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Phakic intraocular lenses after scleral buckling for retinal detachment

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PURPOSE. *To assess efficacy and safety of angle-supported phakic intraocular lenses (PIOL) implanted after scleral buckling for retinal detachment.*
SETTING. *Private practice in Siena, Italy.*
METHODS. *Retrospective, noncomparative consecutive case series. Inclusion criteria for retrospective evaluation were previous uncomplicated external retinal detachment surgery (scleral buckling), and a complete follow-up superior to 3 years from PIOL implantation.*
RESULTS. *Nine eyes of seven patients were included. Mean time interval between retinal detachment surgery and PIOL implantation was 3.2 years ± 4.5 (range 1 to 15). Mean spherical equivalent (SE) before PIOL implantation was –16.36 D ± 3.98; range: –11.75 to –23. PIOL surgery was uneventful in all cases. Mean SE after PIOL implantation was –0.99±0.51 (95% confidence interval for the mean: –0.59 to –1.39). Mean follow-up after PIOL implantation was 4.2 years ± 0.8 (range 3 to 5). Complications were pupil ovalization (inferior to 1 mm) in two eyes, and worsening of floaters in both eyes of one patient. No recurrences of retinal detachment were observed.*
CONCLUSIONS. *In selected eyes with no anterior chamber abnormalities, the implantation of angle supported PIOL after scleral buckling for retinal detachment is associated with good refractive results and minor complications. (Eur J Ophthalmol 2007; 17: 388-91)*

KEY WORDS. *Phakic intraocular lens, Retinal detachment, Scleral buckling*

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INTRODUCTION

High myopia is a well-known risk factor for retinal detachment (1). The surgical correction of myopia after retinal detachment surgery has been successfully performed by laser assisted in situ keratomileusis (LASIK) in eyes with a maximum spherical equivalent (SE) of –7.25 diopters (D) (2, 3), but the correction of higher errors or the use of different surgical techniques has not received attention in the literature.

Anterior chamber phakic intraocular lenses (PIOLs) are commonly used for the correction of high myopia, but their use has been related with possible vitreoretinal complications, although in the largest studies a clear responsibility of PIOL surgery or presence could not be demonstrated (4-6). In addition, in spite of some studies showing no anterior chamber changes (7), scleral buckling surgery may induce an anterior displacement of the iris-lens diaphragm (8), thus reducing the possibility of a successful implantation of an anterior chamber PIOL.

The present article retrospectively assesses the efficacy and safety of angle-supported PIOLs implanted after retinal detachment surgery by scleral buckling. In particular, this study evaluates 1) the possibility of implantation of an angle-supported PIOL after scleral buckling, in spite of possible changes in the anterior chamber anatomy; 2) refractive results; 3) com-

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plications (in iris, vitreous, retina, or choroid) induced by PIOL surgery or PIOL presence in eyes altered by previous scleral buckling.
Since vitreoretinal complications are considered long-term consequences of anterior segment surgery (9), a minimum follow-up of 3 years from PIOL implantation was chosen.

PATIENTS AND METHODS

The charts of all patients receiving a phakic IOL implantation by one surgeon (A.L.) in the period 1999–2003 were reviewed. The inclusion criteria for retrospective evaluation were previous uncomplicated external retinal detachment surgery (scleral buckling, with or without adjunctive implants), a complete follow-up superior to 3 years from PIOL surgery, age between 25 and 45 years, subjective contact lens intolerance, myopia with or without astigmatism, best spectacle-corrected visual acuity (BSCVA) of 0.2 or better, anterior chamber depth superior to 3 mm including corneal thickness (by ultrasound biometry), endothelial cell density superior to 2400 cell/mm^2 (by specular microscopy), mesopic pupil diameter inferior to 6 mm. Corneal refractive procedures had been ruled out because of a high refractive error and/or a thin cornea, measured by ultrasound pachymetry.
Exclusion criteria at the moment of PIOL implantation included previous vitrectomy, crystalline lens or corneal opacities, glaucoma or ocular hypertension, diabetic retinopathy, ocular inflammatory diseases, or untreated rhegmatogenous retinal degenerations. Informed consent was provided by all patients. The study was approved by the ethical committee of our institute.
The ZSAL-4 (Morcher GmbH, Germany), a planoconcave poly(methyl methacrylate) single-piece IOL, was used in the study. This IOL is manufactured in three overall diameters of 12.5, 13, and 13.5 with a total optical zone of 5.5 mm and an effective optical zone of 5 mm; the haptics are Z-shaped and posteriorly angulated at 19° (10). The IOL power was calculated by the van der Hejde formula (11), but no more than 2 D of astigmatism were included in the calculation of SE, in order to obtain a postoperative myopic cylinder. The overall IOL diameter was calculated by adding 1 mm to the horizontal corneal diameter ("white-to-white"), determined by corneal topography image.
Surgical technique has been described in detail (12). Briefly, PIOL implantation was performed on an outpatient basis, with peribulbar anesthesia. A sclerocorneal 5.5x3 mm tunnel (along the steepest meridian on the superior 180°) was made, then anterior chamber was filled with an ophthalmic viscosurgical device (OVD). A peripheral iridectomy was performed through a separate superior side port by the Hoffer technique (13). The lens was inserted and rotated, haptic position checked by intraoperative gonioscopy, and by a round pupil. After the OVD was irrigated out by balanced salt solution, one or two single 10-0 nylon sutures were used to close the wound. Ciprofloxacin and dexamethasone 0.1% eyedrops were used four times daily for 10 days, after which diclofenac sodium eyedrops were started four times daily for 2 weeks. Follow-up visits were made at 6 hours; 1, 2, 7, 14, and 21 days; 2, 4, 8, 12, and 18 months; then yearly. They comprised uncorrected visual acuity (UCVA) and BSCVA, slit-lamp evaluation, funduscopy, iridectomy patency assessment, and tonometry. Pupil ovalization was measured in photopic conditions, and it was considered significant when the pupillary diameter along the IOL major axis exceeded its orthogonal diameter by 1 mm.
Statistical analysis was performed by CIA software (BMJ, Bristol, England).

