

## The Loss of Stereopsis in Intermittent Exotropia: A Risk that Should not be Underestimated

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### Abstract

Intermittent exotropia is the most common type of divergent strabismus among children of less than 19 years of age. Intermittent exotropic patients do have stereopsis, but if the latent deviation progresses to a constant one, the stereopsis is lost. Since the deviation is occasional, it is not often given the proper attention by the parents, who usually notice the condition first. To improve the chances of promptly noticing the intermittent exotropia, paediatricians and family doctors should pay special attention when a deviation, even temporary, is reported by the parents and, if not reported, they still should inquire about it.

**Keywords:** *Strabismus; Intermittent Exotropia; Exodeviation; Stereopsis; Binocular Single Vision*

Strabismus is a condition that occurs in about 5% of children [1], 25% of which presents a divergent squint or exodeviation [2].

Exodeviations can consist of both exophoria, or latent deviation, and exotropia, or manifest deviation. This is relevant because as long as an exophoria is present, normal binocular vision is maintained. Additionally, since exodeviations are often revealed some years after birth, patients with exodeviation can present a mature binocularity [3].

Small exophorias are frequently discovered in adult population and 60 - 70% of newborns presents a transitory deviation which can resolve by 4 - 6 months after birth [4,5].

Intermittent exotropia is the most common type of divergent strabismus among the youngest [6], being the incidence rate of 32.1/100.000 in children under 19 years of age in the USA [7]. Intermittent exotropia is more frequent in females [8], in Asian populations [9,10] and in latitudes closer to the equator [2].

Patients with intermittent exotropia usually have stereopsis, which is the computation of depth information from views acquired simultaneously from different points in space.

The vision system is not mature in the first years of life, and it develops normally when a child's eyes send equal clear images to the occipital cortex, which elaborates images originated from both eyes simultaneously. Thus, stereopsis is not a congenital ability, but it is acquired during growth from 0 - 2 until approximately 8 years of age.

Once this amount of time has passed, children who learned how to see with the two eyes simultaneously can maintain stereopsis; whereas if binocularity fails to mature, it cannot be recovered. For this reason, correct ocular alignment is vital for achieving and maintaining binocular single vision.

The natural history of intermittent exotropia remains unclear. In some cases, an exophoria advances to an intermittent exotropia which eventually becomes constant, first at distance and later at near fixation [11]. Nevertheless, this does not happen as a rule: the deviation may remain stable for many years and, rarely, can even improve. However, the vast majority of untreated patients shows progression towards a stable deviation. Von Noorden found that 75% of 51 untreated patients showed progression over an average follow up period of 3.5 years while 9% did not change, and 16% improved [12].

Thus, the patient should be followed over time to determine whether their exotropia is stable or deteriorating. Although in some cases a non-surgical treatment can be considered, the treatment in intermittent exotropia is essentially the surgery.

As with any strabismus the indications for surgery include preservation or restoration of binocular function and cosmesis. In intermittent exotropia one of the important indications for therapeutic intervention is an increasing tropia phase [11], because binocularity may be lost. Indeed, patients with intermittent or constant exotropia may achieve superior sensory outcome with motor realignment while the deviation is intermittent [13]. Constant exotropia patients decompensated from intermittent exotropia may have missed the best time for treatment [14].

Whereas it has been demonstrated that for children with untreated intermittent exotropia deterioration in near stereoacuity [15] and distance stereoacuity [16] over 2 years is infrequent, it is also true that when intermittent exotropia progresses to a constant deviation, stereopsis is no longer present. Therefore, stereopsis is at risk in intermittent exotropic patients.

So, how can we improve the chances of not missing a phoria phase, which can still be monitored and kept under observation?

Since the onset of intermittent exotropia happens shortly after birth, it is usually first observed by the parents in early childhood [11].

Therefore, parents do play a key role in the discovering of this condition; though, this problem can often be neglected or minimized, because it appears desultorily.

This is why it is vital the participation of paediatricians in this matter, because it can be decisive not only in children's binocular single vision achievement, but also in preventing the loss of binocularity.

Special attention should be paid to this particular deviation, which often goes unnoticed, and should be considered as the subtle threat that it is.

Timing is decisive in this matter: the maintenance of correct ocular alignment in intermittent exotropic patients is essential for stereopsis.

Early detection of abnormal stereoacuity, at near and if possible at distance, may help to decide proper timing of surgery in intermittent exotropia [17].

For this reason, it is crucial to sensitise paediatricians to take particular care when parents inform them that one of their child's eye is deviated outward. In particular, special consideration shall be given if the deviation is most noticeable when the child is tired or sick or when they are day dreaming [11], as the intermittent exotropia often reveals in these occasions. Doctors should as well ask the parents if they noticed a deviation occasionally, if they do not report anything.

Good vision is key to a child's well-being and correct development. If the binocular vision do not develop correctly, and this is the case of strabismus, a child's vision may become limited in ways that cannot be corrected later in life. However, if issues are detected early, it can be possible to treat them effectively.

Intermittent exotropia is a sneaky condition, because it is not always evident and may be underestimated, due to its occasional nature. Nonetheless, the deviation is present and it undermines the keeping of stereopsis. Hence, paediatricians and family doctors should pay special attention when a deviation, even temporary, is reported: maintaining the stereopsis in these children is central and all intermittent exotropic patients should be recognised as soon as possible.

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