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Update on accommodative esotropia

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Accommodative esotropia;
Hyperopia;
Treatment;
Accommodative convergence/accommodation relationship;
Amblyopia;
Stereopsis

Abstract

PURPOSE: The aim of this study was to present an update on accommodative esotropia.

METHODS: The diagnosis, clinical features, etiology, treatment, prognosis, and clinical course for the 3 types of accommodative esotropia are presented.

RESULTS: Accommodative esotropia is the most common pediatric strabismus and must be differentiated from other pediatric esotropias. Although its average age of onset is 2.5 years, it can begin during the first year of life and is seen rarely in older children and teenagers. Refractive accommodative esotropia and nonrefractive accommodative esotropia have a better prognosis for achieving normal binocular vision and high-grade stereopsis with appropriate and timely treatment than partly accommodative esotropia. Children with successfully treated accommodative esotropia need to be followed up with to prevent possible deterioration and development of a superimposed nonaccommodative esotropia, which in some cases may require extraocular muscle surgery. Emmetropization and spontaneous resolution of the esotropia occur rarely and may take many years.

CONCLUSION: Approximately 50% of all pediatric esotropias are either entirely or partly accommodative. Proper care is long term and includes monitoring the refractive error and binocular vision status over the years.
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Accommodative esotropia (AET) is an acquired intermittent or constant convergent strabismus associated with activation of the accommodative reflex. First described by Donders in 1864, it is attributed totally or partly to either uncorrected hyperopia or an abnormal accommodative convergence/accommodation (AC/A) relationship.[1-3] The excessive accommodation needed to focus an otherwise blurred image causes increased accommodative convergence and esotropia. Unlike other types of esotropia, AET is corrected entirely or reduced by 10 prism diopters (PD) or more when the patient wears corrective lenses for the full amount of hyperopia or bifocal lenses for near.[1,4]

A history of familial strabismus is common with AET. In a study of 95 patients with AET, more than 90% had at least 1 affected relative.[5] Overall, 25% of first-degree relatives (siblings and parents) were likely to be affected, and approximately 12% of second-degree relatives (grandparents, aunts, uncles) were likely to be affected compared with only 2% to 3% of third- and fourth-degree relatives.[5]

AET is the most common childhood strabismus. Its prevalence in the United States has been estimated to be 1% to 2%.[6] The overall incidence of AET is 50.3 cases per 100,000 children younger than 19 years.[7] Intermittent exotropia, the second most common childhood strabismus, has an overall incidence of 32.1 cases per 100,000 children younger than 19 years.[7] In 221 children with various types of esotropia, 117 (53%) had some form of AET.[8] AET was diagnosed nearly 10 times more frequently than infantile or congenital esotropia.[8]

AET has an average age of onset of 2.5 years with a usual range from 1 to 7 or 8 years. It can begin within the first year of life,[9-11] especially when the amount of hyper-

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opia exceeds 3 diopters (D) as illustrated by the following case.

Case 1

A 7-month-old normally developing girl presented because her parents noted her left eye turn occasionally when she focused at near. This began 1 to 2 months earlier and had become more noticeable and frequent.

The examination found a 40-PD left esotropia by the Krimsky test. The child would occasionally fixate with the left eye, particularly when viewing to the right. Fleeting orthophoria was also detected. Versions were normal. Cycloplegic retinoscopy showed + 4.50-D hyperopia in each eye. Ophthalmoscopic findings were normal. The full refractive findings were given, and the child maintained ocular alignment with glasses 1 month later (*see* Figure 1). The patient failed to keep follow-up appointments. Seven months later, the parents reported the glasses were broken and not worn for 1 month. The parents reported that the child's eyes did not cross when she wore the glasses. The patient manifested a constant and alternating 30-PD esotropia at distance and 35-PD esotropia at near. Cycloplegic refraction was right eye (O.D.) + 3.50 – 1.25 × 180 and left eye (O.S.) + 2.75 – 0.50 × 180 and was prescribed. The patient is being followed up at 3-month intervals.

AET can also begin later in older children and teenagers. A number of these patients, although having no prior strabismus history, were highly hyperopic and suffered some form of physical trauma.[12,13] The trauma presumably disrupted the fusional mechanism and allowed the hyperopic demands to set the stage for AET. Prescribing the hyperopic glasses alleviated the esotropia. Caution is necessary when evaluating older children and teenagers with presumed late onset AET because the esotropia may be from other causes. In a report on 3 such patients with acute onset comitant esotropia, uncorrected hyperopia, and diplopia, prescribing the hyperopic glasses did not alter the esotropia.[14] For 1 patient, an intracranial neoplasm precipitated the esotropia.[14]

The differential diagnosis of AET includes pseudo-esotropia, infantile or congenital esotropia, sensory esotropia, acquired nonaccommodative esotropia, incomitant esotropia, and esotropia in the neurologically impaired child. Pseudo-esotropia is the appearance of having esotropia when none exists. Infants and young children often have wide, flat, and broad nasal bridges with prominent epicanthal folds and appear to be esotropic. As many as 50% of children evaluated for esotropia are pseudo-esotropes.[15] Infantile or congenital esotropia develops before 6 months of age and usually presents as a large and constant strabismus, frequently 50 PD or more at distance and near. Although 50% have hyperopia exceeding 2 D, correcting the hyperopia usually has minimal if any effect on the magnitude of the esotropia.[1] Dissociated vertical deviation, inferior oblique overaction, cross-fixation, monocular asymmetric optokinetic nystagmus, and latent nystagmus are common in infantile esotropia and can present over time. Sensory esotropia is a convergent strabismus that develops after loss of visual function or marked reduction in visual function in 1 eye. Sensory esotropia can occur in as many as 4% of all childhood strabismus.[7] Congenital or early-acquired organic lesions such as cataract, corneal scarring, optic atrophy, macular lesions, ptosis, or prolonged blurred or distorted retinal images resulting from uncorrected anisometropia may lead to sensory esotropia. Acquired nonaccommodative esotropia occurs when the esotropia develops after 6 months of age and is associated with minimal or no accommodative effort. Correcting any coexisting hyperopic refractive error or prescribing bifocals reduces the esotropia by less than 10 PD, if at all. Incomitant esotropia, such as lateral rectus palsy or type 1 or type 3 Duane syndrome, shows increasing esotropia in horizontal gaze because of limited abduction. Because of the incomitancy, some children acquire a compensatory head turn toward the side of the ocular motility defect. Esotropia in the child with an abnormal central nervous system manifests an angle of

Figure 1 Seven-month-old with RAET. **A**, Esotropia without hyperopic glasses. **B**, Ocular alignment with hyperopic glasses.