



Review

## Updates on managements of pediatric cataract

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### Abstract

**Purpose:** A comprehensive review in congenital cataract management can guide general ophthalmologists in managing such a difficult situation which remains a significant cause of preventable childhood blindness. This review will focus on surgical management, postoperative complications, and intraocular lens (IOL)-related controversies.

**Methods:** Electrical records of PubMed, Medline, Google Scholar, and Web of Science from January 1980 to August 2017 were explored using a combination of keywords: "Congenital", "Pediatric", "Childhood", "Cataract", "Lens opacity", "Management", "Surgery", "Complication", "Visual rehabilitation", and "Lensectomy". A total number of 109 articles were selected for the review process.

**Results:** This review article suggests that lens opacity obscuring the red reflex in preverbal children and visual acuity of less than 20/40 is an absolute indication for lens aspiration. For significant lens opacity that leads to a considerable risk of amblyopia, cataract surgery is recommended at 6 weeks of age for unilateral cataract and between 6 and 8 weeks of age for bilateral cases. The recommended approach in operation is lens aspiration via vitrector and posterior capsulotomy and anterior vitrectomy in children younger than six years, and IOL implantation could be considered in patients older than one year. Most articles suggested hydrophobic foldable acrylic posterior chamber intraocular lens (PCIOL) for pediatrics because of lower postoperative inflammation. Regarding the continuous ocular growth and biometric changes in pediatric patients, under correction of IOL power based on the child's age is an acceptable approach. Considering the effects of early and late postoperative complications on the visual outcome, timely detection, and management are of a pivotal importance. In the end, the main parts of post-operation visual rehabilitation are a refractive correction, treatment of concomitant amblyopia, and bifocal correction for children in school age.

**Conclusions:** The management of congenital cataracts stands to challenge for most surgeons because of visual development and ocular growth. Children undergoing cataract surgery must be followed lifelong for proper management of early and late postoperative complications. IOL implantation for infants less than 1 year is not recommended, and IOL insertion for children older than 2 years with sufficient capsular support is advised.

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**Keywords:** Pediatric cataract; Lensectomy; Intraocular lens

### Introduction

Any lens opacification present at birth or early childhood is defined as congenital cataract. Despite being rare with an estimated prevalence of 4·24 per 10 000,<sup>1</sup> congenital cataract has a significant impact on inflicted patients regarding the low age of its target population and subsequent deprivation amblyopia. It is known as a cause of treatable blindness in children around the world;<sup>2</sup> however, the referred visual

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defects is not merely because of untreated cataract. It can also be due to complications of surgery or other associated structural anomalies.<sup>3</sup>

The etiologies of congenital cataract are of vast variety. Nearly 50% of congenital cataracts are caused by mutations in protein-coding genes that are responsible for lens structure.<sup>3</sup> In many cases, the etiology remains unknown. A thorough evaluation of the child's general health condition and consultation with pediatrician may be necessary to rule out systemic associations and syndromes. Maternal infection is also one of the important causes of pediatric cataract. Many experts recommend genetic counseling in the assessment of hereditary cataract.<sup>4</sup>

There is also the acquired type of cataract in children. Trauma and the possibility of child abuse in case of no known history should be always considered, especially in the presence of other ocular or extraocular signs. Older children with systemic or eye diseases can also present with cataract. The association between posterior subcapsular cataracts (PSCs) and conditions such as exogenous or excessive endogenous corticosteroids and ocular diseases like uveitis is well established in pediatric patients.<sup>5–7</sup> Apart from specific indications and considerations, the general surgical management of such cases are similar to congenital cataracts.<sup>8</sup>

It should not be ignored that cataract is treatable, and its complications can be prevented if dealt with timely. There was a dramatic improvement in the visual prognosis of affected children since the effectiveness of cataract surgery in infancy was first described.<sup>9</sup> Most children with cataract need surgery, and only few can be treated conservatively. Some of them may be managed by close observation and treatment of accompanied amblyopia.<sup>4</sup>

To find the appropriate time and type of therapy, a complete eye exam, including evaluation of the morphology of cataract, is required. It should be noted that an infant is partly resistant to amblyopia in his/her first weeks of life, as vision is mediated subcortically in this period. Thus, early surgical intervention can be associated with good visual prognosis.<sup>4</sup> The current paper reviews the last updates on surgical management and postoperative care of pediatric cataracts with a primary focus on congenital cataract.

