

AMBLYOPIA: TYPES, PRESENTATION AND TREATMENT - A Review

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SUMMARY

A review of types, presentation and treatment of amblyopia was done.

There are four major types of amblyopia namely: strabismic, ametropic (isoametropic), anisometropic and deprivation.

The critical or sensitive period for each varies, although almost all cases present within 7 - 8 years of age. Amblyopia treatment should, therefore, be carried out as early as possible, with the co-operation of the patient's family or other care-givers.

Amblyopia treatment essentially aims at:

- i. Optimizing the clarity of the retinal image in the amblyopic eye by surgery or optical correction of refractive errors and;
- ii. Enhancing the neural stimulus to the visual cortex, in most cases by occlusion therapy.

Conclusions: (i) Being among the top three causes of monocular visual loss in the adult age group from 18-85 years, this suggests that the condition persists well beyond the childhood years. (ii) Also, in spite of successful occlusion therapy in amblyopia patients, it has been found that visual acuity still diminished over time in some patients. The question therefore remains: Are childhood screening programmes for amblyogenic factors effective?

Key words: amblyopia, crowding phenomenon, occlusion therapy

INTRODUCTION

Amblyopia is a developmental defect of spatial vision, the chief symptom of which is loss of visual acuity.¹ The term 'amblyopia' is derived from the the Greek words: *amblyos* for 'dull' and *opia* from the stem *ops* which stands for 'vision'.²

It is a condition of unilateral or bilateral reduced visual acuity which is not alleviated by correction of any refractive error or treatment of any pathological defect

that forms an obstacle to the formation of a clear retinal image.

Von Graefe simply defined 'amblyopia' as a condition where the observer sees nothing and the patient very little.³ Its development requires an immature visual system and the presence of one or more amblyogenic factors (such as high refractive error, anisometropia, strabismus).⁴ It almost always occurs before the age of 7 years. This is the 'critical' or 'sensitive' period of visual development^{5,6} which varies with type of amblyopia. Within this period, a distortion of the retinal image (as seen with conditions such as uncorrected bilateral high refractive errors or from bilateral, symmetrical impediments of the visual axis such as cataracts) or an abnormal binocular interaction will occur between the eyes, with one eye competitively inhibiting the other eye (as seen in strabismus), resulting in amblyopia.

This is because, even though the visual system is hard wired in its basic plan at birth, it requires visual experience, and especially the competitive interaction between the visual pathways of the two eyes in the visual cortex, to develop adult levels of vision (the visual system thresholds in a newborn are several log units below adult levels, in spite of optics that have 6/6 clarity.) This critical period is also known as the 'period of reversibility' - it is during this period that a previously 'deprived eye' is stimulated by removal of the factor that caused amblyopia and then occlusion of the 'undeprived eye' is instituted. The changes in the developing visual system can be reversed and visual acuity improved. After this period, attempts at treating amblyopia yield no result.

If untreated or insufficiently treated in childhood, the visual impairment from amblyopia can last a lifetime.

Currently, it is the single most common form of monocular vision impairment in the first 4 decades of life,⁴ and among the top three causes of monocular visual loss in the adult age group from 18 to 85 years.¹ It

affects 2-4% of the general population in North America and 2-2.5% in the UK.^{1,4}

In this paper, the types, clinical features and treatment of amblyopia are discussed.

TYPES OF AMBLYOPIA

Strabismic Amblyopia

This is characterized by unilateral loss of vision in a strabismic subject as a result of long-continued fixation by the dominant eye, and suppression of the images in the deviating eye.

Mechanism of development: Strabismic amblyopia is thought to result from a competitive or inhibitory interaction between neurons carrying the nonfusible inputs from the two eyes, which leads to the domination of cortical vision centres by the fixating eye and chronically reduced responsiveness to the nonfixating eye's input.⁷

Strabismus is the most common amblyogenic factor. Approximately 40% of children who manifest strabismus develop amblyopia.⁴ Esodeviations are more commonly associated with amblyopia than exodeviations, probably because most childhood exotropias are intermittent.

The critical period in strabismic amblyopia extends to 8 years of age. Occlusion therapy could still improve vision before the critical age of 8 years. When the child is beyond 8 years of age, occlusion may overcome suppression and lead to intractable pathological diplopia if there is no fusion.

