

COMPARISON OF SURGICAL SUCCESS AND VISUAL ACUITY IN EXOTROPIA CASES

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ABSTRACT

Objective: Exotropia is a condition in which there is a misalignment of the visual axes and a difference in eye symmetry. This can lead to diplopia (double vision) and a decrease in visual acuity. In some cases, the head may also change position to help the affected eye focus on distant objects. The main concerns for patients with exotropia are visual acuity, the appearance of their eyes, and cosmetic postures.

Methods: This study examines the success rates of surgery and changes in visual acuity for 44 patients who underwent exotropia surgery.

Results: Of the patients who had recession-resection surgery, 79.1% were successful, 12.5% had partial success, and 8.4% were unsuccessful. For those who had bilateral recession surgery, 70% were successful, 5% had partial success, and 25% were unsuccessful. There was a statistically significant difference in preoperative visual acuity between the two groups. After surgery, there was a significant improvement in visual acuity for both groups.

Conclusion: The majority of patients (70.4%) undergo this surgery for cosmetic reasons rather than for improved visual acuity. There was no significant difference in postoperative results between the two groups in terms of shift values.

Keywords: Exotropia, strabismus, diplopia, visual acuity.

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INTRODUCTION

Exotropia is a condition in which there is a loss of coordination between the visual axes when looking at distant objects, resulting in a lack of parallelism. In the literature, this is often described as the brain suppressing secondary vision or adapting to prevent double vision when the image in the other eye does not align with the fovea.¹⁻⁵

Intermittent exotropia is a prevalent form of strabismus in society. Studies have shown that it is prevalent in the Asian continent, as 4%.^{6,7} The success of exotropia surgeries is determined by two key factors: the patient's visual acuity and the restoration of facial symmetry for cosmetic purposes. Variables such as the age of onset of the disease, age at the time of surgery, degree of deviation, and preoperative visual acuity can all impact the success of the surgery.⁸⁻¹² The most important gain desired in the treatment of strabismus is to ensure that both eyes remain in the same symmetry permanently and to

provide binocular single vision. In cases where there is no binocular vision, strabismus surgeries are preferred for an aesthetic appearance.

In this study, we examined the preoperative and postoperative visual acuities of the patients and compared the results of unilateral and bilateral regression methods in patients diagnosed with exotropia.

MATERIALS AND METHODS

A total of 44 patients who were admitted to the Ophthalmology Polyclinic of Van Training and Research Hospital with a diagnosis of exotropia and underwent surgical treatment were included in the study. The inclusion criteria for patients were voluntary participation, age over 18, and one year of follow-up after surgery. Exclusion criteria included patients who had surgery at another hospital or clinic, those under 18 years old, those who did not wish to participate, and those with mental or physical disabilities, as well as cases of vertical strabismus and nystagmus. The cross-sectional design will be selected within the scope of the survey research design. Cross-sectional design allows the characteristics of the universe or the differences between two or more universes to be described.

Patients without mental or physical disabilities, as well as cases of vertical strabismus and nystagmus, were accepted. Informed consent was obtained from all

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patients, both in writing and orally. The interventions performed on the patient's eye muscles were classified according to the "Basic and Clinical Science Course" table of the American Academy of Ophthalmology (AAO).

In the study, all surgeries involved rectus resection surgery. The AAO scale was used to evaluate the success of the regression surgeries, with a focus on values of 15 PD (prism diopter) and above in both monocular and symmetric surgical methods. In this study, cases with the condition of having eyes that look in different directions from each other, caused by a weakness of the eye muscles, 10 PD or less, were considered successful, while those between 10-19 PD were classified as partially successful. Patients with 20 PD or more were classified as unsuccessful.

According to the AAO Basic and Clinical Science Course table, the sample is divided into two basic groups: monocular surgery (external rectus recession and internal rectus recession) and symmetrical surgery (bilateral external rectus recession).

