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RESEARCH

STRABISMUS IN GERIATRIC PATIENTS: ETIOLOGY AND CLINICAL FEATURES

ABSTRACT

Introduction: As life expectancy is continuously increasing, health issues, such as strabismus that has a functional and psychosocial impact on the quality of life, have gained more importance and require a solution. In the present study, we aimed to describe and determine the strabismus etiology and clinical features in patients aged ≥ 65 years who were examined in a strabismus clinic.

Materials and Method: We retrospectively examined the data of patients aged ≥ 65 years who were admitted to the strabismus clinic between July 2018 and July 2019. The findings of the ophthalmological and orthoptic examination as well as the strabismus etiology, intervention required, and chief complaints were all recorded.

Results: We extracted the medical records of 40 patients (16 female and 24 male) aged ≥ 65 years who were examined in the strabismus clinic. The chief complaint was diplopia in 30 (75%) patients, followed by ocular deviation in 10 (25%) patients. The deviation was horizontal in 26 (65%) patients. The most common etiology was thyroid eye disease (6 patients; 15%), followed by diabetes (5 patients, 12.5%), hypertension (5 patients, 12.5%), trauma (3 patients, 7.5%), cerebrovascular event (3 patients, 7.5%), intracranial mass (3 patients, 7.5%), and secondary deviation (3 patients, 7.5%). Moreover, 11 (27.5%) patients underwent surgery, whereas 17 (42.5%) patients received nonsurgical treatment; 14 (35%) patients did not re-visit the strabismus clinic.

Conclusion: Strabismus can be seen in elderly individuals. The underlying etiology, such as trauma and cerebrovascular events, may be life threatening and requires prompt diagnosis and treatment.

Keywords: Cranial nerve palsy; Diplopia; Geriatric; Ocular misalignment; Strabismus; Surgery

ARAŞTIRMA

GERIATRİK HASTALARDA ŞAŞILIK: ETİYOLOJİ VE KLİNİK ÖZELLİKLER

Öz

Giriş: Yaşam beklentisinin devamlı bir şekilde uzaması ile fonksiyonel ve psikososyal etkisi olan şaşılık gibi sağlık sorunları daha fazla önem kazanmakta ve bir çözüm gerektirmektedir. Bu çalışmada, şaşılık kliniğinde görülen 65 yaş ve üstü hastalarda şaşılık etiolojisini ve klinik özellikleri belirlemeyi ve tanımlamayı amaçladık.

Gereç ve Yöntem: Şaşılık kliniğine Temmuz 2018-Temmuz 2019 tarihleri arasında başvuran 65 yaş ve üstü hastaların verilerini retrospektif olarak inceledik. Oftalmolojik ve ortoptik muayene bulguları ve ayrıca şaşılık etiolojisi, esas başvurma şikayetleri ve gerekli girişimler kaydedildi.

Bulgular: Şaşılık kliniğinde görülen altmış beş yaş ve üstü 40 hastanın (16 kadın, 24 erkek) tıbbi kayıtları çıkartıldı. Esas başvuru şikayeti 30 hastada (%75) çift görme idi ve bunu 10 hastada gözde kayma (%25) izliyordu. Kayma 26 hastada (%65) horizontal idi. En sık etioloji 6 hastada (%15) tiroid göz hastalığı iken bunu diyabet (5 hasta, %12,5), hipertansiyon (5 hasta, %12,5), travma (3 hasta, %7,5), serebrovasküler olay (3 hasta, %7,5), intrakranyal kitle (3 hasta, %7,5) ve sekonder kayma (3 hasta, %7,5) izliyordu. Onbir (%27,5) hasta ameliyat olurken 17 hastaya (%42,5) cerrahi dışı tedavi uygulandı. On dört hasta (%35) şaşılık kliniğine tekrar kontrole gelmedi.

Sonuç: Şaşılık yaşlı kişilerde de görülebilir. Altta yatan travma ve serebrovasküler olay gibi etiolojiler hayatı tehdit edebilir ve hızlı tanı ve tedavi gerektirebilir.

Anahtar sözcükler: Cerrahi; Diplopi; Geriatrik; Kranyal sinir felci; Oküler hizalanmanın bozulması; Şaşılık



INTRODUCTION

Some of the eye diseases, such as cataract and macular degeneration, are related to the age of the individual. However, strabismus, defined as an ocular misalignment, can be observed in every age group, although it is typically encountered and diagnosed during childhood. Indeed, the incidence of strabismus increases with age and tends to be more frequent, particularly in those aged ≥ 60 years (1,2). In adults, this disease is either associated with childhood-onset strabismus or newly developed due to trauma, ocular/nonocular surgery, or neurological disease (2). The ocular deviation can be horizontal, vertical, torsional, or combined as well as be paralytic or nonparalytic. The third, fourth, and sixth cranial nerve palsy results in the paralysis of the extraocular muscles and may occur due to older age, diabetes mellitus, hypertension, or hyperlipidemia, which are all factors that cumulatively result in atherosclerotic changes (3, 4).