Anisometropic Amblyopia

This is the second most common form of strabismic amblyopia. It develops when an unequal refractive error in the two eyes causes the image on one retina to be chronically defocused.

Mechanism of development: It is believed to result partly from the direct effect of image blur on the development of visual acuity in the involved eye, and partly from interocular competition or inhibition of neurons carrying nonfusible inputs from both eyes. Anisometropic amblyopia rarely develops unless the refractive difference between the eyes is at least 1.00 - 2.00D of hypermetropia; 1.00 - 2.00D of astigmatism or 3.00D of myopia. Unilateral high myopia (- 6.00Ds) will often result in severe amblyopic visual loss.^{4,7} Detection and treatment of anisometropic amblyopia are often delayed until school age when the prognosis for recovery of vision is guarded. Unless strabismus is associated with the eyes, it is difficult to detect amblyopia, as it does not present with any visible signs.

If the eyes have fusion they can be occluded at any age but the occlusion therapy does not work for cases of amblyopia after 10-12 years of age.

Isoametropic Amblyopia

This is a bilateral reduction in visual acuity that is usually relatively mild. It results from approximately equally large uncorrected refractive errors in both eyes of a young child. Isoametropic amblyopia is unlikely to develop, unless at least >5.00D of hypermetropia, 2.50D of astigmatism or >10.00D of myopia is present.

Mechanism of development: This type of amblyopia is the direct effect of blurred retinal images on the development of visual acuity.

Meridional amblyopia

This is a type of ametropic amblyopia which occurs in high uncorrected astigmatism. The loss of resolving ability is limited to the chronically blurred meridians. The degree of cylindrical ametropia (astigmatism) necessary to produce meridional amblyopia is not known.

Deprivation Amblyopia

This syndrome is also known as *amblyopia ex anopsia* and *disuse amblyopia*.

Deprivation amblyopia is the least common but most damaging and difficult to treat. It results from conditions that distort the visual image by obstructing the visual axis. These result from light deprivation, form deprivation and abnormal binocular interaction.

The most common causes are cataracts and corneal opacities; less common conditions include eyelid ptosis, eyelid haemangioma, corneal opacification and vitreous haemorrhage.

The duration of the critical period in this type of amblyopia is from several weeks to several months.⁵

Table 1. Types of amblyopia and their mechanisms

Types of Amblyopia	Abnormal Binocular Interaction	Visual Image Distortion
Strabismic	0	-
Ametropic	-	0
Anisometropic	0	0
Deprivation: Unilateral	+	0
Bilateral	-	

Occlusion amblyopia

This is a form of deprivation amblyopia caused by excessive therapeutic patching.

CLINICAL FEATURES OF THE AMBLYOPIC EYE

- Reduced central visual acuity
- Central or eccentric fixation

The minimum threshold for clinically significant amblyopia is usually regarded to be a vision of 6/12 or worse in the amblyopic eye or a two-line difference in acuity between the amblyopic eye and the normal eye.

- Moderate amblyopia¹: 6/12 - 6/60
- Severe amblyopia: < 6/60

Visual acuity testing in children

Since almost all patients diagnosed and treated for amblyopia are children, documenting accurate and reproducible visual acuity can be challenging. The method used depends chiefly on the child's age and level of co-operation. The clinical techniques most commonly used for assessing visual acuity in children include: fixation test, forced-choice preferential looking, and optotype recognition.

Fixation test. This is used for preverbal and nonverbal children. The standard fixation test is an indirect measurement of visual acuity based on identification of central fixation response in one eye.

Central fixation indicates good foveal vision, and eccentric fixation indicates extremely poor vision, usually 6/60 or worse.

Evaluation of Acuity Using the CSM Procedure

C = location of the corneal light reflex

- One eye is covered
- The examiner positions his light in front of the uncovered eye
- Normally, the reflected light from the cornea is near the centre of the cornea
- Fixation could be eccentric

The direct ophthalmoscope can be used to determine fixation in the amblyopic eye. Most direct ophthalmoscopes come equipped with a fixation device built into the optics), particularly eccentric fixation in the older patient).

