

LAMELLAR SCLERAL RESECTION—AN OPERATION FOR RETINAL DETACHMENT*

L. STAZ, M.B., B.CH. (DUBL.), D.O.M.S. (R.C.P. & S. ENG.).

Johannesburg

In spite of the increasingly satisfactory results obtained in the treatment of detachment of the retina by Weve's method of operation, certain types of cases were operated upon with the knowledge that the chance of success was poor (see below). To C. Dee Shapland (1953) much of the credit must be given for popularizing the operation of scleral resection, by his contributions to the English ophthalmic literature. Shapland has modified the operation of 'lamellar' partial-thickness scleral resection: my own technique is based on his method. The operation was first suggested and performed by Müller of Vienna for high myopia and detachment, and was re-introduced by Lindner (1933) for the treatment of cases of retinal detachment with poor prognosis. Lindner's technique was the full-thickness, penetrating excision of a strip of sclera, although I have heard Arruga referring to the lamellar operation plus surface diathermy coagulation, as performed by himself, as the 'Lindner operation'.

LAMELLAR SCLERAL RESECTION

The lamellar type of operation is apparently favoured by Arruga and Barraquer in Barcelona, by Paufigue in Lyons and by Shapland in London; and I witnessed their operations on a visit to their respective hospitals in 1953. The most spectacular or unorthodox demonstrations were the operations performed by Arruga on fully-dressed out-patients, described and photographed by Foster (1951). Arruga's average time of actual operating, that is excluding the preliminary irrigations etc., and injections of local anaesthetics, was 20 minutes. Stitching was done with a continuous suture of white silk, 'locked' at intervals. The patients walked back to their homes or hotels, where they were kept in bed and visited there for 2 weeks. Incidentally, in a description of a visit to Spaeth's clinic in Philadelphia, Robertson (1949) says that after a detachment operation, double dressings are maintained for about 10 days after operation, and then pin-hole spectacles are given. Elevation of the head is anticipated after about 3 weeks. Patients are usually out of bed during the 4th week and wear their pinhole spectacles for 6 months. This must surely have been modified by now, when the tendency is to ease the post-operative burden.

It is clinically observed that the diathermy reaction in the retina, after Weve's operation, does not start to 'dry up' until the 13th day and that the adhesion of the retina to the choroid is complete, but not firm, by about the 21st day. After the infolding of the scleral fibres and choroid as a result of the lamellar operation, contact between the tissues is made easier and the process of healing can occur while the patient has more freedom of movement.

* A paper presented at the South African Medical Congress, Pretoria, October 1955.

The operation of lamellar resection is not a mutilating one in spite of the folded appearance of the globe at the end of operation and, when it is done as a primary operation, gratifying results can be obtained, but there must be no laxity in the search for all retinal tears. The most important factor in the operation, as in all operations for the cure of retinal detachment, is the meticulous pre-operative search for holes in the retina, and the detailed examination of the vitreous. The most important instrument in every type of operation is the ophthalmoscope; and, as no two diathermy machines behave in the same way, one must know one's instrument and use it exclusively.

Symposium on Retinal Detachment, 1955

An interesting report of the *Symposium on Retinal Detachment* held in January 1955 at a Joint Meeting of the New York Society for Clinical Ophthalmology and the New York Academy of Medicine, Section of Ophthalmology, has only come to hand since the preparation of this paper. It should be read in full, though one does not necessarily agree with all it contains. Some of the important points in the report are as follows:

(a) Diathermy reaction causes retinal and vitreous shrinkage and not only may convert a simple detachment into a complicated one, but may put a complicated one beyond reach of even the scleral shortening operation. It is for this reason that one uses a minimal current (see below).

(b) After either surface or penetrating diathermy the sclera in the area of treatment will not take sutures for 3 months. With this statement I cannot agree at all. It may be true in the American technique, where the Walker pins are extensively used, but my own experience has shown no untoward effects or failures of the white silk sutures. Arruga uses diathermy around and in the gutter of the scleral resection as an integral part of his operation.

(c) One or even two vortex veins may be tied if in the way.

(d) A contributor to the symposium, Dr. Shipman, confirms the post-operative schedule quoted above (Robertson 1949), viz, double pad and bandage for 2 weeks, in bed 3 weeks, pin-hole goggles with a gradually enlarged hole for nearly 6 months, after which time only are patients allowed to resume their normal routine. One cannot visualize any of our own impatient population submitting to such a routine!

(e) The choice of case considered suitable for scleral resection operation is divided into 3 classes by Dr. G. Clark, another contributor. They correspond with the types of case which I have enumerated below.

