Management of Accommodative Esotropia in the Presence of a Face Turn

ABSTRACT
Accommodative esotropia is the most common childhood form of strabismus and has a favourable outcome if treatment is initiated promptly. This case report reviews a complex presentation of accommodative esotropia and describes the management options.

CASE HISTORY
Patient TW, a 2-year-old African American female, presented to clinic on August 19th, 2011. The patient’s mother was concerned that her daughter’s eyes were turning in and she had a constant head turn to the left at all waking hours. Mother also stated her daughter had never worn glasses or received any type of treatment for the eye turn. The patient’s medical history is positive for Down Syndrome and she is currently receiving occupational, physical, and speech therapy. She is not currently on any medications and birth history is unremarkable. Patient TW had presented to the clinic one year previously for a routine eye exam. At that time refractive error was documented as being within normal limits for her age, no heterotropia was noted at distance or near, and an intermittent head turn to the left was observed only when the patient was viewing distance objects.

PERTINENT FINDINGS
At her August 19th, 2011 visit a comprehensive eye exam was given. Due to her age and limited understanding several of the standardize tests were unable to be preformed. Best-corrected visual acuity by Snellen optotype was unable to be measured, therefore fixation response was assessed using CSM (central, steady, maintained) notation. This technique evaluates if each eye fixates centrally on the target rather than eccentrically, holds fixation on a target rather than searching for it, and sustains fixation on the target even after occlusion is removed. Patient TW was observed to have equal fixation patterns with each eye and did not object to occlusion of either eye. Sensory testing was unattainable due to the patient’s restricted comprehension of the stereo acuity and Worth 4-dot tests. Pupils were equal, round and reactive, and no afferent pupillary defect was noted. The
patient had a 15 degree head turn to the left and demonstrated a 78 prism diopter intermittent esotropia at distance and near with this head posture. In primary gaze and left gaze a 78 prism diopter constant esotropia was measured at distance and near. No A or V pattern was observed with head in primary position and extraocular muscles were unrestricted in all fields of gaze. Cycloplegia was accomplished using 1% cyclopentolate. Post-cycloplegia retinoscopy found +3.00 DS OD and +4.00+0.50x180 OS. Anterior segment was normal with clear corneas and no lens opacities. Dilated fundus exam revealed normal retinal architecture and no abnormality of the optic nerve or macula.

**DIFFERENTIAL DIAGNOSIS**

Differential diagnosis considered in this case include:

- Cranial Nerve Sixth Palsy OS
- Infantile Esotropia
- Duane Syndrome
- Accommodative Esotropia

Cranial nerve sixth (CN VI) palsy should be investigated due to the patient’s constant head turn. This diagnosis is classified with an abduction deficit that can sometimes elicit a head turn to compensate for the paretic lateral rectus muscle\(^1\). Other additional signs of a CN VI palsy include an esotropia that is greater when measured at distance vs. near and is larger in magnitude when a patient is gazing into the field of the paretic muscle\(^1\). In children, a cranial nerve sixth palsy can be triggered by a viral infection, vaccine administration or trauma\(^1\). TW’s mother reported she was negative for all of these precursors. Furthermore, she was able to fully gaze into the field of the head turn with both eyes, which excludes a CN VI palsy.

Another differential diagnosis to consider would be infantile, or congenital, esotropia. This idopathic condition presents in an infant by the age of 6 months with approximately 1-2 diopters of hyperopia\(^2\). It is associated with a positive family history of strabismus, dissociated vertical deviation, and a large angle of deviation, usually larger than 30 prism diopters\(^2\). Although patient TW did exhibit a larger angle of esotropia, the
onset of strabismus is well beyond the age of 6 months, which we can confirm from her prior eye examination the previous year when no strabismus was detected.

Duane syndrome is also a differential to consider, specifically type I and type III. Type I is characterized by the patient having the inability to abduct and type III is associated with poor abduction and adduction of the same eye. Most commonly Duane syndrome presents unilaterally and can have an associated palpebral fissure narrowing and globe retraction concurrent with attempted or actual adduction. Patients with Duane syndrome usually have an absent strabismus in primary gaze, but in some cases these patients can elicit a head turn of small degree to help compensate for their inability to abduct/adduct. For patient TW, Duane syndrome was ruled out due to the fact that she had no ocular motility restrictions in any field of gaze.

