Published in final edited form as:

J AAPOS. 2017 October ; 21(5): 360–364. doi:10.1016/j.jaapos.2017.07.201.

Factors associated with atypical postoperative drift following surgery for consecutive exotropia

Steven D. Maxfield, MD^a, Sarah R. Hatt, DBO^a, David A. Leske, MS^a, Jae Ho Jung, MD, PhD^{a,b}, and Jonathan M. Holmes, BM, BCh^a

^aDepartment of Ophthalmology, Mayo Clinic, Rochester, Minnesota

^bDepartment of Ophthalmology, Pusan National University Yangsan Hospital, Yangsan, South Korea

Abstract

Purpose—To evaluate the associations of clinical and surgical factors with atypical postoperative drift following surgery for consecutive exotropia.

Methods—A total of 66 patients with consecutive exotropia ($\geq 10^\circ$ at distance), after historical surgery for esotropia were retrospectively identified at a tertiary medical center. All patients underwent unilateral lateral rectus recession (on adjustable suture) with medial rectus advancement and/or resection. Immediate postoperative target angle was 4° – 10° of esotropia at distance, anticipating mild postoperative exodrift. Actual postoperative drift was calculated as change in distance deviation from immediately postadjustment to 6 weeks. Typical drift was defined as 0° – 9° of exodrift. Excessive exodrift was defined as $\geq 10^\circ$. Esodrift was defined as ≥ 1 or more. Univariate and multiple logistic regression analyses were performed to evaluate for associations with a wide range of clinical and surgical factors.

Results—Overall there was a median exodrift (4° , quartiles 0° – 10°). Of the 66 patients, 18 (27%) showed excessive exodrift; 15 (23%), esodrift. In multiple logistic analyses, larger preoperative distance exodeviation was associated with excessive exodrift ($P = 0.01$), and non-normal medial rectus attachment status (abnormal [stretched scar, pseudo-tendon], attached to pulley, or behind pulley) was associated with esodrift ($P = 0.02$).

Conclusions—Approximately half of patients show atypical drift following unilateral surgery for consecutive exotropia, with larger preoperative distance exodeviation associated with exodrift and non-normal medial rectus muscle status with esodrift. Knowing these associations may help when counseling patients regarding surgical outcomes.

Consecutive exotropia is an exotropia in a previously esotropic patient, most often developing after surgical intervention for esotropia. In surgical planning for consecutive

Correspondence: Dr. Jonathan M. Holmes, Ophthalmology E4, Mayo Clinic, Rochester, MN 55905 (holmes.jonathan@mayo.edu).

Presented in part at the Annual Meeting of the Association for Research in Vision and Ophthalmology, Baltimore, Maryland, May 7–11, 2017.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

exotropia, the typical immediate postoperative target angle is a small esodeviation because most patients are expected to experience postoperative exodrift. For some patients, exodrift occurs in excess of the anticipated magnitude, leading to recurrence of the exodeviation, whereas for others an unexpected esodrift occurs.¹ It is currently unclear why some patients show excessive exodrift or esodrift following surgery. The purpose of the present study was to describe the frequency of atypical postoperative drift (excessive exodrift and esodrift) and evaluate clinical and surgical factors associated with both excessive exodrift and any esodrift in patients undergoing surgery for consecutive exotropia.

Subjects and Methods

The procedures used in this study conformed to the Declaration of Helsinki and were approved by the Institutional Review Board of the Mayo Clinic, Rochester, Minnesota.

The medical records of all consecutive exotropia patients seen over a 20-year period (1995–2015) were reviewed to identify a cohort of patients who underwent surgery for consecutive XT of 10° by prism and alternate cover test at distance fixation (3 m, which is standard in our practice), after previous medial rectus recession (with or without lateral rectus resection) for concomitant esotropia. To study postoperative drift in a relatively homogeneous surgical cohort we only included patients undergoing unilateral medial rectus advancement (with or without resection) and lateral rectus recession on an adjustable suture. Previous surgery for consecutive exotropia was allowed, as was coexisting vertical deviation requiring vertical displacement of horizontal rectus muscle and/or simultaneous vertical or oblique muscle surgery on the same eye.

