Management of retinal detachments in pseudophakic patients with Artisan lenses

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Purpose: To report the management and outcomes of retinal detachment repair in patients with Artisan intraocular lenses (IOLs) used for pseudophakic correction.

Setting: Two university-based referral centers.

Methods: In this retrospective case-control study, all cases of retinal detachments in patients with an Artisan IOL used for pseudophakic correction were reviewed over 5 years at 2 university clinics.

Results: Of the 20 patients identified, all had a detachment in 2 or more quadrants. A retinal tear was identified in 19 patients preoperatively. Thirteen patients had a standard buckling procedure, 3 with the addition of gas; 3 required a pars plana vitrectomy; and 2 were treated with pneumatic retinopexy alone. Reattachment was achieved with 1 procedure in 11 patients, with 2 procedures in 5 patients, and with 3 procedures in 3 patients; reattachment could not be achieved in 2 cases. Anterior displacement of the lens was noted when gas tamponade was used. When the displacement was significant, sodium hyaluronate 1% (Healon®) was used to prevent corneal endothelial touch.

Conclusions: In most cases, the Artisan lens did not significantly limit peripheral retinal visibility. Standard buckling procedures were generally successful. Given the limited support provided by the iris, the presence of gas in the vitreous cavity can lead to anterior displacement of the lens. Corneal endothelial touch can be prevented by the use of Healon, which is sufficient if short-term gas tamponade is used.

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When capsular support is inadequate or absent, surgical options for pseudophakic correction have included implantation of an anterior chamber intraocular lens (AC IOL) or transscleral fixation of a posterior chamber intraocular lens (PC IOL).[1–4] While avoiding some of the complications associated with AC IOLs,[5,6] transscleral fixation requires a longer operative time and is associated with a higher incidence of intraoperative complications.[1,4,7] Pupil-supported IOLs, such as the Binkhorst or Worst Medallion claw, were popular 2 decades ago. They fell out of favor because they interfered with the pupillary sphincter, caused irritation of the iris, and increased the risk of cystoid macular edema.

The Artisan lens was introduced in 1978. This lens differs from other iris-fixated lenses as it is fixated to the midperipheral portion of the iris, which is its only contact with the iris surface. It does not interfere with the normal physiology of the iris or the angle structures.[1] Artisan lenses tend to give better visual outcomes with fewer complications than scleral sulcus-fixated lenses.[1] For this reason, their popularity is increasing steadily as an alternative when capsular fixation is not possible after complicated cataract surgery. In The Netherlands, it has become the preferred lens when capsular support is insufficient for placement of a PC IOL.

Pseudophakia, particularly when associated with loss of vitreous or capsule rupture, increases the risk of a

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retinal detachment. The design of the Artisan lens presents a new set of challenges to the vitreoretinal surgeon confronted with the repair of a retinal detachment. In this article, we present our combined experience with the repair of retinal detachments in a cohort of patients in whom Artisan IOLs were implanted to correct aphakia.

Patients and Methods

Data Source

All charts from patients with retinal detachments seen in the eye clinics of the Academic Medical Center and the Free University between January 1, 1994, and March 1, 1999, were reviewed. Selection criteria for further review included Artisan lens implantation before the first retinal detachment and a follow-up of at least 6 months at the clinic in which the surgery had been performed. From the patients' records, the following data were collected: age, sex, ocular history (eg, trauma), preoperative visual acuity, intraocular pressure (IOP), interval between Artisan IOL placement and retinal detachment, parameters related to the retinal detachment (duration of symptoms, number of quadrants involved, size and location of breaks, macular status), surgical parameters (number and type of procedures, intraoperative and postoperative complications), final postoperative visual acuity, reattachment status, and length of follow-up.

