Original Article

Causes of amblyopia in children coming to ophthalmology out patient department Khyber Teaching Hospital, Peshawar

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Abstract

Objective: To find the causes of amblyopia in patients 4 to 14 years old attending out patient Ophthalmology department of Khyber teaching Hospital Peshawar.

Methods: In this prospective cohort hospital based study 200 children aged 4-14 years were studied over a period of 12 months from December 2005 to November 2006 in outpatient department of Ophthalmology, Khyber Teaching Hospital. Visual acuity was checked with Snellen's and Lea symbols depending on level of cooperation of patient. Cycloplegic refraction and orthoptic assessment was performed on all patients. Amblyopia was classified as strabismic, anisometropic, combined and stimulus deprivation. Treatment consisted of optical correction, patching, atropinization and surgery.

Results: Out of 200 patients 126(63%) were male and 74 (37%) were female, 114 (57%) were in age group 4-9 years while 86 (43%) were between 10-14 years. Strabismic amblyopia was present in 110 (55%), Anisometropic amblyopia in 42 (21%), combined mechanism amblyopia in 32 (16%), ammetropia in 12 (6%) and stimulus deprivation amblyopia in 4 (2%) Binocularity could not be assessed in 16 (8%), was present in 38 (19%) and absent in 148 (73%).

Conclusion: Amblyopia was more common in males than females. Most of the children presented in younger age group of 4-9 years. Strabismic amblyopia was the most common cause of amblyopia. Amblyopia was more common in esotropes than exotropes. Half of the patients had moderate amblyopia, while the remaining were suffering from either mild or severe amblyopia. Binocularity was absent in 73% of the patients (JPMA 58:125;2008).

Introduction

Amblyopia is classically defined as a reduction in corrected visual acuity (VA) in absence of visible organic abnormalities and is due to misdirected, blurred, or absent retinal images during development of visual system.[1] It is the most frequent cause of monocular visual impairment in both young and adults.[2] The causes of amblyopia include strabismus, anisometropia, high refractive error, media opacities, high astigmatism or combination of two or more etiologies in the same patient. Strabismic amblyopia is the most common form of amblyopia which develops in consistently deviating eye of the child with ocular misalignment. Constant or alternate tropias (typically esodeviations) are most likely

to cause significant amblyopia. Anisometropic amblyopia is second in frequency to strabismic amblyopia. Anisometropic amblyopia develops when refractive error in two eyes causes image on one retina to be chronically defocused. Relatively mild degrees of hyperopic or astigmatic anisometropia (1-2D) can induce amblyopia. Mild myopic anisometropia (less than -3D) usually does not cause amblyopia but unilateral high myopia (-6D) often results in severe amblyopic visual loss. Isoametropic amblyopia is a bilateral reduction in visual acuity that is usually relatively mild, results from large approximately equal uncorrected refractive errors in both eyes of a young child. Hyperopia exceeding about +5D induces bilateral amblyopia. Stimulus deprivation amblyopia is usually caused by congenital or early acquired media opacities. Stimulus deprivation amblyopia is least common but most damaging and difficult to treat. Combined amblyopia includes patients with either heterotropia at near or distance along with anisometropia. Treatment regimens of amblyopia consist of optical correction, patching, atropine and in case of sensory deprivation amblyopia, treatment of the cause. Similarly in strabismic amblyopia once the visual acuity improves by amblyopia therapy surgery is performed to correct the ocular misalignment.

The objectives of the study were to identify causes of amblyopia in patients 4 to 14 years attending out patient Ophthalmology department Khyber teaching Hospital Peshawar.

