Al-Azhar International Medical Journal

Volume 4 | Issue 5 Article 21

2023
Section: Ophthalmology

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How to Cite This Article

Mostafa, Ramadan Mohamed Abdel Rahman; Khalil, Hisham Fawzy; and Mahdy, Ahmed Gomaa El (2023) "Deep sclerectomy versus trabeculectomy assisted with mitomycin c in management of primary open angle glaucoma.," *Al-Azhar International Medical Journal*: Vol. 4: Iss. 5, Article 21.
DOI: https://doi.org/10.58675/2682-339X.1830

ORIGINAL ARTICLE

Deep Sclerectomy Versus Trabeculectomy Assisted with Mitomycin C in the Management of Primary Open-angle Glaucoma

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Abstract

Background: **Glaucoma is the sneak thief of vision and one of the leading causes of blindness if untreated; neural damage caused by glaucoma is irreversible.**

Objective: **To compare subscleral trabeculectomy (SST) with non-penetrating deep sclerectomy (NPDS) by examining intraocular pressure (IOP), complications, surgical success rate, and preoperative and postoperative best-corrected visual acuity (BCVA).**

Patients and methods: **Two groups of equal size each included 25 eyes of 25 patients. Group 1 included patients who had NPDS and Group 2 included patients who had SST with mitomycin C (MMC) 0.2 mg/ml for 2 min. Patients were deemed to have achieved complete success if their intraocular pressure (IOP) was less than 18 mmHg, whereas patients with IOP higher than 18 mmHg with medication were considered unsuccessful. Between September 2019 and October 2021, the Ophthalmology Department of Al-Azhar University Hospital conducted this prospective comparative study.**

Results: **In the deep sclerectomy group, 17 patients (68%) total success and 6 patients experienced (24%) partial success in. In the trabeculectomy group, full success was attained in 19 patients (76%) and partial success in 5 patients (20%).**

Conclusions: **Trabeculectomy and deep sclerectomy can be performed in patients with POAG to control IOP. Both techniques are effective in controlling IOP, but complications were higher in the trabeculectomy group.**

Keywords: Deep sclerectomy, Glaucoma, Trabeculectomy

1. Introduction

A persistent, progressive optic neuropathy called glaucoma causes distinctive visual field abnormalities. The main focus of both medical and surgical glaucoma therapies continues to be intraocular pressure, which is the most important risk factor that can be controlled. Although cataract is the first leading cause of blindness globally, glaucoma is the primary factor that results in irreversible blindness.[1]

In 1968, Cairns described ‘trabeculectomy’ for the first time. During the trabeculectomy procedure, by removing a portion of the trabecular meshwork and iris, a passage is formed between the anterior chamber and the subconjunctival space. A subconjunctival bleb forms as aqueous humur (AH) exits the eye through this artificial pathway, lowering the IOP.[2]

Fyodorov first described deep sclerectomy (DS) in 1989. This procedure involves creating and removing a deep scleral flap that includes the limbal cornea over Descemet's membrane and the outer wall of Schlemm's canal. The major advantage of DS is non-penetration of the anterior chamber (AC), which prevents hypotony-related complications.[3]

Wound healing and scar formation, which is a natural process after surgery, is the main reason for failure after filtration surgery. Scar tissue resulting from fibroblast proliferation after glaucoma surgery can cause a non-functional bleb.[4]

Accepted 13 November 2022.
Available online 30 December 2023

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https://doi.org/10.58675/2682-339X.1830

A filtration bleb's fibroblast activity and consequent scarring can be prevented by mitomycin C (MMC). In high-risk patients of congenital glaucoma, intraoperative MMC administered at concentrations of 0.2 mg/ml controlled postoperative intraocular pressure (IOP) as efficiently as a 0.4 mg/ml dose, but with a decreased incidence of sequelae and thin-walled blebs.[5] The study aims to compare deep sclerectomy with trabeculectomy assisted with MMC and evaluate best-corrected visual acuity (BCVA), intraocular pressure (IOP), number of medications, surgical success rate, and complications before and after.

2. Patients and methods

The current study is a prospective comparison study that includes 50 eyes from 50 patients, 25 of whom have deep sclerectomy surgery, and 25 of whom have trabeculectomy surgery at the Al-Azhar University Hospitals' Ophthalmology Department between September 2019 and October 2021.

