



Original Article

Status of Binocular Single Vision in Children with Intermittent Exotropia

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Objective: To study the status of binocular single vision in children with intermittent exotropia. On the basis of these observations, to contribute regarding timing and type of management of intermittent exotropia.

Materials and Methods: The study was conducted in the Orthoptic section of the Paediatric Ophthalmology Department of College of Ophthalmology and Allied Vision Sciences/KEMU/Mayo Hospital Lahore. Its duration was one year. Detailed history and examination and orthoptic assessment of 30 children with intermittent exotropia was done. Binocular single vision was checked with Titmus Stereoacuity TEST, Fly test, Animal test, Lang test and Frisby Test.

Results: Out of total 30 children, 13 were male and 17 were female. Minimum age was 4 years. 22 children were between 4 to 11 years, 5 between 12 to 15 years and 3 above 15 but less than 18 years. 14 children had poor near stereo acuity while 11 children had very good stereopsis for near.

Conclusion: In this study 46.7% (n=14) had poor near stereopsis. On the basis of finding of this study it would be difficult to predict any improvement in binocular single vision after surgical or nonsurgical management of intermittent exotropia.

Key Words: Strabismus, Intermittent Exotropia, Binocular Single Vision, Stereopsis.



Introduction:

Strabismus is one of the part and parcel of studies in paediatric ophthalmology. In a study of 3289 children to evaluate the spectrum of eye disease, strabismus was found to be the second most common entity. If not timely addressed, these children have to bear the stigma of squint throughout life.¹ According to another study estimated prevalence of strabismus is 1-3%² Strabismus is not so uncommon in Pakistan. According to a study conducted in Peshawar total frequency of strabismus was found to be 2%³ Afghan migrating to Pakistan had 1.4% strabismus.³ In another study conducted in Pakistan, prevalence of squint was found to be 5.4%⁴.

Amblyopia resulting from strabismus is also a common condition affecting the ocular health of children.⁵

Contrary to some western studies, exotropia is more common in Asian population, than esotropia. According to a study conducted in Singapore, exotropia was 2.5 times more likely presentation in horizontal strabismus cases.⁶ As exodeviation is more common than esodeviation in Asian people, it can be the most prevalent form of strabismus world wide.⁷ According to some studies prevalence of exotropia is 1%⁷

Among different types of exotropia, intermittent exotropia is about 50-90% of all the case, usually preceding by a stage of exophoria.⁸ Intermittent exotropia is more common in female children.⁹ Intermittent exotropia is a common indication of squint surgery in Asia.¹⁰

Natural history of intermittent exotropia is not well understood. Authorities on strabismus usually do not predict definitely on natural history and progression or otherwise of intermittent exotropia.¹¹

Children with intermittent exotropia as well as their parents are equally worried about health related quality of life, outcome of any management, further course of the disease and stigmata of intermittent deviation of eyes.¹²

One unresolve issue in intermittent exotropia is the level of stereopsis for distance and near in children. Strabismus has close relationship with stereopsis in children¹³ Some studies say that intermittent exotropia is a progressive condition that results in a permanent loss of distant and near binocular vision.¹⁴ In a Chinese study, near stereopsis of children with intermittent exotropia was found to be mostly damaged.¹⁵ Central stereopsis was restored only in a few case postoperatively. They recommended early surgery to restore stereopsis. There might be a day to day variability in near and distant stereoacuity in these children.¹⁶

Many studies show variability of binocular single vision in children with intermittent exotropia. Preoperative and postoperative results are also variable as for as binocular single vision is concerned. Hence postoperative restoration of visual status cannot be predicted.¹⁷

Materials and Methods:

Place of Study: Orthoptic section of Paediatric Ophthalmology Department of COAVS/KEMU/M ayo Hospital Lahore.

Study Design: Descriptive case series

Sample Size: Thirty children with intermittent exotropia were included in the study.

Inclusion Criteria:

- Age not less than 4 years
- Definite history of intermittent exotropia
- No history of any surgical or non-surgical intervention
- Co-operative patients

Exclusion Criteria:

- Other associated ocular anomalies
- Any associated systemic disease
- Poor mental status

Data Collection:

After enrollment from outpatient, a detailed history of every child was taken from patient and or the accompanying person. It included birth history, milestones of development, age of schooling; performance in studies, social behavior A detailed relevant family and personal history was also taken. After history a detailed oculr examination including visual acuity, slit lamp biomicroscopy, fundus examination, cycloplegic refraction and best corrected distance and near visual acuity.

A detailed orthoptic examination including cover test, alternate cover test, Krinsky test, Bruckner test, alternate prism cover test for distance and near and in various positions of gaze, extra ocular movements including versions, ductions, vergences, saccades and slow pursuit movements was performed.

Binocular single vision of every patient was checked with Titmus stereoacuity test, Fly test, Circles test, Lang test and Frisby test wit polarized spectacles on the face of the child. A standard 40 cm distance was ensured throughout the testing. Standardized auxiliary lighting was used. Children who were not bilingual were addressed and instructed in their own language. Order of testing was 1. Titmus stereo acuity test, 2. Lang test 3. Frisby stereo test, in order of decreasing stereo-disparity or increasing difficulty of detection.

