MODIFIED RIDLEY LENSES*†

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A MODIFICATION of the original Ridley acrylic implant suggested in a previous communication (Epstein, 1957) comprised a biconvex lens of larger diameter (9.4 mm.) and thinner central thickness (1.5 mm.), and with a naturally tapering edge instead of a relatively thick square edge.

It was found that such a lens facilitates centration, and adjusts itself almost automatically after insertion, little or no additional manipulation being necessary. The fact that the iris is separated from the posterior capsule over a larger area lessens the risk of adhesions between these two layers, and the thin tapering edge of the lens minimizes the undesirable effects of iris pucker which may be produced by these peripheral posterior synechiae. The greater thickness and relatively thick edges of the original Ridley lens allow the formation of large synechiae which pucker the iris and may draw the pupil towards the edge and cause dislocation of the lens.

The modified lens being thinner allows a deeper anterior chamber, and the fact that the volume and mass of the lens are less despite its larger surface area makes it more stable *in situ*. Because the pressure on the zonule and posterior capsule and on the posterior surface of the iris is lessened, there is more freedom for the circulation of the aqueous in the posterior chamber and between the lens and posterior capsule.

The larger diameter may make it more difficult to insert the lens through the pupil, but a few drops of adrenaline 1/1000 from an ampoule applied directly to the iris dilates the pupil and makes this manoeuvre easier.

Six Cases in which the Modified Implant was Used

The first of this series of six cases was done 20 and the last 12 months ago. Two were so-called senile cataracts, the other four were of traumatic origin. Four of these patients were European, one coloured, and one Bantu, and their ages ranged from 10 to 78 years.

Procedure.—The surgical technique was as previously described, except that 6 × 0 mild chromic catgut was used instead of silk. Three to five corneo-scleral edge-to-edge sutures were buried under a conjunctival flap which was also sutured in place with catgut.

For the anterior chamber irrigation Tyrode solution was used; this was supplied in 200-ml. vacoliter-type bottles,‡ the calcium salt being added from a separate ampoule just before use. This was advised by the manufacturers to obviate the calcium settling out during sterilization of the solution. Animal experiments

* Messrs. Rayner and Keeler Ltd. (London), are able to supply these lenses.

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‡ Saphar Laboratory, Ltd., Johannesburg.

and clinical trials have shown that even prolonged irrigation (with 200-ml. in some experiments) was followed by only very little if any striate keratitis.

The lenses were sterilized by immersion in 4 per cent. cetrimide for at least one hour and then washed well in normal saline.

During the post-operative period the pupil was kept semi-dilated. With the larger diameter lens the dangers of a dilated pupil are eliminated, and the problem of exudate in the pupil organizing to form an occlusive membrane is thereby avoided. In this series only one needling of a thin anterior membrane was necessary, and this occurred in the first case when one was rather timid about dilating the pupil which was left contracted during the post-operative phase.

Results.—Four of these six patients achieved a visual acuity of 6/6 or better, one 6/9, and one 6/12.

The patient with 6/9 visual acuity had suffered an intra-ocular foreign body in 1939 whilst serving in the Royal Navy; he had been blind in this eye for 17 years and had developed a 40° divergent squint. After the lens implant and a course of orthoptic treatment, he could achieve binocular vision with a great effort, and binocular vision was maintained after surgical correction of the squint.

The patient with 6/12 visual acuity was a child with a near central leucoma.

Other Modifications

(1) Sometimes the problem arises of a late posterior dislocation of the lens due to a peripherally torn capsule or a subsequent spontaneous degeneration of the zonule. The larger but thinner lens is more stable and exerts less pressure on the posterior capsule, and it is suggested that a special lens as illustrated in Fig. 1 may assist this type of case. The effective lenticulus is 6 mm. in diameter with a rim about 2 mm. broad and as thin as possible. This rim has eight or more perforations, and it is considered more than likely that some if not all of these perforations will fill with fibrin and form anchoring adhesions to the posterior surface of the iris or adjacent ciliary processes.

FIG. 1.—Diagram of suggested lens for insertion into posterior chamber after extracapsular extraction.

(2) In June, 1953, the problem of a patient with a partially subluxated cataract prompted another modification, which may be called the "collar-stud" lens. A deep equatorial groove 0.6 mm. wide was cut, leaving an effective 3-mm. central core with a thin anterior lamina trimmed to about 6.5 mm. diameter and a thicker posterior lamina remaining at the original 8.4 mm. diameter (Fig. 2a, b). An intracapsular cataract extraction was done and the lens was introduced so that the iris fitted into the equatorial groove. Two peripheral iridectomies had been done to ensure the circulation of the aqueous. No hydrocortisone was introduced into the anterior chamber.