S refers to steadiness of fixation on the examiner's light as it is held motionless and also as it is slowly moved about. One eye is covered during this test.

M refers to the ability of the strabismic patient, (strabismus > 10.0 prism dioptres) to maintain alignment first with one eye, then with the other, as the opposite eye is uncovered (binocular fixation pattern). Maintenance of fixation is evaluated under binocular conditions.

Interpretation of Findings

- Alternating and equal fixation responses are presumed to indicate a similar acuity in both eyes.
- Inability to maintain fixation with either eye with the opposite eye uncovered is presumptive evidence of a difference in acuity between the two eyes.

Thus, preverbal or nonverbal patients with a strong fixation preference in one eye should be suspected of having amblyopia in the other eye.

In children with strabismus, less than 10.00PD or straight eyes, this test can give a false/positive result. Children tend to demonstrate a strong fixation preference with the test even if no amblyopia exists. To overcome this drawback, a 10.00 - 16.00PD base-down prism is placed over one eye to induce a vertical deviation. When a vertical displacement of the image is induced in one eye, patients with equal vision and no strabismus demonstrate an easily detectable, alternating vertical fixation movement when they switch fixation between eyes. Strong fixation preference for one eye indicates amblyopia in the nonpreferred eye.

Forced-choice preferential looking test. The preferential looking test is based on the observation that young children, when given a choice, prefer to look at a pattern stimulus (grated targets consisting of alternating light and dark stripes of equal width) rather than a homogenous gray target of equal contrast sensitivity. The preferential looking test is not as widely used as the fixation preference test for evaluating and managing amblyopia.

The Teller Acuity Card procedure is a clinically useful preferential looking test. It consists of a series of grated targets of different stripe widths. To determine the child's visual acuity, the stripe width or 'frequency' is reduced until the child no longer demonstrates a preference for the grated target.

Disadvantages of preferential looking techniques:

- They are time-consuming
- Only children within a limited age range show an interest in the stimulus
- There is no direct correlation between a grated stimulus and optotype visual acuity

- When the results of this test are being interpreted, it must be borne in mind that the Grating acuity, which normally corresponds closely to the Snellen acuity, is often considerably less than the Snellen acuity in strabismic amblyopia.

Optotype Recognition

To evaluate amblyopia in the verbal child, visual acuity testing using the optotype is preferred. This is done monocularly. The optotypes selected for use should suit the child's ability. Allen pictures or Lea symbols work best for children between approximately 2 and 4 years of age.⁴

The H-O-T-V chart is a four-letter test in which letters have been chosen for their lateral symmetry. The child can name the letters or point to a match on a hand-held key card.⁸ The 'broken wheel test' and 'tumbling E optotypes' are usually reliable with children between 3 and 5 years of age.⁴ The standard Snellen number or letter test and the Bailey-Lovie chart are generally reserved for children 5 years of age or older.

Table 2. Normal visual acuity using various tests in children

Age (yrs)	Vision Test	Normal
0 - 2	Visual evoked potential (VEP)	6/9 (age 1)
0 - 2	Preferential looking	6/9 (age 2)
0 - 2	Fixation behaviour	CSM
2 - 5	Allen pictures	6/6 - 6/12
2 - 5	H-O-T-V	6/6 - 6/12
2 - 5	E-game	6/6 - 6/12
5+	Snellen	6/6 - 6/9

Features of Typical Strabismic Amblyopia Uncommon in Other Forms of Amblyopia

Grating acuity measures the ability of the patient to detect patterns composed of uniformly spaced stripes (which normally correspond closely to Snellen acuity). The ability of the patient with strabismic amblyopia to detect patterns using the grating acuity test is considerably better when compared to the Snellen acuity test. Apparently, forms are seen by the affected eye in a twisted or distorted manner that interferes more with letter recognition than with the simpler task of determining whether a grating pattern is present.

This information must be borne in mind when interpreting the visual acuity found in infants and

toddlers by using the Teller card preferential looking test, which is based on grating deflection.

Eccentric fixation: This refers to the consistent use of a non foveal region of the retina for monocular viewing by an amblyopic eye. Minor degrees of eccentric fixation (detectable only with special tests such as visuscopy, Haidinger's brushes or Maxwell's spots) are seen in many patients with strabismic amblyopia and relatively mild acuity loss.

