

Amblyopia in older children

Maya Hindocha and **M Ashwin Reddy** discuss the management of amblyopia against the background of new research suggesting benefits of intervention in older patients.
Module C16385, one general CET point for optometrists and dispensing opticians

From our experience at the Royal London Hospital and Moorfields Eye Hospital, older children with amblyopia are often not being treated or offered appropriate treatment. Several cases have involved inappropriate advice from community optometrists. A recent article in the *Daily Mail* has highlighted this.

The aim of this article is to summarise recent large studies together with the 2010 NHS annual evidence update,¹ on the treatment of amblyopia in children in order to shed light on the best practice that should be adopted.

Amblyopia describes impaired vision which typically affects one eye in the absence of structural or pathological abnormality of the eye or visual pathway. It occurs as a result of poor visual stimulation during a child's early visual development. Amblyopia is a spectrum of visual loss ranging from mild to severe.

The prevalence of amblyopia is estimated at 2 per cent of UK children; the most common forms of amblyopia are related to refractive error and/or strabismus.² It is thought to be the leading cause of unilateral visual impairment in children.³

Optometrists treating ophthalmic conditions in children will often have to consider how to manage amblyopia. It accounts for a high proportion of the workload in paediatric ophthalmology. Early diagnosis of amblyopia increases the chances of improving acuity in the affected eye and thus potential for binocular vision. Also, it maintains a level of vision in the amblyopic eye that would be essential should the sight of the non-amblyopic eye be impaired by disease or injury.^{4,5} In the UK amblyopia treatment occurs at the age of 4-5 and often occurs at school.

Spectacles

Until recently, if a child with amblyopia had a refractive error, they may have



Figure 1 Early refractive screening – most amblyopia is refractive or strabismic

been patched and given glasses at the same time. We now know that spectacle correction alone can be very effective. The Pediatric Eye Disease Investigator Group (PEDIG) studies have shown that a refractive correction improves visual acuity and results in resolution of amblyopia in at least one third of 3-7 year-old children with untreated anisometropic amblyopia.⁶

Visual acuity has also been found to improve in children with amblyopia due to strabismus and therefore initial treatment alone with optical correction until the visual acuity is stable may avoid the use of unnecessary occlusion.⁷

Monitoring of visual acuity in the PEDIG study occurred on a five-week basis. When visual acuity did not improve by one line (0.1 log MAR) on each visit, this was regarded as stabilisation of acuity. The time course for improvement to best amblyopic visual acuity was variable. Eighty-three per cent of the patients stopped improving before 15 weeks; however, one patient showed progressive improvement in acuity for up to 30 weeks following refractive correction. The Royal College of Ophthalmologists suggest visual acuity improvement

following refractive correction should be allowed to plateau prior to treatment with occlusion or atropine and this can take 16-22 weeks.⁸

The evidence therefore suggests optometrists should consider waiting up to four months with no further improvement before assuming that all acuity improvement has been obtained from the wearing of the spectacle lenses. In addition, if visual acuity improvement with spectacles does not occur on consecutive visits then referral to the Hospital Eye Service should be made to consider prescribed occlusion or atropine drops.

Atropine drops vs patching

Amblyopia when diagnosed in children can be treated by occlusion (patching) of the sound eye or drug therapy with a cycloplegic drug (atropine drops). Occlusion therapy with patching of the sound eye has been the first line of treatment despite the lack of meaningful data, demonstrating its superiority compared to other methods. Although less widely prescribed, penalisation with atropine is an alternative. As patching may be difficult for the children and parents, it is essential that



both options are offered at the outset as this represents best practice.

Penalisation with atropine drops has been demonstrated to be as effective as patching for moderate amblyopia (6/12 to 6/30).⁹ Improvement in acuity was initially faster with occlusion, but no significant difference between the two forms of treatment was found beyond six months. The PEDIG studies indicate that both treatments were well tolerated; however, atropine had a higher degree of acceptability on a parental questionnaire.

How long to patch?

PEDIG studies have shown that daily prescribed patching of two hours generates a final improvement similar to that of six hours of treatment for moderate and severe amblyopia. In addition, no benefit was found for undertaking near activities with occlusion when treating anisometropic, strabismic or combined amblyopia.¹⁰

Age of treatment

Traditionally the treatment of amblyopia has not been considered over the age of seven years, as it was thought to be the end of the 'critical period' for visual development in humans.¹¹ Recent work has demonstrated that treatment can be partially effective in some older children.

To address the issue of the response of amblyopia in the treatment of children seven years and older, a randomised trial of 507 patients (aged 7-18 years) with amblyopic eye visual acuity ranging from 6/12 to 6/120 was conducted. Participants had amblyopia associated with strabismus, anisometropia or both.