CHOICE OF CASE

The following types of cases are considered suitable for the scleral resection operation:

1. Every patient over 50 years old with retinal detachment must be considered as a potential candidate unless the retina is but shallowly raised and the tears limited in area and easily coagulated with a minimal diathermy current.

2. Retinal tears with detachment in aphakic eyes.

3. Detachment following perforating injuries of the globe. Weve's dictum is worth recalling: 'The pull of contracting vitreous bands is stronger than any adhesion which can be caused between retina and choroid by any kind of diathermy reaction'.

4. In the presence of very large retinal tears and atrophic-looking retinae.

5. Following previous diathermy operations which have failed to seal off actual tears, or in the presence of newly-formed tears with coincident retinal detachment.

6. In rarer cases showing unusual features, including as a rule fixed retinal folds.

From the above list one is almost drawn to the opinion that primary scleral resection should be performed in every case except that of an inferior disinsertion in a young patient, but perhaps that conclusion is a little too drastic. With experience, which means disappointments, one learns, to a certain extent, to feel which detachment has a poor prognosis.

THE OPERATION

Pre-operative Routine

This is the same as for the ordinary Weve operation. Arruga's precepts are worth recalling. They are based on pre-operative rest in bed in correct position and are of great value in many cases. The results of this are as follows:

1. The retina may settle down in the region of the tear. As soon as this has occurred, operation should be done.

2. The detachment may remain unchanged with rest in bed. This occurs most usually with disinsertions, and nothing is gained by waiting for reapplication of the retina. The same is true in small tears with an altered choroid which does not readily absorb the sub-retinal fluid. If there is a very large tear, the choroid may not be able to absorb the large amount of fluid which passes through the tear. Here, by emptying the sub-retinal fluid, an initial operation may save the macular vision and make a second operation more favourable.

3. Finally, detachment may become worse despite bed rest. This probably indicates a choroiditis, in which event operation should be postponed.

The Author's Operative Technique

This combination embodies, one hopes, the best features picked out from the various masters:

1. Largactil plus Pethidene has been used for pre-medication but one finds Omnopon and scopolamine the best as a routine. Post-operative vomiting is of little importance and can be controlled if necessary by an injection of Largactil when need arises. Procaine 4% with adrenaline and hyalase is injected retro-bulbarly and under Tenon's capsule. Intravenous Pentothal is a very satisfactory anaesthetic.

2. No surface anaesthesia is used, in order to keep the cornea quite clear for ophthalmoscopic examination

during the operation. The head-lamp uni-ocular ophthalmoscope, brought to my notice by Dr. E. Epstein, is invariably used. Scheepens' more elaborate binocular instrument has not been tried.

3. Strict asepsis, which entails *inter alia* the wearing of rubber gloves and the isolating of the eye from the skin and lid margins by a muslin or gauze mask kept in place by dilute Mastisol. (Rubber gloves must be worn in every operation for detachment involving the use of diathermy; this aids the concentration of the current by preventing leakage into the operator's hands.)

4. Division of the attachment of the extra-ocular muscle involved in the area of sclera to be excised.

5. The region of any visible tear is treated with surface diathermy, as in Weve's operation with peripheral 'brushing' as done by Arruga, and included, if possible, in the area of sclera to be excised.

6. The amount of diathermy current used, as in the ordinary operation, is the lowest which shows a retinal reaction in 8-10 seconds. On my Monopolar Toury machine, the average setting of the control dial is 4, giving a milliammeter reading of 50-70 MA, while on the bipolar machine the setting is about 3, giving a reading of 40-50 MA.

7. Marking of the area to be excised by means of the tip of an electrocautery. The strip is 4 mm. wide, with its anterior edge 10 mm. from, and concentric with, the limbus, elliptical in shape and stretching from the edge of one muscle to the edge of the muscle directly opposite.

8. The lamellar gutter is brushed gently with 3% KOH, the excess fluid being carefully mopped up and the cornea especially being protected.

9. Weve's perforations are done in the gutter in 3 or 4 positions and especially in the region of any retinal tears or folds. The needle must just touch the retina and not penetrate into the vitreous (Weekers, 1946). As much fluid as is possible with safety is gently sucked out by means of an ordinary dropper.

10. Stitching of the scleral edges can now be performed with ease. Continuous white silk on an atraumatic needle is used, locked by a knot every quarter of an inch approximately. I find this far easier and more satisfactory than the confusion of numerous interrupted stitches.

