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Strabismus congenital in preterm: "prevalence to a year"

Abstract

The visual system, as other organs and systems, develops gradually during embryonic and fetal life to reach, at the end of pregnancy, a mature stage still incomplete; at the age of about six years the interaction between genetic and environmental factors will allow the full anatomical and functional maturity. The aim of our study was to evaluate the development of heterotrophes in premature infants and try to establish a relationship between prematurity and the incidence of strabismus. We also want to verify the existence of a correlation between gestational age and the degree of deviation of the eye.

Keywords: heterotrophes, retinopathy of preterm, esotropia, exotropia, visit orthoptic, prismatic dioptres, visual system, amblyopia

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Abbreviations: ROP, retinopathy of pre-term; DVD, dissociated vertical deviation

Introduction

The visual system,[1] as other organs and systems, develops gradually during embryonic and fetal life to reach, at the end of pregnancy, a mature stage still incomplete; at the age of about six years the interaction between genetic and environmental factors will allow the full anatomical and functional maturity. At birth the newborn is able to capture all visual stimuli from the environment but not to write, to organize them into images and, therefore, to understand them; the child sees lights and shapes but cannot attribute them to things, people and environments.

At 15 days (Table 1) the child is able to focus the images 20-30 cm away from the eyes, does not yet recognize the colors, but distinguishes light from dark. After 10-12 weeks distinguishes the human face answering smiles, grimaces and lip movements; follows the motion pictures by rotating the head and converging the eyes if an object approaches the face. Between the fourth and fifth month focuses images up to a few feet away, clearly distinguishing some basic colors such as red, green and blue. Between the fifth and sixth month the child is able to make an object, to follow the movement and look to a visual stimulus. Six months controls quite well the eye muscles, and is attracted to small objects.

Table 1 Evolution of the visual system from 0 to 48 months

0-1 month	Pay attention to the light; limited ability to fixation
1-2 months	Following objects and moving lights; pay attention to novel stimuli and complex.
2-3 months	Mature the ability of convergence, setting and focusing.
3-4 months	Eye movements and more linear increase in visual acuity; observes and manipulates objects
4-5 months	Move your gaze from objects to parts of the body; attempts to reach and move towards the objects; recognizes faces and familiar objects.
5-6 months	Reaches and grasps objects.
6-7 months	Comprehensive and coordinated eye movements; shifts his gaze from one object to another
7-8 months	Manipulate objects watching them.
9-10 months	Manipulate objects watching them.
11-18 months	All visual functions ripen.
18- 24 months	Objects appear, imitating actions.
24-30 months	Appear colors and shapes; visually explores distant objects.
30- 36 months	Appear geometric shapes; rudimentary drawing circles.
36-48 months	Good depth perception; recognizes many forms.

Between one and two years the child reaches full control of eye muscles, while the accommodation allows him to focus on objects at any distance. Two years after his eye structures function in a complete, but the achievement of maximum visual acuity is achieved at the age of 6-7 years. Premature birth is part of this process by creating the conditions for events that may have very serious consequences in the short, medium and long term. Between the 28 weeks premature and full-term, the volume of the visual cortex is in 4: 1 ratio and the number of synapses, in little premature, is twice born in the term.[2] In preterm apparatus eye does not present an appropriate development for their age; this immaturity is of variable degree in relation to the degree of prematurity.