Included patients had distance prism and alternate cover test measurements at three time points: (1) immediately preoperatively, (2) immediately following tying of adjustable sutures, (3) at 6 weeks (window of 3–21 weeks, taking the examination closest to 6 weeks) postoperatively

Pre- and Postoperative Clinical Data

The preoperative examination was reviewed to extract the following data: best-corrected visual acuity (converted to logMAR for analysis), horizontal angle of deviation at distance (3 m) and near (1/3 m) by prism and alternate cover test with measurements in up- and downgaze (distance fixation) where available, and refractive error (summarized as spherical equivalent for each eye). Based on review of the medical history, we also recorded the total number of previous strabismus surgeries. Distance and near horizontal prism and alternate cover test were recorded from the 6-week postoperative examination.

Surgical Data

All included patients underwent surgery by a single surgeon (JMH). The immediate postoperative target angle was 4°–10° of esotropia at distance, which has been our standard practice, in anticipation of small-magnitude postoperative exodrift. It is our practice to use a narrow range for the immediate postadjustment target angle (rather than a single target value of, eg, 10°) because achieving a specific value might require multiple adjustments that may be poorly tolerated by some patients and a target range has been reported to be useful.² The

surgical report was reviewed to extract the following data: lateral rectus tightness by positive forced duction testing to adduction (graded normal, mild restriction, or moderate restriction); dose of lateral rectus recession (millimeters); location of medial rectus attachment to sclera (for those with a scleral attachment), including connective tissue or scar tissue (millimeters from insertion); location of majority of medial rectus muscle fibers (millimeters from insertion); dose of medial rectus advancement (with or without resection) in millimeters; whether or not vertical transposition of the horizontal rectus muscles was performed; whether or not simultaneous vertical or oblique surgery was performed (on the same eye); and type of medial rectus muscle attachment (see following detail).

Classification of Medial Rectus Muscle Attachment Type

Data on medial rectus attachment type were included because we previously speculated that attachment type may influence surgical outcomes.³ Based on the written description of the location of the distal end of the medial rectus and the appearance of the attachment, the muscle attachment was classified as follows: (1) normal, with medial rectus muscle fibers attached directly to sclera; (2) abnormal, with medial rectus muscle fibers attached to sclera via a stretched scar or pseudotendon with the distal end of the muscle in front of the orbital pulley; (3) pulley, with medial rectus muscle fibers attached to the pulley but not the sclera; (4) behind pulley, with distal end of the muscle fibers found behind the pulley, but not attached to the pulley; or (5) mixed, with features of a tenuous normal attachment but with muscle fibers also attached to pulley structures or located behind the pulley. In all cases the surgical report was written in sufficient detail to allow classification of attachment type, and all classifications were completed before any analyses were performed.

Analysis

The amount of postoperative drift was calculated as the difference in distance horizontal prism and alternate cover test (in prism diopters), from immediately after adjustment to 6 weeks postoperatively. Esodeviations were assigned a negative value; exodeviations, a positive value. The proportion of patients showing excessive exodrift ($> 10^\circ$), and the proportion of patients showing any esodrift ($< 1^\circ$) were calculated.

Separate univariate and multiple logistic regression analyses were performed to identify factors associated with (1) excessive exodrift (compared with $< 10^\circ$ of exodrift and no esodrift), and (2) any esodrift (compared with $< 10^\circ$ of exodrift). Preoperative clinical factors (continuous data) were as follows: horizontal prism and alternate cover test at distance and at near, adduction deficit in the operated eye, degree of hyperopia (most hyperopic eye), and number of prior strabismus surgeries. Preoperative factors (dichotomized data; yes/no) were presence of amblyopia (interocular visual acuity difference of at least 3 logMAR lines, with no other organic cause), presence of an A pattern (difference of $> 10^\circ$ between up- and downgaze) or V pattern (difference of $> 15^\circ$ between up- and downgaze), presence of hyperopic anisometropia > 1 D (spherical equivalent). From postoperative examinations we included immediate postadjustment horizontal angle at distance and near. The following surgical factors were included: location of medial rectus muscle insertion (included for normal and abnormal scleral attachments only [mixed attachment type excluded]), amount of medial rectus resection and/or advancement, amount of lateral rectus recession, and

location of medial rectus muscle fibers. For location of medial rectus muscle fibers, if the exact distance was not recorded (pulley or behind the pulley insertions only), we imputed values derived in a previously reported dataset,⁴ (12 mm for pulley and 16 mm for behind pulley). The actual surgical dose was calculated including any postoperative adjustment. Additional factors included were whether only horizontal surgery was performed or whether simultaneous vertical transposition of horizontal rectus muscles, or vertical rectus or oblique muscle surgery was performed, lateral rectus tightness (normal, mild, moderate), and medial rectus attachment type.

