

# Trabeculectomy with Mitomycin C in Glaucoma Associated with Uveitis

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## ABSTRACT

*The patients with uveitic glaucoma are at high risk for failure following drainage surgery because of young age of these patients, preoperative long-term control of inflammation and postoperative complications. Twenty-two trabeculectomies performed in 22 patients with uveitic glaucoma were retrospectively evaluated to analyze the effect of intraoperative application of mitomycin C (MMC). Success rates, postoperative levels of intraocular pressure (IOP) and postoperative complications were studied. After a mean follow-up of 10.6 months (range, 5–28 months), 15 patients (68.2%) achieved IOP of 21mmHg or less without antiglaucoma medications. There were statistically significant reduction in IOP postoperatively during the period studied ( $p < 0.001$ ). Early postoperative complications included choroidal detachment (9.1%), shallow anterior chamber (9.1%), hyphema (13.6%), macular edema (4.5%) and raised IOP (27.3%). Late postoperative complications included exacerbation of uveitis (4.5%), macular edema (4.5%), cataract (22.7%) and raised IOP (31.8%). The eyes with raised IOP needed additional antiglaucoma medication. The results of this retrospective and uncontrolled study suggest that intraoperative application of MMC may be a good option for enhancement of short-term trabeculectomy success rates in patients with uveitic glaucoma.*

**Key words:** trabeculectomy, mitomycin C, uveitic glaucoma

## Introduction

Glaucoma is frequent and potentially vision threatening complication of intraocular inflammation. It affects 20–50% of patients and is characterized by a multifactor pathogenesis. The various mechanisms involved include obstruction of the trabecular meshwork by cellular debris and protein, trabeculitis, angle-closure from peripheral anterior synechiae, pupillary block from posterior synechiae, angle neovascularisation and steroid induced. Glaucoma associated with uveitis may not be controlled by medical therapy alone and may require surgical treatment. Patients with uveitic glaucoma are at high risk for failure following the surgery. In addition to the uveitis the young age of these patients may contribute to the high risk. The various surgical approaches described include trabeculectomy, trabeculectomy with antimetabolites and drainage devices. Regardless of the type of surgical intervention chosen, timing of the operation is critical and maximum control of the intraocular inflammation for at least two months

prior to surgery is important for the successful control of glaucoma and favorable long term visual outcome.

To improve the success rate of trabeculectomy in patients with uveitic glaucoma, antimetabolite therapy in association with trabeculectomy has been used for 15 years. Postoperative subconjunctival injection of 5-fluorouracil (5-FU), triamcinolone or, more recently, intraoperative application of mitomycin C (MMC) have been reported to improve the outcome of filtering surgery<sup>1–7</sup>. Because of corneal epithelial toxicity and the need for frequent postoperative subconjunctival injections, 5-FU has been replaced by topical application of MMC, with good surgical results reported for secondary glaucoma. In a multicentered study of 19 eyes with uveitic glaucoma that underwent trabeculectomy with MMC, 18 eyes (95%) were successful with intraocular pressure (IOP) < 21 mmHg, with one or no medications, after a follow-up of 8.5 months<sup>6</sup>. The success rate after trabeculectomy enhanced with antimetabolites in patients

with uveitis varies from 51% to 90%. Wright<sup>8</sup> and associates and Prata<sup>6</sup> and associates reported absolute success rates of 62% and 75%, respectively, in 24 eyes with uveitis that underwent trabeculectomy with intraoperative application of mitomycin C. Most studies of patients with uveitis, who have undergone glaucoma surgery with antimetabolites, have analyzed results at 1 to 2 years after trabeculectomy, but the long term success rate has been documented by use of drainage devices<sup>9–11</sup>.

The purpose of this study was to evaluate the outcome of trabeculectomy with MMC in patients with uveitic glaucoma refractory to maximally tolerated anti-glaucomatous medical therapy.