It highlighted that for 7-12 year-olds, optical correction alone improved vision in 25 per cent of children and the addition of 2-6 hours per day of prescribed patching improved vision in 53 per cent of children altogether.¹²

The study also revealed that among children aged 13-17 years who had not been previously treated for amblyopia, 47 per cent of those who were treated with glasses, patching and near activities improved two lines or more compared with only 20 per cent of those treated with glasses alone.

Intractable, constant diplopia, which has been reported to occur following amblyopia treatment in older children and adults, did not occur in any patients. Although a number of patients reported occasional diplopia when specifically questioned, in almost all cases, the diplopia was infrequent and inconsequential.



Figure 2 Refractive correction is important



Figure 3 Older amblyopes may show improvement

Sustained effect of treatment/ recurrence of amblyopia

Studies have indicated amblyopia does not recur in 76 per cent of children who are successfully treated with patching for amblyopia within the first year. Recurrence is more likely if treatment is stopped abruptly rather than weaned.¹³ In addition, long-term studies have found visual acuity is maintained in approximately 82 per cent of cases for at least one year after cessation of treatment other than spectacle wear,¹⁴ dropping with longer term follow-up to two-thirds of cases.¹⁵

Functional outcomes of amblyopia and its treatment

Visual functioning (education and employment) and quality of life (relationships with others) are considered to be the functional outcomes of amblyopia.¹⁶ One of the motivations cited for treatment is the consequences of visual impairment as a result of disease or injury to the better-seeing eye. Data from the Blue Mountains Eye study reported the incidence of bilateral visual impairment being almost three times as likely for cases with amblyopia compared to those without amblyopia.¹⁷

Therefore it can be concluded, a trial of optical correction for four months seems worthwhile in older children and teenagers and then either atropine drops or patching. It is crucial for optometrists in hospital and community settings to ensure their practice concurs with recent developments for older children with amblyopia.

KEY POINTS

- Prevalence of amblyopia in the UK is estimated at 2 per cent
- Refractive correction alone improves acuity and results in resolution of amblyopia in at least one third of children aged 3-7 years
- Wait up to four months of no change in acuity until considering further intervention
- Further intervention should include hospital referral for possible occlusion or atropine treatment
- Atropine penalisation has been found to be as effective as patching for moderate amblyopia (6/12 to 6/30)
- Two-hour patching daily generates a final improvement similar to that of six hours of treatment for moderate to severe amblyopia
- No benefit has been found for undertaking near work activity with occlusion
- 13-17 year-olds with amblyopia and no history of previous treatment show acuity improvement with refractive correction alone (20 per cent) and more so with refractive correction, patching and near activity (47 per cent)
- Recurrence is more likely if treatment is stopped abruptly

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MULTIPLE-CHOICE QUESTIONS - take part at opticianonline.net

1 What is the estimated prevalence of amblyopia among children in the UK?

- A 1 per cent
- B 2 per cent
- C 5 per cent
- D 10 per cent

2 What period of acuity stability after refractive correction should elapse before referral for further intervention?

- A One week
- B Four weeks
- C Four months
- D 12 months

3 Which of the following is true regarding recurrence of amblyopia?

- A Recurrence of amblyopia upon cessation of treatment does not occur after one year
- B Recurrence of amblyopia does not occur in three quarters of children who are successfully treated with patching for amblyopia within the first year
- C Recurrence is less likely if treatment is stopped abruptly
- D Recurrence of amblyopia never happens after gradual weaning off treatment

4 Which of the following is true?

- A Occlusion should last all day
- B Four-hour occlusion is better than six-hour occlusion
- C Six-hour occlusion is better than shorter patching periods
- D Two-hour patching daily has similar results to six-hour patching for moderate amblyopia

5 Which of the following is the least common cause of amblyopia?

- A Hyperopic error
- B Strabismus
- C Stimulus deprivation
- D Astigmatic error

6 Which of the following is true?

- A There is no evidence for improvement in vision in amblyopes older than the 'critical period'
- B The 'critical period' is 12 years
- C 16-year-olds with amblyopia show improvement with spectacles, patching and near activity
- D 16-year-olds with amblyopia are best managed with spectacles alone

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The deadline for responses is May 19 2011



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● **Maya Hindocha**, is senior optometrist at Barts and the Royal London Hospital.

M Ashwin Reddy, is consultant paediatric ophthalmologist Moorfields Eye Hospital and Barts and the London NHS Trust honorary senior lecturer, University College London and Queen Mary University of London

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