

The Relation Of Left Or Right Visual Acuity And Psychologic Symptoms In Strabismic Patients

Şaşılık Hastalarında Sağ Veya Sol Görme Keskinliği İle Psikolojik Semptomların İlişkisi

Doç.Dr. Sadrettin PENÇE¹, Doç.Dr. Ali SAVAŞ ÇİLLİ², Prof.Dr. Ahmet ÖZKAĞNİCİ³

¹Gaziantep University School of Medicine Department of Physiology

²Selcuk University School of Medicine Department of Psychiatry

³Selcuk University School of Medicine Department of Ophthalmology

Abstract

Strabismus refers to any abnormality of eye coordination or alignment that results in loss of binocular vision. The rate of right-eye preference was reported to be greater at the right-handed subjects than the left-handed ones. The eye has a visual acuity threshold below which an object will go undetected. The 39 consecutive subjects, who had esotropia or exotropia, were enrolled in this study. We noticed a relation in most of the parameters between intensity of psychological symptoms and visual acuity of the right eye, whereas there was no such relation with the left eye. Another interesting finding was the validity of this relation for only men. We may propose that differences in cerebral complex network concerning lateralization may be responsible for this relation of the parameters between intensity of psychological symptoms and visual acuity of the right eye.

Key Words : Strabismus, Visual acuity, Eye preference, Psychological symptoms.

Özet

Şaşılık göz koordinasyonu ve hizalamasındaki herhangi bir anomaliye bağlı binoküler görmenin kaybı olarak tanımlanır. Sağ elini kullanan olgulara kıyasla sol elini kullananlarda sağ göz tercihi daha fazla oranda bildirilmiştir. Gözün bir objeyi farketmesindeki sınır, görme keskinliğidir. Ezotropi veya ekzotropisi olan 39 olgu bu çalışmanın kapsamındadır. Sağ gözde görme keskinliği ile psikolojik belirtilerin şiddeti arasındaki parametrelerin çoğunda bir ilişki saptarken böyle bir ilişkiyi sol göz için saptamadık. Bir diğer ilginç bulgu bu ilişkinin sadece erkekler için geçerli olmasıydı. Serebral kompleks de lateralizasyon ile ilgili farklılıkların sağ gözde, görme keskinliği ile psikolojik belirtilerin şiddeti arasındaki parametrelerin bu ilişkiden sorumlu olabileceği öne sürebilir. **Anahtar Kelimeler**: Şaşılık, Görme keskinliği, Göz tercihi, Psikolojik belirtiler.

Gaziantep Tıp Dergisi 2008, 14:37-40.

INTRODUCTION

Eye dominance (sighting dominance, eye preference, or eyedness) refers to the eye preferentially used in different forms of visual alignment (1) and for carrying out monocular activities such as sighting through a telescope (2,3). Little is known about the factors involved in eye preference. (4).

It was found that the rate of right-eye preferents is greater in the right-handed subjects than in the left-handed ones (5-9).

The two cerebral hemispheres appear to be nearly symmetrical; however, each hemisphere has some anatomical, chemical, and functional specializations. It is well known that the brain hemispheres are anatomically and functionally asymmetric (10).

The right cerebral hemisphere is dominant in visuospatial and nonverbal functions such as art, architecture, geometry, and mathematics, whereas the left cerebral hemisphere is dominant in verbal functions such as rhetoric, literature, and poetry although there are slight differences between males and females in using different brain areas for language processing (6,11-15).

Although pattern-reversal visual evoked potentials of healthy subjects provide electrophysiological evidence of lateralization in the nervous system, sensory eye dominance seems to have no correlation with macular function (16). Even though the molecular and genetic bases of this asymmetry are not well understood (17).

✉ Yazışma Adresi:
Doç. Dr. Sadrettin PENÇE
Gaziantep Üniversitesi Fizyoloji AD
Adres: Gaziantep Üniversitesi Tıp Fakültesi
27310 Şehitkamil / Gaziantep
Tel:0342 360 60 60 / 77701
Fax:0342 360 16 17
E-mail: pence@gantep.edu.tr

Its existence is supported by abundant converging evidence from in vivo and postmortem neuroanatomy, neurochemistry, neuropsychology, neuro-imaging, and behavioral researches (18,19).

