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Self-correcting amblyopia: case report

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Abstract

Aim: **To report an interesting case of amblyopia in a child with a previous history of constant left strabismus and amblyopia treated with occlusion, who subsequently sustained an injury to the non-amblyopic eye.**
Methods: **The case is presented of a 12-year-old child who injured his fixing right eye after falling from a chair onto the corner of a computer table. Ophthalmic and orthoptic findings are documented.**
Results: **The child presented to the accident and emergency department, after transfer from another Trust, with an acute history of right eye penetrating injury. Examination revealed a superior corneal laceration which required surgical repair. Seven months after a successful corneal repair the patient was noted to be turning his head to the right when reading. Orthoptic examination revealed a change in fixation and an increase in visual acuity in the previously amblyopic eye from 6/12 to 6/6 + 2 Snellen.**
Conclusions: **The period of improvement of vision from amblyopia can extend beyond what was previously thought to be the limit for positive change. Despite previous treatment of amblyopia a spontaneous increase in visual acuity occurred and was maintained even when acuity was restored in the non-amblyopic eye.**

Key words: Amblyopia, Occlusion, Strabismus

Introduction

Strabismic amblyopia is treated primarily with occlusion of the unaffected eye after the correction of any refractive error and this is still the main choice of treatment for amblyopia.[1] Equalizing or normalising the visual acuity of the amblyopic eye is often not achieved despite good compliance with treatment. The reversibility of amblyopia depends upon the ability of the visual system to recover at a time when it is still adaptable.[2,3] Strabismus and anisometropia influence the visual system at different times of development and whilst they share a common neural mechanism (binocular competition) it is the periods of susceptibility of cortical processing that are different.[4] There are three critical periods which affect the development and treatment of amblyopia:

The developmental period refers to the development and maturation of the whole visual pathway occurring from birth to early childhood.

The sensitive period is the time when amblyopia can occur.

The recovery period is the time during which the visual system can still recover.

It is the upper limit of the recovery period that is currently under debate.[5]

This case report is about a child who, having had amblyopia diagnosed and treated with partial success, later, due to injury to the non-amblyopic eye, presented again at the orthoptic department.

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Case report

Initial presentation

A history was given by the parents stating a constant left esotropia from early childhood with onset around 2 years of age. Glasses for hypermetropia (actual prescription unknown) were prescribed at this point and had been worn well. Right occlusion was prescribed to treat left strabismic and anisometropic amblyopia and compliance with treatment was reported to have been good. The occlusion was worn part-time, for between 2 and 4 hours each day, with the occlusion treatment persisting for around 3 years. The strabismus was surgically corrected when the patient was 7 years old. On discharge at the age of 8 years the corrected visual acuities were RE 6/5 and LE 6/12 Snellen with a residual esotropia (with glasses) of 10^{Δ} at near and 8^{Δ} in the distance without any binocular single vision.

Injury

The child, aged 12 years old, presented at the accident and emergency department after same-day transfer from another Trust. It was reported that he had fallen from a chair onto the corner of a computer table. There was no loss of consciousness or any head injury. The right eye was red and painful to open. On examination the corrected visual acuity was RE count fingers, LE 0.3 logMAR (Lea Symbols). Refractive correction was

R +2.50DS L+6.00/+0.50 × 180 prescribed by the patient's own optometrist approximately 6 months prior to the accident.

The injury to the right eye presented with a superior corneal laceration with 25–40% iris encarceration and a shallow anterior chamber. The lens was clear, the retina was flat and no damage to the posterior pole was noted. The patient was listed that day for a right corneal repair with or without a lensectomy. Post-operatively the corneal wound was sealed, the anterior chamber deep and the pupil round and a lensectomy was not required.

Post-operative outcome

An uneventful post-operative recovery took place and 3 months post-operatively subjective refraction showed RE +1.75/+1.50 × 180 and LE +5.00/+1.75 × 90 with visual acuities of RE 3/9.5 and LE 3/4.8 Lea Symbols logMAR.

Seven months post-operatively the patient was noted by the mother to be turning his head to the right when reading. On orthoptic examination no head turn was noted and the patient was asymptomatic. Visual acuities were RE 6/6 + 2 and LE 6/6 + 2 Snellen. A constant right esotropia with glasses was noted of 10^{Δ} at near and 8^{Δ} for distance without demonstrable binocular single vision; right suppression was shown with Bagolini glasses for both near and distance fixation. The change in fixation pattern was noted and the subsequent increase in the left visual acuity. The parents were aware of the change in fixation and felt that the head turn had coincided with the change in strabismus.

Discussion

Amblyopia treatment is thought to be most effective during early childhood, with efficacy of treatment decreasing as a function of age.[6] The response to amblyopia therapy, with the notion that age at the start of occlusion therapy is influential on the length of treatment, remains pivotal. There is evidence that amblyopia is best treated at an early age and that treatment in the older child is less beneficial and can be more prolonged.[7] However, reports have demonstrated successful amblyopia treatment when it was initiated in patients over 7 years of age with a mix of anisometropic and strabismic amblyopia.[8–12] Evidence is also available to support the treatment of children with amblyopia up to the age of 12 years by showing that an improvement in acuity is maintained after treatment is discontinued.[13] However, it has been demonstrated that in older children who have been previously treated, there is little benefit to treatment.[14] In older children and adults amblyopia treatment is not without risk, particularly that of intractable diplopia in the absence of binocular single vision.

The improvement in acuity in amblyopic eyes in a proportion of adults after vision loss in the non-amblyopic eye due to other pathology challenges the notion that plasticity of the visual system is confined to childhood.[15,16] However, residual plasticity outside childhood that allows some improvement in vision in the amblyopic eye is variable. The previous acuity in the amblyopic eye, a younger age at presentation and the severity of the visual loss in the non-amblyopic eye all contribute to the potential improvement in the amblyopic eye.[17] Untreated or unsuccessfully treated amblyopia may affect employment in adult life.[18] The effective treatment of amblyopia in childhood can be invaluable if vision loss in the non-amblyopic eye occurs later in life.[19]

Due to the limitations of a retrospective case report, clinical detail such as near visual acuity, fixation and the density of suppression are not available for our patient. The latter would be most pertinent as in this case suppression appears to have transferred to the previously fixing eye. It is not possible to determine how long it took for the acuity in the amblyopic eye to recover after the injury, in part due to the use of different visual acuity tests that make direct comparisons impossible.[20] In addition frequent measurements of the visual acuity were not clinically necessary. However, treatment for the injury was prompt and the severe vision loss was only present for a short period of time.

This case supports the evidence that the period of visual acuity recovery should be extended from the conventional view of 7–8 years of age as an upper limit for treatment. In addition to the improvement in acuity a permanent change in fixation occurred, even when the acuity of the injured eye resolved to the new level of the previously amblyopic eye. This case has again created discussion about when to stop occlusion treatment and how aggressively we should treat even when it appears that the visual acuity has stabilised.

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