

Retinal detachment surgery

Encircling silastic 3-mm. band without evacuation of subretinal fluid

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In retinal detachment surgery, Chawla (1971) had excellent results using a 7-mm. encircling silastic band, cauterization of the edges of the tear by cryocautery, and evacuation of the subretinal fluid (Schepens, Okamura, and Brockhurst, 1957). He felt that the technique was simpler than scleral dissection and safer than the supramid encircling suture.

The present study has the following aims:

- (1) To describe a simplified technique using an encircling 3-mm. silastic band pressing on the sclera at the equator with cryo-coagulation or minimal effective diathermy of the tear edges but without evacuation of the subretinal fluid.
- (2) To compare the results of 100 operations using the technique described with the results of 100 operations using segmental buckling of the diathermized or cryo-coagulated sclera opposite the edges of the retinal tear by a 5-mm. diameter silicone rod, also without evacuation of the subretinal fluid (Custodis, 1952).

In both series of operations most of the subretinal fluid was absorbed before the operation after 3 days' rest in bed, binocular bandaging, atropine sulphate 2 per cent. drops to the affected eye, and fixation of the head so that the retinal tear was most dependent. In both series, the pressure of the synthetic material on the scleral sensory nerve endings during the early postoperative hours, while ocular tension was relatively high, produced an axon reflex engorgement of uveal capillaries (Duke-Elder and Gloster, 1968). The choroidopathy aided in sealing the retinal tear edges. For this reason the ocular tension was not reduced during the operation by evacuation of the subretinal fluid, paracentesis, or giving intravenous mannitol or urea.

The technique of the encircling silastic band operation used is as follows:

An external canthotomy is performed and a lid speculum applied. The bulbar conjunctiva is cut right round 10-mm. from the limbus. The four rectus muscles are exposed in the field of the operation by cutting the inter-rectus fascia. In between the rectus muscles, 13 and 15-mm. from and concentric with the limbus, a mattress supramid suture is passed for 5 mm. each side in half the scleral thickness in each quadrant of the eye (so that the silastic band passes under the supramid loops exactly at the equator, 14-mm. from the limbus). A 3-mm. wide silastic sponge band about 8 cm. long is passed under the four rectus muscles and the supramid mattress suture bridges all round the globe. The ends of the band are left to meet at the upper temporal quadrant of the globe. A double tie without a final knot is placed at the ends of each supramid mattress suture without pressing the band so that the latter can move freely over the sclera when its ends are pulled under the rectus muscles and supramid bridges. The ends of the silastic band are pulled, and while they are stretched indenting the sclera a double tie is made without a final knot. When the band is stretched, it becomes about 1.5 mm. in breadth. Patency of the central retinal artery and transparency of the cornea are assured before the final knot is placed on the double tie of the band. The band ends beyond the final knot are then cut off.

The degree of band pressure on the sclera should be that needed to produce scleral buckling and induce mild choroidopathy to aid sealing of the retinal tear edges. If the pressure on the sclera is not high, these two effects are not produced, and if it is very tight, excessive choroidopathy is produced giving rise to complications such as macular affection or vitreous bands.

Each supramid mattress suture is tightened gently (without pressing or cutting the band) so that the band is placed exactly at the equator. A final knot is placed on each double tie of the supramid sutures. The edges of the retinal tear or tears are coagulated by cryo or minimal diathermy cauteries (60 milliamperes, 4 sec. each). No attempt is made to evacuate the subretinal fluid. The conjunctival wound is closed by interrupted 6-0 silk sutures. In cases in which a giant tear extends behind the equator, the encircling band is placed just behind the posterior edge of the tear and anterior to the equator in the opposite meridian.

The ocular tension in a typical case before, during, and after the operation was as follows:

- (1) Before operation: about 7 mm. Hg (Schiötz).
- (2) After exposure of four rectus muscles and pressure on the globe during the placing of the supramid mattress sutures: 2 mm. Hg or less.
- (3) After stretching the encircling silastic band, indenting the sclera, and trying the ends, keeping the band stretched on the sclera: about 30 to 35 mm. Hg. During the operation, a few minutes after the sclera is pressed by the silastic band, the area subjected to pressure is found to be reddish-blue, because of the underlying dilated choroidal vessels.
- (4) At the end of the operation, after closure of the conjunctival wound by sutures (because of the maintained pressure of the band on the sclera): about 20 to 25 mm. Hg.
- (5) 24 hours after the operation (at the first dressing): about 15 to 20 mm. Hg (partly because some of the intraocular fluid is expressed from the eye).
- (6) During the subsequent days and for 1 or 2 months, (because of the uveopathy present): 2 mm. Hg or below. With this drop in ocular tension, the buckling effect of the band reaches its maximum, pressing the cauterized choroid against the edges of the retinal tear.
- (7) With the resolution of uveopathy, the ocular tension rises gradually to normal: about 16 mm. Hg.