In this study, all patients had the following procedures: Detailed history of prior systemic or ocular disorders or surgeries, thorough ophthalmological evaluation, which includes slit-lamp examination, fundus examination with optic disk evaluation, with intraocular pressure measurements (using Goldmann's applanation tonometry), as well as best-corrected visual acuity (BCVA), gonioscopy using the Goldmann 3-mirror contact goniolens, OCT for the assessment of optic nerve head, and visual field testing using the Heidelberg Engineering machine.

Before the study's enrolment, each eligible patient provided written, informed consent. Al-Azhar University's Faculty of Medicine's ophthalmology department's ethics committee or audit division, evaluated and approved the study's protocol.

2.1. Surgical techniques

Peribulbar anesthesia was used during the entire procedure. Conjunctival limbal base scleral flab was created, and corneal traction suture was taken using silk 8/o at the upper cornea with exposure of the superior section of the bulbar conjunctiva. Undergoing a deep sclerectomy, the superficial scleral flap is produced and stretched into the clear cornea at a length of 1.5 mm and a thickness of 1/3. MMC application was achieved by positioning cellulose sponges soaked in MMC (0.2 mg/ml) for 2 min under the conjunctiva, above the scleral flap, and underneath the conjunctiva. This was followed by dissection of a second deep scleral flap. A step for the closure of the superficial flap should be left by the deep flap being smaller than the superficial scleral flap. A deep scleral flap is subsequently removed (Fig. 1), at which point the aqueous is visible percolating through the trabeculum. The juxtacanalicular TM and the inner wall of Schlemm's canal are then pulled away, suturing the scleral flap using nylon 10/0 suture and then suturing the conjunctiva with 8/0 Vicryl sutures.

In trabeculectomy groups: Dissection of a limbal-based scleral flap is done half thickness into the sclera. Afterword MMC use by cellulose sponges soaked with MMC (0.2 mg/ml) was applied for 2 min. Paracentesis is by corneal stab incision using a 20-gauge MVR blade. Excision of the trabecular meshwork block (2 mmx1mm) was done using vannas scissors after marking with a super blade number 15 followed by peripheral iridectomy, followed by suturing the scleral flap using nylon 10/0 suture and then suturing the conjunctiva with 8/0 Vicryl sutures.

2.2. Postoperative follow-up

Patients were followed at day 1, week 1, 1st month, 6 month, and 1 year after the surgery to record the following parameters: BCVA, IOP using a calibrated applanation tonometer, number of IOP-lowering medications, if required, surgical success rate, and complications. All patients received topical antibiotics and corticosteroids (four times a day) for the first 2 weeks following surgery. The corticosteroids were then gradually tapered off over the following 6–8 weeks.

2.3. Statistical analysis

Data entry was set up using an Excel spreadsheet. To minimize potential errors, for numerical variables, we used validation checks, and for categorical variables, we used an option-based data entry system. The software SPSS was used to conduct the

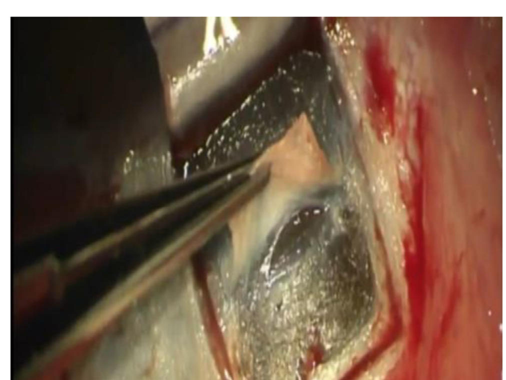

Fig. 1. Deep scleral flap.

analysis (Statistical Package for the Social Sciences, version 24, SSPS Inc, Chicago, IL, USA). The mean, standard deviation, and interquartile range (IQR) were used to characterize numerical data if it had a normal distribution. Frequency tables with percentages were used for categorical variables. While Mann–Whitney and Wilcoxon matched pairs tests were used to compare nonparametric quantitative variables, parametric quantitative variables were compared using independent Student's *t*-tests and paired *t*-tests. The χ^2 test was utilized to analyze categorical variables. The threshold for statistical significance is a 0.05 *P* value.

3. Results

The present study was a prospective cohort study including 50 eyes of 50 patients, 25 patient underwent deep sclerectomy and 25 patient underwent trabeculectomy at the Ophthalmology Department of Al-Azhar University Hospitals (Al Hussein and Sayed Galal Hospital) during the period from September 2019 to October 2021.

In this study, 25 patients (16 females and 9 males with a mean age of 53.64 ± 7.8 years) underwent deep sclerectomy with adjuvant intraoperative use of 0.2 mg/ml mitomycin C (MMC) and 25 patients (15 females and 10 males with a mean age of 56.80 ± 6.96 years) underwent subscleral trabeculectomy with adjuvant intraoperative use of 0.2 mg/ml mitomycin C (MMC).

