Documenta Ophthalmologica **92:** 29–35, 1996.

Iris-Claw intraocular lenses in children

BERT A.E. VAN DER POL & JAN G.F. WORST
Department of Ophthalmology, Refaja Hospital, Stadskanaal, The Netherlands

Accepted 7 May 1996

Key words: Cataract, Children, Congenital, Iris-Claw, IOL, Juvenile

Abstract. 27 children (38 eyes) with cataracts of different origins were treated using iris fixated one-piece Iris-Claw intraocular lenses. Visual acuities outcome in this group was comparable with the results in other series. The Iris-Claw lens is a very versatile IOL, which can be used in most cataract procedures, it can be removed and exchanged with minimal surgical trauma; therefore it is an effective modality in correction of the developmental changes in the refraction of the very young and growing, aphakic eye.

Introduction

The use of intraocular lenses in the eyes of young children is still a controversial subject among ophthalmic surgeons. Adequate refractive correction of the young aphakic eye is the primary condition to prevent deprivation amblyopia. Implantation of an intraocular lens appears to be quite successful in this respect as it spares the child and its parents the troublesome use of contactlenses or the wearing of heavy, cosmetically inacceptable spectacles.

With increasing experience several complications and problems in implant surgery in children have now become apparent. The eye of a young child shows more surgical reaction than an adult eye and tends to behave differently to surgical intervention. Special biochemical and anatomical aspects of the juvenile eye require technical adaptations during surgery. At present there is a tendency to change from discision/aspiration techniques to lensectomy and vitrectomy, mainly to prevent the formation of aftercataracts [1]. A major advantage of a carefully performed discision with aspiration of the lens, followed by secondary implantation is the fact that no invasion of the immature vitreous body, which is still in a developmental stage, is required.

One of the and as yet unsolved problems is the growth of the neonate eye, which has to be operated for a congenital cataract and requires a 'growing' IOL. This can only be solved with several IOL's with different power in the period in which developmental refractive change take place.

This retrospective case-analysis comprises 27 children, which were operated for bilateral or unilateral cataracts and were corrected with implantation of an Iris-Claw lens.

Subjects and method

The medical records of 27 subjects were available for retrospective analysis. 38 eyes of these children were implanted with an Iris-Claw lens in the period from 1980 to 1992. The youngest child was 8 months and the eldest nearly 13 years of age at the time of the first operation. 15 of the children were girls and 12 boys. 17 children had bilateral, congenital or developmental cataracts. 28 eyes of this group were implanted. 10 children had an unilateral cataract of which 3 were of traumatic origin.

All implantations were done after discision and aspiration of the cataract. In six cases discision preceded aspiration by one day.

The Iris-Claw lens was developed by Worst in the late seventies. It is a one-piece PMMA-lens with an optical zone, which can vary in diameter from 4 to 5 mm. The overall length of the lens can vary from 6.5 to 8.5 mm. The optical zone is supported by two haptic 'arms', which grasp the iris stroma in the relatively immobile peripheral part of the iris, like the claws of a lobster (Figure 1).

There is a vast experience in adult eyes with this lens, not only in the Western world, but also in countries like India and Pakistan where several thousands were implanted. The Iris-Claw lens can be used in extracapsular as well as in intracapsular procedures. In the Netherlands it gains an increasing popularity as an 'emergency-IOL' after complicated extracapsular cataract extractions and phakoemulsifications. To obtain a safe fixation the haptics should not be too rigid nor too flexible. In the early years after the introduction of the Iris-Claw lens it became clear, that sometimes the lens dislocated due to slightly too rigid haptics, especially when a small tissue-bridge was enclavated. This problem was solved by the manufacturer in the mid-eighties and followed by a substantial decrease of reports on lens dislocations.

All lenses were implanted secondarily to be sure implantation was performed under optimal conditions in eyes with minimal reactive signs. As the anterior chambers of young children have diameters around 10 mm. the smallest lens type (4.0/6.5 mm.) (Figure 1) was used in most cases.

