

Outcome of lens aspiration and intraocular lens implantation in children aged 5 years and under

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Abstract

Aims—To determine the visual outcome and complications of lens aspiration with intraocular lens implantation in children aged 5 years and under.

Methods—The hospital notes of all children aged 5 years and under, who had undergone lens aspiration with intraocular lens implantation between January 1994 and September 1998, and for whom follow up data of at least 1 year were available, were reviewed.

Results—Of 50 children who underwent surgery, 45 were eligible based on the follow up criteria. 34 children had bilateral cataracts and, of these, 30 had surgery on both eyes. Cataract was unilateral in 11 cases; thus, 75 eyes of 45 children had surgery. Cataracts were congenital in 28 cases, juvenile in 16, and traumatic in one case. The median age at surgery was 39 months (range 11–70 months). Follow up ranged from 12–64 months (median 36 months). Of 34 children with bilateral disease, 25 (73.5%) had a final best corrected visual acuity of 6/12 or better, while seven (20.5%) achieved 6/18 or less; in one child the vision improved from UCUSUM to CSM but another, who had only one eye operated on, was unable to fix or follow with this eye preoperatively or 2 years postoperatively. Of 11 children with unilateral cataract, five (45.5%) had a final best corrected visual of 6/12 or better, and six (54.5%) 6/18 or less. A mild fibrinous uveitis occurred in 20 (28.2%) eyes in the immediate postoperative period, but resolved with topical steroids. One child had a vitreous wick postoperatively requiring surgical division. Glaucoma, endophthalmitis, or retinal detachment have not been observed so far in any patient postoperatively.

Conclusion—From this series the authors suggest that, in children aged 5 years and under, lens aspiration with intraocular lens implantation is a safe procedure, with a good visual outcome in the short term. Further studies are needed to investigate these outcomes in the long term.

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Intraocular lens implantation is becoming an increasingly accepted procedure in young children and infants. Awareness of the rate of myopic shift which takes place in the developing eye, and the use of biometry, allows us to predict appropriate intraocular lens (IOL) powers to try to ensure eventual emmetropia.^{1–3}

However, final refraction is variable, such that emmetropia in adulthood cannot be guaranteed, as there are insufficient long term studies.

There have been many reports of the visual outcome and complications of posterior chamber lens implantation in children.^{4–12} Most of these have been based on older children, secondary lens implants, a high number of traumatic cataracts, and many have reported early outcome. We report visual outcome and complications of primary IOL implantation at least 1 year after surgery, in children aged 5 years and under, with mainly congenital or juvenile lens opacities.

Methods

SUBJECTS

We reviewed the notes of all children aged 5 years and under, who had undergone lens aspiration with primary posterior chamber intraocular lens implantation between January 1994 and August 1998 in our hospital. Forty five of these children were eligible for inclusion in our study, as a minimum of 1 year follow up data were available for them. Those children with uveitis, aniridia, and persistent primary hyperplastic vitreous were excluded.

PREOPERATIVE ASSESSMENT

All patients had had a full ophthalmic assessment preoperatively. This included visual acuity (using preferential looking, Cardiff acuity cards, Kay pictures, Sheridan Gardner singles, or the Snellen chart as appropriate) slit lamp examination, dilated funduscopy, retinoscopy, keratometry, and biometry. B-scan ultrasonography and electrophysiological testing including visual evoked potentials (VEP) and an electroretinogram (ERG) were carried out if necessary. The intraocular lens power was calculated using the SRK II formula, and the appropriate IOL power chosen according to the child's age using a graph constructed from the world literature. The pupils were dilated with cyclopentolate 0.5% and phenylephrine 2.5% inserted at 90, 60, and 30 minutes preoperatively. Informed consent was obtained from the parents.

