Content available at: https://www.ipinnovative.com/open-access-journals

Indian Journal of Clinical and Experimental Ophthalmology

Journal homepage: www.ijceo.org

Original Research Article

Clinical study of esodeviations in children

Suresh Ramanarao Addagarla[1]*

[1]*Dept. of Ophthalmology, Shadan Institute of Medical Sciences, Hyderabad, Telangana, India*

ARTICLE INFO

Article history:
Received 03-06-2023
Accepted 18-11-2023
Available online 30-03-2024

Keywords:
Refractive error
AC/A ratio
Cosmetic correction
Amblyopia

ABSTRACT

Background: Esotropia or convergent strabismus is a common type of squint in children. The esodeviation, the refractive error and the amblyopia should be examined and treated early to achieve good cosmetic correction and to improve Visual acuity.

Materials and Methods: A meticulous history of 25 children up to age of 12 years who presented with esodeviations was taken including the age of onset, duration and previous treatment. They were examined for amount and type of deviation by cover test, hirschberg corneal reflex test, Prism bar cover test and evaluated for refractive error under full cycloplegic correction, for Binocular Single Vision, diplopia, suppression and amblyopia by Worth four-dot test and RAF ruler. Ocular movements and fundus findings were recorded.

Results: 11 male and 14 female children with esodeviations with age of presentation varying from 9 months to 12 years were evaluated for type of esotropia. In our study the most common type seen in 12 cases (48%) is refractive accommodative esotropia with high hypermetropia. Non-refractive accommodative esotropia greater for near with high AC/A ratio in 5 patients (20%), Partially accommodative (mixed) esotropia in 2 cases, acquired non-accommodative esotropia seen in 2 patients. 1 case each is seen in Infantile esotropia, in Sensory esotropia, in child with Duane's retraction syndrome (DRS) and in child having cerebral visual impairment (CVI).

Conclusion: Our study aimed to diagnose and manage the various types of esodeviations at an early age so as to maintain binocular alignment and a good Visual acuity to avoid progression to amblyopia.

1. Introduction

Esotropia is defined as misalignment of eyes, in which one eye deviates towards the nose.[1] The term esotropia is derived from ancient Greek, where "Eso" means "within" and "Tropia" means "a turn." In a study done in 2021 among school-going children, it was found that strabismus was present in 3.11% of the total children screened and further, it was observed that no significant differences existed related to gender among the study population.[2] As reported in 2019, in a meta-analysis by Hashemi et al., the estimated global prevalence of esotropia was reported as 0.77%.[3]

Esodeviations or convergent squint can be congenital or acquired, might appear in one or alternate eyes, intermittent or constant. Additionally, contractions can be constant or variable depending on whether they are labeled as favorable or unfavorable. Comitant esotropia can be further classified into infant esotropia (congenital), accommodative esotropia (refractive, non-refractive, partially accommodative), recalcitrant esotropia, sensory esotropia, and persistent esotropia.[4–6] The incomitant esotropias can be mainly due to Duane's retraction syndrome and Cerebral visual impairment (with VIth nerve palsy). Esotropia with nystagmus on abduction is seen in Nystagmus Blockage

* *Corresponding author.*
E-mail address: suresh_ramanarao@yahoo.com (S. R. Addagarla).

https://doi.org/10.18231/j.ijceo.2024.022

Syndrome and in Fusion maldevelopment nystagmus syndrome.

The main aim of this article will be to study the etiopathogenesis of comitant esotropia and its subtypes for an early management.

1.1. Infantile (Congenital) esotropia

For the ocular deviation Chavasse[7] suggested a primary motor dysfunction, where the associated poor cortical fusion potential and lack of high-grade stereopsis is probably a sensory adaptation due to this motor misalignment. Innervational disturbance in the form of an imbalance between tonic convergence and divergence is now being considered the probable cause. In Essential infantile esotropia (EIE) the child first develops typical infantile esotropia before 6 months of age. This is super added by accommodative esotropia later by the age of 2-3 years, accompanied by a larger hypermetropia than was first measured.[8]

1.2. Refractive accommodative esotropia (RAE)

The underlying pathophysiology is a blurred retinal image secondary to uncorrected hypermetropia. This results in an extra accommodative effort resulting in excessive accommodative convergence to focus on both a distance and a near target. There is also an insufficient fusional divergence. The AC/A ratio between 3:1 and 5:1 is generally normal in the cases of refractive normo accommodative esotropia. In the subtype of refractive hyper accommodative esotropia, the AC/A ratio is high. Refraction under atropine reveals a high underlying hypermetropia in the range of +2 to +6 diopters. Only about 20% of children with hyperopia greater than +3.5 Diopters develop strabismus.[9]

1.3. Non-refractive accommodative esotropia

An underlying high AC/A ratio (the amount of Accommodative Convergence measured in prism dioptres (PD) per unit change in

Accommodation measured in dioptres D) predisposes to this type of non-refractive hyper accommodative esotropia in presence of a normal near point of accommodation (NPA).