The measurement of visual acuity is an essential part of the ophthalmologic examination and it represents the most common and useful test for assessing visual function (20).

Strabismus, or squint, refers to any abnormality of eye coordination or alignment that results in loss of binocular vision. When images from the same spots in visual space do not fall on corresponding points of the two retinas, diplopia, or double vision, occurs. In standard terminology, the disorders of eye movement are described according to the direction of movement.

Table 1. The correlation between psychological symptom severity and right and left visual acuity of strabismic patients.

Symptom Scales	Visual acuity			
	Right		Left	
	R	P	R	P
Somatization	-0.445	0.005**	0.020	0.905
Obsessive- Compulsive	-0.308	0.111	-0.093	0.575
Interpersonal Sensitivity	-0.403	0.011*	-0.027	0.869
Depression	-0.358	0.025*	-0.097	0.555
Anxiety	-0.438	0.005**	-0.032	0.849
Hostility	-0.375	0.019*	-0.106	0.520
Phobic Anxiety	-0.264	0.104	0.124	0.450
Paranoid Ideation	-0.291	0.072	0.013	0.935
Psychoticism	-0.098	0.552	0.039	0.815
Global Severity Index	-0.412	0.009**	-0.037	0.821
Positive Symptom Total	-0.371	0.020**	-0.023	0.887

**Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

Esotropia refers to medial deviation, exotropia refers to lateral deviation, hypertropia refers to upwards deviation, hypotropia refers to downward deviation, and cyclotropia refers to torsional deviation. The term concomitance refers to equal deviation in all directions of gaze. A nonconcomitant strabismus is one that varies with the direction of gaze.

Strabismus may be divided in to paralytic forms, in which there is weakness or paralysis of one or more of the extraocular muscles, and non paralytic forms, in which there is no primary muscle impairment (21). Strabismus is called intermittent, or periodic, when there are periods in which the eyes are parallel. It is monocular when the same eye always deviates and the fellow eye fixates (22).

The symptom checklist (SCL-90_R)(23,24) is a 90-item self report symptom inventory designed to screen for a broad range of psychological problems. Each of the 90 items is rated on a five-point Likert scale of distress, ranging from "not at all (0) to "extremely" (4).

Subsequently the answers are combined in nine primary symptom dimensions. Somatization, obsessive-compulsive, interpersonal sensitivity, hostility, depression, anxiety, paranoid ideation, phobic anxiety and psychoticism. In addition, three global indices provide measures of overall psychological distress: the global severity index (GSI), the positive symptom total (PST) and the positive symptom distress index (PSDI)(25). The aim of this study was to assess any relation between left and right visual acuity and severity of psychological symptoms in patients with strabismus.

METHODS

Subjects:The 39 consecutive subjects (M: 22, F: 17) who had esotropia or exotropia and at least 10 years old were enrolled in this study. The strabismic patients with a history of psychologic disorder and with aesthetic abnormalities except ocular misalignment were excluded. Snellen visual acuity, ocular motility, anterior segment examination were performed in clinical examination. The angles of deviation were measured by the simultaneous prism and cover test and the prism and alternate cover test at 6 and 0.33 meters in the primary position.

Procedure:Subjects completed the SCL-90-R (25,26) which is designed to detect self-reported indicators of behavioral and psychiatric distress. Respondents rate the occurrence and intensity of 90 distress symptoms on a 4-point scale ranging from 0 ("not at all") to 4 ("extremely"), yielding a Global Severity Index (GSI) and nine subscales: Somatization, Anxiety, Obsessive-compulsive, Depression, Interpersonal sensitivity, Psychoticism, Paranoid ideation, Hostility, and Phobic anxiety.

Statistical analyses:We analyzed the relation between right and left visual acuity and SCL-90-R scores of the strabismic subjects using bivariate correlation analysis with SPSS software.

RESULTS

The psychological symptom severity scales and visual acuities of patients are shown in Table 1 We have found significant relations between right visual acuity of strabismic patients and somatization, interpersonal sensitivity, depression, anxiety, hostility, global severity index and total positive symptoms, r and p values were (-0.445, 0.005), (-0.403, 0.011), (-0.358, 0.025), (0.438, 0.005), (-0.375, 0.019), (-0.412, 0.009) and (-0.371, 0.02), respectively. We did not find any significant relations concerning the left visual acuity.

