

Contact lens in children with aphakia: current scenario

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Abstract

Purpose: Management of aphakic children is critical as regards to timely rehabilitation for adequate visual gains. This study aims to analyse the demographic characteristics of children with aphakia and study different aspects of visual rehabilitation with contact lenses.

Method: Retrospective data review was done of subjects upto 16 years of age, presenting to contact lens clinic with aphakia, over a fourteen year period.

Results: A total of 77 eyes of 66 patients were identified, which included 11 cases with bilateral presentation. Of these, congenital cataract comprised 31 cases, 16 of them being infants, traumatic cataract 33 cases and 2 post uveitic complicated cataract cases.

Corneal scar at 29% was the most common co-morbidity identified accompanying 51.5% of trauma cases whereas strabismus at 22.5% was the most common accompaniment in congenital cataract cases. Successful contact lens fit could be achieved in all except one case with excessive corneal flattening subsequent to corneal injury. Lenses fitted were extended wear soft lenses in all eyes except three cases where rigid gas permeable lenses (RGP) were required. Good visual gain of ≥ 1 LogMAR was seen in 42% congenital cataract cases and 51% of post traumatic cases. The major deterrents for good visual gain were poor compliance to follow-up visits with drop-out rates ranging from 36-51%, late presentation for visual rehabilitation and macular damage.

Conclusion: Contact lenses are an extremely effective means of visual rehabilitation in aphakic children with compliance of wear and follow-up being most important to achieve and maintain good visual gain.

Introduction

Aphakia management in adults without adequate posterior capsular support has simplified in current times with options like scleral fixated, iris supported or glued intraocular lenses. In children, especially infants operated for congenital cataracts, management however still remains controversial. Also the risk of amblyopia necessitates prompt rehabilitation of the aphakic eye. Adding to this burden, especially in developing countries, is a large group of children with lens damage subsequent to trauma. Some may require lens removal during primary repair of the perforating injury, unsuitable for simultaneous intraocular lens implantation and planned for a secondary surgery. For these unilateral aphakes during the interim period while waiting for a secondary intraocular lens to be implanted contact lenses remain the only viable option to prevent stimulus deprivation amblyopia from setting in.

Methods

This study is a retrospective analysis of patients registered in contact lens clinic in a government-run tertiary eye hospital. The work was carried out in accordance with the Tenets of Declaration of Helsinki. Records of children below 16 years age, diagnosed with unocular/binocular aphakia who were fitted with aphakic contact lenses were identified and data reviewed for age at presentation, age at surgery, duration of visual limitation, best corrected visual acuity (BCVA) with glasses and contact lenses, compliance for usage (parental and child's), complications with lens usage and reasons for non-compliance.

Results

The data revealed 77 eyes of 66 children fitted with aphakic contact lenses over a period of 14 years. Of these forty eight were male and

eighteen female children, with mean age 6.52 ± 4.7 years (range 3 months to 16 years), including 16 infants. Right eye was involved in thirty one patients and eleven were bilateral aphakes. Thirty three cases had aphakia as a consequence of trauma, thirty one cases congenital/paediatric cataracts and two had been operated for complicated cataract post uveitis. Aetiology of cataract and associated co-morbidities are tabulated in Table 1 and the demographic profile is presented in Table 2. As pre-schooling starts at 3 years for children in our country, cases with congenital cataract were divided for analysis purpose into those upto 3 years of age (pre - preschool age) and those above. The two children with complicated cataract were aged 4 and 14 years, operated at the same age and presented within 3-6 months. However both did not report improvement in visual acuity and failed to follow-up and thus have been further excluded.

Children with congenital cataract

In the twenty children presenting at less than 3 years of age, 16 were infants and of these 85% were noted to have good fixation and were able to follow light after a successful lens fit. Despite this, the drop-out rate in follow up visits was 50% (10/20) with most clocking fewer than 2 visits. Of the remaining children, mean duration of follow up was 6.24 ± 5.39 years (mean \pm standard deviation) with maximum follow

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Table 1. Aetiology of cataract and associated co-morbidities in aphakic children.

