SURGICAL RESULTS IN ACUTE GLAUCOMA*

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A REVIEW of the literature of the past 10 years shows little published work on the results of surgery in acute closed-angle glaucoma. This is rather surprising in view of the wider use of the classification into simple glaucoma and closed-angle glaucoma (see, for example, Duke-Elder, 1955) and the better understanding of some of the mechanisms involved in the latter type. This has led to the use of peripheral iridectomy and to a change in the criteria for filtration operations. During this period Diamox (acetazolamide) has also become available.

McDonald (1956) published an interesting series of 58 consecutive cases of iridectomy for closed-angle glaucoma, and the incidence and causes of post-operative iritis in glaucoma surgery were reviewed by Kalt, Decaudin, and Krajevitch (1954). Mackie and Rubinstein (1954) reported the results of iridencleisis in "unrelieved" acute closed-angle glaucoma. In all these papers, however, the material either included types other than the acute phase of closed-angle glaucoma or consisted of selected cases. It seemed worthwhile therefore to analyse the case records of a consecutive series of patients who were admitted to this University Unit with a diagnosis of acute "congestive" glaucoma and were followed up in the Glaucoma Clinic.

Material

156 cases diagnosed as acute "congestive" glaucoma were admitted to the University Department at Manchester Royal Eye Hospital during the period 1954–1957 inclusive. Each patient was treated initially as a case of acute closed-angle glaucoma, although this diagnosis was not always correct. The patients fall into three groups according to the type and duration of the pre-operative hospital treatment that they received. The groups are approximately equal in size:

- (1) The earliest group is composed of patients who were treated by intensive eserine therapy followed wherever possible by operation on the following day. The decision as to the type of operation was based entirely on a history of previous congestive attacks, and the state of the optic disc, where visible.
- (2) An intermediate group is transitional in nature and comprises patients in whom Diamox was added to supplement the miotic therapy and who were operated upon at no fixed interval after commencing treatment.
- (3) The latest group comprises patients in whom intensive miotic therapy and Diamox were followed wherever possible by minimum miotic therapy, with or without

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Diamox, until the eye had recovered fully from the congestive attack and investigation, with particular reference to the state of the angle, had been carried out.

These three groups are likely to differ substantially only in the nature and duration of pre-operative hospital treatment. No attempt has been made to take into account the total duration of the attack, but other published series (Lloyd, 1948; McDonald, 1956) have suggested that this has little influence on the outcome.

The result of each case was assessed at approximately 6 months after the operation. The criteria used in this assessment led to the following cases being classed as unsuccessful:

- (1) Those in whom either an ocular tension above normal was recorded, or in whom further congestive attacks had occurred at any time during the 6 months.
- (2) Those in whom the visual field showed undoubted deterioration from the pre-operative or first available post-operative record.
- (3) Those in whom post-operative uveitis led to a reduction in visual acuity below 6/12 (corrected).

It is debatable whether cases in which lens opacities of senile type developed or increased rapidly after glaucoma surgery should be regarded as failures of the operation. In this series such cases are not so regarded.

Results

Using the above criteria we were able to assess the result in 140 out of the 156 cases. Sixteen could not be assessed because the patient had either died or could not be traced. Further, this series of 140 patients includes seven (5 per cent.) who had a definite uveitis before operation. In comparing the results of the different treatments, these seven cases have been omitted as incorrectly diagnosed on admission; one patient who had a cyclodiathermy for an absolute glaucoma has also been omitted. 96 cases (73 per cent.) out of the remaining total of 132 were classed as successful.

During the period covered by the survey the proportion of successful cases of true closed-angle glaucoma has increased. Table I compares the first fifty consecutive cases in whom the results are known with the last fifty cases.

TABLE I
RESULTS OF FIRST AND LAST FIFTY CASES

Result	Success		Failure	Total
	No.	Per cent.		
First fifty cases	31	62	19	50
Last fifty cases	43	86	7	50
Total	74		26	100

$\left(\chi^2_c = 6.29 \quad 0.01 < P < 0.02\right)$

This is almost equivalent to comparing the first with the last group described above, omitting the transitional group. The Table shows that there has been a significant increase in the proportion of successful cases.

Discussion

During the period covered by the survey the treatment of acute closed-angle glaucoma has been considerably modified and the results have improved. It is necessary to assess the contribution to this improvement made by:

- (i) The use of Diamox;
- (ii) The effect of delaying operation;
- (iii) The effect of more careful selection of patients for iridectomy as opposed to filtration.

This series cannot be regarded as a controlled statistical sample, as it comprises a consecutive series of routine admissions to the Glaucoma Clinic during a period when the approach to treatment was changing. Thus, minute statistical analysis is likely to be unrewarding and unreliable. It should be pointed out that in all the succeeding comparisons the results are not “statistically significant”. Nevertheless it is felt that the overall picture is sufficient to form a basis for argument.

