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Global Practice Patterns in the Management of Infantile Cataracts

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Abstract

Objectives—Surveys are an important tool to assess the impact of research on physicians' approach to patient care. This survey was conducted to assess current practice patterns in the management of infantile cataracts in light of the findings of the Infant Aphakia Treatment Study.

Methods—Pediatric ophthalmologists were emailed a link to the survey via newsletters from AAPOS and WSPOS, and the Pediatric Listserv. The 17-question survey was anonymous and active during July–August 2016.

Results—125 respondents (North America, 65%; Asia, 12%; Europe, 9%; other, 14%) reported operating on pediatric cataracts. Most practice in a university setting (55%). There was a strong consensus that unilateral cataract surgery should be performed between ages 4–6 weeks and aphakic contact lenses should be used to optically correct their eyes, particularly in children < 6 months of age. For bilateral cataracts, there was a trend for surgeons to perform cataract surgery at an older age than unilateral cataract surgery. Surgeons who performed <5 vs. >20 pediatric cataract surgeries/year were more likely to utilize aphakic contact lenses in children undergoing cataract surgery >6 months of age (62% vs. 35%, $P=0.04$). Most respondents (73%) indicated that the Infant Aphakia Treatment Study had changed how they manage unilateral congenital cataracts.

Conclusion—Most pediatric cataract surgeons perform congenital cataract surgery between ages 4–6 weeks and use aphakic contact lenses for initial optical correction in infants less than six months. Surgeons have equal preference for intraocular lenses and contact lenses in infants more than 6 months of age.

Keywords

infantile cataracts; aphakic contact lens; survey

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INTRODUCTION

Randomized clinical trials are considered to be the most reliable means of evaluating new medical treatments. The National Institutes of Health spends billions of dollars each year to fund clinical trials. However, clinicians often resist changing their practice patterns even when there is strong evidence that one treatment works better than another. In some cases clinicians do not change because they are unaware of the results of clinical trials. In other cases, they may not believe that the results of these clinical trials are generalizable to their practices. Investigating how and why clinicians may or may not have changed their practices based on new evidence is important in translating clinical research to patient care. Despite certain inevitable biases and distribution challenges, surveys can be useful in evaluating the impact of clinical trials on clinical practice.

The treatment of unilateral congenital cataracts has evolved over the past 50 years. Initially, it was believed that it was nearly impossible to achieve a good visual outcome in an eye with unilateral congenital cataract.¹ However, beginning in the 1970s case reports of good visual outcomes in children with unilateral congenital cataracts began to appear in the medical literature when cataract surgery was performed during infancy and coupled with contact lens correction and part-time patching of the fellow eye.^{2,3} Over time, practitioners began to explore the possibility that visual results would even be better if an intraocular lens (IOL) was implanted at the time of cataract surgery. In 2001, a survey on infantile cataract management was sent to members of the American Association of Pediatric Ophthalmology and Strabismus (AAPOS) to ascertain their perceptions of optically correcting these eyes with an intraocular lens or an aphakic contact lens.⁴ Of the 269 participants who responded to the survey, 41 (15%) indicated a strong preference for aphakic contact lens correction after unilateral congenital cataract extraction in infants, and 11 (4%) indicated a strong preference for primary IOL implantation. However, the majority (77%) indicated no strong preference for either, which allowed them to be equipoised to randomize infants with a unilateral congenital cataract to these two different treatments.

In 2004, a multi-centered randomized clinical trial, the Infant Aphakia Treatment Study (IATS), was launched with funding from the National Institutes of Health to study whether primary IOL implantation or contact lens correction for aphakia resulted in better visual outcome after unilateral cataract extraction in infants 6 months of age or younger.⁵ The IATS showed no significant difference in median visual acuity at age 4.5 years.⁶ Adverse events, which included glaucoma, ocular hypertension, visual axis opacities and lens proliferation, occurred more frequently in the IOL group compared to the aphakic contact lens group (77% versus 26%, $P < 0.0001$) during the first postoperative year.⁷ On the basis of these findings it was recommended that a child undergoing unilateral congenital cataract surgery be left aphakic and optically corrected with a contact lens unless it was deemed likely that the child would not wear a contact lens.