Since medial rectus insertion location data were not applicable to patients with pulley or behind pulley attachments, we performed secondary univariate and multiple logistic regression analyses including only patients with normal and abnormal medial rectus muscle attachments.

For all univariate analyses, to reduce the possibility of missing possible associations for evaluation in multiple logistic regression analyses, each variable with a significance of $P < 0.1$ was included in the subsequent analysis.

Spearman rank correlations were calculated to identify moderate to strong correlations (r 0.6) between factors identified in univariate analysis. To determine whether masking of variable influence was occurring due to a correlation, multivariate analyses were performed first with all items identified in univariate analysis, but then repeated including only one of any pair of correlated factors. Stepwise multiple logistic regression analyses were performed including only patients with data on each variable. Demographic descriptive statistics were formulated as means and standard deviation, or medians if non-normally distributed. All statistical analyses were performed using SAS software (version 9.4, SAS Institute Inc, Cary, NC).

Results

A total of 66 patients were included (mean age 40 ± 19 years; range, 12–82 years). Of these, 44 (67%) were female and 63 (95%) were white. Median preoperative exotropic angle of deviation was 25 (range, 12 –60) for distance and 35 (range, 10 –65) for near. Forty-three (65%) underwent surgery on their left eye. Amblyopia was present in 20 patients (30%). The preoperative data were obtained at a median 1 day before surgery (range, 1–39 days). For 63 of the 66 patients adjustment was performed the day of surgery; 3 were adjusted the following day. The 6-week visit data were obtained at median of 7 weeks postoperatively (range, 4–18 weeks).

Overall, at 6 weeks postoperatively there was an average exodrift of 4 (quartiles, 0 –10). Eighteen patients (27%) showed excessive exodrift and 15 (23%) showed esodrift. For patients with excessive exodrift, the 6-week postoperative examination range was 5–9 weeks (mean, 7 weeks); for patients with esodrift, 4–9 weeks (mean, 7 weeks).

Factors Associated with Excessive Exodrift

In univariate analysis (selecting factors for inclusion in multiple logistic regression analyses) there was significant association ($P < 0.1$) between excessive exodrift and larger preoperative exodeviation at distance ($P = 0.004$), larger preoperative exodeviation at near ($P = 0.07$), and larger, immediate postadjustment esodeviation at distance ($P = 0.08$) (Table 1).

In multiple regression analyses, with all three factors identified as significant in univariate analysis included, only preoperative distance deviation remained associated with excessive exodrift ($P = 0.01$, Table 1). The proportion of patients showing excessive exodrift increased with progressively increasing preoperative distance angle of deviation (Figure 1A).

Preoperative distance and near deviation were found to be correlated ($P < 0.0001$); therefore, analysis was repeated including only one correlated variable at a time. With preoperative distance deviation and postadjustment distance deviation included in the analysis (but not preoperative near deviation), only preoperative distance deviation remained significantly associated ($P = 0.008$). With preoperative near deviation and postadjustment distance deviation included in the analysis (but not preoperative distance deviation), no factors were found to be significantly associated with excessive exodrift.

Factors Associated with Esodrift

In univariate analysis (selecting factors for inclusion in multiple logistic regression analyses), there was significant association ($P < 0.1$) between esodrift and medial rectus status ($P = 0.009$; association with any non-normal attachment [abnormal, pulley, behind pulley]), greater number of previous surgeries ($P = 0.04$), and larger medial rectus surgical dose ($P = 0.06$).

In multiple regression analyses, with all three factors identified as significant in univariate analysis included, only non-normal medial rectus status remained associated with esodrift ($P = 0.02$). The proportion of patients showing esodrift was greater with abnormal attachment, attachment to the pulley and attachment behind the pulley (Figure 1B). There were no significant correlations between factors.

