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Original Research Article

Accommodative esotropia–A clinical study

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Abstract

Accommodative esotropia or refractive esotropia is one of the commonest forms of strabismus or squint. It is usually seen in infants, children. Normal visual acuity of a new born child is first detected as early as sixth week of post natal life. Thereafter it progresses rapidly and achieves the visual acuity of a normal adult by the time the child reaches sixth year of life. Any refractory error especially hypermetropia, will tend to make the visual axis deviate resulting in refractive esotropia. Early detection and timely refractory error correction tend to bring the visual axis parallel and correct the strabismus.

Materials and Methods: Twenty three infants with an youngest age of 9 months and oldest age of 4 years that attended the clinical department from the period two years from 2008 to 2010 were selected and screened**.**

Results: All the twenty three children were screened thoroughly and their hypermetropic refractive errors were detected and proper spectacles were given till 8 years of their life and constant follow up was done for 4 more years. The convergent squint started to decrease after three months of usage of glasses and never returned.

Conclusion: Accommodative esotropia is one of the commonly seen squints of infants and young children. If properly detected, diagnosed, investigated and promptly treated with spectacles, this is the squint which gives best results without any surgical intervention**.**

Discussion

New born child cannot normally see the outer world. Also the size of the eye of a new born is a smaller one when compared to an adult eye in all dimensions. So the rays of light after passing through the cornea will appear to fall behind the retina ie: hypermetopia. Accommodative convergent deviation is defined as a convergent deviation of the eyes associated with the accommodative effort necessary to overcome the blurred image caused by hypermetropia. Because of this defect in refractive power the child sees poorly for distant objects. But the child tries to compensate this by the excessive use of his ciliary muscles which is already strong in children. This forceful contraction of ciliary muscles, that is Accommodation, helps the child to see distant objects somewhat better. Aided by the combined contraction of medial recti muscles brings in another force called Convergence into action so that the child is able to see distant objects clearly. Shifting fixation from a distant object to a near object, three separate but independent actions occur. The eyes converge so that the child sees singly, the lens accommodates so that the near object is seen clearly and the pupils constrict. This triad is called the near reflex. Accommodative esoropia is classically divided into three catagories.

1. Refractive accommodative eotropia [low accommodative convergence/accommodation or A/C Ratio of less than 5.
2. Nonacommodative esotropia [high A/C Ratio]
3. Partially accommodative esotropia

Accommodative esotropia usually begins between the ages of 1½ and 2½ years. These children are monocular, have a greater deviation for near than for distance and usually have 20* of esotropia or less. The usual amount of hypermetropia is +4 to +7 diopters. More than this power of hypermetropia, in these children will not show any effect on esotropia, even when the error is fully corrected. At the beginning the deviation is usually intermittent, but becomes constant in the coming months most children with such hypermetropia seem to increase from birth to 7 years of age. Most children have less than 2.5d Diopters hypermetropia at any age and lose most of these by age of 14 or 15. Accommodative esotropia, or refractive esotropia, is one of the most common forms of strabismus [crossed eye]. It refers to eye crossing that is caused by the focusing efforts of the eyes as they try to see clearly. Patients with refractive esotropia are typically farsighted (hyperopic). This means that the eyes must work harder to see clearly, particularly when the object of regard is up close. This focusing effort is called accommodation. The closer an object is to the eye, the greater the amount of accommodation that is required. A