Clinically evident eccentric fixation, detectable by observing the non central position of the corneal reflection from the amblyopic eye while it fixates a light with the dominant eye covered, generally implies visual acuity of 6/60 or worse. The mechanism of this interesting phenomenon is unknown.

Crowding phenomenon (also known as 'contour interaction'):⁷ The findings from several studies suggest that the receptive fields of visual system neurons in the amblyopic eye are abnormally large. This disturbance may account for the crowding phenomenon or contour interaction. In this condition, visual acuity is better when single letters are presented to the patient than when the patient is asked to read a whole row of letters. In the latter, the Snellen letters become more difficult to recognize, if they are closely surrounded by similar forms as in a whole row of letters.

Neutral density filter test: In an amblyopic eye, there is virtually no change of visual acuity when the patient reads through a 3.00 neutral density filter. A normal eye will have a drop in acuity of about two lines, whereas an eye with an organic lesion will have a significant drop of visual acuity. Amblyopic eyes have acuities similar to normal eyes under conditions of reduced illumination.

For example, prior to an NDF test, the vision in the suspected amblyopic eye is 6/36:

- An NDF filter of 3 log units is placed before the suspected amblyopic eye and vision remeasured.
- If the visual acuity is considerably worse, ie, a fall from 6/36 to hand motions or counting finger, the likely cause is organic visual loss and not amblyopia.
- In the normal eye, the visual acuity will drop to about 5/60.
- With amblyopia, the vision with the NDF stays the same (6/36 in the example) or even improves slightly.

This simple test is useful in differentiating organic visual loss from the functional visual loss characteristic of amblyopia.

Neutral-density filter effect: When illumination is reduced, the acuity of an eye with strabismic amblyopia tends to decline sharply when compared with a normal or organically diseased eye. In dim light, the normal eye may see no better than the amblyopic eye.

Others: Several other abnormalities in amblyopic eyes have been documented. Some are inconsistent and controversial. These include abnormalities of pursuit movements, fixation stability, pupils contrast sensitivity, visual fields and accommodation.⁴

TREATMENT

Treatment should be initiated as early as possible: The different types of amblyopia are generally detected at different ages due to the underlying cause.

Ocular opacities and onset of strabismus during childhood are detected much earlier than other amblyopia types without obvious symptoms, e.g., refractive errors and small angle strabismus. The latter will only be detected by ophthalmological examination and late age of presentation is a problem in amblyopia prevention and treatment.

In a study conducted in Leicestershire, Shaw⁹ et al. demonstrated that strabismic cases, generally, were found before 5 years of age, whereas the straight-eyed amblyopes were identified before the age of 5 only in 15% of the cases (the median age at presentation was 6.3 years):

How successful is outcome of therapy if amblyopia is detected at a later age?

It has been shown by Flynn and Cassidy¹⁰ and Oliver et al.¹¹ that the prognosis is worse when therapy is initiated after the patient has attained the age of 7-8 years.

Is the age of 4 years or less at presentation of amblyopia compatible with successful treatment in most cases?

Sjostrand and Abrahamsson¹² demonstrated, in a study of 52 amblyopic cases aged 2½ - 8 years, that amblyopia responded to treatment in more than 95% of the cases, if straight-eyed amblyopes were detected at 4 years and strabismic cases early after onset. The most important factors for a successful outcome are summarized as follows:

- low age at presentation
- good compliance
- early referral of strabismic cases
- effective visual acuity testing from 2½ years and onwards

It is important to enlist the co-operation of the patient's family or other care-givers before developing a

treatment plan for amblyopia. They should understand the condition as clearly as possible and also the importance of their role in its management. Before treatment is instituted they should be able and willing to participate in the process.

Replacing Eccentric Fixation with Foveal Fixation¹³

Before undertaking any treatment for amblyopia, it is essential to make a careful diagnosis of the fixation because the proper management of the case varies depending on this factor.

