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Predictors of Postoperative Binocularity in Adult Strabismus

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Abstract: We evaluated postoperative binocularity in a retrospective study of 111 adult strabismus patients in order to identify the factors which influence the success of surgery for horizontal concomitant strabismus in adults. Selection criteria included minimum age of 15 years at time of surgery, and preoperative fusion impairment with both the Bagolini lens test and synoptophore. Logistic regression analysis was used to correlate patient factors and postoperative binocularity. We found that 52 (65%) of 80 patients with exotropia and 23 (74.2%) of 31 patients with esotropia achieved post operative fusion. Significant predictive factors in exotropia were absence of previous surgery; visual acuity of the deviating eye >0.5; an increase in the spherical equivalent of the deviating eye, and normal retinal correspondence. Significant predictive factors in esotropia were fusion during prism adaptation, absence of infantile esotropia, and an increase in vertical deviation. The majority of adults with exotropia or esotropia can achieve binocularity after surgery for horizontal concomitant strabismus. **Jpn J Ophthalmol 1997;41:414–421** © 1997 Japanese Ophthalmological Society

Key Words: Adult strabismus, logistic regression analysis, postoperative binocularity, predictive factor.

Introduction

The accepted belief has been that surgical alignment would not be successful in producing binocularity in adults with long-standing strabismus. Recent studies, however, have documented varying degrees of improvement in binocularity[1,2,3,4,5] or expansion of the binocular field[6,7] in these patients.

A number of factors influence postoperative binocularity, complicating the precise prediction outcomes. Visual acuity is related to fusion or stereoscopic acuity;[1,8–11] the type of deviation is also a factor.[15] Kushner and Morton found a high percentage of adults achieving binocularity (Bagolini lens test) with satisfactory surgical alignment regardless of the type of deviation, duration of strabismus, or depth of amblyopia in the deviating eye.[7,3]

In this study, we examined the results of strabismus surgery in adults to identify the factors which influenced the achievement of postoperative binocularity in patients who had no binocular function preoperatively.

Subjects and Methods

Patients

We reviewed the records of adult strabismus surgery patients who were treated at Okayama University Medical School from January 1984 to December 1994. Criteria for selection were: horizontal concomitant strabismus, with or without vertical deviation; minimum age of 15 at time of surgery; no demonstrable preoperative fusion, with both Bagolini lenses and synoptophore; availability of reliable data; and a minimum of 1 month follow-up. There were 80 exotropia and 31 esotropia patients; 42 men and 69 women; age range, 15–78 years (mean: 32.7) who met the criteria.

Data

Table 1 presents data on 15 factors identified as independent variables for logistic regression analysis. The angle of strabismus was determined by the

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alternate prism and cover test (APCT) in the primary position at 5 meters, or by the Krimsky corneal reflex test at 0.3 meter, both with appropriate spectacle correction. Measurements in prism diopter (Δ) units were converted to degrees: angle in degrees = arc tangent (Δ/100). Refractive errors determined by retinoscope or refractometer were recorded as the spherical equivalent. Visual acuity was measured with appropriate spectacle correction at 5 meters.

Preoperative and postoperative sensory states were tested with Bagolini lenses (Oculus, Wetzler, Germany) and a synoptophore (Clement Clarke, London, UK). No prisms were used to neutralize deviation during Bagolini lens testing. Patients were designated as fusion(+) if they had binocular single vision, with or without foveal scotoma, at 5 meters. Patients with diplopia or suppression were classified as fusion(−) (Figure 1).

Fusion amplitudes were measured with the synoptophore using F.3, F.4, F.111, F.112, F.167, and F.168 slides (Clement Clarke). Patients with any degree of fusion amplitude were included in the fusion (+) group; patients with none, even if they had sensory fusion, were placed in the fusion (−) group.

In preoperative examinations, Fresnel Press-On Prisms™ (Vision Care/3M, St Paul, MN, USA) were used[12] for prism adaptation; the prism prescription was based on the APCT deviation measured while wearing proper refraction correction glasses. To estimate fusion potential, we evaluated the sensory state with Bagolini lenses during prism adaptation. Afterimage testing was used to determine preoperative retinal correspondence.