As regards preoperative data that are summarized in (Table 1), there were no statistically significant results between groups in the form of BCVA, IOP, and C/D ratio.

3.1. Postoperative evaluation

There were five postoperative and follow-up visits within 1 year of surgery: 1 day, 7 days, 1 month, 6 months, and 1 year postoperatively. The following parameters were recorded:

Table 1. Preoperative BCVA, IOP, and C/D ratio.

	Group 1	Group 2	*P* value
Mean BCVA ± SD (decimal)	0.32 ± 0.21	0.24 ± 0.15	0.13 (NS)
Mean IOP ± SD (mmHg)	29.52 ± 3.77	31.52 ± 3.71	1.89 (NS)
Mean C/D ratio ± SD	0.62 ± 0.14	0.64 ± 0.13	0.15 (NS)

$P < 0.05$ result has significance.
$P < 0.001$ result has high significance (HS).
$P > 0.05$ result has no significance (NS).
This table shows nonsignificant change among the study group as regards BCVA, IOP, and C/D ratio.

Best-corrected visual acuity (BCVA): (decimal notations): Preoperative BCVA ranged from (0.05 Decimal) to (0.7 decimal) in group (1) and from (0.05 decimal) to (0.6 decimal) in group (2) (Table 2).

This table shows no statistically significant difference between the mean preoperative BCVA values of deep sclerectomy and trabeculectomy with MMC groups ($P = 0.13$). There were statistically significant differences between preoperative BCVA and 1 day postoperative (*P* value = 0.002 (HS). There was no statistically significant difference between the mean postoperative BCVA values at 1 day, 7 days, 1 month, 6 months, and 1 year postoperatively between deep sclerectomy and trabeculectomy with MMC groups ($P > 0.05$) (Fig. 2).

IOP using a calibrated Goldmann applanation tonometer: The mean IOP decreased from 29.52 ± 3.77 mmHg to 14.72 ± 3.31 in the 1-year postoperative follow-up in group (1) and decreased from 31.52 ± 3.71 mmHg to 14.72 ± 3.31 in 1-year postoperative follow-up in group (2). There were statistically significant differences between preoperative and postoperative IOP (*P* value = 0.0001) (HS) (Table 3).

This table shows a statistically significant difference between preoperative and postoperative IOP (*P* value = 0.0001) (HS) in both groups (Table 4).

This table shows no statistically significant difference between the mean preoperative and postoperative IOP values of deep sclerectomy and trabeculectomy with MMC groups (Fig. 3).

Conjunctival blebs in group (1) after one month were as follows: 23 functioning blebs, 2 no bleb, no cystic or encapsulated blebs while in Group (2), 22 functioning blebs, 2 no bleb, 1 cystic, and no encapsulated blebs. There was no statistically significant difference between deep sclerectomy and trabeculectomy groups ($P = 1.0$). After 1 year: In group (1) there were 19 functioning blebs, 3 no blebs, 1 cystic, and 2 encapsulated blebs, while in Group B there was 20 functioning blebs, 3 no blebs, 1 cystic, and 1 encapsulated blebs. There were no statistically significant differences between study groups ($P = 0.8$) (Fig. 4).

Deep sclerectomy operations with MMC were completed without any intraoperative complications except penetration of AC in one case and were converted to subscleral trabeculectomy. Postoperative hypotonia was detected in two patients (8%) in the deep sclerectomy group with MMC. IOP values in these cases were determined as 7 mmhg on the first and third day; no hypotony was observed at the first week follow-up visit. As the anterior chamber formation was complete in two cases, the patients were followed up without any interventions.

Table 2. Comparison of visual acuity values in study groups.

VA	Group 1		Group 2		T value	*P* value
	Mean	Range	Mean	Range		
Pre-op	0.32 ± 0.21	0.05–0.7	0.24 ± 0.15	0.05–0.6	1.52	0.13
1-day post-op	0.16 ± 0.11	0.04–0.5	0.13 ± 0.08	0.03–0.4	1.06	0.29
1-week post-op	0.25 ± 0.17	0.05–0.7	0.20 ± 0.12	0.05–0.5	1.25	0.21
1-month post-op	0.33 ± 0.20	0.05–0.8	0.25 ± 0.15	0.05–0.5	1.60	0.11
6-month post-op	0.31 ± 0.20	0.05–0.7	0.26 ± 0.16	0.05–0.6	0.91	0.36
12-month post-op	0.34 ± 0.19	0.05–0.7	0.28 ± 0.15	0.05–0.6	1.19	0.20

$P < 0.05$ result has significance.
$P < 0.001$ result has high significance (HS).
$P > 0.05$ result has no significance (NS).
T: independent sample *T*-test.

