

Prevention of relapse of amblyopia by various modalities

Salil Kumar¹

The Journal of the College of Ophthalmologists of Sri Lanka 2014; 20: 66-70

Background

Recurrence of amblyopia is defined as ≥ 2 log MAR level reduction in visual acuity after cessation of patching. There is 50% risk that amblyopia will recur following successful primary treatment particularly when preference to one eye is present, amblyopia recurs in non preferred eye within 1 to 3 months. Therefore careful monitoring is required upto age of visual maturity.

Differential diagnosis

Before diagnosing the patient as a case of recurrence detailed history and examination should be done to rule out any new pathology and sub clinical diseases or recurrence of primary condition (squint, ptosis, media opacity) etc.

Higher recurrence rate was observed in –

- Eyes with better visual acuity at the time of cessation of treatment
- Sudden stoppage of occlusion
- No maintenance therapy
- Poor follow up and compliance
- Lower socio-economic status and illiteracy and also lack of care and commitment from parents
- Improper schedule of occlusion leads to poor compliance on long term follow up

Work-up

- Re-refraction under cycloplegic agent according to age.
- Meticulous slit lamp examination to look for sub clinical diseases such as keratoconus, corneal dystrophies etc.
- Complete posterior segment examination to look for sub clinical diseases.
- Other test such as colour vision, contrast sensitivity, macular function test, to rule out sub clinical disease without fundus abnormality.
- To rule out recurrence of primary condition such as squint, ptosis and media opacity.

Lack of knowledge about the severity of disease, non compliance to conventional full time occlusion therapy and maintenance therapy, patch related problems, long duration of treatment and follow up, lower socioeconomic status, frequent visits, non co-operation and illiteracy of parents.

How to improve compliance

- Explain to the patient about severity of disease and impact on life.
- Vision loss is irreversible and cannot be corrected by any mode such as glasses, contact lens and refractive surgery if not treated on time
- Previously it was thought that full time occlusion therapy is gold standard and has no alternative.
- But according to recent studies, long term result of part time occlusion is equally effective as conventional full time occlusion.
- Therefore with part time occlusion compliance results are improved.
- Long duration of treatment and follow up is required, which itself is a major problem.
- ATS newer guidelines for treatment and followup of patients with amblyopia helps to overcome this problem.

¹Regional Institute of Ophthalmology, Bhopal, India.

- Conjunction with other modalities such as penalization (optical or pharmacological) and active vision therapy decreases the duration of treatment.
- Amblyopia therapy requires frequent visits to evaluate response.
- It should be adjusted according to patients socio-economic status, travelling distance, age of patient and response of therapy.

Parental co-operation

A full co-operation of the parents is essential. Many parents fail to co-operate for one or the other reason – may be their inability to devote time for their child or may be a lack of understanding.

Therefore, it is the duty of treating person to hammer on the parents mind the importance of patching for sake of their child.

Parents should be emphasized regarding importance of treatment vis-à-vis age.

Other compliance issues

Education of patient, teacher, etc. Parents need to champion this cause. Decorate eye patches to attract children. Home activity kits with instructions, track and demonstrate improvements in-office to encourage treatment.

Treatment options

Refractive correction alone. Surgery to treat the cause of amblyopia. Occlusion therapy. Penalization. Drug therapy. Pleoptics. Home vision therapy. Active vision therapy.

Refractive correction

The amblyopic eye must have the most accurate optical correction prior to any occlusion therapy. Atropine penalization or occlusion therapy is required only if the child does not improve by use of optical correction for 4 months.

GUIDELINES FOR PRESCRIPTION OF GLASSES IN YOUNG CHILDREN

CONDITION	AGE 0-1 YEARS	AGE 1-2 YEARS	AGE 2-3 YEARS
ANISOMETROPIA			
HYPEROPIA	>+2.00D	>+1.50D	>+1.00D
ASTIGMATISM	>2.00D	1.50D	1.00D
MYOPIA	>-3.00D	>-2.50D	>-2.00D
ISOMETROPIA			
MYOPIA	>-4.00D	>-3.50D	>-2.50D
HYPEROPIA (NO MANIFEST DEVIATION)	>+5.00D	>+4.50D	>+4.00D
HYPEROPIA WITH ESOTROPIA	>+2.50D	>+1.50D	>+1.00D
ASTIGMATISM	>2.50D	>2.00D	>1.50D

Surgical management

For the strabismus amblyopia, surgery is performed to re-align the visual axis. Similarly, for the stimulation deprivation amblyopia treat the cause.

Patching/Occlusion therapy

Mainstay of treatment since the 18th century -

- This forces the child to use the amblyopic eye. Patching stimulates vision in the weaker eye and helps the part of the brain that manages vision to develop more completely.

OCCLUSION SCHEDULE

AGE OF PATIENT	OCCLUSION (DAYS)	
	BETTER EYE	AMBLYOPIC EYE
0-1 YEAR	3	1
2-3 YEAR	4	1
4-6 YEAR	5	1
>6 YEAR	6	1

Problems in applying patching

Poor compliance due to reduced vision during school and work related visual tasks. Cosmetic concerns. Skin allergies and irritations with bandage-type occluders. Psychological problems.

PEDIG

In 1997, the pediatric eye disease investigator group (PEDIG) was formed to conduct clinical research in eye disorders affecting children. Amblyopia is the most common cause of monocular visual impairment in children and young and middle aged adults. PEDIG has laid emphasis on studies of treatment modalities of amblyopia, the Amblyopia Treatment Studies (ATS). The recent general guidelines for occlusion therapy are based on ongoing ATS - these are equally effective as previous therapy with better compliance.