Patients and Methods

In this prospective cohort hospital based study 200 children aged 4-14 years were studied over a period of 12 months from December 2005 to November 2006 in outpatient department of Ophthalmology Khyber Teaching Hospital. Visual acuity was checked with best possible correction using Snellen's and Lea symbols depending on level of cooperation of children. Cycloplegia was performed on all children. Additional ocular examination included Krimsky test, prism cover test, Bagolinis test, Titmus fly test, worth four dot test, Lang test, crowding phenomenon, eccentric fixation examination with ophthalmoscope and ocular motility examination whereever required. Patients were asked to come for a follow up after every two months till vision improved, for a period of 12 months. They were provided appropriate optical corrections and were instructed to perform near visual tasks for at least one hour a day while patching and were advised to do home work, reading, drawing and computer work. Patients in younger age group (4-12 year) were also prescribed one drop daily of atropine for the sound eye. At each visit visual acuities were measured in each eye separately wearing best possible correction. Patching was prescribed for 2-6 hours a day in the non school hours. For children whose sound eye acuity was decreased by two or more lines from the baseline and the inter eye acuity difference was one or more lines, patching was advised on alternate eye on alternate days. A treatment success was a final visual acuity of 6/9 or better or if the visual acuity had improved to two lines or more. In our study patients with visual acuity of 2 line difference between two eyes were labeled as mild amblyopes, patients with visual acuity of 3 and 4 line difference between two eyes were labeled as moderate and severe amblyopes respectively.

Results

Out of two hundred patients 126 (63%) were male and 74 (37%) were female. 114 (57%) were in age group 4-9 years while 86 (43%) were between 10-14 years. Strabismic amblyopia was present in 110 (55%), anisometropic amblyopic in 42 (21%), combined mechanism amblyopia in 32 (16%), ammetropia in 12 (6%), and stimulus deprivation in 4 (2%) of the children. In strabismic amblyopia 83 (75%) were esotropes while 27 (25%) were exotropes. 72 (36%) patients were mild amblyopes, 102 (51%) moderate amblyopes while 26

Table 1. Base line characteristic according to cause of amblyopia before amblyopia therapy.

Visual acuity in worse eye	Strabismus n=110	Anisometropia n=42	Combined n=32	Stimulus deprivation n=4	Ammetropic n=12
6/6	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
6/9	0 (0%)	1 (.5%)	2 (1%)	0 (0%)	0 (0%)
6/12	16 (8%)	2 (1%)	8 (4%)	0 (0%)	2 (1%)
6/18	21 (10.5%)	3 (1.5%)	7 (3.5%)	0 (0%)	1 (0.5%)
6/24	30 (15%)	14 (7%)	4 (2%)	1 (0.5%)	3 (1.5%)
6/36	32 (16%)	8 (4%)	3 (1.5%)	0 (0%)	4 (2%)
6/60	18 (9%)	8 (4%)	4 (2%)	1 (0.5%)	1 (0.5%)
< 6/60	5 (2.5%)	4 (2%)	4 (2%)	2 (1%)	1 (1.5%)

Table 2. Base line characteristic according to cause of amblyopia after amblyopia therapy.

Visual acuity in worse eye	Strabismus n=110	Anisometropia n=42	Combined n=32	Stimulus deprivation n=4	Ammetropic n=12
6/6	10 (5%)	1 (0.51%)	2 (1%)	0 (0%)	2 (1%)
6/9	12 (6%)	2 (1%)	5 (2.5%)	0 (0%)	1 (0.5%)
6/12	13 (6.5%)	3 (1.5%)	2 (1%)	0 (0%)	2 (1%)
6/18	15 (7.5%)	7 (3.5%)	7 (3.5%)	1 (0.5%)	1 (0.5%)
6/24	5 (2.5%)	8 (4%)	4 (2%)	0 (0%)	4 (2%)
6/36	4 (2%)	13 (6.5%)	3 (1.5%)	1 (0.5%)	1 (0.5%)
6/60	6 (3%)	4 (2%)	2 (1%)	0 (0%)	1 (0.5%)
No Improvement	35(17.5%)	4 (2%)	4 (2%)	2 (1%)	0 (0%)