Often in more severe cases are noticed lid margins with very thin lashes almost non-existent and the orbicular is muscle poorly efficient. The size of the eyeball are unusually low, the cornea is not transparent, the iris gray-bluish and miotic pupil and hypo reagent to light. The lens is globular and is traversed by the residual "tunica vasculosa lentis", which normally withdraws from the 33rd-34th week of gestation; the vitreous is turbid with debris hyaloid artery. The preterm[3] has poor control of eye muscles, gets tired easily and sometimes can seem squint (Figure 1). Taking into account the frequent association between strabismus and prematurity and of cause and effect between strabismus and amblyopia, in premature infants must be performed within the first year of life assessment orthoptics. In a patient squint, eyes are not aligned on the same object, then the projected images on the two retinas cannot be merged into a single three-dimensional image. In order to avoid the phenomena of diplopia and sensory confusion, the brain chooses to suppress the image from the eye deviated, not allowing a complete development of its visual pathways, thus achieving maximum visual acuity (phenomenon of amblyopia). Besides visiting orthoptic is critical observation of the fundus, the purpose of early detection of retinopathy of pre-term (ROP).[4] The study of the effects in the medium and long-term vision on the apparatus[5] of the population of preterm focuses mainly on the analysis of the incidence of eterotropie with or without co-existence of refraction defects. As regards the defects of refraction than the onset of myopia linked to the ROP, often prematurely are hyperopic-medium grade high in relation to prematurity. Strabismus is a clinical condition characterized by a misalignment of the visual axes of the two eyes fixed on the object. Often we find an esotropia in premature but are rare exotropie, often secondary to advanced stages of ROP.

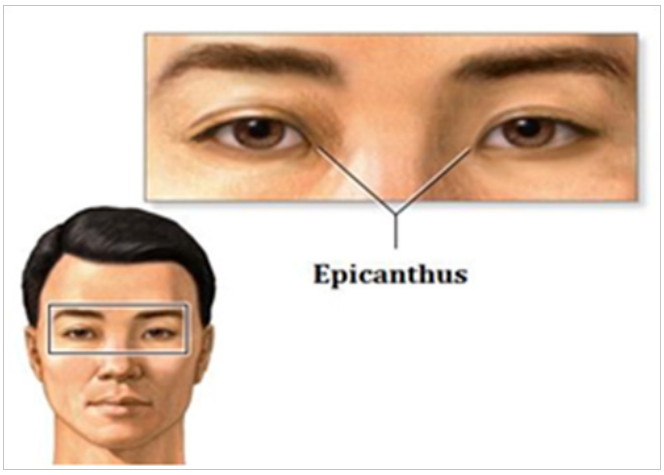

Figure 1 Is a representation of epicanthus.

Esotropie

The congenital esotropia[6] (Figure 2) has an angle that varies between 20-80 prismatic diopters and is often associated with dissociated vertical deviation (DVD), syndromes of the alphabet, "A" or "V" (Figure 3&4) and nystagmus. The latter has a high incidence in children with birth weight less than 1000 grams. Usually in this type of eterotropie refractive[7] defects are found in very small quantities whose correction does not affect the angle of deviation? In general, in fact, there is a slight hyperopia associated with various degrees of astigmatism. In cases where, strabismus was associated with high hyperopia the total correction of the defect may change the angle; in this case it is called accommodative esotropia essential (Figure 5) if the angle of deviation is completely offset by the optical correction, and if the angle is reduced only in part it will be accommodative esotropia with component.

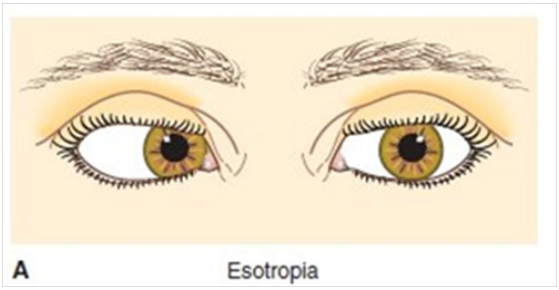

Figure 2 Is a representation of esotropia.

Figure 3 Is a representation of alphabetic syndrom "A".

Figure 4 Is a representation of alphabetic syndrome "V".

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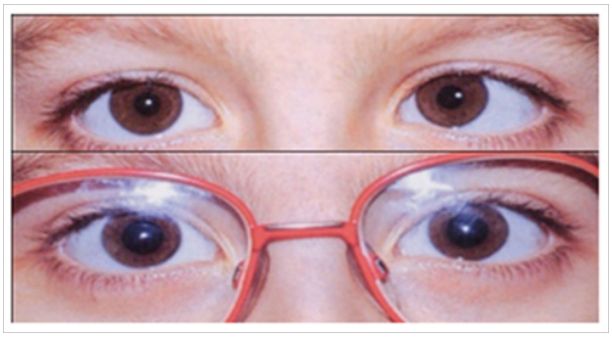

Figure 5 Is a representation of accomodative esotropia.

