

Common eye problems among children

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ABSTRACT

The following article discusses four common paediatric ophthalmology presentations to primary care. A simple approach to assessment of children with these presentations is described.

THE INFANT WITH DELAYED VISUAL BEHAVIOUR

Normal visual development

Children are born with quite poor levels of vision, as assessed by both electrophysiological and functional tests. These methods are not as reliable as measuring visual acuity in an adult with a Snellen letter chart, but they indicate that the visual acuity in a newborn infant approximates to around the 2/60 level. An infant's vision develops rapidly so that by 6 months post-term their visual acuity approximates to 6/12. Their colour vision, contrast sensitivity and ability to focus for near (accommodation) are also poorly developed at birth and improve rapidly.

Parents expect their children to achieve the visual functional milestones of fixing on their face by about 6 weeks and following their face or other large object by about 8 weeks, and will usually present to a doctor if these milestones are not achieved at the normal time.

Assessing infants with possible delayed visual behaviour

Use an ophthalmoscope or pen-torch to examine the corneal light reflexes, the small pin-point light reflections that normally sit just nasally to the centre of the pupil with the child looking towards the light source. If the light reflexes on each cornea are not symmetrical there may be a squint. Are the eyes oscillating? If nystagmus can be observed this can be caused by either sensory problems (e.g. retinal dystrophies) or motor problems (e.g. brainstem lesions).

The black numbered lenses on the ophthalmoscope can be used to examine the eye in more detail close-up. Try putting up + 6 or 7 (black) which bring the eye into focus from about 15 cm (N.B. in North American ophthalmoscopes, sometimes sold in the UK, the positive lenses are red not black). Then examine the red reflexes with the ophthalmoscope back on 0, unless you need to correct for not having your own glasses on. If you are short-sighted (myopic) you will need to go through the red lenses (on a UK standard ophthalmoscope) to examine the red reflex from a distance, if you are long-sighted (hypermetropic/hyperopic) then you will need to go through the black lenses.

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If you are not sure of the characteristics of the red reflex in an infant then the pupils can be safely dilated with cyclopentolate 0.5% if under age 1 year and use 1% over age 1 year. There is no risk of inducing acute glaucoma in children. Warn the parents that the drops sting, babies are only distressed by this for up to a minute.

The ability to fix and follow a brightly coloured target is most easily assessed with both the baby's eyes open; to make sure that the target has no auditory cues. Now cover each eye with your or a parent's hand held just off the face, if the child objects to each eye being covered equally then there is at least moderate vision in each eye. An older infant may happily let you occlude each eye and then fix and follow a target with each in turn. Quantitative assessment is carried out by an orthoptist, who are trained in assessing children's vision and measuring squints, using Cardiff cards or the more discriminatory Kay pictures depending on the infant's development.

Important causes of delayed visual development

Congenital cataract may be missed at the post-natal check and present later in infancy, usually with an abnormal retinal reflex on photography, delayed visual behaviour, or a squint. If there is a dull red reflex or white reflex (leucocoria) on examination then the infant should be seen within the week by an ophthalmologist to exclude an intraocular tumour (e.g. retinoblastoma). Cataract surgery is often best performed as soon as possible to avoid amblyopia.

Optic nerve hypoplasia is a condition can be unilateral or bilateral, and if bilateral can be asymmetric. The optic nerve is of a variable size (sometimes near-normal) on ophthalmoscopy and this condition is associated with a wide variety of vision outcomes. Optic nerve hypoplasia may be associated with mid-line intracranial abnormalities and children should have neuro-imaging and a paediatric endocrinology opinion

Retinal dystrophies can present early in life and are usually associated with poor vision and nystagmus. Examination with the ophthalmoscope may be normal in the early stages. Purely ocular albinism in infants presents with nystagmus and variable visual impairment, the iris can appear normal with an ophthalmoscope; the retina is normally of a paler-than-average colour.

Cerebral visual impairment is the term used for visual problems due to congenital or acquired neurological disease. Although often associated with hypoxic ischaemic encephalopathy, cerebral visual

impairment can be due to damage to the primary visual pathway (retina to occipital cortex) or secondary visual areas of the cerebral cortex before, during, or after birth. It is often an element in more global developmental delay. Children may have problems with visual acuity, the field of vision, or with recognition of objects, particularly in crowded visual environments.