The presence of an eccentric or non-foveal fixation prevents the re-development of good visual acuity. If it is diagnosed correctly, the first step in the treatment must be its replacement by foveal fixation. This is attempted by a variety of methods depending on the details of the case concerned. These methods include:

Pleoptics: This means 'full' or 'more' vision. This method developed by Bangerter¹⁵ involves the functional destruction of eccentric fixation by intense dazzling or blinding of the retina, followed by elaborate methodical stimulation of the fovea using specially designed instruments such as the localisator, centrophore, etc.

Cuppers¹⁴ improved on the Bangerter method (above) and eliminated blinding the retina. Once the diagnosis of eccentric fixation was established, Cuppers used more positive ways of promoting 'straight-ahead localisation'. He devised the visuscope for diagnosis and then used the euthyscope to create after-images (both positive and negative) to restore true spatial value of the macula. The ophthalmologist uses the entoptic phenomenon of Haidinger's brushes to improve foveal function and visual acuity.

Unfortunately, these methods are generally only suitable for older children, as they are time-consuming and high levels of co-operation are required.

Inverse occlusion of the amblyopic eye: This method has not been very effective, except that it accustoms the older child to wearing a patch before conventional occlusion is started.

Occlusion of the fixating eye with therapy of the amblyopic eye: Red filter therapy is used to re-establish foveal fixation; only light wavelengths longer than 640nm are allowed to reach the retina of the amblyopic eye and stimulate the cones; this is done with total occlusion of the preferred eye.

Various combinations of prisms placed before the amblyopic eye, with occlusion therapy have been used for amblyopia with eccentric fixation.

Occlusion of the fixating eye alone: In all cases of eccentric fixation, occlusion of the fixating eye is tried first. The occlusion may result in one of the following:

i. **Restoration of the central fixation:** In such a case, total occlusion of the normally fixating eye can be continued, as in patients who originally had foveal fixation.¹³

ii. **Shift of the eccentric point:** If this occurs, occlusion of the normally fixating eye should continue until either foveal fixation is established or the eccentric point seems static. These patients should be seen at weekly intervals and if they do not regain foveal fixation they should be treated with inverse occlusion (see eccentric point remains static below).

iii. **The eccentric point remains static:** If this occurs, inverse occlusion is tried in order to prevent any further stimulus of the eccentric point and to gradually dislodge the eccentric fixation. Once foveal fixation is confidently established, treatment proceeds as in foveal fixation.¹²

In certain cases of eccentric fixation that have not responded to occlusion, pleoptic therapy may be initiated. Where pleoptic treatment is not advisable, occlusion of the normally fixating eye should now be carried out to get maximum visual acuity at the eccentric point. In large-angled squints, eccentric fixation may only respond to occlusion therapy of the fixating eye, after surgery has been carried out to reduce the size of the deviation.

The clarity of the retinal image in the amblyopic eye can be optimized by providing a clear visual axis and correcting significant refractive errors.

SURGERY

Cataract Surgery

For optimal recovery of vision, significant congenital lens opacities should be removed during the first 2-3 months of life. In symmetric bilateral cases, the interval between operations on the first and second eyes should be no more than 1-2 weeks.

Acutely developing severe traumatic cataracts in children under 8 years should be removed within a few weeks of injury, if possible. Significant cataracts with uncertain time of onset also deserve prompt and aggressive treatment during childhood. Early surgical intervention combined with occlusion therapy can result in an excellent visual outcome in appropriate cases.

Strabismus Surgery

This should be delayed until the amblyopia has been successfully treated. The surgery done in order to

develop fusion may then help to maintain the acuity in the previously amblyopic eye.

Optical Correction

The correction of significant refractive errors early in life may prevent the development of amblyopia. Once amblyopia has developed, optimal optical correction alone may eliminate the amblyopia or serve as a useful adjunct to other amblyopia therapy.

- Optical prescription for amblyopic eyes should, in general, correct the full refractive error as determined with cyclopegia.
- If strabismus accompanies the anisometropia, occlusion or defocusing therapy is usually necessary, in addition to correcting the refractive error.
- Correct all hypermetropia in ametropic amblyopia because the amblyopic eye's ability to control accommodation tends to be impaired, therefore, it cannot compensate for uncorrected hypermetropia as would the normal child's eye.
- Refractive correction for aphakia following cataract surgery in childhood must be provided promptly.

