

Should an iridectomy be routinely performed as a part of trabeculectomy? two surgeons' clinical experience

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Abstract

Purpose To investigate the effects of performing peripheral iridectomy on the outcome of trabeculectomy.

Methods Retrospective chart review of the medical records of 75 patients (75 eyes) who underwent trabeculectomy surgery, with or without peripheral iridectomy, who had been followed for more than 1 year. Data were collected preoperatively, 1 day postoperatively, on days 30–90 postoperatively, and 1–3 years postoperatively. The collected data included visual acuity, intraocular pressure, bleb development, postoperative inflammation, and complications. Thirty-six eyes (48%) had cataract extraction at the time of trabeculectomy. A peripheral iridectomy was performed in 43 cases (57%). Student's *t*-test was used for the statistical analyses.

Results Patients having peripheral iridectomy had more inflammation on days 30–90 than those who did not have peripheral iridectomy performed (in patients having cataract extraction with trabeculectomy ($P = 0.018$) and those not having cataract extraction ($P = 0.038$)). There was no statistically significant difference in intraocular pressure in eyes with or without iridectomy. Postoperative complications were rare in both groups but greater in number in the eyes with peripheral iridectomy.

Conclusions Trabeculectomy performed without peripheral iridectomy appears to be as effective in lowering intraocular pressure as when performed with peripheral iridectomy, but it is a safer procedure, with a lower incidence of postoperative inflammation. It may be an advantage to avoid performing

peripheral iridectomy during trabeculectomy in eyes that are not predisposed to postoperative shallowing of the anterior chamber or pupillary block.

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Introduction

Peripheral iridectomy (PI) has been a routine part of filtration procedures for over 100 years. The removal of iris tissue lessened the likelihood of an iris prolapse into the area of filtration, and that the patient might develop pupillary block as a consequence of the posterior synechias that routinely followed these operations.¹

Today, there is a better understanding of how to prevent the excessive filtration that frequently followed full-thickness filtration surgery.² Furthermore, the availability of anti-inflammatory eye drops has greatly lessened the likelihood of the development of pupillary block.

Peripheral iridectomy induces an inflammatory response.³ Additionally, complications such as bleeding and vitreous loss may follow iridectomy.

Evaluating the need for an iridectomy as a routine part of a filtration procedure seems appropriate. Shingleton and co-authors⁴ have reported that it is probably not necessary to perform PI in conjunction with a trabeculectomy when it is done at the same time

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as a cataract extraction. The purpose of the present report is to describe our experience in performing trabeculectomy without iridectomy, both in cases having a simultaneous cataract extraction and in those cases where only trabeculectomy is performed.

Patients and methods

We retrospectively reviewed the charts of 75 eyes of 75 consecutive patients who had trabeculectomy with mitomycin-C for the first time, with or without PI. Patients were selected from the practice of two surgeons (JM and GS) who did trabeculectomy with PI up to a certain time and then switched to trabeculectomy without PI (with the exception of those who were believed likely to develop postoperative flat chambers (phakic patients with primary angle-closure glaucoma not having concurrent phacoemulsification)). All cases undergoing primary trabeculectomy with or without PI were included. Postoperatively, patients used topical antibiotics for 1 week and prednisolone acetate 1% tapered over 6 weeks. One eye of each patient was enrolled.

The average ages of the participants receiving and not receiving surgical PI during trabeculectomy were 69 (± 13.2) and 74 years (± 8.7 years), respectively. For both groups, the most common diagnosis was primary open-angle glaucoma. A summary of the demographic data and preoperative findings is shown in Table 1. It should be noted that the patients with angle-closure glaucoma who underwent trabeculectomy without PI previously had laser iridotomies during the course of their glaucoma management.

Data were collected preoperatively and postoperatively on days 1, 30–90, and 1–3 years. Specific comments regarding the depth of the anterior chamber (AC) and amount of inflammation were present in all cases. Inflammation was clinically graded on a scale of 1–4. AC depth was graded from grade 0 (no shallowing) to grade III, which represented total contact between the iris and internal tissues (cornea and lens).⁵ Blebs were described in terms of height (1–3 ‘corneal thicknesses’) and vascularity (0–4+). All cases were tested for leakage of aqueous by applying a moistened, fluorescein-impregnated strip to the eye and by noticing the presence or absence of leakage, with and without pressure on the globe.