Surgical Procedures

For patients having a standard buckling procedure, the holes were localized by indirect ophthalmoscopy and indentation; light cryocoagulation was applied at the edges of the identified holes. A silicone band or explant was used for indentation and held in place with 4-0 silk sutures. Holes were localized in a similar fashion in patients having pneumatic retinopexy. These patients received preoperative acetazolamide (Diamox®) and ocular massage. Before the appropriate amount of gas was injected, sodium hyaluronate 1% (Healon®) was injected into the superior third of the anterior chamber. In eyes having a pars plana vitrectomy and definite evidence of endothelial touch, Healon was placed in the anterior chamber before the eye was filled with gas. In all cases, the Healon was left in place and the patient treated with Diamox over the following week to prevent an IOP rise. The IOP was monitored frequently in the first 24 hours after surgery.

Results

Twenty patients meeting the inclusion criteria were identified. One patient could not be included in the study as the preoperative ocular evaluation was missing. The patients' data are summarized in Table 1. The mean age at presentation was 66.2 years (range 12 to 91 years). Twelve patients (63%) were men.

The reason for the Artisan IOL implantation was capsule rupture in 11 patients (57.9%), subluxation of a previously implanted PC IOL in 6 patients (31.6%), and trauma in 2 patients (10.5%). In 7 patients (36.8%), the Artisan lens was implanted at the time of

Table 1. Patients' characteristics when first presenting with a retinal detachment.

Patient	Age (Y)	Sex	Reason for IOL	Time between 1st Eye Surgery and IOL Implantation	Time Since Lens Implant (Mo)	Symptom Duration (D)	Location and Nature of Tear	Number of Detached Quadrants	Status of Macula	Visual Acuity
1	74	M	CR	12 mo	42.0	5	Round hole superiorly	2	Off	CF at 1 m
2	45	F	SL	3 mo	12.0	1	Round hole superiorly	3	On	20/40
3	33	M	CR	1 d	1.5	1	Rhegmatogenous tear superiorly	2	On	20/60
4	91	F	CR	132 mo	0.8	2	Round hole superiorly, ora disinsertion nasally	2	On	CF at 1 m
5	12	M	T	15 mo	23.0	3	Giant tear from 1 to 5 o'clock	3	Off	LP
6	78	M	CR	I	11.0	7	Rhegmatogenous tear inferiorly	3	Off	CF at 1m
7	66	M	SL	1 mo	76.0	7	Round hole inferiorly	3	Off	20/50
8	86	F	CR	0.25 mo	2.5	1	Round hole superiorly	2	Off	LP
9	81	F	SL	7 mo	8.0	1	Rhegmatogenous tear superiorly	2	On	20/25
10	81	F	CR	30 mo	36.0	28	Round hole superiorly	2	Off	CF at 1 m
11	83	M	SL	87 mo	18.0	14	Round hole superiorly, 2 round holes inferiorly	4	Off	HM at 2 m
12	81	F	CR	I	72.0	6	Rhegmatogenous tear inferiorly	3	Off	20/200
13	49	M	CR	I	36.0	7	Rhegmatogenous tear superiorly	2	Off	HM at 1 m
14	66	F	SL	23 mo	0.3	3	Round hole superiorly	3	On	20/200
15	58	M	T	I	4.5	4	Round hole superiorly	3	Off	20/120
16	68	M	CR	I	48.0	7	Rhegmatogenous tear superiorly	3	Off	CF at 1 m
17	73	M	SL	0.25 m	0.3	28	Lattice and tear superonasally	4	Off	HM at 1 m
18	56	M	CR	I	2.5	7	No holes found	2	On	20/50
19	76	M	CR	I	3.0	Unknown	No holes found	2	On	20/80

CR = capsule rupture; T = trauma; SL = subluxation of IOL; mo = months; d = day; I = immediate (during the 1st surgery); CF = counting fingers; HM = hand motions; LP = light perception

the initial surgery and in 12 (63.2%), as a secondary procedure. The median interval between the first-eye surgery and placement of the Artisan lens was 9.5 months (range 1 day to 132 months). The median interval between placement of the Artisan lens and the presentation at the outpatient clinic with a retinal detachment was 11 months (range 0.3 to 76.0 months). The preoperative visual acuity ranged from light perception to 20/25; 11% had a visual acuity of 20/40 or better. All patients had 2 or more detached quadrants, and 2 patients had a total retinal detachment. Retinal tears were found in 17 patients (89.5%) preoperatively or intraoperatively. Thirteen patients (63%) presented with detached maculas.