Secondary Analysis of Normal versus Abnormal Medial Rectus Attachment Type

Similar to our overall findings, univariate analysis showed that excessive exodrift ($n = 13$) was significantly associated ($P < 0.1$) with larger preoperative exodeviation at distance ($P = 0.04$) and larger immediate postadjustment esodeviation at distance ($P = 0.08$). Medial rectus insertion location was not found to be associated. Both larger preoperative exodeviation at distance ($P = 0.03$) and larger immediate post-adjustment esodeviation at distance ($P < 0.05$) remained associated in multiple regression analysis.

For esodrift ($n = 9$), associations were again similar to our overall findings, with greater number of previous surgeries ($P = 0.03$) and medial rectus attachment status ($P = 0.08$) being associated in univariate analysis, but, in addition, more anterior medial rectus insertion location (independent of attachment type) was also associated with esodrift ($P = 0.008$). More anterior medial rectus insertion location was the only factor that remained associated

in multiple regression analyses ($P = 0.02$). Interestingly, medial rectus location (as distinct from attachment type) was not found to be associated in the overall analyses of esodrift.

Discussion

When evaluating patients undergoing surgery for consecutive exotropia, half demonstrated typical, small-magnitude exodrift postoperatively, whereas the other half demonstrated either excessive exodrift or unexpected esodrift. When analyzing a wide range of clinical and surgical factors for association with atypical postoperative drift, we found larger preoperative distance exodeviation was associated with excessive exodrift and non-normal medial rectus status was associated with esodrift.

Previous studies of surgery for consecutive exotropia typically report postoperative exodrift, and therefore many surgeons deliberately target an immediate postoperative esotropia.^{5,6} Across previous studies the reported magnitude of exodrift ranges from approximately 4 to 7°⁶⁻⁹ in the early postoperative period, similar to our finding of 4° over 6 weeks. Nevertheless, reporting averages can obscure individual responses. We found that whereas half of the patients drifted as anticipated, the other half did not. Eino and colleagues⁵ also reported that the majority of their patients had 3°-7° exodrift postoperatively, with exceptions drifting more exo or eso in similar proportions.

Approximately a quarter of patients in our study showed excessive exodrift. Larger-than-expected exodrift is undesirable, because it increases the likelihood of unwanted recurrence of the exodeviation, previously reported in 8%–50%.^{1,7,8,10-13} We are not aware of any previous studies that have evaluated associations with excessive exodrift per se, but some have evaluated associations with exodeviation recurrence. Two studies found associations between larger preoperative angle of deviation^{9,14} and recurrent exodeviation, paralleling our finding of larger preoperative deviation associated with excessive exodrift. Other factors reported as associated with exodeviation recurrence in consecutive exotropia are millimeters of medial rectus advancement¹⁵ and limitation of adduction preoperatively,¹¹ but these were not found associated with excessive exodrift in the present study.

It is unclear why some patients are susceptible to excessive exodrift postoperatively and why this phenomenon might be associated with larger preoperative exodeviation. Our finding that larger initial surgical overcorrection was associated with excessive exodrift in univariate analysis (Table 1) suggests that the problem is not one of inadequate surgical dose. We speculate that patients with excessive exodrift are exhibiting “inexorable exotropic drift.” This exodrift may be driven by a functional preference for the preoperative exodeviation due to adaptations such as panoramic vision. Alternatively, it is possible that smaller preoperative exodeviations enable better stabilization of postoperative alignment because anomalous retinal correspondence has developed preoperatively^{16,17} and then reestablishes itself postoperatively.¹⁷ It would be of value to assess binocular status preoperatively, using, for example, the synoptophore, to determine associations of fusion ability with postoperative drift.

Our finding that a larger preoperative angle of deviation was associated with excessive exodrift may seem to call for greater initial overcorrection, but paradoxically we found that larger-angle esotropia immediately post-adjustment was actually associated with excessive exodrift (in univariate analysis). Donaldson and colleagues¹ reported a similar finding, stating that “exodrift was more prominent in those patients who were overcorrected at 1 week.” The fact that a surgically induced larger angle esotropia immediately postoperatively does not appear to be protective against excessive exodrift suggests other, as yet unidentified, treatment strategies are needed to correct this tendency to exodrift.