11. The divided external-ocular muscle is now re-attached to the globe, usually in the region of the stitched scleral lips. This constitutes a recession of about 4 mm. to balance the shortening of the globe by that amount.

12. Penicillin powder is dusted freely on the area, and the conjunctiva stitched with continuous black silk.

Post-operative Routine

Some relaxation in the duration of the strict binocular pad and bandage can be allowed, especially in old disorientated patients. This is exemplified by the case of an old lady who did everything she should not have done, including falling out of bed, scratching around in her bed-side locker, climbing up the wall, etc. Her mental condition, but not her physical activities, improved on dispensing with the binocular pad, and there was a perfect surgical result.

In a cooperative patient both eyes are kept bandaged for 14-16 days, the eye operated on being dressed on

every alternate day. A pin-hole goggle is then worn for a further period of 2 weeks and normal routine can be resumed 6 weeks after operation.

DELLAPORTA'S EXPERIMENTS ON DOGS

The fate of the folded scleral gutter, the choroid and the retina has been studied experimentally by Dellaporta (1954). His publication is well illustrated and is worthy of study. He states that shortening of the eyeball by scleral resection has proved to be successful in many cases of retinal detachment in which diathermy either has failed or offers a poor prognosis. Such cases include detachments in aphakic eyes without visible tears (I would add, with visible tears as well), total detachments, cases with exceptionally large tears, and detachments with fixed star folds or vitreous strands (particularly when caused by the passage of an intra-ocular foreign body).

Dellaporta and other authors quoted by him, using modified techniques of scleral folding, indicate that the two operations, viz. full-thickness scleral resection and scleral folding or 'lamellar resection', have similar effects in selected cases. The operations were performed on dogs' eyes and in each case a strip of sclera 3 mm. wide and 30-33 mm. long was excised 9-10 mm. posterior to the limbus. Absorbable catgut sutures had previously proved unsatisfactory for holding the wound edges tightly in apposition and so interrupted mattress sutures of silk were used. In the series of lamellar resection operations, the anterior 2/3rds of the scleral wall was excised and the anterior chamber was tapped to reduce the intra-ocular tension so as to facilitate the tying of the sutures. In neither series of operation is mention made of diathermy coagulation, either surface or penetrating, nor apparently was KOH used.

Dellaporta gives some comparisons of the *technical differences* in the operations of full-thickness scleral resection and lamellar resection in dogs, but many of his difficulties do not occur in operating on the human eye. I find I am not troubled by tension on the stitches, intra-ocular tension etc. because my practice is to carry out penetrating diathermy punctures in at least 3 or 4 positions in the exposed scleral gutter after having applied 3% KOH to the remaining thin layer of scleral fibres. During healing the punctures facilitate the ingrowth of fibroblasts, as demonstrated so beautifully by Weekers (1946), and, at the time of operation, the evacuation of sub-retinal fluid, and sometimes fluid vitreous. This makes the apposition of the wound margins very easy.

Dellaporta describes the *post-operative findings* in both series of cases:

Ophthalmoscopic findings were the same in both series, i.e. full-thickness and lamellar resection. Immediately after operation a band-shaped protrusion of the choroid and retina is observed along the operation area. The choroidal bulge disappears in 3 or 4 days, while the retina flattens more slowly. In about 8 days no ophthalmoscopically visible changes are seen in the operation area. However, in lamellar scleral folding, 10 days after operation a thin transparent retinal fold along the operation area is still visible.

Histologically in both series the scleral wounds were found to be firmly closed by connective tissue in 10 days. In 3 weeks the connective tissue in the wounds could hardly be distinguished from the surrounding sclera. In both operations it is obvious that the shortening of the sclerotic creates a surplus of choroid and retinal tissue in normal eyes. In scleral resection the choroid develops folds along the excised scleral strip, compensating for its tissue surplus. These folds generally last 2-4 days. In scleral folding the choroid is first indented by the 'scleral lamella' toward the interior of the eye but, during the operation or immediately after, the choroid detaches from the sclerotic and takes its normal stretched shape, compensating for its tissue surplus by a histologically visible thickening, extending to the posterior pole of the globe. In no case does the choroid develop folds in scleral folding.

After scleral resection, thickening of the choroid, with marked hyperemia and heavy infiltration with leucocytes, appears several hours after the operation. After 14 days, more or less firm adhesions are seen between the choroid and the inner surface of the sclera around the wound. Essentially different is the response of the uvea to the scleral folding operation. Neither the choroid nor the ciliary body shows noticeable inflammatory changes; especially are there no permanent tissue alterations.

