Lecture

Paediatric optometric practice
To refer or not to refer

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Key Learning Objectives:

1. A revision of techniques used in paediatric optometric practice
2. To identify conditions that require referral
Introduction

In the last decade there have been enormous and exiting advances in the understanding of visual development in children which have been matched by the development of new clinical tests. There has also been an increase in interest from optometrists wishing to develop their skills to enable them to provide optimum care for this most precious section of our community, children.

The aims of this lecture are to refresh your knowledge of the techniques available for examining babies and children and to review various clinical categories that may require referral.

Clinical measurement of vision and visual acuity

Numerous clinical tests of children's visual acuity are available, which vary greatly in complexity. A selection of some of the more commonly used tests are listed and categorised into the age groups with which they are used (Table 1).

<table>
<thead>
<tr>
<th>Infants of less than 18/12</th>
<th>Children of 18/12 to three years</th>
<th>Children of three years to five years old</th>
<th>Children of five years and older</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Response to occluding one eye</td>
<td>• Visual acuity cards</td>
<td>• Kay picture test</td>
<td>• Sheridan-Gardiner test</td>
</tr>
<tr>
<td>• Forced preferential looking</td>
<td>• Cardiff test</td>
<td>• Sheridan-Gardiner test</td>
<td>• Sonksen-Silver acuity system</td>
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<tr>
<td>• Visual acuity cards</td>
<td>• Kay picture test</td>
<td>• Cambridge acuity system</td>
<td>• Cambridge crowding cards</td>
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<tr>
<td>• Stycar graded-balls</td>
<td>• Sheridan-Gardiner test</td>
<td>• Glasgow acuity cards</td>
<td>• matching letters to the Snellen chart</td>
</tr>
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<td>• Cardiff test</td>
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<td></td>
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<td>• Sonksen-Silver acuity system</td>
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<td>• Glasgow acuity cards</td>
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<td>• matching letters to the Snellen chart</td>
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<td></td>
<td></td>
<td></td>
<td>• Snellen or LogMAR</td>
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<td>• Maclure near test</td>
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</tbody>
</table>

Table 1. Summary of visual acuity tests used for different age groups

Figure 1. Preferential looking using Keeler Acuity Card

Table 2. Provides a summary of the various optometric procedures employed in examining the paediatric patient.
Table 2. A guide to examination procedures for different age groups of children in primary care optometric practice

<table>
<thead>
<tr>
<th>Vision</th>
<th>Infants &lt;18 months</th>
<th>18 months to 3 years</th>
<th>3 to 5 years</th>
<th>&gt;5 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vision</td>
<td>Preferential looking (forced choice or Visual Acuity Cards); Bock candy beads; Stycar graded-balls test, Cardiff Test; response to occlusion</td>
<td>Visual Acuity Cards; Bock candy beads; Kay Pictures; Cardiff; Sheridan-Gardiner; Sonksen-Silver</td>
<td>Kay Pictures; Cardiff; Sheridan-Gardiner; Cambridge Crowding; Sonksen-Silver; Glasgow Acuity Cards</td>
<td>Sheridan-Gardiner, Cambridge, Crowding, Sonksen-Silver; Glasgow Acuity Cards; Snellen</td>
</tr>
<tr>
<td>External exam (inc. S/L)</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Pupillary reflexes</td>
<td>Attempt</td>
<td>Attempt</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Ophthalmoscopy</td>
<td>Binocular: Fixation on face, squeaky toy, pen torch</td>
<td>Binocular: pen torch, toy</td>
<td>Binocular (&amp; monocular): pen torch</td>
<td>Binocular (&amp; monocular): pen torch. Hess or Lees screen</td>
</tr>
<tr>
<td>Ocular motility</td>
<td>Hirschberg/Krimsky/Bruckner; near cover test</td>
<td>Hirschberg/Krimsky/Bruckner; near cover test, distance cover test sometimes possible</td>
<td>Distance and near cover test</td>
<td>Distance and near cover test, Maddox rod and wing. Fixation disparity (Mallet)</td>
</tr>
<tr>
<td>Eye position/ oculomotor balance</td>
<td>Gross convergence (light or toy); 5-10Δ base out by six months</td>
<td>Convergence (fine picture on fixation stick or toy); 10Δ base out</td>
<td>Convergence (fine picture on fixation stick or toy); &gt; 10Δ base out</td>
<td>Convergence (including subjective response)</td>
</tr>
<tr>
<td>Fusion</td>
<td>Lang</td>
<td>Lang, Titmus fly/animals, TNO butterfly</td>
<td>Lang, Titmus fly/animals, TNO butterfly</td>
<td>Lang, Titmus fly/animals, TNO butterfly</td>
</tr>
<tr>
<td>Stereopsis</td>
<td>-</td>
<td>Kinetic outline perimetry at as young as 2½ years</td>
<td>Kinetic outline perimetry</td>
<td>Adult tests</td>
</tr>
<tr>
<td>Visual fields</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Colour vision</td>
<td>Retinoscopy (cycloplegic, Mohindra)</td>
<td>Retinoscopy (cycloplegia, Mohindra)</td>
<td>Distance fixation retinoscopy, cycloplegia</td>
<td>Retinoscopy; attempt subjective</td>
</tr>
<tr>
<td>Refraction</td>
<td>Objective (retinoscopy)</td>
<td>Objective; Picture recognition</td>
<td>Objective; Picture recognition; &quot;push up subjective&quot;</td>
<td>Objective; Picture recognition; &quot;push up subjective&quot;</td>
</tr>
<tr>
<td>Accommodation</td>
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</table>
General comments

