

Management strategies in concomitant esotropia in children – A prospective study

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Abstract

Aim: To study the functional and cosmetic outcome in the management of Concomitant Esotropia in children.

Settings & Design: Observational case series.

Materials & Method: 70 children who presented with concomitant esotropia at the out-patient clinic of the Ophthalmology Department in a tertiary care centre in south India over a period of 1 year. Each patient underwent a comprehensive ophthalmological evaluation and their initial visual acuity, binocular fusion and ocular deviation were documented. Management options included occlusion, optical correction and surgery for esotropia. During follow up visits their visual outcome were analyzed in terms of visual acuity, binocular fusion, and ocular alignment.

Result: 44.3 % were males and 55.7 % females. 51.4% had improvement in visual acuity which was more in the surgical group. Improvement in BSV was also more marked among the surgical group 63% vs 17.5% in the non-surgical management group. The mean ocular deviation was 32.14 pd of esotropia at initial visit which became 14.46 pd at 6 months follow up. Among the surgical group 72% achieved the desirable goal of <10 pd deviation whereas only 17.5% of patients in the non-surgical group had deviation <10pd.

Conclusion: The patients included under the surgical management group showed better outcome in terms of binocular single vision restoration, improvement in visual acuity as well as better cosmetic alignment.

Keywords: Esotropia, Visual acuity, Alignment, Surgical management.

Introduction

Strabismus affects 2 to 4 % of the population,⁽¹⁾ esodeviations being more common than exodeviations with a prevalence ratio of 5:2⁽²⁾ according to western literature. Esodeviations are quite common among children causing both cosmetic and visual problems. In India 61% of visual impairment in children is due to uncorrected refractive error⁽³⁾ which has an association with strabismus also. So treatment of strabismus has an important role in preventing and reducing the incidence of childhood blindness. In our set up parents of the children with strabismus when advised regarding a surgical option are not willing initially even though we explain that a combined effort including both surgical and nonsurgical options are often required to bring out the best possible functional outcome for a child. Feasibility of surgery is another problem as paediatric general anaesthesia facilities are not easily available. Appropriate timely management is often effective for a better outcome.

Concomitant esotropia is a type of manifest squint in which the amount of deviation in the squinting eye remains constant within 5 prism dioptres in all the directions of gaze and there is no associated limitation of ocular movement. Concomitant esotropia includes Accomodative esotropia, Non accommodative esotropia, Secondary esotropia and Consecutive esotropia.⁽⁴⁾ Treatment options for esotropia include optical correction, use of prisms, orthoptic exercises and extraocular muscle surgery. In the absence of organic pathology, the treatment plan is formulated

based on the interpretation and analysis of the motility examination results and the overall ocular evaluation. Besides the establishment and stabilization of single binocular vision, the significance of normal ocular alignment for the development of a positive self-image and interpersonal eye contact cannot be overemphasized. The goals of treatment may include obtaining optimal visual acuity in each eye, improving fusion and attaining a favourable functional appearance of the alignment of the eyes.⁽⁵⁾

Aim

To study the functional and cosmetic outcome in the management of Concomitant Esotropia in children.

Material and Method

A prospective study was conducted involving 70 children who presented with concomitant esotropia at the out-patient clinic of the Ophthalmology Department of a tertiary care centre in south India over a period of one year. Inclusion criteria:-Children with concomitant esotropia of the age group below 15 years. Exclusion criteria:-

- 1) Children with incomitant squint.
- 2) Patients who are not willing to give consent.
- 3) Patients having any other ocular diseases like congenital cataract, congenital glaucoma, retinoblastoma etc. which affects the visual outcome.
- 4) Children who had undergone surgical correction for a pre-existing squint. This study was done as

per ICMR norms after getting ethical committee clearance.

A standard case proforma was maintained to conduct the study. Each subject underwent a comprehensive ophthalmological examination including corneal reflex test, cover test, prism reflection test, prism bar cover test for distance, near and with accommodative target with and without glasses, assessment of extraocular movements, pattern of heterotropias, fixation, nystagmus, visual acuity using snellens chart, HOTV and Cambridge cards, cycloplegic refraction and binocular single vision status using worth 4 dot test for near and bagolini striated glasses. Because of unavailability of tests for stereopsis we tested mainly fusion (Grade 2 BSV). AC/A ratio was measured using gradient method and a value greater than 5:1 was considered as high. Spectacles were prescribed only after proper cycloplegic refraction. Full cycloplegic correction was given subtracting 1 DS for the distance from the refraction value obtained.