Table 1. Independent Variables

Variables
Sex
Male
Female
Age (y)[a]
15–30
31–50
≥51
Infantile esotropia
Yes
No
Spherical equivalent of deviating eye (D)
Spherical equivalent of non-deviating eye (D)
Difference in spherical equivalents (D)[b]
Visual acuity of deviating eye
≤0.5
>0.5
Visual acuity of non-deviating eye
≤0.5
>0.5
Preoperative deviation (degrees)
Vertical deviation (degrees)
Dissociated vertical deviation (DVD)
Yes
No
Normal retinal correspondence (NRC)[c]
Yes
No
Fusion in prism adaptations[d]
Yes
No
Previous operation
Yes
No
Postoperative deviation
Orthophoria
Undercorrection >10Δ
Overcorrection >10Δ

D: diopters. Δ: prism diopters.

[a]In esotropia, patients were divided into two age groups, 15–30 and 31–50 years.

[b]Difference in spherical equivalents between right and left eyes.

[c]Results of afterimage test.

[d]Results of Bagolini lens test during preoperative prism adaptation.

Surgery

The extent and type of surgery was determined by the type and amount of preoperative deviation. Procedures selected for horizontal deviation were combined recession-resection, 83 patients; combined recession and advancement, 2; single rectus muscle resection, 5; single rectus muscle recession, 2; single rectus muscle advancement, 17; combined recession and resection with single rectus muscle recession in the contralateral eye, 1; combined recession and re-

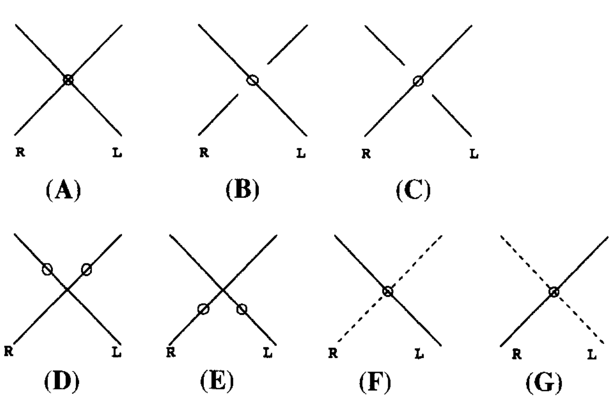

Figure 1. Bagolini lens test (**A**) Binocular single vision, (**B**) Binocular single vision with foveal scotoma of right eye. (**C**) Binocular single vision with foveal scotoma of left eye, (**D**) Uncrossed diplopia, (**E**) Crossed diplopia, (**F**) Supression of right eye, (**G**) Supression of left eye. We defined conditions (**A**), (**B**), and (**C**) as fusion (+), and conditions (**D**), (**E**), (**F**), and (**G**) as fusion (−).

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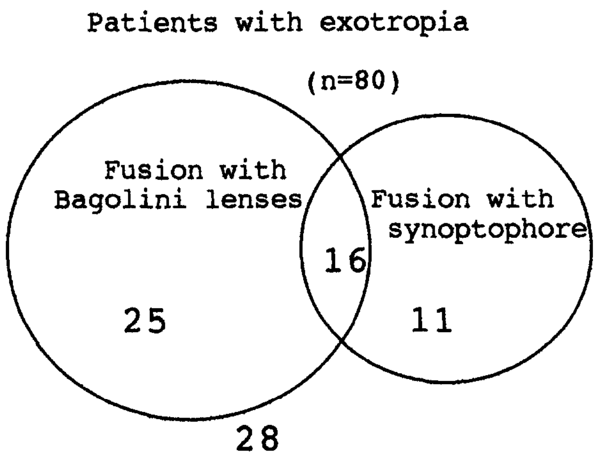

Figure 2. Exotropic patients in each postoperative binocular condition.

