

The Clinical Manifestations of the Amblyopic Subjects in Middle Black Sea Region of Turkey

Türkiye'nin Orta Karadeniz Bölgesindeki Ambliyopik Olguların Klinik Bulguları

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Özet

Amaç: Ambliyopik olguların klinik bulguları değerlendirilmesi

Yöntem: Yaş, cins, görme keskinliği, ambliyopi tipi, ambliyopik göz, kırma kusuru, şaşılığın tipi, füzyon, stereopsis ve ambliyopi tedavisinin başarısı değerlendirildi.

Bulgular: Dört yüz elli bir hastanın yaş ortalaması 21.3±15.3 yılıdır. Üç yüz onbir hastada (%69) anizometropik, 108 hastada strabismik (%24), 16 hastada karışık (%3.5) ve 16 hastada ise deprivasyon ambliyopisi (%3.5) mevcuttur. Hipermetropi en sık kırma kusuruydu. Dört yüz elli bir olgudan seksen üçü düzenli olarak takip edilmişti. Seksen üç olgudan elli dörtünde şaşılık, yirmi dokuzunda anizometropik, karma ve deprivasyon ambliyopisi mevcuttu. Takibi yapılan tüm olguların en iyi görme keskinliği, stereopsis ve füzyonunda anlamlı artış olduğu belirlendi (p<0.001).

Sonuçlar: Ambliyopiyi azaltmak için tarama programları oluşturulmalıdır.

Anahtar kelimeler: Ambliyopi, füzyon, stereopsis, tedavi

Abstract

Purpose: To evaluate the clinical manifestations of amblyopia.

Methods: Age, sex, visual acuity, type of amblyopia, amblyopic eye, refractive error, type of strabismus, fusion, stereopsis and the success of amblyopia treatment were evaluated.

Results: The mean age of 451 subjects was 21.3±15.3 years. Three hundred and eleven patients (69%) had anisometropic, 108 had strabismic (24%), 16 patients had (3.5%) mixed and 16 (3.5%) had deprivation amblyopia. Hypermetropia was the most common refractive error. Only 83 of 451 subjects (%18.4) were followed. Fifty-four of 83 (65%) had strabismic, 29 (35%) had anisometropic, mixed or deprivation amblyopia. Significant increase was found in final best corrected vision, stereopsis and fusion in followed patients (p<0.001).

Conclusions: Screening programs should be constituted to minimize amblyopia.

Key words: Amblyopia, fusion, stereopsis, treatment

Introduction

Amblyopia is a common visual disorder in the childhood and its prevalence is 1-5% (1). The decrease in the visual acuity cannot be explained by a recognizable pathological problem. Beside reduced letter acuity, binocularity and stereopsis are also effected in amblyopia (2). The most common causes are anisometropia, strabismus and deprivation (3). Early diagnosis and treatment provide stable visual improvement and the visual sensitive period is 6 to 7 years old (1). Amblyopia is one of the important causes of unilateral visual loss in developing countries (4). Saw et al. reported that amblyopia as one of the major cause of unilateral blindness in rural Indonesia (5). A few studies has been conducted for amblyopia in Middle East Region. Yekta et al. reported the incidence of amblyopia as 2.29% in school children screened for amblyopia (n=2638) (6). Anisometropic amblyopia was found in 58.1% of their amblyopic subjects. In this study, we aimed to evaluate the clinical manifestations of amblyopia in Middle Black Sea Region of Turkey.

Materials and Methods

A total of 451 amblyopic subjects who admitted to our ophthalmology clinic between January 2006 and March 2011 were evaluated retrospectively. Age, sex, visual acuity, type of amblyopia, amblyopic eye, refractive error, type of strabismus, fusion with Worth 4 dots test and stereopsis with Titmus stereo acuity test were recorded in 451 subjects. The history of prematurity, oxygen treatment, low birth weight, febrile illness and trauma were questioned. Family history of

strabismus, anisometropia and amblyopia were determined. Amblyopia types were classified as strabismic, anisometropic, deprivation or mixed (strabismic+anisometropic). Eighty – three of 451 subjects (%18.4) were followed. Fusion, stereopsis and best corrected visual acuity after treatment were examined in followed patients (n=83). Part time occlusion was used as the treatment method.

All subjects were treated in accordance with the tenets of the Declaration of Helsinki. Approval for the study was obtained from the local ethics committee of Gaziosmanpaşa University.

Pearson's chi-square test was used to compare the categorical variables among groups. Categorical variables were presented as count and percentages. Kolmogorov-Smirnov test was used to evaluate whether the distribution of continuous variables were normal. Accordingly, it was seen that all variables displayed a normal distribution. Therefore, two independent sample t test was used to compare the continuous variables between groups. Two paired sample t test was used to compare the continuous variables between before and after treatment. Continuous variables were presented as mean and standard deviation. A p values <0.05 were considered as statistically significant. Analysis were performed using commercially software (IBM SPSS Statistics 19, SPSS inc., an IBM Co., Somers, NY).

