UNTOWARD SEQUELS OF ARRUGA ENCIRCLEMENT FOR RETINAL DETACHMENT*

REPORT ON 29 CASES

BY

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ALTHOUGH major advances in the surgical treatment of retinal detachment have been made in the past decade, the ideal technique has not yet been evolved. Introduction of the method involving encirclement of the globe with synthetic suture material by Arruga (1962) appears to be a major step forward in terms of simplicity and effectiveness. Since the widespread adoption of this method it has, however, become clear that post-operative complications, some trivial, others of a more serious nature, can be expected.

A small series of 29 cases treated by this method is reviewed in this paper. The frequency and seriousness of some of the complications have prompted us to make this study.

The Arruga method was used as a primary procedure in nineteen of these cases: the other cases were preceded by other standard surgical procedures. The minimum period of observation post-operatively was not less than nine months.

Method

Apart from the routine examination of the eye, particular attention was given to the following:

- (1) Ocular muscle movements; comparison of the palpebral fissures of both sides, and recording of exophthalmometer readings.
- (2) Transillumination of the iris for detection of loss of iris pigment (Abrams, 1964).
- (3) Determination of the state of lacrimal secretion by Schirmer's test.
- (4) Corneal sensitivity was evaluated by lightly touching the cornea with monofilamentous nylon suture threads of a different calibre (Nos. 1-5). Each thread was fixed to a metal holder so that 1 in. projected freely and was directed so that it touched the cornea obliquely. Sensitivity was recorded as moderate when loss was to 3 and 4 and severe when below 2.
- (5) Ocular tension was measured in all cases with a Schiötz tonometer loaded with 5.5 and 7.5 G. In ten cases this was supplemented with applanation tonometry.
- (6) Fundus examination was carried out by direct ophthalmoscopy, together with a slit-lamp study using the three-mirror gonioscope of Goldmann.
- (7) Peripheral fields were plotted in suitable cases.

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Results and Complications

Out of 29 cases, ten were females. The majority of cases were over 50 years of age, and only two were under 20. The retina was successfully replaced in fourteen cases; this excluded cases in which the retina was *in situ* for a few months following the operation but subsequently detached (four cases). Table I gives the results in terms of final corrected visual acuity and peripheral fields in the fourteen successful cases. The complications met with in this series are set out in Table II.

TABLE I
VISUAL ACUITY AND PERIPHERAL FIELDS IN FOURTEEN SUCCESSFUL CASES

No. of Cases	Visual Acuity	Peripheral Fields of Vision
2	6/6	Full
3	6/18	"
2	6/24	"
4	6/36	"
3	6/60	"

TABLE II
COMPLICATIONS IN PRESENT SERIES OF 29 CASES

Complications	No. of Cases
Narrowing of palpebral fissure	24
Apparent enophthalmos (Includes all cases showing not less than 2 mm. difference with Hertel's exophthalmometer)	24
Increased lacrimation, an average of two to four times the amount of the operated eye	14
Corneal sensitivity: Moderate diminution Severe diminution	16 9
Iris: (a) Moth-eaten appearance of posterior pigment epithelium (b) Extensive overgrowth of posterior pigment on to anterior iris surface	2 1
Glaucoma	3
Erosion of suture	4

Narrowing of the palpebral fissure, associated with ptosis of the upper lid and elevation of the lower lid, was a finding in the majority of cases. Its association with apparent enophthalmos leads to the belief that both these conditions are produced by a decrease in the volume of the globe anterior to the equator (Fig. 1 a and b).

Moderate diminution of corneal sensitivity over the whole cornea was seen in sixteen cases, producing no apparent ill effects. In nine cases severe corneal hypaesthesia was noted and in one of these cases an insidious neurotrophic keratitis developed a few weeks after the operation resulting in permanent scarring of the cornea (this has been arrested by the use of methyl cellulose drops and a contact lens). It was also noted that the pupil was fixed in this case (Fig. 2).

FIG. 1a.—Arruga encirclement of right eye performed sixteen months ago. Note narrowing of right palpebral fissure.

FIG. 1b.—Same case as Fig. 1a with eyes depressed to show reduction in volume of right eye.

FIG. 2.—Neuroparalytic keratitis in case of total corneal anaesthesia following Arruga encirclement fifteen months previously.

Ocular tensions were raised in two cases with open angles, the unoperated eyes being normotensive. In both cases tensions were of the order of 30 mm. mercury and have responded to miotic therapy. A third case was of particular interest: 24 hours post-operatively the ocular tension was markedly raised and the eye red and painful. Tension failed to respond to Diamox and the encircling suture had to be removed ten days post-operatively; this was followed by relief of pain and reduction of the ocular tension. Subsequently the eye did not require glaucoma therapy. One year later the retina was *in situ*, the ocular tension was normal, and there was no ridge visible but there remained a delicate circumferential pigmentation at the site of the encirclement.

Erosion of the sclera occurred in four cases. In three cases the erosion was circumferential and in the other the suture had apparently "bow-stringed" into the upper part of the vitreous chamber, the overlying retina having atrophied leaving the suture exposed and shining with apparently no reaction around it in the vitreous body (Fig. 3). All four instances of erosion occurred in cases which had not been subjected to other surgical procedures.

FIG. 3.—Erosion of Supramid into vitreous body fourteen months after encirclement.