## Methods

The PubMed, Medline, Web of Science, and Google Scholar databases were searched (from January 1980 to August 2017) using the keywords “Congenital”, “Pediatric”, “Childhood”, “Cataract”, “Lens opacity”, “Management”, “Surgery”, “Complication”, “Visual rehabilitation”, and “Lensectomy” without language restrictions. Reference lists of relevant studies were explored for additional resources. After appraising the search results and article abstracts, proper papers with available full text were added to Endnote library and checked for duplication. Eligible studies were selected based on reviewing the full article text, and a comprehensive literature review was conducted on a total of 109 articles and books.

## Results

### Indications of surgery

In preverbal children, dense cataracts with blocking the red reflex with dilated pupils, strabismus with unilateral cataract or nystagmus accompanied by bilateral cataracts are considered to be absolute indications of cataract surgery. If the cataract is incomplete, does not involve visual axis, and we can view the fundus clearly with an ophthalmoscope, surgery might be deferred.<sup>3</sup>

Children with bilateral cataracts who have best corrected visual acuity of 20/40 or better should not undergo cataract surgery. In case of post sub-capsular cataract or the child having difficulties in school, cataract surgery may be done in spite of the vision of 20/40 or better. However, if visual acuity is worse than 20/40, but the child is doing well in school and does not have any visional problems, the surgery can be deferred.<sup>10</sup> Unlike bilateral cataracts, visual behavior in children with a unilateral cataract is less helpful in assessing the need for cataract surgery. If amblyopia therapy can not be successful to improve best corrected visual acuity to 20/50 or better, cataract surgery should be considered.<sup>3</sup>

Consult with parents: Cataract surgery improves the visual acuity, but it leads to loss of accommodation by removing the crystalline lens. Parents should be aware that their child will have to wear bifocal glasses to optimize distance and near vision after undergoing cataract surgery.<sup>3</sup>

The optimal time for cataract surgery in a child with a congenital cataract is still equivocal.<sup>9</sup> The timing of lens aspiration is critical in congenital cataracts to prevent deprivation amblyopia. Birch and colleagues have established that visual development to achieve the best visual outcomes occurs in children having lensectomy before six weeks of age for unilateral cataracts.<sup>11</sup>

If the surgery is performed after four weeks, the prevalence of strabismus and nystagmus will be more than the surgery before four weeks, whereas surgery during the first four weeks has the risk of secondary membrane formation and glaucoma. Early surgery for bilateral cataracts may minimize the deprivation amblyopia.<sup>12</sup>

Several case series have reported that cataract surgery during the first four weeks of life provokes a higher incidence of aphakic glaucoma, so they recommend that surgery should be deferred until patients are at least 28 days of age.<sup>13,14</sup> Also, the final visual outcome is equal between performing cataract surgery at 4 weeks old and when delaying it until infants reach six weeks of age.<sup>13</sup>

Lambert and colleagues evaluated the long-term visual outcomes for children with dense bilateral congenital cataracts. They found that delaying cataract surgery to 10 weeks of age or later increased the chance of poor visual outcome (20/100 or worse),<sup>15</sup> but good postoperative visual acuity was achieved in most healthy children with dense bilateral congenital cataract when surgery was performed before 6–8 weeks of age.<sup>16</sup> Therefore, it is believed that the optimal age for cataract surgery in a child with a unilateral congenital

cataract is between four and six weeks of age, and bilateral cases should be extracted by eight weeks of age to achieve the best visual outcomes and to prevent the development of deprivation amblyopia, strabismus, and nystagmus.<sup>4,17</sup>

