SHORT TERM EXPERIENCE WITH “MODERN” TRABECULECTOMY AUGMENTED WITH INTRAOPERATIVE ANTIMITEBOLITES

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ABSTRACT

Purpose: Owing to its technical refinements, “modern” trabeculectomy aims to reduce the incidence and severity of early postoperative complications while increasing postop IOP success. The purpose of our study was to evaluate namely the safety of “modern” trabeculectomy, the quality of the filtration blebs, the influence on the quality of life and secondarily IOP reduction according to the surgical procedure whether augmented with peroperative application of antimetabolites or not.

Material-Methods: Retrospective study including our 45 first consecutive procedures in 38 patients (mean age: 61.1 years) with medically uncontrolled various glaucomas. All procedures were performed according to a modified P.Khaw’s protocol. Antimetabolites were applied peroperatively in 28/45 eyes (62.2%) with a history of previous filtering surgery (12/28 eyes) and/or advanced glaucomatous damage (22/28 eyes). Antimetabolites were not used in the 17/45 other eyes with lower surgical risk factors and higher target IOP, surgical procedure was not augmented with antimetabolites. Postoperative management included laser suture lysis, withdrawal of adjustable sutures and 5-FU injections when needed. Complete ocular examination was carried out preoperatively and postoperatively at day 1, 7, at 1, 2 and 3 months and every 3 months thereafter. All patients were questioned for symptoms associated with filtration bleb dysesthesia at the last visit.

Results: The mean follow-up was 7.9 ±3.3 in the group without antimetabolites and 5.3 ±2.2 months in the group with antimetabolites (p<0.05). Final mean IOP (±SD) was significantly lower in the group augmented with antimetabolites (11.2±4.5mmHg) compared with the group without antimetabolites (14.9±3.7 mm Hg) (p<0.05). Complete and qualified success were respectively 64.3% and 89.3% in the group with antimetabolites and 70.6% and 82.4% in the subgroup without antimetabolites (p>0.05).

1st month postoperative complications were transient and minor. They occurred in 59% in the group without antimetabolites and in 68% in the subgroup augmented with antimetabolites. Complications had comparable frequency of distribution between the 2 subgroups (p>0.05).

84% of the filtration blebs (30/45) were diffuse and mildly vascularized. Avascular blebs were noticed in 7 eyes (15.5%) and were not related with the intraoperative application of mitomycin C (p>0.05). Subjective comfort was good to excellent in 42/45 eyes (93.3%). Mean final visual acuity was not altered compared with preop level (p>0.05).

Conclusions: Our short term results suggest that the safety of “modern” trabeculectomy augmented with antimetabolites is comparable to those without intraoperative antimetabolites. Filtration blebs were very well tolerated in most patients. The peroperative use of antimetabolites precludes to appreciate if the success rates are due to the use of antimetabolites and/or the technique per se.
RÉSUMÉ

Objectif: Grâce à ses innovations techniques, la trabéculectomie "revisée" vise à diminuer la fréquence et la gravité des complications postopératoires précoces de la chirurgie, tout en augmentant le succès tensionnel à long terme. Le but de notre étude est d’apprécier en 1ère intention, l’innocuité de la trabéculectomie "revisée", la qualité des bulles de filtration, les symptômes de dysesthésie éventuellement associés et secondairement la réduction de pression intraoculaire (PIO) obtenue selon que l’intervention a été couplée ou non à une application peropératoire d’un antimétabolite.

