

# Esotropia (Crossed Eye(s))

Esotropia is a type of strabismus or eye misalignment in which the eyes are "crossed," that is, while one eye looks straight ahead, the other eye is turned in toward the nose.

## Congenital (Infantile) Esotropia

Congenital (infantile) esotropia is a type of strabismus which appears within the first six months of life. Within the first four months of life, eye alignment may be unstable. If misalignment of the eyes persists thereafter, a consultation with a pediatric ophthalmologist is warranted. Generally, the amount of crossing, or angle of deviation, for patients with infantile esotropia is large, measuring 15 degrees or more. The amount of farsightedness or hyperopia in these children, however, is usually insignificant.



*Child with Infantile Esotropia*

One to two percent of children have infantile esotropia. The child may cross fixate, that is, view objects on the right side with the left eye and vice versa. Children with infantile esotropia often alternate their vision between the two eyes by crossing one eye or the other. Other children constantly cross the same eye, which may indicate that amblyopia, or decreased vision (despite refractive correction), is developing in that eye.

Since the amount of farsightedness in children with infantile esotropia is typically small, the large magnitude of crossing prevents development of stereoacuity, and the chance of outgrowing the condition is slim, surgical treatment is recommended. Surgery is optimally performed between the ages of 6-9 months, but before age 2 for the most benefit to the development of depth perception.

On the other hand, if the infant has significant amount of hyperopia in addition to a large amount of eye crossing, Dr. Shin will recommend trying glasses to see how much crossing they control, although surgery will probably still be necessary to achieve

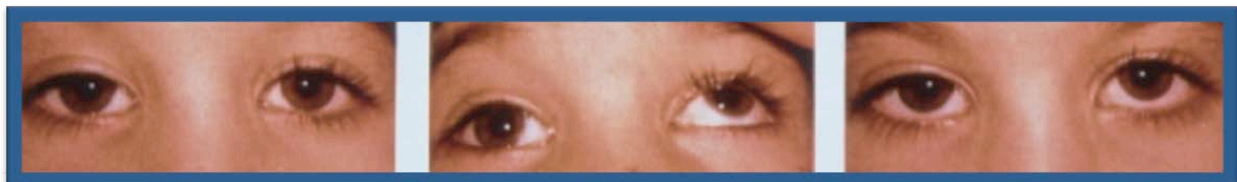
straight eyes. In addition, if amblyopia is detected, this reduced vision should ideally be treated before surgical intervention. This is accomplished by patching the better eye or by paralyzing the focusing muscles of the better eye to force the brain to use the eye with poorer vision. Though this will not correct the eye crossing, it will equalize the vision, and in turn, improve the prognosis for a successful surgical outcome.

A child's appearance dramatically improves with surgery, but more importantly, early eye alignment allows the brain to experience normal depth perception and fine three-dimensional vision. Achieving binocularity at a young age also affords a child the best chance of maintaining normal ocular alignment throughout life. Additionally, a child with good ocular alignment is at decreased risk for developing amblyopia.

Even after successful surgery, periodic follow up is necessary to detect associated eye problems which may occur months, years, or decades later: Vertical misalignment of an eye, especially when looking to the side (see photo below), horizontal eye misalignment, or amblyopia. Approximately 75% of children with infantile esotropia develop inferior oblique overaction, which is best recognized when the patient looks up and in. The eye looking toward the nose elevates higher than the the opposite eye. When present bilaterally, a V pattern is more likely to be present, meaning the eyes cross more in downgaze than in upgaze or they turn outward more in upgaze than downgaze. In addition to oblique muscle dysfunction, there is a tendency for one eye to drift upward and sometimes outward, a condition known as dissociated vertical deviation (DVD). This condition occurs in up to two thirds of patients with congenital esotropia. In addition, it is usually bilateral and asymmetrical.



*Bilateral Inferior Oblique Overaction*



*Dissociated Vertical Deviation*

## Accommodative Esotropia

Accommodative esotropia is a form of strabismus that most commonly begins between 2 and 4 years of age but may show onset between 4 months to 6 years of age in farsighted children who reflexively cross their eyes when they focus or accommodate. During accommodation, a small muscle inside the eye contracts and causes the natural lens to change its shape and focus images properly on the retina at the back of the eye.

### Signs of Accommodative Esotropia

Noticeable crossing of the eyes is usually the primary sign. This crossing may only be evident when the child intently views a near object or when the child is tired or ill. Some children complain of double vision, squint, or rub one of their eyes, most often the misaligned eye.

### Diagnosis and Treatment

Full-time use of appropriate farsighted glasses often controls the esotropia. With glasses, the child will not need to accommodate, and hence the associated eye-crossing reflex will disappear. However, after removing the glasses, the crossing will reappear, perhaps even more than before the child began wearing glasses. If glasses with farsighted correction control the crossing, eye muscle surgery is not necessary.



*Child with Accommodative Esotropia*

### Esotropia Controlled at Distance with Single-Vision Glasses Yet Still Significant at Near

If glasses control the crossing when the child looks in the distance, but inadequately hold the eyes aligned when the child focuses at near (i.e. there is greater than 5 degrees more crossing of the eyes up close), bifocals are usually prescribed to enable the child to have straight eyes at not only at distance but also at near.

### Partially-Accommodative or Decompensated Esotropia

When eyeglasses control a portion of the eye crossing, but enough turning still remains to interfere with or prevent optimal formation of stereoacuity, the patient has partially-accommodative esotropia. In these cases, surgery is performed to correct the crossing

not controlled by wearing the glasses. Alternatively, some children whose eye crossing used to be controlled with glasses may “deteriorate” and develop significant eye crossing even while wearing glasses. If significant esotropia is evident despite proper glasses, eye muscle surgery is required to attain good ocular alignment.