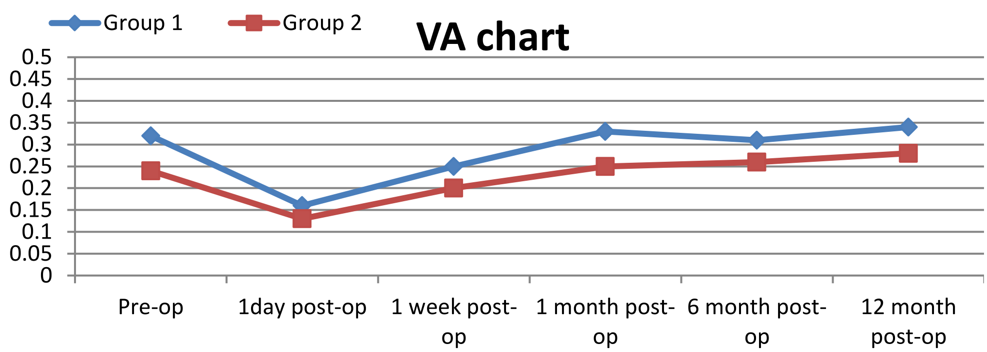

Fig. 2. Comparison of visual acuity values between study groups.

In the trabeculectomy group, three patients (12%) had bleeding in the anterior chamber during the operation. Patients received viscoelastic agents in the anterior chamber and bleeding was controlled intraoperatively. Hyphema was observed in one case postoperatively for 3 days and then resolved. Hypotony with a shallow anterior chamber was detected in five patients (20%) in the trabeculectomy group. A tight bandage was performed with cycloplegia in five patients with shallow anterior chambers. Anterior chamber formation was achieved in patients at day 3 and no hypotony was observed in the first week of controls. Cataract formation was detected in the trabeculectomy group in 2 cases; both were treated by phacoemulsification and IOL implantation (Fig. 5).

Table 3. Comparison of preoperative and postoperative IOP using a calibrated Goldmann applanation tonometer in each group.

	Range (mmHg)	Mean ± SD (mmHg)	T value	*P* value
Group (1)				
Pre-op	24–39	29.52 ± 3.77	14.75	0.0001**
1-year post-op	10–24	14.72 ± 3.31		
Group (2)				
Pre-op	25–39	31.52 ± 3.71	15.659	0.0001**
1-year post-op	11–23	14.44 ± 3.0		

$P < 0.05$ result has significance.
$P < 0.001$ result has high significance** (HS).
$P > 0.05$ result has no significance (NS).
T: independent sample *T*-test.

Table 4. Comparison of IOP using a calibrated Goldmann applanation tonometer between study groups.

	Group 1	Group 2	T value	*P* value
Pre-op				
Mean ± SD	29.52 ± 3.77	31.52 ± 3.71	1.89	0.06 (NS)
Range	24–39	25–39		
1-day post-op				
Mean ± SD	11.32 ± 2.48	10.56 ± 2.79	1.01	0.31 (NS)
Range	7–18	6–17		
1-weak post-op				
Mean ± SD	13.84 ± 3.18	13.28 ± 2.39	0.70	0.48 (NS)
Range	10–22	9–18		
1-month post-op				
Mean ± SD	14.52 ± 3.5	13.96 ± 2.28	0.66	0.50 (NS)
Range	10–25	10–18		
6-month post-op				
Mean ± SD	15.4 ± 3.28	14.04 ± 2.52	1.64	0.10 (NS)
Range	10–25	10–18		
1-year post-op				
Mean ± SD	14.72 ± 3.31	14.44 ± 3.0	0.31	0.75 (NS)
Range	10–24	11–23		

$P < 0.05$ result has significance.
$P < 0.001$ result has high significance.
$P > 0.05$ result has no significance.
T: independent sample *T* test.