To Enhance the Neural Stimulus to the Visual Cortex

This is generally accomplished by forcing the poorer eye 'to work' by limiting stimuli to the better eye. This can be done in a number of ways:

Occlusion: This could be total or partial. Its effectiveness has been proven in several studies.¹⁶⁻²⁰ Occlusion for most waking hours results in a visual acuity of 6/12 or better in 60% to 90% of patients with amblyopia associated with anisometropia or strabismus. Although occlusion therapy is the accepted method of treatment for amblyopia, there is no agreement in the literature as to the type (total or partial), the extent, the duration, or the reasons for discontinuing the procedure.

Total occlusion: Using this method, no light reaches the retina at all. It could be full-time or part-time, using either the commercially available opaque adhesive patch applied to the skin, opaque contact lenses, cloth occluders applied over the glasses or graded intermittent filters.

Full-time occlusion: This course of treatment is used in:

- Severe amblyopia, i.e., < 6/60 visual acuity
- Children over 5 years
- Failure of part-time occlusion

Occlusion schedules: Empirical schedules have been developed to prevent occlusion amblyopia, (i.e., 'switch

amblyopia'). They are, however, imperfect; parents should be warned in advance of the possible occurrence of occlusion amblyopia. A general rule of thumb is to patch initially one week for each year of age between medical examinations. For infants, patch for 3-4 days then uncover and patch the amblyopic eye for a day.

If, at the time of re-examination, fixation and following are not improved, and if the ability of the amblyopic eye to maintain fixation with the normal eye uncovered is unchanged, suggesting no substantial improvement in visual acuity, and if occlusion amblyopia has not developed in the normal eye, the period of occlusion could be doubled prior to the next scheduled evaluation. If acuity does not improve after 3-6 months of total occlusion of the sound eye, further therapy will not be successful. Most opticians advise terminating or decreasing occlusion therapy,²¹⁻²² if after conducting three patching trials of high-percentage occlusion, there is no measurable improvement in visual acuity. In such a case it would be advisable to exclude the existence of an organic disease in the amblyopic eye.

A similar study by Keech et al²³ suggested that at least three intervals of full-time occlusion (FTO) therapy are necessary to determine whether an amblyopic patient is unresponsive to treatment. Furthermore, after three full-time occlusion therapy intervals without improvement, additional FTO is unlikely to improve visual acuity, and is therefore discontinued in most patients. Therefore, patients and families who struggle to continue occlusion therapy should be guided by these studies.

If acuity is improving, treatment should be continued until a plateau is reached and maintained for about 3-6 months.

In the treatment of strabismic amblyopia, if accurate visual acuity is not possible, the patient should be occluded until alternation occurs. When patching these patients, warn the parents that the squint may switch to the other eye. It is a good sign and they should inform the ophthalmologist.

During the period of occlusion, to encourage maximum use of the amblyopic eye and accelerate the progress of the effect of occlusion, the amblyopic eye should be made to do visually demanding tasks (**active therapy**).

Gains in acuity, however, may not be permanent. Patching may be re-initiated as needed, until the patient

is about 9 years of age, to maximize improvement. Indeed, some ophthalmologists believe that patients on occlusion therapy should not be discharged until they have reached 9 years.

Part-time or Intermittent Total Occlusion

Indications

- Intolerance of patch
- Mild amblyopia
- Intermittent squint
- Anisometric amblyopia with 'straight eyes'

Occlusion schedule: Usually the normal eye is patched totally for 2-4 hours every day, depending on visual acuity, tolerance, etc. The patching could last for 15 minutes at a time.

Optical Degradation, Penalization or Defocusing Therapy or Partial Occlusion

Indications

Same as for part-time occlusion

Types of optical degraders available include:

- Filters of varying optical densities
- Contact lenses (dark, opaque or high plus)
- Atropine drops
- Transparent contact paper and decals applied to the surface of one spectacle lens
- Clip-on and contouring opaque devices applied to spectacle frames
- Stripe (CAM) therapy

Penalization can be by optical or pharmacological means. It is a 'user-friendly' method of treating amblyopia. The principle in this method of amblyopia treatment is that the quality of the retinal image on the sound eye is degraded. To be effective, the degree of image degradation should be such that the amblyopic eye has a competitive advantage in order to encourage its use.