In the present study, we aimed to describe the clinical features of strabismus in patients aged ≥ 65 years who were examined in a strabismus clinic for the past 1 year and to determine the underlying causes and management of strabismus.

MATERIALS AND METHOD

A retrospective review of the records between July 2018 and July 2019 of the strabismus clinic at Hacettepe University, Faculty of Medicine was conducted. The study was conducted in complete accordance with the tenets of the Declaration of Helsinki and was performed upon the approval of the Institutional Review Board. Data regarding patients aged ≥ 65 years were extracted and included the demographic characteristics, such as age and sex, and ophthalmological and orthoptic examination findings as well as information regarding the systemic comorbidities diagnosed and the surgical and nonsurgical interventions (prismatic glasses and botulinum toxin injection)

employed for the management of strabismus.

Furthermore, the chief complaint at initial presentation, best corrected visual acuity, type of ocular deviation, amount of deviation in the primary position in prism diopters (PD), and underlying etiology, if identified, were noted. Alternate prism cover test was performed at near (1/3 m) and distance (6 m) fixation for measuring ocular deviation. Krimsky test was used when the visual acuity of the patient is insufficient for target fixation.

All statistical analyses were performed using IBM SPSS Statistics 23.0 software. Descriptive statistics were expressed as mean \pm standard deviation or median (min-max) for quantitative data, according to the assumption of normal distribution, and as frequency for qualitative data. Chi-squared test was used for comparison. A $p < 0.05$ was accepted as statistically significant.

RESULTS

The data of 40 patients (16 female and 24 male) aged ≥ 65 years who were admitted to the strabismus clinic were included in the study. Mean patient age was 70.07 ± 6.16 (65-83) years.

Demographic and clinical characteristics of the patients are presented in Table 1. The mean best corrected visual acuity was 0.80 ± 0.20 in the right eye and 0.73 ± 0.26 in the left eye.

The chief complaint was diplopia with a frequency of 75% (30 patients) followed by ocular misalignment in 25% (10 patients). The onset of the complaint occurred during the past 1 month in 7 patients (17.5%). A horizontal deviation, occurring in 26 (65%) patients, was the most common type of ocular deviation in the primary position at initial presentation.

Mean ocular deviation was 16.8 ± 18.4 PD for near horizontal, 17.92 ± 18.99 PD for distance horizontal, 5.70 ± 11.42 PD for near vertical, and 5.65 ± 11.11 PD for distance vertical.

Table 1. Demographic and clinical characteristics of the patients aged ≥ 65 years at the initial presentation to the strabismus clinic

Demographic characteristics	No. of patients (%)
Sex	
Male	24 (60)
Female	16 (40)
Comorbidity	
Hypertension	15 (37.5)
Thyroid disease	9 (22.5)
Diabetes mellitus	7 (17.5)
Coronary heart disease	4 (10)
Chronic obstructive lung disease	2 (5)
Depression	2 (5)
Acne rosacea	1 (2.5)
Breast cancer	1 (2.5)
Intracranial aneurysm	1 (2.5)
Disease characteristics	
Laterality	
Unilateral	27 (67.5)
Bilateral	13 (32.5)
Chief complaint	
Diplopia	30 (75)
Ocular misalignment	10 (25)
Onset of the complaint	
≤ 1 month	7 (17.5)
2–11 months	6 (15)
≥ 1 year	27 (67.5)
Type of initial ocular deviation	
Horizontal	26 (65)
Vertical	5 (12.5)
Combined	9 (22.5)
Underlying etiology	
Thyroid eye disease	6 (15)
Diabetes mellitus	5 (12.5)
Hypertension	5 (12.5)
Trauma	3 (7.5)
Cerebrovascular event	3 (7.5)
Intracranial mass	3 (7.5)
Sensory (due to low vision)	3 (7.5)
Congenital	2 (5)
Surgery for orbital mass	2 (5)
Sagging eye syndrome	1 (2.5)
Multiple sclerosis	1 (2.5)
Myasthenia gravis	1 (2.5)

The three most common etiology was thyroid eye disease (6 patients; 15%), followed by diabetes mellitus (5 patients; 12.5%), and hypertension (5 patients; 12.5%).