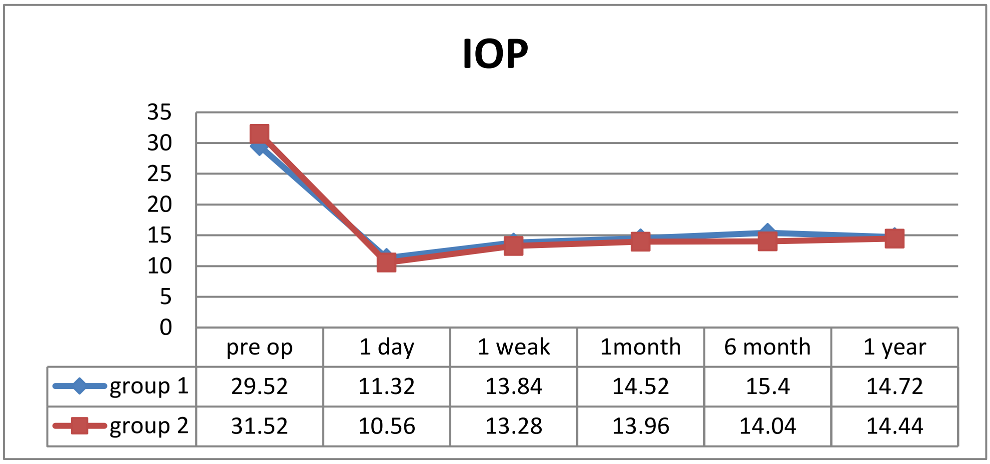

Fig. 3. Comparison of IOP values between study groups.

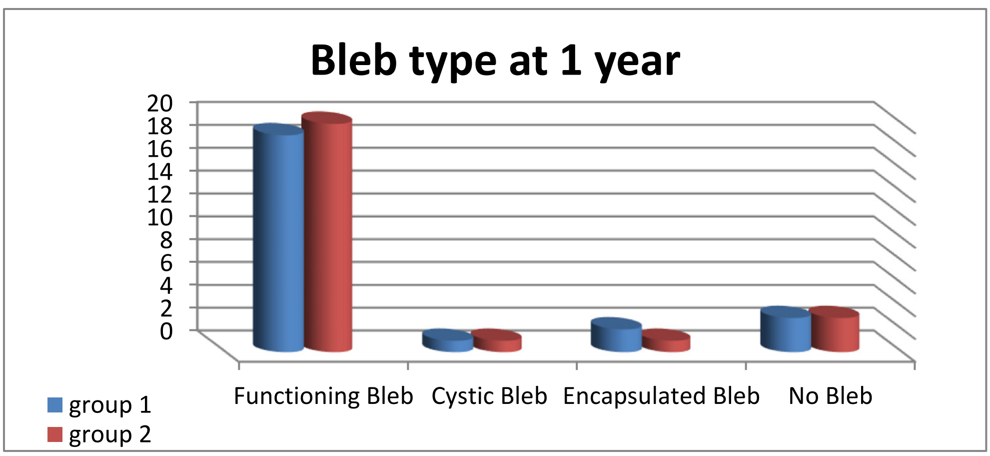

Fig. 4. Types of conjunctival blebs in both groups after 1 year.

Complete success was achieved in 17 patients (68%) in the deep sclerectomy with the MMC group as the IOP is less than 18 mmHg in all readings without any glaucoma medication. Partial success was achieved in six patients (24%) with an IOP of less than 18 mmHg in all readings with anti-glaucoma medication. It was unsuccessful in 2 patients (8%). Complete success was achieved in 19

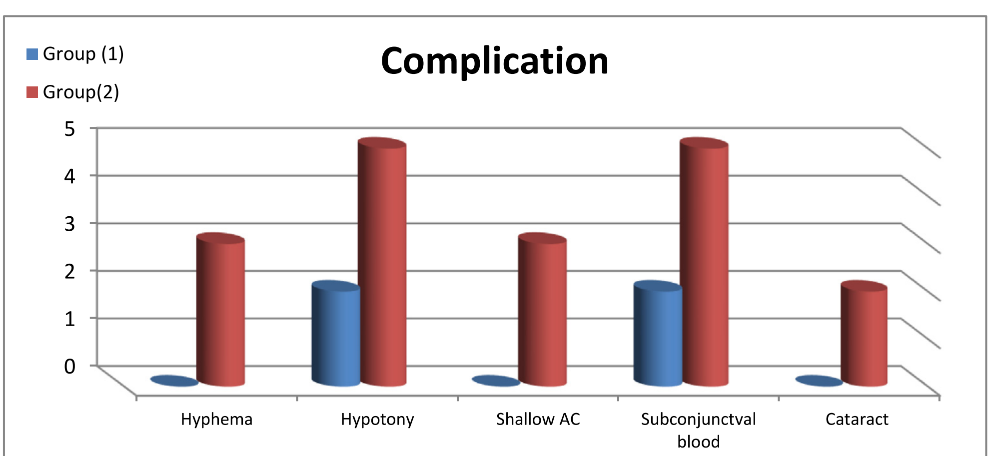

Fig. 5. Complication of surgery in study groups.