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side effect of the accommodative effort can be excess convergence or crossing of the eyes. In fact most children are farsighted but the majority of them do not have any esotropia. Most children are only mildly farsighted, and thus the accommodative effort they make to see clearly is not significant. Why certain children develop this problem is the million dollar question.? It is often found out that a prolonged illness or trauma or fatigue may be the trigger. There is also a strong family history of strabismus. It is seen that 75% of patients with accommodative esotropia have a first degree or second degree relative with the same condition. Among the first degree relatives alone, the prevalence rate is about 25%. Therefore it is imperative that siblings are to be investigated. Prolonged duration of hypermetropia tend to weaken the eye and results in convergent squint formation aided by the abnormally over exerting accommodation and excessively acting convergence. Thus in longstanding cases of refractory error uncorrected, it will lead to irreversible convergent squint with amblyopia. These esodeviations are frequently associated with amblyopia. Timely treatment thus overcomes this weakness and prolonged use of suitable spectacles eradicates the accommodative convergent squint thereby eliminates amblyopia or the sleeping eye. All children with the newly developed esodevition require a thorough history, review of symptoms and a comprehensive examination. The examination should include assessment of vision, ocular motility, strabismus measurements at distant and near besides the cycloplegic refraction and general ocular examination. The distance and near vision measurements are essential to determine the accommodative convergence to accommodation [AC/A] ratio this AC/A ratio should be investigated if there is a good alignment is there for distance and greater than 10 prism diopter of increased esodeviation at near full correction. The next step is to relax the accommodation and determine the remaining amount. We hold +4 DS lenses over both eyes and remeasure the esodeviation at near. The esodeviation while looking through the +4ds lens is subtracted from the original esodeviation at near without the +4 ds lenses and the difference is divided by +4d. If the value is greater than 5 then the patient has a high AC/A ratio. If it is so the corrective glasses for the child should have binocular lenses as well. Even after a child has been successfully wearing glasses to treat accommodative esotropia, it is still normal for the eyes to continue crossing without the glasses. The uncorrected hypermetopia force the patient to exert excessive accommodation to focus the images on the retina, thus evoking increased convergence. If the fusional divergence mechanism is insufficient to compensate the increased convergence then he esotropia sets in. In fact, the crossing may be even more noticeable than it was before the child started wearing glasses. The important thing is whether the eyes are straight and controlled with the glasses on. If the eyes are not straight with glasses on, then vision with two eyes will not develop normally. These follow-up examinations are important not only to monitor the eye crossing, but also to check for associated problems such as amblyopia (decreased vision in one or both eyes which is common in this type of strabismus). The goals of treating the condition is to restore normal ocular alignment, maintain good visual acuityin each eye and promote good binocular function. Treatment consist of prescribing spectacle correction with the full amount of hypermetropic correction as determined by a cycloplegic retinoscopy. Significant delay in the initiation of the treatment for these cases following the onset of accommodative esotropia increases the likelihood that a nonaccommodative component [partially accommodative esotropia] may develop.

Materials and Methods

In all twenty three children, 12 males and 11 female children were screened over the period. A brief ocular examination done to assess the binocular alignment of the eyes and the amblyopia assessed. All children had cycloplegic refraction with atropine applied both eyes two time a day for x 3 days Fundus examination also done to rule out retinal pathology as well. All the children under this group had retinoscopy done b the same consultant to eliminate observation errors. These patients returned after a week to undergo post mydriatic retinoscopy and were prescribed glasses. The cylindrical portion were preferentially avoided and spherical component was prescribed.

These patients were reviewed every three months

1. To assess the correction of esotropia.
2. To check whether the spectacles were regularly used.
3. To note the degree of squint, whether it is decreasing or otherwise.
4. To assess the patient's compliance.
5. Whether the power of the hypermetropic correction to be augmented.
6. Health education to the parents and to emphasise the importance corrective glasses over the possibility of surgical treatment

Details of the cases seen

Table 1: Showing the pattern of distribution of extent of hyperopia, sex wise,age wise

Sex	Age 0-1yr	Age 1-2yr	Age 2-3yr	Age 3-4	Total
Boys	2	6	4	0	12
Girls	2	5	3	1	11
Total	4	11	7	1	23

Table 2: Showing the pattern of retinoscopic findings in the investigation of 23 children with power neutralized after atropine

