

Results of peripheral iridectomy in closed-angle glaucoma

T. K. GHOSHAL AND P. L. BLAXTER

Manchester Royal Eye Hospital

It is now generally recognized that the peripheral iris plays a major part in the mechanism of closed-angle glaucoma and consequently the practice of treating these cases by a peripheral iridectomy has become a standard procedure. In addition, many surgeons now adopt the policy of performing a prophylactic peripheral iridectomy on the other eye of a patient who has suffered an attack of angle-closure. Some are still reluctant to adopt as a routine procedure surgery on an eye with normal vision because of the risks involved, and this view may be encouraged by a recent publication (Phillips and Snow, 1967) which suggests that the operation is not as safe as was once thought. The results we are to discuss later will, we hope, go some way towards alleviating these fears. But first it is necessary to review the evidence at our disposal to enable us to form a clear picture of the problem.

It is an undisputed fact that an attack of acute closed-angle glaucoma, even if treated in the early stages (and unfortunately circumstances beyond the ophthalmologist's control often prevent this), may result in severe damage to the eye. Lowe (1965) stated that, despite the advances that have been made in the concepts of diagnosis and treatment in acute closed angle glaucoma, the disease still leaves a "trail of destruction in its wake".

We also know that in a certain proportion of patients who develop acute glaucoma the fellow eye will sooner or later develop an acute angle-closure. Adams (1955) concluded that 54 per cent. will develop raised tension if an iridectomy is not performed. Kronfeld (1956) stated that 50 per cent. will develop an acute attack within 5 years and Bain (1957), in a review of 200 cases, stated that in 53 per cent. of second eyes the attack occurred within $4\frac{1}{2}$ years. Lowe (1965) estimated that 75 per cent. of second eyes are at risk.

These figures should convince anyone that the second eye must be treated either by miotics or by a peripheral iridectomy. Kronfeld (1956) and Bain (1957) both stated that the acute attack developed in spite of miotic therapy, and Lowe (1965) confirmed the inefficiency of miotic therapy.

Blaxter and Chatterjee (1960) stated that they had been performing therapeutic and prophylactic peripheral iridectomies since 1956, a series involving over seventy cases. They reviewed the results of the first 39 cases and from these concluded that when this was performed on properly selected cases, it was a safe and worthwhile procedure. There were no significant operative or post-operative complications.

Primrose (1960) described the results of peripheral iridectomy on 23 patients with closed-angle glaucoma which included twelve prophylactic operations and also concluded that this was a safe effective procedure.

Lowe (1962) analysed the results of the "second eye" in 200 cases of acute closed-angle glaucoma of which 23 were bilateral, and of the remainder 113 had medical treatment and

64 prophylactic surgery. Of those given medical treatment, 58 developed an acute attack and eight of these suffered severe loss of sight. The interval before these attacks varied from a few months to 25 years. Of the surgical cases, serious visual loss occurred in only one eye which went into acute tension postoperatively and then developed chronic angle-closure. Lowe did, however, note the presence of posterior synechiae in several cases and stated that these are very prone to occur. In spite of this, he considered that the results of conservative treatment were much worse than that of prophylactic peripheral iridectomy, which should be performed at the earliest opportunity.

Chandler (1963) stated that an operation was the best procedure for closed-angle glaucoma and considered that a peripheral iridectomy should be performed on the second eye even if there were no positive provocative tests, especially if the first eye developed malignant glaucoma. In the discussion that followed, Gilkes, while accepting the theoretical reasons for the advice, doubted whether the surgeons who advocate this policy would permit its practice in their own case because of the operative risks.

Douglas and Strachan (1967) published the results of prophylactic peripheral iridectomy in 103 eyes. The technique used was the same as described by previous writers. They had a small number of postoperative complications, including one case of flat chamber lasting for 4 days. No patients had reduced visual acuity attributable to the effects of the operation, and only two developed posterior synechiae. These authors considered that it was safer to perform a peripheral iridectomy on an eye at risk from glaucoma than to attempt to maintain it on miotic therapy, and suggested that the reluctance of some surgeons to adopt this policy might be due to the fact that previous writers had not stressed the almost complete absence of serious operative or postoperative complications.

Phillips and Snow (1967) stated that, while they regarded peripheral iridectomy as probably one of the most satisfactory operations in ophthalmic surgery, they suspected that a considerable number of eyes developed posterior synechiae; when they investigated a series of 63 eyes for posterior synechiae they found them in 33 per cent. They also found an average drop in visual acuity of one line in the patients without synechiae and of 2.05 lines in those where these had developed. Of 37 patients who had had a purely prophylactic peripheral iridectomy, seven (18.90 per cent.) showed posterior synechiae. They discussed the reasons for the occurrence of synechiae and advocated a small iridectomy and postoperative treatment with atropine and phenylephrine.

