya şöbəsində aparılmışdır. Tədqiqata açıqbucaqlı qlaukoma, psevdoeksfoliativ qlaukoma və iridokorneal disgenez ilə pasiyentlər daxil edilmişdir. Nəticələrin əsas meyarları görmə itili, gözdaxili təzyiq, istifadə edilən antiqlaukomatoz preparatların sayı və fəsadlar olmuşdur.

Nəticə

Əməliyyatdan əvvəl orta görmə itiliyi logMAR üzrə 1,54 ± 1,2, əməliyyatdan sonra – 0,39 ± 0,37 təşkil etmişdir. Görmə itiliyinin əhəmiyyətli dərəcədə yüksəlməsi əməliyyatdan sonra müşahidə edilmişdir (P <0,05). Əməliyyatdan əvvəl gözdaxili təzyiqin orta göstəricisi 33,4 ± 10,7 mm c.s. təşkil etmişdir. Əməliyyatdan 3 ay sonra orta GDT 10,5 ± 2,1 mm c.s., 6 aydan sonra – 11,2 ± 2,3 təşkil etmişdir. Əməliyyatdan əvvəl dövr ilə müqayisədə əməliyyatdan sonra bütün müşahidə dövrü ərzində GDT əhəmiyyətli dərəcədə aşağı olmuşdur (P

<0,05). Əməliyyatdan əvvəl və sonrakı dövrlərdə antiqlaukomatoz müalicədən sonra nəticələrin müqayisəli təhlili aktiv maddələrin 2,5 ± 0,8 azalmasını göstərmişdir, əməliyyatdan sonra aktiv maddələr miqdarının enməsinin orta göstəricisi isə 3,4 ± 1,2 təşkil etmişdir. Daha tez rast gəlinən fəsad hifema olmuşdur (28,6%). Bir pasiyentdə (2,9%) dərin hipotoniyanın inkişafına görə əməliyyat uğursuz hesab edilmişdir.

Yekun

Kataraktanın xaric edilməsi ilə yanaşı QTT əməliyyatının yerinə yetirilməsi, onun effektivliyini azaltmır. Lakin bu prosedur QTT zamanı daha çox rast gəlinən fəsadın – hifemanın tezliyini azaldır. Bu səbəbdən bir sıra hallarda kombinəedilmiş cərrahiyyənin yerinə yetirilməsi təhlükəsizdir.

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РЕЗУЛЬТАТЫ КОМБИНИРОВАННОЙ ГОНИОСКОПИЧЕСКОЙ ТРАНСЛЮМИНАЛЬНОЙ ТРАБЕКУЛОТОМИИ В СОЧЕТАНИИ С ХИРУРГИЕЙ КАТАРАКТЫ

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Ключевые слова: *глаукома, гониоскопическая транслюминальная трабекулотомия, ab interno, хирургия катаракты, минимально инвазивная хирургия глаукомы*

РЕЗЮМЕ

Цель – оценить положительные результаты, безопасность и осложнения гониоскопической транслюминальной трабекулотомии (ГТТ) в сочетании с хирургией катаракты.

Материал и методы

Ретроспективное исследование было проведено в Отделе офтальмологии медицинского факультета Университета Улудаг, Бурса, Турция. В исследование включены пациенты с первичной открытоугольной глаукомой, псевдоэксфолиативной глаукомой и иридо-роговичным дисгенезом. Основными критериями результата были острота зрения, внутриглазное давление (ВГД), количество используемых антиглаукоматозных препаратов и осложнения.

Результаты

Средняя предоперационная острота зрения по logMAR составила 1,54 ± 1,2, а средняя послеоперационная острота зрения – 0,39 ± 0,37. Значительное увеличение остроты зрения наблюдалось после операции (P <0,05). Среднее предоперационное внутриглазное давление (ВГД) составляло 33,4 ± 10,7 мм рт.ст. Через 3 мес. после операции среднее ВГД составлял 10,5 ± 2,1 мм рт.ст., а на 6-м месяце – 11,2 ± 2,3 мм рт.ст. Во всех послеоперационных наблюдениях ВГД был значительно ниже, чем в течение предоперационного периода (P <0,05). Сравнительный анализ результатов до и послеоперационного периодов после проведенного антиглаукоматозного лечения показал снижение активных веществ в среднем на 2,5 ± 0,8, а среднее снижение количества активных веществ после операции составило 3,4 ± 1,2. Наиболее частым осложнением была гифема (28,6%). У одного пациента (2,9%) операция считалась неудачной из-за развития глубокой гипотонии.

Заключение

Выполнение ГТТ в сочетании с удалением катаракты не снижает эффективность ГАТТ, но эта процедура уменьшает количество наиболее частого осложнения ГТТ – гифемы. Поэтому, в ряде случаев выполнение комбинированной хирургии является безопасным.

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