Stereopsis was tested before any othertests. This assured that stereopsis was tested before any dissociative procedure.

Other Tests: performed in some patients were

- Occlusion or +3.0 D test for intermittent distance exotropia
- Synoptophore
- Worth four dot test
- Bagolini test

Data Analysis:

At the conclusion of history and clinical examination,

all the data was computerized and analyzed using statistical software SPSS version 16.

Results:

The study was conducted in the OPD of Paediatric Ophthalmology Deptt of COAVS/KEMU/Mayo Hospital, Lahore The study period was one year. A total number thirty patients were included in the study, female being 17(56.7%) and male 13(43.3%) This shows preponderance of female patients in this study. Table 1

Table 1: Distribution of Gender

Gender	No. of Patients	Percentage
Male	13	43.3
Female	17	56.7

The ages ranged between 4 years to less than 18 years. 11(36.7%) patients were in the age group 4—7 years. 11(36.7%) patients were in the age group 8—11 years. 5(16.7%) patients were between 12 to 15 years while 3(9.9%) patients had age more than 15 and less than 18 years. Maximum number of patients, 22(73.4%) had ages 4 and 11 years. Minimum number of patients, 3(9.9%) had ages above 15 years but less than 18 years, this showing majority of cases belonging to early childhood and younger age group. Intermittent exotropia gradually changes from exophoria to exotropia with intervals of intermittency in between.(Table 2)

Table 2: Age Distribution of Patients

Age in years	No. of Patients	Percentage
4 - 7	11	36.7
8 - 11	11	36.7
12 - 15	5	16.7
<18	3	10.0
Total	30	100.0

Mean±SD = 9.33±4.02

Eleven (36.7%) patients had intermittent exotropia ranging between 10 to 20 prism diopters, 10(33.3%) patients had intermittent exotropia between 21 and 30 prism diopters, 7(23.3%) patients had intermittent exotropia 31 and 40 prism diopters.(Table 3)

Stereopsis or depth perception measurements were as follows.

Table 3: Frequency of Intermittent Exotropia

Prism diopters	No of patients	Percentage
10 - 20	11	36.7
21 - 30	10	33.3
31 - 40	7	23.3
41 - 50	2	6.7

Table 4: Frequency of Stereopsis

Seconds of arc	No. of Patients	Percentage
40 - 60 (Normal)	1	3.3
61 - 200 (Very good)	11	36.7
201 - 800 (Good)	4	13.3
801 - 3000 (Poor)	14	46.7

Discussion:

Strabismus is one of the most common eye problems in the children.¹⁸ Mahdi et al describe its incidence upto 4.75%.¹⁹

Exodeviations are more common than esodeviation in Africa and Asia.²⁰ In a study conducted in Singapore, intermittent exotropia was found to be relatively more common²¹

In this study we have evaluated the status of binocular single vision in 30 children with intermittent exotropia. 56.7% (n=17) were females and 43.3% (n=13) were males. Other studies also show similar results.

In our study, majority of children, 73.4% (n=22) were aged between 4 and 11 years. These results are comparable with a study conducted in Karachi, Pakistan showing majority of children, 24%, having strabismus¹⁹. Another study shows strabismus to be more common in early childhood and least common in first year of life²²

Our inclusion criteria were minimum age of 4 years. Stereo acuity test performance depends on age. Performance of older children is much better than the younger children.²³ According to another study 97% children age 4 years and above can complete stereopsis test²⁴

In our study 36.7% (n=11) children had intermittent exotropia between 10 and 20 prism diopters. 33.3% (n=10) had intermittent exotropia between 21 to 30 prism diopters while 6.7% (n=2) had intermittent exotropia between 41 to 50 prism diopters.

In this study, 3.3% (n=1) children had stereopsis between 40 and 60 seconds of arc, 36.7% (n=11) had stereopsis between 61 and 200 seconds arc. 13.3% (n=4) children had stereopsis between 201 and 800 seconds of arc while 46.7% (n=14) children had stereopsis between 801 and 3000 seconds of arc. These values were categorized as

normal (40 to 60 seconds of arc), very good (61 to 200 seconds of arc), good (201 to 800 seconds of arc) and poor (801 to 3000 seconds of arc). This was an arbitrary categorization but similar categories have been made in other studies. In an Australian study stereo acuity of 2343 children was measure. Stereo acuity of >120 seconds of arc was considered as reduced.²⁵

In our study, 46.7% (n=14) children had poor stereopsis. These results are comparable with a study conducted by Sharma et al. They found poor near stereopsis in intermittent exotropia patients as compared to normal subjects.²⁶

This study is not without shortcomings. Apparatus for distant stereo acuity testing was not available. Sample size was small. Age limit of 4 years was also a short coming. By various sophisticated tests binocular single vision can be tested for clinical trials in children upto 2 years of age²⁴ We concluded that 46.7% (n=14) children had poor stereopsis. On the basis of these findings any prediction about status of binocular single vision in children with intermittent exotropia after any management cannot be made. Further large studies on this topic should be done.

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