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Trabeculectomy and phaco-trabeculectomy with and without peripheral iridectomy

AUDREY KAPLAN-MESSAS[1], YUVAL COHEN[1], EYTAN Z. BLUMENTHAL[2], ISAAC AVNI[1]

[1]Department of Ophthalmology, Assaf Harofeh Medical Center, Zerifin, affiliated with the Sackler Faculty of Medicine, Tel Aviv University
[2]Department of Ophthalmology, Hadassah–Hebrew University Medical Center, Jerusalem - Israel

PURPOSE. *To compare the 1-year outcome of trabeculectomy and combined phaco-trabeculectomy that were performed with or without a peripheral iridectomy (PI).*
METHODS. *In a large tertiary glaucoma clinic, with a single surgeon performing all surgeries, 47 patients scheduled to undergo either a primary trabeculectomy or phaco-trabeculectomy were prospectively randomized to surgery with or without peripheral iridectomy. Other than the inclusion (PI group) or omission (no PI group) of a PI, surgical technique and postoperative care were identical for the two groups. The two groups were compared for intraocular pressure (IOP), success rates, visual acuity (VA), and complication rates. Complete and qualified success rates were defined as IOP 18 mmHg or less with or without medications, respectively.*
RESULTS. *The 1-year complete and qualified success rates were comparable for both groups. Complete success was observed in 70% of cases, and qualified success in more than 90%. One patient (4.3%) from the no-PI group developed an iris incarceration into the internal sclerectomy site on postoperative day 1, requiring surgical intervention. No other significant complications (blebitis, endophthalmitis, or choroidal hemorrhage) were encountered in any of the study patients.*
CONCLUSIONS. *This randomized prospective small scale study explored the possibility of sparing the need to perform a routine PI in trabeculectomy and phaco-trabeculectomy. These preliminary results suggest that the outcomes in the two groups are comparable, paving the way to a larger scale study evaluating the need for PI in modern trabeculectomy surgery. (Eur J Ophthalmol 2009; 19: 231-4)*

KEY WORDS. *Trabeculectomy, Phaco-trabeculectomy, Peripheral iridectomy, Trabeculectomy without peripheral iridectomy*

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INTRODUCTION

Peripheral iridectomy (PI) is performed either surgically or with a laser to halt or prevent an attack of angle closure glaucoma resulting from pupillary block. Pupillary block has also been described in pseudophakic eyes (1, 2). In distinction, the rationale for performing PI as part of trabeculectomy surgery is primarily to avoid iris incarceration into the inner ostium, which would block the surgical fistula. In addition, in phakic eyes with a narrow angle, it is possible that a PI will also alleviate the pupillary block component in a post-trabeculectomy eye.
While providing mechanical advantages as listed above, performing a PI also has several unwanted effects such as modification of the normal aqueous humor flow through the pupil and disruption of the blood–aqueous barrier (3). The latter, in turn, increases inflammation in the eye, leading to excessive postoperative wound healing.

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The actual PI procedure involves the risk of damaging ciliary processes, markedly increases the risk of bleeding into the anterior chamber, and might disrupt the lens capsule. In one study it was suggested that the focal absence of iris cover may be cataractogenic (4).

There are several obvious surgical advantages for not performing a PI during trabeculectomy. First, enhancing safety: PI is the only intraocular portion of a trabeculectomy, with inherent risks of bleeding, introduction of bacteria, shallowing of the anterior chamber, and crystalline lens damage. Second, enhancing efficacy: postoperatively, we speculate that such crude disruption of the blood–aqueous barrier secondary to the PI might enhance prolonged inflammation, resulting in an increased tendency for scarring and hence bleb failure. Finally, manipulation of the iris during cataract surgery has been associated with increased intraoperative pain, raising the possibility that a PI might do the same (5).

In this prospective study, we sought to determine whether avoiding a PI compromises short and long-term safety and success of trabeculectomies and phaco-trabeculectomies.

