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Communications

Failure in retinal detachment surgery

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Many modern series showing the results of the treatment of retinal detachment report high success rates (Custodis, 1965; Davis, 1965; Jesberg, 1965; Hagler, 1965; Schepens, 1965; Kreiger, Hodgkinson, Frederick, and Smith, 1971). The object of this report is to focus attention on anatomical failure in retinal detachment surgery in an attempt to highlight the important preoperative, operative, and postoperative factors that can contribute to failure, and as a result of these findings to suggest means by which the incidence of failure may be reduced.

In this series failure has been defined as either incomplete flattening of the retina after surgery, or re-detachment within a period of 6 months.

Material and methods

In this series only cases which have been treated exclusively by the unit have been included. This is because it was sometimes difficult to be sure of the factors responsible for failure in cases that had been operated upon elsewhere as it was not possible in such cases to observe either the preoperative state or the operation itself. Those which received prophylaxis only have not been included.

There were 452 cases treated by the Unit between 1967 and 1972. The minimum follow-up period was 6 months. Cases were operated upon by either a Resident or a post-graduate Surgeon. Although there was sometimes divergence of views amongst us about the surgical treatment of some cases, in general the techniques employed were similar. Thus, for local procedures, episcleral silastic sponge implants buckled over full-thickness sclera were used, and for encirclement procedures, episcleral silicone rubber bands. In all cases cryotherapy was employed.

The data on the failed cases in this study were compared to those obtained from a study of 100 randomly selected successful cases ranging over the same period of time.

Results

Of the 452 cases, 114 (25 per cent.) needed further surgery after the first operation. It was possible to re-attach 61 of these (a further 13 per cent.), but 53 cases (12 per cent.) were complete failures. Thus the overall success rate in this series was 88 per cent. (Table I). Of the 114 cases, five were successfully re-attached after the first operation but re-detached within 6 months.

PREOPERATIVE FACTORS

The factors that were found to be of particular significance ($P<0.05$) are set out in Table II. The term "uncertain holes" refers to cases in which it was not possible to be sure of the exact location of some or all of the retinal holes. The depth of subretinal fluid was roughly estimated by clinical examination as the depth of the subretinal fluid beneath the

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Table I *Results of retinal surgery*, 1967–1972

Total number of cases	452
Failures of first procedure	114 (25 per cent.)
Cases subsequently re-attached	61 (13 per cent.)
Cases not re-attached	53 (12 per cent.)
Overall success	399 (88 per cent.)

retinal holes. Preoperative "fibrosis" referred to retinal, preretinal, or vitreous fibrosis. Other factors considered, which were not statistically significant, were age, sex, myopia, duration of detachment (unless fibrosis was present), site, and most types and multiplicity of retinal tears.

Table II *Significant preoperative factors*

Percentage cases		*Success*	*Failure*
Aphakia		10	21
"Uncertain" holes		4	13
Size of detachment	1 Quadrant	42	17
	3–4 Quadrant	10	24
Depth of subretinal fluid	Minimal	21	7
	Balloon	21	41
Fibrosis		2	11

SURGICAL PROCEDURES

A summary of the surgical procedures carried out is given in Table III. It can be seen that the number of encirclement procedures was considerably higher in the failure group ($P<0.05$) and that there was corresponding reduction in the number of cases in which subretinal fluid was not drained ($P<0.05$) when compared to the control group. The number of cases in which vitreous injection was performed was also significantly higher in the failure group ($P<0.05$).

Table III *Surgical procedures*, 1967–1972

Result (per cent.)	*Control*	*Failure*
Local indentation with drainage of subretinal fluid	36	19
Without drainage of subretinal fluid	34	19
Encirclement With drainage of subretinal fluid	24	55
Encirclement and local procedures with drainage of subretinal fluid	6	7
Vitreous injections	3	12

COMPLICATIONS

Tables IV and V show the major operative and immediate postoperative complications encountered in the two main groups of patients. Other less severe complications such as pigment fall-out which are not related to anatomical success have not been included. When the two main groups of complications (excluding choroidal detachments, which in no case caused a serious problem) are considered together, it is seen that the failure group of patients suffered a significantly higher proportion of complications (36) in their initial operation than did the control group of successful cases (14) ($P<0.05$). As far as operative complications were concerned, all those encountered in both groups resulted from drainage of subretinal fluid, with the exception of the one case of inadvertant paramacular cryosurgery. Of the postoperative complications, drainage was considered to be responsible for the two cases of intraocular endophthalmitis (this complication has not been described after non-drainage procedures) and also the four cases of vitreous haemorrhage. The other postoperative complications could not be attributed to the drainage of subretinal fluid.