When the opacified lens is extracted, it is vital to correct the refractive error with an intraocular lens (IOL), contact lens, or eyeglasses.<sup>10</sup>

### *Surgical considerations in congenital cataract*

#### *Preoperative workup*

Although most pediatric cataracts are idiopathic,<sup>18</sup> based on the prenatal history, family history, and the type of cataract, a baseline laboratory workup is helpful and recommended. In unilateral cataracts, extensive laboratory investigations are not usually indicated because most of them are isolated, nonhereditary, and without any systemic and genetic abnormality.<sup>18,19</sup> Laboratory studies include TORCH titers and Venereal Disease Research Laboratory (VDRL) test, CBC, BUN, urine analysis for reducing substances and amino acids, red cell galactokinase, calcium, and phosphorus. Dysmorphic appearance may suggest the need for involvement of a geneticist.<sup>4,20</sup>

If the cataract(s) significantly affect the visual system, surgical intervention is the only option because visual development depends on frequent visual stimulation in childhood.<sup>21</sup> The best time and methods of surgery that should be used for treating congenital cataract are controversial and challenging for pediatric cataract surgeons around the world.

#### a. Anterior capsule management

The lens capsule in pediatrics differs from the adult lens capsule which has more elasticity and makes it harder to control the direction, shape, and size of manual rhexis; therefore, it became essential to develop appropriate and reliable techniques for anterior capsulotomy in children.<sup>22–24</sup>

Many techniques have been designed to cut the anterior capsule in pediatric cataract surgery. Care should be taken for anterior capsulectomy to decrease the incidence of radial tears, postoperative complications, and cost and to be easily performed because many studies show that a decrease in surgery complication and expense lead to improving access to appropriate care, management, and follow-up for children with cataract.<sup>25,26</sup>

In cataract surgery, after the corneal incision has been made, the next step is to open the anterior lens capsule. Continuous-tear curvilinear capsulorhexis (CCC) is the technique for anterior capsular opening, which allows a broader range of safer cataract surgery techniques. This technique is the preferred method in adult eyes, but it is difficult in pediatric patients due to the elasticity of the pediatric anterior capsule. If the surgeon can control and complete the CCC, it creates an edge and decreases the incidence of radial tears.<sup>22,27</sup> The use of trypan blue to stain the capsule for more visibility has been shown to reduce the capsular elasticity and make it more stiff and less elastic<sup>28</sup> which lead to less radial tear.

Vitrectorhexis is an anterior lens capsule opening method in which low aspiration and high cut rate are employed to construct an anterior capsular opening. A mechanized circular anterior capsulectomy has been proven to be an excellent, safe alternative if the CCC is not possible, and it is the technique of choice. If an IOL is not being implanted, vitrectorhexis is appropriate for use in children under the age of six years, but it increases anterior capsule tear.<sup>14,27,29,30</sup>

Using radio-frequency diathermy for capsulotomy was introduced in 1984.<sup>31</sup> Some studies described its use in pediatric cataract surgery for both the anterior and posterior capsule and reported no complications.<sup>32,33</sup> The problem with this method is that when we are doing capsulotomy by radio-frequency, it leaves some small tags behind, and the rhexis edge is not as sharp as a manual tear.<sup>34–36</sup>

Foldable Template Intraocular Ring is another anterior capsulorhexis technique that is used for accurate size capsulorhexis. In this technique, first, place a ring barrier to prevent the rhexis from getting larger or running out. Then the rhexis is started centrally. After the rhexis is completed, the ring is removed.<sup>37,38</sup>