After doing clinical evaluation for the subjects using the above mentioned tests, they were classified into particular type of esotropia and initial visual acuity, status of binocular single vision and the amount of deviation were estimated. The patients were randomly selected for surgical and nonsurgical treatment. Those who were given non-surgical management included those with hypermetropia, accommodative esotropia and small angle deviations <20 pd. Patients with dense amblyopia and large angle deviations >20 pd and long standing esotropia were given an option of surgery. Non-surgical management included occlusion and optical correction. We advised 6 hours of patching of the normal eye. During follow-up visit visual acuity of normal eye was checked to rule out occlusion amblyopia. The surgical option included bimedial recession depending on the amount of deviation and unilateral recess – resect procedure for constant unilateral deviations.

Improvement is determined by at least 1 line improvement in visual acuity by using Snellens chart. Outcome of the surgery was considered successful if patients achieved ≤ 10 pd of ocular alignment. In order to analyze the visual outcome after management based on the treatment strategy patients were categorised into 2 groups. Group 1 – Non-surgical management (Optical and or Occlusion), Group 2 - Surgical management group for whom either bimedial recession or unilateral recess-resect procedure was done. They were asked to come for follow up at an interval of after 1week, 1 month, 3 months, 6 months. During follow up visits their visual outcome was measured in terms of visual acuity, binocular single vision, and ocular alignment. The data obtained on follow up at 6 month post treatment was analysed using SPSS software version 20 and chi square test was employed to find out the statistical significance.

Result

Total 70 cases were selected for the current study of which 11 cases were accommodative esotropia, 31 were infantile esotropia and 28 acquired non-accommodative esotropia. 14 were unilateral deviation and 56 were alternate deviation. 44.3 % (n=31) were males and 55.7 % (n= 39) were females. The mean age at presentation was 5.886 years with SD of 3.7708 and the mean age at onset was 1.424 with SD of 1.3909.

In the accommodative esotropia group out of 11 children 9 had fully accommodative esotropia with normal AC/A ratio. In one child with increased AC/A ratio bifocals were prescribed. One child had partially accommodative esotropia for which he underwent bimedial recession for the non-accommodative part. In the infantile esotropia group 31 children were present for whom both surgical and nonsurgical management were given depending on the criteria. 28 patients belonged to non-accommodative esotropia group for whom primarily surgical as well as non-surgical management were given.

The initial visual acuity was as shown in figure 1. Out of 70, 15 children already had normal visual acuity of 6/6, 14.28% (10 children) had amblyopia at presentation and VA couldn't be checked in 19 children as they belonged to <3 yrs. 36 subjects had an improvement in visual acuity by at least 0.1 logmar units. Hence 70% had improvement in visual acuity i.e 36/51 ignoring the group <3 yrs. whose vision documentations were not available (NA). On analyzing the data using chi square test the result was found to be statistically significant (p value = 0.002).

Regarding the status of binocular single vision status 2 patients had normal fusion initially, 49 patients did not have BSV and it couldn't be measured among 19 patients (<3 yrs. age group). So the percentage of improvement was calculated among the remaining 51 patients. Improvement was more marked among the surgery group i.e. 68% compared to non-surgical group (17.5%). (p value = 0.001). The improvement in visual acuity and BSV is as shown in Tables 1 and 2 respectively.

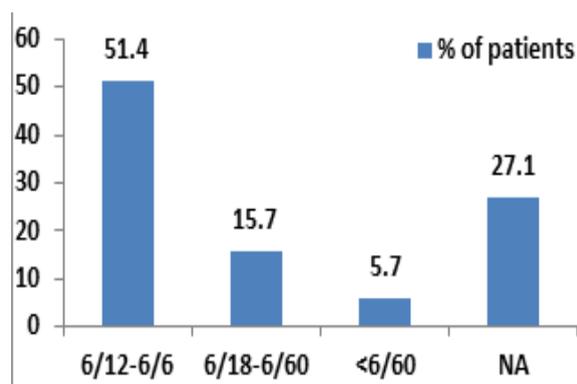


Fig. 1: Visual acuity at first visit (using Snellen chart)

Table 1: Comparing the improvement in visual acuity among treatment groups

| Category | No. of patients | VA Improved* | % |
|--------------|-----------------|--------------|------|
| Non-surgical | 40 | 17 | 42.5 |
| surgical | 30 | 19 | 63.3 |
| Total | 70 | 36 | |

*Improvement determined by at least 1 line improvement in visual acuity by using Snellen's chart.

