Surgical decision in glaucoma simplex

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SUMMARY The indications for 220 trabeculectomies performed by six surgeons at three different centres were studied. 82% of the decisions to operate were based on a non-progressive but high risk situation. The 18% of cases showing preoperative deterioration were characterised by early presentation and low preoperative residual pressures. There was a distinct similarity in the incidence of individual indications at the different centres.

The last two decades have seen a decline in morbidity due to glaucoma operations. Precipitate and medium term reduction of visual acuity from cataract has been lessened by the movement away from trephine and iris inclusion procedures to the Scheie and particularly the trabeculectomy operations. This surgically induced visual morbidity may be further reduced with the advent of laser trabeculoplasty, when its area of efficacy has been established.

Meanwhile the decision to operate requires discreet clinical judgment, as the preservation of long term visual reserves still incurs a consequential risk of more immediate reduction of visual acuity due to cataract formation.¹ Asymptomatic patient notice visual deterioration equally if not more so than those whose vision is reduced from the worsening of pre-existent lens opacities.

The ideal of absolute criteria on which the surgical decision may be based has been found lacking in a hospital glaucoma population.² Accessibility to factors of prime consideration such as progressive changes in visual fields or optic discs may not be possible because of extensive glaucomatous damage, associated ocular pathology, or general morbidity in the patient. It is of interest, therefore, to explore the indications that have been used to make the surgical decision.

This paper attempts to delineate, by a consensus view, current attitudes to the surgical management of glaucoma. This has allowed observations on

the relative value of the preoperative monitoring procedures.

Materials and methods

Records of patients from the three centres of Cardiff, Newport, and Bath were analysed.

The patients at Bath had attended a glaucoma clinic and had been examined by one consultant (D.E.P.J.) personally at each attendance. A random sample of 120 surgical procedures was reviewed and the indications for trabeculectomy ascertained.

In Cardiff and Newport the indications for 100 trabeculectomies were studied. These cases were supervised by five consultant surgeons, and each contributed 20 patients. The patients attended clinics served by junior hospital staff, but the 100 surgical decisions were made by the consultant in charge.

All six consultants had different backgrounds of surgical training.

At Newport, Bjerrum and Friedmann perimetry was performed, whereas in Cardiff and Bath fields were charted on the Goldmann perimeter. The study did not attempt to delineate the degree of visual field deterioration which precipitated surgery or to compare the efficacy of the various methods of perimetry. The investigative effort was directed towards analysing whether the surgeon had made the decision to operate because of evidence of progression of the glaucomatous damage.

Those cases in which there had been a progressive visual field loss and/or increased cupping of the optic disc were first isolated. The remaining patients in

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whom there had been no increase in the glaucomatous damage to the eye since presentation were then studied.

It was possible to place these cases showing no increase in damage, that is, 'non-progressive' into one of the following categories:

(A) In this group a residual pressure alone precipitated surgery in the presence of a normal disc and a full visual field.

(B) These patients had a residual pressure >25 mmHg with a cup/disc ratio >0.5 but with no detectable field defect.

(C) Patients in this group had a residual pressure >30 mmHg with a cup/disc ratio >0.5, and a field defect was present.

(D) In these patients the residual pressure was <30 mmHg and the cup/disc ratio >0.5. A field defect was present.

'Residual pressure' refers to the intraocular pressure on maximal medical treatment preoperatively.

Background factors such as age, family history, presence of myopia, state of the other eye, general health, and social considerations frequently facilitated the surgical decision.

The analyses of all cases at Cardiff and Newport were undertaken by two of us jointly (L.B. and A.G.K.). The analyses of 'progressive' cases at Bath were undertaken by all authors. 'Non-progressive' cases at Bath were categorised by D.E.P.J. retrospectively. Once the above groupings were established the severity of visual field loss was compared in groups C and D in the Cardiff-Newport patients.

Results

Twenty eyes of the 100 studied in Cardiff and Newport showed a change preoperatively in the visual field and/or optic disc appearance (Table 1).

In Bath 19 of the 120 eyes analysed showed change in the degree of glaucomatous damage before surgery (Table 2).

The distribution of the remaining 181 trabeculectomies from the three centres in groups A, B, C, or D is shown in Table 3.