Permission for the study was obtained from the Van Training and Research Hospital Clinical Research Ethics Committee with the number 2023/04-03. The data obtained were analyzed with the help of a statistics program, SPSS version 20.0.

RESULTS

The average age of the 44 patients included in the study was 41.2 years old. The youngest patient was 22 years old, and the oldest was 56 years old.

As shown in Table 1, the demographic characteristics of the patients were analyzed, and it was found that more than half (56.8%) were male. The majority of the patients had a high school or primary school education level (79.5%), and almost all of them had an income of less than 10,000 - (90.8%). Additionally, the majority of the patients were married (84%). When examining the reasons for the patients' request for strabismus surgery, it was found that 70.4% of them chose to undergo the surgery for cosmetic reasons.

Visual acuity was compared between the two groups (see Table 2). In the monocular surgery group, patients had a range of visual acuity from 0.1 to 0.9, according to LogMAR. In the symmetry surgery group, the range was from 0.2 to 0.7. The mean visual acuity using LogMAR for the first group was 0.8 ± 0.053 , while the mean for the second group was 0.5 ± 0.732 . A statistically significant difference was found between the two groups when comparing their preoperative visual acuity using LogMAR ($p=0.037$).

When the preoperative shift levels were measured, it was determined that the lowest was 30, the highest was 72 PD for the first group, the lowest was 38, and the highest

was 88 PD for the second group (table 3). In terms of the averages, it was understood that the first group was 42.21 ± 8.1 , and the second group was 46.15 ± 7.9 PD. In the comparison between both groups, it was understood that there was no statistically significant difference in terms of preoperative shift values ($p=0.697$).

After the surgery, patients were regularly monitored at standard intervals (1 week, 1 month, 3 months, 6 months, and 1 year).

Visual acuity improved in both groups after surgery (table 4). In addition to both the minimum and maximum values, there was an increase in the mean visual acuity. After the t-test analysis, a statistically significant difference ($p=0.014$) was found between the two groups in terms of visual acuity. When the Tukey HSD test was applied to determine the direction of the difference, it was determined that those who had unilateral resection surgery constituted the direction of this difference.

In the first group, 19 patients (79.1%) had successful results, three patients (12.5%) had relatively successful results, and one patient (8.4%) had an unsuccessful outcome after undergoing regression-resection surgery. As a result of the unsuccessful surgery, no cosmetic success was achieved. For patients who underwent bilateral recession surgery, 14 patients (70%) had successful results, one patient (5%) had a relatively successful outcome, and five patients (25%) had unsuccessful results.

When the post-surgical shift levels were measured, it was determined that the lowest 6 PD and the highest 32 PD for the first group, and the lowest eight and the highest 40 PD for the second group (table 5). In terms of the averages, it was understood that the first group was 12.43 ± 7.9 and the second group was 18.64 ± 6.8 PD. In the comparison between the two groups, it was understood that there was no statistically significant difference in terms of the postoperative shift values ($p=0.725$).

DISCUSSION

According to studies, several factors can significantly impact the success of surgical treatment for exotropia. These factors include gender, age, age at onset of the disease, age at the time of surgery, and the amount of preoperative shift. For instance, binocular vision is one example of a factor that can affect surgical outcomes. In this particular study, 56.8% of the participants were male. However, unlike other studies, there was no significant difference between men and women in terms of preoperative shift levels ($p=0.697$).⁸⁻¹²⁻¹⁴

The majority of the patients had an income of less than 10,000 - (90.8%). The hospital where the study was conducted is a state hospital. The health payments of everyone with social health insurance are covered by the state. Therefore, it is evaluated that the majority of the patients in the study are those who cannot have this surgery