RESULTS

Nine eyes of seven patients were ultimately included in the study. No case was excluded from PIOL implantation because of a reduced anterior chamber depth. Mean age at the time of PIOL implantation was 33.1 years ± 4.9 (standard deviation). Mean time interval between retinal detachment surgery and PIOL implantation was 3.2 years ± 4.5. In all cases, encircling scleral buckling had been performed with no radial implants; in three eyes (in right eye of Patient 3, in Patient 4, and in Patient 7) a macular detachment had occurred. Mean spherical equivalent (SE) before PIOL implantation was –16.36 D ± 3.98; range: –11.75 to –23 D. Surgery was uneventful in all cases. Mean SE after PIOL implantation was –0.99 D ± 0.51 (95% confidence interval for the mean: –0.59 to –1.39). Mean defocus equivalent after PIOL implantation was 1.44

TABLE I - EYES IMPLANTED WITH AN ANGLE-SUPPORTED PHAKIC INTRAOCULAR LENS (IOL) AFTER SCLERAL BUCKLING

Patient no./sex/age, y/eye	RD/IOL lapse, y	Preop refr. (BSCVA)	Postop refr. (BSCVA)	Follow-up, y
1/F/35/R	1	–23 (0.4)	–0.75 –0.75 x 40 (0.7)	3.5
1/F/35/L	2	–21 (0.5)	–1.25 –0.5 x 0 (0.8)	3.5
2/F/40/R	15	–9.5 –4.5 x 175 (0.5)	–3 x 170 (0.7)*	4
3/F/38/R	2	–13.5 –2 x 120 (0.3)	+0.5 –1.5 x 30 (0.6)	5
3/F/38/L	1.5	–13 –1.5 x 110 (0.7)	–0.75 (0.9)	5
4/M/31/R	2	–12 –1 x 140 (0.5)	–0.75 x 110 (0.6)	3
5/M/26/R	3	–14 (0.6)	–1.5 (0.7)*	4
6/F/33/L	1	–17 –1.5 x 5 (0.5)	–0.5 –1 x 0 (0.7)	5.5
7/M/29/L	1	–19 (0.3)	–1.25 (0.4)	4.5

*Eyes underwent photorefractive keratectomy 3 to 6 months after PIOL implantation to correct residual error.
Age = Age at the time of phakic intraocular lens (PIOL) implantation; RD/IOL lapse = Time interval between retinal detachment surgery and PIOL implantation; Preop refr. = Refraction in diopters before PIOL implantation; BSCVA = Best spectacle-corrected visual acuity; Postop refr. = Refraction in diopters after PIOL implantation at last follow-up; Follow-up = Follow-up after PIOL implantation

D ± 0.68 (95% confidence interval for the mean: 0.92 to 1.97). In two eyes (Patients 2 and 5), residual refractive error was corrected by photorefractive keratectomy respectively 6 and 3 months after PIOL surgery, achieving –0.75 D cyl @ 5° in Patient 2, and +0.25 D in Patient 5.

Mean follow-up after PIOL implantation was 4.2 years ± 0.8. The following complications were observed: slight pupil ovalization (inferior to 1 mm) in the right eye of Patient 3 and in Patient 7; worsening of floaters in both eyes of Patient 1 (2 and 2.5 years after PIOL surgery). No recurrences of retinal detachment were observed. Mean endothelial loss at 1 year was 8.2%±3.1, and at 3 years 13%±5.4.

DISCUSSION

In the present series, a good correction of the myopic error by angle-supported PIOL after scleral buckling was achieved, similarly to eyes with no previous history of retinal detachment surgery (12). In all cases, anterior chamber depth was sufficient for anterior chamber PIOL implantation, and surgery did not present any particular challenge. Postoperative course was uneventful, and no iris atrophy or vascularization was found.

The issue of anterior chamber changes after scleral buckling is controversial: in some studies a reduced anterior chamber depth was found after encircling (8, 14, 15) or local buckling surgery (16), whereas no significant changes were documented by other series (7). Encircling procedure may also cause anterior segment ischemia in the long term (17) or anterior chamber angle narrowing in the short term (18). All these possible abnormalities must be carefully evaluated before considering PIOL implantation.

Retinal detachment recurrence was not observed in the present series. A similar study, conducted on phacoemulsification after scleral buckling, equally showed no retinal redetachments (19). It has been suggested that an encircling scleral buckle may reduce the vitreous base stress during suction in LASIK, thus preventing recurrent retinal detachments (3). Similarly, the buckle might reduce vitreous traction caused by anterior chamber depth variations during phacoemulsification or PIOL surgery.

The main weakness of the present study is the limited sample. Vitreoretinal complications after PIOL implantation in eyes without previous vitreoretinal surgery are estimated to occur in 2.87% of cases (6), so a large sample would be required to detect the effect of PIOL implantation.

In conclusion, in carefully selected eyes with no anterior chamber abnormalities, the implantation of angle supported PIOL after scleral buckling for retinal detachment is associated with good refractive results and minor complications.

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