

## The Specialised Orthoptic Role in Management of Contact Lens Use in Infants

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### ABSTRACT

Contact lenses are a standard method of correcting aphakia during infancy. Aphakia in infancy occurs secondary to congenital cataracts, PHPV, ectopia lentis and some penetrating eye injuries. Contact lenses may also be used to correct high anisometropic refractive errors in infants. A retrospective review was carried out on patients attending the Eye Clinic at The Children's Hospital at Westmead

who required contact lens correction over a seven year period from 2000 to 2007. This paper discusses specialised techniques related to the use of contact lenses in these infants and the orthoptists role in the management of patients with contact lenses.

**Keywords:** contact lens, infant, congenital cataract, aphakia, compliance

### INTRODUCTION

Contact lenses are a standard method of optically correcting bilateral and unilateral aphakia during infancy, until the time when patients may be suitable for an intraocular lens (IOL). Aphakia in infants occurs secondary to surgical intervention for congenital cataracts, PHPV, ectopia lentis and penetrating eye injuries resulting in traumatic cataracts or lens dislocation. Contact lenses can also be used in infants for high anisometropic refractive errors, however this form of treatment is less common.

Congenital cataract is one of the leading causes of form deprivation amblyopia in infants<sup>1</sup>. Early detection and intervention within the first three months of life is vital in achieving an adequate visual outcome. Immediate contact lens insertion following removal of the lens combined with intense occlusion of the better eye, or unaffected eye, is required to achieve the best visual outcome.

Following the removal of the lens from the eye to clear the visual axis, the ophthalmologist has three options for correction of aphakia. These are IOL implant, spectacles or contact lenses. In infants less than 2 years of age an IOL is not preferable due to change in growth of the eye and subsequent change in refraction<sup>2</sup>. This is the process of emmetropisation, or myopic shift, whereby eye growth or an increase in axial length results in a flattening of the cornea and loss of refractive power<sup>3</sup>. IOL implantation prior to 2 years of age therefore often requires additional

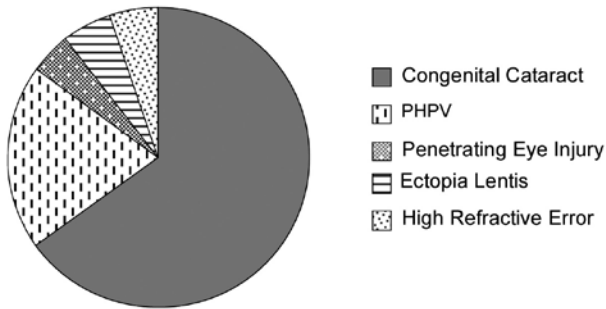
spectacle or contact lens correction. Spectacle correction of aphakia is impractical due to the difficulty in fitting frames to young children and the weight of the high powered lens. Due to this spectacles are poorly tolerated and can be costly and unc cosmetic. In unilateral cases spectacle correction also causes a significant amount of magnification induced aniseikonia which is difficult to overcome<sup>4</sup>. This aniseikonia causes a barrier to fusion and binocular vision and results in the development of amblyopia impacting on visual development. Given the limitations of spectacle use and IOL implant in infants, contact lenses are the preferred method of correction. This paper discusses specialised techniques related to the use of contact lenses in these infants and the orthoptists role in the management of patients with contact lenses. It also provides a review of the contact lens patient population at The Children's Hospital at Westmead (CHW).

### PATIENT REVIEW

The Eye Clinic at CHW specialises in the management of infantile cataracts. The medical records of patients who were being treated with soft extended wear contact lenses between the years of 2000 and 2007 in the Eye Clinic at The Children's Hospital at Westmead (CHW) were retrospectively reviewed.

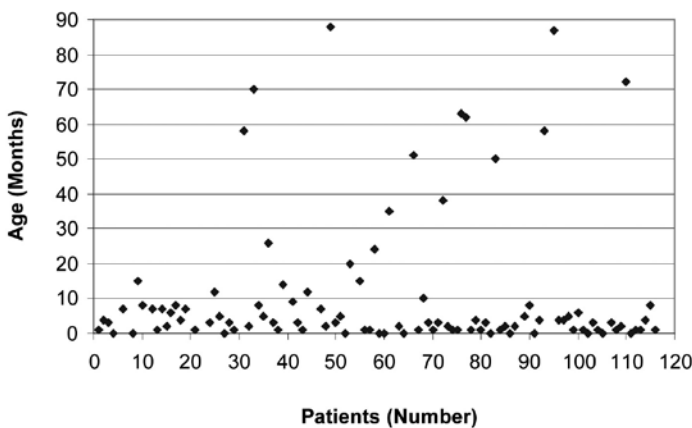
In total 116 patients were included in the review. Of these patients 66% (n=76) had a diagnosis of congenital cataracts, 20% (n=23) PHPV, 4% (n=5) had a penetrating eye injury causing aphakia, 5% (n=6) had ectopia lentis and 5% (n=6) high refractive errors (Fig 1).