We found that approximately a quarter of patients unexpectedly showed postoperative esodrift. Donaldson and colleagues¹ distinguished between patients showing exodrift, no drift, and esodrift, reporting 17% of patients showing esodrift from 1 to 6 weeks postoperatively (mean, $6 \pm 2.7^\circ$), but did not study associations with esodrift.

We found non-normal medial rectus attachment was more likely to be associated with esodrift than a normal medial rectus attachment and speculate that dynamic changes occur in non-normally inserted muscles. In animal models, Scott¹⁸ found that when the medial rectus was on stretch there was a dramatic increase in sarcomeric length. Correspondingly, when in a relaxed state, the antagonist lateral rectus muscle demonstrated a decrease in sarcomeric length.¹⁸ Despite the fact that over time there was a compensatory increase or decrease in sarcomeric length it is plausible that in consecutive exotropia, non-normally attached medial rectus muscles may exert a more powerful adduction force once reattached to the globe, resulting in subsequent esodeviation. A target angle of orthotropia or small-angle exotropia may be more appropriate for such patients, but the majority already demonstrate exodrift and therefore might be more prone to excessive exodrift if the target angle was less eso. This topic deserves further study.

When evaluating only those patients with a scleral medial rectus muscle attachment (whether normal or abnormal), more anterior insertion of the medial rectus was associated with greater esodrift. We speculate that this association may reflect the fact that more anteriorly located medial rectus muscles had undergone previous advancement or resection. Consistent with this possibility, we found a greater number of previous surgeries was also associated with esodrift in univariate analysis (Table 1). Nevertheless, for many patients, previous surgeries had been performed elsewhere and operative details, including whether surgery was for esotropia or exotropia, were often unavailable.

There are several limitations to the present study. We only analyzed drift in the early postoperative period and it is possible that associations are different with longer follow-up. We did not have complete data on all possible factors. For example, we did not include presence versus absence of dissociated vertical deviation, which has been reported to be associated with consecutive exotropia.¹⁹ We also only studied patients undergoing unilateral lateral rectus recession (on an adjustable suture) combined with medial rectus advancement or resection; it is possible that associations are different when performing other surgical procedures. Also, we did not have complete sensory testing data, limiting our ability to determine any potential role of abnormal retinal correspondence. We had to rely on written operative reports for the classification of medial rectus attachment type. Nevertheless, each

report was sufficiently detailed to reliably identify the medial rectus attachment type encountered at the time of surgery.

Acknowledgments

Supported by National Institutes of Health Grant EY024333 (JMH), Research to Prevent Blindness, New York, New York (unrestricted grant to the Department of Ophthalmology, Mayo Clinic), and Mayo Foundation, Rochester, Minnesota.