Table IV *Operative complications*

Complication	*Controls*		*Failures*	
	No.	*Per cent.*	*No.*	*Per cent.*
Choroidal haemorrhage	3	3	9	8
Vitreous loss	2	2	8	7
Retinal incarceration	2	2	5	4
Paramacular cryosurgery	1	1	—	
Iatrogenic tear	—		1	1

Table V *Postoperative complications*

Complication	*Controls*	*Failures*	
		No.	*Per cent.*
Infective endophthalmitis	–	2	2
Severe uveitis	4	5	4
Glaucoma	–	1	1
Vitreous haemorrhage	1	3	3
Anterior segment necrosis	1	2	2
Choroidal detachment	6	11	9

FAILURE GROUP

Of the 61 patients that were successfully re-attached by further surgery, eighteen were cured by postoperative application of photocoagulation. In these patients faulty application of cryotherapy by the surgeon was considered to be responsible for failure, with resultant poor adhesion, so that complete absorption of subretinal fluid did not occur. Of the eighteen cases seven had an inferior temporal dialysis and in such cases a long line of cryotherapy is often needed to treat the dialysis, and a gap in application may result in communication between the dialysis edge and the subretinal fluid behind the buckle with consequent failure of absorption of fluid (Chignell, 1973).

In the 43 cases that required further buckling to achieve success the reasons for failure and the subsequent surgical procedures performed are seen in Tables VI and VII. Table VI

Table VI 43 *cases re-attached by further buckling*

Reasons for failure:	
More holes	12
Defective indent	24
No cause found	7

Table VII *Subsequent surgery in* 43 *cases*

Re-attachment with one further operation	29
with two further operations	12
with three further operations	2

shows that 24 of the failures were caused by defective indentation. This term was applied to an indent that was malpositioned, of insufficient height, or had resulted in a communicating fold from the hole to the subretinal fluid behind the ridge. The discovery of more holes accounted for failure in twelve cases. In ten cases it was definitely felt that these holes had been missed at the initial examination and had not appeared after surgery.

In two cases the retina flattened satisfactorily after operation, and because of the appearance of further holes, it re-detached within 6 months. In seven cases the cause of the failure could not be ascertained, and in most of these cases an encirclement procedure was performed after an initial local procedure, and this resulted in anatomical success.

Of the 53 cases not re-attached by further surgery, 25 had only one operation, and the reasons for this are given in Table VIII. The reasons for failure in the remaining 28 cases that did have further operations are shown in Table IX.

Table VIII *Reasons for no further surgery in* 25 *cases*

Onset of massive vitreous retraction	17
Incurable giant tear	3
Patient refused operation	2
Total vitreous haemorrhage	2
Diabetic traction detachment	1

Table IX *Reasons for failure in* 28 *cases*

Development of massive vitreous retraction	20
Total vitreous haemorrhage	3
Other reasons	5

Of these 53 cases, 21 (40 per cent.) suffered a serious operative or postoperative complication (excluding choroidal detachments). In this group failure was due to the onset of massive retraction of the vitreous body in 37 cases. Seventeen patients developed this problem after the first operation and twenty after subsequent surgical procedures. Table X shows the features of the cases that developed massive vitreous retraction; in this group fourteen (28 per cent.) had suffered a serious complication in their management. Aphakia was also a significant factor in this group, as was preoperative fibrosis of either retina or vitreous.

Table X *Features of* 37 *cases that developed massive vitreous retraction*

Preoperative fibrosis	6
Aphakia	12
Severe complications	14

Comment

An analysis has been made of 452 cases of retinal detachment treated exclusively by our unit. 114 (25 per cent.) needed further surgery, and of these only five (4 per cent.) were completely re-attached initially but re-detached within a period of 6 months. There was a final complete failure rate of 12 per cent. (53 cases).