Delayed visual maturation is a diagnosis reserved for visual impairment where there is a slow improvement to either normal visual function or to a reduced level of vision in the presence of cerebral visual impairment or ocular disease. In the absence of other visual pathway disease three-quarters of children have a significant improvement in visual function by 6 months. No cause for the delay is found in the majority of cases although sometimes it is associated with more global developmental delay and all children should be referred for a paediatric developmental assessment.

THE CHILD WITH A WATERING AND/OR STICKY EYE

Most cases of Conjunctivitis of the Newborn (formerly known as Ophthalmia neonatorum) are due to Gram-positive bacteria, but in the first 2 weeks after birth severe complications can result from conjunctivitis secondary to *Neisseria gonorrhoeae* or Chlamydia. All neonates with conjunctivitis should be seen by an ophthalmologist within 24 hours. The first step in making the diagnosis of conjunctivitis is to find evidence of inflammation. Are there signs such as eyelid swelling and/ or erythema or conjunctival swelling and/ or injection (= dilated blood vessels)? If so, then a swab should be taken and in addition to cultures, a Gram stain should be requested; a broad-spectrum topical antibiotic such as chloramphenicol or fusidic acid should then be started.

Stickiness of the eye does not differentiate infective conjunctivitis from congenital nasolacrimal duct stenosis. If there are none of the above inflammatory signs then infection is unlikely and the parents should be encouraged to keep the eyelids clean and discouraged from using topical antibiotics. They should be warned that the watering (epiphora) and stickiness can wax and wane, especially worsening with upper respiratory tract infections. Congenital nasolacrimal duct stenosis will resolve in 95% of children in the first year of life. After this time, if the situation is static, then they can be referred to an ophthalmologist, who can operate under general anaesthetic. Parents should be counselled that the problem can still resolve spontaneously after the first year of life and if the

problem is slowly improving, a referral should be deferred.

Although rare, Infantile-onset glaucoma should be suspected in cases of watering with photophobia where there are no eyelid signs or stickiness. In children, raised intraocular pressure causes an enlargement of the cornea (buphthalmos) although this may only be apparent in asymmetric cases.

In a toddler or older child sub-acute and chronic conjunctivitis in children is normally due to either blepharitis (eyelid inflammation) or allergic eye disease. Allergic eye disease can often be a year-round problem in children although there may be a worsening in the hay-fever season. In both conditions there may be minimal inflammatory signs and symptoms can also be variable. Photophobia may be obvious or the parents may just notice excessive blinking.

There may be an indication that blepharitis is contributory such as a history of recurrent cysts (chalazia) or signs of visible flakes on the eyelashes or erythema at the base of the lashes. If the child has a history of atopy or is complaining of itching then allergic (vernal) disease may be the cause.

If the child is in worsening discomfort over a period of days or they are unable to open the eyelids in one or both eyes then this indicates probable corneal disease in addition to conjunctivitis (keratoconjunctivitis). This may have permanent effects on the vision of the child and they should be seen within 48 hours by an ophthalmologist.

Usually the best treatment on first presentation is topical antibiotic in cases where the child is suspected of having an acute bacterial conjunctivitis. If there are allergic signs or symptoms then anti-allergy drops can be started. An ophthalmologist may use steroid drops in moderate-severe keratoconjunctivitis but steroid drops should never be initiated by non-ophthalmologists. Long-term oral erythromycin may be used to control blepharitis.

THE CHILD WHO APPEARS TO SQUINT

Check the red reflex on all children presenting with a suspected squint. If a squint appears to be due to an ocular problem then the child should be seen within the week by an ophthalmologist.

An intermittent turn of the eye (squint) is a normal phenomenon in the first 6 months of life. Until 12 months of age infants can appear to have an eye that turns in (convergent) due to a wide nasal bridge. Use

an ophthalmoscope or pen-torch to examine the corneal light reflexes, the small pin-point light reflections that normally sit just nasally to the centre of the pupil with the child looking towards the light source. Jangling keys make an impromptu target that often works well. If the light reflexes sit in a different position on each pupil (with the child looking towards you) then there may be a squint and the child should be referred routinely, unless there is a problem with the red reflex or the visual behaviour of the child.