Matériel-Méthodes: Etude rétrospective incluant nos 45 premières trabéculectomies réalisées consécutivement chez 38 patients (âge moyen: 61,1 ans) porteurs d’un glaucome non contrôlé médicalement. Les interventions ont été réalisées selon une variante légèrement modifiée de la technique de P.Khaw. Des antimétabolites ont été appliquées en peropératoire chez 28/45 yeux (62.2%) ayant un antécédent de chirurgie filtrante (12/28 yeux) et/ou un déficit glaucomateux sévère (22/28 yeux). Les 17 autres interventions réalisées sans antimétabolites concernent des yeux à plus faible risque chirurgical et des PIO cibles comprises entre 15 et 20 mm Hg. Nous avons procédé au cours du 1er mois postopératoire à une section au laser des sutures du volet scléral, au retrait des sutures ajustables et au besoin, à des injections sous-conjonctivales de 5 Fluorouracile. Nous avons procédé à un examen oculaire complet en préop, et en postopératoire à 1,7 jours, 1,2 et 3 mois puis trimestriellement. Tous les patients ont été interrogés sur d’éventuels symptômes de sécheresse oculaire en relation avec leur bulle de filtration.

Résultats: Le recul moyen actuel est de 7.9 ±3.3 mois dans le groupe n’ayant pas reçu d’antimétabolites et de 5.3±2.2 mois dans celui en ayant reçu (p<0.05). La PIO finale (±SD) est significativement plus basse dans le groupe ayant bénéficié d’une application d’antimétabolites (11.2±4.5 mm Hg) que dans le groupe sans antimétabolites (14.9±3.7 mm Hg) (P<0.05). Les taux de succès complet et relatif sont respectivement de 64.3% et 89.3% lorsqu’il y a eu application d’antimétabolites et de 70.6% et 82.4% dans le groupe sans antimétabolites. Les complications observées au cours du 1er mois post opératoire sont transitoires, mineures et sont recensées chez 59% des yeux opérés sans antimétabolites et 68% des cas couplés à une application d’antimétabolites. La fréquence de distribution des complications est comparable entre les 2 groupes (p>0.05). 30/45 (84%) des bulles de filtration sont diffuses et légèrement vascularisées avec un confort subjectif bon à excellent dans 95% des cas. Une bulle cystique avasculaire est présente dans 7 cas, sans relation apparente avec une application éventuelle de Mitomycine C. L’acuité visuelle finale n’est pas significativement modifiée (p>0.05).

Conclusions: Notre expérience à court terme tend à montrer que l’innocuité d’une trabéculectomie "moderne" associée à une application peropératoire d’antimétabolites est comparable à celle réalisée sans antimétabolites et que les bulles de filtration obtenues sont compatibles avec un excellent confort subjectif dans la majorité des cas. Notre méthodologie ne nous permet pas d’apprécier si les taux de succès notés sont le fait de l’utilisation d’antimétabolites ou sont liés à la technique opératoire elle-même.

KEY WORDS
Glaucoma surgery, trabeculectomy, adjustable sutures, releasable sutures, antimetabolites, filtration bleb, quality of life (QoL).

MOTS-CLÉS
Chirurgie du glaucome, trabéculectomie, sutures ajustables, antimétabolites, bulle de filtration, qualité de vie.
The continuing quest for safer and more successful glaucoma surgery had motivated surgeons to revisit trabeculectomy in the past few years (12).

By differing from standardized Cairn's trabeculectomy in the instrumentation used to perform the lamellar scleral flap and the trabeculectomy, in the scleral flap dissection itself and the placement of both adjustable and releasable sutures, "modern" trabeculectomy mainly aims in reducing the incidence and the severity of early postoperative hypotony and to increase post-operative success (8). Low intraocular pressure (IOP) and decrease of IOP diurnal fluctuations have been shown to be associated with reduced progression of visual field defects in patients with advanced glaucoma (1). When a filtering surgery is necessary in glaucomatous patients with far advanced glaucomatosous damage, intraoperative application of antimetabolites is usually recommended to reach low target IOP (< 12 mm Hg) (7).

Since August 2003, we have experienced "modern" trabeculectomy in a cohort of patients with various surgical risk and different stages of glaucomatous damage. Intraoperatively we had applied antimetabolites in eyes with history of previous filtering surgery and/or suffering from severe visual field defects. Then the primary purpose of this study was to appreciate the safety of this revisited procedure in the early postoperative course as well as the quality and the tolerance of the filtration blebs.