SURGICAL TECHNIQUE

After conjunctival peritomy and cautery to the sclera, a 6 mm scleral tunnel was made in all cases, using an angled crescent blade. A small opening was then made using a keratome into the anterior chamber (AC). Healon GV was then injected to the AC and an anterior continuous circular capsulorhexis (CCC) performed using a Sutherland rhexis forceps. The lens matter was aspirated using a

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Table 1 The Great Ormond Street occlusion protocol for bilateral and unilateral cataracts

Occlusion regime for bilateral cataract	Occlusion regime for unilateral cataract
(1) 0–1/2 octaves interocular difference in visual acuity, no occlusion	(1) The phakic eye is occluded 1hour/day for each month of life* until 6 months of age. After 6 months occlusion depends on interocular difference (see 2–4 below)
(2) 1–2 octaves interocular difference in visual acuity, 1–2 hours of occlusion of the preferred eye	(2) 0–1/2 octave interocular difference in visual acuity, 50% of waking hours
(3) More than 2 octaves interocular difference in visual acuity, 2–4 hours of occlusion of the preferred eye	(3) 1–2 octaves interocular difference in visual acuity, 75% of waking hours
(4) If no improvement after stage 3, full time occlusion	(4) More than 2 octaves interocular difference in visual acuity, 100% waking hours
NB To be reviewed every 2 weeks	NB To be reviewed every 2 weeks

*That is, a child aged 2 months is patched for 2 hours a day, a 3 month old child for 3 hours/day, etc.

Table 2 Visual outcome and compliance with occlusion therapy in children with unilateral cataract

Patient	Eye	Age at surgery	Aetiology	Preop VA	Postop VA	Occlusion concordance*	Follow up (years)
1	R	18/12	C	Not fixing or following	6/12	Good	4
2	L	3 y 6/12	C	1/60	6/24	Poor	4
3	L	3 y 6/12	C	6/24	6/9	Good	3.5
4	L	5 y 3/12	J	CFs	6/6	Good	2.5
5	R	1 y 2/12	C	? not cooperative	6/60	None	1.1
6	R	5 y	J	6/60	6/60	None	3
7	R	14/12	C	? not cooperative	6/60	None	2.2
8	R	3 y	T	PL	6/24	Poor	1.2
9	R	5 y 1/12	J	2/60	1/60	Good	1.3
10	R	3 y	J	PL	6/12	Good	1.3
11	R	2 y 1/12	J	3/60	6/6	Good	5

C = congenital; J = juvenile; T = traumatic; CF = counting fingers; PL = perception of light.

*Concordance was categorised into none (no compliance), poor (less than full), and good (full).

Table 3 Requirement for posterior capsulotomy postoperatively in patients having had primary posterior capsulotomy without primary vitrectomy

Eye	Primary posterior CCC	Primary vitrectomy	YAG capsulotomy	Surgical capsulotomy
A	Yes	No	Yes × 2	Yes
B	Yes	No	Yes × 1	No
C	Yes	No	Yes × 2	Yes

Simco cannula. Most cases (n=9) performed after January 1998 had a posterior capsulorhexis performed followed by a limited anterior vitrectomy using a Storz cutter. A one piece PMMA 5.5 mm heparin coated IOL, 12 mm in length, was inserted into the bag, the Healon aspirated, and wound sutured with interrupted 10/0 Vicryl sutures. A subconjunctival injection of cefuroxime and betamethasone (Betnesol) was given at the end of the procedure.

POSTOPERATIVE MANAGEMENT

Postoperatively, all children received dexamethasone eye drops (Maxitrol) 2 hourly and cyclopentolate eye drops at night. The drops were then tapered and eventually discontinued 1 month later. Children with unilateral cataracts received further occlusion therapy for amblyopia immediately postoperatively according to our previously standardised regimen¹³ (Table 1). Children with bilateral lens opacities requiring surgery had the eye with poorer vision operated on first, with surgery for the second eye within 2–3 weeks. All patients were reviewed at 1, 2, and 3 weeks postoperatively, and then at 3 monthly intervals.

Results

Of 45 children eligible for inclusion on the minimum follow up criterion, 34 had bilateral and 11 unilateral disease. Cataracts were congenital in 23 cases in the group with bilateral lens opacities, the remaining 11 were juvenile. In the unilateral group there was one traumatic cataract, five congenital cataracts, and five juvenile cataracts. Five cases in the unilateral group and two in the bilateral group were associated with posterior lenticonus.