Table 5. Success rate of study groups.

	Group (1)	Group (2)	*P* value
Complete success	17 (68%)	19 (76%)	0.59 (NS)
Partial success	6 (24%)	5 (20%)	1.10 (NS)
Qualified success	23 (92%)	24 (96%)	0.99 (NS)
Unsuccessful	2 (8%)	1 (4%)	0.31 (NS)

$P < 0.05$ result has significance.
$P < 0.001$ result has high significance.
$P > 0.05$ result has no significance.

patients (76%) in the trabeculectomy with MMC group as the IOP is less than 18 mmHg in all readings without any glaucoma medication. Partial success was achieved in five patients (20%) as the IOP is less than 18 mmHg in all readings with antiglaucoma medication. It was unsuccessful in 1 patient (4%). There is no statistically significant difference between the two groups as regards the success rate (Table 5).

This table shows that complete success was achieved in 17 patients (68%) in the deep sclerectomy group compared with the MMC group and 19 patients (76%) in the trabeculectomy group compared with the MMC group. There is no statistically significant difference between the two groups as regards the success rate.

4. Discussion

Glaucoma is a sneaky disease that can result in irreversible blindness. Today, glaucoma is the second cause of blindness in the world. It is known that neural damage caused by glaucoma is defined as progressive optic neuropathy with characteristic visual field defects. Early diagnosis and treatment are of great importance in this case.[6]

It is assumed that in the majority of glaucoma patients, the IOP is too high for the optic nerve axons to function properly and that reducing the pressure will stabilize the damage. But even if the IOP drops, the optic nerve could still sustain injury.[7]

An individual's susceptibility to POAG, which is a complex disease process, is influenced by a variety of clinical variables. A positive glaucoma family history, advanced age, race, a thin central cornea, and increased intraocular pressure (IOP) are some of these risk factors. Ocular ischemia, anomalies of axon or ganglion cell metabolism, and corneal hysteresis are other factors that may increase disease vulnerability.[8]

Trabeculectomy is the most preferred treatment modality among the surgical treatment modalities, if other treatment methods fail to reach the target intraocular pressure. Trabeculectomy, first described by Cairns in 1968, was associated with less complication than other surgical techniques at the time and more success rates in IOP control.[9]

Modifications of the trabeculectomy techniques and new techniques such as the non-penetrating surgery have increased the reliability of surgical interventions and nowadays surgical interventions have been discussed in the early period without medical treatment.[10]

The deep sclerectomy technique may prevent previously reported complications as the anterior chamber of the eye is not inserted. However, excessive postoperative wound-healing response causes fibrosis of the aqueous filtration zone that prevents the exit of the aqueous from the anterior chamber, and IOP may increase again. For this reason, a number of medications and implants have been introduced during these surgeries, so that the reduction in IOP in the deep sclerectomy operations can be extended to longer periods and successful trabeculectomy can be achieved with this technique.[11]

To examine the clinical effectiveness and safety of deep trabeculectomy and sclerectomy with MMC in Al-Azhar University Hospitals, we reviewed 50 eyes from 50 patients prospectively. We looked at how both surgical approaches affected IOP, visual acuity, success rates, and comorbidities.

Those with IOPs under 18 mmHg were considered completely successful; patients with IOPs under 18 mmHg with topical treatment were considered somewhat successful; and patients with IOPs beyond 18 mmHg were considered unsuccessful. Six (24%) and 17 (68%) of the 25 patients in the deep sclerectomy group with MMC experienced partial success. Complete success was attained in 19 patients (76%), who underwent trabeculectomy and partial success in five patients (20%). IOP was seen to drop statistically significantly for both methods. One month following surgery, the current study found that BCVA in both groups decreased and subsequently returned to baseline values. The mean IOP in group (1) decreased from 29.52 ± 3.77 mmHg to 14.72 ± 3.31 in the 1-year postoperative follow-up, while in group (2) IOP decreased from 31.52 ± 3.71 mmHg to 14.72 ± 3.31 in the 1-year postoperative follow-up.