In groups C and D (from Cardiff and Newport) there was no significant difference in the degree of visual field loss. Most cases in both groups were characterised by advanced loss, whereby field defects had broken out to the periphery.

Discussion

It is evident from this analysis that 181 (82%) of the 220 surgical decisions in this broad based group of patients with chronic simple glaucoma were undertaken in the absence of any preoperative deterioration of the eyes from the time of presentation of the patient. The value derived from preoperative examinations, therefore, was confined to the initial evaluation of the patient's status and the subsequent recordings of the intraocular pressure alone.

Whether glaucoma management is undertaken in general clinics with junior staff (Cardiff and Newport) or in special glaucoma clinics personally conducted by the consultant (Bath) this pattern was

Table 1 *Cardiff and Newport: eyes which showed progressive deterioration prior to trabeculectomy*

No	Presentation status			Preoperative status		
	C/D	IOP	VF	C/D	IOP	VF
1	0.8	40	Full	0.8	26	Nasal defect
2	0.5	34	Full	0.8	26	Nasal quadrantanopia
3	0.8	30	Nasal quadrantanopia	0.8	26	Altitudinal hemianopia
4	0.7	27	Arcuate scotoma	0.7	17	Larger arcuate scotoma
5	0.4	24	Full	0.4	17	Nasal step
6	0.9	Unknown	Full	0.9	24	Gross constriction
7	0.5 (tilted)	29	Full	0.5	23	Arcuate scotoma
8	0.9	36	Arcuate scotoma	0.9	18	Nasal quadrantanopia
9	0.8	32	Full	0.9	24	Nasal quadrantanopia
10	0.9	20	Arcuate scotoma	0.9	14	Nasal quadrantanopia
11	0.7	40	Superior constriction	0.7	20	Increase in superior field loss
12	0.5	32	Full	0.9	22	Arcuate scotoma
13	0.6	25	Altitudinal hemianopia	0.6	20	Increase in superior field loss
14	0.5	19	Full	0.8	18	Nasal hemianopia
15	0.9	32	Nasal quadrantanopia	0.9	27	Extension of defect
16	0.5	22	Full	0.8	26	Nasal step
17	>0.6	26	Full	1.0	24	Nasal quadrantanopia
18	0.5	25	Full	0.7	28	Full (disc change only)
19	0.7	45	Arcuate scotoma	0.7	22	Extension of arcuate into periphery
20	0.9	26	Full	0.9	26	Temporal defect

C/D=cup/disc ratio, IOP=intraocular pressure, VF=visual field.

Table 2 Bath: eyes which showed progressive deterioration prior to trabeculectomy

No	Presentation status			Preoperative status		
	C/D	IOP	VF	C/D	IOP	VF
1	Normal (inf. conus)	34	Full	1.0	25	Central island
2	0.6	38	Full	Difficult to evaluate	19	Temporal hemianopia, nasal quadrantanopia
3	>0.6	20	Full	0.8	23	Upper altitudinal hemianopia
4	<0.5	20	Full	0.75	18	Gross loss. Unreliable for charting
5	<0.5	29	Full	0.8	22	Nasal quadrantanopia
6	0.7	20	Superior arcuate scotoma	1.0	18	Superior nasal defect extending from arcuate
7	0.8	38	Superior altitudinal hemianopia	0.9	20	Increasing size of field defect
8	0.9	35	Superior arcuate	1.0	14	Increasing size of arcuate extending to periphery nasally
9	>0.5	28	Full	0.8	24	Branch vein occlusion
10	0.8	18	Full	0.9	15	Lower altitudinal hemianopia nearing fixation
11	0.9	15	Full	0.9	23	Superior altitudinal hemianopia
12	0.4	19	Full	0.8	20	Superior arcuate
13	Saucerisation +0.5	20	Nasal quadrantanopia	Disc same	16	Nasal loss increasing
14	0.5	22	Full	0.9	20	Nasal step
15	<0.5	22	Full	0.7	16	Nasal quadrantanopia
16	<0.5	24	Full	0.9	15	Superior altitudinal hemianopia
17	<0.5	24	Full	0.8	20	Nasal quadrantanopia
18	0.7	32	Full	0.9	18	Superior altitudinal defect
19	Not known	20	Full	Not known (cataract)	14	Cataract precludes accuracy but 'considerably restricted'

C/D=cup/disc ratio, IOP=intraocular pressure, VF=visual field.

