THE SURGICAL TREATMENT OF RETINAL DETACHMENT MODIFIED BY THE USE OF CRYOTHERAPY

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INTRODUCTION

The surgical treatment of rhegmatogenous retinal detachment (caused by retinal tears, holes, or a dialysis) has been modified from time to time by the introduction of new techniques. Currently, cryotherapy is an important modification in management. Unlike diathermy it does not produce scleral neurosis. This report is to describe a modified technique of scleral buckling incorporating the use of cryotherapy.^{1,2}

A. PRE-OPERATIVE MANAGEMENT

The usual patient with a rhegmatogenous retinal detachment is allowed to continue activities without strenuous exercise up to the time of operation. Pinhole glasses are not used. I consider that bedrest is indicated only if a detachment is close to, but not yet affecting the macula, or if a very highly ballooning detachment is present, with freely movable folds. A patient may be seen in whom bedrest might produce sufficient flattening of the retina to obviate choroidal perforation and evacuation of subretinal fluid; but it is rare. 0.2% Scopolamine and 10% Phenylephrine drops are used as a mydriatic.

B. OPERATION

As a rule, general anaesthesia is used with endotracheal intubation.

1. The skin around the eye is prepared and the field is draped.
2. Lid sutures are inserted, and a lid speculum is placed in position. A canthotomy is performed if indicated.
3. In primary cases, peritomy is performed at the limbus and radial incisions are made through conjunctiva in opposite quadrants of the globe. This enables conjunctiva and Tenon's capsule to be displaced posteriorly without opening them separately. In the case of an aphakic retinal detachment, if a limbus based flap had been made, then the incision is made through conjunctiva and Tenon's capsule just behind the original incision.
4. Usually one of the rectus muscles is detached from its insertion. 5-0 chromic catgut is sutured to the cut ends of the muscles to facilitate reattachment and black silk is inserted into the globe at the sites of insertion of the muscles for traction. For traction, black silk is looped around the recti not removed. The lid speculum is removed.

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5. Localization of the retinal tears. This is performed using a binocular stereoscopic indirect ophthalmoscope ^{4,3} to examine the fundus while using a flat diathermy electrode in the area of the tear. As gentle pressure is applied to the sclera an elevation is visible in the fundus. The electrode tip is moved so that it is just posterior to a large or medium sized tear, or directly over a tiny hole. In the case of large tears, the extremities are marked as well as the posterior edge. When the surgeon is holding the electrode in the correct position, he applies a diathermy which is visible on the sclera.
 6. Preparation of the scleral bed for the silicone implant. An incision is made through of the sclera to leave the sclera slate colored. The incision is made parallel to the limbus and usually fairly close to the equator of the eye. Its exact position is determined by the diathermy marks on the sclera placed during tear localization, and by any retinal degeneration. For example, if there is a retinal tear marked at 7:30 13 mm. from the limbus, and at 10:30 12 mm. from the limbus, with lattice degeneration at 9:00 11 mm. from the limbus, then the partial scleral incision will probably extend from 7 to 11:00 14 mm. from the limbus. From this scleral incision the lamellar scleral flaps are dissected anteriorly and posteriorly to produce a scleral bed the size of which is dependent on the size of silicone 5 implant to be inserted. This in turn depends on the width and height of the buckle that is required. (A useful implant measures 4.5 mm. wide by 2 mm. deep) The implant may be cut to any length. The silicone implant has a groove in its superficial surface for a band to hold it in place. (This piece of silicone requires a scleral bed about 7.5 mm. wide). The type of silicone used for this purpose excites a minimal fibrous tissue reaction. After the dissection of the scleral flaps three areas of freezing are made in the scleral bed. Freezing is watched by stereoscopic indirect ophthalmoscopy and time taken for the freezing to occur is noted. The average of time for three spots is then used throughout the dissected scleral bed without further ophthalmoscopic control.
 7. Placement of implants. The 0000 dacron mattress sutures are placed through the scleral flaps and the implant is placed in the bed under the sutures. An encircling silicone band is placed between the mattress sutures and the implant and then passed under the insertions of the attached recti. The band is fastened temporarily with a dacron suture tied as a clove-hitch, and the mattress sutures are tied temporarily. Figures I, A, B, and C illustrate stages 6 and 7 of the operation.
- Ophthalmoscopy is performed at this stage to ascertain that the tears are in a position which is satisfactory in relation to the buckle and to locate an area where the retina is sufficiently elevated to the next stage. This is perforation of the choroid for release of subretinal fluid.