## Patients and Methods

This is a retrospective study on 22 eyes of 22 patients who had undergone trabeculectomy with mitomycin C for uncontrolled IOP secondary to intraocular inflammation between January 2000 and March 2004. The following variables were studied: age, sex, preoperative duration of increased IOP, number and category of anti-glaucoma medications used preoperatively and postoperative early and late complications during the extended follow-up period.

Eyes that had previous conjunctival or intraocular surgery or laser trabeculoplastics were excluded from the study. Twenty-two eyes of 22 patients with various types of uveitis were included in the study. The mean age ( $\pm$  SE) for all patients was 42.1 $\pm$ 6.9 (range, 32 to 58 years); eight patients were male and fourteen were female. The duration of glaucoma before trabeculectomy was 4 to 6 months. All patients had uncontrolled IOP despite maximally tolerated antiglaucomatous medical therapy (Table 1).

TABLE 1  
PATIENT DATA

		n	%
Sex	M	8	36.4
	F	14	63.6
Preoperative period (months)	4	14	63.6
	5.5	7	31.8
	6	1	4.5
Drug category	$\beta$ – blockers	22	100
	CAIs	22	100
	$\alpha_2$ agonists	22	100

The trabeculectomies were all performed by one surgeon in the following manner after informed written consent was obtained: retrobulbar and peripheral facial blocks were given using 2% lidocaine and 0.75% bupivacaine, mixed 50:50. A limbal-based conjunctival flap was created starting 7 to 8 mm behind the limbus. A 3 x 3 mm scleral flap, 2/3 of the scleral thickness was made and after that mitomycin was applied in exposition of 3

minutes (0,5 mg of mitomycin was diluted in 20 ml physiological liquid). After that Descemet's Kelly punch was use to excise approximately 1 x 2 mm of anterior chamber angle tissue. Three to five 10-0 nylon sutures were used to suture the scleral flap to the surrounding sclera. The conjunctiva was closed using a running, lockong 9.0 Vicryl suture.

All eyes received dexamethasone eyedrops every two hours while the patient was awake and dexamethasone ointment before sleeping, starting the day after surgery. Seven to ten days after surgery, the administration of corticosteroids was decreased to four times a day and the ointment was discontinued. The frequency of dexamethasone drops was than decreased by one daily dose per week.

When describing results, parameters of descriptive statistics were used. For the qualitative data, absolute and relative frequencies were used, and for the quantitative data mean, standard error, median and range. Changes in IOP level, between the two single measurements, were tested according to the Mann-Whitney U test. Values when  $p < 0.005$  were considered statistically significant.

## Results

A mean follow-up was 10.6 months (range, 5–28 months). During that period there were three main visits of patients. The first visit was the day after surgery, the second one a month after surgery and the third one 6 months or later after surgery.

The mean level of preoperative IOP ( $\pm$  SE) was 31 $\pm$ 0,7 mm Hg. In postoperative follow-up the level of IOP ( $\pm$  SE) was 16.1  $\pm$  1.4 in the first visit, 17.5  $\pm$  1.3 in the second visit and 16.3  $\pm$  1.1 in the third visit (Table 2). Statistical analysis demonstrated a statistically significant reduction in IOP postoperatively during the period studied ( $p < 0.001$ )

TABLE 2  
PREOPERATIVE AND POSTOPERATIVE FOLLOW OF  
INTRAOCULAR PRESSURE (mmHg)

	$\bar{X}$	SE	Median	Range
Preoperative	31	0.7	30	26–42
1 <sup>st</sup> visit	16.1	1.4	14	4–26
2 <sup>nd</sup> visit	17.5	1.3	15.5	8–30
3 <sup>rd</sup> visit	16.3	1.1	14.5	8–25