MATERIAL-METHODS

1. Patients

This was a retrospective, non randomized, interventional case study including our first 45 consecutive procedures in 38 patients refractory to medically uncontrolled glaucoma (22 female, 16 male). African ethnicity concerned 2 patients. The mean age of the patients was 61.1 ± 17.4 years (14 to 82 years). Minimum follow-up was 3 months.

30 eyes (73%) suffered from Primary Open Angle Glaucoma and Normal Tension Glaucoma. 3 eyes (6%) had ocular hypertension ≥ 35 mm Hg in spite of maximal medical therapy. Pseudoxfoliative glaucoma was present in 2 eyes (4%). 5 eyes (11%) had primary closed-angle glaucoma.

Severe visual field defects associated with a Mean Defect > - 12 dB in Humphrey computerized perimetry were present in 60% of the eyes. 12 eyes (27%) had one previous filtering procedure or more (one filtering procedure in 10 eyes, two filtering procedures in 1 eye, phakotrabeculectomy in 1 eye).

The preoperative best corrected mean visual acuity was 0.7 ± 0.5 (0.05 to 1.0). Lens opacities were noticed to different degrees in 50% of the eyes.

Preoperatively, the mean number of medications was 2.6 ± 0.7 (1 to 4) whereas the mean duration of treatment was 115 ± 82 months (2 to 360 months).

Table 1 summarizes the demographics of patients.

2. Surgical procedure

All procedures were performed according to a slightly modified P. Khaw's protocol (8) as following and summarized on the drawing 1:

1. Placement of a superior 9-0 vicryl peripheral corneal traction,
- Dissection of a fornix-based conjunctival flap on 2 hours o'clock width with dissection of conjunctiva and Tenon's capsule backwards.
- Dissection of a rectangular 4×3 mm scleral flap (about 50% of the scleral thickness) and continuation into a sclero-corneal tunnel on its anterior one third.

2. Pre-placement of two nylon 10-0 adjustable sutures in the bed of two corneal grooves performed at 0.5 mm from the limbus in front of the lateral sides of the scleral flap. Preplacement of one nylon 10-0 releasable suture.

3. Paracentesis in the inferior temporal quadrant with a V-Lance™ Knife 20 Gauge 1.3 mm (Alcon®). Introduction of a Blumenthal conic anterior chamber maintainer canula (B.D.Visitech® FL, USA) connected to an infusion bottle in order to provide anterior chamber continuous infusion.

- Positioning of the infusion bottle at 35 cm above the patient's head to maintain an intracameral IOP of about 10 mm Hg.

4. Trabeculectomy in a deep block dissection with the 0.5×0.5 Khaw's small Descemet mem-
brane punch (Duckworth and Kent™, Lensesita™ for Belgium)
5. Peripheral iridectomy.
- Topical atropine 1% administration.
6 and 7. Tying up of adjustable sutures with a seamanship’s knot (4 simple loops). Closure of the preplaced releasable suture and placement of one or more additional releasable sutures if needed according to the degree of observed filtration. A slight aqueous percolation through the interstices of the scleral flap must be observed at this time.
8. Tight closure of the conjunctivo-tenonian flap with 10-0 Biosorb® (P-3 needle) (Alcon®) separate sutures.
9. Withdrawal of the anterior chamber infusion canula and suture of paracentesis with a nylon 10-0 monofilament.
- Inferior subconjunctival injection of betamethasone (4mg/ml)
When needed, 2 or 3 small sponges soaked with 5 fluorouracil (5-FU) or mitomycin C (0.1 and 0.2 mg/ml) were applied after the dissection of the conjunctiva and before the dissection of the scleral flap. Sponges were placed beneath the conjunctival flap as posteriorly as possible to increase the antimetabolite treatment area.