Four incision capsulorhexis is another safe and effective method consisting of 4 concentric arcuate openings in the anterior capsule with the distance of intended capsulotomy (usually 5 mm) between two opposite incisions. Afterwards, edges of each cut are brought together through forceps. This technique has been proved to be beneficial, especially in case of a hyper mature cataract.<sup>39</sup>

Femtosecond laser is a new anterior and posterior capsulotomy method which offers many advantages in cataract surgery, including accurate and consistent capsulotomy<sup>40,41</sup> and a decrease in corneal endothelial damage<sup>42,43</sup> and post-operation complications.<sup>44,45</sup> By this technique, the surgeon can make precise cuts in lens capsule without damaging the surrounding tissues.<sup>46</sup> Some studies report that the surgical outcomes improved significantly with greater surgeon experience, and the complications of this technique highly depend on surgeon conversancy and adjustment to the surgical procedure and previous experience with a femtosecond laser improve the learning curve.<sup>47,48</sup>

As discussed earlier, fashioning a CCC in the pediatric group can be extremely challenging regarding anterior elastic capsule and intraoperative complications such as a peripheral extension of capsulorhexis, which occurs in a higher incidence even in the hands of experienced surgeons. Therefore, the surgeon must be familiar with management techniques for different, unexpected conditions.<sup>49</sup>

#### b. Lens aspiration and anterior vitrectomy

By innovation and spreading automated, mechanical lensectomy/vitrectomy technique, which was designed to prevent secondary visual axis opacification by removing the maximum extent of the lens capsule, lensectomy has evolved in recent years.<sup>50</sup>

Lens aspiration in children can be approached through the pars plana or the limbus.<sup>51</sup> If the surgeon has the desire to insert IOL after lens aspiration, the limbal approach has the

benefit of preserving the posterior capsule to simplify posterior chamber intraocular lens (PCIOL) implantation. Some ophthalmic surgeons prefer lens aspiration through pars plana when no IOL insertion is purposed. Regarding soft nucleus of children, vitrector suffices in removing lens material. An effort is made to remove the whole cataractous lens and the anterior part of vitreous with a vitreous cutter for preserving enough anatomy for future secondary IOL insertion and preventing late opacification as a secondary aim.<sup>52–56</sup>

Current evidence supports performing of a posterior capsulotomy followed by anterior vitrectomy to avoid future opacification of visual axis especially in children younger than six years old.<sup>17</sup> Different techniques can be used to perform posterior capsulotomy including capsulorhexis similar to anterior capsulotomy, vitrectorhexis, and radio-frequency endodiathermy.<sup>57</sup> Posterior opening of the capsule is usually fashioned in a size smaller than anterior capsulorhexis, allowing IOL optic capture with a lower incidence of opacification.<sup>58,59</sup>

Unlike adult cataract surgery, lens aspiration without instant IOL implantation is usual in infants, and most surgeons prefer not to implant IOL in this age group.<sup>60</sup> Hypermetropic refractive error as a result of aphakia following a lensectomy in infancy requires contact lens correction or thick spectacle lenses to prevent amblyopia, especially in unilateral cataract.<sup>61,62</sup>

Some studies reported that visual outcome following primary IOL implantation in unilateral cataracts appear to be better compared with aphakia and contact lens correction, but this technique needs more secondary interventions than aphakic patients.<sup>63</sup>

### c. Aphakia versus intraocular lens insertion

Following the surgery, it is essential to correct aphakia as soon as possible. One option is to implant an IOL. The infant's lens is more spherical than in adults, so the IOL which gives normal vision to an infant will lead to significant myopia when he or she is older. It could be more complicated by changes in the power of the cornea and axial lengthening of the globe. Because of these rapid changes during the first few years of life, it is almost impossible to predict the correct power of lens for any infant.<sup>30</sup>

It is acceptable and safe to implant an IOL in children as young as one year, but in a patient that is younger than one year, there is great controversy, and it needs further research. Early results of Infant Aphakia Treatment Study (IATS) in this subject show good visual outcome.<sup>64</sup>