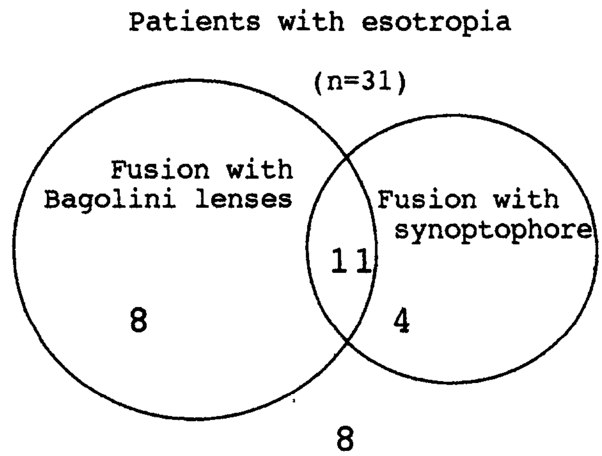

Figure 3. Esotropic patients in each postoperative binocular condition.

section with single rectus muscle resection in the contralateral eye, 1. Combined vertical or oblique and horizontal muscle procedures were selected for nine patients. Patients of several surgeons were included, but all surgeons were supervised by one (H.O.).

Statistical Analysis

The SPSS 6.1 and SPSS Advanced Statistics 6.1 software (SPSS, Chicago, IL, USA) was used for data analysis. Data from patients in both the fusion (+) and fusion (−) groups were analyzed with the

Table 2. Univariate Analysis of Predictors for Postoperative Binocularity With Bagolini Lenses in Exotropia

	Fusion (+)	Fusion (−)	*P*
Number of patients	41	39	
Sex (male)	16 (39.0%)	15 (38.5%)	0.959[a]
Age (y)			
15–30	20 (48.8%)	20 (51.3%)	0.156[a]
31–50	13 (31.7%)	6 (15.4%)	
≥51	8 (19.5%)	13 (33.3%)	
Spherical equivalent of deviating eye (D)[b]	−0.76 ± 2.27	−1.42 ± 2.84	0.258[c]
Spherical equivalent of nondeviating eye (D)[b]	−0.47 ± 2.83	−0.80 ± 1.57	0.514[c]
Difference in spherical equivalents (D)[b,d]	0.89 ± 1.67	1.13 ± 1.61	0.520[c]
Visual acuity of deviating eye ≤0.5	4 (9.8%)	12 (30.8%)	0.019[a]
Visual acuity of nondeviating eye ≤0.5	0	1 (2.6%)	0.488[e]
Preoperative deviation (degree)[b]	24.76 ± 9.68	22.83 ± 10.11	0.387[c]
Vertical deviation (degree)[b]	2.82 ± 2.65	3.18 ± 0.88	0.625[c]
DVD	8 (19.5%)	7 (17.9%)	0.858[a]
NRC[f]	11 (26.8%)	11 (28.2%)	0.890[a]
Fusion in prism adaptation[g]	8 (19.5%)	3 (7.7%)	0.125[a]
Previous operations (+)	12 (29.3%)	21 (53.8%)	0.026[a]
Postoperative deviation			
Orthophoria	34 (82.9%)	25 (64.1%)	0.101[a]
Undercorrection >10Δ	6 (14.6%)	9 (23.1%)	
Overcorrection >10Δ	1 (2.5%)	5 (12.8%)	

D: diopters. Δ: prism diopters. DVD: dissociated vertical deviation. NRC: normal retinal correspondence.
[a]Chi-square test.
[b]Mean ± standard deviation.
[c]Student's *t*-test.
[d]Difference in spherical equivalents between right and left eyes.
[e]Fisher's exact test.
[f]Results of afterimage test.
[g]Results of Bagolini lens test during preoperative prism adaptation.

chi-square, Fisher's exact, and Student's *t*-tests to identify factors which differed significantly ($P < 0.05$) between the groups. To identify predictive factors for postoperative binocularity, we used a multiple logistic regression model:

$$\text{Prob (event)} = \frac{e^z}{1 + e^z}$$

$$(Z = B_0 + B_1X_1 + B_2X_2 + \ldots + B_pX_p)$$

where Prob(event) is the probability of fusion (+), B_i ($i = 1, 2, 3, \ldots p$) are coefficients estimated from the data, X_i ($i = 1,2,3 \ldots p$) are the independent variables and e is the base of the natural logarithm (approx. 2.718). Model selection for identifying significant factors predictive of postoperative binocularity was derived from forward stepwise selection with the likelihood-ratio test (enter limit, 0.05; remove limit, 0.1).