Operation: 1st visit  $p < 0.001$ ; Mann-Whitney U test

Operation: 2nd visit  $p < 0.001$ ; Operation: 3rd visit  $p < 0.001$

Early postoperative complications are shown in Table 3. A day after surgery, two patients developed choroidal detachment, two shallow anterior chamber, and three postoperative hyphema, which vanished very soon. On the first postoperative day, in 15 patients there were no complications. A month after surgery there

**TABLE 3**  
FREQUENCIES OF EARLY POSTOPERATIVE COMPLICATIONS

Complications	1 <sup>st</sup> visit		2 <sup>nd</sup> visit	
	N	%	n	%
No complications	15	68.2	16	72.7
Chorioidal detachment	2	9.1	–	–
Shallow anterior chamber	2	9.1	–	–
Hyphema	3	13.6	–	–
Raised IOP	–	–	6	27.3
Macular edema	–	–	1	4.5

were no cases of chorioidal detachments or shallow anterior chambers, but 6 patients had increased level of IOP that needed additional medical therapy.

On the third visit there were no complications at all in 14 patients, but some complications such as macular edema and exacerbation of uveitis were noticed. Seven eyes developed increased level of IOP and in five eyes cataract was developed (Table 4).

**TABLE 4**  
FREQUENCIES OF LATE POSTOPERATIVE COMPLICATIONS

Complications	3 <sup>rd</sup> visit	
	N	%
No complications	14	63.6
Exacerbation of uveitis	1	4.5
Cataract	5	22.7
Raised IOP	7	31.8
Macular edema	1	4.5

## Discussion and Conclusion

The surgical management of glaucoma secondary to intraocular inflammation can be complex and challenging problem because of numerous mechanisms involved in its pathogenesis. The reported evidence appears conflicting, as some studies have suggested that these patients may be at high risk for failure after drainage surgery<sup>1,5,12</sup>, yet others have reported a high success rate, at least after short follow-up<sup>8,13</sup>. This is also indicated by the diversity of surgical approaches, including wound modulation with antimetabolites and drainage devices<sup>6,8,14</sup>. The purpose of this study was to assess the outcome of trabeculectomy with mitomycin C in patients with uveitic glaucoma refractory to medical therapy.

Wright<sup>8</sup> and associates and Prata<sup>6</sup> and associates reported absolute success rates of 62% and 75%, respectively, in 24 eyes with uveitis that underwent trabeculectomy with intraoperative application of mitomycin C. During the period studied 62%<sup>8</sup> and 75 %<sup>6</sup> eyes achieved an IOP of 21 mmHg or less without antiglaucoma medi-

cations. The same IOP level with one antiglaucoma medication was achieved in 16.6% eyes. Ceballos<sup>15</sup> and associates reported absolute success rates of 78% in first year and 62% in second year after trabeculectomy with mitomycin C.

In our study, seven of twenty-two (32 %) patients developed an increased IOP level (IOP > 21 mmHg) six months or later after glaucoma surgery. As for the level of IOP is concerned, in 68% of our patients, the results of our satisfactory has been achieved in postoperative follow up period of 10.6 months. Those results almost correlate with the results above mentioned authors.

Improvement in the pattern of uveitis after trabeculectomy with or without antimetabolites compared with the preoperative period was obvious in many patients. Weinreb<sup>16</sup> reported postoperative improvement of the inflammation and reduction in the topical and systemic corticosteroids in four of six patients who underwent filtering surgery with postoperative subconjunctival 5-FU for inflammatory glaucoma. Jampel<sup>1</sup> and associates reported no severe inflammatory exacerbations in the immediate postoperative period in 12 uveitic eyes that underwent trabeculectomy with 5-FU. Ophir and Ticho also reported remission of anterior uveitis over 12 months by repeat subconjunctival injection of 5-FU in three patients who underwent trabeculectomy for glaucoma because of anterior uveitis<sup>17</sup>. Improvement of uveitis after trabeculectomy is not related to the hypothesis of a beneficial effect of the antimetabolite on the intraocular inflammation<sup>1,16,17</sup>. Postoperative inflammation or reactivation of uveitis has been reported to occur in 5.2% to 31.1% of cases of uveitic glaucoma<sup>5,6</sup>. This incidence can be lowered by treating the patients with pre and postoperative corticosteroids<sup>18</sup>. In our study, there was only one patient with exacerbation of uveitis on the third visit.