Mean deviation (MD) ranged in group (1) from -3.8 to -29.1 dB with a mean of -13.7 ± 6.3 db, while in group (2) it ranged from -1.9 to -25.6 db with a mean of -12.6 ± 4.8 db preoperatively. *P* value for preoperative MD was 0.5, which is statistically insignificant. In group (1), postoperative MD ranged from -4.4 to -30.1 dB with a mean of -14.8 ± 6.4 db, while in group (2), postoperative MD ranged from -5.5 to -26.3 db with a mean of -13.1 ± 8.0 db, *P* value for the postoperative MD = 0.4, which is considered statistically insignificant.

Pattern standard deviation (PSD) ranged in group (1) from 0.5 to 14.3 with a mean of 7.03 ± 4.7 db, while in group (2) it ranged from 2.2 to 14.9 db with a mean of 8.3 ± 4.1 dB. *P* value for preoperative PSD was 0.3, which is statistically insignificant. In group (1) postoperative PSD ranged from 1.2 to 14.8 db with a mean of 7.8 ± 4.4 dB, while in group (2) it ranged from 2.5 to 15.6 db with a mean of 9.3 ± 4.4 dB. *P* value for the postoperative PSD is 0.2, which is considered statistically insignificant.

Deep sclerectomy operations with MMC were completed without any intraoperative complications except there is perforation of the trabeculo-descemet membrane in one case and were converted to subscleral trabeculectomy. Postoperative hypotonia was detected in two patients (8%) in the deep sclerectomy group with MMC.

In the trabeculectomy group, three patients (12%) had bleeding in the anterior chamber during the operation. Hypotony with a shallow anterior chamber was detected in five patients (20%) in the trabeculectomy group. Cataract formation was detected in the trabeculectomy group in two cases: the first case developed posterior subcapsular cataract and the second case developed nuclear cataract both treated by phacoemulsification and IOL implantation.

In the deep sclerectomy group, 8 patients need antiglaucoma medication, to control an IOP of less than 18 mmHg. IOP was still higher than 18 in two patients after the addition of three antiglaucoma medications. In the trabeculectomy group, six patients need antiglaucoma medication to control an IOP of less than 18 mmHg. IOP was still higher than 18 in one patient after the addition of 3 antiglaucoma medications.

Zhang et al. 2022 analyzed a retrospective study comparing modified CO2 laser-assisted sclerectomy (MCLASS) and conventional trabeculectomy in patients with medically untreated primary open-angle glaucoma (POAG) (TRAB). In all, 42 patients were in the TRAB group and 45 patients were in the MCLASS group out of a total of 87 patients, who were reviewed. At 24 and 36 months, MCLASS had a complete success rate of 60% and 53.3%, respectively. The 66.7% and 59.5% of TRAB, and MCLASS had a qualifying success rate of 91.1% and 88.9%, as opposed to TRAB's 83.3% and 80.9%.[12] In comparison to our study, the Zhang et al. retrospective review used CO2 laser and laser peripheral iridectomy (LPI) and the success rate was higher in MCLASS than TRAB.

The study by Dwivedi et al. (2021) is a retrospective review of DS + MMC and trabeculectomy + MMC with a minimum of 12-month follow-up. DS + MMC was done in 46 eyes and Trab + MMC was done in 44 eyes. Complete success were 67.39% v 61.36%, partial success were 26.09% v 29.55%, failure were 6.52% v 9.09% in the DS and the trabeculectomy group, respectively; there were no statistically significant difference between two groups.

At 2 years after surgery, Dwivedi et al. came to the conclusion that both operations had sustained intraocular pressure and reduced decrease. Given that DS + MMC has lower complication rates, which necessitate less intervention and significantly fewer clinic visits, this may be a key consideration when deciding how to manage glaucoma patients surgically in the Covid-19 era to minimize the risk of virus exposure for both patients and medical staff.[13]

In comparison to our study, the number of patients were 25 in each group, the mean IOP reduction was 50.1% in the deep sclerectomy group, and 54.1% in the trabeculectomy group. Complete success were 68% v 76%, partial success 24% v 20%, and failure were 8% v 4% in the DS and the trabeculectomy group, respectively. Eyes were included in a retrospective study by Elhofi et al. in 2020, of which 40 underwent penetrating trabeculectomy and the remaining 40, non-penetrating deep sclerectomy (NPDS). IOP of 16 mmHg was regarded a complete success of the surgical treatment without the use of any glaucoma drugs. In the NPDS and trabeculectomy groups, the complete success rate was 60% (24 eyes) as opposed to 57.5% (23 eyes); the qualifying success rate was 25% as opposed to 25% (10 eyes); and the overall success rate was 85% (34 eyes) as opposed to 82.5% (33 eyes) ($P = 0.9$).[14]

Complete surgical success was regarded as an IOP of 18 or above in our study. Six (24%) and 17 (68%) of the 25 patients in the deep sclerectomy group with MMC experienced partial success. Complete success was attained in 19 patients (76%) who underwent trabeculectomy, and partial success in 5 patients (20%).