Age Months	Sex	Right Eye hori Axis	Right eye vert Axis	Left eye Hori Axis	Left eye Vert Axis
09	Boy	+4.5 D	+4.5 D	+4.5 D	+4.5D
09	Boy	+4 D	+4.5 D	+4 D	+4.5 D
13	Boy	+4.5 D	+4.5D	+4D	+4D
13	Boy	+5 D	+4.5 D	+4.5 D	+4.5 D
15	Boy	+4.5 D	+4.5D	+4 D	+4D
18	Boy	+4.5 D	+4.5 D	+4.5 D	+4.5 D
20	Boy	+3.5D	+3.5 D	+3.5 D	+3.5 D
22	Boy	+4 D	+4 D	+4 D	+4 D
25	Boy	+4.5 D	+4.5 D	+4.5 D	+4.5 D
26	Boy	+4 D	+4 D	+3.5 D	+3.5D
28	Boy	+3.5 D	+3.5 D	+4.5D	+4.5 D
30	Boy	+3.5 D	+3.5 D	+4 D	+4 D
09	Girl	+5 D	+4 D	+4 D	+4 D
09	Girl	+4.5 D	+4.5 D	+5 D	+5 D
14	Girl	+5.5D	+5 D	+5 D	+5 D
15	Girl	+5 D	+5 D	+5 D	+5 D
18	Girl	+4 D	+4.5 D	+4.5 D	+4.5 D
20	Girl	+4.5 D	+4 D	+5 D	+5 D
20	Girl	+5 D	+5 D	+4 D	+4 D
26	Girl	+4 D	+4 D	+4 D	+4 D
32	Girl	+4.5 D	+4 D	+4 D	+4.5 D
35	Girl	+4 D	+4 D	+3.5 D	+4 D
37	Girl	+4 D	+4 D	+3.5 D	+3.5 D

Final refraction power given was: Total power [eliminating the cylindrical power altogether] - 2.5 D [- 2.5 DS] is = the working distance of in meter expressed in diopters +[Atropine contributetes to +1 diopter [60 centimeters =+1.5D]. On first glance the treatment may appear as a simple one. Find out the amount of latent or hidden hypemetropia and correct it with appropriate convex lenses and observe. However the experiences tell us that the treatment of accommodative esotropia treatment outcomes are inconsistent and often less than ideal. The results are governed by other factors, like the initial treatment of hypermetropia, the recognition and treatment of associated abnormal distance –near relationship and amblopia and patient [child] compliance Emmetropisation and spontneous resolution of accommodative esotropia rarely if at all and may take many Years. The goal of the treatment is to restore normal ocular alignment, maintain good visual acuity in each eye and promote good binocular functionso the treatment consists of prescribing spectacle correction with the full amount of hypermetropic correction as determined by cycloplegic retinoscopy. Significant delay in the initial treatment following the onset of esotropia increases the likelihood that a Nonaccommodative esotropia or partially accommodative esotropia may creep in. To the ophthalmologist the clinical diagnosis and treatment are straight forward. i.e, note the esodeaiation measure it and find out the degree of hypermetropia and prescribe the spectacle for the full amount of hypermetropia. But from the parents are ignorant about the disease and how and what are the treatment modalities. From the child's point of view the earlier the spectacles are prescribed and used the better the prognosis, but taking into the difficult part of making a one year old child to use spectacle, and that too for a prolonged use will always confuse the parents and ask for surgical option. Here lies the true role of the ophthalmologist to convince and compare the merits of spectacles as against the difficulties of a surgical option and to guide the parents about the success of spectacle in the treatment of accommodative esotropia. But the simple truth is for a typical, true accommodative esotropia the treatment is spectacles and not surgery. And surgery, is indicated if optical correction is ineffective in restoring the normal visual alignment. So the parents will and should be well educated and explained of the child's defect and ensure the true essence of a good follow up for years to prevent the onset of amblyopia once the use of glasses is discontinued. Some children may quickly respond to spectacles but some show delay to become normal and become symptom free.

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