The characteristics of the surgical procedures and follow-up are shown in Table 2. Nine patients had a standard buckle procedure; 5 had a buckle plus intraocular gas, and 1 also had a pars plana vitrectomy. Two patients with superior tears were treated by pneumatic retinopexy. One patient presented with a giant tear. He had a pars plana vitrectomy, retinotomy, and silicone oil placement. One patient presented with a dropped nucleus and a retinal detachment. The lens was removed by phacofragmentation at the time of vitrectomy. In addition, a scleral buckle was placed and gas tamponade used to flatten the retina.

Reattachment was achieved with 1 operation in 10 patients (52.6%), 2 procedures in 7 patients (36.8%), and 3 procedures in 1 patient (5.3%). A 91-year-old patient refused further surgery when a redetachment occurred. Excluding this patient, the total reattachment rate was 100%. The postoperative visual acuity ranged from no light perception to 20/20; 47% had a visual acuity of 20/40 or better (Figure 1).

Visualization of the peripheral retina was not significantly hindered in these patients as the pupil could be sufficiently dilated in all cases. When gas tamponade was used, there was a tendency for anterior displacement of the IOL toward the endothelium, which was resolved by placing Healon in the anterior chamber.

Table 2. Characteristics of the surgical procedures, reattachment rate, and visual outcome.

Patient	Initial Procedure	Additional Procedures	Final Reattachment	Follow-up (Months)	Final Postop Visual Acuity
1	SB	—	Yes	22.0	20/32
2	SB	1st revision SB; 2nd revision SB, SF_6	Yes	12.0	20/40
3	SB	—	Yes	47.0	20/32
4	SB, SF_6	—	No	16.0	NLP
5	PPV, R, SO	—	Yes	11.0	CF at 2 m
6	SB	—	Yes	42.0	20/200
7	SB	SF_6; laser	Yes	9.0	20/25
8	SB, C_3F_8	PPV; SO	Yes	24.0	NLP
9	SB	Revision SB	Yes	8.0	20/20
10	SB	—	Yes	50.0	20/60
11	SB	—	Yes	30.0	20/25
12	SB, C_3F_8	—	Yes	6.0	20/80
13	PR	SB; SF_6	Yes	24.0	20/32
14	SB, SF_6	SB	Yes	6.0	20/80
15	SB	—	Yes	6.0	20/25
16	PR	—	Yes	18.0	20/20
17	SB, PPV, SF_6	PPV; SO	Yes	15.0	HM at 1 m
18	SB, C_3F_8	—	Yes	13.0	CF at 3 m
19	PPV, R, SO	PPV; SO	Yes	11.5	20/80

SB = scleral buckle; SF_6 = sulfur hexafluoride; PPV = pars plana vitrectomy; R = retinotomy; SO = silicone oil; C_3F_8 = perfluoropropane; PR = pneumatic retinopexy; NLP = no light perception; CF = counting fingers; HM = hand motions

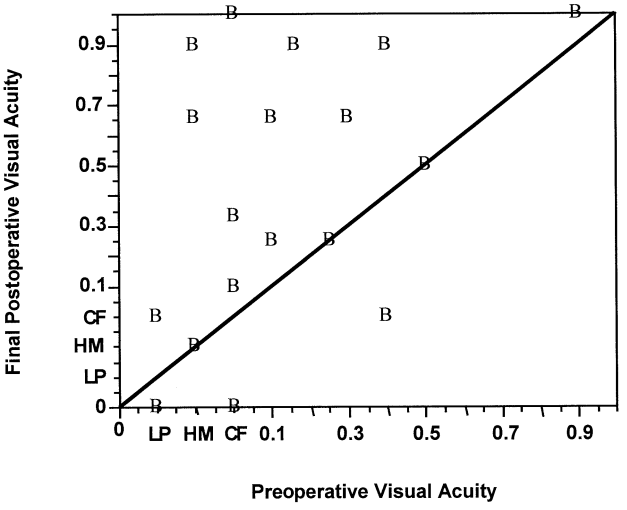

Figure 1. (van der Meulen) Preoperative versus final recorded visual acuity.