A squint that may be amenable to early treatment most often presents between the age of 1 and 3 years. A squint either in (convergent) or out (divergent) can start as an intermittent phenomenon and in these early stages the prescription of appropriate glasses can prevent the squint becoming permanent. Surgery also has a better chance of restoring the normal alignment of the eyes if it is performed as soon as possible after the squint's onset. A large squint may be obvious but a small squint may only be seen with a cover test. Choose an interesting target such as a toy or picture that you can ask questions about to maintain visual fixation. Cover each eye with either your hand or a plastic occluder, a squinting eye will move to take up fixation on the target.

Children under age 6 years with a probable squint should always have cyclopentolate drops instilled before being examined for glasses. Children who develop a convergent squint after age 1 year are usually long-sighted. The amount of long-sightedness may be underestimated if drops are not used and parents should be encouraged to attend an optometrist that uses cyclopentolate drops. Depending on how quickly hospital eye services can be accessed an outside optometrist may be the most rapid way to get a child a pair of spectacles that could fully correct the squint.

Amblyopia (lazy eye) is reduced vision in the absence of structural ocular or neurological disease. A squinting eye or eye that is blurred from not having an appropriate spectacle prescription may develop amblyopia. Visual development stops after age 7 and therefore it is important that amblyopia is treated before this time. Patching treatment is undertaken over the good eye for a number of hours per day, often this takes up to a year to have its full effect. There is a lifetime risk of visual impairment in the good eye of 1:50 in boys and 1:100 in girls and this should be emphasised to parents.

THE CHILD WITH A LUMP AROUND THE EYE

Acute peri-ocular skin erythema and swelling should be assumed to be due to orbital cellulitis until proven otherwise. Orbital cellulitis is a vision-threatening and occasionally life-threatening illness. Affected children should be admitted to hospital for intravenous antibiotics unless the erythema is localised to a small area around a skin break or is very mild, in which case oral antibiotics can be started and daily review commenced. If there is sufficient eyelid swelling to preclude a view of the eyeball or the child is pyrexial then the child should definitely be admitted.

Eyelid swelling with minimal erythema that develops over less than half-an-hour in both eyes simultaneously is more often due to an acute allergic reaction and oral antihistamine should be given in the first instance.

Rhabdomyosarcoma is the most common malignant orbital tumour of childhood and presents with a non-inflammatory mass effect that progresses rapidly over a couple of weeks. Any child with rapid progression of proptosis or eyelid swelling and erythema should be seen by an ophthalmologist within the week. If there are inflammatory signs in addition then the diagnosis is orbital cellulitis and the child should be referred immediately.

Chalazia are discrete, round lumps that develop over weeks in the eyelid, with or without erythema, that are usually due to a blockage in one of the lipid glands of the eyelids. Parents should be encouraged to heat the lesion and massage it to try and express the built-up lipid through the gland orifice at the base of the eyelashes. Although secondary cellulitis can occur, chalazia are not normally an infective phenomenon. Erythromycin oral solution can be used long-term to prevent further chalazia occurring but this is through altering the bacterial profile of the glands and thereby the physical characteristics of the lipid produced. Chronic conjunctivitis in a child with a history of chalazia should prompt a referral to an ophthalmologist to exclude secondary corneal problems.

Haemangiomas are hamartomatous malformations that develop most quickly over the first 3 months after birth, but can maintain growth up to around one year of age. Most spontaneously regress thereafter with 75% disappearing before age 7 years. The more superficial haemangiomas are sometimes termed "strawberry naevi"; deeper lesions may penetrate into the posterior orbit. Children with peri-ocular haemangiomas are at risk of amblyopia

from induced astigmatism or ptosis. Rarely, more extensive haemangiomas can compress the optic nerve or cause proptosis and corneal exposure. Treatment to shrink vision-threatening lesions is with systemic propranolol or an intra-lesional steroid injection.

Dermoid cysts are cystic choristomas that usually located over cranial sutures, particularly over the zygomaticofrontal suture. They may extend through bone intra-cranially and computed tomography imaging is indicated unless the cyst is mobile and can be palpated all around. Excision is best performed between the ages of 3 and 5 years, depending on when the child can tolerate imaging. These cysts rarely have serious sequelae.

CONCLUSION

There are a small number of common presentations of paediatric eye problems to primary care practitioners. Sometimes these presentations can be potentially very serious and the child may have to be referred that week or more rarely, that day. Through taking a directed history and examining the child with an ophthalmoscope most serious causes can be differentiated and better communication with the ophthalmology team can allow appropriate timeliness of referral.

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