Seventy five eyes of 45 children (28 boys, 17 girls) had surgery, 11 eyes in the unilateral group, and 64 eyes in the bilateral group. Thirty children with bilateral cataracts had bilateral lens aspiration and PC IOL, and four children had unioocular surgery, as the cataract in the second eye was not significant enough to interfere with visual acuity. The median age at surgery was 39 months (range 11–70 months). The median follow up period was 36 months (range 12–62 months).

VISUAL OUTCOME

In the bilateral group, final best corrected visual acuity in the worse eye was 6/12 or better in 25 (73.5%) children, 6/18 or less in seven (20.6%), and in one child whose vision was not assessed using acuity cards, the vision improved from fixation that was uncentral unsteady and unmaintained (UCUSUM), to central steady and maintained (CSM). One child from the bilateral group who only had one eye operated on, was not fixing or following with this eye 2 years postoperatively; this was because of non-compliance with occlusion therapy.

In the unilateral group, the final best corrected visual acuity was 6/12 or better in five (45.5%) children, 6/18 or less in six (54.5%) cases. Poor vision was attributed, at least in part, to poor compliance with occlusion therapy in five of 11 (45%) children (Table 1).

POSTOPERATIVE COMPLICATIONS

Nine patients had a posterior capsulorhexis, six combined with a limited anterior vitrectomy, and three without. Posterior capsule and anterior hyaloid face opacification requiring YAG capsulotomy occurred in all three patients who had posterior capsulorhexis without vitrectomy, two of these children requiring surgical capsulotomy because of failure of laser to keep the visual axis clear (Table 2). Only three of six eyes which had posterior CCC combined with vitrectomy required a YAG capsulotomy, and none of these eyes needed a surgical capsulotomy due to failed YAG (Table 3). YAG capsulotomies were carried out under GA in the operating theatre, using a vertically oriented YAG laser.

All but one child who had no primary posterior capsulotomy required at least one YAG-laser capsulotomy. Twenty two children required a surgical capsulotomy owing to persistent regrowth of lens fibres despite having had two YAG capsulotomies; two of these children had had a posterior capsulotomy without vitrectomy at the time of the initial lens extraction, and none of those patients who had had a primary posterior capsulorhexis together

Table 4 Requirement for posterior capsulotomy postoperatively in patients having had primary posterior capsulotomy with primary vitrectomy

Eye	Primary posterior CCC	Primary vitrectomy	YAG capsulotomy	Surgical capsulotomy
D	Yes	Yes	Yes × 1	No
E	Yes	Yes	No	No
F	Yes	Yes	Yes × 1	No
G	Yes	Yes	No	No
H	Yes	Yes	No	No
I	Yes	Yes	No	No

with anterior vitrectomy, needed a secondary surgical capsulotomy (Table 4).

A mild fibrinous uveitis was noted in 20 (26.6%) eyes in the immediate postoperative period. This resolved rapidly and without sequelae in all cases with topical steroids. One child had a vitreous wick postoperatively requiring vitrectomy. Intraocular pressures were measured every 3–6 months using either Pulsair or Goldmann tonometry, and no child had raised IOP. Cystoid macular oedema, endophthalmitis, or retinal detachment have not been observed so far.

Discussion

Once an IOL has been implanted into the paediatric eye it is there to stay for 80 years or more, hence the long term safety must be firmly established. Though there have been encouraging results from some centres^{5–12} there have been no long term prospective studies looking at the outcome of IOL implantation in infants and young children.

Owing to the availability and continued development of biocompatible materials, development of techniques to reduce inflammation and avoid IOL decentration, such as anterior CCC which ensures “in the bag” placement of the lens, there is increasing confidence about IOL implantation in children. Postoperative uveitis, particular when fibrinous, can result in the formation of synechiae, pigment deposition on the IOL or secondary membrane formation¹⁴ and can result in poor vision.¹⁵ In our patient group we did not find such complications as a result of fibrinous uveitis, which may be due to an intensive postoperative regime of 2 hourly topical steroid increasing to hourly at any sign of fibrin formation (depot steroids injected at the time of surgery are used for less than perfectly cooperative children).

Primary posterior CCC and limited anterior vitrectomy reduce the need for repeated general anaesthetics in order to perform YAG and eventual surgical capsulotomy. But is IOL implantation safe in the long term? Is there an increased risk of cystoid macular oedema, retinal detachment or glaucoma with time? In the short term we have not seen any of these complications in our patients (Table 5). Further studies are required to investigate the risk of long term adverse outcomes and their predictors.

