

Astigmatism following retinal detachment surgery

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SUMMARY Eighty-three patients on whom successful retinal detachment had been performed were studied to note astigmatic changes following surgery. In the majority of cases the errors following such surgery are of no great clinical importance. However, in some situations a high degree of astigmatism may be produced. This study showed that these sequelae are particularly likely after radial buckling procedures, and surgeons favouring these techniques should be aware that astigmatic errors can be induced. The astigmatic errors may persist for several years after surgery.

Silastic sponge implants have become a popular method of achieving indentation, particularly as they may be buckled over full-thickness sclera.¹ Although refractive changes after retinal detachment surgery have been well described,^{2,3} high degrees of astigmatism following such procedures have not been fully documented, although isolated cases were reported.⁴ High degrees of induced astigmatism can result in reduction of visual acuity and metamorphopsia, and the resultant spectacle correction is often poorly tolerated. In view of the fact that we noticed considerable degrees of astigmatism in some of our patients we performed a prospective study on the refractive errors induced in 83 patients whose retinas were successfully reattached with scleral buckling surgery and whom we were able to follow up over a period of several years.

Patients and methods

The refractive state of the patient was noted prior to operation. This was achieved by refraction just before operation if the macula had not been detached, but, in those cases in which the macula was involved and in which retinoscopy was therefore unreliable, information about the patient's refractive state was sought by studying the current spectacle correction and also obtaining, where possible, records about previous refractive states. At the time of surgery the method used was similar in all cases. Thus full-thickness scleral buckles were used and cryotherapy applied; subretinal fluid (SRF) was drained according to criteria previously described.⁵ After the retina had been successfully reattached the

refractive state of the patient was studied in the post-operative period and compared with the preoperative findings. The first postoperative refraction was usually carried out approximately 6 weeks from the time of surgery, and in those cases in which an appreciable change of refraction was noted the examination was repeated at intervals over a period of years. In all cases the refraction was performed by the same observer (J.F.C.). The height of the buckle was checked regularly in the postoperative period.

Results

Eighty-three patients were studied—37 patients with radial implantation, 26 with circumferential implants, and a further 20 by a combination of methods. The changes assessed 6 months after surgery induced by radial, circumferential, and mixed buckles are summarised in Tables 1, 2, and 3.

Discussion

It can be seen when reviewing the 3 groups together that in the majority of cases fairly small and therefore acceptable degrees of astigmatism in the patient were produced quite commonly. Of the 83 patients 58 (69%) had induced astigmatic errors of less than 2 dioptres. In the remaining patients astigmatism of more than 2 dioptres was produced by the operative procedure. This degree of astigmatism was uncommon after circumferential buckling procedures. Thus in only 2 out of the 26 cases was astigmatism of more than 2 dioptres produced. However, when radial buckles were used, 20 of the 37 cases produced the same degree of astigmatism. In 14 patients who had induced astigmatism of more than 3 dioptres it

Table 1 *Astigmatic refractive changes after radial buckling (37 cases)*

Dioptries	Cases
No change	4
0-2	13
3-4	17
More than 4D	3

Table 2 *Astigmatic refractive changes after circumferential buckling (26 cases)*

Dioptries	Cases
No change	14
0-2	10
3-4	2

Table 3 *Astigmatic refractive changes after mixed buckling (20 cases)*

Dioptries	Cases
No change	9
0-2	8
3-4	3

was possible to follow up 8 for 5 years to observe the changes in the correction that occurred. The details of this group are summarised in Table 4. In 6 of the 8 cases funduscopy revealed the presence of moderate or very high buckles, whereas in 2 cases only minimal indentation was seen. We were surprised that in these 2 cases there had not apparently been much reversion to the preoperative refractive state.

Previous studies of astigmatism following retinal detachment surgery^{2,3} have shown that astigmatism is

common after episcleral implantation, particularly after radial buckles have been produced. This finding is confirmed by the present study, in which we have found induced astigmatic errors to be very common, particularly when radial buckles have been used. Small errors pose little difficulty to the patient, only requiring alteration in spectacle correction. It has also been pointed out^{2,3} that the majority of astigmatic errors induced by buckling procedures slowly corrected themselves within 6 months of the operation. However, we followed up 8 patients of 14 who had developed a degree of astigmatism greater than 3 dioptries after detachment surgery over a period of 5 years, and we found that in these cases the astigmatic error was long lasting and in most cases appeared to be due to the retention of the height of the buckle. Radial implantation seems more likely to produce astigmatic error than circumferential buckles, and it is likely that the greater the height of the buckle produced the greater the risk of inducing astigmatic change. It is also interesting to note that, of the 8 cases which were followed up over a long period of time (Table 4), 6 of them did not have drainage of SRF at the operation. This would indicate that even though the drainage of SRF at operation facilitates the raising of a high buckle, it is still easy to achieve high indentation with the nondrainage procedure, and thus there is a risk of producing high astigmatic error even when this technique is used. Table 4 shows that, even though there is some lessening in the degree of astigmatism over a period of years, in most cases it still remains considerable.

We are grateful to Mrs Margaret Grice for her secretarial assistance. This work was supported by the Iris Fund.

Table 4 *Eight patients with astigmatism following operation for retinal detachment*

Type of operation	Preop. refraction	Refraction after 6 months	Refraction at 3-5 yr	Height of buckle 3-5 years	Drainage of SRF
1. R 5 mm radial UTO	+3.25 -1.5 × 160°	+2.0 -4.00 × 135°	+2.25 -3.00 × 125°	Moderate	SRF not drained
2. L 7 mm radial UNQ	-4.00 -0.5 × 90°	-5.0 -4.5 × 90°	-4.75 -2.75 × 105°	Moderate	SRF not drained
3. L 7 mm radial UNQ	-4.50 -1.25 × 100°	-5.50 -5.00 × 125°	-5.0 -3.50 × 135°	Very high buckle	SRF drained
4. L 7 mm radial LTQ	+0.25 -0.25 × 90°	+1.25 -5.00 × 120°	+1.75 -2.50 × 95°	Moderate	SRF drained
5. L 5 mm radial SNQ and LTQ	+1.50	+1.00 -5.00 × 150°	+0.75 -3.50 × 65°	Low buckle	SRF not drained
6. R 5 mm radial UTO	-14.0	-14.50 -3.50 × 165°	-14.0 -3.50 × 10°	No buckle	SRF not drained
7. R 5 mm radial LNQ	-4.50 -1.5 × 110°	-5.0 -4.0 × 150°	-5.0 -3.00 × 150°	Very high buckle	SRF not drained
8. R 7 mm radial under SR	+4.00	+4.50 -3.00 × 115°	+4.50 -1.50 × 110°	Moderate	SRF not drained

R=right. L=left. UTO=upper temporal quadrant. UNQ=upper nasal quadrant. LTQ=lower temporal quadrant. SNQ=superior nasal quadrant. LNQ=lower nasal quadrant. SR=superior rectus.

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