Though the IATS was a large multi-center study that provided strong evidence that infants should be left aphakic and be optically corrected with a contact lens after congenital cataract surgery, ophthalmologists may still vary on how they manage visually significant pediatric cataracts depending on local practice patterns, available resources and services, the patient

population, and the cataract type and laterality. The purpose of this study was to survey current practices in managing pediatric cataracts around the world, especially in light of the outcomes reported from the IATS.

MATERIALS AND METHODS

This study was not human subjects research and therefore was deemed exempt from IRB review.

An anonymous survey with 17 multiple-choice questions regarding type of clinical practice, experience with infantile cataract surgery, timing of surgery, cost, and postoperative management of refractive errors depending on age at time of surgery was distributed (see appendix A for complete survey). Only the results of questions pertaining to the choice and utilization of an aphakic contact lens are discussed in this report. The survey was sent out as a link to members of AAPOS, World Society of Pediatric Ophthalmology and Strabismus (WSPOS), and the pediatric ophthalmology email listserv. The survey was active from July 30, 2016 to August 29, 2016. No compensation was provided to participants.

Statistical analysis was performed using chi-square analysis in Excel, and statistical significance was defined as p-value <0.05.

RESULTS

AAPOS has 1,522 members, with active, international, associate, affiliate, emeritus, honorary and candidate-in-training membership categories. WSPOS has 1945 members. The pediatric list serv has 1337 registered users. Given significant overlap between all three organizations, the exact number of ophthalmologists who received the survey is difficult to discern. A total of 142 participants responded to the survey. Of these, 125 indicated that they manage pediatric cataracts. Not every question was addressed by each respondent; hence, the denominator varied depending on the question. Of the 125 respondents, 65% (81/125) practice in North America, 12% (15/125) in Asia, 9% (11/125) in Europe, 6% (8/125) in Sub-Saharan Africa, 4% (5/125) in Middle East/North Africa, 2% (2/125) in South/Central America, and 2% (3/125) in other countries (Australia and New Zealand). Most (55%, 68/124) reported practicing in a university setting while others reported practicing in various private settings (30%, 37/124). The minority reported working in “other” settings (15%, 10/124). There was an even distribution of respondents with regard to surgical volume, when categorized by <5, 5–10, 11–20 and >20 surgeries per year (Table 1).

Our survey showed that the preferred age of most surgeons to perform cataract surgery on both unilateral and bilateral cataracts was age 4–6 weeks (Table 2 and 3). For unilateral cataracts, over 80% of surgeons indicated a preference to perform unilateral cataract surgery during the 4–6 week age range whereas for bilateral cataracts only about one-half selected this answer. Surgeons’ willingness to delay surgery for bilateral cataracts may arise from data showing that bilateral congenital cataracts are less amblyogenic than unilateral congenital cataracts.

When asked what type of refractive correction they preferred for children undergoing unilateral cataract surgery at 6 months of age, 83% (103/123) responded aphakic contact lens, 7% (9/123) aphakic spectacles, and 7% (9/123) primary IOL placement, and 2% (2/123) “other” (Table 4). There was no significant difference in preferred type of refractive correction for unilateral cataracts based on surgical volume (surgeons who operated on <5 cataracts/year versus those who operated on >20 cataracts/year).

For children older than 6 months of age, a similar proportion of respondents preferred aphakic contact lens (47%, 59/125) to primary IOL (42%, 53/125), with a few preferring aphakic spectacles (5%, 6/125) or “other” (6%, 7/125). There was a significant difference in type of refractive correction based on surgical volume, as surgeons who performed <5 cataracts/year indicated a stronger preference for aphakic contact lenses over IOL or aphakic spectacles than those who operated on >20 cataracts/year (62% vs. 35%, $P=0.04$). The preferred refractive correction was aphakic contact lenses for unilateral cataracts in North America for both patients younger or older than age 6 months. However, in other parts of the world, surgeons tended to prefer IOL implantation if patients were older than 6 months (Table 6).