Table 2: Comparing the improvement in Binocular fusion

| Category | BSV Restoration | % | Total no. of patients |
|--------------|-----------------|------|-----------------------|
| Non-surgical | 7 | 17.5 | 40 |
| Surgical | 19 | 63.3 | 30 |
| Total | 26 | | 70 |

The mean ocular deviation at initial visit was 32.14 pd with a standard deviation of 12.39 pd whereas the mean post treatment deviation at 6 months was measured to be 14.46 pd with a standard deviation of 7.27. In the non-surgical management group among those who had >20 pd deviation, some had accommodative esotropia and few were not willing for surgery. Only 17.5% of patients in the non-surgical group had the desirable goal of deviation <10pd on follow up. Among the surgical group, 18 out of 25 ie 72% achieved the successful outcome of <10 pd deviation (p value < 0.001).The details of follow up ocular alignment is shown in table 3.

Table 3: Comparing the amount of deviation in prism diopters at follow up visit

| Category | <10 pd | 10-20 pd | >20pd | Total |
|--------------|--------|----------|-------|-------|
| Non-surgical | 7 | 21 | 12 | 40 |
| Surgical | 20 | 10 | 0 | 30 |
| Total | 27 | 31 | 12 | 70 |

Discussion

In the current study prevalence of different types of esotropia were as follows accommodative esotropia (15.7%), acquired non accommodative esotropia (40%) and infantile esotropia (44.3%). This is in contrast to study by Greenberg et al⁽⁶⁾ where the percentage of accommodative esotropia was found to be highest (46.5%). The increased incidence of acquired esotropia in our study could be supported by an Indian study by Kothari M⁽⁷⁾ in which he has concluded that acquired non accommodative esotropia is more common than previously reported in western literature. When compared with studies by Greenberg et al⁽²⁾ and Soltan Sanjari et al,⁽⁸⁾ where males population predominated

with 54.3% and 51.5% respectively, our study showed a slightly different trend with female preponderance.

14.28% (10 patients) had amblyopia at presentation. Analysing the incidence of amblyopia in previous studies it was reported to be 35 % among 408 patients with infantile esotropia according to Von Noorden.⁽⁹⁾ Shauly and co-workers reported amblyopia in 48% of the 108 patients.⁽¹⁰⁾ Proper optical rehabilitation plays a vital role in amblyopia treatment. According to Amblyopia Treatment Study (ATS-1) patching for 6 hours vs full-time resulted in similar magnitude of improvement in visual acuity. Usually occlusion yields result in 3 months period.

BSV was present in 2 patients (2.9 %) who had a lesser amount of deviation. It was absent in 49 patients (70%) and couldn't be measured in 19 patients (27.1%) as they belonged to < 3 years of age, in whom test for BSV were not reliable. Management of esotropia may be surgical or non-surgical. Many cases may need surgical management while almost all will require some non-surgical modality of treatment either before and/or after surgery. Non-surgical management in the current study showed not much improvement towards binocular single vision restoration, but only minor reduction in the angle of deviation in few cases and improvement in visual acuity by at least 2 lines in Snellens chart / HOTV chart. Mainly optical line of management with bifocal/ convex lenses were given for accommodative esotropia. Patients with refractive accommodative esotropia showed tremendous improvement with appropriate hyperopic spectacle correction whereas cases with high AC/A ratio required bifocals with additional near adds.

Surgical option was given because of functional and cosmetic reasons. Goals of surgery were

1. Cosmetic: to achieve satisfactory appearance (alignment) of the two eyes in all gazes.
2. Functional: to restore and maintain good visual acuity as well as normal binocular single vision in all gazes.

The surgical technique used were mainly bimodal recession in 24 patients and unilateral recess- resect procedure in the affected eye was done in 6 children with constant unilateral deviation. On follow up the surgical groups showed better outcome in terms of BSV, improvement in visual acuity as well as better cosmetic alignment. According to literature a post-operative deviation of <10 pd is the required goal and we could achieve this goal in 72% of patients who belonged to surgical group. We did not get exactly similar study to compare the outcome after management. But according to the current study on comparing the improvement we got in terms of BSV, alignment and visual acuity in the various treatment groups the result that we obtained were statistically and clinically significant.

The limitation of our study were small sample size, lack of proper visual assessment in < 3 years age group

and another drawback was that finer aspects of BSV could not be checked due to unavailability of tests for stereopsis.

Conclusion

Non-surgical management did not show much improvement regarding binocular single vision restoration except in refractive accommodative esotropia. The patients included under the surgical management group showed better outcome in terms of binocular single vision restoration, improvement in visual acuity as well as better cosmetic alignment. To conclude all cases of concomitant esotropia need timely intervention whether non-surgical or surgical depending on the amount of deviation and visual acuity. Based on our study we recommend optical correction and or occlusion as a primary treatment in esotropia <20 pd whereas early surgical intervention followed by amblyopia treatment for deviations >20 pd for better cosmetic and functional outcome.

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