Therefore, patient TW was tentatively diagnosed with a refractive accommodative esotropia. Accommodative esotropia is characterized by a “convergent deviation of the eyes associated with activation of the accommodative reflex.” This type of strabismus usually presents between 6 months and 7 years of age, average onset is 2.5 years old. There are three classifications of accommodative esotropia, all of which are acquired and usually present intermittently at initial onset. Treatment for patient TW included the full cycloplegic spectacle prescription for full time wear and she was scheduled for a follow up in 6 weeks.

DIAGNOSIS/DISCUSSION

Accommodative esotropia is the most common form of all childhood strabismus and can be divided into three categories (1) refractive, (2) partially refractive, and (3) nonrefractive.

Refractive accommodative esotropia exhibits the same angle of esodeviation at both distance and near targets without spectacle correction. The onset usually occurs around the age of two to three, but has been documented in children as young as 4 months. The refractive error of these children averages + 4.75 diopters. The mechanism behind accommodative esotropia consists of three components: undercorrection of the hyperopia, accommodative convergence, and insufficient fusional divergence. An uncorrected hyperope is forced to accommodate excessively to produce a clear retinal image. In the
presence of accommodation, convergence is stimulated requiring the patient’s fusional divergence system to react. If the child has a poor fusional divergence mechanism and cannot compensate for the convergence tonus, an esotropia will result\(^2\). The treatment for a child is their full cycloplegic hyperopic spectacle correction\(^2,3\). This will decrease the amount of accommodation needed to sharpen their retinal image, which in turn will maintain the proper alignment of the eyes.

If a patient has a residual esodeviation even with their full hyperopic spectacle correction, the residual deviation is nonaccommodative and is classified as partially accommodative. Partial accommodative esotropia commonly occurs because the accommodative treatment needed for an accommodative esotropia was delayed\(^2\). In some cases the esotropia will be initially relieved with the spectacle prescription, but over time the nonaccommodative portion slowly becomes evident. With these patients treatment may include a surgical consult\(^3\).

Children with nonrefractive accommodative esotropia have an esodeviation that is greater at near than distance fixation. The onset is still between the ages of two and three, but the average amount of refractive error is less, approximately + 2.25 diopters, compared to the fully refractive accommodative esotropia cases\(^3\). In these children the ratio of accommodative convergence to accommodation (AC/A) is high. There are several treatment option to consider for these patients. Bifocal spectacles are most commonly prescribed. On average the power needed to control the esotropia is between + 2.50 and + 3.00 diopters. Patients should be aligned at distance with no more than 10 diopters of residual esotropia. Observation is another treatment modality that can be used as long as the child has fusion at distance. Surgery is yet another option that is considered by some pediatric ophthalmologists\(^2\).

**TREATMENT**

Patient TW was given the full cycloplegic hyperopic correction so that the differentiation of refractive accommodative esotropia and partially accommodative esotropia could be made at her follow up appointment. If ocular alignment through the spectacle prescription is orthophoric the conclusion can be made that her esotropia is purely
refractive. In addition, the patient’s head turn would be proposed to be absent or greatly reduced in the presence of eye alignment. A head turn is not usually present with the majority of accommodative esotropia cases, but in patient TW it may be a compensatory mechanism the patient adapted to help her maintain some fusional ability. It may also be that her esotropia is incomitant in nature which will be further investigated at her follow up appointment.

In many cases accommodative esotropia patients have a positive prognosis for some form of fusional ability; specifically if the onset of the deviation is after 24 months of age\(^5\). Amblyopia is a common associated finding to be monitored for at our follow up visits, especially since her refractive error is positive for anisometropia. With accommodative esotropia, anisometropia was found to be the only statistically significant risk factor for the development of amblyopia\(^5\).

**CONCLUSION**

It is important to differentiate between the etiologies of incomitant and concomitant esotropias so that appropriate treatment and management can be initiated. The clinician needs to be able to conclude if the esotropia is a primary benign strabismus or if it is secondary to a mechanical restraint and possibly related to a serious systemic condition. Accommodative esotropia has a favourable prognosis if treatment is introduced promptly. Treatment must include full correction of the hyperopia as found by cycloplegic refraction due to the central role the hypermetropia has in this condition. If it is not clear if the etiology of the esotropia is nonaccommodative, accommodative, or partial, the initial treatment should seek to correct any amount of hyperopia found before other treatment options are considered. It is important to remember that every encounter with a strabismic patient will not always fit the specified criteria for a certain classification. Always take into consideration the child’s refractive error, binocular status, and accommodative function in diagnosing each individual patient so that treatment can be tailored appropriately.
References


