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Retinal mobility and retinal detachment surgery

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SUMMARY A series of 200 consecutive retinal detachments was examined prospectively to consider the physical sign of mobility of the detached retina.

Retinal mobility was found to be absent in 28 cases, and this immobility is caused by periretinal membrane formation. The importance of retinal mobility when considering the case for non-drainage retinal surgery has been examined with particular emphasis on the tear/buckle relationship at the end of the operation.

It was found that there was an excellent prognosis (92% success rate) for cases in which the retina was found to be mobile in the vicinity of the retinal tear, and a high proportion of these cases (71%) can be successfully treated with a non-drainage operation.

It has been stated that the assessment of the mobility of the detached retina is an important factor (Scott, 1972; Chignell, 1974) when the non-drainage retinal detachment operation of Custodis (1953) and Lincoff *et al.* (1965) is being considered. If the retinal tear cannot be closed at the time of surgery, then the detached retina must, if the non-drainage operation is to succeed, have sufficient mobility to sink back against the buckle and close the tear. (A small increase in the height of the buckle may be expected in the immediate postoperative period owing to expansion of the sponge, as the intraocular pressure falls.) Sinking back of the detached retina takes a varying length of time from a few hours to several days, depending partly on how far it has to go. Thus the proximity of the buckle to the tear at the end of operation is an important feature; the deeper the intervening fluid, the greater must be the degree of retinal mobility if settling back is to occur. The object of the present study was to report a prospective series of retinal detachment cases to assess preoperative retinal mobility and the influence it has on the decision whether a non-drainage operation can be performed.

Retinal mobility

Two main factors effect the mobility of the detached retina. The first is the depth of subretinal fluid. If the subretinal fluid is shallow, there is very little scope for actual movement of the detached retina, which, in fact, may then appear to be relatively immobile. This situation is rarely of clinical significance, as in the presence of minimal fluid the retinal hole can easily be closed at the time of surgery with a non-drainage operation. The second circumstance in which retinal mobility is reduced is when the detached retina is converted into a more rigid structure by the presence of fibrotic retinal membranes, membranes which may form at either surface of the detached retina (Machemer and Laqua, 1975; Laqua and Machemer, 1975). The denser the membrane, the greater will be its immobilising effect. It is the latter problem of immobility that is of particular importance to the surgeon, both preoperatively and at the time of operation, in assessing whether or not the non-drainage operation can be expected to succeed.

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Materials and methods

Two hundred consecutive cases of retinal detachment admitted to the Retinal Unit of the Eye Department, St. Thomas's Hospital, London, were studied. All cases, including those that had been previously operated upon elsewhere, were included. The follow-up period has varied from 1 to 2½ years from the time of surgery.

Preoperative assessment

RETINAL MOBILITY

The retina was described as being mobile if any degree of undulating movement of the detached retina could be detected in the vicinity of the tears either on indirect ophthalmoscopy with scleral depression or on 3-mirror gonioscope examination.

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The retina was described as immobile if no such movement could be detected.

RETINAL MEMBRANES

The presence and position of periretinal membranes was assessed. Presumed and therefore early evidence of membrane formation was not included—for example, simple distortion of a retinal tear or of neighbouring retinal blood vessels, changes which usually precede the onset of the visible white membrane (Scott, 1975). Only when actual whiteness of the membrane could be detected was it included in the series. The degree of membrane formation varied considerably from small patches of preretinal membrane to end-stage massive periretinal proliferation. The membrane was considered to be immediately related to the tear if within 1 to 2 mm.

SURGICAL DETAILS

In all cases the method of surgery was similar. Thus full-thickness scleral buckles were used. Cryotherapy was applied. Silastic episcleral sponge implants were used and, for encirclements, silicone rubber bands, which in most cases were accompanied by local implants. At the time of surgery if the retinal tear could not be closed an attempt was made to produce a high buckle and to approximate the buckle to the tear as nearly as possible. The relationship of the buckle to the tear at the end of operation was described as either tear closed, a moderate depth of subretinal fluid (the tear completely separated from the buckle, the outline of which can easily be detected), or deep subretinal fluid (the outline of the buckle more difficult to detect).

REASONS FOR DRAINAGE

For the purpose of this study the reasons for drainage, noted at the time of surgery in all cases, were considered under two main headings: (1) insufficient mobility of the detached retina; and (2) when drainage was performed for reasons other than that of retinal immobility. This included a varying group—e.g., accidental drainage with a scleral suture, a poor view of the optic disc preventing visualisation of arterial pulsation, uncertain localisation of the hole, or when intravitreal injections were being used. Sometimes a case was drained for a combination of reasons, and if insufficient mobility was among them—e.g., immobile retina and poor view of the optic disc—the case was considered as being drained for insufficient mobility.

Results and discussion

In the 200 cases performed there was an overall surgical reattachment rate of 90%; 129 cases (65%) were treated with an initial non-drainage procedure (this incidence would have been 70% but for inadvertent drainage which occurred in 9 cases). Of these 129 cases 13 needed more than one operation, in the course of which 5 further cases had subretinal fluid drained, giving an overall non-drainage rate in the cases successfully reattached of 62·2%. In the non-drainage cases local implants were successfully used in 112 cases (89%), and a combination of local and encircling buckles were used in 14 cases (11%).