The preoperative factors that were found to be significant in contributing to failure

were uncertain holes, aphakia, size of detachment, depth of subretinal fluid over the site of the intended buckle, and fibrosis of the vitreous or retina. These findings support the clinical impression of a "difficult" case when assessed preoperatively. Uncertain holes, size of the detachment, and depth of subretinal fluid cause failure because of the difficulty of accurately locating the size and extent of the intended buckle. This is also true of most aphakic patients, particularly in those cases characterized by small holes in the periphery; examination in these cases may be impeded by poor dilatation of the pupil.

All other preoperative factors considered were not statistically significant; in some instances this may have been because there were too few cases. Thus, in considering the type of retinal tear present, it was found that there were five giant tears, two of which were successfully re-attached. Analysis of the number of cases of this condition was not statistically significant, but the poor prognosis of giant tears is well known (Freeman, 1969).

Examination of operations performed, in a successful "control" group of patients and also in the failed cases, shows that encirclement with drainage was performed more often in failed cases. However, this probably only represents the tendency (right or wrong) to favour this operation in "difficult" cases. Vitreous injection, which is usually used to restore intraocular pressure after a drainage procedure, was also performed more often in the failed group of cases.

More than 50 per cent. of the cases which did not completely absorb subretinal fluid in the postoperative period and were therefore classified as failures were subsequently re-attached by further surgery. If deficiency of cryosurgical application was the only factor (18 cases), then photocoagulation in the postoperative period was all that was necessary to achieve success. In other cases another buckling procedure was required (43 cases).

It was seen, both from the causes of failure and from the successful results of further surgery, that in the cases re-attached either by photocoagulation alone, or by a further buckling procedure, the majority of failures could be attributed to inaccurate preoperative assessment (*e.g.* failing to observe holes at the preoperative examination), simple operative error (*e.g.* incorrect placement of the buckle), or both.

In considering what were termed the complications of surgery, be they operative or immediately postoperative, it was seen that the majority of serious complications occurred in the patients that were complete failures. Thus, in this group of 53 cases, 22 (40 per cent.) suffered a serious complication in their management. The successful group of patients demonstrated that serious complications may occur and yet not necessarily result in failure, but it is nevertheless clear that the occurrence of these complications is a contributory factor to failure, *e.g.* retinal incarceration may lead to re-detachment (Norton, 1969) and vitreous haemorrhage may result in failure by the induction of fibrotic changes in the retina and vitreous (Jaffe, 1969; Tolentino, Schepens, and Freeman, 1967). A high complication rate was also noted by Criswick and Brockhurst (1969) after the surgery of complicated cases. Norton (1964) found that operative or immediately postoperative complications adversely affected the rate of re-attachment in the treatment of aphakic detachment.

It was noteworthy that 28 per cent. of cases that proceeded to massive vitreous retraction had suffered a serious complication in their management. Three additional failures were caused by total vitreous haemorrhage preventing a retinal view.

It has also been seen that, in this series, nearly all of the operative and some of the postoperative complications were a direct or indirect result of the drainage of subretina

fluid; this confirms the views of Cibis (1965) that the drainage of subretinal fluid was the most dangerous step in a retinal detachment operation. Although non-drainage procedures, advocated by Custodis (1953), Lincoff, Baras, and McLean (1965), and Scott (1970), may be accompanied by complications associated with cryotherapy (*e.g.* Lincoff and McLean (1966), Abraham and Shea (1968), and Chignell, Revie, and Clemett (1971)), the intraocular complications are almost negligible compared to cases treated by drainage. Lincoff and Kreissig (1972) have now extended the application of this method so that over 70 per cent. of all their cases are treated in this way.

The drainage of subretinal fluid may also result in hypotony necessitating the added risk of vitreous injection to restore normal intraocular pressure.

This present series has shown that although massive vitreous retraction may occur "spontaneously" after apparently uncomplicated retinal surgery, the occurrence of serious complications increases the chance of permanent failure; as these complications are largely avoided by the non-drainage procedures, it is felt that the use of these operations may have prevented some of the complete failures encountered in this series (12 per cent.). It is therefore of great importance to determine the extent of application of the non-drainage operation in retinal detachment surgery.

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