Pain in the eye and headache, which may follow the operation, are due to the uveopathy and will disappear in 1 to 2 months with the resolution of the uveopathy. The appearance of the sclera on fundus examination depends on the thickness and softness of the sclera, the ocular tension, and the tightness of the encircling band. It may appear immediately, after one or more days, or may be delayed as long as the 25th day after the operation.

Results

I. 100 SEGMENTAL BUCKLING OPERATIONS

(1) In ninety cases, each with a small tear anterior to the equator, the operation succeeded. In three cases, with recession of the buckled area 2 to 3 months after the operation, the tear reopened and the detachment recurred. The three recurrences were successfully treated with an encircling 3-mm. silastic band at the equator and cryo-coagulation of the edges of the tear without evacuation of subretinal fluid.

(2) In five cases, each with a small tear anterior to the equator, there was severe exudative choroidopathy of the buckled area between the 7th and 20th postoperative days and the previously closed tear opened so that the detachment recurred. All five cases were treated with an encircling 3-mm. silastic band at the equator (without removing the existing silicone rod). Strong pressure on the sclera must be avoided in such cases so as not to produce fresh choroidopathy; it must be just enough to coapt the retinal tear edges to the

inflamed choroid without the application of new diathermy or cryo-coagulation and without any attempt to evacuate subretinal fluid. This procedure was aided by anti-inflammatory steroidal and non-steroidal drugs and antihistamines. In all these five cases the retinal tears were closed and the retina replaced.

(3) In five cases, each with a giant tear or dialysis anterior to the equator, more than one quarter of the circumference of the globe in extent, a part of the tear was seen to reopen during the second postoperative week with recurrence of the detachment. These were treated with an encircling 3-mm. silastic band at the equator without fresh diathermy or cryo-coagulation and without draining the subretinal fluid. In two cases the encircling band indented the sclera just enough to coapt the edges of the tear to the inflamed choroid without producing fresh uveopathy and these two operations succeeded. The ocular tension after tying the band was 15 mm. Hg (Schiötz). In the other three cases the encircling band was too tight and caused fresh uveopathy; this gave rise in two cases to a severe macular lesion and in one case to severe vitreous exudations, leading to vitreous band formation and obscuring the view of the fundus. After each of these three operations, although the retinal tear was closed and retina replaced, the visual acuity was reduced to hand movements.

II. 100 ENCIRCLING 3-MM. SILASTIC BAND BUCKLING OPERATIONS

(1) In 85 cases, each with a small tear anterior to the equator, the operation succeeded. In two of these cases there was a "fixed" retinal fold, which unfolded during the postoperative period.

(2) In fifteen cases, each with two or three small retinal tears anterior to the equator, affecting different quadrants of the globe, the operation succeeded.

(3) In three out of five cases with giant tears or dialysis anterior to the equator, and more than one quarter of the circumference of the globe in extent, the operations succeeded.

Discussion

The best material for encircling operations is a flexible band of silastic sponge. This does not require the ocular tension to be reduced by evacuation of subretinal fluid. Because of its elasticity the band continues a gentle pressure on the sclero-choroid whatever the ocular tension. Its encircling effect is seen to fulfil two requirements in the fundus. Besides the buckling effect, the pressure on the sclera produces uveal capillary engorgement, which assists in sealing the retinal tear. Because the band is elastic, it can be prevented from slipping forwards or backwards from the equator only by scleral supramid sutures. Slipping of the band is avoided by placing it exactly at the equator all round the globe.

Non-elastic material, such as supramid thread, when used for cerclage without evacuation of the subretinal fluid, causes a slight fall in ocular tension postoperatively. The cerclage effect is not seen in the fundus and is thus ineffective. If its use is combined with evacuation of subretinal fluid, especially if vitreous is accidentally lost, the globe may remain soft however much the cerclage is tightened, and there is a risk of total retinal detachment.