The therapy of early esotropie essential is to bring about the development of the same visual acuity in both eyes by induction of alternation in the fixation with the method of occlusion in the skin. The timing of this requirement must be appropriate to the age of the child, the possibility or less the amblyopia has already been established, and in any case the small patient should be inspected at short time intervals to prevent the onset of iatrogenic amblyopia in 'contralateral eye. The next step involves surgery to solve the anatomical abnormality, unsightly and still amblyopia. In the first few months of life may be achieved spontaneous alternation in such a way that the child exploits the right eye to secure items to the left of the visual field and vice versa. This causes the so-called establishment crusade by pseudoparalysis external rectus. In this case the usual therapy of esotropie you add the use of sectors binasali applied sull'occhiale with exercises to reinforce laterality abduction.

Exotropie

The forms of exotropia (Figure 6) are rarer and are primarily associated with retinopathy of preterm and in particular to the third stage of ROP associated with a high myopia or 4 stage subsequent to surgery abesterno. The onset dell'exotropia often is characterized by a period of intermittently, during which the stimulus of fusion is able to maintain visual axes parallel. So the ocular deviation becomes apparent only when the merger is interrupted or if the child is sick or very tired. Even at this stage, the first therapy is aimed at the correction of the possible ametropia; also can stimulate the merger through the exercises anti-suppressive as temporary occlusion eye dominant, but if these were not to be effective, are used as an alternative to the internal base of the prismatic lenses, which forcibly maintain parallel eyes. This therapy is, however momentary and serves to delay as much as possible the intervention, to reach a stable condition since the final exotropia tends to worsen with the growth.

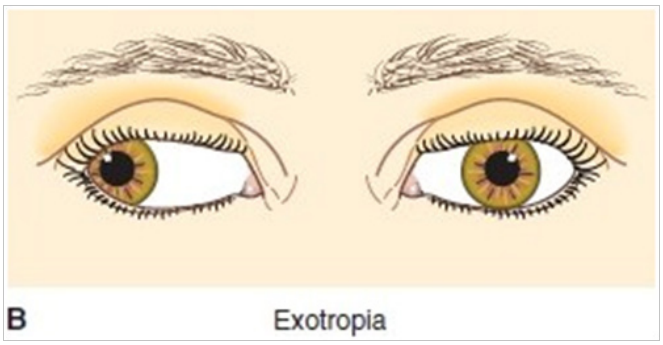

Figure 6 Is a representation of exotropia.

Materials and methods

In our study enrolled 19 premature babies visited in ambulatory from 13/01/06 to 30/09/06.

1. All children were chosen according to the following inclusion criteria:
2. Week of birth between the 29th and 36th week of gestation.
3. Age at the time of the visit between 10-12 months.
4. Birth weight not exceeding 1600 grams.
5. No child had serious problems at birth.
6. The children were evaluated orthoptics.

The visit included:

1. Testing the corneal reflex to light (Hirschberg Test): for any misalignment of the visual axes (Figure 7);
2. Unilateral and alternating cover test for near and far: for any phorias or Tropie; convergence assessment;
3. Evaluation of the way through stereoscopic Stereotest Lang I: to ensure binocular vision (Figure 8).
4. Test of Irvine: to exclude deep amblyopia or microstrabismi (Figure 9);
5. Evaluation of ocular motility: To check for hyperfunctions or ipofunzioni eye muscles;
6. Undus examination: exploration of the fundus after expansion to exclude retinal diseases (Figure 10).
7. Patients with strabismus were underwent an eye examination in cycloplegia to exclude high refractive errors often cause strabismus.