Student’s *t*-test was used to test for differences in mean IOP. The Wilcoxon rank sum test was used to compare the distribution of visual acuity. Poisson regression with exact *P*-values was performed to test for differences in the number of glaucoma medications. χ^2 tests with exact *P*-values were used to evaluate differences in inflammation. Analyses were performed using SAS v. 9.1

Table 1 Preoperative patient demographics

	<i>Surgical PI</i>	<i>No PI</i>
<i>Age (years)</i>		
Mean \pm SD	69 \pm 13.2	74 \pm 8.7
Range	31–92	48–89
<i>Gender</i>		
Male	16 (37%)	18 (56%)
Female	27 (63%)	14 (44%)
<i>Race</i>		
White	29	29
African American	12	3
Hispanic	1	0
Asian	1	0
<i>Glaucoma type</i>		
PSXF	2 (4.7%)	8 (25%)
POAG	33 (76.7%)	14 (43.8%)
AACG	2 (4.7%)	1 (3.1%)
CACG	5 (11.6%)	5 (15.6%)
Pigmentary glaucoma	0	1 (3.1%)
Uveitic glaucoma	0	3 (9.4%)
Traumatic	1 (2.3%)	0
<i>Spherical equivalent refraction</i>		
Mean \pm SD	−0.7 \pm 2.5	−0.71 \pm 2.27
Range	−9.5 to 3.25	−6.0 to 4.25
<i>Type of refraction</i>		
Myopic	22 (51.2%)	16 (50%)
Hyperopic	13 (30.2%)	11 (34.4%)
Emmetropic	8 (18.6%)	5 (15.6%)
Cataract extraction during surgery	18	18

AACG, acute angle-closure glaucoma; CACG, chronic angle-closure glaucoma; POAG, primary open-angle glaucoma; PSXF, pseudo exfoliation.

and LogXact 7; a *P*-value of <0.0125 (0.05/4) was considered significant.

Results

Of the 75 eyes that underwent trabeculectomy surgery, a PI was performed in 43 cases (57%). Thirty-six cases (48%) had cataract extraction at the time of trabeculectomy.

Postoperative results, including intraocular pressure (IOP), visual acuity, and postoperative inflammation are shown in Table 2. Patients who had PI showed more inflammation at days 30–90 than those who did not have PI performed during trabeculectomy. This difference was statistically significant, both among groups of patients, receiving cataract removal at the time of surgery ($P = 0.018$), and those not receiving cataract removal ($P = 0.038$). At no point following the trabeculectomy

Table 2 Summary of pre- and postoperative findings

	No cataract extraction			Cataract extraction		
	PI ^a	No PI	P-value	PI	No PI	P-value
<i>IOP^b (mmHg) (mean ± SD)</i>						
Pre-op	25.04 ± 9.52	22.21 ± 5.60	0.32	20.89 ± 6.76	24.44 ± 9.25	0.20
<i>Post-op</i>						
1 day	14.36 ± 10.21	14.14 ± 8.42	0.95	18.78 ± 10.51	14.89 ± 8.77	0.24
30–90 days	13.56 ± 4.52	14.21 ± 5.13	0.68	15.39 ± 5.05	12.61 ± 6.10	0.15
1–3 years	12.92 ± 3.17	14.93 ± 4.65	0.12	16.22 ± 9.40	13.17 ± 4.93	0.23
<i>Visual acuity (median (interquartile range))^c</i>						
Pre-op	0.10 (0–0.3)	0.18(0.1–0.3)	0.76	0.48 (0.4–0.6)	0.51 (0.4–1)	0.78
<i>Post-op</i>						
1 day	0.54 (0.4–0.6)	0.6 (0.18–1.3)	0.37	0.54 (0.3–0.7)	1.0 (0.6–1.3)	0.04
30–90 days	0.18 (0.1–0.4)	0.1 (0.1–0.3)	0.82	0.30 (0.18–0.7)	0.18 (0–1)	0.35
1–3 years	0.10 (0.1–0.3)	0.1 (0.1–0.3)	0.48	0.30 (0–0.6)	0.30 (0–1.3)	0.76
<i>Inflammation (median (range))</i>						
Pre-op	0 (0–0)	0 (0–0.5)	0.12	0 (0–0.5)	0 (0–0)	1
<i>Post-op</i>						
1 day	1 (0.5–3)	0.5 (0–2)	0.14	1.5 (1–2)	0.5 (0.5–3)	0.075
30–90 days	0.5 (0–2)	0 (0–0.5)	0.038	0.5 (0–1)	0 (0–1)	0.018
1–3 years	0 (0–0)	0 (0–0.5)	0.12	0 (0–0)	0 (0–0.5)	1