Discussion

Complications following Arruga's encirclement have been mentioned by Arruga himself (1962), who noted two cases of scleral erosion, and by Manson (1964) who described the so-called "string" syndrome characterized by oedema of the lids, proptosis of the globe, chemosis of the conjunctiva, uveitis, and ocular hypotension.

In the present series erosion of the sclera (four cases) and severe post-operative glaucoma (one case) were the most important complications. Of the four cases of erosion three showed severe corneal anaesthesia; in one case an insidious neurotrophic corneal ulceration with opacification in the optical zone occurred. It may be presumed that in these cases erosion has resulted in damage to nerves supplying the

anterior segment. This view is supported by the presence of a fixed pupil in the case of neurotrophic keratitis.

Of the three glaucoma cases one was severe, occurring in the immediate post-operative period. Here the suture had to be removed; the result was favourable as far as tension and retinal reposition were concerned. In the other two cases moderately elevated tensions were noted several months after operation and these cases were readily controlled by miotics. It is interesting to note that scleral rigidity was not altered by the operation. The "string" syndrome was not observed in this series.

Narrowing of the palpebral fissure, which occurred in the majority of cases, is not generally a serious complication but it may acquire more significance in younger and/or female patients. The increased lacrimation in some cases suggests chronic orbital inflammation as the exciting cause. Post-operative infection did not occur in any of the cases included in this series.

In spite of the simplicity of this method we are unable to escape the conclusion that the present form of the Arruga encirclement technique requires modification to eliminate the more serious complications noted here. It may be relevant to note that Regan and Schepens (1964), using polyethylene tubing for encirclement, have reviewed 4,000 cases. They have encountered erosion in 1 per cent. of cases, intractable glaucoma in two cases, and striate keratopathy and iris atrophy in one case. Derick Vail in his editorial comment on this review condemns the use of polyethylene tubing for encirclement operation on the grounds that *rigid* material used for encirclement will invariably erode the ocular wall.

Summary

Complications in 29 cases of retinal detachment treated by Arruga encirclement are reviewed.

We wish to express our gratitude to the consultants of the Nottingham Eye Hospital for permitting us to examine and include some of their patients in this series. We would also like to thank Mr. J. F. V. Larway of the United Sheffield Hospitals for preparing the photographs.

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JOHAN WILHELM NORDENSON, 1883-1965

Johan Wilhelm Nordenson died on March 12, 1965. The son of a distinguished Swedish ophthalmologist, Erik Nordenson, he was born in Paris and qualified in medicine at Uppsala in 1912, a university from which he was awarded the Doctorate of Science in 1918. From 1922 to 1931 he was Professor of Ophthalmology in this university, and thereafter he was called to the professorship at the Karolinska Institutet at Stockholm where he acted as head of the Eye Clinic, first at Serafimer-lasarettet, and from 1941 at the Karolinska Sjukhuset. He retired in 1948.

Nordenson held a leading position among Swedish ophthalmologists and his scientific work excited world interest. In this his three special subjects were the refracting powers of the eye, especially the refraction of the lens and the mechanism of accommodation; the invention of the first fundus camera suitable for practical use and widely used for many years; and the study of the macular pigment. On several occasions he was president of the Swedish Ophthalmological Society, and from 1933 to 1950 he was President of the International Council of Ophthalmology, taking the chair at the International Congress in London in 1950.

RAÚL ARGANARAZ, 1884-1964

We record with regret the death of Dr. Raúl Argañaraz in September, 1964, on the eve of his 80th birthday. He had been a long and distinguished career devoted to the furtherance of ophthalmology, of which specialty he was the most eminent representative in South America. He was one of the founder members of the Argentine Ophthalmological Society, a member of the American Academy of Ophthalmology and Otolaryngology, and a member of the International Council of Ophthalmology from 1949 to 1955. His textbook *Manual de Oftalmologia* has long been the book of reference for students in Latin America and Spain. Our sympathy is extended to his widow and his two daughters.

NOTES**INTERNATIONAL SYMPOSIUM ON CORNEAL AND SCLERAL LENSES**

Baylor University College of Medicine announces an International Symposium on Corneal and Scleral Lenses to be held in Houston, Texas, on April 4, 5, and 6, 1966, immediately preceding the Third Annual Baylor Ophthalmology Residents' Alumni Meeting on April 7, 1966. Complete details of the meeting will be circularized at a later date. Anyone requesting preliminary information should contact Louis J. Girard, M.D., Department of Ophthalmology, 1200 Moursund Avenue, Houston, Texas 77025.

OPHTHALMOLOGICAL SOCIETIES OF AUSTRALIA AND NEW ZEALAND*Second Conjoint Meeting*

This will be held from Saturday, October 29, to Friday, November 4, 1966, at Rotorua, New Zealand.

An interesting scientific and social programme has been arranged. Guests at this meeting will be the Ophthalmological Section of the Pan-Pacific Surgical Association Second Mobile Educational Seminar.

For further information write to Dr. M. R. Ashbridge, Kelvin Chambers, The Terrace, Wellington, New Zealand.

CORRIGENDUM

"Untoward Sequels of Arruga Encirclement for Retinal Detachment", by A. J. Dark and S. N. M. Rizk, *Brit. J. Ophthalm.*, 1965, **49**, 259:

In Table II, p. 260, the third entry under "Complications" should read:

"Increased lacrimation, an average of two to four times the amount of the *unoperated eye*."