Brief communication

Unilateral blindness and low vision due to strabismic amblyopia

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Abstract: To assess the magnitude of unilateral blindness or low vision caused by strabismic amblyopia in astrabismic population, a prospective study was conducted between November 15, 1995 and March 20, 1997 at Menelik II Hospital. The visual acuity of 361 patients with strabismus was evaluated. The average age of persentation was 15.8 years. Visual acuity of less than or equal to 3/60 in the involved eye was considered as blind, while visual acuity better than 3/60 and less than or equal to 6/18 was regarded as low vision. Forty one (11%) patients had unilateral blindness and 72(20%) had low vision in the amblyopic eye. In conclusion, unilateral blindness or low vision as a result of strabismic amblyopia was significant among strabismic patients, especially when the age of persentation of our cases was considered. This calls for health education to increase public awareness so that parents seek medical advice early for their strabismic children. [*Ethiop. J. Health Dev.* 2000;14(1):109-112]

Introduction

With normal visual experience, the eyes gradually adopt their convergence angle by the age of about six weeks (1). Presumably, the visual axes normally stop converging when the images of the visual world are correctly lined- up, in rough correspondence on the two retinae, and binocular cells are therefore consistently stimulated by correlated images. Suppression phenomena are well known to occur both in normal binocular vision and in patients with neuro-muscular anomalies of the eyes. Suppression that is orginally present only in binocular vision may develop into the complex sensory-motor syndrome of amblyopia, thus persisting even when the sound eye is covered.

Functional amblyopia has been described by Von Noorden as "reduced visual acuity without ophthalmoscopically detectable anomalies of the fundus" (2). Strabismic amblyopia is one of several sensory adaptations produced by a misalignment of the visual axes. In alternating tropia, suppression is carried over from one eye to the other when the patient is made to switch fixation between the eyes. Retinal rivalry is presumably the physiologic mechanism on which the sensory phenomena in alternating strabismus are based (3).

The management of strabismic amblyopia is to correct refractive error, treat amblyopia and align the visual axes of the eyes to obtain binocular cooperation. Though amblyopia is a reversible clinical condition, the therapeutic success depends on the age of the patient and the cooperation of the care-taker. Most ophthalmolgists agree that the upper age limit for the treatment of amblyopia is about six years (4,5). Untreated functional amblyopia results in permanent reduction of vision in the involved eye. The extent of visual reduction also depends on the age of onset and the duration of deprivation.

The significance of strabismic amblyopia as a cause of unilateral blindness or low vision has not been evaluated among Ethiopian strabismic patients. This prospective study was, therefore, designed to assess the visual consequences of amblyopia in strabismic patients with emphasis on the age at which our patients seek medical advice for their ocular misalignment.

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Methods

Patients with manifest ocular deviations seen at the motility clinic of the Department of Ophthalmology of Addis Ababa University, Menelik II Hospital between November 15, 1995 and March 20,1997 were studied. Patients with organic cause for their poor vision resulting in sensory deviation of the eye were excluded form the study population. Data on sex, age of onset, and age at presentation was recorded for the remaining strabismic patients in the study protocol.

The visual acuity of preverbal or uncooperative children was assessed by the reaction of the individual to occlusion of either eye and their fixation stability. The child's objection to the occlusion of an eye with fixation dominance was taken as indicative of the presence of visual asymmetry. The visual acuity of cooperative children and older patients was taken on Snellen's Chart. The pinhole test was also used whenever a subnormal vision was encountered. Retinoscopy was perfomed with 1 % atropine eye drop applied three times a day for three consecutive days for children under the age of twelve years. For older patients, this was done under 0.5% mydriacyl applied 2-3 times until the pupils were dilated. The fixation stability and reaction to occlusion in younger children was evaluated with the correction. In older patients the visual acuity was tested with correction on Snellen's Chart.

Blindness was defined as the visual acuity of 3/60 or less in the involved eye, while low vision was considered when the visual acuity of the amblyopic eye was less than or equal to 6/18, but better than 3/60. In preverbal children for whom visual acuity could not be objectively measured, the distance at which the child identified the object of interest with the sound eye patched was estimated by the parents at home.

Results

Four hundred and thirteen patients with strabismus were seen during the study period, of whom 52 (12.6%) had sensory origin and were thus excluded. The remaining 361 patients, 284 (78.7%) esotropes, 75 (20.8%) exotropes and 2 (0.5%) hypertropes were studied.