References

1. Donaldson MJ, Forrest MP, Gole GA. The surgical management of consecutive exotropia. *J AAPOS*. 2004; 8:230–36. [PubMed: 15226722]
2. Liebermann L, Hatt SR, Leske DA, Holmes JM. Adjustment versus no adjustment when using adjustable sutures in adult strabismus surgery. *J AAPOS*. 2013; 17:38–42. [PubMed: 23415035]
3. Jung JH, Leske DA, Holmes JM. Classifying medial rectus muscle attachment in consecutive exotropia. *J AAPOS*. 2016; 20:197–200. [PubMed: 27164430]
4. Hatt SR, Leske DA, Jung JH, Holmes JM. Intraoperative findings in consecutive exotropia with and without adduction deficit. *Ophthalmology*. 2017; 124:828–34. [PubMed: 28238457]
5. Eino D, Kraft SP. Postoperative drifts after adjustable-suture strabismus surgery. *Can J Ophthalmol*. 1997; 32:163–9. [PubMed: 9131279]
6. Weston B, Enzenauer RW, Kraft SP, Gayowsky GR. Stability of the postoperative alignment in adjustable-suture strabismus surgery. *J Pediatr Ophthalmol Strabismus*. 1991; 28:206–11. [PubMed: 1919967]
7. Cho YA, Ryu WY. The advancement of the medial rectus muscle for consecutive exotropia. *Can J Ophthalmol*. 2013; 48:300–306. [PubMed: 23931470]
8. Gesite-de Leon B, Demer JL. Consecutive exotropia: why does it happen, and can medial rectus advancement correct it? *J AAPOS*. 2014; 18:554–8. [PubMed: 25454022]
9. Rajavi Z, Feizi M, Mughadasifar H, Yaseri M, Haftabadi N, Sheibani K. Surgical results of consecutive exotropia. *J Pediatr Ophthalmol Strabismus*. 2013; 50:274–81. [PubMed: 23937864]
10. Ohtsuki H, Hasebe S, Tadokoro Y, Kobashi R, Watanabe S, Okano M. Advancement of medial rectus muscle to the original insertion for consecutive exotropia. *J Pediatr Ophthalmol Strabismus*. 1993; 30:301–5. [PubMed: 8254445]
11. Patel AS, Simon JW, Lininger LL. Bilateral lateral rectus recession for consecutive exotropia. *J AAPOS*. 2000; 4:291–4. [PubMed: 11040479]
12. Mohan K, Sharma A, Pandav SS. Unilateral lateral rectus muscle recession and medial rectus muscle resection with or without advancement for postoperative consecutive exotropia. *J AAPOS*. 2006; 10:220–24. [PubMed: 16814174]
13. Chatzistefanou KI, Droutsas KD, Chimonidou E. Reversal of unilateral medial rectus recession and lateral rectus resection for the correction of consecutive exotropia. *Br J Ophthalmol*. 2009; 93:742–6. [PubMed: 19471001]
14. Marcon GB, Pittino R. Dose-effect relationship of medial rectus muscle advancement for consecutive exotropia. *J AAPOS*. 2011; 15:523–6. [PubMed: 22153393]
15. Yurdakul NS, Ugurlu S. Analysis of risk factors for consecutive exotropia and review of the literature. *J Pediatr Ophthalmol Strabismus*. 2013; 50:268–73. [PubMed: 23641958]
16. Pasino L, Maraini G. Importance of natural test conditions in assign the sensory state of the squinting subject with some clinical considerations on anomalous retinal correspondence. *Br J Ophthalmol*. 1964; 48:30–4. [PubMed: 18170855]
17. Herzau V. How useful is anomalous correspondence? *Eye (Lond)*. 1996; 10:266–9. [PubMed: 8776458]
18. Scott AB. Change of eye muscle sarcomeres according to eye position. *J Pediatr Ophthalmol Strabismus*. 1994; 31:85–8. [PubMed: 8014792]

19. Han SY, Han J, Rhiu S, Lee JB, Han SH. Risk factors for consecutive exotropia after esotropia surgery. *Jpn J Ophthalmol.* 2016; 60:333–40. [PubMed: 27230032]

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

FIG. 1.

A, Proportion of patients with excessive exodrift ($n = 18$ [27%]) following surgery for consecutive exotropia, by magnitude of preoperative angle of deviation at distance by prism and alternate cover test (in 10° increments). B, Proportion of patients with esodrift ($n = 15$ [23%]) following surgery for consecutive exotropia, by type of medial rectus muscle attachment.

Table 1

Univariate logistic analysis to select factors for multiple logistic regression analyses^a to determine associations with excessive exodrift ($\geq 10^\circ$), or with any esodrift ($\geq 1^\circ$) following surgery for consecutive exotropia

Factor	P value	
	Excessive exodrift (n = 18)	Esodrift (n = 15)
Amblyopia (IOD 3 lines or more)	0.2	0.2
Preop horizontal PACT distance	0.004 ^b	0.5
Preop horizontal PACT near	0.07	0.4
Immediate post-adjustment PACT distance	0.08	0.9
Immediate post-adjustment PACT near	0.5	0.7
Hyperopic anisometropia	0.5	0.9
Hyperopia (most hyperopic eye)	0.5	0.8
A or V pattern	0.9	0.7
Number of previous surgeries	0.1	0.04
Preop adduction deficit	0.8	0.2
Lateral rectus tightness	0.7	0.8
Medial rectus attachment status	0.3	0.009 ^b
Medial rectus dose	0.1	0.06
Lateral rectus dose	0.3	0.4
Vertical surgery (in addition to horizontal)	0.2	0.7
Medial rectus muscle fiber location	0.5	0.5

IOD, interocular difference; PACT, prism and alternate cover test.

^a Factors for multiple logistic regression analysis were selected if they met a threshold of $P < 0.1$.

^b Remained significantly associated in multiple logistic regression analysis.