In many infants, primary IOL implantation is not done. Visual rehabilitation is done by contact lens or spectacle correction. Secondary IOL implantation is done later.<sup>65</sup>

It is controversial to implant an IOL at the time of cataract surgery in infants, versus to leave the child aphakic with a secondary procedure for IOL implantation later in childhood.<sup>66</sup>

According to some studies, there is not a significant difference in the mean visual acuity of operated eyes at five years

of age<sup>67</sup> among those who underwent primary IOL implantation and those left aphakics to secondary IOL implantation. On the other hand, studies reported that there were significantly more adverse events and additional intraoperative procedures, one year postoperatively, in the IOL group<sup>66–68</sup> and increased the odds of re-operation requiring repeat general anesthesia.<sup>69</sup> Although Tadros and coworkers suggest that either a primary IOL or a secondary IOL may be used in patients with unilateral infantile cataract, during five or more years of follow-up, additional surgeries and complications were found in both groups. Many factors such as patient characteristics, surgeon experience, and available resources will determine the optimum treatment for each specific case.<sup>70</sup>

Mohamed et al. reported that primary IOL implantation in children <2 years is a safe surgical procedure with excellent long-term results compared with aphakia and secondary IOL implantation after the age of 2 years. The myopic shift is well-controlled, and final visual acuity achieved is reasonably good, and it leads to lower incidence of complications such as glaucoma, uveitis, membrane formation, synechia, and secondary interventions. However, care must be taken in children <6 month-old because the incidence of adverse events is high.<sup>64,71,72</sup> Although some investigators believe that IOLs could be implanted at an even younger age less than six months in unilateral cataract with no contraindications such as microphthalmia or structural abnormality,<sup>73</sup> Lambert et al. and Plager et al. recommended to leave the eye aphakic with fitting a contact lens for an infant with a unilateral cataract <7 months of age.<sup>67,68</sup> Primary IOL implantation should be used for those infants where the cost and handling of a contact lens will be burdensome so as to result in significant periods of uncorrected aphakia.<sup>68</sup> In a long-term follow-up, following simultaneous removal of bilateral congenital cataract, similar visual outcome and complications were observed among primary and secondary IOL implantation.<sup>74</sup>

On the other hand, Solebo and colleagues demonstrated primary IOL implantation is associated with better visual outcome in bilateral [odds ratio (OR) 4.6, 95% confidence interval (CI) 1.6 to 13.1,  $P = 0.004$ ] but not unilateral congenital cataract probably due to preexisting amblyopia.<sup>69</sup>

### d. Intraocular lens types in congenital cataract surgery

Two kinds of IOL have been used: polymethyl methacrylate (PMMA) and acrylic hydrophobic IOL. Acrylic hydrophobic IOLs have unique benefits in children due to increased biocompatibility.<sup>75</sup>

66.8% members of the American Society of Cataract and Refractive Surgeons (ASCRS) and 71.7% the American Association for Pediatric Ophthalmology and Strabismus (AAPOS) in a 2001 survey said they preferred hydrophobic acrylic IOL for implantation in children.<sup>76</sup>

Rashid and colleagues in a study from 2006 to 2011 on children 2–16 years old showed that foldable acrylic hydrophobic IOL was well tolerated in children, and there is less chance of postoperative inflammation and posterior capsular opacification in this kind of IOL.<sup>77</sup>

In a study of 57 eyes in 40 patients in the years 2002–2007, Kleinmann and colleagues applied hydrophilic acrylic IOLs in all operations and concluded that hydrophilic acrylic IOLs appear to be preferred for use in pediatric cataract surgery.<sup>78</sup>