Therefore, nearsightedness occurs when the child has been positioned for the target.[10] Near hypopositional esotropia is defined as an esotropia greater than that observed in the distance due to over convergence of increased power to overcome the primary or secondary weakness of accommodation. Costenbader points to this special form of esotropia, proposing the term hypo-location esotropia.

1.4. Partially accommodative (mixed) esotropia

The main reason is uncorrected high hypermetropia with a normal or high AC / A ratio, and the presence of a non-accommodating component partially corrected with the help of deviating glasses.[11] Amblyopia is usually permanent.

1.5. Non-accommodative esotropia

The primary etiopathogenesis is excessive convergence associated with normal amplitude of accommodation. In addition, near deviation is more with minimal deviation for distance.[12] In this primary form of esotropia, deviation is the same for both distance and near and is the most common form after 6 months of age.

1.6. Sensory esotropia

Sensory esotropia is caused by poor vision in one eye in early childhood. The eye with low vision is often squinted, and the other eye becomes the dominant eye.[13] Duane retraction syndrome (DRS): this is a congenital cranial dysplasia that manifests as esotropia-DRS in type I and III. Cerebral visual impairment: Esotropia can result from hypoxic-ischemic brain injury involving the 6th cranial nerve.

Common complications associated with childhood Esotropia (ET) include loss of binocular single vision (BSV), 3 grades: Simultaneous macular perception (SMP), fusion and stereopsis. Anomaly is the suppression of the image of the esotropic eye, defined as a partial loss of reversal in one or both eyes in the absence of organic disease of the media, retina, or optic canal, when the treatment is allowed to continue. It is important to study the patient properly and plan the appropriate management for each case. It is now believed that early alignment before age 2 results in sharper vision and some retention of binocular vision. Although most accommodative esotropia can be managed with glasses, prisms, orthoptic exercises, and occlusion therapy for amblyopia, congenital esotropia requires early surgical intervention to improve cosmesis.[14]

2. Materials and Methods

The study was conducted in the department of Ophthalmology, Shadan institute of medical sciences, Hyderabad during a period of 2 years. The institute ethical committee approval was obtained and the informed consent in their native language was taken. 25 children up to the age of 12 years with esodeviations were evaluated by me and the postgraduates. A detailed history for age, sex, onset, duration of symptoms and any previous treatment done elsewhere were also noted.

Ophthalmic examination in children included visual acuity assessment by Snellen's chart or Tumbling E-chart or Landolt's C-chart or by the ability to count

fingers at a distance of 6 metres or less. Refractive error under full cycloplegic correction was estimated by using age appropriate drops, either 1% Atropine sulphate drops/ointment for 3 consecutive days in children below 5 years or 2% Homatropine hydrobromide drops instilled every 10 minutes for 6 times in patients upto 8 years or by 1% Cyclopentolate hydrochloride drops every 10-15 minutes for 3 times (Havener's recommended dose). Wet retinoscopy is done by a Streak retinoscope (HEINE BETA 200). The movement of the red reflex is to be neutralized by addition of convex lenses when reflex is moving with the movement of retinoscope and vice versa. Auto refractometer is also used in most children. Pupillary light reflexes both direct and consensual are elicited. Examination of anterior segment is done with the slit lamp (Appasamy associates model ACC002) or with Torch and loupe. Fundus examination is done by Direct ophthalmoscope (HEINE BETA 200) and by Indirect Ophthalmoscope (Appasamy AAIO wireless) using a + 20D double aspheric lens (VOLK, USA).