Table II indicates that there are proportionately fewer failures among Diamox-treated patients, whether operated upon early (Groups A and C) or late (Groups B and D). The highest proportion of successful cases occurs in Group D, which comprises those patients in whom operation was delayed until after the eye had recovered from the congestive attack, and where more careful investigation was carried out. Finally, if Group A is compared with Group D, then the combined effect of all three changes in pre-operative

TABLE II
RESULTS IN RELATION TO TYPE AND DURATION OF TREATMENT

Group	Pre-operative Hospital Treatment	Time of Operation	Result			Total
			Success		Failure	
			No.	Per cent.		
A	Eserine	Early (within 48 hrs)	26	65	14	40
B	Eserine	Late	5	63	3	8
C	Eserine and Diamox	Early	29	69	13	42
D	Eserine and Diamox	Late	36	86	6	42
Total			96		36	132

management is associated with an increase in the proportion of successful cases from 65 to 86 per cent. The figures indicate that it is probably advisable to delay operation in acute closed-angle glaucoma for at least 48 hours if possible, provided that the time gained by the use of Diamox is employed in a more thorough survey of each case. A rather similar approach is advocated by Malbrán and Malbrán (1959).

Table III shows the indications which were adopted for the filtrations carried out in this series. In the "early" group the indications for filtration were either a history of previous congestive attacks, or the discovery of a cupped disc. Three cases with cupping in this group were treated by early iridectomy, presumably because the condition of the eye did not permit accurate diagnosis. Conversely, pre-operative investigation in the "late" group resulted in the discovery of seven cases with cupped discs and field defect. In the "late" group less emphasis has been placed upon the history of previous attacks, and more upon objective clinical findings. Cases which failed to settle were treated by filtration as it was felt that a broad iridectomy was less likely to control the tension (Mackie and Rubinstein, 1954). The state of the filtration angle appears as a reason for filtration only in the "late" group, for although gonioscopy was employed in the investigation of some patients in the earlier part of the series, less weight was put upon the findings. It is reasonable to suppose that useful information will be obtained more often if gonioscopy is carried out after the acute episode has been allowed to subside. These considerations support the supposition that the more leisurely approach facilitated by Diamox leads to better diagnosis.

TABLE III
INDICATIONS FOR FILTRATION OPERATION*

Time of Operation	Early	Late
History	21	8
Failure to Settle	0	5
Cupped Disc or Field Defect	4 (all cupping)	7
State of Filtration Angle	0	9
Total	25	29

* Including five patients in whom the final result is not known, and excluding one patient in whom the reasons for filtration are not clear from the records.

If the combined results of broad and peripheral iridectomy, on the one hand are compared with iridencleisis and Elliot trephine on the other, it is found that filtration operations show a higher proportion of successes than iridec-

tomies. The comparison is invalid, however, as this grouping is highly

selective and gives no indication of the relative merits of the two types of operation, independently of the criteria used in assessing the cases. No attempt has been made to compare trephine and inclusion operations as the numbers involved are too small. Peripheral and broad iridectomy are not compared owing to the small number of peripheral iridectomies, which were only introduced in this Clinic toward the end of the series. The need for careful selection would be greater if the latter were the standard iridectomy in use.

Causes of Failure.—It is interesting to survey the primary causes of failure of the initial operation (Table IV). The most obvious feature is the higher incidence of hyphaema followed by raised tension in the early group. This is in accordance with what one might expect after operating upon a congested eye, though in this set of figures the difference could have arisen by chance.

TABLE IV
PRIMARY CAUSES OF FAILURE OF INITIAL OPERATION

Time of Operation		Early		Late		Total
Proce dure		Iridectomy	Filtration	Iridectomy	Filtration	
Cause of Failure	Hyphaema followed by raised ocular tension	5	0	1	0	6
	Raised ocular tension	8	3	0	3	14
	Post-operative uveitis resulting in low visual acuity or raised ocular tension	5	3	3	1	12
	Cupping and/or field loss after iridectomy	4	0	0	0	4
Total		22 of 59	6 of 23	4 of 23	4 of 27	36 of 132

It should be appreciated that these figures give the results of the first operation only or the result at 6 months. The results have also been surveyed to the time of writing. Little change in the proportion of successful cases was found. Those in whom a raised tension at or after 6 months was controlled by further operation are off-set by an almost equal number whose condition deteriorated. It must be realized, however, that such a comparison is of little value as the period of follow-up varies from 6 months to over 4 years.

Summary

A review of 156 consecutive cases initially diagnosed as acute closed-angle glaucoma reveals:

- (1) That, during the period 1954–1957, the proportion of successful cases increased significantly.
- (2) That this improvement appeared to be the result of the combined effect of delaying operation until after the second day wherever possible and of using more logical criteria in deciding upon the type of operation.
- (3) That this end can be better achieved in most cases by employing Diamox and minimum miotic therapy until the eye has settled from the acute episode and thorough investigation is possible.
- (4) In this survey it is impossible to compare the results of filtration with those of iridectomy independent of the method of selection. The criteria for deciding which procedure to employ have changed during the 4-year period of this survey, but more information is still required before cases suitable for iridectomy can be selected with confidence.
- (5) That 5 per cent. of cases initially diagnosed as acute closed-angle glaucoma were in fact secondary.

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