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Management of Amblyopia by Occlusion therapy

Lokesh HM[1]*, and Bindurani MK[2].

[1]Department of Ophtahlmology, Sri Siddhartha Medical College, Tumkur, Karnataka, India.
[2]Department of Anatomy, Sri Siddhartha Medical College, Tumkur, Karnataka, India.

ABSTRACT

Amblyopia is defined as unilateral or bilateral decrease of best corrected visual acuity of two line difference, caused by pattern vision deprivation or abnormal binocular interaction for which no causes can be detected by physical examination of the eye and in appropriate cases is reversible by therapeutic measures. It is the most common cause of monocular visual impairment among children. Occlusion therapy with patching of the non-amblyopic eye has long been the mainstay of amblyopia treatment. Our aim was to study the response of amblyopic patients of different age groups to occlusion therapy. Data were collected from 39 patients below the age of 14 years with difference in visual acuity of at least 2 lines or less than 6/12 in each eye in cases of bilateral amblyopia . All the patients were treated with total occlusion of good eye. Out of 28 children who completed the whole course of treatment. 20 were cured with visual acuity of 6/9 or better in the amblyopic eye. In remaining 8 cases visual acuity showed 2-3 lines of improvement. Occlusion is one of the effective mode of treatment of amblyopia and Compliance is main factor in successful treatment.
Keywords: Amblyopia, Occlusion, Compliance , Visual acuity

Corresponding author

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INTRODUCTION

The term Amblyopia literally means "Dullness of vision". It is defined as unilateral or bilateral decrease of best corrected visual acuity of two line difference, caused by pattern vision deprivation or abnormal binocular interaction for which no causes can be detected by physical examination of the eye and in appropriate cases is reversible by therapeutic measures [1]. It is the most common cause of monocular visual impairment among children, young, and middle-aged adults [2]. Children are susceptible to amblyopia between birth and 7-8 years of age. The frequency of amblyopia varies in different population . It ranges from 1% to 3.2% among military recruits, 0.55% to 3.5% in preschool and school children, 4 to 5.3% in patients with ophthalmic problems. It is said that 2.05% to 2.5% of general population have amblyopia [1].

It is thought that amblyopia results from inadequate stimulation of the fovea or peripheral retina or abnormal binocular interaction, resulting in different visual input from the foveae [3]. Amblyopia results in the loss of binocular vision, which is manifested as absent stereoscopic depth perception, poor spatial acuity, low contrast sensitivity and reduced sensitivity to motion [4].

Although the condition has been recognised from antiquity there is still much that is not understood about clear guidelines for treatment. Even though there are many modes of treatment for amblyopia like Penalisation, Red filter treatment, pleoptics, CAM treatment, and drugs, Occlusion therapy with patching of the non-amblyopic eye has long been the mainstay of amblyopia treatment [5]. Occlusion therapy by a patch is an economical, affordable and the feasible option for amblyopia.

However the age beyond which amblyopia treatment is not effective is still open to question. Thus the paediatric ophthalmologists whose amblyopic patient is more than 8 years old wonders when treatment is justified, particularly in the view of the physochological implications and crowded daily activities of the children at this age. These could be the reason for lack of compliance at this age, which might in turn explain the reported higher percentage of treatment failures in older children. Success of amblyopia treatment in older children up to 15 years of age, with fulltime occlusion is reported [6].

So our aim was to study the response of amblyopic patients of different age groups to occlusion therapy.

MATERIALS AND METHODS

Data were collected from 39 patients below the age of 14 years with difference in visual acuity of at least 2 lines or less than 6/12 in each eye in cases of bilateral amblyopia attending Ophthalmology OPD. Children more than 14 years of age, with any evident of organic causes for decrease in vision or with mental retardation were excluded from the study. Ambloypia was identified as difference of best corrected visual acuity between two eyes of at least two lines on the age specific visual acuity testing methodology. Visual acuity was assessed depending on the age of the patient by different methods. For visual acuity testing in 0-3 years of age , fixing and following of light or accommodative target, the visual acuity in that eye was considered to be good and Snellen's equivalent assigned. If the child was not able to fix follow the light or accommodative target, that eye was considered as amblyopic. For visual acuity testing in 3-5 years of age Snellen's equivalent picture chart and Snellen's E picture chart was used. After the age of 6 years Snellen's letter chart was used in general.

All the patients were treated with total occlusion of good eye. This was alternated with occlusion of amblyopic eye to prevent occlusion amblyopia. The duration of occlusion of good eye was done depending on the age of the patient alternating with one day occlusion of amblyopic eye. This was done for 2 days up to 2 years of age and subsequently up to 6 years of age the duration was increased to 1 day for every year. Thus patching was done for 3:1, 4:1 or 5:1 days for 3,4,5 years respectively in old children. Above 6 years the regime remains 6:1 for all ages. A skin patch with cotton and gauze eye pad secured with micropore plaster was used. Occlusion was carried out for all working hours. The rate of improvement was monitored by examining the children as for as possible every weak during first 4 weeks and thereafter every 2nd week for the rest of the treatment. After the treatment was over the children were put on maintenance occlusion for 1 hour daily.

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RESULTS

A total of 39 patients of Indian origin aged less than 14 years (Table-1) were analysed out of which 22 were males and 17 were females. Out of 39, only 28 children completed the whole course of treatment. Out of 28 children 20 were cured with visual acuity of 6/9 or better in the amblyopic eye. In remaining 8 cases visual acuity showed 2-3 lines of improvement. (Table-3,4 and 5).