Results

The mean age of 451 patients was 21.3±15.3 (1-73) years. Two hundred and sixty-one of 451 (57.9%) were female and 190 (42.1%) were male (p=0.125). The

mean age of females and males were 22.1±15.0 and 20.1±15.7 years, respectively (p=0.168). The mean age of 83 followed patients was of 7.31±3.17 (3-25) years. Eighty-seven patients (19.3%) had family history of amblyopia.

Three hundred and eleven patients (69%) had

anisometropic, 108 had strabismic (n=86 (19.1%) esotropia, n=22 (4.9%) exotropia), 16 had (3.5%) mixed and 16 (3%, 5) had deprivation amblyopia. Of the followed patients, 54 (65%) had strabismic, 29 (35%) had anisometropic, mixed or deprivation amblyopia (Table 1).

Table 1: Distribution of amblyopia types

	Anisometropia	Strabismic		Mixed	Deprivation
		Esotropia	Exotropia	(Strabismic +Anisometropia)	
All patients (n=451)	311	86	22	16	16
Followed patients (n=83)	18	42	12	10	1

The cause of deprivation was congenital cataracts in 5 patients (31.3%), ptosis in 3 (18.8%), keratoconus in 4 (25%), persistent hyperplastic primary vitreous (P HPV) in 1 (6.3%), and corneal opacity in 3 patients (18.8%). Left eyes were found to be more amblyopic than right eyes. (n=233, n=207, respectively) 11 patients (%2.4) had amblyopia in both eyes.

Visual acuity were assessed in 446 patients, in 5 patients could not be determined because of young age. The mean visual acuity of amblyopic eyes before treatment was 0.1±0.2. 83 cases could be followed. Of these cases, the mean visual acuity before treatment was 0.6±0.3. The mean follow up in 83 cases was 17.7±8.9 months. The mean visual acuity of 83 cases was 0.9±0.1 after the treatment. (p=0.001) (Table 2)

The refractive error of 446 cases was calculated as spherical

equivalent. The mean of absolute spherical equivalent in amblyopic eyes was 1.3±3.6 D (-17.00 - +8.50). The mean spherical equivalent of the amblyopic eyes of 83 patients was 2.5±3.5D (-1.0 - +7.5) at the first visit and 2.3±3.2 D (-0.75-+6.50) after the follow-up period (p> 0.05) (Table 2).

Hyperopia was more frequent than myopia in both 451 cases and 83 cases with followed patients (p<0.001). A hundred and eight of 451 cases had strabismus. Deviations at distance and near were measured. (30.1±6.4 PD and 25.1±10.2 PD respectively) Before treatment, 49 of 83 patients had examined at distance and near (23.1±8.3 PD and 17.1±8.1 PD respectively). After the occlusion therapy and refractive correction, it was 8.0±8.3 PD at distance and 6.5±7.6 PD at near, respectively (p<0.001). In 5 patients deviation was measured by Krimsky. It was 29.0±5.5 PD before and 10.0±7.1 PD after the treatment (p=0.009) (Table2).

Table 2: Comparison of the parameters in the study group

		Before treatment	After treatment	p
Angle of Deviation at distance (PD)	All patients (n=103)	30,1±6,4	-	-
	Followed patients (n=49)	23,1±8,3	8,0±8,3	<0.001
Angle of Deviation at near (PD)	All patients (n=108)	25,1±10,2	-	-
	Followed patients (n=49)	17,1±8,1	6,5±7,6	0,009
	Followed patients by Krimsky (n=5)	29±5,5	10±7,1	-
Visual Acuity	All patients (n=446)	0,1±0,2	-	-
	Followed patients (n=83)	0,6±0,3	0,9±0,1	<0.001
Refraction error (D)	All patients (n=446)	1,3±3,6	-	-
	Followed patients (n=83)	2,5±3,5	2,3±3,2	0,050
Stereopsis(sec/arc)	All patients (n=446)	1830,0±212,5	-	-
	Followed patients (n=78)	381,5±256,8	99,6±91,5	<0,001
Fusion	All patients (n=446)	Right Suppressed	200 (44.8)	-
		Left Suppressed	230 (51.6)	-
		Fusion available	16 (4.4)	-
Fusion	Followed patients (n=78)	Right Suppressed	36 (46.2)	-
		Left Suppressed	42 (53.8)	3 (3.8)
		Fusion available	-	75 (96.2)

Data were presented as mean±st.deviation and n (%).