Co-Morbidities	Congenital (n=31)	Traumatic (n=33)	Complicated (n=2)
Corneal scar/opacity	2	17	
Strabismus	7 (6 esotropia and 1 exotropia)	1 (exotropia)	
Nystagmus	3		
Aniridia	2	1	
Microphthalmia, Microcornea, Megalocornea, Microspherophakia, Telecanthus-blepharophimosis	7		
Retinal involvement (Cystoid macular edema, Choroidal tear involving macula, Epiretinal membrane, Post Vitreo-retinal surgeries)		6	
Secondary glaucoma	2	1	
Penetrating keratoplasty		1	
Uveitis (quiescent)			2

Table 2. Demographic profile of aphakic children fitted with contact lenses.

	Congenital (n=31)		Traumatic (n=33)
	<3 years (n=20) Mean + SD* (range)	>3years (n=11) Mean + SD* (range)	(4-16years) Mean + SD* (range)
Age at presentation	11.6 ± 8.52 months (3-36 months)	8.36 ± 4.08 years (4-15 years)	9.12 ± 3.12 years (4-16years)
Age at surgery	7.95 ± 6.03 months (2-24 months)	5 ± 3.97 years (2-13 years)	8.21 ± 3.11 years (3-15years)
Duration of visual limitation	2.56 ± 2.67 months (1week - 1year)	21.36 ± 32.55 months (1month - 8years)	12.8 ± 22.28 months (1month - 10years)
Follow up	6.24 ± 5.39years (6 months - 13 years)	6.6 ± 7.9 months (2-24 months)	6.05 ± 8.1months (1-24 months)
Drop-out rate	11/20 (55%)	4/11 (36.3%)	17/33 (51.5%)
Secondary IOL implanted	3	None	3

SD* = Standard Deviation

up duration of 7-13 years for five children. Two children with bilateral aphakia switched to aphakic glasses after 3-6 months due to enhanced comfort while parents of one unilateral aphake shifted to glasses (along with patching) citing financial reasons. Remaining seven children (35%) were compliant with 5-8 hours of daily contact lens usage along with amblyopia therapy with occlusion. Of these, three children, two with uniocular aphakia and one bilateral aphake (including two siblings) could be planned for secondary intraocular lens after four-six years of contact lens usage at 4-7 years of age. The intraocular lens (IOL) implanted in sulcus, on the fibrosed residual anterior capsule rim, resulted in improvement of visual acuity to $\geq 6/12$ (0.3 logMAR) in all three cases.

In the eleven children presenting after 3 years, vision improved to $\geq 6/12$ Snellen acuity (0.3 logMAR) in four (36.3%) and to 6/24 (0.6 logMAR) in three (27.2%) improving from 1/60. Remaining four children did not have significant improvement despite adequate amblyopia management which included occlusion and penalization in a stepped up manner. Around 36.3% children were lost to follow-up and remaining had a mean follow-up of 6.6 ± 7.9 months ranging from 2 months to 2 years.

Children with post traumatic cataract extraction

All post traumatic cases were children older than 3 years of age with mean age at surgery being 8.21 ± 3.11 years (range 3-15 years) and average duration of visual impairment being 12.8 ± 22.28 months. Visual acuity at presentation ranged from hand movements close to face (HMCF) to 2/60 (1.48logMAR) which improved to $\geq 6/12$ Snellen acuity (0.3 logMAR) in 9% (3/33) and 6/60-6/18 (1-0.47 logMAR) in 42.4% (14/33) including patients with corneal scarring (9), operated retinal detachment (1) and secondary glaucoma (1). No visual improvement occurred in 48.6% (16/33) children; with probable reasons being cataract surgery performed after 4 years (3 cases), macular edema (3 cases), inadequate lens fit (2), posterior capsular opacification, corneal grafting and traumatic aniridia in one child each. Four children refused contact lens wear and preferred spectacles. The drop-out rate was 51.5% (17/33); with the remaining having a mean follow-up of 6.05 ± 8.1 months (range 1 month – 2 years). Three children underwent successful secondary intraocular lens implantation within 6 months of primary surgery for managing the perforating injury.