Results

Congenital and developmental cataracts were not evaluated as special groups. The etiology was uncertain in many cases. 6 of the 17 children with bilateral cataracts showed preoperative nystagmus. The highest visual acuity of the best eye in this subgroup was 0.25. 7 children with bilateral cataracts had only a strabismus and scored a highest visual acuity of the best eye of 0.8 and of the squinting eye of 0.5. (Table 1 and 2). In the group of 10 unilateral cataracts

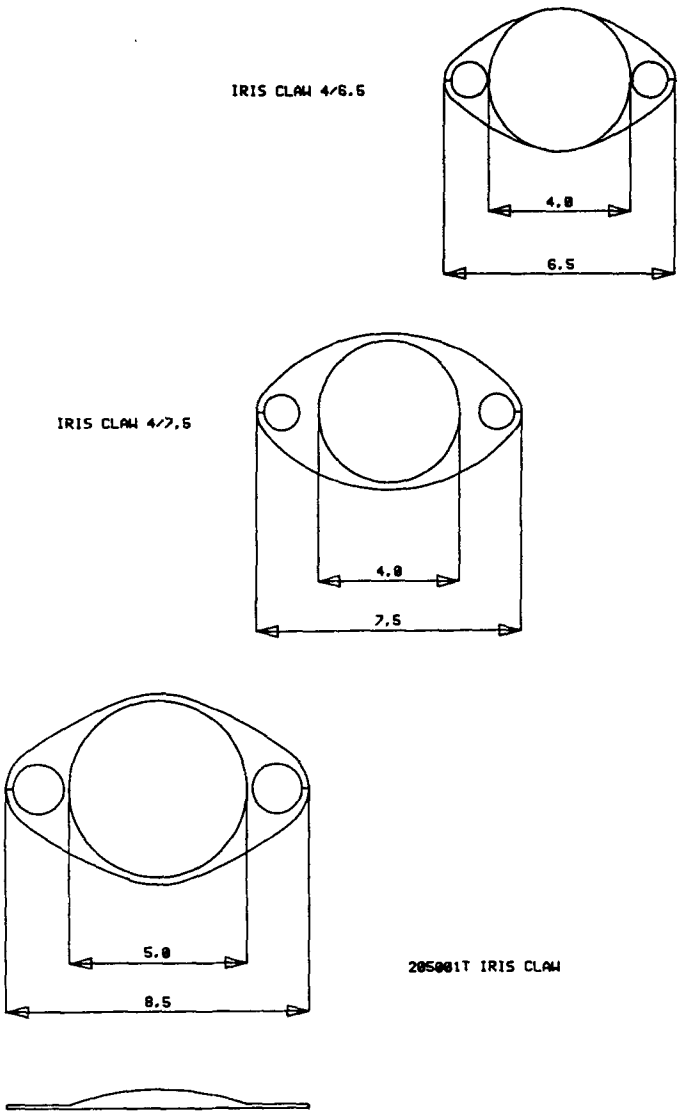

Figure 1. The three current versions of the Iris-Claw intraocular lens.

were three children with a traumatical cataract. In the children with unilateral cataracts the highest visual acuity of the operated eye was 0.75 and two eyes reached a visual acuity of less than 0.1. In this group the squinting eyes appeared to be the worst performing eyes. (Table 3). In the total population 3 children were lost to follow-up, caused by the fact that these children were

Table 1. Summary of 11 subjects with bilateral cataracts and bilateral implantations

	O	I	N	S	oth	VA	Comment
1:	0/3	0/9	–	+	–	0.5	dislocation
	0/3	0/9	–	+	–	0.5	sec.membr.:2x
2:	0/5	1.3	+	–	–	0.15	
	0/7	1/6	+	–	–	0.1	sec.membr.:1x
3:	0/9	1/11	+	+	+	0.1	mental retardation
	0/9	2/0	+	+	+	0.1	sec.membr.:1x
4:	/0/10	1/5	+	–	–	0.03	hereditary
	1/0	1/10	+	–	–	0.03	
5:	1/0	1/4	+	–	–	0.07	hereditary/sec.membr.:1x
	1/1	1/5	+	–	–	0.07	
6:	1/1	8/0	+	–	+	0.1	irisanomaly/sec.membr.:1x lensexchange (miscalc.).
	1/1	8/1	+	+	+	0.25	irisanomaly/sec.membr.:1x
7:	1/3	1/7	–	–	–	0.8	
	8/2	8/2	–	+	–	0.05	dislocation
8:	2/4	8/11	–	+	–	0.2	dislocation.
	2/6	10/5	–	–	–	0.8	sec. membr.:1x
9:	3/0	4/9	–	–	–	0.8	
	3/0	8/4	–	+	–	0.15	ac. glaucoma
10:	5/3	5/5	–	–	–	0.5	
	5/4	5/6	–	–	–	0.75	
11:	7/9	9/5	–	–	–	1.0	dislocation/sec. membr.: 2x
	8/4	12/7	–	–	–	0.8	sec.membr.:2x