Visual acuity was taken in 306 (85%) of the cases while 55 (15%) were either too young or uncooperative to do the test. Amblyopia was established in 118 (33%) of strabismic patients. As shown in Table 1, 41 (11%) of the patients had visual acuity of 3/60 or less in the affected eye while 72 (20%) had low vision in the involved eye. All patients that were considered as having unilateral blindness were eccentric fixators.

The average ages of the patients was 15.8 years and their age ranged between six months and 55 years. Only 32 of 113 (28%) cases who presented with unilateral blindness were in the treatable age group. The majority of our patients, 81/113 (72%), presented with permanent unilateral visual impairment.

Table 1: **The distribution of amblyopia, unilateral blindness and low vision among different types of deviation.** 1995-1997

Type of deviation	Total	Amblyopia	Unilateral blindness	Low vision
Esotropia	284	101	40	56
Exotropia	75	17	1	16
Hypertropia	2	0	0	0
Total	361	118(33%)	41(11%)	72(20%)

Discussion

There is a significant degree of overlap in the number of children with amblyopia and strabismus with the point prevalence figure being 5% of the population(6). What makes this figure noteworthy is not only its appreciable size but also the fact that many cases are detected too late for treatment to be maximally effective. One reason for this situation is that the original detection of the amblyopia or strabismus must often be made by the parent or guardian who not only is untrained in recognizing the symptoms but who also may be reluctant to acknowledge the existence of such abnormality in the child.

The average age at presentation of our patients was 15.8 years; this was higher

compared to the previous reports of 3.64 (7) and 6-7 years (8). Shaw et.al. (7) also found that cases with strabismic amblyopia presented at an earlier age compared to other forms of amblyopia, the reason being that strabismus is often observed by parents or others and consequently advice may be sought early. A clear correlation between the angle of deviation and the age at diagnosis was also observed, those with larger angles being diagnosed earlier(9).

One hundred eighteen (33%) patients were found to have amblyopia among the strabismic population. Patients with amblyopia function adequately in most everyday life, but are limited in tasks requiring accurate, close-range depth- perception. They also lack the visual potential of the second eye if the healthy eye suffers visual reduction or loss. The reversibility of amblyopia is dependent on the duration of impairment and the age at which appropriate treatment is began.

Of the total strabismic patients 113 (31%) cases had either unilateral blindness or low vision. On further analysis, 41 (11%) and 72 (20%) of the cases had unilateral blindness and low vision, respectively. All patients who were regarded as having unilateral blindness were eccentric fixators. When the ages of our cases were considered, 81/113 (72%) of these patients were found to have permanent visual impairment indicating its lifelong significance among the strabismic population. Noting the limited choice of a future career for the young amblyopic person, prompt, early diagnosis and effective treatment is urged in all such patients.

Costenbader and Coworkers (10) have shown that the direction of strabismus correlates more closely with the eventual development of amblyopia than does the child's age at the time the deviation appeared. An analysis of 439 patients with strabismic amblyopia (11) demonstrated that those patients with esotropia had approximately four times greater incidence of amblyopia than those with exotropia. In this study, amblyopia occured about six times in esotropia (86%) than in exotropes (14%). This also supports the view that divergent strabismus is less prone to cause amblyopia than is the convergent type.

The treatment of amblyopia has many variants, all of which are based on occluding the eye with good vision. While occlusion treatment is primarily designed to prevent the fixating eye from taking part in the act of vision and to put the amblyopic eye to work, it also prevents the fixating eye from exerting inhibitiory stimuli on the amblyopic eye. The quality of interactions with health care providers, expectations about treatment, and compliance with the recommended schedule determine the outcome of treatment. This is a succession of steps; one should not skip a step unless one is aware of and accepts the possible consequences. The long road should not be discouraging as it will not be possible to pass by the same road later.

The obstacles in the management of strabismic amblyopia could be social as well as medical factors. A variety of health beliefs in the community could influence the parents' reaction to their squinting children. Knowledge about the cause and significance of strabismus might also affect their decisions about whether or when to seek medical care for their children. The long followup required until the patient is aged 12-13 years (12) would, undoubtedly, pose an economic burden on the family and affects the outcome of therapy as noted by Grahm previously(13). Unavailability of a screening program for pre-school children to early identify cases that are likely to develop amblyopia also appears to be a major contributing factor.

Amblyopia is preventable. One need not stress that prevention is preferable to any cure and that ophthamologists should do all in their power to avoid its occurrence. Parents and pediatricians must be taught to refer infants to an ophthalmologist as soon as any abnormality in the position of the visual axes is suspected.

References

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