Table 3 Distribution of eyes where there was no preoperative change in visual fields or optic discs

Group	Cardiff and Newport	Bath
A	4	12
B	5	1
C	28	26
D	43	60
Total	80	101

fairly uniform. Moreover, there is a striking similarity in the distribution of clinical settings within the non-progressive cases (Table 3). There appears to be, therefore, a generalised tendency to anticipate rather than await a worsening situation in a large majority of instances.

Several factors may contribute to this. Advanced disease at presentation has been found to be a prominent cause of registrable blindness,³ and late presentation enhances subsequent progress to visual disability.⁴ This may well incline surgeons to early surgery rather than risk the erosion of an increasingly critical residual function. Associated morbidity such as cataract, pathological myopia, senility, etc., which occur prominently in a hospital glaucoma population,² may further reduce the surgeon's confidence in the principle of awaiting deterioration.

A high residual intraocular pressure in the absence of glaucomatous change in the eye is a comparatively rare indication for trabeculectomy (group A, Table 3). This may signify the efficacy of modern medical treatment, but it may also indicate a reluctance to operate for pressure alone in the absence of glaucomatous damage. There can be no precise level for undertaking drainage surgery, as factors such as venous thrombosis in the fellow eye, age of patient, family history, pathological myopia, degree of existing glaucomatous damage in the fellow eye, etc. significantly affect the prognosis.

The small number of cases in group B suggests that even when the optic disc is pathologically cupped trabeculectomy is not often performed in the presence of a full visual field. A considerably raised residual pressure and/or provocative background factors would usually have to be present in addition for surgery to be advised. Patients with this relatively early state of glaucoma may well be regarded as having sufficient reserves to allow some deterioration before undertaking surgery.

Once a visual field defect has been established there seems to be a general concern for even a moderately raised level of intraocular pressure. In group D, by far the largest group, all the preoperative pressures were consistently less than 30 mmHg,

often in the low or mid 20s. It is perhaps in this group that there is an increasing general awareness that patients may slip inadvertently into blindness, when visual reserves are low and intraocular pressures are not quite controlled.

It is in these cases that the most astute clinical judgment is required—whether to risk the trauma of surgery or the further loss of critical visual field. Trabeculoplasty may in future be the initial procedure of choice in these circumstances.

When the residual pressures are greater than 30 mmHg, as in group C, the decisions to operate may be more easily taken especially as the presenting pressures may not have been greatly lowered. The smaller size of group C compared with D may reflect the efficacy of medical treatment, providing a larger residual pool of patients with pressures under 30 mmHg. No significant difference was ascertained in the severity of field defects in groups C and D to explain the larger size of group D in these non-progressive cases.

Analysis of the two groups of patients showing a change in the status of the eye preoperatively, that is, the 'progressive' cases, reveals distinct trends (Tables 1 and 2).

A characteristic prominent in both Cardiff-Newport and Bath groups is the relatively early presentation of the patients who had adequate reserves of disc appearance and visual fields. This would allow accurate, non-critical change during follow up. Thus, 27 of the 39 eyes had full visual fields at presentation, and most of the remainder had changes of an isolated arcuate nature.

Another feature of note is the low level of residual intraocular pressure in most of these cases. Twenty-four eyes of the 39 had intraocular pressures of 22 mmHg or less preoperatively.

Those eyes which showed a change of status before surgery therefore tended to have good

reserves at presentation and 'normal' or slight elevation of intraocular pressures preoperatively. This situation may allow a slow, non-critical, deterioration, which permits the clinician to await rather than anticipate the need to operate. It is known that the prognosis in this group of patients is good³, and operative complications are fewer.⁵

In the Cardiff-Newport group three eyes showed extensive field loss at presentation with cup/disc ratios of 0.8 in two and 0.9 in the other, with residual intraocular pressures of 26, 20, and 27 mmHg (cases 3, 13, and 15, Table 1). These eyes would have fitted into group D at presentation, and the consensus view found in this study may well not have awaited progression. In the Bath group (Table 2) only case 7 may have had a different consensus directed management.

Until the frequency of relatively late presentation of glaucoma simplex is lessened by more effective screening procedures the anticipatory pattern of surgical decisions found in this study is likely to remain.

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