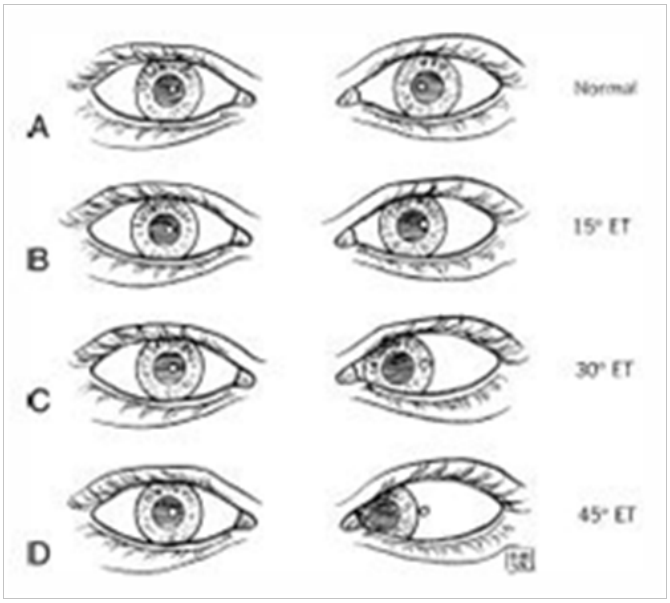

Figure 7 Is a representation of Hirschberg test.

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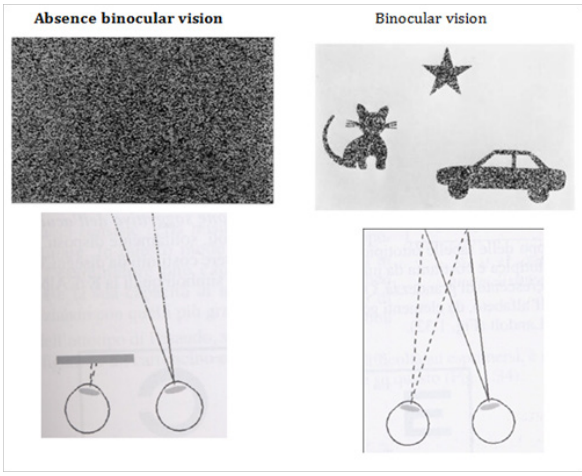

Figure 8 Is a representation of difference between the absence of binocular vision and binocular vision.

Figure 9 Is a representation of Irvine test.

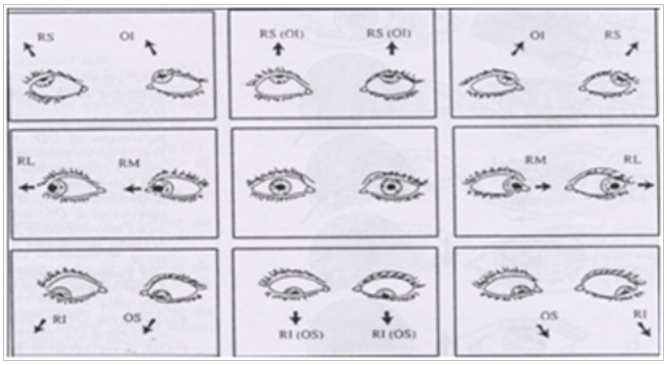

Figure 10 Is a representation of nine diagnostic positions of gaze.

Results and discussion

Our results confirmed as prematurity is a risk factor for strabismus. In fact, out of a population of 19 children, 14 were ortoforici to visit orthoptic while 5 had an esotropia variable angle between 30 and 60 prismatic diopters. All five children were born between the 29th and 34th week of gestation (Table 2). We also noted as gestational age seems to affect the numbers of strabismus; in fact the deviation angle decreases with increasing gestational age. Our survey shows that the child born at 29 weeks, had a deviation angle of about 60 prismatic diopters, while the two were born at 32 weeks had a deviation angle of about 50 diopters prismatic and finally the remaining two children born to 34 weeks had an angle of about 35-40 prismatic diopters. All children esotropici examination showed hypermetropia cycloplegia in age-related; only in two cases is associated hyperopia astigmatism average of about 3-4 diopters. None of the 19 children suffers from retinopathy of preterm.[8]

In dealing with this study we wanted to evaluate how prematurity in fluisse development of strabismus. The risk of developing of etherotrophia in a baby born before 38 weeks of gestation is known, but we wanted to understand the relationship between prematurity and the incidence and how these two factors affect the extent of ocular deviation. In fact, we have verified that the incidence of strabismus increases with decreasing gestational age, and also as the angle of deviation appears to be related to prematurity in fact lower the gestational age, the greater the deviation of the eye.

