DETACHED RETINA TREATED BY THE ARRUGA STRING OPERATION* REVIEW OF 112 CASES

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SINCE the introduction by Schepens, Okamura, and Brockhurst (1957) of globe-encircling techniques into the surgery of retinal detachment, this basic principle, with various modifications, has been increasingly applied. Arruga (1958a, b; 1961; 1962) pioneered the technique of equatorial cerclage with a simple suture which was adopted in this hospital.

Selection of Patients

Between November, 1961, and October, 1964, 182 cases of detached retina came to surgery. They were treated as follows: Arruga string operation, 112 cases; silicone rod implant, 33 cases; scleral resection or overlay, 20 cases; diathermy, 17 cases. Other patients were seen in whom operation was either not advised or was refused.

Indications for the Arruga string operation were detachment with (a) multiple holes or (b) multiple areas of degeneration, particularly those occurring in myopia or aphakia. The procedure was also used in very extensive detachment or where other methods had failed.

Method of Treatment

Patients were admitted two or three days before operation, thus permitting a detailed examination and a drawing of the fundus to be made. Pre-operative treatment varied between complete bed-rest and almost complete mobility, depending on the surgeon concerned. The eyes were not padded.

All the operations were performed under general anaesthesia. The lids were held with a self-retaining speculum. The conjunctiva was opened by either a radial or a circumferential incision in each quadrant between the recti. In cases with an atrophic conjunctiva a circular incision 1 cm. from the limbus gave better exposure without tearing. The incisions were extended through Tenon's capsule to the sclera.

Using Supramid sutures on a No. 6 eye needle, a partial-thickness bite of sclera was taken, usually about 14 mm. from the limbus over the area of maximal detachment. The suture was then threaded round the globe deep to the recti, taking a bite of the sclera in each quadrant and again close to the first bite. The string was sometimes placed further backwards, forwards, or obliquely, depending on the site of the holes. A half-knot was tied.

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Surface diathermy was then applied, if it was to be used, over the area of the holes and separating them from the posterior pole. Subretinal fluid was released through one or more cautery or penetrating diathermy holes over the areas of maximal detachment, and preferably in front of the string. As fluid escaped the string was tightened, with frequent reference to the tension of the globe and ophthalmoscopic appearances. When the picture was satisfactory the knot was completed. Particular care was taken to avoid occlusion of the retinal circulation.

The conjunctiva was closed with continuous or interrupted silk sutures. Antibiotic ointment and a single pad and strapping were applied.

The patients were allowed out of bed to go to the toilet on the first day, had their first dressing on the second day, their conjunctival sutures out and the pad off on the fifth day, and went home on about the tenth day after the operation.

Pre-operative Data

Operations were performed on 112 eyes in 109 patients—62 women and 47 men. There was bilateral detachment in 13 (12 per cent.), myopia in 40 (35 per cent.), aphakia in 27 (24 per cent.), and a definite history of trauma in 3 (3 per cent.).

The age distribution was as follows: 10–19 years (7 cases); 20–29 years (7 cases); 30–39 years (3 cases); 40–49 years (6 cases); 50–59 years (31 cases); 60–69 years (33 cases); 70–79 years (22 cases).

Results

These are classified under the headings success, indeterminate, and failure.

Success.—The retina became completely flat, sometimes only after several months.

Indeterminate.—Subretinal fluid persisted, but did not increase, and useful vision was frequently maintained. This occurred mainly with inferior detachments.

Failure.—All other cases. If further surgery was undertaken, other than a second string operation, the case was considered a failure for the purpose of this series.

Overall results gave success in 54 cases (49 per cent.), failure in 40 (35 per cent.), and were indeterminate in 18 (16 per cent.).

Table I shows the detailed results in the various groups of cases. Table II gives the post-operative visual acuity.

TABLE I
RESULTS IN VARIOUS GROUPS

Group	No. of Cases	Percentage Success
Myopia	40	55
Aphakia	27	46
Hole not found	20	50
First operation	83	52
Second operation or more	29	38
Partial detachment (three-quarters or less)	88	55
Sub-total detachment	13	39
Total detachment	11	9
Surface diathermy used	19	47

13 patients had 2 strings on the same eye, 3 had both eyes treated by cerclage.

TABLE II
POST-OPERATIVE VISUAL ACUITY

Acuity	6/9	6/12	6/18	6/24	6/36	6/60	C.F.	Hand Movements	Unknown
Success	5	10	7	6	14	6	5	1	0
Indeterminate	0	1	2	0	1	5	4	1	4

Complications noted were pain (7 cases), uveitis (5 cases), intra-ocular haemorrhage (2 cases), orbital cellulitis (1 case), rise in tension (1 case), conjunctival cyst (1 case), persistent chemosis (1 case), and "cheese-wiring" of the Supramid sutures (1 case).

Discussion

An overall success rate of approximately 50 per cent. was obtained with above-average results in myopia and partial detachment. As might be expected, the results were poor in extensive detachment and following previous surgery. Some of the patients with indeterminate results have maintained good vision over long periods despite the presence of sometimes large and threatening areas of residual detachment.

Surface diathermy was used in 19 cases without apparently significantly affecting the results. Usually no attempt was made to seal the retinal hole and it is therefore not surprising that operations were still 50 per cent. successful if the hole was not found (20 cases). Perhaps this is an indication for the operation. In one patient a macular hole was treated with light-coagulation ten days post-operatively, but subretinal fluid persisted below and the retina re-detached two months later.

Injections of air, saline, or liquid silicone were made into the vitreous of a few relatively hopeless eyes without apparent benefit.

There was a notable absence of serious complications. No eye was lost. The string syndrome, which several reports have indicated as a common complication (Manson, 1964; Hudson, 1964), did not occur. "Cheese-wiring" of the Supramid suture into the vitreous took place in one eye that had Arruga strings in December, 1961, and January, 1963. The retina is still flat and the vision 6/18 with correction. Orbital cellulitis developed in one patient and settled with systemic antibiotics. Infection was otherwise not a problem. Pain of a troublesome nature was recorded as occurring in seven patients, but in all it abated over a period of months. It was never necessary to remove the string. Alterations in refraction were small. A few patients complained of diplopia, which in time they were able to overcome.

Conclusion

This series suggests that the Arruga string operation can be used with success as the primary procedure in the treatment of many cases of retinal detachment. The technique is relatively simple. The results and complications are comparable with those obtained by other methods. For the patient it normally involves not more than two weeks in hospital with minimal discomfort.

Summary

An account is given of 112 cases of detached retina treated by the Arruga string operation.

Indications for the procedure and the technique are described. Advantages are simplicity of operation and speed of convalescence.

The results show success in about 50 per cent. of cases, plus 16 per cent. of patients in whom vision is maintained in spite of residual subretinal fluid.

Complications encountered in the series were minimal. In particular there was no case of the string syndrome and only one case each of "cheese-wiring" and deep sepsis. It was never necessary to remove the string and no eye was enucleated.

It is concluded that the Arruga string operation has certain advantages and gives acceptable results in the treatment of many cases of detached retina.

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