METHODS

Patients

Patients were enrolled from the glaucoma clinic in one large tertiary medical center if they had open-angle glaucoma (including pseudoexfoliation and pigmentary glaucoma) uncontrolled with maximal medical therapy and were scheduled for a trabeculectomy or phaco-trabeculectomy. Exclusion criteria were age under 18; previous intraocular surgery; glaucoma laser treatment in the previous 6 months, such as laser iridectomy, selective laser trabeculoplasty, argon laser trabeculoplasty, and transscleral cyclophotocoagulation; secondary glaucoma; or an angle-closure component. Randomization to PI or no-PI group was performed using a table of random sampling. Informed consent was obtained from all participants, and Institutional Ethics Committee approval was obtained. Patient recruitment spanned a 12-month period.

Surgical technique

All surgeries were performed by one surgeon (A.K.M.) using one surgical technique, using topical anesthesia. A two-site phaco-trabeculectomy was performed in a three-stage procedure. The first was the preparation of the trabeculectomy, which included a fornix-based 6 mm conjunctival incision followed by mild cautery. Then, creation of a 4 mm square half-thickness scleral flap and application of 0.2 mg/mL mitomycin C for 1 minute was performed. The second stage was a standard phacoemulsification within the capsular bag using the chop technique. Phacoemulsification was done in a second site through a temporal clear cornea incision distant from the trabeculectomy site. In the third stage, the scleral flap was elevated and a posterior lip sclerectomy was performed with a Kelly-Descemet punch. Based on randomization, a PI was performed using Vannas scissors, without the instillation of miotics. The scleral flap was sutured with two releasable and additional fixed 10-0 nylon sutures, as needed, and the conjunctival incision was sutured in place.

All patients were followed postoperatively at days 1, 7, and 30, and after 3 months, 6 months, 9 months, and 1 year. During each of these examinations a complete slit-lamp evaluation and Goldmann applanation tonometry were performed, and if needed, additional surgical interventions (release of sutures, bleb needling) were performed. Visual acuity was tested through a pinhole, to overcome media opacities and refractive changes, primarily astigmatism, common after cataract and glaucoma surgery. The primary outcome of the study was the overall IOP lowering in the two groups at 1 year. Complete and qualified success rates were defined as an IOP of 18 mm Hg or less without or with medications, respectively.

Statistical analysis

Statistical significance was analyzed using Student *t*-test for data involving means. A p value less then 0.05 was accepted as statistically significant. Data were analyzed using JMP statistical software version 5.0 (SAS Institute, Cary, NC).

RESULTS

Table I presents the preoperative patient demographics. Twenty-four patients were randomized to the PI group (18 phaco-trabeculectomy, 6 trabeculectomy), and 23 patients comprised the no-PI group (18 phaco-trabeculectomy, 5 trabeculectomy). All patients underwent surgery as planned. One patient from the PI group was lost to follow-up after the 6-month visit. None of the patients experi-

enced major complications, such as blebitis, endophthalmitis, choroidal hemorrhage, or retinal detachment.
Table II summarizes the postoperative results for each group. Table III summarizes the complication rates in each group. No significant difference in complication rates was found between the two groups, although more hypotony and hyphemas occurred in the PI group. In addition, filtering bleb appearance (vascularization, size, elevation) as well as the presence of peripheral anterior synechia at the location of the inner ostium (per gonioscopy) did not differ statistically between the two groups. Incarceration of the iris into the inner ostium of the trabeculectomy occurred in one patient who underwent trabeculectomy alone without PI. This complication was resolved without sequel by surgical intervention that included simple release of the iris from the ostium without performing peripheral iridectomy. Regarding overall IOP lowering in the two groups, the 1-year complete and qualified success rates, respectively, were 70% and 91% (PI group) and 70% and 95% (no-PI group). No statistically significant difference was

TABLE I - PREOPERATIVE PATIENT DEMOGRAPHICS

Characteristics	PI group	No-PI group	p-value
Age (years) Mean ± SD (range)	75.0 ± 10.8 (46-88)	75.2 ± 6.9 (62-88)	0.96
Gender: Male: Female:	11 13	15 8	0.03
IOP (mmHg) Mean ± SD (range)	26.9 ± 1.9 (17-60)	28.0 ± 2.0 (18-52)	0.7
‡Log MAR VA ± SD	0.27 ± 0.25	0.33 ± 0.24	0.39
Mean # of pressure-lowering medications Mean ± SD	3.1 ± 1.0	3.24 ± 1.1	0.47
Vertical C/D ratio Mean ± SD (range)	0.79 ± 0.02 (0.5-1.0)	0.88 ± 0.03 (0.6-1.0)	0.012