RETINAL FIBROSIS

Sixty-four cases (32%) had clinical evidence of fibrosis either in the detached retina near the retinal hole or elsewhere, or both. In 40 of the 64 cases (62%) there was fibrosis in the immediate vicinity of the tear (this is probably a conservatively low figure, as in 10 cases assessment was not possible because the view of the retina in the vicinity of the tear was obscured by opacities in the media). In 24 cases (38%) the fibrosis was found only in detached retina remote from the retinal hole. This finding indicates that, although membranes favour the vicinity of tears for their formation, possibly owing to local stimuli from torn retina and also possibly from allowing easy access of pigment epithelium (with its fibrotic potential) to the vitreous cavity, this is not invariably the case.

EFFECT OF FIBROSIS ON MOBILITY

The detached retina was judged to be completely immobile in 20 out of the 40 cases where there was fibrosis in the immediate vicinity of the retinal tear. Of the 24 cases in which fibrosis was not immediately related to the retinal tear the retina near the tear was judged to be completely immobile in 8. Thus it can be seen that, although fibrosis arising in retina not immediately associated with a retinal tear does not usually immobilise the retina near the tear, it may do so. This is probably due to a splinting effect, which is likely to occur when fibrosis is central to a patch of fibrosis and situated in the same meridian.

RESULTS OF ASSESSMENT OF RETINAL MOBILITY

There were 28 cases in which the retina was considered to be completely immobile in the vicinity of the tears on the preoperative examination and 157 in which the retina was found to have a degree of mobility varying from being freely mobile to partially mobile. In the remaining 15 cases assessment was not possible owing to difficulty in observing the retina in the vicinity of the tears.

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Choice of operation

IMMOBILE RETINA

A non-drainage operation was attempted in 11 of the 28 cases (Table 1). In 17 cases in this group drainage of subretinal fluid was performed in the initial operation (Table 1), and in 15 of these 17 cases this drainage was for immobility. In the 7 cases where the hole could be closed at the time of surgery (Table 2) operation was successful at the first attempt. In 4 cases there was still fluid between buckle and tear, and initial failure occurred in 2 because the retina did not settle back against the buckle, and at reoperation drainage was necessary.

In the 28 cases only 9 (32%) were successfully treated by non-drainage operation, and in 7 of these 9 it had been possible to close the tear at the time of surgery. There were 3 overall failures in this group.

MOBILE RETINA

In the 157 cases in which the retina was judged to be mobile the initial operation was a non-drainage procedure in 111 (Table 3). In the 22 non-drainage cases in which the retinal tear could be closed at the time of surgery (Table 4) all were successful with 1 operation. When there was slight intervening subretinal fluid (68 cases) 5 reoperations were necessary. In 1 of these reoperation cases drainage was performed for what was considered to be insufficient mobility of the detached retina. In the 21 cases in which deep subretinal fluid was present at the end of operation in the non-drainage group 4 reoperations were necessary, of which 1 required drainage for reasons of insufficient mobility There was 1 overall failure in this group.

Thus the total number of successful non-drainage cases in the mobile retina group was 106 (67·5%), a significant difference ($P < 0.01$) from the successful non-drainage in the immobile retina cases. It will be seen from Table 3 that in the majority of the cases the subretinal fluid which was present was drained for reasons other than relative immboility. In only 8 (18%) was drainage initially performed for reasons of relative immobility. Although in these cases a preoperative assessment of the detached retina had indicated some degree of mobility, it was felt at the time of surgery that this was limited, and in the presence of deep subretinal fluid it was not expected that sufficient settling back of the retina in the postoperative period would occur. In the mobile retina group of 157 cases there were eventually 12 failures (an overall success rate of 92%).

Table 1 *Drainage of SRF in 28 cases of immobile retina*

Drained for immobility	15
Drained for 'other reasons'	2
Not drained	11

Table 2 *Immobile retina (28 cases). Relationship of tear to buckle at end of operation in 11 non-drained cases*

Tear closed	*Slight SRF*	*Deep SRF*
7	4	0

Table 3 *Reasons for drainage in 157 cases in which the retina was mobile*

Drained for immobility	18
Drained for 'other reasons'	28
Not drained	111

Table 4 *Mobile retina (157 cases). Relationship of tear to buckle at end of operation in 111 non-drained cases*

Closed	*Slight SRF*	*Deep SRF*
22	68	21

Conclusion

In a series of 200 consecutive cases of retinal detachment the retina was found to be completely immobile near the retinal tears (owing to retinal fibrosis) in 28 of them. Some degree of mobility at least was found in 157 cases. Retinal fibrosis was present in 64 cases (32%). In 44 cases in which fibrosis was present in the vicinity of the tear complete immobility was present in 20 cases. In spite of this a non-drainage operation may be performed, but it is necessary to close the retinal tear at the time of surgery, and two failures with non-drainage in this group emphasised this necessity. Of 24 cases in which the retinal fibrosis was not related to the tears the retina was immobile in the vicinity of the tear in 8, possibly by a splinting effect on the detached retina.

The surgical results in this series emphasise that one of the most important sequelae of retinal fibrosis is its effect on the mobility of the detached retina and the dynamic relationship the retina has with the buckle that has been raised. Thus it was found that regardless of any other feature of the detachment (e.g., size, position, multiplicity, and type of retinal hole) there was an excellent prognosis

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(92% success rate) for cases in which the single physical sign of at least some retinal mobility in the vicinity of the tear is present, and a high proportion of these cases (71%) can be successfully treated with a non-drainage operation. In the cases that were drained in the mobile retina group drainage was usually performed for 'other' reasons.

In view of the improved general treatment of retinal detachment modern series are bound to contain increasing numbers of complicated cases. One of the most important preoperative problems is that of attempting to assess the mechanical effect of any retinal fibrosis that may be present. It is stressed that one of the most important features of these membranes is their effect on retinal mobility, and this physical sign is of great importance as an indicator of whether or not a successful non-drainage operation can be performed.

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