Orthoptic evaluation starts with Ocular Movements, both uniocular and binocular in all 9 diagnostic positions of gaze (1 primary, 4 secondary, 4 tertiary) and if possible saved on the 9Gaze App. Direct cover test, Cover-uncover test and alternate cover test is done to confirm presence of phorias, concomitant and incomitant squint. Estimation of the angle of Esodeviation (ET) in degrees is done by Hirschberg corneal reflex test (HCRT). In Prism bar cover test (PBCT) Prisms of increasing strength from 1 PD to 45 PD fixed on a horizontal bar with their apex towards the esodeviation are placed in front of one eye, patient asked to fixate an object with other eye and cover-uncover test is performed till there is no movement of the eye under cover. Amount of deviation in Prism dioptres (PD) is recorded for both near and distance. In Modified Krimsky corneal reflex test the power of the prism required to centre the light reflex in the squinting eye is noted. Normal AC/A ratio is about 3-5 PD for 1D of accommodation. Heterophoria method of measurement of AC/A ratio is the deviation measured with full optical correction at 6m distance and at 33cm near distance in prism dioptres and IPD measured in cm. AC/A= IPD + Dn-Dd/D, where IPD is inter pupillary distance, Dn is deviation at 33cm in prism dioptres, Dd is deviation at 6m distance in prism dioptres and D is fixation distance at near of 3 Dioptres. In clinical practice, a difference in deviation between distance and near of ≥10 PD is considered a high AC/A ratio.

Compensatory head posture (CHP) to avoid diplopia if any and Nystagmus if present is noted and classified. Suppression is evaluated by Worth four-dot test (WFDT) using red-green goggles. RAF ruler is used to measure the NPA (near point of accommodation) and NPC (near point of convergence). Amblyopia is defined as an interocular difference of two lines or more in acuity on Snellen chart when the eye optics are maximally corrected and graded as per visual acuity into mild (VA 6/12), moderate (VA 6/18-6/24) and severe (VA 6/36 or worse).

In our study, management of all 25 children with esodeviation was done with the aim to improve visual acuity, to maintain binocular single vision, to prevent amblyopia and to achieve good cosmetic correction. Spectacles with full correction of the hypermetropia was prescribed in all the 12 children with Refractive accommodative esotropia (RAE), in the 2 cases of Partially accommodative (mixed) esotropia, in 2 patients with acquired non-accommodative esotropia and in 1 patient with Sensory esotropia. Hypermetropia according to the American optometric association (AOA) is graded as low hypermetropia when the error is ≤ +2D, moderate hypermetropia between +2D to +5D and high hypermetropia when the error is ≥ +5D. Executive bifocal glasses with +3 D addition for near vision was prescribed to the 5 children with Non-refractive accommodative esotropia to decrease the demand for accommodation. Ocular deviation and AC/A ratio is reassessed after six weeks of spectacle usage. In the 1 child with Congenital esotropia, before 1 year of age I did squint surgery with bilateral medial rectus recession of 5 mm in each right and left eye and added a 7 mm lateral rectus resection in the left eye to correct the 40 PD of esotropia.

Figure 1: LE: Refractive accommodative Esotropia (RAE) with Amblyopia: Hypermetropia is managed with convex lens and the Amblyopia with rubber occluder to the normal eye

In presence of amblyopia in Figure 1, after correcting the hypermetropia the normal eye is occluded with either rubber occluder stuck onto the spectacle lens or with orthoptic eye patch (Opticlude, 3M, size 8.0 x 5.7 cm, marketed by Akriti ophthalmic pvt. Ltd, Hyderabad). We followed the 'Amblyopia rreatment study (ATS)' evaluated by the paediatric eye disease Investigator Group (PEDIG)[15] with part-time occlusion for 4 to 6 hours per day of the normal eye until Visual acuity improves by 1 or 2 lines and there is no further improvement of vision after 3 months of occlusion therapy in children younger than 7 years of age.[16] Maintenance occlusion for 2 hours in a day was recommended in children from 7 to 12 years of age.[17]

3. Results

In the 25 children with esodeviations who attended the OPD, age of presentation to us varied from 9 months to 12 years. In the Age group of 9 months to 3 years there were 4 cases (16%), from 4 years to 10 years of age 16 cases (64%) and

from 10 years to 12 years there were 5 patients (20%), with a Median age of 6.9 years. There were 11 male and 14 female children in our study.