Before recommending operative treatment, it is the duty of the surgeon to balance the risks against its advantages over conservative treatment, and to do this he must have a clear picture of what is likely to occur if the latter policy is adopted. From most of the findings reported above it would seem that the case for performing a peripheral iridectomy for prophylactic as well as therapeutic reasons in closed-angle glaucoma is overwhelming. However, reports of posterior synechiae and more especially of a drop in visual acuity is bound to cause anxiety, not only in those who are already reluctant to adopt this procedure, but also in those who use it, because they are frequently operating on an eye with normal vision which may also sometimes be the only good eye.

Present investigation

We consider that this policy of performing a peripheral iridectomy has been one of the most successful advances in the therapy of glaucoma in recent years and have therefore felt that it would be worth re-examining a series of patients who had had this operation to see if our clinical impression that it was a safe and successful procedure was correct.

Material

During the period 1956–1966 a peripheral iridectomy has been performed on 288 eyes of patients under the care of one of us (P.L.B.). To re-examine all these would have been an unjustifiable expenditure of the time at our disposal at least in the first instance, so we decided to make a detailed assessment of one-quarter of the cases. Patients were selected at random from the operating theatre book, but as the non-attendance rate of the earlier cases was high, some of the more recent ones were included. Of the seventy eyes examined eight were found to be unsuitable for the series, and so finally 62 eyes were included. Of these, 21 had been operated on between 5 to 10 years, 24 between 2 and 5 years, and seventeen between 1 and 2 years ago. The operation was performed for therapeutic reasons on 33 and as a prophylactic procedure on 29 eyes.

Method

All the patients were seen in the glaucoma clinic and the investigation included correction of any refractive error, examination of the anterior segment with gonioscopy, applanation tonometry, and measurement of the visual fields, when the discs were abnormal or suspicious. A further examination of the anterior segment for synechiae was made after the instillation of 2 per cent. cocaine with homatropine drops.

Results

Therapeutic cases

Of the total of 33 eyes, four had attacks of acute closed-angle glaucoma, 22 had early angle-closure attacks, and seven subsequently proved to be cases of chronic closed-angle glaucoma.

SUBSEQUENT MIOTIC THERAPY Of the four acute cases one required subsequent miotics, and of the 22 cases of early angle-closure only one needed miotics. All the chronic closed-angle cases, however, subsequently required miotics, and two of these required further glaucoma operations after which the tension was adequately controlled. One in the last group showed field loss but this was not progressive (Table I).

Table I 33 *Therapeutic cases. Subsequent miotics*

| <i>Type of glaucoma</i> | <i>Total cases</i> | <i>Controlled by peripheral iridectomy alone</i> | <i>Subsequent miotics</i> | <i>Subsequent further glaucoma surgery</i> | <i>Field loss</i> |
|-------------------------|--------------------|--|---------------------------|--|-------------------|
| Acute closed-angle | 4 | 3 | 1 | | |
| Early closed-angle | 22 | 21 | 1 | | |
| Chronic closed-angle | 7 | — | 7 | 2 | 1 |

VISUAL ACUITY The postoperative corrected visual acuity of these 33 cases is shown in Table II.

POSTERIOR SYNECHIAE Sixteen (48.5 per cent.) of the 33 cases developed this condition; these included all four cases of acute closed-angle glaucoma, all seven cases of chronic angle-closure, and five (22.7 per cent.) of the 22 cases of early angle-closure (Table III).

SEGMENTAL DISTRIBUTION OF POSTERIOR SYNECHIAE This varied considerably. Commonly two quadrants were involved, and one case showed involvement of all four quadrants (Table IV).

Table II 33 Therapeutic cases. Corrected post-operative visual acuity

| Type of glaucoma | Visual Acuity | | | | | | | | Total Cases |
|----------------------|---------------|------|------|------|------|-----|-----|-----|-------------|
| | 6/60 | 6/36 | 6/24 | 6/18 | 6/12 | 6/9 | 6/6 | 6/5 | |
| Acute closed-angle | — | — | 2 | 2 | — | — | — | — | 4 |
| Early closed-angle | — | — | — | — | 3 | 4 | 10 | 5 | 22 |
| Chronic closed-angle | — | — | — | 3 | 2 | 2 | — | — | 7 |

Table III 33 Therapeutic cases. Posterior synechiae

| Type of glaucoma | Total Cases | Posterior synechiae | | No. on miotics |
|----------------------|-------------|---------------------|-----------|----------------|
| | | No. | Per cent. | |
| Acute closed-angle | 4 | 4 | 100 | 1 |
| Early closed-angle | 22 | 5 | 22.7 | 1 |
| Chronic closed-angle | 7 | 7 | 100 | 7 |
| Total | 33 | 16 | 48.5 | 9 |

Table IV 33 Therapeutic cases. Quadrant affected in 16 cases

| Type of glaucoma | Quadrants affected | | | |
|----------------------|--------------------|-----|-------|------|
| | One | Two | Three | Four |
| Acute closed-angle | 1 | 3 | — | — |
| Early closed-angle | 2 | 1 | 1 | 1 |
| Chronic closed-angle | 1 | 5 | 1 | — |

The synechiae occurred most frequently in the iridectomy segment. In four cases this was the only segment affected, and in only one case was a single quadrant remote from the iridectomy segment involved.

