

Retinal detachment surgery without cryotherapy

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SUMMARY A series of cases of retinal detachment treated without the application of cryotherapy at the time of surgery has been studied. The omission of cryotherapy while not interfering with retinal reattachment, carries the risk of redetachment at a later date. Macular pucker may still occur in spite of the absence of cryotherapy.

The use of cryotherapy in the prevention of retinal detachment (prophylaxis) has been found to be safe, and complications as the result of its use in this way are rare.^{1,2} But when it is used in the treatment of retinal detachment, complications are more likely.^{3,4} They are probably related to excessive application, a situation that is likely to occur either when large areas of retina have to be treated, or when there is deep subretinal fluid and the end point of the cryotherapy reaction difficult to see. Recent experimental work has indicated that a strong adhesion is likely to be achieved only when the detached retina itself is involved in the freezing process.⁵ This work does not substantiate the clinical impression that freezing of the pigment epithelium (a fairly frequent practice in cryotherapy applications when the retina is deeply detached) is unlikely to result in the formation of strong adhesion. The same experimental study also showed that cryotherapy can produce star-shaped folds by stimulating astrocytes (proliferation of which can contribute to formation of periretinal membranes). The possibility that cryotherapy can contribute to membrane formation, either by stimulating new membranes or by increasing pre-existing ones, is important because the widespread occurrence of periretinal membranes now represents the commonest cause of failure to reattach a detached retina.⁶ Similarly, localised membrane formation can destroy vision if it occurs at the macular region. Thus macular pucker is one of the commonest reasons for failure of visual acuity to improve after retinal detachment surgery.⁷

The experimental findings that cryotherapy can precipitate membrane formation is supported by our clinical impression, particularly in cases where

detachment surgery has failed, that heavy cryotherapy may contribute to a more rapid progression of previously existing intraocular fibrosis.

The possibility of treating some types of retinal detachment without induced adhesion and by means only of a buckling procedure has already been suggested,⁸ and the present series reports the effects of using full-thickness scleral buckles with or without drainage of subretinal fluid and avoiding the use of cryotherapy.

The main purpose of this study was to investigate (1) whether the omission of cryotherapy prejudiced the immediate reattachment of the retina, particularly when the nondrainage operation was used; (2) whether redetachment of the retina occurred at a later date; and (3) whether cryotherapy had any obvious effect on the incidence of macular pucker after successful reattachment.

Materials and methods

The selection of cases was made on the basis that in the event of an unsuccessful operation it would be easy to establish whether the failure had been caused by the omission of the cryotherapy or by an inadequate buckling procedure. For this reason the cases selected were of a relatively simple nature. Thus cases were excluded with complex arrangements of tears (e.g., giant tears or multiple tears at different levels) or in which the retinal hole was either difficult to identify with certainty or was not found at all. Cases with extensive retinal fibrosis were also excluded. The macula was studied both before and after operation at intervals with slit-lamp biomicroscopy. Cases with any suggestion of preoperative preretinal membrane formation at the macula were excluded.

No selection, however, was made on the basis of refractive error, the extent of the retinal detachment,

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depth of subretinal fluid under the retinal holes, and the presence of dynamic vitreous traction at the site of the retinal hole (both round and horseshoe shaped tears were included), or the length of time that the retinal detachment had been present.

Forty-seven cases were initially treated without cryotherapy. The follow-up period has varied from 1 to 5 years. Of the 47 cases 1 had previous retinal surgery several years before.

There were 24 cases of myopia and 6 of aphakia. The remaining 17 cases were emmetropic. In 17 cases the detachment extended for more than 2 quadrants of the retina, and in 30 cases for less than 2 quadrants. In 39 cases the macula was detached at the time of presentation. Retinal holes were single in 36 cases and multiple in 11 (in 3 of these 11 cases the holes were separated by more than a quadrant of detached retina). There were 26 horseshoe tears, 16 round holes, and 5 dialyses.

Preoperative fibrosis. In 3 cases there was evidence of early preretinal membrane formation in the detached retina but not in the immediate vicinity of the retinal hole.

SURGICAL TECHNIQUE

All cases were treated with local Silastic sponge implants of various sizes buckled on to full-thickness sclera. Subretinal fluid was drained in 10 cases according to criteria previously described.⁹

The hole was closed in 18 cases, and there was intervening subretinal fluid in the remaining 29 cases (in these cases it was not possible to close any part of the retinal hole.)