For example, penalization may be accomplished by using such drops as Atropine in one eye and Phospholine iodide drops in the other (*pharmacological method*) or by placing plus lenses before one eye and minus lenses before the other (*optical method*). There are various other combinations of optical/ pharmacological methods.

It should, however, be remembered that excessive partial occlusion, just like excessive total occlusion, can

* High-percentage occlusion is occlusion of the dominant eye for at least 75% of the child's waking hours.

cause 'switch' amblyopia. Therefore, frequent evaluation of the patient's visual status is important.

If visual acuity is improving, continue with the same amount of occlusion, but if visual acuity is not improving try full-time occlusion before giving up.

IMPORTANT PROGNOSTIC FACTORS IN OCCLUSION THERAPY

Initial visual acuity: If reasonably good it tends to improve. If about 3/60 it may not improve.

Age of patient: Final level of visual acuity obtained is dependent on the age at which treatment is begun. The earlier treatment is begun, the better the prognosis. Again, babies and young children respond rapidly to occlusion.

State of fixation: Prognosis for successful outcome following treatment of amblyopia is better when foveal fixation is present before occlusion.

Cooperation: Co-operation from the patient, parents, school teachers and nursery school helpers is absolutely essential. It is the major factor that governs the outcome of treatment. To enhance co-operation, it is advisable to choose a method of occlusion that suits the individual patient.

The patient must wear the prescribed glasses while the recommended treatment is carried out or a successful outcome is unlikely. Keeping a patch on a small child is not easy. Some children respond to bribes and rewards; with others the limbs may be restricted with plaster of paris; the final alternative is admission into the hospital.

Previous treatment: Prognosis for improvement with amblyopia treatment is better when the amblyopic eye has previously received treatment.

Loss of the sound eye: When the patient's better eye is lost he is forced to start using the amblyopic eye.

The condition present before the institution of the occlusion therapy: e.g., intermittent squint.

COMPLICATIONS OF OCCLUSION THERAPY

Switch amblyopia: This is amblyopia that develops in the occluded eye. It could be treated by stopping, reversing or alternating occlusion.

Allergic or toxic reactions to pharmacologic agents used for optical degradation: Occlusion of the lacrimal puncta will help to avoid toxic reactions.

Skin irritation from patching: Once this occurs patching should be discontinued until the skin fully heals. Before re-applying the patch, either coat the affected areas of skin with a protective solution (or agent) such as

tincture of benzoin, or reduce the stickiness of the patch by lightly coating the affected areas with a skin cream.

Recidivism: The results of successful occlusion therapy may not be permanent. In a randomized clinical trial with short follow-up periods of 1-3 years, the visual acuity in a cohort of successful amblyopic patients was found to diminish.²⁵

PREVENTION OF AMBLYOPIA

To identify children at risk of developing amblyopia, pre-school vision screening is recommended. The aim is to detect and treat amblyogenic factors early enough before amblyopia develops.

Do Childhood Screening Programmes for Amblyogenic Factors Really Reduce the Prevalence of Amblyopia?

Amblyopia is among the top three causes of monocular visual loss in adults (from 18 to 85 years). It is evident that the condition persists well beyond the childhood years, is resistant to therapy, and leaves its victims vulnerable to bilateral diseases of later onset, e.g., cataract, macular degeneration, diabetic retinopathy, glaucoma.¹

Two British researchers found that the incidence of amblyopia was the same in a non-screened school as in a screened (and treated) one.²⁴ Because of the persistence of this condition despite treatment, these researchers concluded that visual screening for amblyogenic factors was of little use and recommended that all ongoing childhood screening programmes for amblyogenic factors in Great Britain be discontinued and new ones not undertaken.

This study recommends that screening should be continued, as at present there are no better ways of detecting children with one or more risk factors for amblyopia, on a population-wide basis.¹ The sensitivity and specificity of the methodologies currently in use are not known, therefore one cannot draw precise conclusions as to the worth of those methods.¹

CONCLUSIONS

Amblyopia is a disease of public health importance affecting large segments of the population. Although the usefulness of childhood screening programmes is questionable, visual screening of pre-school children for early detection and treatment of amblyogenic factors is recommended for the prevention of amblyopia.

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