O: age (yr/mth) of first operation
I: age (yr/mth) of implantation
N: nystagmus; S: strabismus; oth: other abnormalities
VA: visual acuity

postoperativaly looked after by other ophthalmologists. All three cases were operated more than 10 years ago and could not be traced.

In 7 eyes the lens had dislocated 4 months to 6.5 year after implantation. In all these cases the lens had detached on one side only and remained in the plane of the iris without corneal endothelial touch,

Two of these dislocations seemed to be related to a blunt trauma. One of these two eyes showed signs of contusion. All but one of the 7 dislocations took place in eyes with lenses manufactured in the early eighties, the period when the 'claws' were still rather rigid. Reattachment or exchange of the dislocated lens was done in all cases without any complication during

Table 2. Summary of 6 subjects with bilateral cataracts but unilateral implantations

	0	1	N	S	oth	VA	Comment
1:	0/4	12/9	+	+	+	0	microphthalmos./phtisis sec.membr.:4x
	0/6	–	+	+	+	0.03	sec.membr.:1x
2:	6/0	6/0	–	–	–	0.2	
	–	–	–	–	–	0.6	
3:	?	6/11	–	+	–	?	lost to follow-up
	?	–	–	–	–	–	?
4:	8/9	8/11	–	+	+	0.03	myop.grav./sec.membr.:5x
	–	–	–	–	+	0.4	myop.grav.
5:	8/11	8/11	–	–	–	0.8	
	–	–	–	+	–	0.4	
6:	12/4	12/4	–	–	+	0.07	neon.hypoglycemia.
	–	–	–	–	+	0.5	

0: age (yr/mth) of first operation
1: age (yr/mth) of implantation
N: nystagmus; S: strabismus; oth: other abnormalities
VA: visual acuity

Table 3. Summary of 10 subjects with unilateral cataracts and unilateral implantations

	0	1	N	S	oth	VAo	VAno	Comment
1:	0/4	0/8	–	+	–	?	?	lost to follow-up
2:	0/7	4/3	–	–	–	?	?	disloc./lost to follow-up
3:	1/8	1/11	–	+	–	0.02	1.0	sec.membr.: 4x
4:	3/0	3/10	–	+	–	0.08	1.5	
5:	3/0	4/8	–	+	–	0.1	1.0	traumatic/disloc.
6:	4/7	4/10	–	–	–	0.4	0.8	high myopia ou sec. membr: 1x
7:	5/0	5/0	+	+	–	0.02	1.0	traumatic
8:	5/2	5/3	+	+	–	0.1	0.5	sec. membr.: 2x
9:	6/6	7/4	–	–	–	0.6	1.2	traumatic
10:	10/2	10/9	–	–	–	0.75	1.2	dislocation

0: age (yr/mth) of first operation
1: age (yr/mth) of implantation
N: nystagmus; S: strabismus; oth: other abnormalities
VAo: visual acuity of operated eye
VAno: visual acuity of non-operated eye

the operation or afterwards. Compared with the other eyes, the ones with dislocated lenses did not behave differently.

Other complications were: a miscalculation of the power of one lens, which was exchanged; a blocked pupil with glaucoma and a phthisis bulbi after retinal detachment in a microphthalmic eye. On these 27 children 121 operations were performed: 42 discisions and aspirations (in 6 eyes in two sessions); 35 secondary implantations; 29 aftercataract treatments; 7 other operations (strabismus, glaucoma) and 8 reattachments or exchanges.

