Management of Strabismus in Ophthalmology

Written by Brian Hoyle

Strabismus is a condition in which the eyes are not properly aligned with each other. A number of speakers presented information on strabismus of varying causes.

ACCOMMODATIVE ESOTROPIA

Esotropia is a form of strabismus in which one or both eyes turn inward. Tammy Yanovitch, MD, MHSc, Dean McGee Eye Institute, Oklahoma City, Oklahoma, USA, discussed accommodative esotropia, which comprises cranial nerve IV palsy, esotropic Duane syndrome, sensory esotropia, restrictive esotropia, consecutive esotropia, and nystagmus-blockage esotropia.

Near measurements vary depending on patient age. With children who are able to understand the process, asking them to focus on an object positioned a foot or so away from the eyes is sufficient; a word-hunt game can encourage participation. Infants do not understand the process, and must be restrained during measurement, typically by a family member, necessitating a very close approach. Use of a toy as the object of focus can be helpful.

Drops are used to dilate the eyes. Infants receive 0.2% cyclopentolate or 1% phenylepherine. Children receive 1% cyclopentolate, 2.5% phenylepherine, or 1% tropicamide. The examination should be performed 30 to 40 minutes after dilation. If the drops are not correctly applied, a repeat of the procedure may be necessary. Side effects of the drops include hypersensitivity, fever, dry mouth, elevated pulse, nausea, vomiting, flushing, or changes in behavior.

Retinoscopy is a painless process that involves shining a light into a patient's eye and observing the reflection off the retina. With younger patients, it can be easier to use an autorefractor, in which the patient focuses on a picture that alternately moves in and out of focus. A retinoscopy bar can also be useful.

There are challenges of accommodative estropia that are specific to pediatric patients. Compliance with wearing glasses can be an issue. Decisions concerning bifocal lenses, contact lenses, or refractive surgery need to be made in consultation with caregivers, but the patient should not be excluded; an explanation can be simple, and encourages patient agreement. Decisions concerning surgery and informing parents of the prognosis are performed on an individual basis. Discussion of a long-term management plan is important.

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INTERMITTENT EXOTROPIA

Exotropia is a form of strabismus in which the eyes are deviated outward. Erin Herlihy, MD, University of Washington School of Medicine, Seattle, Washington, USA, reviewed intermittent exotropia using a series of case reports. One case involved a healthy 5-year-old boy who had failed a school vision-screening examination. There were suspicions that he had difficulty seeing at distance, but there were no concerns about eye alignment. The patient's father has high myopia with a retinal hole that had been repaired.

At the yearly follow-up, visual acuity (VA) for both eyes with glasses was 20/50. Other findings were as follows: stereo 6/9 circles, cycloplegic refraction −2.50 +1.25 ×95 → 20/25+ right eye (OD) and −3.75 +2.00 ×85 → 20/25+ left eye (OS), 25 prism diopters (PD) of exotropia at distance (X[T]), and 30 PD of intermittent exotropia (X[T]). New glasses were prescribed.

Four months later, the father reported misalignment < 1% of the day. VA with the new glasses was 20/25+1 OD and 20/25+2 OS. In this case, management was nonsurgical, involving correction of the refractive error. Part-time occlusion and over-minus therapy are other nonsurgical management techniques.

The second case involved a healthy young girl whose parents had noticed occasional drift over the course of 3 years. The patient had been monitored elsewhere without intervention.

Examination results revealed intermittent exotropia. The parents wished to continue monitoring.

One year later, misalignment had become more evident without correction (20/20- OD and 20/20 OS, and stereo 9/9 circles). Surgery was indicated because of lessening fusional control.

ISOLATED CRANIAL NEUROPATHIES

Mitchell Strominger, MD, Tufts Medical Center, Boston, Massachusetts, USA, discussed isolated cranial nerve palsy, which is indicated by double vision (diplopia) that is not present when either eye is covered. Diplopia does not vary as the eyes fatigue. A Tensilon test is negative, and acetylcholine receptor antibody is not present. The third, fourth, and sixth cranial nerves are typically involved. Dr Strominger presented cases as illustrative examples.

A 63-year-old patient presented with a 2-year history of progressive diplopia. Vision was 20/20. Ptosis involved 3 mm of the left upper lid. The left pupil was 1.5 mm greater than the right and reacted poorly. Relative afferent pupillary defect (RAPD) was absent. In the primary position, a 35-mm exotropia was observed that was 16 diopters hypotrophic. Elevation deficit was appreciable, and both depression deficit and adduction deficit were mild. The problem was related to a palsy of cranial nerve III.

In such cases, it is paramount to determine involvement of the pupil and whether the involvement is complete or partial, Dr Strominger noted. Pupil fibers are peripheral. Nerve compression can relate to an aneurysm or a neoplasm. A diagnosis can be made using magnetic resonance imaging (MRI), magnetic resonance angiography, or computerized axial tomography. If the pupil is not involved, suggested explanations for pupil involvement include hypertension, diabetes, or an autoimmune reaction. Determinations that can be useful include blood pressure readings, HbA_{1c}, complete blood cell count, rapid plasma reagin, antinuclear antibody, C-reactive protein, erythrocyte sedimentation rate, and determination of antibody to the causative bacterium of Lyme disease. The condition demands vigilant monitoring.