Table 1: Demographics

<table>
<thead>
<tr>
<th></th>
<th>38 patients (22F/16M)</th>
<th>45 eyes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean age</strong></td>
<td></td>
<td>61.1±17.4 years (14 to 82 years)</td>
</tr>
<tr>
<td>(mean years±SD)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td></td>
<td></td>
</tr>
<tr>
<td>African</td>
<td></td>
<td>2 pts</td>
</tr>
<tr>
<td><strong>Diagnosis</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary open-angle glaucoma and Normal Tension Glaucoma</td>
<td>30</td>
<td>67</td>
</tr>
<tr>
<td>Ocular hypertension</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Exfoliative Glaucoma</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Primary closed-angle</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>Congenital Glaucoma</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Secondary Glaucoma</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td><strong>Pseudophakic /aphakic</strong></td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td><strong>Previous filtering surgery</strong></td>
<td>12</td>
<td>27</td>
</tr>
<tr>
<td><strong>Preoperative medications</strong></td>
<td></td>
<td>2.60 ±0.7 (1 to 4)</td>
</tr>
<tr>
<td>(mean number ± SD)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Duration medications</strong></td>
<td></td>
<td>115±82 months (2 to 360 months)</td>
</tr>
<tr>
<td>(mean number of months + SD)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Preoperative best corrected visual acuity</strong></td>
<td>0.75±0.48 (0.05 to 1.0)</td>
<td></td>
</tr>
<tr>
<td><strong>VF defect (HFA)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Mild (MD ≤ - 6 dB)</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Moderate(-12 dB&gt;MD&gt;−6 dB)</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Severe (MD&gt;−12 dB)</td>
<td>27</td>
<td>60</td>
</tr>
</tbody>
</table>
Intraoperative antimetabolite application was done in 28 eyes (62.2%). Mitomycin C at the concentration of 0.1mg/ml in 7 eyes and 0.2mg/ml in 16 eyes, was applied in 23/28 eyes with a mean duration of application of 58.9±10.6 seconds (minimum: 10 sec; maximum: 180 seconds). 5-Fluorouracile (50mg/ml) was applied in the other 5 eyes. Mean duration application of 5-Fluorouracile was 153 seconds (45 to 180 seconds).

The table 2 summarizes the number of previous filtering surgery and the severity of glaucomatous damage in the 17 procedures without intraoperative antimetabolites and the 28 ones augmented with intraoperative antimetabolites.

The first month postoperative management included step-by-step laser suture lysis, withdrawal of releasable sutures and 5-FU (5mg) injections whenever needed. According to the spontaneous evolution, laser suture lysis was considered between day 3 and day 14. Releasable sutures were generally withdrawn from the surgical corneal groove with one week interval, using a jeweller’s forceps at the third postoperative week.

Due to technical difficulties, control and mobilization of adjustable sutures with a special transconjunctival forceps (Khaw Transconjunctival Adjustable Suture Control Forceps manufactured by Duckworth and Kent™) was not performed during the postoperative visits.

Postoperative topical treatment consisted in a combination of framicetine, dexamethasone three times daily for 4 weeks. If needed, cyclopentolate was instilled once or twice daily during the early postoperative days.

Complete ocular examination was carried out preoperatively and postoperatively, at day 1, 7, at 1, 2, and 3 months and every 3 months thereafter.

3. Success criteria

Complete success was defined as a clinical target IOP reached without medication for each patient at the last examination.

Qualified success was considered when an individual final target IOP was reached with or without medication.

The calculation of target IOP was done using H. Jampel’s formula (9):

\[
\text{Target IOP} = \text{maximum IOP} - \text{maximum IOP%} - Z (Z= \text{optic nerve damage severity factor}).
\]

When "maximum" IOP (which is the value of IOP at which glaucomatous damage presumably occurred) was unknown, the calculation was based on the severity of optic nerve damage and the associated risk factors for glaucomatous neuropathy.

Graph 1 shows the repartition of the target IOP’s for the two subgroups with and without intraoperative antimetabolites augmentation.

4. Questionnaire on Quality of life (QoL).

All patients were questioned for ocular discomfort (burning, itching, sensation of dry eye, tearing and others) associated with filtration bleb dysesthesia at the last visit. According to their intensity, symptoms were graded as 0 (no symptom), 1 (mild and tolerable), 2 (moderate and alleviated with artificial tear application) and 3 (severe).