Postoperative hyphema has not been reported to be a significant problem in trabeculectomy for uveitic glaucoma. Prata and associates reported postoperative hyphema in 4.2 % cases<sup>6</sup>. In our study there were 13.6% patients with hyphema in early postoperative period. Postoperative complications such as chorioidal detachment, hypotony, postoperative shallow anterior chamber, wound leak and macular edema are higher in eyes with uveitic glaucoma since adjunctive treatment with 5-FU, mitomycin C or a drainage device is more commonly used in patients with uveitic glaucoma. Results of this study such as 9.1% of chorioidal detachment, 9.1% of shallow anterior chamber and 4.5% of macular edema are in agreement with previous observations<sup>6,15,19</sup>.

Cataract progression is very common after filtration surgery for uveitis glaucoma. In one study<sup>5</sup> 90% (9/10) of the phakic eyes with uveitic glaucoma that underwent trabeculectomy with antimetabolites had progression of the cataract and seven of these eyes needed surgery. In other study<sup>15</sup> 51.6% phakic patients developed new cataracts or had progression existing cataracts and required cataract extraction. In our study, 5 patients (22.7%) developed new cataracts. Late postoperative

endophthalmitis can occur in patients treated with mitomycin C. Bleb infection with conjunctival discharge is typically seen in postoperative endophthalmitis associated with filtering surgery<sup>20</sup>. This complication is rare and unnoticed in our study, fortunately. The patients with uveitic glaucoma are at high risk of failure following drainage surgery because of young age of these pa-

tients, preoperative long-term control of inflammation and postoperative complications.

In conclusion, the results of this retrospective and uncontrolled study suggest that intraoperative application of MMC may be a good option for enhancement of short-term trabeculectomy success rates in cases of uveitic glaucoma.

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## TRABEKULOTOMIJA S MITOMICINOM C KOD UVEITIČKOG GLAUKOMA

### SAŽETAK

Rizik za neuspješan ishod operativnog drenažnog zahvata kod bolesnika s uveitičkim glaukomom vrlo je visok zbog mlade životne dobi ovih bolesnika, dugotrajne preoperativne kontrole upale i postoperativnih komplikacija. Izvedeno je 22 trabekulektomije u 22 bolesnika sa uveitičkim glaukomom i retrospektivno evaluirano kako bi se analizirao učinak intraoperativne primjene mitomicina C. Proučavana je uspješnost operativnog zahvata, postoperativna razina intraokularnog tlaka (IOT) i postoperativne komplikacije. Nakon srednjeg vremena praćenja od 10.6 mjeseci (raspon, 5–28 mjeseci), kod 15 (68.2%) bolesnika postignut je IOT od 21 mmHg ili manji bez antiglaukomskih lijekova. Postoji statistički značajno sniženje IOT tijekom postoperativnog praćenja bolesnika ( $p < 0.001$ ). Rane postoperativne komplikacije uključivale su: odignuće žilnice (9,1%), plitku prednju sobicu (9,1%), hifemu (13,6%), edem makule (4,5%) i povišeni IOT (27,3%). Kasne postoperativne komplikacije uključivale su: eksacerbaciju uveitisa (4,5%), makularni edem (4,5%), kataraktu (22,7%) i povišeni IOT (31,8%). Oči s povišenim IOT-om trebale su dodatnu antiglaukomsku terapiju. Rezultati ove retrospektivne studije sugeriraju da intraoperativna primjena mitomicina C pospešuje ishod trabekulektomije u bolesnika s uveitičkim glaukomom u kratkom postoperativnom praćenju bolesnika.