In 26 (65%) patients, the ocular deviation was caused by cranial nerve palsy. In 19 (47.5%) patients, cranial imaging was available. There was no significant difference in age between patients with paralytic and non-paralytic strabismus (69.19 ± 5.25 years vs. 71.71 ± 7.51 years, $p > 0.05$). The most common type of paralytic strabismus was due to the isolated sixth nerve palsy (12 patients; 30%), followed by isolated fourth nerve palsy (8 patients; 20%), isolated third nerve palsy (3 patients; 7.5%), combined third and sixth nerve palsies (1 patient; 2.5%), combined sixth and seventh nerve palsies (1 patient; 2.5%), and multiple cranial neuropathies (1 patient; 2.5%).

In five (12.5%) patients, the underlying cause of strabismus remained unidentified. Further, 10 (25%) patients were treated with prismatic glasses, whereas 7 (17.5%) patients received botulinum toxin injection.

Only 26 (65%) patients came to the clinic for the control visit, and the mean number of control visits was 2.46 ± 2.01 .

Moreover, 11 (27.5%) patients underwent surgery: 9 (22.5%) patients underwent one surgery, 1 (2.5%) patient underwent two, and 1 (2.5%) patient underwent three surgeries. Three of the patients were offered strabismus surgery, but they denied.

DISCUSSION

According to the demographic projections for the aging population worldwide, the global life expectancy as well as the number of individuals with a longer lifespan are increasing (5).

Binocular vision and eye movement disorders are common in the elderly (6). With the increase in age, there is an accumulation of age-related



systemic and/or ocular diseases. Chronic diseases are more common and tend to simultaneously occur in the elderly, thereby resulting in a phenomenon called multimorbidity (7). Comorbid conditions may also be suitable for the occurrence of acquired, particularly paralytic, strabismus.

In the present study, we evaluated the etiology and characteristics of ocular deviations in elderly patients.

Although strabismus is commonly reported and diagnosed in children, it is not restricted to childhood. Hashemi et al. systematically reviewed the global and regional prevalence of strabismus and showed that the estimated pooled prevalence of strabismus was 1.93%, whereas it was 1.23% for esodeviations and 0.77% for exodeviations (8). The heterogeneity of prevalence was significantly affected by age and WHO region; for example, exotropia was more frequent in patients aged ≥ 20 years compared with those aged < 20 years and strabismus was more prevalent in two WHO regions: European Regional Office and South-East Asia Regional Office (8).

In the present study, the major complaint of the patients was diplopia. Double vision is an extremely disabling symptom that can affect the quality of daily life of patients. Kawai et al. investigated the clinical characteristics of patients aged ≥ 60 years who complained of binocular diplopia and found that the most common type of strabismus was esotropia due to orbital pulley disorder (9). They classified the causes of strabismus according to the type of deviation and demonstrated that orbital pulley disorder was the main reason for esodeviation, whereas it was convergence insufficiency for exodeviation, fourth nerve palsy for vertical deviation, and orbital pulley disorder and fourth nerve palsy in an equal frequency for combined deviation (9). In the present study, there was one patient with sagging eye syndrome caused by the abnormalities of the extraocular muscle bands, which are primarily induced by the aging process (10). Typically, the band between

the lateral and superior recti becomes thin with the increase in age and results in the inferior displacement of the lateral rectus and eventually in esotropia (10).

Martinez-Thompson et al. investigated the incidence and type of new-onset strabismus in a cohort with a median age of 65 years and found that 86.2% exhibited diplopia as a presenting symptom and 68% exhibited horizontal deviation (1). In the present study, 65% of the patients exhibited isolated horizontal deviation. Moreover, in the study by Martinez-Thompson et al., the annual incidence of adult-onset strabismus was 54.1 cases per 100000 individuals, the peak incidence was during the eighth decade of life, and paralytic strabismus was the most frequent type of ocular misalignment (1). However, they included only adults aged ≥ 19 years who developed new ocular misalignment during the study period (1). Notably, in the present study, 67.5% of the patients were admitted to the strabismus clinic after more than 1 year of its occurrence, indicating that the elderly individuals do not prefer to seek treatment for strabismus either because it loses priority among other serious medical conditions or they do not believe that it can be cured. However, strabismus surgery in adults has demonstrated positive psychosocial implications as well as improved binocularity besides its cosmetic effect (11, 12).

Repka et al. reviewed strabismus among the aged fee-for-service Medicare beneficiaries, of which the patients aged ≥ 65 years constituted the largest cohort, and found that strabismus was diagnosed in 0.68% of the patients, with paralytic deviation being the most common type (2). They demonstrated that the strabismus diagnosis was increasing with age after 65 years and decreasing after 80-84 years (2).