5. Statistical analysis

Student’s tests were used for comparison of pre and postoperative IOP measurements.

Chi-square analysis for 2×2 tables and Anova test were used for comparative analysis of preoperative demographic characteristics, postoperative complications, success rates and filter-
tion bleb morphology in surgeries augmented with intraoperative antimetabolites or not. 

A $p$ value $< 0.05$ was considered statistically significant.

RESULTS

Mean actual follow-up time was $6.3\pm2.9$ months (minimum: 3 months, maximum: 13 months). It was $7.9\pm3.3$ months in the group without antimetabolites and $5.3\pm2.2$ months in the procedures augmented with antimetabolites ($p<0.05$).

Peroperatively Surgical procedure was uncomplicated in 34 eyes (76%). A microhyphema has occurred in 6 eyes. Peroperative complications were not related with training.

1st month postoperative course 5-FU injections were performed in 9 eyes (20%) with $5.6\pm2.7$ injections done on average. 6 eyes were from the subgroup with intraoperative antimetabolites (6/28 eyes, 66.6%) and 3 eyes from the subgroup without intraoperative antimetabolites (3/17, 17.6%). For the whole group, most of the observed complications were transient and minor. Postoperative early anterior chamber inflammation was mild to moderate in all cases. The most frequent complication was a conjunctival wound leak (positive Seidel test) in 11 eyes (24.4%) that was associated with a shallow anterior chamber in only one case. Maximum duration of Seidel was 4 days. In all 11 eyes, this concern was resolved by adding one suture with 10-0 Biosorb® (Alcon®) and/or the application of a 20.50 mm Megasoft contact lens (Procornea®). Moderate hyperfiltration with transient shallowing of anterior chamber (grade I: peripheral iris-cornea contact) was noticed in 7 eyes (15.5%) during the first 4 postoperative days. Marked conjunctivo-tenonian fibrosis with cystic filtration blebs was observed in 5 eyes (11%). For 2 of the 3 eyes who failed to develop a filtration bleb and a significant IOP decrease, surgical exploration of the filtration site was performed respectively at 2 and 3 months postoperatively and was successful in one case. At 3 weeks postoperatively, anterior vitrectomy was required in a intracapsular aphakic

![Graph 1. Preoperative repartition of the target IOP’s in the two groups](image-url)
young patient in whom trabeculectomy was complicated by vitreous hernia in the trabeculectomy site. 1st month postoperative complications were observed in 59% and 68% respectively in trabeculectomies without antimetabolites and in the surgeries augmented with intraoperative antimetabolites. The frequency of the distribution of the observed complications was not different between the 2 groups (chi-square p-value >0.05).

The table 3 summarizes postoperative complications during the 1st month for the whole population.

<table>
<thead>
<tr>
<th>Complications</th>
<th>Number of eyes</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>16</td>
<td>36</td>
</tr>
<tr>
<td>Transient leaks</td>
<td>11</td>
<td>24.4</td>
</tr>
<tr>
<td>Hyperfiltration + shallow AC</td>
<td>7</td>
<td>16</td>
</tr>
<tr>
<td>Excessive scar tissue</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>Vitreous incarceration</td>
<td>1</td>
<td>2.2</td>
</tr>
</tbody>
</table>

IOP results and success rates

For the whole sample and from a mean preoperative value of 25±8.2 mm Hg, IOP was highly significantly reduced to 12.6±4.6 mm Hg at the last visit, corresponding to a percentage of IOP reduction of 49.6% (p< 0.05).

The graph 2 shows the mean IOP results, their standard deviation and the sample size at each time interval. The graph outlines that the mean IOP was significantly reduced at all visits (p<0.05).

The IOP decrease evolution was relatively stable throughout the follow-up period. The mean IOP values slightly increased to 14.1 mm Hg from the 4th postoperative month, but still on a small sample size. 78% (35/45) of the eyes have a final IOP ≤ 15 mm Hg with adjunctive medical treatment in 23% (8 eyes).