Results

In patients with exotropia, 41 (51.3%) demonstrated fusion with Bagolini lenses and 27 (33.8%) with the synoptophore; 28 (35.0%) demonstrated no fusion with either (Figure 2). In the patients with esotropia, 19 (61.3%) showed fusion with Bagolini lenses and 15 (48.4%) with the synoptophore; 8 (25.8%) showed no fusion with either (Figure 3).

Univariate analysis of data from exotropic patients revealed that significant factors influencing postoperative binocularity (Bagolini lens testing) were the visual acuity of the deviating eye and surgical history (Table 2); analysis of synoptophore test results indicated that preoperative deviation, normal retinal correspondence (NRC), fusion with prism adaptation, and previous surgery were significant factors (Table 3). In esotropic patients, data analysis of postoperative Bagolini lens test results identified the significant factor as fusion with prism adaptation (Table 4), while synoptophore testing identified infantile esotropia as significant (Table 5).

Results of the stepwise logistic regression for postoperative binocularity are shown in Tables 6–9. Significant predictive factors in exotropic patients (Bagolini lens testing) were positive surgical history,

Table 3. Univariate Analysis of Predictors for Postoperative Binocularity With Synoptophore in Exotropia

	Fusion (+)	Fusion (−)	*P*
Number of patients	27	53	0.456[a]
Sex (male)	12 (44.4%)	19 (35.8%)	0.282[a]
Age (y)			
15–30	13 (48.1)	27 (50.9)	
31–50	9 (33.3)	10 (18.9)	
≥51	5 (18.6)	16 (30.2)	
Spherical equivalent of deviating eye (D)[b]	−0.96 ± 1.98	−1.13 ± 2.84	0.747[c]
Spherical equivalent of nondeviating eye (D)[b]	−0.70 ± 1.91	−0.59 ± 2.49	0.837[c]
Difference in spherical equivalents (D)[b,d]	0.77 ± 1.01	1.14 ± 1.87	0.257[c]
Visual acuity of deviating eye ≤0.5	4 (14.8)	12 (22.7)	0.408[a]
Visual acuity of nondeviating eye ≤0.5	0	1 (1.9)	0.408[e]
Preoperative deviation (degree)[b]	20.44 ± 8.37	25.55 ± 10.21	0.020[c]
Vertical deviation (degree)[b]	2.64 ± 2.61	3.17 ± 3.60	0.453[c]
DVD	5 (18.5%)	10 (18.9%)	0.970[a]
NRC[f]	13 (48.1%)	9 (17.0%)	0.003[a]
Fusion in prism adaptation[g]	7 (25.9%)	4 (7.5%)	0.030[e]
Previous operations (+)	7 (25.9%)	26 (49.1%)	0.047[a]
Postoperative deviation			
Orthophoria	20 (74.1)	39 (73.6)	0.999[a]
Undercorrection >10Δ	5 (18.5)	10 (18.9)	
Overcorrection >10Δ	2 (7.4)	4 (7.5)	

D: diopters. Δ: prism diopters. DVD: dissociated vertical deviation. NRC: normal retinal correspondence.
[a]Chi-square test.
[b]Mean ± standard deviation.
[c]Student's *t*-test.
[d]Difference in spherical equivalents between right and left eyes.
[e]Fisher's exact test.
[f]Results of afterimage test.
[g]Results of Bagolini lens test during preoperative prism adaptation.

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visual acuity of the deviating eye ≤0.5, and the spherical equivalent of the deviating eye. The odds ratios indicated that previous operations and visual acuity ≤0.5 decreased, but higher spherical equivalent of the deviating eye increased, the probability of postoperative fusion (Table 6). The significant predictive factor, by synoptophore, was NRC, which increased the probability (Table 7).

In esotropic patients, (with Bagolini lenses) fusion with prism adaptation was the significant predictive factor, increasing the probability of postoperative binocularity (Table 8). Significant factors with synoptophore testing were infantile esotropia, which decreased the probability, and vertical deviation, with a higher deviation increasing the probability of postoperative fusion (Table 9).