^aPeripheral iridectomy.

^bIntraocular pressure.

^cLogMar score.

procedures was a difference between the IOPs in the two groups found to be statistically significant (*P*-values ranged from 0.12 to 0.95).

Postoperative complications were uncommon in both groups (Table 3).

Discussion

Several years ago two authors of this report decided that there was little evidence to show that peripheral iridectomy was a necessary part of a routine trabeculectomy. Consequently, they abruptly switched from performing an iridectomy in combination with such surgery to performing the procedure without simultaneous iridectomy. It appears that few glaucoma surgeons have made this switch, hence sharing a review of our results appeared appropriate.

Modern filtration surgery for glaucoma evolved from two procedures, iridectomy first and sclerectomy later. Iridectomy controlled IOP in some cases and not in others, as would be expected. Earlier, ophthalmologists, not understanding angle closure, could not distinguish between cases likely to benefit from an iridectomy (angle-closure cases) and those not likely to benefit from an iridectomy (open-angle cases). Sclerectomy controlled

IOP in a higher percentage of cases, as would be expected, as it was likely to work in both types of glaucoma. However, sclerectomy had a disturbing rate of complications, including flat AC, adhesions of the iris to the lens or the cornea, iris incarceration,⁶ increased risk for development and progression of cataract,⁷ and sympathetic ophthalmia.⁸ Until the advent of corticosteroids, postoperative inflammation sufficiently severe to cause posterior synechia was routine. Consequently, topical atropine was routinely employed. Although atropine dilated the pupil, it was not particularly effective in preventing inflammation. When patients developed posterior synechia, those receiving atropine had large fixed pupils rather than small fixed pupils due to posterior synechiae. Shallowing or complete loss of the anterior chamber was common, and increased the likelihood of adhesions to the sclerectomy and to the lens. Peripheral iridectomy, to prevent pupillary block and to remove tissue that had a reasonable likelihood of blocking the sclerectomy, was an essential part of every filtering procedure.

During the 20th century, attempts were made to reduce the complications associated with filtration procedures. ‘Guarded’ filtration procedures in many forms, such as trabeculectomy, were developed in the hope of

Table 3 Incidence of various complications after trabeculectomy with and without peripheral iridectomy (PI)

	Complications	PI group (43 eyes)	No PI group (32 eyes)
Intraoperative	Bleeding (hyphaema)	—	—
	Vitreous loss	—	—
	Lens injury	—	—
Early and intermediate postoperative	Bleeding (hyphaema)	1	—
	Malignant glaucoma	—	—
	Retinal oedema	—	—
	Failure of bleb	—	—
	Pupillary block	—	—
	Serous choroidal detachment	3	—
Late postoperative	Progression of pre-existing cataract	5	3
	Recurrent angle closure	—	—
	Development of other type of glaucoma	—	—
	Retinal oedema	—	—
	Failure of bleb	1	4
Total		10 (23%)	7 (22%)

preventing excessive filtration and shallowing of the AC.^{9–11} Although these techniques reduced the frequency of shallow and flat chambers,¹² the complications continued to occur and with them the other problems of full-thickness sclerectomy.¹³ However, with the advent of titratable filtration, postoperative flat anterior chambers can be almost completely avoided. This was done first by using a method in which the scleral flap was tightly closed and flow later increased, if needed, by cutting sutures using a laser¹⁴ and later by using releasable sutures.^{2,15–19}

It is likely that some of the complications of filtration procedures (hyphema, excessive inflammation, posterior synechia, iridodialysis, and cataract formation)^{4,5,20} are not a consequence of the filtration part of the procedure but rather of the iridectomy that is routinely performed at the time of filtration procedure. Now that it is possible to perform trabeculectomy so that postoperative shallowing of the AC is rare makes sense to aim for the IOP-lowering benefit of a trabeculectomy without routinely performing an iridectomy.