Fusion of the 446 patients were evaluated and in 230 left eyes, in 200 right eyes were suppressed in both distance and near. 16 patients had fusion. Fusion was evaluated in 78 of 83 followed cases. Before the treatment, in 42 of 78 patients left eyes, in 36 patients right eyes were suppressed in both distance and near. Fusion was

achieved in 75 of 78 patients after treatment, 3 patients had suppression on the left eye after the treatment ($p<0.001$) (Table 2).

Stereopsis was assessed in 446 patients. The mean stereopsis was 1803.0±212.5 sec / arc. In 78 of the 83 followed cases stereopsis was

determined. The mean stereopsis of 78 patients before treatment was 381.5 ± 256.8 sec /arc and 99.6 ± 91.5 sec / arc after treatment ($p < 0.001$) (Table2).

Discussion

Amblyopia is defined as diminished vision in either one or both eyes. The prevalence of amblyopia is found between 1-4% (7,8). Regardless of underlying reason, the period of its development in children is similar. The first 2-3 years of age is the most sensitive period for amblyopia and susceptibility of children gradually decreases until 6-7 years of age (9,10). Amblyopia diminishes stereopsis and binocular vision and affects a child's social life and career. Early diagnosis and treatment of the amblyopia lead to save visual acuity of the amblyopic eye in case of trauma or disease affecting the normal eye. It has been reported that patients with amblyopia are more vulnerable to blindness due to trauma (11). The mean age of the subjects was 21.3 ± 15.3 years. There was no significant difference in means of age between the genders ($p = 0.168$). The mean age of followed patients with was 7.31 ± 3.17 (3-25) years. The success of rehabilitation increases with early diagnosis. The age at beginning of treatment was reported to be 5.9 ± 3.9 years in the literature (12). Our cases were older at the beginning of treatment when compared to the literature. Amblyopia was detected more frequent in men and in left eye (13,14). However, some authors reported more frequent in girls, whereas some found no difference between genders (6). In our study, although it was not statistically significant, the left eyes were more amblyopic

($p = 0.242$) and there was no statistically significant difference between genders. ($p = 0.125$).

The most common cause of amblyopia is reported to be anisometropia. Besides the depth of amblyopia increases by the degree of anisometropia. In our study, anisometric amblyopia was the most common type of amblyopia as well. ($n = 311$) (3). Esotropia reported as the most common type of strabismic amblyopia and hyperopia as the most common refractive error in previous epidemiological studies of amblyopia (3,15). Our findings were compatible with the literature. ($p = 0.001$) Only 83 of 451 patients kept regular follow-up. Fifty-four of 83 had strabismic amblyopia (65.1%) and 10 (12.1%) had mixed (strabismic and anisometric). Strabismic amblyopia was the most frequent cause in followed patients with probably due to the parents' attitude to seek treatment for such a manifest problem.

The increment in the visual acuity was found to be statistically significant in present study. ($p = 0.001$). Our cases were followed-up with partial occlusion therapy. Successful results has been stated in anisometric and strabismic cases by partial occlusion (16-18). Occlusion therapy is the most common method for the treatment of amblyopia. Some anisometric cases can be treated with only eyeglasses. The major cause of failure in amblyopia treatment is incompatibility with occlusion (19). Another reason for poor compliance in developing societies is that the parents don't understand the importance of therapy in unnoticeable disorders like amblyopia. Our successful results with occlusion therapy may be attributed to regular visits

and treatment compliance of the parents in the followed cases.

A hundred and eight of 451 patients had strabismic amblyopia. Only 50% of these cases had continued routine follow-up. In these cases, the angle of deviation decreased after treatment ($p < 0.001$) (Table 1).

Before the treatment fusion evaluated in 78 cases, 36 right and 42 left eyes were suppressed. After the treatment, fusion was provided in 75 patients (96.2%), in 3 cases (3.8%) suppression continued in the left eye ($p < 0.001$). Except deprivation amblyopia, increment in the visual acuity results in improvement in binocularity and fusion (20).

Statistically significant increase was found in stereopsis in 78 patients ($p < 0.001$) It is known that stereopsis decreases with low visual acuity and increases with refractive error correction (21). The risk of moderate and severe amblyopia due to Esotropia and / or anisometropia reported to be decrease in the presence of stereopsis (22).

Amblyopia is the most common cause of vision loss in children. Appropriate treatment in childhood has been shown to significantly decrease its frequency. Visible problems like strabismus stimulate parents to consult an ophthalmologist in the developing countries. The most common disorders unnoticeable to parents such as anisometropia may easily be overlooked. Therefore, early diagnosis and treatment of amblyopia must be initiated for all pre-school children by screening programs. Amblyopia requires long-term follow-up and treatment. Families should be

informed about the nature of the treatment and should be motivated for regular visits.

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