Table No 1: Demographics and income details of the participants

Gender	n	%	Marital Status	n	%
Male	25	56.8	Married	37	84
Female	19	43.2	Single	7	16
Education			Patient's request for surgery		
Primary School	17	38.6	Cosmetic	31	70.4
High School	18	40.9	Visual acuity	13	29.6
University	9	20.5			
Income					
0-5000 ₺	21	47.7			
5.000-10.000 ₺	19	43.1			
10.000-15.000 ₺	4	9.2			
+15.000 ₺	-	-			
Total	44	100.0	Total	44	100.0

Table No 2: Visual acuity of the participants

Groups	n	Min	Max	Mean	StD.	t	p
Monocular	24	0.1	0.9	0.8	0.053	-2.412	0.037
Symmetry	20	0.2	0.7	0.5	0.732		

Table No 3: Preoperative Shift

Groups	n	Min	Max	Mean	StD.	t	p
Monocular	24	30	72	42.21	8.142	-0.861	0.697
Symmetry	20	38	88	46.15	7.923		

Table No 4: Visual Acuity

Groups	n	Min	Max	Mean	StD.	t	p
Monocular	24	0.5	1.0	0.9	0.053	-3.162	0.014
Symmetry	20	0.4	0.9	0.7	0.082		

Table No 5: Postoperative Shift

Groups	n	Min	Max	Mean	StD.	t	p
Monocular	24	6	32	12.43	7.964	-0.668	0.725
Symmetry	20	8	40	18.64	6.834		

in private hospitals.

According to studies, 10 cases of successful PD correction have been reported (15). The American Academy of Ophthalmology (AAO) uses a «Basic and Clinical Science Course» scale with 10 PD as a reference. In this study, 79.1% of patients who underwent recession resection were successful, 12.5% were partially successful, and 8.4% were unsuccessful. It can be concluded that 70% of patients who underwent bilateral recession surgery were successful, 5% were partially successful, and 25% were unsuccessful.

When comparing the preoperative visual acuity of the two groups, a statistically significant difference was found ($p=0.037$). Following the surgery, both groups showed a significant increase in visual acuity. Further analysis using a t-test revealed a statistically significant difference ($p=0.014$) between the two groups in terms of visual acuity. The Tukey HSD test was then used to determine the direction of this difference, which showed that those who underwent unilateral resection surgery had a higher visual acuity. This suggests that unilateral resection surgeries may yield more successful results in terms of visual acuity compared to symmetry surgeries. Similar results have been obtained in other studies, although the increase in visual acuity sometimes increases after a second or more operation [16,17].

One of the most significant findings of the study is that patients with a preoperative deviation level of 50 PD or higher experienced less satisfactory results after surgery. Therefore, it can be stated that the satisfaction levels of patients with high deviation levels are mixed.

One finding from the study is that the majority of patients (70.4%) opt for this surgery for cosmetic purposes rather than to improve their visual acuity. After comparing postoperative values, it was determined that there was no significant difference in shift values between the two groups ($p=0.725$). Additionally, there was an improvement in visual acuity for both groups. Upon examining the postoperative results of patients who initially sought the surgery for cosmetic reasons, it was concluded that satisfactory success was achieved in terms of both cosmetic appearance and visual acuity.

CONCLUSION

Exotropia cases are a condition that negatively affects both the cosmetic appearance and visual acuity of patients and deeply undermines their overall quality of life. The results of this study indicate that postoperative deviation levels showed a satisfactory improvement compared to preoperative levels, with monocular surgery proving to be more successful than symmetry operations.

The satisfaction levels of patients with a preoperative deviation level of 50 PD or higher vary. Contrary to our expectations, patients with a high deviation level were found to have lower satisfaction and contentment levels. This suggests that re-surgery may be necessary for patients with a high degree of deviation. It is crucial to inform patients about this possibility before the operation.

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Authors Contribution:

Following authors have made substantial contributions to the manuscript as under

Authors	Conceived & designed the analysis	Collected the data	Contributed data or analysis tools	Performed the analysis	Wrote the paper	Other contribution
Sever TH	✓	×	✓	×	✓	×
İffet Yarınmağa I	✓	✓	×	✓	✓	×

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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