FIG. 2a, b.—Photographs of "collar-stud" lens. The radius of curvature of the anterior surface is 25 mm. and that of the posterior surface 12 mm.

Fig. 3 shows the result in this case which has now been observed for nearly 5 years. The visual acuity is 6/9+ with correction -5 D sph. The myopia was to be expected owing to the anterior position of the lens. In my experience the original Ridley lens has a vergence power above that of the average human lens.

FIG. 3.—Collar-stud implant "home-made" from an original Ridley lens. This has been in place for 5 years.

After this patient had been observed for 2½ years and no complications had ensued, ten others were similarly treated, all with an intracapsular cataract extraction. Nine patients are still doing well, the first after 2 years and the last after 1 year (Table, overleaf).

TABLE
VISUAL RESULTS IN NINE CASES IN WHICH THE COLLAR-STUD
IMPLANT WAS USED SUCCESSFULLY

Case No.	Operated Eye					Other Eye					Remarks
	Side	Visual Acuity	Correction			Side	Visual Acuity	Correction			
			D sph.	D cyl.	Axis			D sph.	D cyl.	Axis	
1	R	6/5	-4.0	-1.5	15°	L	6/5	-1.25	-0.75	180°	This patient had megalocornea, the diameter being 16 mm. An old prescription for the right eye gave -2 D sph., -1 D cyl., axis 180°.
2	R	6/5	-0.5	-3.0	90°	L	6/5		+0.25	45°	
3	R	6/8	-0.75	+2.0	110°	L	6/12		+0.5	45°	The left eye showed macular degeneration, and as it seemed likely that the right eye would be similarly affected, and that binocular vision would offer the best prognosis, it was decided to insert a lens implant as well as performing a monocular cataract extraction.
4	L	6/18	+2.0	+2.0	180°	R	6/18	+1.25	+0.5	190°	There was macular degeneration in both eyes. The patient reads much better binocularly than with either eye alone.
5	L	6/6 + (with slightly dilated pupil 6/9)	+0.5	+2.75	180°	R	6/6	+1.75	+1.0	75°	The cataract in the left eye had been present nearly 18 years.
6	R	6/9 +	-5.0	-2.5	80°	L	6/5		+0.5	90°	The right eye had always been myopic.
7	R	6/6	-0.5	-3.5	90°	L	6/6 +		-1.0	170°	
8	L	6/6	-1.0	+3.0	150°	R	6/5		+1.0	90°	
9	L	6/9	-2.0	-1.0	90°	R	6/6	-0.75	-0.5	180°	

A miotic was prescribed for use twice daily for several months after the operation to keep the pupil fully contracted within the groove. In some cases this miotic state has been maintained after stopping the drops; in others the pupil has tended to dilate a little but this has had no adverse effect. In Case 5 the vision is 6/6+ with the pupil fully contracted and 6/9 when it is slightly dilated.

In some cases sudden movements of the eye and head cause the implant to give a momentary quiver associated with the iridodonesis, but this has produced no visual disturbance.

In one instance, however, the implant had to be removed because a slight endothelial touch occurred medially at the edge of the anterior lamina 17 days after the operation. Until that time the anterior chamber had been deep and the result had been as gratifying as the others, but I removed the implant because I feared the complication of a corneal degeneration. Had the patient been put to bed, and air injected into the anterior chamber, the chamber might have regained its previous depth. It was suspected that a choroidal detachment had caused the anterior chamber to become shallower, but the oedema caused by the endothelial touch obscured the fundus. It so happened that the anterior lamina of this lens was thicker than that of the others.

It is hoped to obtain a further supply of these lenses modified so that the anterior and posterior laminae are as thin as possible, the latter to have the same effective

diameter as the former but with a thin rim to increase its overall diameter to 9 or 9.5 mm. (Fig. 4).

FIG. 4.—Diagrammatic section of improved collar-stud implant. Anterior and posterior surface radius of curvature 25 and 12 mm. respectively.

It is anticipated that this shape will eliminate the chance of endothelial touch and also check the possible quiver caused by iridodonesis.

The present curvatures of the lens surfaces have given fairly satisfactory refractive results. However, the idea of measuring the axial length by *x* rays, as described by Sorsby (1948), is being investigated. This may provide a means, with keratometer readings, of estimating the refraction pre-operatively.

Summary

Two modifications of the original Ridley lens are described. Clinical results are reported and further improvements suggested.

REFERENCES

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