Table 2 Table and graph of results indicate the incidence of babies born squinty in relation to the week of gestation

Gestational weeks	29	32	34	36	Total
Orthophoria	2	3	5	4	14
Esophoria	1	2	2	0	5
Total	3	5	7	4	19

Conclusion

Although we know from the literature and from previous studies[9] that prematurity is also a risk factor for retinopathy of preterm[10] premature nobody in our group was suffering from the disease despite the presence of children born at a gestational age at highly risk. In fact I think it would be useful to expand the range of patients to obtain more information on retinopathy of preterm and how this can affect the development and the progress of strabismus. In dealing with a patient squint a correct diagnostic approach is crucial for the correct choice of treatment. Careful refraction in cycloplegia allows us to correct some forms of strabismus with a simple pair of glasses. This is the case of strabismus convergent in the presence of high hyperopia or an altered relationship between convergence and accommodation (bifocal) or, in the presence of divergent strabismus where the negative lenses or prisms can delay surgery. Finally, the analysis of ocular motility, with the identification of deficient muscles or muscles hyper functioning allows understanding which muscles strengthen and weaken them in the time of surgery. In determining the size of the recession or resection must pay attention to the possibility that some forms of esotropie[11] evolve spontaneously in exotropie. It would be interesting to investigate this point but to do this we would have to extend the follow-up, since the surgery to get around 4-5 years; and not before the child has reached the same visual acuity in both eyes.[12]

Acknowledgments

None.

Conflicts of interest

Author declares that there is no conflict of interest.

References

1. Riccardo frosini, Roberto caputo, Luciana campa, et al. Pediatric ophthalmology. *Practical Handbook of ophthalmology for the pediatrician* - See – Firenze.
2. Pennefather PM, Clarke MP, Strong NP, et al. Risk factors for strabismus in children born before 32 weeks' gestation. *Br J Ophthalmol*. 1999;83(5):514–518.
3. A Moore. Brain injury and ocular motor abnormalities in surviving preterm infants. *Br J Ophthalmology*. 1999;83(5):509–510.
4. Orzatesi N, Pierrottet CO, Rossetti L. *Treaty of ophthalmology*. Italian Edition.

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DOI: 10.15406/aovs.2015.02.00053

5. Zubcov AA, Kaiser P, Subklev R, et al. Refractive errors and strabismus in premature infants. *Ophthalmologe.* 1996;93(4):341–344.

6. Campos EC. *Manual of strabismus*. Ghedini Editor.

7. Kozeis N, Panos GD, Zafeiriou DI, et al. Comparative study of refractive errors, strabismus, microsaccades, and visual perception between preterm and full-term children with infantile cerebral palsy. *J Child Neurol pii*. 2014;0883073814549248.

8. Cernea P, Petria I, Despa C. Strabismus and pseudostrabismus in premature infants. *Rev Chir Oncol Radiol O R L Oftalmol Stomatol Ser Oftalmo*l. 1989;33(1):21–28.

9. Nixon RB, Helveston EM, Miller K, et al. Incidence of Strabismus in Neonates. *Am J Ophthalmol.* 1985;100(6):798–801.

10. Holmströma G, el Azazib M, Kugelbergc U. Ophthalmological follow up of preterm infants: a population based, prospective study of visual acuity and strabismus. *Br J Ophthalmol*. 1999;83(2):143–150.

11. Kushner BJ. Strabismus and Amblyopia Associated With Regressed Retinopathy of Prematurity. *Arch Ophthalmol*. 1982;100(2):256–261.

12. Mohney BG, Erie JC, Hodge DO, et al. Congenital esotropia in Olmsted County, Minnesota. *Ophthalmology*. 1998;105(5):846–850.

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