For patients undergoing bilateral cataract surgery at 6 months of age, most preferred aphakic contact lens (65%, 81/124) or aphakic spectacles (29%, 36/124); only 4% (5/124) preferred primary IOL implantation (Table 5). For children older than 6 months of age undergoing bilateral surgery, primary IOL insertion was the preferred treatment of 39% (49/125) of surgeons. The percentage of respondents who preferred to leave patients aphakic and optically correct with contact lenses (33%, 41/125) or spectacles (18%, 23/125) was much lower for this age group than it was for children 6 months of age. Regional trends are shown in (Table 7).

More than one-half of respondents (59%, 71/120) estimated that aphakic contact lenses resulted in higher costs compared to IOL implantation (Table 8). Conversely, 16% (19/120) estimated that IOL implantation resulted in higher costs, and 25% (30/120) estimated that both options resulted in similar costs in their practice. Surgeons in North America tended to estimate that aphakic contact lenses results in highest costs.

Responses regarding the number of hours of patching recommended each day after unilateral cataract surgery in infants varied widely. The most popular response was approximately 50% of the day (35%, 44/125) followed by 4 hours (24.8%, 31/125), 0–2 hours (16.0%, 20/125), “other” (14%, 18/125) and 6 hours (10%, 12/120).

The majority of participants (73%, 91/124) responded that the results of the IATS had impacted their management of infantile cataracts.

DISCUSSION

Our survey suggests that the results from the IATS have impacted management of pediatric cataracts. Overall, there seems to be acceptance of primary IOL implantation in older infants worldwide, but avoidance of IOL implantation in younger infants, and most surgeons prefer to perform cataract surgery before 6 weeks of age.

Over the past 2 decades, a few other surveys have assessed trends in IOL implantation rates in infants. In a survey of AAPOS members in the United States and Canada conducted in 1997, 89% (224/252) of respondents reported managing at least one infant with a unilateral congenital cataract during the previous year.⁴ Ten percent (22/228) reported implanting an IOL in children 1 year of age, but with no distinction about exact age.⁴ In a second survey of AAPOS and American Society of Cataract and Refractive Surgery (ASCRS) members conducted in 2001, 21% of respondents reported having implanted an IOL in an infant in the previous year.⁴ In our survey 15 years later, we did not ask how many surgeons had implanted an IOL in an infant 1 year of age but asked about preferences, and only 7% of respondents indicated a preference for IOL implantation for infants 6 months of age with a unilateral cataract and 4% for infants 6 months of age with bilateral cataracts. Repka et al, in a registry conducted by the Pediatric Eye Disease Investigators Group (PEDIG, 2016), reported <1% (1/101 infants) of unilateral cataract patients had an IOL implanted when <3 months of age and only 2% (2/133 infants) <6 months of age.⁹ The reasons for variations in survey responses are most likely based on the construct of the questions as well as the surgeon groups surveyed. Regional differences may influence management, and we noted a preference for primary IOL implantation during infancy was overrepresented by surgeons practicing outside the US (Europe, n=3; Asia, n=2; Sub-Saharan Africa, n=1, North America, n=3) in comparison to their relative representation among all respondents. Notably, an international panel of surgeons with expertise in pediatric cataract surgery did not reach consensus using a modified Delphi process regarding the minimum age for unilateral or bilateral IOL implantation.¹⁰ It is also possible that the preference for aphakic contact lens correction remains in part due to the higher complication rate reported with IOL implantation during infancy in the IATS.⁷ These results could have also been extrapolated by respondents to infants aged 7 months and older, even though this group was not part of the IATS study and may not be at the same risk for complications.¹¹

Our survey showed that 4–6 weeks was the preferred age to perform cataract surgery on unilateral cataracts for >80% of surgeons, which corresponds to the younger age group in the IATS which had better visual outcomes. About 50% of surgeons indicated a preference to perform cataract surgery during the 4–6 week age range for bilateral cataracts, suggesting some willingness to delay surgery for bilateral cases since previous experience has shown that less severe deprivational amblyopia results when cataracts are bilateral compared to unilateral.