PI: peripheral iridectomy; C/D ratio: cup to disc ratio; ‡ Log MAR pinhole visual acuity. Statistical significance was analyzed using Student-t test

TABLE II - POSTOPERATIVE RESULTS

Characteristics	PI group			No-PI group		
	1-month	6-month	1-year	1-month	6-month	1-year
IOP (mmHg) Mean ± SD range	11.5 3.7 6-24	11.2 3.5 5-17	12.9 0.9 8-20	13.4 4.8 7-24	12.5 4.0 6-22	12.4 0.7 6-24
p-value of PI vs. No-PI	0.18	0.31	0.61	---	---	---
‡Log MAR VA ± SD	0.29 ± 0.26	0.37 ± 0.27	0.39 ± 0.27	0.44 ± 0.24	0.41 ± 0.2	0.38 ± 0.24
p-value of PI vs. No-PI	0.06	0.69	0.95	---	---	---
†Meds Mean ± SD	0.08 ± 0.1	0.2 ± 0.1	0.46 ± 0.2	0.1 ± 0.09	0.34 ± 0.1	0.43 ± 0.1
p-value of PI vs. No-PI	0.70	0.47	0.92	---	---	---

PI: peripheral iridectomy; † Meds: number of pressure-lowering medications; ‡ Log MAR pinhole visual acuity. The groups were compared using Student-t test

TABLE III - POSTOPERATIVE COMPLICATION RATES.

Characteristics	PI group	No-PI group
Early postoperative inflammatory response	6	4
Blebitis/endophthalmitis	0	0
Choroidal hemorrhage/retinal detachment	0	0
Wound leak (positive Seidel's test)	1	1
Hypotony (IOP<5) at any point in time	3	1
Hyphema	3	1
Cystoid macular edema	1	0
Iris incarceration	0	1

PI: peripheral iridectomy; Early postoperative inflammatory response: low grade cellular inflammation of the anterior chamber

found between the two groups for both complete and qualified success rates. Three patients in the PI group and four patients in the no-PI group had one bleb needling procedure during follow-up. No patient had undergone re-trabeculectomy, or other glaucoma filtering surgery.

DISCUSSION

Shingleton et al reported their retrospective analysis of a comparison of phaco-trabeculectomy with or without PI (6). They found similar postoperative IOP as well as similar complication rates. Moreover, iris incarceration was not detected in their study as well as in a prospective case series of phaco-trabeculectomy without PI (7).

In this study, we evaluated the safety and efficacy of a non-PI trabeculectomy and phaco-trabeculectomy. While a relatively small study, with a 1-year follow-up, our results suggest that non-PI trabeculectomy and phaco-trabeculectomy might be viable options worth exploring in larger prospective randomized studies.

One major limitation of our study is the relatively small proportion of trabeculectomies recruited, as compared to the phaco-trabeculectomy group. This is an important point as phakic eyes may behave differently than pseudophakic eyes in regards to their ability to maintain a safe filtering fistula without an underlying PI. The one eye in which iris incarceration occurred on the first postoperative day belonged to the relatively small trabeculectomy no-PI group, with no further complications. A much larger study would be necessary to determine the overall frequency and implications of this isolated complication.

Of historical interest, PIs were at one time routinely performed as part of extracapsular cataract extraction, until eventually proven unnecessary (8-10).

In conclusion, our results seem to indicate that based on this small series of patients, phaco-trabeculectomy performed without a PI appears to be a safe alternative to the standard technique. Pressure reduction, as well as early and late complication rate, appeared comparable. Regarding trabeculectomy without PI, a larger cohort is needed to reach the same conclusion. Larger multicenter studies are needed to better evaluate the feasibility of eliminating the PI, and establishing which subgroups benefit most from this surgical variation.

Proprietary interest: None.

Reprint requests to:
Audrey Kaplan-Messas, MD
Department of Ophthalmology
Assaf-Harofe Hospital
Zrifin 70300, Israel
audreykap@gmail.com

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