These correlations were assessed in terms of sex. The same correlations observed in male patients were also significant (Table 2).

The r and p values of somatization, interpersonal sensitivity, depression, anxiety, hostility, paranoid ideation, global severity index and total positive symptoms were (-0.659, 0.001), (-0.541, 0.009), (-0.529, 0.011), (-0.567, 0.006), (-0.515, 0.014), (-0.433, 0.044), (-0.548, 0.008) and (-0.573, 0.005), respectively. There was no such relation in female patients (Table 3).

Table 2. The correlation between psychological symptom severity and right and left visual acuity of male strabismic patients.

Symptom Scales	Visual acuity			
	Right		Left	
	R	P	R	P
Somatization	-0.659	0.001**	0.046	0.838
Obsessive- Compulsive	-0.410	0.058	-0.194	0.387
Interpersonal Sensitivity	-0.541	0.009**	-0.011	0.961
Depression	-0.529	0.011*	-0.116	0.608
Anxiety	-0.567	0.006**	-0.046	0.838
Hostility	-0.515	0.014*	-0.113	0.616
Phobic Anxiety	-0.375	0.086	0.126	0.575
Paranoid Ideation	-0.433	0.044*	0.062	0.783
Psychoticism	-0.170	0.448	0.005	0.981
Global Severity Index	-0.548	0.008**	-0.057	0.801
Positive Symptom Total	-0.573	0.005**	0.010	0.965

**Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

DISCUSSION

It was reported that in the right-handed population, the number of persons with right-eye dominance is greater than the number of persons with left-eye dominance, but this was opposite in the left-handed population (6,27) reported that the left eye is dominant in 36.1% of pure right-handers, 23.3% of mixed right-handers, 67.6% of pure left-handers, and 55.4% of mixed left-handers. Merrell (9) reported that 29% of 464 right-handed subjects and 61% of 33 left-handed ones had left-eye dominance.

Baykal et al. (7) reported that 85% of the right-handed subjects had right-eye, 11% had left-eye, and 4% had both-eye dominance, whereas 67% of the left-handed subjects had right-eye, 22% had left-eye, and 11% had both-eye dominance.

These studies have shown that there is a weak but definite relation between hand preference and eye dominance. Consequently, it may be concluded that the human eyes are predominantly ipsilaterally controlled by the cerebral visual cortices.

Table 3. The correlation between psychological symptom severity and right and left visual acuity of female strabismic patients.

Symptom Scales	Visual acuity			
	Right		Left	
	R	P	R	P
Somatization	-0.104	0.691	-0.023	0.930
Obsessive- Compulsive	0.252	0.329	0.188	0.469
Interpersonal Sensitivity	-0.071	0.785	-0.060	0.820
Depression	-0.094	0.719	-0.073	0.782
Anxiety	-0.051	0.844	0.004	0.987
Hostility	-0.098	0.709	-0.102	0.697
Phobic Anxiety	-0.051	0.847	0.121	0.644
Paranoid Ideation	0.109	0.678	-0.087	0.740
Psychoticism	0.081	0.756	0.102	0.696
Global Severity Index	-0.086	0.743	0.001	0.995
Positive Symptom Total	0.032	0.902	-0.082	0.754

The findings of our study reveal that there is a relation between psychologic symptom severity and right eye visual acuity, whereas there was no such relation between left eye visual acuity. Another interesting finding is that this relation is observed only in male subjects. Further studies are needed in order to explain the relation between right eye visual acuity and psychological symptom severity limited to the male subjects and imply its role in patophysiological mechanisms.

REFERENCES

1. Money, J. Studies on the function of sighting dominance. 1972;24:454-64.
2. Porac C, Coren, S. Lateral preferences and human behavior. New York, Springer Verlag, 1981.
3. Bourassa DC, McManus IC, Bryden, M.P. Handedness and eye-dominance: a meta-analysis of their relationship. Laterality. 1996;1:5-34.