1) Symptoms and history is required at all ages.
2) Cycloplegic refraction is not always imperative. For indications for cycloplegia see chapter 7, Barnard & Edgar (1996)
3) Mydriasis using a cycloplegic drug is necessary for binocular indirect ophthalmoscopy.

To refer or not to refer?

Thankfully, paediatric ocular disease rarely presents for the first time in primary care optometric practice.

Optometrists should generally refer

- any patient exhibiting ocular disease that has not previously investigated
- or which the optometrist suspects has altered since a previous ophthalmological examination
- reduced visual acuities that cannot be explained or the cause of which will not be treated by the optometrist

Reduced visual acuity

Difficulties can arise in determining what constitutes a reduced visual acuity in a child particularly when using non-letter tests.

The management of refractive and strabismic amblyopia falls within the scope of optometric practice. Orthoptics forms part of optometric training.

Guidelines

- Consider referring any child with an unexplained difference of more than one Snellen line or equivalent between eyes
- Refer any child with unexplained visual acuity in both eyes of < 6/12
- Refer any child with refractive or strabismic amblyopia who you do not wish to actively manage. Referral may be to an optometric colleague specialising in paediatrics or for ophthalmological review.

Strabismus

- Refer infantile esotropia (usually > 45°)
- Refer previously unreported incomitant strabismus including Duane’s, Brown’s
- Refer any child over two years with recent onset esotropia particularly if not accommodative
- Refer any new unexpected exotropia
Signs of neurological disease

- **Progressive deterioration of visual acuity** can be the earliest sign of a range of neurological diseases including brain tumours and degenerative diseases of the brain. Young children adapt quickly to reduced vision and their behaviour may remain apparently normal even when severe visual loss is present. Refer.

- **Visual field defects** also may not become apparent until the loss is quite severe. Constricted visual fields may result from optic nerve damage in hydrocephalus. Homonymous defects may be found in some children with cerebral palsy. Refer.

- **Delayed visual development** may occur in an otherwise normal baby. Concerned parents report that the baby does not appear to “see”. ERG, VEP and EEG excludes major organic disease and diagnosis is made when the baby develops normal vision a few months later. Refer.

- **Optic atrophy**. May be referred to optometrist following failure at school vision check due to reduced VAs. May be an inherited disorder, or as a result of neonatal anoxia, trauma, inflammation, compression by a tumour or secondary to papilloedema. Refer.

- **Papilloedema and papillitis** (see page 8)

- **Anomalies of pupillary reflexes**

Refer relative afferent pupillary defect (RAPD), sluggish or abolished pupil reflexes.

Note that 10%-20% of population exhibit observable physiological anisocoria. The difference in pupil size is constant in all light levels. This does not need referral but a letter to the GP stating your findings is useful as it may be helpful for other clinicians to be aware that this has been noted.

Congenital Horner’s syndrome may include heterochromic irides. Parents usually confirm their awareness of the condition and referral is not normally indicated.