8. Perforation for release of subretinal fluid. Perforation is usually performed posterior to the buckle although it may be performed in the bed of the buckle, preferably towards one end of it. If it is performed posterior to the buckle, a 2 mm. scleral incision is made and dacron mattress sutures placed in the sclera at this site. The limbs of the suture are separated, allowing a knuckle of choroid to prolapse. The scleral edges of the incision are diathermized to facilitate gaping of the choroidal knuckle. Then the exposed choroid is diathermized to close choroidal blood vessels and avoid choroidal bleeding. The choroid is perforated with an extremely fine electrode, almost tangential to the scleral surface as shown in Figure II. As subretinal fluid is being released and the buckle is being tightened, pressure is applied to the globe with a cotton-tipped applicator to obviate hypotony of the eye.
9. Tightening of sutures. The mattress sutures are tightened and tied temporarily. The encircling band is shortened and tied temporarily. The site of perforation is tied temporarily.
10. Ophthalmoscopy is done. If the tears are closed and on the anterior slope of the buckle, if the retina is reasonably flat; and if the optic disc is not ischemic; then all sutures are tied permanently. To produce a tension of about 15 mm. of mercury Shiotz, minor adjustments of the tightness of the encircling band are often required. If, having shifted in an unpredictable direction with release of subretinal fluid, the tears are not in a satisfactory position, the buckle is moved in the necessary direction by further scleral dissection and additional freezing is added in the freshly dissected scleral bed. Figure 3 illustrates an eye in cross section with a silicone implant in position.
11. In the illustrated case, it would be necessary to insert two sutures anchoring the encircling silicone band to the sclera, one at 1:30 and the other at 4:30. These sutures prevent the band from slipping.
12. Closure. The muscle is reinserted, usually being recessed 2 mm. (except the inferior rectus which is not recessed). If Tenon's capsule has been opened, it is closed by interrupted 5-0 chromic catgut in the four quadrants and the conjunctiva repaired with continuous 5-0 plain catgut. If a canthotomy was done it is sutured with a subcuticular stitch.
13. Chloromycetin or methicillin is irrigated around the implants and atropine instilled in the conjunctival sac. A pressure dressing is applied and the other eye is not covered.

The time taken for such an operation is about three and a half hours.

A shorter form of this operation can be done with transfull thickness cryotherapy,

(no scleral dissection). An encircling silicone band is used and subretinal fluid is released. This procedure can be completed in about two hours.

C. POST-OPERATIVE MANAGEMENT

The patient is given "bathroom privileges" on the first post-operative day, and activity progresses until he is discharged from the hospital on the seventh post-operative day. While the patient is in the hospital, the fundus is examined daily. The pressure dressing is removed on the first post-operative day and an eye pad is then worn for about four days. Thereafter, a patient will wear clip-on dark glasses. A mixture of scopolamine, phenylephrine and hydrocortisone is used in the eye which has been operated. Fourteen days after the operation, the patient is examined in the office; if the eye is satisfactory the patient returns to his home. If the patient lives at some distance he returns home by air. The patient is seen regularly by an ophthalmologist. Usually a patient begins work four to six weeks after surgery, except in the case of a manual worker, whose return to full work is delayed an additional month.

DISCUSSION

The advantage of the procedure described is the avoidance of scleral necrosis. Besides those cases in which the surgeon wishes to avoid scleral necrosis, it may be used in other simpler cases transconjunctivally. Cryotherapy is therefore of value in simpler cases, cases with thin sclera, and cases which can be treated transconjunctivally.

Histological studies suggest that cryoapplications produce a strong chorioretinal scar, but there is no definite information on the actual strength of the lesion. Criticism has been aimed at cryotherapy because there is no reliable comparison between the strength of the chorioretinal adhesion produced by freezing as compared with that produced by diathermy in the human eye.⁶ The relative merits of cryotherapy as compared with diathermy in cases with marked retinal tractions are difficult to evaluate at this time. Although diathermy has been shown over many years to produce a strong chorioretinal bond, cryotherapy does not seem to increase the vitreoretinal adhesion.

Patients who require reoperation due to the absence of a strong chorioretinal scar should be treated by diathermy to provide the new adhesion.

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FIGURE I

- A. Beginning of scleral dissection.
- B. After preparation of scleral flaps, cryoprobe is applied in the scleral bed.
- C. Sutures are in place through the scleral flaps.

FIGURE II

- A. Silicone in position and perforation site ready.
- B. Method of perforating choroid and releasing subretinal fluid.

FIGURE III

Cross section of globe showing silicone and encircling band in position. Note retinal tear placed on scleral buckle.