Tamhankar et al. investigated the isolated cranial nerve (third, fourth, and sixth) palsies in a cohort of patients aged ≥ 50 years (13). The most common type was the sixth nerve palsy, and the median duration of diplopia was 14 days (13).

They suggested that cranial imaging is important at the initial examination because it can reveal the underlying etiology besides microvascular ischemia (13). In the present study, 19 (47.5%) patients underwent cranial imaging. However, we are unaware and unsure of the data regarding imaging in all patients. The patients who did not re-visit the clinic might have undergone examination and treatment at other clinics. In the present study, 65% of the patients exhibited paralytic strabismus and sixth nerve palsy was the most frequent.

Fang et al. showed that patients aged ≥ 65 years who underwent strabismus surgery because of diplopia as a leading complaint showed successful outcomes in their retrospective cohort and suggested that surgery should be considered a viable option for elderly patients (14). In the present study, 11 (27.5%) patients underwent surgery, whereas 3 patients declined surgery.

Jackson et al. investigated the psychosocial benefits of strabismus surgery in adults aged between 16 and 61 years and showed that it offers a significant improvement in psychosocial and physical adjustment following surgery (15). This result may emphasize the importance of the strabismus surgery from a psychological point of view for a patient who is uncomfortable with his/her physical appearance or body image, particularly during instances requiring an eye contact, although there was no separate analysis for the geriatric age group.

Coats et al. showed that strabismus surgery might be delayed by as long as 72 years in adults (16). The two most common reasons for the delay were as follows: surgery was never offered and surgery was offered but declined (16). They suggested that the delay can be avoided by educating the medical community to offer appropriate surgical intervention and the patients to seek a solution for their complaint as well as by increasing public awareness regarding strabismus (16).

Myasthenia gravis, one of the causes of ocular misalignment, might be underdiagnosed in elderly individuals and mistaken for stroke, Parkinsonism, or other neurological disorders (17, 18). One of the patients in the study was diagnosed with myasthenia gravis, which is not a common diagnosis in the elderly. However, its age at onset was shown to have a significant shift toward the older age (19).

The present study had certain limitations. The medical files were collected from the strabismus clinic of a hospital with tertiary referral center characteristics. This could cause a bias in case selection and the results cannot be extrapolated to all elderly patients with strabismus. Overall, 14 (35%) patients did not re-visit the strabismus clinic and we are unaware of their progress; we believe that some of them might have received a diagnosis and treatment elsewhere. Treatment outcomes were beyond the scope of the manuscript and were not incorporated in the data analysis. The study reflects the findings of a single strabismus clinic. Several patients aged ≥ 65 years may not have been referred to a strabismus clinic because other ocular and/or systemic disorders dominate their clinical picture and an ocular deviation loses its priority. Because the number of patients was limited, the sample was not stratified in subgroups according to the age as 65–69, 70–79, and ≥ 80 years. Despite its limitations, the present study provides supportive evidence that cranial nerve palsy is one of the most common causes of ocular deviation and for admittance to a strabismus clinic in elderly individuals.

One of the interesting findings of the present study was the number of patients lost to follow-up. A significant proportion of the patients failed to come to the clinic again for a control visit possibly because they did not desire to undergo general anesthesia or did not have the opportunity to be accompanied by their relatives to go to a hospital. All the aforementioned drawbacks should be taken into consideration. One possible



explanation is that several elderly individuals do not seek a surgical solution because of the general anesthesia risk, possibility of postoperative diplopia, and unsatisfactory surgical result. However, a remarkable portion of patients did not visit the strabismus clinic despite a nonsurgical option, such as prismatic glasses or botulinum toxin injection, was recommended.

Notably, there was a general reluctance among patients who were admitted to the strabismus clinic. Some patients denied surgery, whereas some failed to re-visit the clinic, although only follow-up was recommended without any intervention.

Considering the frequency of cranial nerve palsy as one of the leading causes of ocular misalignment in the geriatric population concurrent with systemic comorbidities, the results of the present study lend support to the consideration of strabismus, particularly recent-onset strabismus, as an emergency in this age group. On the other hand, strabismus can develop

due to the worsening of a previously controlled latent deviation.

The results of the present study demonstrate that strabismus is observed in the elderly. The underlying condition may be potentially serious but treatable; therefore, particularly recent ocular deviations in the geriatric population should be carefully managed and ideally, in collaboration with other departments, such as neurology.

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CONFLICTS OF INTEREST

The authors of this article state that they have no conflict of interest.

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