Establishing a patient's history of eye-related trauma is important. Indications of aberrant regeneration should be given attention; these include neuromyotonia, lid retraction when gazing downward (pseudo-von Graefe phenomenon), and constriction of the pupil when the gaze is shifted toward the center of the body.

In this case, a decision was made to proceed with surgery after further history taking, said Dr Strominger. A multilobulated mass was apparent at the point where the third nerve enters the cavernous sinus. The findings were consistent with radiation-induced hemangioma. Resection was not performed.

A second case involved a 59-year-old patient with a 1-year history of vertical diplopia when gazing to the left. Cataract surgery had been performed 8 years ago.

Isolated cranial nerve IV palsy was implicated. In such a case, Dr Strominger explained, it is helpful to determine whether head tilt has been present for a long time, such as since childhood. A history of head trauma, even if seemingly minor, can be important.

MRI revealed a thin superior oblique. It was necessary to perform the aforementioned laboratory determinations. The ultimate diagnosis was schwannoma.

A third case involved diplopia in a 73-year-old patient. The patient history revealed a motor vehicle accident–related whiplash injury 18 months prior, but no hitting of the head. Double vision was noted a week after the accident and improved slightly. Isolated cranial nerve VI palsy was involved. The diagnosis was petroclival meningioma.

These cases highlight the need to evaluate vasculopathic risk factors, including age, medical conditions, and medication use. The clinical findings must be consistent with the diagnosis.

ELDERLY PATIENTS WITH DIPLOPIA

Nandini Gandhi, MD, University of California at Davis Medical Group, Roseville, California, USA, discussed diplopia, commonly known as double vision, in elderly individuals. Three noteworthy clinical scenarios in this population are convergence insufficiency, divergence insufficiency, and small vertical deviations that can be difficult to discern. Nonsurgical treatment is available.

The first case involved an 86-year-old woman with Parkinson disease who was experiencing difficulty reading because of double vision. VA with correction was 20/25 for both eyes. RAPD was not evident. Intraocular pressure (IOP) was 15 mm Hg. Full duction was observed, with orthophoria at distance, and exotropia 10 at near vision. The suspicion was convergence insufficiency, which is common in individuals with Parkinson disease and other neurodegenerative conditions. Dedicated reading glasses containing a prism at the base can be helpful.

A second case involved an 80-year-old man, who had ceased driving 2 years earlier when he experienced long-distance double vision. His reading was not impeded. The examination revealed VA with correction of 20/30 OD and 20/25 OS. His pupils did not have RAPD; IOP was 15 mm Hg. Divergence insufficiency was determined.

It is important to rule out neurologic abnormalities, including brainstem lesions. Dedicated distance glasses are a useful strategy.

A third case involved an 85-year-old man with gradual binocular vertical diplopia. The examination revealed VA without correction of 20/60 OD and 20/25 OS, with no pupil RAPD; IOP was 15 mm Hg. Right flick hypertrophy was evident after prolonged distant and near focusing, with constant diplopia. The diagnosis was vertical deviation. These small events can cause profound diplopia, and are exacerbated by fading vision in 1 eye. The installation of a Fresnel prism in eyeglasses can be beneficial, and can save cost and time in treatment.

THYROID EYE DISEASE

Thyroid eye disease causes the muscles and soft tissues within the eye socket to swell. Hallmarks of the condition are an upward gaze and bulging pupil, explained Shira Robbins, MD, University of California San Diego, San Diego, California, USA. The most common patterns are restriction of either the inferior or medial rictus. IOP is increased, and can be addressed using a precision electronic tonometer. Laboratory examinations must include thyroid-stimulating hormone. It is prudent to be aware that laboratory-to-laboratory values can vary, so performing several determinations (or the use of a laboratory accredited for the test) is wise. Noncontrast computed tomography can be useful in revealing enlargement of 1 or both recti.

Nonsurgical options include occlusion, use of prisms, an orthoptics evaluation, and injection of botulinum toxin to temporarily relax the affected rictus. Referral of a patient is wise when there is a suspicion of optic neuropathy (about 5% of patients), retrobulbar pain/ache, increased IOP, and disfigurement. A patient can proactively participate by decreasing dietary salt and monosodium glutamate intake, and by elevating the head during sleep. Another wise step, Dr Robbins noted, is to stop smoking, which has been linked to more severe/prolonged disease and increased risk of vision loss.

SENSORY STRABISMUS

Erick Bothun, MD, University of Minnesota, Minneapolis, Minnesota, USA, discussed sensory strabismus, in which the eye with poorer vision drifts slightly over time. Sensory strabismus is frequently associated with a childhood loss of vision or an extended loss of vision. It can also occur after intraocular surgery. Surgery can be corrective in 80% of cases, and surgical risks are low [Kushner BJ. *Optom Vis Sci*. 2014]. The condition has a profound psychosocial effect on adults, and should not be considered merely cosmetic, Dr Bothun noted. Patients can often be hindered from seeking treatment, feeling guilty over pursuing what they view as a cosmetic condition.

Esodeviations require a conservative approach, whereas exodeviations require an aggressive approach. Double vision is a possibility and must be discussed with patients. In addition, patients should be aware that surgery may not be a one-size-fits-all option. It may not be prudent to operate when there is severe double vision/fusion status or if there are marked mechanical limitations, phthisis considerations, or unrealistic patient expectations.