### **Amblyopia Treatment-Eye Patches or Blurring Eye Drops**



*Baby with Eye Patch for Amblyopia Treatment*

It is not uncommon for children with accommodative esotropia to have amblyopia or decreased vision in one eye (usually the eye that does most or all of the crossing and often the eye with the larger refractive error). If there is significant amblyopia, Dr. Shin will recommend patching the stronger eye or administering atropine eye drops (with or without a fogging lens) to blur the stronger eye and force the child to use and strengthen the eye with amblyopia. The patching and eyedrop/fogging lens regimen stimulate the brain to pay attention and use the affected “lazy” eye, especially with the correct lens over it to make the image as clear as possible. Most often, glasses must be worn when using the patch or atropine eye drops.

For some children who have been without adequate or any correction of their refractive error (farsightedness, astigmatism, and less often myopia) during the developmental period of visual potential (approximately to age 9), both eyes are amblyopic. The child may still demonstrate amblyopia of both eyes upon receiving new glasses but will most likely see better than upon presentation. In addition, with continued glasses wear, the visual acuity should improve with time, although the patient may still be amblyopic in one eye without additional treatment.

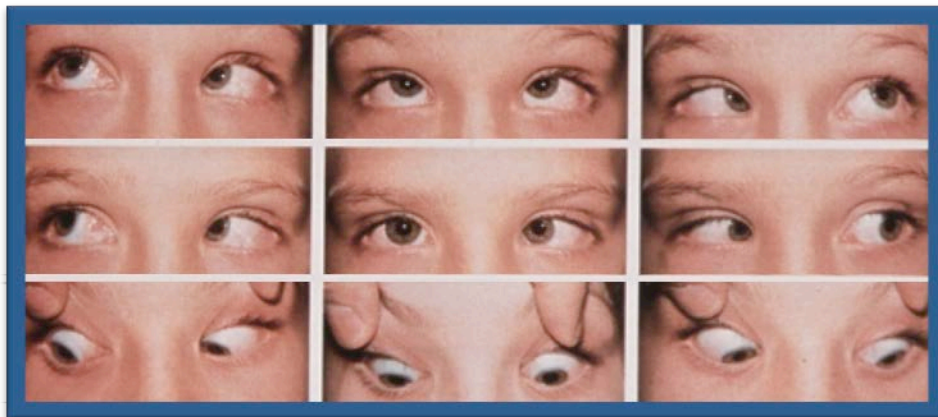
### **Do Children Outgrow This Problem?**

Children outgrow accommodative esotropia more often than not. The majority of children are born hyperopic and become less so (emmetropize) over time, especially those with lesser degrees of hyperopia. Alternatively, hyperopic children can, of

course, become worse. Some children manage to maintain straight eyes without glasses prior to or within their early teen years, while others need proper farsighted glasses or contact lenses to control the esotropia. In general, the need for hyperopic glasses or contact lenses to control eye crossing decreases with age and is therefore much less prevalent in adulthood than during childhood. At the appropriate time, Dr. Shin will attempt to wean a child's dependency on glasses.

## Acquired Non-Accommodative Esotropia

Esotropia can occur after infancy and be insignificantly responsive to farsighted glasses, thereby falling outside the categories of congenital (infantile) or accommodative esotropia. Acquired esotropia can arise in children who have been farsighted for a while and have not had glasses or in children who were initially responsive to glasses but later develop eye crossing even when wearing the proper glasses. Children with acquired eye crossing require timely evaluation by a pediatric ophthalmologist. Eye muscle surgery can correct such deviations and usually restore binocular vision..



*A-Pattern Esotropia (crossing worse in upgaze than downgaze) with Mild Bilateral Superior Oblique Overaction and Bilateral Inferior Oblique Underaction*

## Esotropia Secondary to Sixth Nerve Palsy

Sixth nerve palsy refers to a weakness of the nerve that supplies impulses to the lateral rectus muscle, the eye muscle that mainly moves the eye outward. This is usually an acquired condition which presents with gradual or sudden onset of eye crossing, double vision, and inability of the eye to move outward. An abnormal face turn to the side of the paretic sixth nerve may occur in order to relieve the double vision. In children, the most common cause of a sixth nerve palsy is most often viral and can be recurrent. Other causes in the young age group include head trauma and brain tumors.

Sixth nerve palsies generally improve over the course of several months. Botox treatment to the patient's antagonist medial rectus muscle (eye muscle on the nasal side

of the same eye) is sometimes recommended, particularly in acute cases, to prevent contracture while the lateral (outside) muscle regains strength. After a period of observation, if recovery is incomplete and residual eye crossing remains, eye muscle surgery can eliminate the eye crossing in straight ahead gaze and relieve symptoms of double vision. Restoring single vision in right and left gaze in addition to primary gaze depends on the severity of the sixth nerve palsy and the surgical procedure performed.

## Pseudoesotropia

Pseudoesotropia refers to the appearance of crossed eyes in a child whose eyes are actually perfectly aligned. This is common in infants and younger children who have a broad, flat nasal bridge because the skin on the inner part of the eyelids extends nasally over the inner part of the eyes. The sclera (the white part of the eye) closest to the nose becomes covered, especially when the child looks toward either side, and the appearance of crossed eyes is simulated (see photo below). As the face matures and the nasal bridge grows, the skin is pulled away from the eyes, thereby minimizing or eliminating the crossed-eye appearance. Lid asymmetry and ptosis of one upper lid can also contribute to or be responsible for the appearance of crossed eyes.



*Pseudoesotropia as a result of a broad nasal bridge. This is not real eye crossing.*