In this retrospective review we found that in cases having trabeculectomy and cataract extraction and in cases not having simultaneous cataract extraction, there was a trend toward less inflammation in cases not having a PI. This greater degree of inflammation may possibly be clinically important. The Advanced Glaucoma Intervention Study reported that postoperative inflammation increases the risk of surgical failure.²¹ Uveitis is also known to increase the failure rate in

patients having trabeculectomy.²² It is well established that trauma to uveal tissue, including iridectomy, may cause serious complications.^{23–27}

There are other problems associated with performing a PI (Table 4). Although proper technique decreases the likelihood of any of these occurring, it does not eliminate them.

In our study, the incidence of progression of pre-existing cataract was higher in the PI group than in the no-PI group. Several aetiologic factors have been suggested to cause cataract, including direct trauma to the lens by surgical manipulation and postoperative iritis,²⁸ both of which can occur as a result of surgical iridectomy.

There are, of course, instances that call for iridectomy to be performed. Some conditions that predispose patients having trabeculectomy to postoperative shallowing of the anterior chamber are an anterior chamber angle narrow enough to occlude, primary angle closure, significant hyperopia, nanophthalmos, Sturge–Weber syndrome, active uveitis and aniridia, when incomplete. It is prudent to perform PI in these patients, either separately or as part of a trabeculectomy, to decrease the chance of iris prolapse, blocked sclerectomy, or blocked pupillary flow.

A shortcoming of this study is its retrospective nature. There is a possibility that patients more predisposed to complications were selected for trabeculectomy with iridectomy so that the PI group was predisposed to worse outcomes. We believe that is not a likely problem,

Table 4 Risks of surgical peripheral iridectomy

Intraoperative	Postoperative
Bleeding	Hypohaema
Cutting haptic of intraocular lens	Iritis
Lens trauma	Corectopia
Iridodialysis	Vitreous loss
Posterior synechia	Iris atrophy
	Cataract

however, because the choice of including or not including a PI with the trabeculectomy was based on the date of the surgery; up until a certain date, all cases had PI and after that date no patients had PI, with the exception of those who were believed likely to develop postoperative flat chambers (phakic patients with primary angle-closure glaucoma not having concurrent phacoemulsification). One could also theorize that the surgeons were motivated to eliminate iridectomy because of a recent series of iridectomy-related complications that led to their changing their techniques. However, in our review of the patients' histories, we did not find evidence to suggest this. The PI group was slightly younger on average, which potentially could also influence surgical outcomes.

A second possible weakness is the crude method of estimating postoperative inflammation. However, there is no reason to believe that the grading would be different in the patients having had a PI, unless the presence of the PI biased the observers' grading. Because we were not aware that the PI patients might have more inflammation, it is not likely that this bias was important in this regard; as part of our postoperative care, we were looking primarily for complications such as flat chamber and bleeding.

The two populations—those with and those without a PI—are not completely comparable. Although these differences may possibly have an impact on the long-term success of filtration surgery, it is not likely that they have a significant impact on the short-term issues with which this report is concerned. Also, as observed in this report, in view of the higher number of pseudo-exfoliation glaucoma and uveitic eyes in the no PI group and of these eyes in some series having been reported to be more prone to inflammation and failure,²² the difference, if any, may have favoured the PI group both for inflammation and surgical result. A prospective, randomized trial would be helpful to address more definitively the outcomes of trabeculectomy with and without iridectomy.

In conclusion, trabeculectomy performed without a PI appears to be as effective in lowering IOP as when performed with a PI. However, omitting the PI may make the operation a safer procedure, with a lower incidence

of postoperative inflammation. It may be an advantage to avoid performing a PI in those cases not predisposed to developing a flat anterior chamber.

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