In a study on 61 infants and children who underwent cataract surgery and primary IOL replacement, ROW and colleagues showed that foldable soft acrylic IOLs cause less postoperative complications than rigid PMMA IOLs.<sup>79</sup> Also in another study in 2003 on 30 patients 1–16 years with cataract extraction and replacement of PMMA, and hydrophobic acrylic PCIOL, Kuchle et al. showed that hydrophobic foldable acrylic PCIOL in children had fewer postoperative complications such as posterior synechiae and fibrin formation in comparison with PMMA IOL.<sup>80</sup>

Two types of PMMA and foldable acrylic lens are widely used throughout the world for cataract surgery in children. IOL diameter of 12–13 mm with an optic size of 5.5–6 mm is suitable. Foldable IOL is better over rigid IOL. Among the variety of foldable IOL, hydrophobic acrylic IOL was better suited for children.<sup>81</sup>

### Intraocular lens power

Measuring keratometry and axial length in pediatric eyes is more challenging in comparison to adults, and it may need examination under anesthesia.

#### a. Method of intraocular lens power calculation

The method of IOL power calculation is essential. There are two different methods: ultrasound biometry, which includes immersion techniques and applanation techniques, and optical biometry [based on partial coherence interferometry (PCI)], which provides for IOL master and Lenstar method. PCI is not a good choice for young children because it needs cooperation.<sup>82</sup> Some studies show that immersion techniques are more accurate than applanation techniques in these groups of patients.<sup>82,83</sup> In another study, PCI compared with immersion ultrasonography in children, they found that PCI gives lower values of axial length, especially when the axial length is longer than 23 mm. Therefore, an error in dioptric power calculation will occur.<sup>84</sup> In a study of 565 children, considering central corneal thickness and anterior chamber depth, Lenstar method was

statistically similar to A-scan ultrasonography, but not regarding axial length and lens thickness.<sup>85</sup> Laser interferometry was not a suitable method in IOL power calculation among children in a study of 27 eyes before and after cataract extraction.<sup>86</sup>

#### b. The degree of under correction

Determining IOL power in congenital cataract surgery is an important issue due to increasing axial length and the refractive power of pediatric eyes after cataract surgery and also an additive effect of IOL implantation on eye growth.<sup>87</sup>

Pediatrics eyes in comparison to adults eye have shorter axial length, steeper corneas with higher keratometry values, and smaller anterior chamber depth<sup>88</sup> myopic shift will occur with increasing age. Therefore, there are recommendations for under correction of IOL power and hyperopic outcomes so the patient will be postoperatively hypermetropic which will shift to emmetropic during adulthood to reduce the necessity of IOL exchange.<sup>87</sup> As a result, there should be an under correction of about 20% in infants and 10% in toddlers.<sup>89</sup> However, this may make the child prone to amblyopia and make them need corrective glasses or contact lens with a periodical change in powers.

Table 1 shows the recommended postoperative target refraction in different age groups based on different studies.

In a survey of visual outcomes of PCIOL implantation in the first year of life, six diopters under correction were applied.<sup>93</sup> Awner et al. and Buckley et al. recommend postoperative refraction of +4.00 diopters for children under two years and two diopters for 4–6 years of age.<sup>94,95</sup> Hutchinson et al. suggested one diopter under correction for children between 3 and 9 years old.<sup>96</sup>

#### c. Intraocular lens power formula

There are different formulas and methods for calculating IOL power which is classified into two major categories: regression formulas such as SRKII formula and theoretical formulas such as Hoffer and Holladay and SRK/T formula.<sup>97</sup> In a study of 84 children, less than two years with IOL implantation SRKII was the most accurate formula when comparing absolute prediction error between them.<sup>88</sup> In another study, Deborah and his colleagues found that Holladay

Table 1  
Recommended postoperative refraction in different age groups.