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**Figure 1.** Graph illustrating the indication of contact use in patients at CHW Eye Clinic from 2000 - 2007

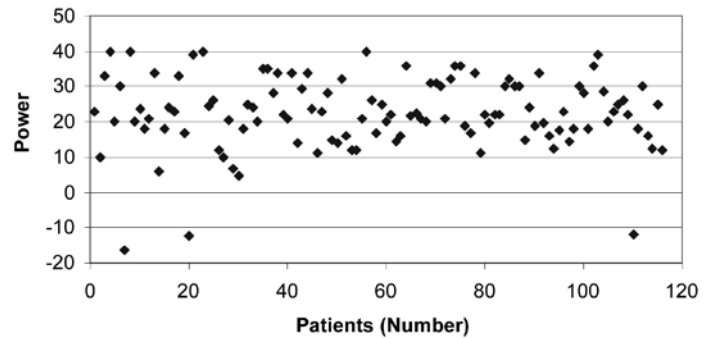
The age of patients at the time of the initial contact lens insertion ranged from 2 weeks to 7 years with the mean age being 11 months (SD ± 19.95). The mean age of the congenital cataract and PHPV patients was 2 months (Fig 2).



**Figure 2.** Graph illustrating the age of patients at the time of lensectomy and initial contact lens instruction at CHW Eye Clinic from 2000 - 2007

116 patients with aphakia and high anisometric refractive error were fitted with soft extended wear lenses. These lenses have a high water content allowing comfortable wear of the lens without removal over seven days. The power of the contact lens ranged from -16.50 to +40.00 diopters (Fig 3) with the mean power +17.5 (SD ± 7.78). The base curve measurement ranged from 7.2 to 8.4 millimetres with the mean 7.6 millimetres (SD ± 0.21) and lens diameter ranged from 10.0 to 14.0 millimetres with the mean diameter 13.8 millimetres (SD ± 0.35).

Schedule of wear was weekly, in which one night out of seven the lenses were removed and cleaned for a minimum of 6 hours, or overnight. Cleaning was performed with a hydrogen peroxide system and the lens was irrigated with saline solution prior to reinsertion at the cessation of



**Figure 3.** Graph illustrating the range in power of the contact lenses prescribed for patients at CHW Eye Clinic from 2000 - 2007.

cleaning. The hydrogen peroxide system of cleaning has been the preferred method at the Eye Clinic at CHW for the past 13 years with very little complication, and has been found to be very effective. The use of protein tablets are rarely required as the lenses are often lost, torn or changed for fit before protein build-up becomes problematic.

Of the 116 patients reviewed a total of 31 patients (26.7%) had an IOL implant. Age range at the time of IOL implant was 1 month to 7 years with the mean age being 2 years (SD ± 25.62). Reasons for unsuitability of an IOL included microphthalmos, anterior segment disorders, inflammation including iritis and uveitis, glaucoma and poor visual prognosis.

### THE ORTHOPTISTS' ROLE

At CHW the orthoptist has a vital role in the management and care of infants using contact lenses. The orthoptist is responsible for teaching parents\* techniques in insertion and removal of the contact lens as well as education in cleaning procedures, hygiene, and overall care of the contact lens. The orthoptist also provides an important support network for children and families with contact lenses and will often provide ongoing counselling and guidance, building a relationship, which continues throughout their care.

The CHW Eye Clinic provides a service to patients by ordering the lenses direct from the company on their behalf. It takes approximately one to two weeks to receive the lens. An intensive contact lens teaching session is provided and takes approximately two hours. Parents are taught the skill of insertion and removal of the contact lens, a very different skill to insertion in adults. During the intensive session parents are encouraged to insert and remove the lens under the supervision of the orthoptist. A significant amount of patience and practice is required.

Within the intensive contact lens teaching session the protocol to be followed at home is explained and demonstrated. The protocol is as follows. The infant is

placed on an examination table and wrapped in a sheet or blanket to provide comfort and secure the arms and hands. Two adults are needed, initially one being the instructing orthoptist and the other the parent. The parent is positioned at the top of the head with hands holding the head straight and still. They are responsible for ensuring the upper lid is held open, usually with an index finger. The orthoptist picks up the lens in the fan position (Fig 4) pinching one end of the lens gently, being careful not to cause a crease or fold in the lens. With their free hand they hold the infant's head and use their index finger to hold the lower lid down. The lens is then placed on the eye aiming to push the lens up under the top lid. It is flattened onto the eye and the lids are gently released (Fig 5). Once the lens is inserted, the lids are opened and the lens position is assessed. This method models the appropriate insertion technique which will be practised by both parents in the home.



**Figure 4.** A contact lens held in the fan position



**Figure 5.** Insertion of a contact lens by the parent with the help of the orthoptist

Fit of the lens is assessed by the orthoptist and ophthalmologist, and if acceptable the patient wears the lens for seven days. The parent is encouraged to attempt to

remove, clean and insert the lens at home, and is followed up in the Eye Clinic the following week. If the patient and parent face difficulties with carrying out the removal or insertion they are to return to the clinic to receive hands on help from the orthoptist. This allows difficulties to be addressed and resolved. They are then usually reviewed monthly until three monthly visits are more appropriate. More frequent visits are arranged if necessary.