Discussion

Pseudophakic retinal detachments carry a worse prognosis when vitreous gel is present in the anterior chamber, in presence of a total detachment, or with an incomplete view of the ora serrata.[8,9] Visualization is often reported as the significant limiting factors in detachment repair.[9–11] This problem was frequently encountered with the older iris plane lenses, which by design severely limited pupil dilation.[8,10,12–14] This problem is not present with the Artisan IOL. With indentation, good visualization of the peripheral retina is possible. In addition, this view is unhindered by the presence of a capsular bag and one does not have to contend with peripheral aberrations imposed by the capsule.[11,15] Given the tendency for cataract surgeons to opt for smaller capsulorhexis openings and smaller diameter lenses, visualization in the presence of an Artisan IOL is the same or better than that obtained with a standard PC IOL.

At the last follow-up, most patients had regained significant visual acuity, with about half achieving 20/40 or better. This is in contrast with results observed in other series in which AC IOLs were used in cases in which visual acuity was often limited by the development of corneal edema[16,17] or anterior segment inflammation.[17,18] Postoperative inflammation in our patients with an Artisan lens was not significant and is comparable to what is observed in patients with a PC IOL. Corneal edema over a follow-up of up to 50 months was not significant.

A comparison with other implantation techniques for poor capsular support was not possible in our clinics. For the past 15 years, the Artisan has been the lens of choice when capsular support is inadequate or nonexistent. Therefore, we compared our results with those in published series. The reattachment rates after 1 operation were less than for standard pseudophakic detachments after PC IOL implantation; however, the overall reattachment rate was comparable. Comparison with this group of patients is difficult. All patients in our series had complicated cataract surgeries or trauma. Only 8 of the 20 patients had preoperative retinal defects (single round hole or tear at the ora serrata), which can be considered similar to those usually observed in pseudophakic retinal detachments. Roughly 30 Artisan lenses are implanted per year per center in cases in which there is no capsular support. Over the course of this study, both centers implanted about 300 lenses, yet 18 of the 20 patients in the current series were referred from other centers. Thus, the risk of retinal detachment after Artisan IOL implantation is small, although a determination of the exact risk requires a separate study.

Precautions are necessary when performing surgery in patients with Artisan lenses. Because there is no angle support for these lenses with gas in the vitreous cavity, the lens can be pushed against the endothelium. Often, only the upper half is shifted forward, rotating along the longitudinal axis of the lens. Injecting Healon into the superior anterior chamber will prevent contact between the endothelium and IOL. When combined with Diamox, IOP remains in a reasonable range. With short-term gas tamponade (a bubble that is expected to disappear completely in 7 to 10 days), reinjection of Healon has not been required. We have also tried sodium hyaluronate 1.4% (Healon GV®), but this was associated with a significant pressure rise that was difficult to manage for the first 3 to 4 days postoperatively. In the presence of silicone oil, care must be taken to ensure the posterior chamber is adequately filled. This provides equal posterior pressure in both the superior and inferior halves of the iris. There is then only a slight tendency for anterior displacement of the superior edge of the lens. Overfilling the posterior chamber should be avoided as it can lead to an anterior displacement of the whole lens. In this situation, allowing the oil to enter the anterior

chamber will again equalize the pressure on both sides of the lens and allow its relocation in the appropriate plane.

Our small series demonstrates that good reattachment rates can be achieved in patients with Artisan IOLs, although more than 1 operation may be required. Visual rehabilitation was excellent, similar to that achieved with PC IOLs. If precautions are taken to prevent contact between the corneal endothelium and the IOL, the prognosis for retinal detachment repair in these patients is excellent.

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