Evaluation and surgical outcome of acquired nonaccommodative esotropia among older children

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ABSTRACT ●

Objective: To describe the presentation, clinical evaluation, work-up, surgical management, and surgical outcomes in children older than 8 years with spontaneous, comitant, acquired nonaccommodative esotropia (ANAET).

Design: Retrospective chart review.

Participants: Children who underwent bilateral medial rectus recession surgery for ANAET with initial esotropia onset later than 8 years of age.

Methods: The medical records of children older than 8 years presenting with ANAET from 2009 to 2015 were retrospectively reviewed. The clinical presentation, work-up, surgical intervention, preoperative and postoperative deviations, and surgical outcomes were recorded.

Results: A total of 7 healthy patients were identified. The average age of onset was 11.9 years. All patients presented with symptoms of diplopia with large-angle esotropia. Most patients had no preceding illness and presented with minimal refractive error. All 7 patients had unremarkable neurological and general pediatric evaluations without findings of acute intracranial pathology on neuroimaging. Bilateral medial recession surgery was performed for all 7 patients with resolution of diplopia and excellent stereopsis postoperatively.

Conclusions: Diplopia is the most common presenting symptom among older children presenting with ANAET. Bilateral medial recession surgery achieved excellent postoperative results with resolution of diplopia and excellent stereopsis.

Acquired nonaccommodative estropia (ANAET) is a type of strabismus characterized by constant and comitant esodeviation that presents after 6 months of age without a significant refractive component.[1–3] ANAET is considered either the second or third most common type of esodeviation, followed by accommodative or infantile esotropia.[2,4] However, the prevalence of spontaneous ANAET among older children (after 5 years of age) remains unknown and is considered rare.[5,6]

To date, most published reports on ANAET have focused on younger children. Mohney described 23 children with ANAET at a median age of 31.4 months and concluded that ANAET typically presents between 1 and 5 years of age.[7] In 2011, Jacob et al. reported the largest series of 174 children with ANAET and a mean age of onset at 3 years.[8] Kothari reported 15 patients with ANAET who presented at an average age of 7.2 years.[5] However, most of their patients initially presented at a much younger age; therefore, limited insights can be drawn for older children presenting with ANAET.

We reviewed the presentation, clinical characteristics, work-up, surgical management, and outcomes in a case series with children older than 8 years presenting with spontaneous ANAET. To our knowledge, this is the first report to examine ANAET exclusively among older children.

Subjects and Methods

The medical records of children older than 8 years presenting with spontaneous, comitant ANAET to a single pediatric ophthalmologist (S.S.) at the Ivey Eye Institute, University of Western Ontario (London, Ont.) from 2009 to 2015 were reviewed retrospectively. Research ethics approval was obtained from University of Western Ontario Health Science Research Ethics Board (HSREB No. 106985). It was believed that older children with ANAET were presenting in the clinic more frequently than had been noted in the past years in the same clinic.

Patients with history or findings of other types of esotropia, such as accommodative, refractive, partially accommodative, or infantile esotropia, or who first presented with ANAET before the age of 8 years were excluded. The following information was collected from patient charts: age of onset, sex, duration of symptoms, patient symptoms, medical history, ocular history, family history, general pediatric and neurological assessment, presence of preceding illness, cycloplegic refraction, investigations performed, preoperative and postoperative deviation at near and distance, surgery performed, and preoperative and postoperative stereopsis. Intracranial anomalies and thyroid eye disease were ruled out.

Results

A total of 7 cases (5 males and 2 females) of spontaneous ANAET in children older than 8 years were identified. Detailed patient information is listed in Table 1. The average age of symptom onset was 11.9 years. All patients had symptoms of sudden onset of

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Table 1—Clinical findings and surgical outcome of older children presenting with ANAET