Recent guidelines of ATS

ATS-1:

- Adhesive patch vs. atropine penalization with moderate amblyopia (20/40-20/100)
- Results: Similar magnitude of improvement in VA for children <7 yrs.

ATS-2 Part A:

- 6 hours/day vs. full time occlusion with severe amblyopia (20/100-20/400)
- Results: Similar magnitude of improvement in VA for children 3-7 yrs.

ATS-2 Part B:

- 2 hours/day vs. 6 hours/day occlusion with moderate amblyopia (20/40-20/80)
- Both groups had 1 hour/day of prescribed near activities during occlusion

- Results: Similar magnitude of improvement in VA for children 3-7 yrs.
- No time difference in VA results (both had similar rates of improvement)

ATS 4:

- • Compared daily vs. weekend (2 days) atropinisation for moderate amblyopia (20/40-20/80)
- • Results: Similar magnitude of improvement in VA for children 3-7 yrs.

Other therapy

Active vision exercises by amblyopic eye during occlusion therapy may enhance the success of occlusion and reduces the treatment time,

1. Eye-hand coordination (throwing, hitting, tracing, drawing)
2. Resolution activities (hidden pictures, letter searches, card games)
3. Accommodative amplitude (near-far focus, lenses)
4. Oculomotor skills (saccadic and pursuit training)
5. Pleoptic methods (after-image flash)

Simple task like - dotting the o's and encircling the e's in the newsprint, joining the dots to make drawing tracing, threading beads, watching television, reading comics and story books may be quite useful and enhance the recovery. Computer games, especially designed for active vision exercises, are being considered a very useful adjunct with occlusion therapy. In patients with improvement, vision assessed at monthly follow-up visits, the occlusion should be continued till the amblyopic eye has not only developed equal vision but also equal preference of fixation compared to the normal eye. On an average, it may take 3-6 months, depending upon the age of the patient and initial level of vision. The younger the patient the better is improvement in the visual acuity, when the occlusion is started, and the shorter is duration of occlusion required, lesser recurrence. In patients with no improvement with occlusion on three consecutive monthly follow-up visits, further occlusion is unlikely to be fruitful.

Role of near activities PEDIG study 2005

Designed to determine whether children randomized to near or non-near activities would perform prescribed activities and to obtain a preliminary estimate of the effect of near versus non near activities on amblyopic eye, when combined with 2 hours of daily patching. Performing near activities while patching may be beneficial in treating amblyopia.

Penalization

Therapeutic technique performed by optically defocussing the eye with better vision by using cycloplegia or by altering the eyeglass lens to cause decreased vision in the non amblyopic eye. Advantages being - easier administration, lower cost and good compliance.

- Indications -
 - Moderate amblyopia in uncooperative patients
 - Anisometropic amblyopia
 - Maintenance therapy
 - Occlusion failure
 - Occlusion nystagmus

Drug therapy

Levodopa exact action is unknown, it either extends or reactivates the visual system's sensitive period of neural plasticity. When drug is used in lower doses of 0.48mg/kg body weight for 3 weeks, there was improvement in visual acuity and no side effects were observed.

Side effects - Nausea, vomiting, diarrhoea, mood disorder, tiredness, hallucinations, decreased respiration and heart rate, nocturnal incontinence.

Newer therapy

Red filter treatment

Discovered by Brinker and Katz for treating amblyopia associated with eccentric fixation. Based on the principle that predominantly rod populated areas of the retina are used for eccentric fixation. Totally occlude the sound eye and application of a red filter that exclude wavelengths shorter than 640nm on the spectacle frame before the amblyopic eye. The red filter is ineffective in stimulating this area because of reduced number. of cones as compared to fovea, thus red filter forces the patient to use fovea. Red filter is removed when fixation becomes central and further occlusion is continued till amblyopic eye becomes normal.

Liquid crystal glasses

Recently been developed as a treatment for amblyopia. They provide an electronic, controlled intermittent occlusion of the sound eye allowing for visual stimuli input to the amblyopic fellow eye.

Acuity maintenance regime

Once the vision has been equalized, the maintenance occlusion should be started and continued till the amblyogenic age i.e. up to at least 9 yrs and sometimes even till the child has reached early teens. Maintenance occlusion is accomplished by a part time occlusion for 2-3 hrs in a day with active vision exercises at home for severe amblyopia. Gradual reduction of patching hours. Penalization with atropine 1 day per week or 2 days per week is sufficient for mild to moderate amblyopia maintenance therapy. This may require periodic monitoring until 8-10 years of age.

ATS 2C:

ATS 2C was undertaken to study the recurrence of amblyopia after discontinuation of treatment. Approximately one fourth of the children were noted to have a recurrence of amblyopia in the first year post treatment. This is similar in the patching and atropine group. In patients with intense patching (6-8 hours per day), recurrence was more common when the treatment was not reduced prior to cessation, than when treatment was reduced to 2 hours per day prior to cessation. Thus, maintenance therapy or tapering of therapy should be strongly considered and recommended.

Conclusion

Returning to original treatment regime helps to regain the higher visual acuity followed by maintenance therapy. Stress on importance of good compliance and long term follow up are a must for prevention of recurrence.

Carry home message

- Finally, amblyopia management requires a multi disciplinary approach with involvement of not only the ophthalmologist but also pediatricians, general practitioners, teachers and parents.
- So let us all join hands to make the world amblyopia free.