Clinical aspects of different types of amblyopia

Klinički aspekti različitih tipova ambliopije

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Introduction

Amblyopia is a deficit of vision, principally visual acuity, not immediately correctable by glasses, in the absence of ocular pathology, due to interruption of normal visual development during a sensitive period in childhood. Amblyopia occurs before 6–8 years of age. It may be completely or partially treated by modulation of the visual input during a sensitive period of visual development. The duration of this period varies depending on the cause of amblyopia 1–4.

Amblyopia is the leading cause of visual impairment in children affecting up to 5% of general population 5, 6. Population prevalence depends upon the fact if there have been any interventions to prevent or treat the condition, or not.

Diagnosis is based on a reduction in best corrected visual acuity by testing visual acuity in each eye separately with a line of symbols with appropriate effect of crowding, and after exclusion of ocular pathology 7–9. The acuity testing procedure and refraction must be accurate, and the age related norms must be known for the vision test used. Amblyopia is defined in terms of visual acuity, but other visual functions are affected as well. It is important to recognize that a finding of reduced visual acuity in a child is not a diagnosis of amblyopia. Amblyopia is only found in the setting of a causative factor. If no obvious amblyogenic factor is found on examination, then either the reliability of the visual acuity measurement should be questioned or subtle ocular pathology such as optic nerve hypoplasia or macular disease should be considered 10.

Classification

Classification of amblyopia is based on clinical conditions responsible for its development. Etiology is heterogeneous, may be caused by stimulus deprivation, strabismus, refractive error or a combination of these. Amblyopia is usually unilateral, but it may be bilateral in cases of bilateral high refractive error or bilateral ocular pathology, such as cataract.

The commonest risk factors for amblyopia are constant strabismus and different refractive errors in each eye. The child's age when exposed to an amblyopia-inducing condition appears to be the most important determinant for the development of amblyopia 11.

Differences exist in psychophysical functions between the fovea and the retinal periphery in human strabismic amblyopia, on the one hand, and in anisometropic and visual deprivation amblyopia, on the other. There are also differences in the severity and reversibility of the various types of amblyopia. The basic amblyogenic mechanisms are the same even though their contribution to each type of amblyopia varies 10.

Stimulus deprivation amblyopia occurs when a physical obstruction along the line of sight prevents the formation of a well-focused, high-contrast image on the retina. The degree to which amblyopia develops depends on the time of onset and the extent of form deprivation. This type of amblyopia requires early, vigorous treatment. Untreated unilateral form deprivation extending past the first 3 months of age profoundly affects visual acuity development. Untreated bilateral visual form deprivation has a similar effect if it extends past 6 months of age. If treatment for these conditions is not initiated during this critical developmental period, the prognosis for normal vision development is poor. When the onset of the cause of deprivation occurs after the first 6–12 months, the prognosis for vision recovery is improved with early treatment.

Strabismic amblyopia is suspected when a child shows either constant unilateral squint (without alternation of fixation) or a fixation defect with one eye. It is always unilateral. It occurs far more often in esotropes. Anisometropic amblyopia occurs when an interocular difference in spherical or cylindrical refractive error exceeds certain limits. In spherical anisometropia, a minimum difference of 1.25 DS may be significant 2, 4, 7–9, 12.
Presentation and referral

Constant squint is generally recognized early by the family or general practitioner. A positive family history of squint or amblyopia should alert those in primary care when carrying out routine checks or immunizations. Small angle deviations and anisometric amblyopia are the primary screening targets. Early screening compared with later screening at 3 years of age and at school entry (4–5 years of age) may not reduce the overall prevalence of amblyopia by 7 years of age. The prevalence and severity of amblyopia have declined substantially where screening programmes are in place.

Aims of intervention

It is important to detect amblyopia early and to initiate treatment for amblyopia at a stage when treatment is likely to be effective (ideally between 3 and 5 years of age, and under 7 years of age). The rationale for treatment of amblyopia is to optimize visual function and binocular vision. Severe amblyopia persisting in adulthood is a significant risk factor for blindness in individuals with binocular detrimental consequences. Also, recent work has indicated that occlusion enhances binocularity more than penalization and that more intensive patching may be needed in children with better levels of vision in order to re-establish bifoveal fixation.

Treatment issues in amblyopia

Practice still varies widely in the management of strabismic, anisometric and combined amblyopia: how much patching, start and maintenance, penalization, time of screening? The results of the some Pediatric Eye Disease Investigator Group (PEDIG) amblyopia studies reported results are in contrast to long experience with treating amblyopes largely based on clinical significance.

Is the treatment really similar for different types of amblyopia (excluding deprivation)? Does “slow” treatment waste valuable time during the sensitive period? Refractive correction with spectacles and occlusion therapy remains the mainstay of amblyopia therapy. Spectacles alone may be enough to improve vision in some patients with late-onset amblyopia.

Debate still continues regarding treatment and occlusion modalities. But the reality of amblyopia treatment is that the intensity of patching prescribed is not always the actual amount of patching that is received, even when special monitoring devices have been used. This is one of the reasons, aside from potentially better binocularity outcome, why recent studies have looked at the efficacy of atropine penalization rather than patching in the treatment of amblyopia. Regarding the efficacy of various protocols there have been several reports with conflicting results. Treatment duration data have also been contradictory, ranging from no association with treatment effect to both direct and inverse relationships. It has long been known that the “white noise” of unilateral optical defocusing has both monocular and binocular detrimental consequences. Also, recent work has indicated that occlusion enhances binocularity more than penalization, and that more intensive patching may be needed in children with better levels of vision in order to re-establish bifoveal fixation.

The conclusions indicating that lower intensities of patching are as effective as full time regimens might be too optimistic and have some limitations. In some countries these studies have drawn much attention from the lay press to the point where this publicity appears to play an important role in influencing parent treatment preferences. The evaluation of amblyopia treatment outcome presents a serious challenge. Problems include the design of VA charts, difference in symbols and unequal separation between them on most currently used test charts or projection slides. There is also a problem in analyzing data of children with amblyopia that is not encountered in analyzing acuity data from adults. The VA of children, when tested by the same method, tends to improve with age. Evidence from different studies may be proven to be correct, or will have to be changed as new facts emerge from more tightly monitored controlled clinical trials. Data must be analyzed carefully because nearly all studies suffer from some scientific flaws. For several reasons, including the existence of so few prospective studies, the way in which ophthalmologists move from one to the other, or the way in which we refine some treatment protocols, may also be the right way!

There is a need for good quality trials to be conducted in these areas in the future, to improve the evidence base for the management of amblyopia. Objective electronic compliance monitoring, could be the key to a more evidence-based treatment for amblyopia. It is clear that children do not like patching, and achieving compliance presents a serious challenge.

REFERENCES


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