**Trauma**

- **Periorbital bruising.**
  - Lift upper lid to check eyeball.
  - Check vision if possible as well as ophthalmoscopy, pupil reflexes and ocular motility.
  - If all normal no need to refer.
  - Review in one week.
- **Lid laceration.**
  - Refer to casualty.

- **Subconjunctival haemorrhage.**
  - Was the cause non-accidental? (see ocular signs of child abuse on page 8).
  - Do not refer unless this has occurred before.
  - Resolves spontaneously.

- **Corneal abrasions and foreign bodies**
  - Use fluorescein to investigate.
  - Rule out positive Seidel’s sign, which indicates penetrating injury.
  - Remove epithelial foreign body.
  - The management of superficial epithelial abrasions is with antibiotic ointment, cycloplegia and analgesic.
  - Note that aspirin must not be used for children under 12 years (particularly with concurrent virus infection). The mother will state what she usually gives the child.
  - Refer any lesion deeper than epithelium for ophthalmological assessment.

**Eye lids**

- **Staphylococcal blepharitis**
- **Stye**
- **Chalazion**

  Refer…?

**The red eye**

- **Cellulitis**
  - Pre-septal cellulitis. This is an acute inflammation of the superficial tissues anterior to the orbital septum. The lid appears swollen and hyperaemic but ocular motility is full and pupillary reflexes are normal. Refer to GP.
  - Orbital cellulitis. This is an infection deep to the orbital septum and can be life-threatening. There may be proptosis, reduced vision, limited ocular motility, swollen conjunctiva and a high temperature. Emergency referral.

- **Viral conjunctivitis**
- Bilateral hyperaemia and lacrimation.
- No treatment.
- Self-limiting.
- EKC is very contagious.

- **Bacterial conjunctivitis**
  - Sticky purulent or muco-purulent discharge.
  - Topical antibiotic required.

- **Allergic eye disease**
  - With children this should be managed in conjunction with the GP as the patient may have other atopic anomalies. Vernal keratoconjunctivitis should be managed by an ophthalmologist.

**Chorio-retinal conditions**

Any acquired should be referred. There are a number of congenital anomalies that normally do not require referral. Examples of these include:

- **Coloboma.** Inform GP.

- **Optic nerve pit.** Inform GP. Note that there is a increased risk of central serous retinal detachment.

- **Myelinated nerve fibres.** Inform GP.

**Diabetic retinal disease**

Most children have Type 1 diabetes mellitus (IDDM). The peak ages of onset for IDDM are between six years and puberty, with prevalence increasing with age from one case in 1500 at five years of age, to about one case in 350 at 16 years of age. The prevalence of diabetic retinopathy increases with duration of the disease and retinopathy is rare in childhood.

As with adult diabetic patients, the fundi of diabetic children should normally be examined annually by slit lamp microscopy. Referral criteria are the same as for adults.
Raised optic nerve heads

Slit lamp microscopy should be used when possible to aid differential diagnosis between:

- **pseudo-papilloedema** which is quite common amongst hypermetropic children. No haemorrhages. Normal visual fields. No suspicious symptoms. No referral necessary.

- **“choked disc”** which may be caused by a passive swelling of the optic nerve head (**papilloedema**) or by an active inflammation (**papillitis**). Urgent referral should be instigated.

Caution… early “choked disc” may not yet have developed haemorrhages!

- **drusen** are not accompanied by hyperaemia of the neural rim. They can be difficult to detect and if in doubt refer for second opinion to confirm your tentative diagnosis.

Ocular signs of child abuse

- Up to 40% of cases of physically abused children exhibit ocular complications.
- 6% of reported child abuse cases were detected by eye-care practitioners.
- Refer any suspected cases of abuse.
- Do not accuse the parents.

Psychosomatic visual anomalies

- These may take the form of many visual problems.
- Unexplained amblyopia is the most commonly encountered problem seen with children.
- Refer any child with poor vision to rule out organic disease
- Remember that a psychosomatic problem may be a cry for help and be caused by underlying problems such as abuse or problems that require professional counselling.

Final note

The author’s opinions must be seen as guidelines. Individual practitioners must refer any patient of whom they are unsure and must satisfy themselves that they are at all times complying with the law.

Acknowledgements

These notes are based on revisions to various chapters of *Paediatric Eye Care* edited by Simon Barnard & David Edgar (1996), Blackwell Science, Oxford.