Results

FAILURES

There were 7 initial failures. In 1 case photocoagulation was applied 3 weeks after surgery to the area surrounding a retinal tear on a well-placed buckle. This photocoagulation was applied to encourage absorption of remaining subretinal fluid. Absorption of fluid in this case did in fact take a further month, and in retrospect it is probable that this application of photocoagulation was unnecessary. In the 6 remaining failures it could be clearly seen that the buckling procedure performed had been inadequate. In 3 of these cases, which occurred early in the series, cryotherapy was applied when reoperation was performed. In the remaining 3 cases, when greater confidence in the procedure had been gained, cryotherapy was not applied at the reoperation. In all of these initially failed cases the reoperation was successful in reattaching the retina. Thus of the original 47 cases 43 had been treated entirely without adhesion.

RATE OF REATTACHMENT

Three of the 43 cases required early reoperation, and subretinal fluid absorption was therefore studied in the remaining 40 cases. In 18 cases the hole was closed on the table at the time of surgery, and of these 16 (88%) were flat within 1 week. In 16 of the remaining 22 cases slight subretinal fluid remained, between hole and buckle, and of these the retina was flat by the end of 1 week in 12. In the 6 cases in which deep subretinal fluid was present at the end of operation 5 were flat at the end of 1 week. Although not statistically comparable, this rate of reattachment did not appear to differ obviously from a previous series of patients on whom cryotherapy had been used.¹⁰

POSTOPERATIVE ASSESSMENT

After several months slight scattered pigmentation is usually found on the surface of the buckle in the vicinity of the retinal hole. As usual with Silastic sponge buckles, there was a variable loss in the height of the buckle.

LATE FAILURES

So far 6 redetachments have occurred at times of 1-4 years from the time of surgery. Two redetachments occurred after a dialysis and the 4 other cases were in horseshoe-shaped tears. In all cases the height of the buckle had entirely disappeared (in 1 the buckle had become infected and had to be removed). In all 6 cases the original hole could clearly be implicated as causing the reaccumulation of subretinal fluid, and the cases were cured by further buckling of the same hole. So far redetachment has not occurred in any case where a round hole had been initially the cause of the detachment.

MACULAR PUCKER

In 2 cases (4.7%) macular pucker appeared after retinal reattachment had been achieved. In both cases the macula had been detached prior to surgery. In both of these cases radial sponge buckles had been used to seal holes in the upper temporal quadrant. In the original operation subretinal fluid had been drained to facilitate localisation.

Discussion

Forty-three cases of retinal detachment treated without the use of cryotherapy have been followed up for a period of 1-5 years and the following points may be made from the study of this group of patients.

SUBRETINAL FLUID ABSORPTION

The omission of cryotherapy at the time of surgery

is consistent with complete absorption of subretinal fluid and reattachment of the retina in the relatively simple types of cases studied. Six of the original 47 cases that required further buckling soon after surgery emphasised that it is only the placement of an adequate buckle that is necessary to achieve reattachment of a detached retina in the type of cases studied. With full-thickness scleral buckles and Silastic sponge implants absorption of subretinal fluid has occurred whether or not it had been possible to close the hole at the time of surgery, with no obvious change in the expected rate of subretinal fluid absorption. The absorption of subretinal fluid proceeded uneventfully in cases with different refractive errors, varying extent of detachment, and irrespective of the type or number of holes present. In contrast with a previous study⁸ we did not experience failure in the small number of aphakic cases treated.

The long-term failure of 6 cases has raised further points. (1) The disappearance of the buckle indicates that for long-term reattachment (of at least dialyses and horseshoe-shaped tears where there is still active traction) either the buckle must remain permanent (and the permanence of a buckle when external Silastic sponge implants are used is impossible to guarantee), or the original tear must be reinforced by the presence of iatrogenic adhesion. (2) Failure has not so far occurred in cases where the retinal holes were free of traction (round holes).

MACULAR PUCKER

The appearance of this complication, though in only 2 cases (4.7%), suggests that macular pucker will appear even in cases treated with simple buckling, that is, it appears that the simple physical detachment of the macula is enough to stimulate the formation of preretinal membrane in some cases. This appeared to confirm the findings in a recent series¹¹ in which progression of periretinal membranes still occurred after retinal surgery of cases treated without adhesion. In a separate study (Markham and Chignell, in preparation) the incidence of macular pucker was 6% in a series of 500 cases of retinal detachment in which the macula had been detached prior to surgery.

Conclusion

It is concluded that if full-thickness scleral buckles using Silastic sponge implants are used to treat retinal detachment, then the omission of an induced adhesion cannot be recommended as previously hoped,¹² as not only is there a risk of redetachment but macular pucker can still occur. However, an appreciation that cryotherapy is not concerned with the process of reattachment of the detached retina should increase the tendency to conservatism in its use to a sensible minimum, so that its application is confined to the immediate vicinity of the retinal hole.

We are grateful to Miss Sue Patterson and Mrs Margaret Grice for their secretarial assistance.

This study was in part supported by the Iris Fund of St Thomas's Hospital.

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