The prompt stretching of the choroid within the operation area in scleral folding is caused by the presence of the 'scleral lamella' which detaches it from the inner surface of the sclera, and the absence of almost any inflammatory changes in the choroid. The normal elasticity of the latter structure is thus maintained, and adhesions to the scleral wound are prevented by the 'scleral lamella'.

Retina. After both operations, owing to surplus tissue, the retina is detached from the pigment epithelium within the operation area and develops folds. Thus, an artificial band-shaped separation along the operative fields is produced. From the anatomical point of view, it is similar to the serous retinal detachment in man. The sudden detachment and folding of the retina causes necrosis of many cells in the outer nuclear layer. This is much less after lamellar folding. A general shrinking of the retina within the operation area takes place. In scleral resection the detached retina re-adheres closely to the pigment epithelium in 10-14 days after operation. In lamellar folding, in spite of the approximation of the deeper structures to the retina, the latter may remain flatly detached for several weeks but will finally become permanently re-attached. There is eventually a general shrinkage of the surplus retina. In scleral resection some of the larger folds become fixed, this being due to the close and rapid re-attachment of the retina with the inflamed choroid. In scleral folding, because of the absence of inflammatory changes in the choroid, the folds always stretch and decrease to a multiple slight wrinkling of the retina.

Dellaporta concludes *inter alia* that when the surgeon wants to achieve shortening of a normal eye or a prompt and reliable relaxation of the choroid, as for instance in high myopia, scleral folding should be performed, but when a shortening operation has to be performed for

the treatment of retinal detachment scleral resection must be advocated.

Comment

I cannot agree with these conclusions in the light of my own experience and that of other writers quoted. It will be appreciated that Dellaporta's fascinating work has been carried out on the healthy eyes of dogs. There had been no pre-existing pathological detachment of the retina and consequent changes in choroid, retina and vitreous, and in his performance of the lamellar folding operation no inflammatory reaction was excited by diathermy surface coagulation or penetration, or by the application of KOH solution. In fact Dellaporta states that such procedures are not advisable.

In the pathological cases operated upon in human eyes I have found the scleral lamellar operation far safer to perform than the full-thickness scleral excision. When performed by the technique described in this paper, with the use of a mild but adequate diathermy reaction and a KOH chemical reaction to cause an aseptic chorio-retinitis, the clinical results have been very satisfactory. A few cases have shown that the surplus folds in the retina may remain for many months, being contained from spreading by a line of healed chorio-retinitis. They will possibly remain for the duration of life, and their presence in the periphery does not interfere with useful vision.

RESULTS

A series of approximately 30 cases that can be traced have been operated upon in 2½ years. A number of hospital cases have been lost sight of, so that their present visual acuity is unknown. Of the 32 eyes which

have been operated upon. 21 have been surgically successful and 12 have 6/18 or better vision. All the other successful cases have at least 6/60.

Illustrations of Dellaporta's experimental operations and diagrams of illustrative cases were shown. A small series of the author's cases were described, with fundus diagrams.

SUMMARY

1. A short history and description of the scleral lamellar resection operation as performed by a few overseas authorities is given.
2. It is suggested that the operation should be performed more often as a primary operation.
3. Indications for operation are given and pre-operative, operative and post-operative details and routines are described.
4. Dellaporta's experimental work on the fate of the scleral gutter is quoted in some detail.

REFERENCES

- Arruga, H. (1945): *Year Book of the Eye, Ear, Nose and Throat*, 1945. Chicago: Year Book Publishers, Inc.
- Clarke, G. *et al.* (1955): Symposium on Retinal Detachment. *Arch. Ophthalm.*, **54**, 143.
- Dellaporta, A. N. (1954): *Arch. Ophthalm.*, **51**, 525.
- Foster, J. (1951): *Trans. Ophthalm. Soc. U.K.*, **71**, 557.
- Lindner, K. (1933): *Klin. Mbl. Augenheilk.*, **90**, 757.
- Philps, A. S. (1948): *Brit. J. Ophthalm.*, **32**, 811.
- Idem* (1951): *Trans. Ophthalm. Soc. U.K.*, **71**, 631.
- Shapland, C. D. (1951): *Ibid.*, **71**, 29.
- Idem* (1953): *Brit. J. Ophthalm.*, **37**, 177.
- Robertson, F. W. (1949): *Trans. Ophthalm. Soc. U.K.*, **69**, 450.
- Weekers, L. (1946): *Brit. J. Ophthalm.*, **30**, 715.