Discussion

In accordance with other publications [2, 3] the visual performance of these young eyes after cataractextraction and lensimplantation appeared to be related to the preexisting level of deprivation indicated by nystagmus and strabismus. The group of children with bilateral implants showed the best visual outcome. The unilateral implanted subjects, with unilateral and bilateral cataracts, obtained less favourable visual results.

The rate of secondary membrane development (15 out of 38) in this series seemed to be lower than the numbers reported by other authors using a discision/aspiration technique [1].

The difference with other series is the use of the Iris-Claw lens in this group of children. The Iris-Claw lens can be placed, replaced and exchanged with minimal surgical trauma under nearly all circumstances. The ever present synechiae formation in the juvenile eye after cataract surgery make posterior chamber lens implantation difficult. The anterior chamber position of the Iris-Claw lens gets round this problem.

Especially in the eyes of very young children several surgeons feel the need for an easy-to-exchange IOL [2]. Theoretically the refractive development of the neonate eye should be followed in order to minimize the risk of deprivation. In the case of an older child most surgeons choose an IOL power based on the expected adult power or the schematic adult eye. For the very young eye that would result in a considerably undercorrected refractive state in a critical period of neurophysiological development [4]. The growth of the eye appeared not to be influenced by aphakia [5] and probably not by pseudophakia [6].

The relatively easy to handle Iris-Claw lens seems to be a more attractive option than for example a system as the 'piggyback' principle based on a posterior chamber IOL [7]. However, this group of children demonstrates a relatively high rate of lensdislocations. There are two causes for this phenomenon. In the early series of the Iris-Claw lens the 'claws' were a little too rigid, which sometimes caused the iris stroma sliding out of the slot of the lens

haptic, especially when a too narrow tissue bridge was formed. As already stated above, this technical problem was also well known in adult eyes and the lens quality was improved in the mid eighties. Bringing an appropriate amount of tissue through the 'claws', remains imperative to get a stable and safe fixation of the lens. Atrophy and leakage at the fixation sites have never been demonstrated.

Further advantages of this lens are easy access to possible secondary membranes and the possibility to choose the lens dimension appropriate for the eye to be operated.

Conclusion

Effective treatment of children with congenital, developmental and traumatic cataracts has still to be developed. Prevention of deprivation amblyopia is the first therapeutical goal. Nystagmus and strabismus are prognostically unfavourable signs. Implantation of intraocular lenses gains an increasing interest as a promising method for effective visual rehabilitation. The current small diameter version of the Iris Claw intraocular lens for children could be a versatile lens in the treatment of cataracts in the very young eye.

References

1. Keech RV, Cibis Tongue A, Scott WE. Complications After Surgery for Congenital and Infantile Cataracts. Am J Ophthalmol 1989; 108: 136–141.
2. Dahan E, Salmenson BD. Pseudophakia in children: Precautions, technique, and feasibility. J Cataract Refract: Surg 1990; 16: 75–82.
3. Hiles DA. Intraocular Lens Implantation in Children with Monocular Cataracts. Ophthalmology 1984; 91: 1231–1237.
4. Kampik A, Schinzel M, Haigis W. Brechkraftberechnung und Refraktionsentwicklung bei theoretischer Intraokular-Linsenimplantation im Kleinstkindesalter. Klin Monatsbl Augenheilkd 1993; 202: 315–319.
5. Niederreiter P, Klemen UM, Leitner J. Zur Ultraschall-Biometrie im Kindesalter. Klin Monatsbl Augenheilkd 1987; 191: 355–357.
6. Kora Y, Shimizu K, Inatomi M, et al. Eye growth after cataract extraction and intraocular lens implantation in children. JPN Ophthalmic Surg 1993; 24/7: 467–475.
7. Mittelviefhaus H. The Piggyback Intraocular Lens for Congenital Cataract. Poster. European Congress on Pediatric Ophthalmology and Orthoptics. Maastricht, October 28 and 29, 1994.

Address for correspondence: B. A. E. van der Pol, Department of Ophthalmology, Refaja Hospital, Boerhaavestraat 1, 9501 HE Stadskanaal, The Netherlands
Phone: 31- (0) 599-616850; Fax: 31- (0) 599-622282