Age at surgery (year)	Dahan 1997 <sup>89</sup> % of undercorrection	Trivedi and Wilson 2009 <sup>22</sup>	Enyedi 1998 <sup>90</sup>	Crouch 2002 <sup>91</sup>	Plager 2002 <sup>92</sup>
<1	20%				
1		+6	+6	+4.0 D	
2	10%	+5	+5	+3.5D	
3			+4	+2.5D	+5
4		+4	+3	+2.5D	+4
5		+3	+2	+2.0D	+3
6		+2	+1	+2.0D	+2.25
7		+1.5	Plano	+1.0D	+1.5
8		+1		+1.0D	+1
10	Plano	plano		plano	+0.5 (+ 0.5%)

1 and SRK/T formulae have the most predictive value in infants with unilateral congenital cataract.<sup>98</sup>

In some studies, there was no significant statically difference between 4 formulas including Hoffer Q, Holladay, SRKII, and SRK/T.<sup>99,100</sup> In a retrospective case series of 135 eyes, Bharti et al. found that Hoffer Q formula has better predictability although prediction error was similar for all equations.<sup>101</sup> Neely et al. stated that there was no difference between SRKII, SRK/T, and Holladay 1 formula in predicting IOL power in children, but in children under age of two years old, there was the highest degree of variability in postoperative refractive outcomes with Hoffer Q formula.<sup>100</sup> There was also new formula such as Holladay 2. Fenzl et al. found no more accuracy for Holladay 2 than Hoffer Q formula.<sup>102</sup> In another study, predicted implant power by Holladay I and Haigis formula was similar to each other, and the SRK/T was comparable to these both.<sup>103</sup>

In fact, we can use any IOL formula for determining IOL power in children, but we should expect more error than adults.<sup>97</sup> However, it seems that theoretical methods are overall more accurate in children with small eyes.<sup>104</sup>

### *Postoperative complications*

Even after successful congenital cataract surgery in children, various postoperative complications are reported. Diagnosis and timely treatment of these complications is a vital part of management. According to the time of manifestation, complications can divide into early and late groups.

#### *a. Early complications*

With careful selection of surgical techniques, we can reduce most of the early complication such as wound leakage, iris, and vitreous incarceration in the wound. Retinal hemorrhages can be seen in early postoperative period and may be related to low intraocular pressure at the end of the operation.<sup>22</sup>

IOL capture is a one of the early complications that can be the main reason for lack of visual improvement after cataract surgery. This complication can be reduced by carefully implanting IOL at surgery. IOL capture may cause pupil distortion and patient discomfort. Postoperative cystoid macular edema is not as prevalent in children as it is in adults, but it is one of the possible mechanisms of visual impairment postoperatively.<sup>67</sup>

The most important complication of any intraocular surgery in children is postoperative uveitis or severe fibrinous reaction. The pathophysiology of this complication can be explained by the fact that children usually demonstrate harsh and vigorous inflammatory response during the healing process. In the early postoperative period, meticulous examination of the anterior chamber and vitreous cavity leads to prompt diagnosis of early stages of fibrin or membrane formation. Following the diagnosis of postoperative uveitis or

excessive inflammation and membrane creation, aggressive anti-inflammatory medication should be started, and re-operation might be considered.<sup>22</sup>

Postoperative endophthalmitis is the most hazardous and feared complication that can occur in early or late phases following intraocular surgery. Prompt diagnosis and treatment of this devastating complication can lead to better prognosis and visual outcome in these patients.<sup>22</sup>