About 60% of the respondents estimated that aphakic contact lenses results in higher costs compared to IOL implantation and one quarter of respondents estimated that costs were similar for the two treatment options. The IATS performed detailed cost analysis of services and supplies for children who underwent unilateral cataract surgery and found that IOL implantation was actually about 5% more expensive than treatment with aphakic contact lenses after 5 years.¹² However, respondents may have been focusing on the cost for parents since most third party payers will not cover the costs of contact lenses. However, they may not have also been considering the additional costs arising from reoperations in children after primary IOL implantation. Since direct costs to a family may vary widely in different regions and countries, extrapolations from IATS data may be inconsistent among respondents.

Limitations to this survey include the use of responses generated by commonly reported standards, rather than open-ended responses, which introduces suggestion bias into the grouped answer categories. In asking a question with multiple choice answers, assumptions may have been made by the surveyor. For example, the assumption was made in our survey that those children who had relative contraindications to undergoing IOL implantation (ie. microcornea, severe persistent fetal vasculature, other retinal disorders) would be left aphakic just as they were excluded in the IATS.¹³ Another limitation is the relatively low number of respondents despite efforts to widely distribute the survey through electronic newsletters and listservs. Previous AAPOS surveys on this topic distributed by mail in 1997 and 2001 had a 40% response rate.⁴ Given the considerable overlap between the memberships of AAPOS, WSPOS and the pediatric email list serv, it is unknown how many practitioners received the survey. Since the survey was anonymous, we cannot exclude the possibility that some respondents completed the survey more than once, but we deem this unlikely given that no compensation was provided for completing the survey. The low number of respondents may also reflect a tendency for pediatric ophthalmologists to refer children with cataracts to other providers for treatment, hence making this survey irrelevant to them. Another limitation was that certain geographical regions were underrepresented, especially in developing countries, despite our efforts to collect responses internationally. Developing countries may, for example, have limited access to resources or environmental conditions that might limit the feasibility of contact lens wear, which potentially could alter surgeons' approach to pediatric cataracts. Another limitation is that some participants skipped questions. Our assumption is that these questions were not applicable to their practice. Finally, in any study involving a survey, there may be a selection bias inherent in the population who decides to respond, and an unintentional bias toward what is perceived to be a standard answer. Strengths of our study include the diverse clinical and international backgrounds of the respondents, and the survey was constructed to evaluate responses by infant age (e.g. 6months of age vs. 6–12 months of age), whereas earlier surveys often did not make this division.

Our survey suggests that aphakic contact lenses continue to be the preferred optical treatment for infants following cataract surgery. This was particularly true in North American and Europe. In developing countries, IOLs and aphakic spectacles are more frequently utilized likely due to limited access to aphakic contact lenses and related services.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1

Number of responses indicating number of cataract surgeries performed on infants per year

Answer Choices	Responses (%)	Responses (N) (Total=124)
<5	21.0%	26
5-10	25.0%	31
11-20	26.6%	33
>20	27.4%	34

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Table 2

Number of responses indicating preferred age at surgery for unilateral cataracts

Answer Choices	Reponses, %	Responses, N (Total=124)
Before 4 weeks of age	3.3%	4
4–6 weeks of age	81.8%	99
7–10 weeks of age	12.4%	15
> 10 weeks of age	2.5%	3

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Table 3

Number of responses indicating preferred age at surgery for bilateral cataracts

Answer Choices	Reponses, %	Responses, N (Total=125)
Before 4 weeks of age	0.8%	1
4–6 weeks of age	57.6%	72
7–10 weeks of age	36.0%	45
> 10 weeks of age	5.6%	7

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Table 4

Number of responses indicating preferred type of refractive correction for children undergoing unilateral cataract surgery 6 months of age and older than 6 months of age

Answer choices	Responses, % (N) for 6 months of age (total N=123)	Responses, % (N) for >6months of age (total N=125)
Aphakic contact lens	83.7% (103)	47.2% (59)
Intraocular lens implant	7.3% (9)	42.4% (53)
Aphakic spectacles	7.3% (9)	4.8% (6)
Other	1.6% (2)	5.6% (7)

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Table 5

Regional trends for refractive correction for unilateral cataracts, % (proportion of respondents in each region)