Harju et al. (2018) investigated 37 patients with normotensive glaucoma who underwent deep sclerectomy in a prospective study. The mean follow-up time was 7.9 (1.0−9.0) years, and they found a significant decrease in IOP and a low rate of complications.[15]

In a prospective study by Leleu I et al. (2018), 34 eyes with severe and end-stage glaucoma who underwent deep sclerectomy were followed for an average of 29 (6−54) months. They found that the sclerectomy operation provided stabilization in the central 10° visual field and even provided some improvement, if not statistically significant.[16]

Özsoy et al. (2016) prospectively studied 20 eyes of 20 patients with open-angle glaucoma who underwent deep sclerectomy. In this study, which had a mean follow-up of 6 months, it was found that deep sclerectomy surgery significantly decreased IOP and increased ocular perfusion pressure and retrobulbar blood flow.[17]

In a study by Mercieca et al. (2015) who underwent deep sclerectomy combined with phacoemulsification, 296 eyes of 282 patients were retrospectively analyzed. In this study with a mean follow-up period of 63.5 ± 35.3 months, deep sclerectomy combined with phacoemulsification was found to be effective and safe in the long term.[18]

In their study, Elewa and Hamid (2014) assessed 30 patients with progressive field loss and medically uncontrolled POAG who received either DS (Group I) or trabeculectomy on 40 of their eyes (Group II). Preoperative IOP in groups I and II, respectively, was 28.2 2.5 mmhg (range 28−35 mmhg) and 27.8 4.2 mmhg (range 24−36 mmhg). At 24 months, postoperative IOP in groups 1 and 2 was 17 5.5 mmHg (range 12−20 mmHg) and 18.2 2.2 mmHg (range 12−22 mmHg), respectively ($P = 0.0066$ and 0.0077).[5] Compared to our study the mean postoperative IOP was 14.7 ± 3.3 from 29.5 ± 3.7 preoperatively in group (1), while the mean postoperative IOP was 14.4 ± 3.0 from 31.5 ± 3.7 preoperatively in group 2.[2]

Ollikainen et al. (2011) prospectively examined 68 eyes of 68 patients with primary open-angle glaucoma and pseudoexfoliative glaucoma who underwent deep sclerectomy with MMC. In this study with a mean follow-up of 3 years, in both glaucoma groups, they found that deep sclerectomy with MMC operation was defined to be effective and safe.[19]

In a research conducted by El-Sayyad et al. in 2000, 39 individuals underwent DS or SST in one eye and the opposite operation in the other eye. With an overall success rate of 79 and 85%, respectively (IOP less than 21 without glaucoma drugs), they discovered IOP reductions of 15.6 4.2 mmhg in DS and 14.1 6.4 mmhg in SST. Compared with our study, a complete success rate was 68% in the DS group and 76% in the trabeculectomy group (IOP less than 18 with no glaucoma medications).[20]

In high-risk individuals, deep sclerectomy has a few advantages over trabeculectomy. Anterior chamber (AC) inflammation brought on by trabeculectomy may have an impact on bleb survival. In high-risk eyes, AC inflammation is markedly reduced following DS compared with trabeculectomy, which may be helpful for bleb survival. With trabeculectomy, excessive flow during the initial postoperative phase can lead to a variety of problems. In the initial postoperative phase, the TDM's presence in DS ensures a predictable continuous flow of aqueous and a low IOP, both of which are positive prognostic indications.[21] After deep sclerectomy, shallow AC, hyphema, and AC inflammation are rare. The difficulty of performing surgery in the nasal or temporal quadrants, where the limbus is limited and it is more difficult to slice a big TDM window, is one of the most important limitations of DS. A significant drawback of the DS is its lengthy learning curve.[1]

4.1. Conclusion

Patients with POAG can be treated with deep sclerectomy and trabeculectomy to lower IOP. Problems were more common in the trabeculectomy group. The most important reason for this is the entrance into the anterior chamber during surgery. However, the deep sclerectomy technique is difficult to apply and the learning period is long.

Disclosure

The authors have no financial interest to declare regarding the content of this article.

Authorship

All authors have a substantial contribution to the article.

Sources of funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflicts of Interest

There are no conflicts of interest.

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