Discussion

In the present study, we found that 65.0% of adults with exotropia and 74.2% of those with esotropia achieved postoperative binocularity, corroborating the results of recent studies[6,1,2,7,3,9,5] which have indicated that adults with long-standing strabismus could develop fusion postoperatively. The percentages of patients who developed fusion with Bagolini lenses postoperatively in this study, however, were lower (exotropia, 51.3%; esotropia, 61.3%) than in Kushner and Morton's report (86.0%).[3] Percentages of patients demonstrating postoperative fusion by synoptophore (exotropia, 33.8%; esotropia, 48.4%) were also lower than those reported by Goldstein and Schneekloth (90.0%).[1] One possible reason may be the differences in the study populations. We excluded patients who preoperatively demonstrated fusion by synoptophore but no fusion with Bagolini lenses while Kushner included them, perhaps influencing the higher success rate. All patients in the Goldstein and Schneekloth[1] study had excellent vision (some in our study had amblyopia) and were also younger (12–45 years; mean 28.5) than ours. These differences could also have affected the postoperative success rates.

Table 4. Univariate Analysis of Predictors for Postoperative Binocularity With Bagolini Lenses in Esotropia

	Fusion (+)	Fusion (−)	*P*
Number of patients	19	12	
Sex (male)	7 (36.8%)	4 (33.3%)	0.842[a]
Age (y)			
15–30	14 (73.7%)	9 (75.0%)	0.638[b]
≥31	5 (26.3%)	3 (25.0%)	
Congenital esotropia	11 (57.9%)	7 (58.3%)	0.981[a]
Spherical equivalent of deviating eye (D)[c]	−3.94 ± 7.79	−2.27 ± 4.18	0.446[d]
Spherical equivalent of nondeviating eye (D)[c]	−3.63 ± 7.65	−1.35 ± 3.24	0.338[d]
Difference in spherical equivalents (D)[c,e]	1.29 ± 1.28	1.50 ± 1.31	0.657[d]
Visual acuity of deviating eye ≤0.5	3 (15.8%)	3 (25.0%)	0.427[b]
Visual acuity of nondeviating eye ≤0.5	1 (5.3%)	1 (8.3%)	0.426[b]
Preoperative deviation (degree)[c]	23.66 ± 10.03	24.43 ± 12.62	0.859[d]
Vertical deviation (degree)[c]	2.42 ± 2.77	1.75 ± 2.23	0.466[d]
DVD	6 (31.6%)	2 (16.7%)	0.355[a]
NRC[f]	7 (36.8%)	2 (16.7%)	0.228[a]
Fusion in prism adaptation[g]	9 (47.4%)	1 (8.3%)	0.027[b]
Previous operations (+)	3 (15.8%)	4 (33.3%)	0.255[a]
Postoperative deviation			
Orthophoria	13 (68.4%)	7 (58.3%)	0.526[a]
Undercorrection >10Δ	5 (26.3%)	5 (41.7%)	
Overcorrection >10Δ	1 (5.3%)	0	

D: diopters. Δ: prism diopters. DVD: dissociated vertical deviation. NRC: normal retinal correspondence.
[a]Chi-square test.
[b]Fisher's exact test.
[c]Mean ± standard deviation.
[d]Student's *t*-test.
[e]Difference in spherical equivalents between right and left eyes.
[f]Results of afterimage test.
[g]Results of Bagolini lens test during preoperative prism adaptation.

The logistic regression model identified influential factors in postoperative binocularity; differences in the factors identified in exotropia and esotropia seem to reflect the different mechanisms involved in binocularity in these two conditions. In the current study, 61 exotropic and 29 esotropic patients were tested for stereopsis using the TNO test (Lameraise, Utrecht, The Netherlands). Excluding those with exotropia following surgery for esotropia, 23 of 46 exotropic (50.0%) demonstrated postoperative stereopsis; with esotropia, 4 of 29 patients (13.8%), again suggesting a difference in success possibly related to the different mechanisms of binocularity in exotropia and esotropia. Differences in factors identified by the Bagolini lens and synoptophore testing appear to reflect differences in the measurement sensitivity of the two procedures.