To assist families a fact sheet was developed by the Orthoptic Department at CHW. All new contact lens patients receive the document during the teaching session. This enables written instruction and provides additional information that parents find useful such as hints and tips from other parents. The orthoptists contact details are also provided on this fact sheet to offer parents with further support if needed once the patient has returned home. After hours care is usually provided by the on call ophthalmology registrar through the CHW Accident and Emergency Department. Patients who live outside the metropolitan area and remote country areas are usually co-managed by a local eye care provider.

## POSSIBLE COMPLICATIONS

The use of contact lenses in infants is not always without complication. Patients will often suffer irritation associated with dry eyes. In this instance they may benefit from the use of lubricants. Occasionally a patient will be intolerant to a contact lens once it is inserted. Possible complications if this occurs include infective keratitis, corneal irritation and inflammation and hypoxic ulceration. Watery or purulent discharge and redness is not uncommon. Parents should be informed to remove the lens if this is to occur – 'if in doubt, take it out.'

When lens aspiration and removal is performed in the first few weeks of life there is a risk of developing secondary glaucoma<sup>5</sup>. This impacts on visual outcome, as well as contact lens management of patients because of a change in the size and shape of the eye with the increase in intraocular pressure. In these patients regular refractive changes are observed and changes in power, base curve and diameter of the contact lens are needed. Interestingly, in our experience an IOL implant significantly reduces the risk of secondary glaucoma.

## COMPLIANCE

There are many factors that contribute to compliance in contact lens wear. These include age of the patient, anatomical difficulties such as microphthalmia, eyelid abnormalities, small palpebral fissure, systemic associations such as Down's Syndrome and other issues of growth and development such as developmental delay.

Co-operation from parents also determines the success of compliance. In our experience, factors such as multiple

children, being a sole parent, postnatal depression or difficulties accepting the diagnosis of the child are some reasons seen for poor compliance. Two people are required for insertion and removal of the contact lens, a stressful and difficult task. Self confidence and motivation of the parents are contributing factors, along with parental disability and impairments, such as a vision impairment.

Loss of a contact lens is not uncommon and contact lenses are frequently rubbed out or dislodged by patients. Due to the rapid eye growth and changes in refraction during infancy frequent lens replacement is needed, especially within the first two years of life. These factors can result in a costly experience for families and financial pressure has a negative impact on compliance.

Although initially difficult, children and families will tolerate contact lenses well with time. Significant decrease in stress and anxiety experienced by patients and parents to inserting and removing the contact lens can be observed within the first 6 months of treatment<sup>6</sup>. Compared with other aspects of management for aphakia in infants, contact lens use is not a major stressor for most caregivers and patients<sup>7</sup>.

## AMBLYOPIA MANAGEMENT

Paediatric cataract is responsible for a high proportion of childhood blindness<sup>8</sup>. Prognosis for a good visual outcome is poorer in unilateral cases than bilateral cases<sup>9,10,11</sup>. Up to one-third of infants with unilateral congenital cataracts remain legally blind even after surgical and optical treatment<sup>12</sup>. This is due to the development of dense stimulus deprivation amblyopia which can be very difficult to treat successfully due to compliance issues.

Amblyopia treatment is compulsory in the management of unilateral aphakia following correction with a contact lens. It may also be needed in bilateral cases if there is a detectable difference in visual acuity. At CHW an intense patching regime is commenced in unilateral cases at the contact lens teaching session for half waking hours initially, and then the patching regime is tailored to the individual patient needs. The unaffected eye is occluded by an eye patch, generally an adhesive patch to the skin around the eye (Fig 6). Strong objection to occlusion can be expected by the patient. It is a very stressful time for both the patient and the parent. Patching treatment is continued long term in these cases with a variance in compliance throughout different ages.

Most paediatric patients with cataracts who discontinue contact lens treatment do so because of problems related to the treatment of amblyopia, not problems related to the fitting and wearing of the contact lens<sup>13,14</sup>. Lens use is discontinued as the lens is not perceived to be improving the vision of the patient. Generally patching treatment has failed in these cases because of poor patient/parent



**Figure 6.** Occlusion treatment with an adhesive patch

compliance. Compliance with occlusion is the factor that is most strongly associated with visual outcome in unilateral and bilateral cases<sup>15,16</sup>.

## CONCLUSION

Aphakia secondary to congenital cataract has the highest incidence in contact lens use in infants. Early detection and treatment to prevent stimulus deprivation amblyopia is vital. Soft extended wear contact lenses are a safe and effective method of treating aphakia and less commonly high anisometric refractive error. They are generally well tolerated and despite initial difficulty, most parents insert and remove lenses successfully with time. The orthoptist has an important role with contact lens patients and will be responsible for educating parents on care of a contact lenses, teaching insertion and removal techniques, as well as orthoptic assessments including vision and amblyopia management at review visits.

\* For the purpose of this paper the term parent is used to describe the parent, care giver or adult responsible for care and insertion of the patients' lens.

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