(13%) were severe amblyopes. Fixation was central in 112 (56%), eccentric in 72 (36%) while no fixation and the eye was wandering in 16 (8%) patients. There were 16 (38%) myopes and 25 (60%) hypermetropes and 1 (2%) with astigmatism in anisometropic amblyopes. In ammetropic amblyopes, 28 (66%) were hypermetropes and 14 (33%) were myopes. In sensory deprivation amblyopia, 1 (25%) patient had ptosis, 2 (50%) had congenital cataract and 1 (25%) had corneal scar. In combined mechanism amblyopia, 27 (84%) were hypermetropes, 6 (2%) were myopes and 3 (10%) had astigmatism. Binocularity could not be assessed in 16 (8%), was present in 38 (19%) and was absent in 148 (73%). Treatment success was seen in 155 (77.5%) patients while 45 (22.5%) patients showed no improvement in visual acuity.

Discussion

In our study strabismic amblyopia accounted for 110 (55%), anisometropic amblyopia for 42 (21%), combined amblyopia for 32 (16%), ammetropic amblyopia for 12 (6%) and stimulus deprivation amblyopia for 4 (2%). These findings are quite similar to those of a population based study by Wood Ruff et al[4] on 961 children with amblyopia in United Kingdom. The author found the cause to be strabismus in 57%, anisometropia in 17% and combination of two in 27% patients. Our findings differ from those of the study done by Shah M at Khyber Institute of Ophthalmic Medical Sciences, Hayatabad Medical Complex, Peshawar that had slightly greater number of patients with amblyopia due to anisometropia than due to strabismus with about one fifth of the patients having elements of both.[5] The reason may be that the study at Khyber Institute of Ophthalmic Medical Sciences was done by an Optometrist, who had greater referral of patients with refractive errors. Strabismus has been proven to be the most common cause of amblyopia[6,7] other causes are anisometropia, combined strabismus with anisometropia, and sensory deprivation.[8] In our study among strabismic amblyopes, 83 (75%) were esotropes while 27 (25%) were exotropes. Prevalence of amblyopia is higher in esotropia than exotropia.[9,10] Our study also showed 51% children to be moderate amblyopes. It has been found that the proportion of mild to moderate amblyopia is equal in patients with amblyopia due to strabismus and anisometropia but greater in patients with combined mechanisms. Severe amblyopia is encountered more in combined mechanism followed by strabismic amblyopia which suggests that strabismic and combined mechanism amblyopia represent more severe physiological deficit due to active cortical suppression, than purely anisometropia amblyopia.[11] Coexistence of strabismus and anisometropia are known to constitute a barrier to achievement of normal visual acuity.[12]

Early detection of amblyopia and institution of appropriate therapy is of immense value towards preventing prevalence of life long visual morbidity. We observed that 57% of our patients presented in age group 4-9 years. Associated strabismus was one of the reasons for early referral. Knowledge about subtypes of amblyopia is important because the clinical presentations, management and out comes of these different types are different. Various modalities are used for treatment of amblyopia. These techniques can only be applied and become useful if the diagnosis of amblyopia is made early in amblyogenic or vision developing age. Early detection of amblyopia and its treatment can reduce the overall prevalence as proved by many studies in different parts of the world.[13] Both in context of vision 20/20, with added stress on rehabilitation of paediatric low vision of which amblyopia is major preventable and treatable cause of monocular or binocular low vision in adulthood with associated deterioration of QOL (Quality of life) indices, measures for early detection, and dedicated rehabilitation of amblyopia should be taken on priority basis.[14-21]

Paediatricians could be trained to look for delays in the development of visual milestones in children. Training and availability of equipment is however necessary.

Conclusions

Amblyopia was more common in males than females. More than half of the patients presented in the younger age group. Strabismic amblyopia was the most common cause of amblyopia. Amblyopia was more common in esotropes than exotropes. Half of the patients were suffering from moderate amblyopia while the remaining were suffering from either mild or severe amblyopia.

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