Pt No.	Age of Onset (y)/ Sex	Duration of Symptoms (mo)	Presenting Symptoms	MHx/Preceding Illness	Cycloplegic Refraction	MRI Findings	Preop Deviation (Prism Diopter)	Surgery Performed	Postop Deviation and Clinical Outcome	Postop Fusion Status at 1/ 3m/6m	Postop Stereopsis
1	11/M	1	Diplopia	Healthy/URTI	+1.0 OU	Normal	LET 45	BMR 6.5 mm	E3, no diplopia	BSV/BSV	40 secs of arc
2	9/F	6	Diplopia	Healthy/none	+1.0 OU	Normal	RET 20	BMR 5.0 mm	E2, no diplopia	BSV/? diplopic	40 secs of arc
3	17/M	1	Diplopia	Depression, ADHD/none	OD: −8.25 to 0.25 × 080 OS: −7.25 to 0.75 × 105	Normal	RET 35	BMR 6.0 mm	RET14, no diplopia	Diplopia/ right suppression	None
4	12/M	Revealed only in clinic that diplopia experienced for several months	Diplopia	Central auditory processing disorder, chronic left ptosis, ADHD, chromosomal copy number variation at 1q21.2 locus/none	+0.5 OU	Normal, possible previous left thalamus infarct	ET 18	BMR 3.5 mm	E(T)8, no diplopia	BSV/BSV	40 secs of arc
5	13/F	10	Diplopia	Healthy/none	-0.5 OU	Normal	ET 35	BMR 5.5 mm	E8, no diplopia	BSV/BSV	40 secs of arc
6	10.5/M	6	Headache and diplopia	Healthy/none	+1.0 OU	Normal	E(T) 20	BMR 4.0 mm	Orthophoria, no headache or diplopia	BSV/BSV	40 secs of arc
7	11/M	6	Headache and diplopia	Healthy/none	OD: plano −1.0 × 90 OS: plano −1.0 × 90	Normal	E(T) 18	BMR 3.5 mm	E(T)4, no headache or diplopia	Diplopia/ BSV	40 secs of arc

Pt, patient; MHx, medical history; URTI, upper respiratory tract infection; ADHD, attention-deficit hyperactivity disorder; ET, esotropia; E(T), intermittent esotropia; BMR, bilateral medial rectus recession; E, esophoria; BSV, binocular single vision.

diplopia at disease onset. Two patients experienced intermittent headaches in addition to symptoms of diplopia. The duration of symptoms ranged from 1 to 10 months. One patient was not able to identify the duration of symptoms because he did not voluntarily disclose his symptoms of diplopia to his parents or pediatrician; in fact, his parents realized only in the clinic that he was experiencing diplopia. The majority (5 out of 6 patients) of the other patients presented within 6 months of symptom onset.

Five of the 7 patients were previously healthy without any identifiable medical or ocular history. Patient 3 had depression and attention-deficit hyperactivity disorder. Patient 4 had chromosomal copy number variation at the 1q21.2 locus of unknown significance, as well as central auditory processing disorder, chronic left ptosis, and attention-deficit hyperactivity disorder. Before the onset of ANAET, only 1 patient had experienced preceding illness in the form of a mild upper respiratory tract infection. Six patients had no identifiable family history of strabismus or other ocular pathologies. Patient 3 had an older sibling who had required strabismus surgery at a young age.

All 7 patients had unremarkable anterior and posterior segment examinations. Six patients had minimal refractive error with a spherical equivalent of no more than 1.0 diopter of either hypermetropia or myopia, and all 6 patients had uncorrected or corrected vision of 20/20 OU or better. Patient 3 showed high myopia with best-corrected vision of 20/40 OD and 20/25 OS. Preoperative strabismus evaluation showed that all 7 patients showed comitant deviation with identical measurements at distance and near. Five patients showed manifest esotropia, and 2 patients demonstrated intermittent poorly controlled esotropia. The average measured esotropia was 26 prism diopters, and the range of measured deviation was 18–45 prism diopters. No inferior oblique muscle or superior oblique muscle overaction, nystagmus, or dissociated vertical deviation was found in any of these patients.

Magnetic resonance imaging (MRI) of the brain was performed in all patients to rule out any intracranial abnormalities. Six of the 7 patients had completely unremarkable MRI studies, whereas patient 4 demonstrated chronic changes over the left thalamus, suggesting possible previous ischemic infarct. Blood work, including thyroid function tests, was carried out at the discretion of the general pediatrician. All 7 patients had unremarkable blood work results.

All 7 patients underwent strabismus surgery to correct ANAET. Bilateral medial recessions ranged from 3.5 to 6.5 mm and were performed by a single pediatric ophthalmologist (S.S.). The amount of bilateral medial recessions was guided based on the amount of presenting deviation. Postoperatively, all 7 patients had complete resolution of symptoms of diplopia. The 2 patients who presented with intermittent headaches also had resolution of headaches. Postoperative measurement performed 2 months after surgery demonstrated that all 7 patients had significant reduction in their measured deviation. Four patients had residual deviation less than 5 prism diopters. Patient 3 had the largest residual esotropia at 14 prism diopters. There was no measured consecutive exodeviation. Six of the 7 patients regained excellent stereopsis