The best width for the silastic band is 3-mm. If it is narrower the band may cut while the ends are being pulled, and a broader band may give rise to severe pressure choroidopathy.

No complications were observed such as may occur after the use of other encircling materials: infection (McMeel and Wapner, 1965), ulceration of the sclera (Lincoff, Baras, and McLean, 1965), necrosis of the anterior segment (Boniuk and Zimmerman, 1961), narrowing of the anterior chamber with formation of peripheral anterior synechiae and the development of glaucoma (Sebestyen, Schepens, and Rosenthal, 1962), occlusion of

the central retinal artery (Lincoff, 1960), sudden blindness from circulatory disturbance (Jarrett and Brockhurst, 1965), multiple corneal erosions and sympathetic ophthalmitis (Elmassri, 1964), string syndrome (Manson, 1964), expulsive haemorrhage (Wolter, 1961), or rupture of posterior lens capsule, cataract, and phaco-anaphylactic endophthalmitis (Wolter and Bryson, 1966).

Comparing the results of buckling operations using the encircling 3-mm. silastic band with those using the segmental 5-mm. silicone rubber rod (in both cases coagulating the retinal tear edges by diathermy or cryo-coagulation and without evacuating the subretinal fluid), the encircling technique has the following advantages:

It has a higher percentage of success and lower incidence of recurrence.

It should be the operation of choice for multiple tears in different quadrants of the globe, giant tears anterior to the equator of the globe, and fixed retinal folds.

It is not followed by localized severe choroidopathy which sometimes opens the retinal tear with recurrence of the detachment.

It produces quicker and firmer retino-choroidal adhesions all round the globe, and prevents the formation of fresh tears.

It does not recede 2 to 3 months after the operation unless it slips out of place, which is very rare.

The scleritis produced in the pressed area causes scleral shortening.

Very low preoperative ocular tension usually indicates the presence of uveitis, and the encircling band must not be tightened for fear of producing fresh uveopathy. As chorioiditis is already present, the encircling band is designed to coapt the retinal tear edges opposite the coagulated and inflamed area of the choroid.

Summary

(1) The technique is described of placing an encircling 3-mm. silastic band round the equator of the globe, followed by cryo-coagulation or diathermy of the retinal tear edges, without evacuation of the subretinal fluid; it has a very high percentage of success (above 95 per cent.) and a very low incidence of recurrence.

(2) This high rate of success is explained by the gentle pressure exerted by this elastic type of cerclage; it keeps the torn edges of the retinal break in contact with the cauterized choroid and by slight indentation of the sclera causes an engorgement of the uveal capillaries which aids in sealing the tear.

References

- BONIUK, M., and ZIMMERMAN, L. E. (1961) *Trans. Amer. Acad. Ophthal. Otolaryng.*, **65**, 671
 CHAWLA, H. (1971) *Brit. J. Ophthal.*, **55**, 331
 CUSTODIS, E. (1952) *Ber. dtsh. ophthal. Ges.*, 1951, **57**, 227
 DUKE-ELDER, S., and GLOSTER, G. (1968) In "System of Ophthalmology", vol. 4, p. 328. Kimpton, London
 JARRETT, W. H., and BROCKHURST, R. J. (1965) *Arch. Ophthal. (Chicago)*, **73**, 782
 LINCOFF, H. A. (1960) *Ibid.*, **64**, 201
 ———, BARAS, I., and McLEAN, J. (1965) *Ibid.*, **73**, 160
 MANSON, N. (1964) *Brit. J. Ophthal.*, **48**, 70
 MASSRI, A. EL (1964) *Orient. Arch. Ophthal.*, **2**, 111
 McMEEL, J. W., and WAPNER, J. M. (1965) *Arch. Ophthal. (Chicago)*, **74**, 42
 SCHEPENS, C. L., OKAMURA, I. D., and BROCKHURST, R. J. (1957) *A.M.A. Arch. Ophthal.*, **58**, 797
 SEBESTYEN, J. G., SCHEPENS, C. L., and ROSENTHAL, M. L. (1962) *Arch. Ophthal. (Chicago)*, **67**, 736
 WOLTER, J. R. (1961) *Amer. J. Ophthal.*, **51**, 264
 ——— and BRYSON, J. M. (1966) *Ibid.*, **61**, 428