Graph 2. Mean IOP results with their standard deviation and the sample size at each time interval.
The mean (±SD) preoperative IOP values were 26.2±3.4 mm Hg and 24.3±10.1 mm Hg respectively in the group without intraoperative antimetabolites and the group augmented with antimetabolites (p>0.05). At the last visit, mean IOP (±SD) was significantly lower in the group augmented with antimetabolites (11.2±4.5 mm Hg) comparatively with the group without antimetabolites (14.9±3.7 mm Hg)(p<0.05).

In the subgroup of the 28 trabeculectomies augmented with intraoperative antimetabolites, a final IOP value ≤12 mm Hg was reached in 20 eyes. A final IOP value ranging from 13 to 16 mm Hg was obtained in 2 eyes whereas 6 eyes had measured IOP between 17 and 21 mm Hg at the last visit. In the subgroup of the 17 trabeculectomies without intraoperative antimetabolites, a final IOP ≤12 mm Hg was reached in 2 eyes, a final IOP value ranging from 13 to 16 mm Hg was measured in 11 eyes and a final IOP value ranging from 17 to 21 mm Hg was obtained in 2 eyes. 2 eyes had final IOP values of 22 and 25 mm Hg respectively (graph 3).

According to the predefined success criteria, 66.7% (30/45) of the eyes presented with complete success at the last visit. Qualified and complete success concerned 86.7% of the eyes. Complete and qualified success rates were slightly but not significantly higher in the subgroup augmented with antimetabolites than in the subgroup without antimetabolites: complete and qualified success were observed in 64.3% and 89.3% respectively in the group with antimetabolites and in 70.6% and 82.4% of the eyes not having received antimetabolites (chi-square p-value > 0.05).

MORPHOLOGY OF THE FILTRATION BLEBS

At the final visit, 84% (30/45 eyes) of the filtration blebs were diffuse or slightly elevated and mildly vascularized.

The analysis of the patients’s questionnaire on QoL revealed that subjective comfort was good to excellent in 42 out of the 45 eyes (93.3%). Symptoms were graded as following: grade 0:...
41 eyes; grade 1: 1 eye; grade 2: 1 eye; grade 3: 1 eye.
Avascular blebs were noticed in 7 eyes (15.5%) and were, at this stage, not related with the intraoperative application of mitomycin C (chi-square p-value > 0.05).

**Visual acuity**

For the whole group, the mean final visual acuity (0.74±0.40) was not significantly altered compared with its preoperative level (p > 0.05).

**DISCUSSION**

By focusing their research on the observation that high initial aqueous outflow can be deleterious after any filtration surgery, P. Khaw and co-workers had recently innovated trabeculectomy procedure, aiming at achieving safer long-term postsurgery outcomes with minimal complications (2,8,12). In conjunction with advances allowing safer control of long-term healing processes, both titrations of peroperative IOP through anterior chamber continuous infusion and short-term postoperative IOP with step-by-step scleral flap suture release, have been a major advance in terms of the prevention of early hypotony. In a recent paper dealing with an experimental model of conventional guarded filtration surgery, A. Wells and co-workers had suggested that suture adjustment by direct transconjunctival manipulation of the adjustable sutures, may be superior to both standard posterior lip massage and releasable sutures for managing IOP in the early phase following glaucoma surgery (14).

To the best of our knowledge, results of this modern approach which allows posterior, unrestricted drainage of aqueous and minimize hyperfiltration related complications, has not been published yet.

Owing to its retrospective nature, our study included heterogeneous risk for surgical failure patients. Unlike to the group of the 17 (37.8%) trabeculectomies without intraoperative antimetabolites application, 12/28 (42.8%) procedures augmented with antimetabolites concerned eyes with one or more previous filtering surgery. Concomitantly, severe glaucomatous damage requiring target IOP’s in the low teens, concerned 22/28 eyes (78.5%) of this group and only 5/17 eyes (29.4%) without application of antimetabolites. Herein our two subgroups are not possible to compare in terms of postsurgery IOP reduction; moreover they have a significantly different follow-up.