	Age 6months				Age>6 months			
	aphakic CL	aphakic spectacles	IOL		aphakic CL	aphakic spectacles	IOL	other
Asia	64.3% (9/14)	28.6% (4/14)	7.1% (1/14)		20.0% (3/15)	20.0% (3/15)	60% (9/15)	0
Australia	0	0	100% (1/1)		0	0	100% (1/1)	0
Europe	66.7% (6/9)	0	33.3% (3/9)		54.5% (6/11)	9.1% (1/11)	36.4% (4/11)	0
Middle East/North Africa	40% (2/5)	60% (3/5)	0		20% (1/5)	0	80% (4/5)	0
New Zealand	100% (2/2)	0	0		50% (1/2)	0	50% (1/2)	0
North America	95.0% (76/80)	1.3% (1/80)	3.8% (3/80)		54.3% (44/81)	1.2% (1/81)	37.0% (30/81)	7.4% (6/81)
South/Central America	100% (2/2)	0	0		0	0	1/2	1/2
Subsaharan Africa	62.5% (5/8)	25.0% (2/8)	12.5% (1/8)		37.5% (3/8)	25.0% (2/8)	37.5% (3/8)	0

Table 6

Number of responses indicating preferred type of refractive correction for children undergoing bilateral cataract surgery 6 months of age and older than 6 months of age

Answer choices	Responses, % (N) for 6 months of age (total N=124)	Responses, % (N) for >6months of age (total N=125)
Aphakic contact lens	65.3% (81)	32.8% (41)
Intraocular lens implant	4.0% (5)	39.2% (49)
Aphakic spectacles	29.0% (36)	18.4% (23)
Other	1.6% (2)	9.6% (12)

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Table 7

Regional trends for refractive correction for bilateral cataracts, % (proportion of respondents in each region)

	Age 6months					Age>6 months						
	aphakic CL	aphakic spectacles	IOL	Other	aphakic CL	aphakic spectacles	IOL	Other	aphakic CL	aphakic spectacles	IOL	other
Asia	26.7% (4/15)	73.3% (11/15)	0	0	6.7% (1/15)	33.3% (5/15)	46.7% (7/15)	0	6.7% (1/15)	33.3% (5/15)	46.7% (7/15)	13.3% (2/15)
Australia	0	0	100% (1/1)	0	0	0	100% (1/1)	0	0	0	100% (1/1)	0
Europe	72.7% (8/11)	9.1% (1/11)	18.2% (2/11)	0	36.4% (4/11)	9.1% (1/11)	54.5% (6/11)	0	36.4% (4/11)	9.1% (1/11)	54.5% (6/11)	0
Middle East/North Africa	20% (1/5)	60% (3/5)	20% (1/5)	0	20% (1/5)	20% (1/5)	60% (3/5)	0	20% (1/5)	20% (1/5)	60% (3/5)	0
New Zealand	100% (2/2)	0	0	0	50% (1/2)	0	50% (1/2)	0	50% (1/2)	0	50% (1/2)	0
North America	77.5% (62/80)	21.3% (17/80)	1.3% (1/80)	0	39.5% (32/81)	16.0% (13/81)	33.3% (27/81)	0	39.5% (32/81)	16.0% (13/81)	33.3% (27/81)	11.1% (9/81)
South/Central America	50% (1/2)	50% (1/2)	0	0	50% (1/2)	50% (1/2)	0	0	50% (1/2)	50% (1/2)	0	0
Subsaharan Africa	25% (2/8)	50% (4/8)	12.5% (1/8)	12.5% (1/8)	0	42.9% (3/7)	57.1% (4/7)	12.5% (1/8)	0	42.9% (3/7)	57.1% (4/7)	0

Table 8

Number of responses indicating highest estimated costs

Answer choices	Responses, %	Responses, N (Total=120)
Aphakic contact lens (include replacement of lost lenses, updated prescriptions, optometry visit for contact lens training and follow up)	59.2%	71
Intraocular lens implantation (includes subsequent procedures ie. Capsulotomy, lens exchange)	15.8%	19
Both aphakic contact lens and intraocular lens implantation result in similar costs in their practice	25.0%	30

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