The contact lenses prescribed were extended wear soft lenses in all except in three post-traumatic cases with corneal scarring which required RGP lenses.

Mean lens power prescribed was +18.96DS (≤ 3 years) and +14.96 DS (> 3 years) with mean base curves ranging from 8.3 to 8.4 and overall diameter of 13 and 13.5 mm. Rate of contact lens change per follow-up year was 0.74 and all school-going children (ranging from kindergarten to class 8th) were able to continue with their school education while wearing their lenses.

No untoward complications were noted with contact lens usage in any group except lack of compliance with follow up visits at 50% in congenital cataract group and 51.5% in post-traumatic group. Only one child discontinued lens wear due to persistent blepharitis. Six patients were implanted with secondary intraocular lenses (three each operated for congenital cataract and post traumatic cases) after a variable time of contact lens wear with good gain of post-operative visual acuity.

Discussion

Contact lenses (CL) for treatment of paediatric aphakia especially post congenital cataract cases has been in vogue since 1970s with upto 50% patients achieving visual acuity better than 6/60 (1.0 logMAR) [1-5]. Recent results of IATS (Infant Aphakia Treatment Study) have reported good compliance with contact lens wear in infants and concluded CL to be ideal substitutes for intraocular lens implantation in infants younger than 7 months [6,7]. Along with providing a clear visual axis, contact lenses eliminate inherent problems of intraocular lenses namely sizing, anticipation of post-operative refractive error including long term myopic shift. In this study, 85% children younger than 3 years operated for congenital cataract at mean age of 8 months and rehabilitated within 2.56 ± 2.67 months showed fixation to light; three of them being rehabilitated with secondary intraocular lenses later on with good gain of visual acuity ($> 6/12$). Among children older than 3 years rehabilitated within 21.36 ± 32.55 months (1month – 8years), 64% showed visual acuity improvement upto 0.6 logMAR. The poor visual gain in remaining four children (36%) despite adequate amblyopia management could be attributed to long duration of aphakia of 6-8 years and consequent esotropia. Overall 42% children with operated congenital cataract improved to ≥ 1.0 logMAR.

Among post-trauma aphakes, the mean age of presentation was 9.12 ± 3.12 years and visual gain was better than 6/60 in 51.5% with

mean age of surgery being 8.21 ± 3.11 years. The average duration of visual impairment was noted to be 12.8 ± 22.28 months. Prior studies have also noted that in injuries occurring after 6-7 years and in those rehabilitated within 6-8 months, visual gains were superior to those presenting at an early age or rehabilitated late [8,9]. In this study, no significant improvement in visual acuity was noted in children with complex trauma, macular involvement/edema and younger than 4 years age at injury.

About 16 of 17 patients (94.11%) with repaired corneal perforation could be successfully fitted with contact lenses, of which 3 required RGP lenses. Similar improvement has been reported in previous series detailing adult patients with corneal scarring [10,11]. Also operated vitreo-retinal surgery including buckling, secondary glaucoma and corneal scarring were not found to hinder contact lens fitting. Contact lenses have been found to be comparable to primary intraocular lens implantation in both post-traumatic as well as non-traumatic cataract patients older than 2 years age [5,12]. Contact lenses were well tolerated over long term wear after an initial resistance. Similar findings regarding adequate tolerance have been reported with Ma J et al. and Moore et al. [13,14]. Compliance with follow up visits was the major deterrent identified in our study with drop-out rate being high at 50% in congenital cataract group. Other than economic constraints, educational level and motivation of the primary care-giver (*i.e.* parents), along with understanding of the disease by them were noted to be the main reasons for long term compliance. Well motivated parents (especially mother) influence the level of care given to the child. In post-traumatic cases the drop-out rate was higher at 51.5%; with reasons other than those discussed previously being good functional vision in the unaffected eye. Problems with contact lens handling and wearing were not unsurmountable by those who maintained a regular follow-up, indicating high level of acceptance for the ongoing treatment.

Conclusion

Contact lenses as a form of aphakia rehabilitation have withstood the test of time. A high level of motivation for the primary care-giver and regularity with follow-up visits is a major determinant in its overall success.

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