The duration until cure in relation to the age at the start of treatment of complaint children were also noted. The treatment time until cure ranged from 30 days to 150 days to achieve final visual acuity except in 4 year old child which was 1 year 6 months and was attributed to low compliance. (Table-6). The treatment time was not related to initial degree of amblyopia.

Table 1: Showing age incidence

Age group	No. of cases	percent
Less than 4 years	4	10.2%
4-8 years	23	59%
More than 8 years	12	30.8%

Table 2: Showing causes for Amblyopia

Type of Amblyopia	No. of cases	Percent
Ametropic amblyopia	9	23
Anisometropic amblyopia	8	20.5
Strabismic amblyopia	17	43.6
Meridional amblyopia	2	5.12
Stimulus deprivation amblyopia	3	7.7 2

Table 3: Showing initial visual acuity scores

Visual acuity range	No. of cases
<6/60	11
6/60-6/24	13
>6/24	15

Table 4: Showing visual acuity achievements in children aged 8 and <8 years old

Initial visual acuity	Cf-1m to 6/12		
Final visual acuity	1 line difference or better	2 line difference	>2 line difference
	15 cases	4 cases	2 cases

Table 5: Showing visual acuity achievements in children > 8 years old

Initial visual acuity	Cf-1m to 6/12		
Final visual acuity	1 line difference or better	2 line difference	>2 line difference
	3 cases	3 cases	1 case

Table 6: Showing time taken to cure in different age groups

Age groups	Time to cure (days)
< 4 years	75-105
4-8 years	30-150
>8 years	30-150

DISCUSSION

The response to amblyopia therapy is related to type of amblyogenic stimulus, initial depth and duration of amblyopia, age at initiation of therapy, method of amblyopia treatment and compliance [7].

Epelbaum et al reported in strabismic amblyopia that the recovery of acuity of the amblyopic eye was maximum when the occlusion was initiated before three years of age, the improvement further decreased as a function of age and was about null by the time the patient was 12 years of age [8]. Similarly Rutstein et al reported that the visual acuity improvement is somewhat lesser in patients older than seven years than in younger patients [9]

Although the paediatric ophthalmologists agree that amblyopia should be treated at an early age, there is no evidence that treating older children and adults is without benefit and good reports in such cases have been reported. As far back as in 1982, Sen had suggested that every effort should be made to treat patients even after 12 years of age [10].

Vereecken and Brabant described a series of 144 amblyopic patients aged 9-61 years who had each lost good eye as a result of trauma or illness. In 28.5% treatment lead to improved vision in amblyopic eye [11].

Foley-Nolan et al in their study showed that atropine penalisation has been shown to be as effective as occlusion therapy [12]. The advantage of occlusion therapy is short duration, while main disadvantages are low compliance and risk of occlusion amblyopia. A study conducted by Scheiman and coworkers in 2004 on 404 patients aged 7–17 years found that 49% of treatments were successful in 7–12 year olds and 23% were successful in 13–17 year olds [13].

Brar GS et al conducted a retrospective study on 88 children more than 6 years of age and reported success rate of 90% following full time occlusion therapy. Time taken to achieve final treatment was 5.59+_2.78 months which correlates with our study [14].

In our study we extended the treatment age until 14 years to know the effectiveness of treatment in older children. We used occlusion of sound eye as a main therapeutic modality. Occlusion remains even today mainstay of treatment which reported success rates ranging from 30%-93% [15].

In our study with occlusion we got 71.4% success rates with visual acuity of 6/9 or better in complaint children.

In all the three age groups most of the improvement occurred during first 2-3 weeks of treatment. And visual acuity achievements were same regardless of age. The improvement in visual acuity at first was quite rapid but slowed down once a certain level of acuity has been reached. Similarly Oliver et reported that most of the improvement of visual acuity occurred during the first three months of treatment independent of type or initial degree of amblyopia. The main clinical implication of this finding is that occlusion therapy for amblyopia in older children can be restricted to 3 months period provided that patient is complaint. If visual acuity does not improve during this time despite full compliance with treatment the case may be described as refractory amblyopia [16]. Most of the published reports suggest that following occlusion therapy, visual acuity starts improving within the first 3 months and maximal benefit occurs within the first 3-6 months [17,18].

Oliver et al believe that the success of treatment cannot be measured by visual acuity alone but the initial visual acuity must also be taken into account. However in our study the final visual acuity did not correlate with initial visual acuity.

Studies have shown that patching or occlusion therapy compliance is a major factor that influences the outcome of treatment [19,20].

It is often claimed that compliance with treatment has a significant effect on final visual acuity results. In our study 71.8% of the children were complaint and 28.2% were non complaint with occlusion therapy. Among the complaint children 71.4% children were cured with visual acuity of 6/9 or better. In our study younger children were more complaint to patching than older ones .Our study shows that low compliance to patching is the primary factor for treatment failure. Emphasis should therefore be placed on adherence to therapy during amblyopia treatment and initial and repeated information about the importance of compliance to treatment should be given to the family.

After cessation of treatment, however the improvement in visual acuity in amblyopia tends to deteriorate. In study by Levartovsky (14) et al, deterioration of visual acuity occurred in 51.6% of patients after cessation of treatment. In our study in order to prevent the deterioration of visual acuity after treatment, patients were put on maintenence occlusion for two to four hours of day.

CONCLUSION

Occlusion is one of the effective modes of treatment for amblyopia. Compliance to treatment regimen is main factor in successful therapy of amblyopia. Our study hypothesises that age is not a strong factor in the outcome of amblyopia treatment and response to occlusion is same in all age groups.

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