Morris et al[4] suggested that adults who had had previous strabismus surgery, but who had not achieved good alignment, did have a potential for peripheral fusion after strabismus surgery. In the current study, 33 of the 80 exotropic patients had a history of strabismus surgery (21 had surgery for exotropia after surgery for esotropia; 12 had surgery for exotropia alone). Postoperative fusion was demonstrated in 12 (36.4%) of these 33 patients (Bagolini lens test), significantly lower than in patients without previous surgery (61.7%). Logistic regression analysis (Bagolini lens data) also indicated a poorer prognosis for exotropic patients with a history of surgery. This may be influenced by the high incidence of surgery for infantile esotropia, some with subsequent exotropia, as well as the previously noted poor binocular prognosis for patients with infantile esotropia.[8,11,13]

Exotropia following surgery for esotropia differs from simple exotropia; a logistic regression analysis was done on data of 59 exotropic patients without a history of esotropia surgery. Significant factors influencing binocularity, with Bagolini lenses, were the same but the influence of the surgical history diminished. Logistic regression analysis of synoptophore

Table 5. Univariate Analysis of Predictors for Postoperative Binocularity With Synoptophore in Esotropia

	Fusion (+)	Fusion (−)	*P*
Number of patients	15	16	
Sex (male)	5 (33.3%)	6 (37.5%)	0.809[a]
Age (y)			
15–30	12 (80.0%)	11 (68.8%)	0.382[b]
≥31	3 (20.0%)	5 (31.2%)	
Congenital esotropia	6 (40.0%)	12 (75.0%)	0.048[a]
Spherical equivalent of deviating eye (D)[c]	−4.02 ± 8.58	−2.61 ± 4.16	0.573[d]
Spherical equivalent of nondeviating eye (D)[c]	−3.36 ± 8.19	−2.19 ± 4.15	0.624[d]
Difference in spherical equivalents (D)[c,e]	1.34 ± 1.25	1.39 ± 1.33	0.911[d]
Visual acuity of deviating eye ≤0.5	3 (20.0%)	3 (18.8%)	0.641[b]
Visual acuity of nondeviating eye ≤0.5	2 (13.3%)	0	0.226[b]
Preoperative deviation (degree)[c]	22.17 ± 11.40	25.63 ± 10.51	0.389[d]
Vertical deviation (degree)[c]	3.07 ± 2.80	1.32 ± 2.04	0.058[d]
DVD	4 (26.7%)	4 (25.0%)	0.618[b]
NRC[f]	4 (26.7%)	5 (31.3%)	0.546[b]
Fusion in prism adaptation[g]	7 (46.7%)	3 (18.8%)	0.101[b]
Previous operations (+)	2 (13.3%)	11 (68.7%)	0.224[b]
Postoperative deviation			
Orthophoria	10 (66.7%)	10 (62.5%)	0.504[a]
Undercorrection >10Δ	4 (26.7%)	6 (37.5%)	
Overcorrection >10Δ	1 (6.6%)	0	

D: diopters. Δ: prism diopters. DVD: dissociated vertical deviation. NRC: normal retinal correspondence.

[a]Chi-square test.

[b]Fisher's exact test.

[c]Mean ± standard deviation.

[d]Student's *t*-test.

[e]Difference in spherical equivalents between right and left eyes.

[f]Results of afterimage test.

[g]Results of Bagolini lens test during preoperative prism adaptation.

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Table 6. Logistic Regression of Predictors for Postoperative Development of Binocularity With Bagolini Lenses in Exotropia

Variables	Estimated Coefficient	Odds Ratio	P
Previous operations (+)	−1.589	0.2041	0.004
Visual acuity of deviating eye ≤0.5	−1.722	0.1787	0.011
Spherical equivalent of deviating eye (D)	0.229	1.2575	0.042
Constant	1.296		

Model chi-square = 16.506, P = 0.0009. D: diopters. Of 80 patients, 57 patients (71.25%) were correctly classified by this model.

Table 8. Logistic Regression of Predictors for Postoperative Development of Binocularity With Bagolini Lenses in Esotropia

Variables	Estimated Coefficient	Odds Ratio	P
Fusion in prism adaptation[a]	2.293	9.8999	0.045
Constant	−0.095		0.827

Model chi-square = 5.815, P = 0.0159. Of 31 patients, 20 patients (64.52%) were correctly classified by this model.
[a]Evaluated with Bagolini striated glasses test in prism adaptation.

data indicated that a smaller preoperative deviation, in addition to NRC, increased the probability of postoperative binocularity. Apparently only small changes result with exclusion of patients with exotropia following esotropia surgery. We believe that these do not lessen the usefulness of the model.