4. Dellatolas G, De Agostini M, Curt F, Kremin H, Letierce A, Maccario J. et al Manual skill, hand skill asymmetry, and cognitive performances in young children. *Laterality*. 2003;8:317-38.
5. Annett, M., *Left, right, hand, and brain: right-shift theory*. Hillsdale, NJ: Erlbaum, 1985.
6. Annett, M., Turner, A. Laterality and the growth of intellectual abilities. *British Journal of Educational Psychology*, 1974;44:37-46.
7. Baykal, O., Dane, S., Akar, S., Colak, A., Pence, S. Relationships between hand preference and eye dominance in normal human subjects. *Turkish Journal of Medical Sciences*, 1995;24: 95-97.
8. Dane, S., Gumustekin, K. Correlation between hand preference and distance of focusing points of two eyes in the horizontal plane. *International Journal of Neuroscience*, 2002;112:1041-1047.
9. Merrell, D. J. Dominance of eye and hand. *Human Biology*, 1957;29:314-328.
10. Dolcos, F., Rice, H.J., & Cabeza, R. Hemispheric asymmetry and aging: right hemisphere decline or asymmetry reduction. *Neuroscience and biobehavioral reviews*, 2002;26:819-825.
11. Geschwind, N., Behan, P. Left-handedness: Association with immune disease, migraine, and developmental learning disorder. *Proceedings of the National Academy of Sciences*. 1982;79:5097-5100.
12. Springer, S. P., Deutsch, G. *Left brain, right brain: Perspectives from cognitive neuroscience*. New York: Freeman. 1998.
13. Gur, R. C., Turetsky, B. I., Matsui, M., Yan, M., Bilker, W., Hughett, P., & Gur, R. E. Sex differences in brain gray and white matter in healthy young adults: Correlations with cognitive performance. *Journal of Neuroscience*. 1999;19:4065-4072.
14. Tan, Ü. The left brain determines the degree of left-handedness. *International Journal of Neuroscience*. 1990;53:75-85.
15. Tan, Ü., Kutlu, N. Right and left hand skill in relation to cerebral lateralization in right-handed male and female subjects: The prominent role of the right brain in right-handedness. *International Journal of Neuroscience*. 1992;64:125-138.
16. Kamis, U., Gunduz, K., Okudan, N., Gokbel, H., Bodur, S., Tan, U. Relationship between eye dominance and pattern electroretinograms in normal human subjects. *International Journal of Neuroscience*. 2005;115:185-92.
17. Geschwind, D. H., & Miller, B. L. Molecular approaches to cerebral laterality: Development and neurodegeneration. *American Journal of Medical Genetics*, 2001;101:370-381.
18. Davidson, R. J., Hugdahl, K. *Brain asymmetry*. Cambridge, MA: MIT Press. 1995.
19. Effect of skill on visual laterality: now you see it--now you don't. *Brain Cognition*, 1994;24:277-83.
20. Ricci, F., Cedrone, C., Cerulli L. Standardized measurement of visual acuity, *Ophthalmic Epidemiology*. 1998;5:41-53
21. Porth, C. M., Kunert, M. P. *Pathophysiology concepts of altered health states* Lippincott Williams and Wilkins, Philadelphia, 2002.
22. Lavrich, J. B., Nelson, L. B. Diagnosis and management of strabismus disorders. *Pediatric Clinics of North America*, 1993;40:737-751.
23. Derogatis, L.R., Lipman, R.S., & Covi, L. SCL-90: an outpatient psychiatric rating scale--preliminary report. *Psychopharmacology Bulletin*. 1973;9:13-28.
24. France, A.I., Alpher, V.S. Structural analysis of social behavior and perceptions of caregiving. *Journal of Psychology*, 1995;129:375-388.
25. Derogatis, L. R. Confirmation of the dimensional structure of the SCL-90: A study in construct validation. *Journal of clinical psychology*, 1977;33:981-989.
26. Dağ. I. Belirti tarama listesi (SCL-90-R) 'nin üniversite öğrencileri için güvenilirliği ve geçerliliği. *Türk Psikiyatri Dergisi*, 1991;2:5-11.
27. Annett, M., & Kilshaw D. Mathematical ability and lateral asymmetry. 1982;18:547-68.