Prophylactic cases

In 29 cases peripheral iridectomy was performed as a prophylactic measure. These were "pre-glaucomatous cases" which showed a positive or negative dark-room test with a narrow angle. In recent years, we have performed the dark-room test only on selected cases as its result is somewhat unreliable and rarely influences our choice of treatment.

SUBSEQUENT MIOTIC THERAPY Three cases were found to have been receiving miotic therapy for variable lengths of time. These were admitted for re-assessment; in two

miotics were considered to be unnecessary, and in the third super-added chronic simple glaucoma had developed, so that the miotic therapy had to be continued (Table V).

Table V 29 Prophylactic cases. Subsequent miotics

| Total cases | No. on miotics | | |
|-------------|----------------|--|--------------------------------|
| | Total | Justified | Unnecessary |
| 29 | 3 | 1 (Super-added chronic simple glaucoma) | 2 (Miotics discontinued) |

VISUAL ACUITY Two of the 29 cases showed a drop in corrected visual acuity from 6/6 to 6/9. In one case, bilateral lens opacities were present; these were of the ordinary "senile" type and not *glaukomflecken* (Lowe, 1965). Both patients had been on miotics.

POSTERIOR SYNECHIAE Of the 29 cases, five (17.2 per cent.) developed this condition. These included all three patients who had been having miotics for a variable period of time and only two of the 26 others who had never been given miotics.

SEGMENTAL DISTRIBUTION OF POSTERIOR SYNECHIAE The iridectomy quadrant was involved in all five cases and in two of them synechiae were also present in one additional quadrant.

Discussion

The chief object of this work was to assess the safety of a prophylactic peripheral iridectomy but some other interesting facts emerge.

(1) *Efficiency of the operation in controlling the glaucomatous process*

In no case did the instillation of a mydriatic produce a significant rise in tension; this is a clear demonstration of the value of the operation in preventing an attack of angle-closure.

THERAPEUTIC CASES In the early closed-angle cases, miotic therapy was subsequently required in only one of 22; one of four cases of acute angle-closure glaucoma also required subsequent miotics. As we would expect, all the chronic closed-angle cases required subsequent miotic therapy and two also required further surgery which was successful. It would appear that in every case the glaucomatous process had been controlled, either by peripheral iridectomy alone or by the addition of miotic therapy or by further surgery which would appear to be satisfactory.

PROPHYLACTIC CASES One would not have expected it to be necessary to discuss the control of glaucoma in the prophylactic cases, as in theory they should not have the disease. Of the three cases found to be on miotic therapy, however, this was found to be unnecessary in two after reassessment and the third proved to be a case of superadded early chronic simple glaucoma. In all three cases miotics had been given because the patient had been found to have a raised intraocular pressure in the ordinary out-patients' clinic and had not been referred to the glaucoma clinic. The commencement of a miotic regime is a serious step which should not have been instituted on the basis of one abnormal tension reading.

(2) *Visual acuity*

THERAPEUTIC CASES The lowest postoperative visual acuity was 6/24 and only seven were lower than 6/12. So, even if we assume that all these eyes had 6/6 vision before treatment, the "trail of destruction" in this small series had been relatively mild.

PROPHYLACTIC CASES Only two cases out of 29 showed any visual deterioration and then only by one line on the Snellen chart. In one patient lens changes were present and both had been on miotic therapy. This would seem to be a reasonably satisfactory result and does not conform with the drop of 1 or 2.05 lines found by Phillips and Snow (1967).

(3) *Posterior synechiae*

It is undoubtedly true that posterior synechiae are a fairly common finding after a peripheral iridectomy. This is especially true after a therapeutic operation, and in cases of acute angle-closure it also seems to be more common if miotics are used postoperatively, but probably the percentage of cases with posterior synechiae after a purely prophylactic operation is small, and the condition does not appear to have any serious effect on the function of the eye.

We agree with Phillips and Snow (1967) that this operation must be performed with the minimum of trauma, and the use of postoperative steroids is probably a help. We also use either phenylephrine or atropine postoperatively, and although this practice may carry the remote risk of an attack of raised ocular tension due to angle crowding, as experienced by Lowe (1962, 1965) and Douglas and Strachan (1967), this has not occurred in any of our cases.

We do not feel that the possible development of posterior synechiae can be regarded as a contraindication to performing a prophylactic peripheral iridectomy.

Summary

- (1) The long-term follow-up of 33 therapeutic peripheral iridectomies and 29 prophylactic peripheral iridectomies is presented.
- (2) The only postoperative complication encountered was the development of posterior synechiae. Although not uncommon, these are considered relatively benign.
- (3) The result re-emphasizes the safety and effectiveness of a peripheral iridectomy both as a therapeutic and prophylactic procedure for the treatment of closed-angle glaucoma.

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