Earlier studies indicate that postoperative binocularity (Bagolini lens testing) and binocular field expansion occurred regardless of the amblyopia depth in the deviating eye.[6,2,7,3] Other reports suggest that good bilateral vision is necessary for adults to achieve fusion after surgery for long-standing strabismus.[1,4,8,11] In our exotropic patients, both logistic regression and univariate analysis indicated that poor visual acuity in the deviating eye was associated with poor Bagolini lens binocularity postoperatively, supporting the second position.

Logistic regression analysis of exotropic data also indicated that increased probability of success was related to the increased spherical equivalent in the deviating eye (Bagolini lens testing), suggesting that more severe myopia will presage a poorer outcome. Seven of the exotropic patients in the present study had myopia of −5.0 D or more; these 7 had a lower success rate than the remaining 73 (28.6% vs. 53.4%). The odds ratios indicate, however, that the influence of the spherical equivalent is relatively small compared to the influence of previous surgery and visual acuity.

Patients with NRC have a good postoperative prognosis. Exotropic patients with NRC in our study had a good outcome, by synoptophore; however, NRC was not a significant predictive factor in binocularity, using Bagolini lenses. Some patients with anomalous retinal correspondence (ARC) preoperatively may have included some with ARC fusion who developed postoperative fusion (Bagolini lenses). With the synoptophore, fusion indicates a higher degree of binocular function than with Bagolini lenses;[14] our results suggest that patients with ARC may develop fusion with Bagolini lenses but not with the synoptophore.

We found that patients with esotropia who demonstrated preoperative fusion with Bagolini lenses during prism adaptation had good postoperative binocularity with Bagolini lenses. Previous reports indicate that prism adaptation is useful for estimating fusion potential in children with acquired esotropia;[12,15] our results imply that the same is true for adults with esotropia.

The development of fusion is rare in infantile esotropia if ocular alignment has not occurred during the critical period of binocular vision develop-

Table 7. Logistic Regression of Predictors for Postoperative Development of Binocularity With Synoptophore in Exotropia

Variables	Estimated Coefficient	Odds Ratio	P
NRC[a]	−1.513	4.5397	0.004
Constant	−1.145		0.001

Model chi-square = 8.422, P = 0.0037. NRC: normal retinal correspondence. Of 80 patients, 57 patients (71.25%) were correctly classified by this model.
[a]Evaluated with afterimage test.

Table 9. Logistic Regression of Predictors for Postoperative Development of Binocularity With Synoptophore in Esotropia

Variables	Estimated Coefficient	Odds Ratio	P
Congenital esotropia	−1.948	0.1425	0.030
Vertical deviation (degrees)	0.388	1.4740	0.036
Constant	0.182		0.788

Model chi-square = 9.449, P = 0.0089. Of 31 patients, 23 patients (74.19%) were correctly classified by this model.

ment.[16,2,13] Some patients may acquire postoperative peripheral fusion but few achieve central fusion.[11,13] Kushner and Morton[3] however, reported postoperative binocularity with Bagolini lenses in a majority of adult patients with infantile esotropia. The present study indicates that infantile esotropia does not have a significant influence on postoperative binocularity with Bagolini lenses, but is significant in predicting the outcome with the synoptophore. This suggests that adult patients with infantile esotropia can achieve peripheral fusion with Bagolini lenses even though surgery occurs after the critical period of binocular vision development. Our study also indicates that these patients cannot develop fusion with the synoptophore, which demands a higher level of binocular function. our results support the hypothesis that fusional mechanisms can be modified even after the age of visual maturation.[1]

The majority of adults with exotropia or esotropia, with no preoperative binocularity, can expect postoperative binocularity, with Bagolini lenses or synoptophore. Significant factors influencing the outcome differ in the two conditions, and with the two techniques. Postoperative binocularity in exotropia is significantly associated with absence of previous surgery, visual acuity of the deviating eye >0.5, and normal retinal correspondence. A favorable outcome for esotropic patients is significantly related to fusion during prism adaptation and the absence of infantile esotropia. Recognition of the influence of these factors can increase the accuracy of prediction of postoperative binocularity in adults.

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