In our patients visual outcome was better in bilateral cases than in unilateral cases, and these results correlate with those of other studies. The main reason for failure was poor compliance with occlusion.

Visual outcome in unioocular cases depends on compliance with occlusion therapy, which

Table 5 Postoperative complications

Complication	No of eyes	% of eyes
Fibrinous uveitis	20	28.2
Posterior capsule opacification	70	98.6
Vitreous wick	1	1.4

must be discussed in detail with parents preoperatively. In our department an information booklet on patching is given to the parents at their first visit to the clinic, and if patching is abandoned, it is the parents who make the final decision.

It should be noted that the youngest patient in this study was 11 months old, and this may be a contributing factor towards the good visual outcome in this group of patients. Since the later part of 1998 we have started using intraocular lenses in infants as young as 3–4 weeks of age, and will publish the results of outcome in these younger children as a separate communication.

Advances in surgical technology and the development of biocompatible IOL materials have revolutionised paediatric cataract surgery in the past few decades. However, widespread adoption of new techniques in infants and young children requires evidence of their safety and effectiveness, particularly compared with existing treatment. We must therefore not become complacent, and should remain vigilant about potential long term complications, especially in the infant eye. We suggest long term longitudinal studies are required to establish the safety of IOLs in young children and infants, and to determine what is the best treatment in this age group.

- McClatchey SK. Intraocular lens calculator for childhood cataract. *J Cataract Refract Surg* 1998;24:1125–9.
- Enyedi LB, Peterseim MW, Freedman SF, et al. Refractive changes after pediatric intraocular lens implantation. *Am J Ophthalmol* 1998;126:772–81.
- Flitcroft DI, Knight-Nanan D, Bowell R, et al. Intraocular lenses in children; changes in axial length, corneal curvature, and refraction. *Br J Ophthalmol* 1999;83:265–9.
- Thouvenin D, Lesueur L, Arne JL. Implantation Intercapsulaire dans les cataractes de l'Enfant. Etude de 87 cas et comparaison a 88 cas sans implantation. *J Fr Ophthalmol* 1995;18:678–687.
- Knight-Nanan D, O'Keefe M, Bowell R. Outcome and complications of intraocular lenses in children with cataract. *J Cataract Refract Surg* 1994;22:730–6.
- Brady KM, Atkinson CS, Kilty LA, et al. Cataract surgery and intraocular lens implantation in children. *Am J Ophthalmol* 1995;120:1–9.
- Sinskey RM, Stoppel JO, Amin P. Long-term results of intraocular lens implantation in pediatric patients. *J Cataract Refract Surg* 1993;19:405–8.
- Zwaan J, Mullaney PB, Awad A, et al. Pediatric intraocular lens implantation; surgical results and complications in more than 300 patients. *Ophthalmology* 1998;105:112–19.
- Gimbel HV, Basti S, Ferensowicz M, et al. Results of bilateral cataract extraction with posterior chamber intraocular lens implantation in children. *Ophthalmology* 1997;104:1737–43.
- Crouch ER, Pressman SH, Crouch ER. Posterior chamber intraocular lenses; long term results in pediatric cataract patients. *J Pediatr Ophthalmol Strabismus* 1995;32:210–18.
- Burke JP, Wilshaw HE, Young JDH. Intraocular lens implants for unioocular cataracts in children. *Br J Ophthalmol* 1989;73:860–5.
- Churchill AJ, Noble BA, Etchells DE, et al. Factors affecting visual outcome in children following unioocular traumatic cataract. *Eye* 1995;9:285–91.
- Taylor D. The Doyne Lecture. Congenital cataract; the history, the nature and the practice. *Eye* 1998;12:9–36.
- Lesser GR, Osher RH, Whipple D, et al. Treatment of anterior chamber fibrin following cataract surgery with tissue plasminogen activator. *J Cataract Refract Surg* 1993;19:301–5.
- Sharma N, Pushker N, Dada T, et al. Complications of pediatric cataract surgery and intraocular lens implantation. *J Cataract Refract Surg* 1999;25:1585–8.



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