At this stage, our results could only suggest that "modern" trabeculectomy is a relatively safe procedure and that filtration blebs were very well tolerated by the great majority of patients. In terms of final IOP’s values and success rates, the fact that the final IOP was significantly lower (11.2±4.5 mm Hg) in the subgroup augmented with antimetabolites comparatively with the subgroup without antimetabolites (14.9±3.7 mm Hg) is probably related to the application of antimetabolites itself and its well-known effects (7). The number of postoperative 5-Fluorouracile injections was lower in the subgroup without antimetabolites which included eyes with a lower surgical risk for failure and a distribution of target IOP’s in the high teens for most of them. In the same way, the fact that about 20% of the subgroup augmented with antimetabolites needed adjunctive medical treatment and only 11.8% in the subgroup without antimetabolites is not conclusive and has probably a multifactorial origin.

Unlike to standard trabeculectomy which is known to be associated with more frequent and potentially vision threatening complications, our experience dealing with "modern" trabeculectomy suggested that the 1st month postoperative complications are minor and transient whether antimetabolites have been applied or not (3,4). Early postoperative conjunctival wound leaks observed in one fourth of cases are preventable by a careful tight closure of the conjunctival flap. This reduced incidence of early postoperative complications suggests that "modern" trabeculectomy could be as safe as non-penetrating deep sclerectomy (6,10,11).

Even more important, by doing this technique and whether using or not intra- and postoperative antimetabolites, filtration bleb morphology was safe and consistent with the maintenance of good quality of life in a large majority of the patients (QoL). Both fornix-based conjunctival flap and strictly posterior application of intraoperative antimetabolites when needed, are crucial to promote diffuse, mildly vascularized filtration and to reduce the incidence of avascular cystic high risk filtration blebs (12).
However, our follow-up is still too short to confirm that the current characteristics of the filtration blebs, specially, in the subgroup augmented with Mitomycin C will be stable and concomitantly associated with a reduced incidence of endophthalmitis. Anyway potential long-term complications associated with intraoperative use of mitomycin should warn of the potential dangers of routinely using antimetabolites during surgery. We had not proceeded to the suture adjustment in the early postoperative course as recommended by Wells et al, because we had experienced that this technical refinement was practically difficult to manage. Moreover, releasable sutures are not always visible and accessible to laser cutting, specially when the conjunctiva and Tenon’s capsule are thick and abnormally congestive. On the other hand, adjustable sutures are easier to withdraw than releasable sutures owing to the technique of the seamanship’s knot.

Modern trabeculectomy has some other potential advantages. It requires a relatively short learning curve, as suggested in our experience, and can be performed in one-day surgery. The longer duration of the surgery itself comparatively with standard trabeculectomy and the need for special instrumentation are some non consistent limitations of the procedure. Our study is indeed biased and limited by its retrospective nature, its small and heterogeneous sample size. Above all, the application of antimetabolites in a large proportion of eyes precludes an objective complete analysis of this revisited procedure. Within the design of this study, it is very difficult to know if the success rates are due to the use of antimetabolites and/or the technique employed. Definitely, we also need a longer follow-up to confirm these results.

Finally, we need to further refine our current technique, especially by an early postoperative appropriate direct suture adjustment through a transconjunctival manipulation of the filtration bleb (14). Needle revision of failing and failed trabeculectomy blebs would also have probably reduced the need for surgical revision of the filtration bleb (5).

**CONCLUSION**

Our short term results suggest that the safety of "modern" trabeculectomy augmented with antimetabolites is comparable to those of the same procedure non associated with intraoperative antimetabolites and that filtration blebs are very well tolerated by the large majority of patients. The final IOP success could be in the low teens in a substantial proportion of cases, but the intraoperative application of antimetabolites precludes to appreciate if the success rates are due to the use of antimetabolites and/or the technique employed.

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