#### *b. Late complications*

Secondary glaucoma is a common finding in children undergoing congenital cataract surgery. Both types of glaucoma may be seen: open angle and angle closure glaucoma. Mechanisms of secondary glaucoma can be attributed to postoperative inflammation or structural and anatomical destruction as a result of surgery.<sup>105</sup> The incidence of secondary glaucoma in aphakic patients, history of surgery within the first month of life, children with family history of aphakic glaucoma, persistent fetal vasculature syndrome, and nuclear cataract is higher than others. Because of irreversible damage to the optic nerve in glaucoma, early detection and treatment are very important to avoid permanent effects on visual function. Medication is usually the first line of treatment. However, the majority of cases of secondary glaucoma need glaucoma surgery ultimately. Due to the lifelong risk of glaucoma development after congenital cataract surgery, regular intraocular pressure measurement and ophthalmic examination are required.<sup>105</sup> One of the most common complications of congenital cataract surgery is visual axis opacification, and it should be considered seriously because of subsequent amblyopia. Implementing techniques such as posterior capsulorhexis and anterior vitrectomy can reduce the probability of posterior capsule opacification in children. Many surgeons made new modification in conventional surgical procedures to minimize this complication (such as IOL optic capture). When opacification has occurred, the ophthalmologist should consider Nd:YAG laser capsulotomy under general anesthesia or surgical membranectomy as soon as possible.<sup>58</sup>

Amblyopia and strabismus may be detected in pre- and post-operation, and the surgeon can improve final visual achievement with timely treatment of reversible causes in a critical period. Complete ophthalmic examination and occlusion therapy are crucial in reaching this goal.<sup>22</sup>

Lifelong risk of retinal detachment is increased in children after cataract surgery. This complication increases in myopic children and patients with history of multiple operations. Vitreous hemorrhage can also be seen in the postoperative visit, but this complication is rare.<sup>22</sup>

### *Post-operation care*

Topical corticosteroids are routinely used following childhood and adult cataract surgery to reduce postoperative inflammation. Oral and intracameral corticosteroids may be

dispensed to prevent IOL deposits and posterior synechiae. However, all forms of corticosteroids may cause growth retardation and adrenal suppression. Topical cycloplegics are usually prescribed for two weeks following uncomplicated pediatric cataract surgery.<sup>50</sup>

Topical antibiotics are also routinely used following cataract surgery although their role in the prevention of infectious endophthalmitis is uncertain.<sup>106</sup>

For reducing postoperative pain, topical anesthetics can be given at the end of the cataract surgery and so can a subtenon's block following induction of anesthesia to improve postoperative analgesia.<sup>17</sup>

Placing a contact lens at the end of the surgery allows the visual rehabilitation to begin immediately and minimizes the delay in getting the postoperative topical medications started.<sup>17</sup>

### Visual rehabilitation

Postoperative visual rehabilitation is a challenge in congenital cataract. It is essential to initiate optical restoration as soon as possible to reduce the incidence of amblyopia, strabismus, and poor fusion.<sup>17,107</sup>

The visual recovery includes IOL implantation, glasses, contact lenses, and epikeratophakia.<sup>107</sup> The worst way of optical correction is glasses.<sup>108</sup> Aphakic glasses are commonly used for bilateral aphakia in children.<sup>109</sup> Contact lenses are considered optically superior to spectacles,<sup>107</sup> but long-term use of contact lenses is not feasible.<sup>17</sup> A significant advantage of contact lenses in unilateral aphakia is the reduction in the disparity of the retinal image size. Other benefits of the contact lenses include increasing optical zones, decreasing glare and dazzle, an absence of ring scotomas, reduction in the incidence of nystagmus,<sup>107</sup> and easy adjustability with the changing refractive error.<sup>109</sup>

### Discussion

Congenital cataract as the leading cause of preventable blindness in children can be a critical condition requiring well-timed and proper surgical or optical management. With regards to evolving techniques of lens aspiration and anterior vitrectomy in recent years, this procedure along with primary or secondary IOL implantation regarding the age of the child has become the standard of care in the surgical management of visually significant congenital cataract.

Another delicate matter in pediatric cataract surgery is recognition of possible related complications which are often quite common in the postoperative period, although the risk of later consequent visual impairments is reduced by timely interventions.

The last but not the least consideration is optical rehabilitation and patch therapy in a pseudophakic or aphakic eye following lens aspiration with probable concomitant amblyopia as a result of previous deprivation state or inevitable complications of surgery itself.

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