The various types of esotropia in children were evaluated as seen in Table 1. The most common type seen in 12 cases (48%) is Refractive accommodative esotropia (RAE). Non-refractive accommodative esotropia with high AC/A ratio seen in 5 patients (20%), partially accommodative (mixed) esotropia in 2 cases (8%), acquired non-accommodative esotropia seen in 2 patients (8%). 1 child (4%) presented with infantile (congenital) esotropia and 1 case (4%) had Sensory esotropia. Duane's retraction syndrome (DRS) with esotropia was observed in 1 child (4%) and 1 child (4%) having Cerebral visual impairment (CVI) was referred to us from the Paediatric OPD.

Table 1: Types and percentages of esotropia in children

S. No.	Types of Esotropia (ET)	Percentage %
1	Refractive accommodative esotropia (RAE) - 12	48
2	Non-refractive accommodative esotropia - 5	20
3	Partially accommodative (mixed) esotropia - 2	08
4	Acquired non-accommodative esotropia - 2	08
5	Infantile (congenital) esotropia - 1	04
6	Sensory esotropia - 1	04
7	Duane's retraction syndrome (DRS) with esotropia - 1	04
8	Cerebral visual impairment (CVI) - 1	04
		100

Spectacles with full correction of the refractive error is prescribed to all the patients. Visual alignment and Visual acuity was partially improved with hypermetropic glasses given in range of +1.5D to +6.0D in the 12 cases of Refractive accommodative esotropia and in the 2 cases of Partially accommodative esotropia and also in the 2 cases of Acquired non-accommodative esotropia. Executive Bifocal glasses with +3D addition for near vision was given to all the 5 patients (20%) with Non-refractive accommodative esotropia and this was also seen to reduce the esodeviation as in Figure 2. The amount of esodeviation in prism dioptres (PD for distance and near) varied from 15 PD to > 45 PD horizontally. Alternating squint was observed in 60% of all the cases. I operated on the child with Congenital esotropia under GA with bilateral Medial rectus recession of 5 mm in each right and left eye and also added a 7 mm Lateral rectus resection in the left eye to correct the 40 PD of Esotropia.

However, Amblyopia was manifest in 17(68%) of all the 25 cases who were advised Part-time occlusion therapy to the normal eye with rubber occluder or eye patch for 4 to 6 hours per day for 3 months. Mild amblyopia (VA 6/12) persisted in 5 children, moderate amblyopia (VA 6/18 - 6/24) in 8 cases and severe amblyopia (VA 6/36 or worse) in 4 cases out of the 17 children who manifested with amblyopia.

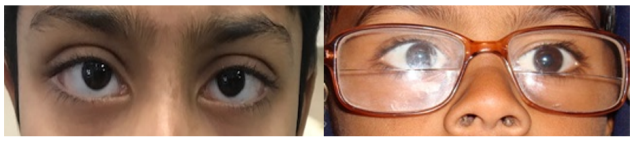

Figure 2: RE: Non-refractive accommodative esotropia (NRAET) managed with executive bifocal glasses

4. Discussion

We evaluated 25 cases in the Clinical study of Esodeviations in children undertaken at our postgraduate teaching hospital. In the age group of 9 months to 3 years there were 4 cases (16%), from 4 years to 10 years of age 16 cases (64%) and from 10 years to 12 years there were 5 patients (20%), with a Median age of 6.9 years. Elsewhere in a study conducted by Amy E. Greenberg et al[18] the incidence rate was highest in the first 5 years of life and new cases of esotropia significantly decreased with an increase in age in all the paediatric residents of Olmsted County, Minnesota, diagnosed with an esodeviation (≥10 prism diopters) from January 1, 1985 through December 31, 1994. In our study we concluded that most of the parents were not aware that the early squint leads to significant visual problems and were under the impression that the squint would resolve on its own. The majority of girls with strabismus do not seek surgery until marriageable age in our country.

As per Table 1 the most common type of Esotropia in 12 cases (48%) is Refractive Accommodative Esotropia (RAE) with high hypermetropia. Non-refractive accommodative esotropia with a high AC/A ratio is seen in 5 patients (20%). Partially accommodative (mixed) esotropia seen in 2 cases (8%) and Acquired non-accommodative esotropia in 2 patients (8%). 1 child (4%) presented with Infantile (congenital) esotropia, 1 case (4%) had Sensory esotropia. Duane's retraction syndrome (DRS) with esotropia was diagnosed in 1 child (4%) and 1 child (4%) having Cerebral visual impairment (CVI) was referred to us from the Paediatric OPD. Similarly, in a retrospective cohort study of 385 children diagnosed with esotropia in Minnesota, 36% reported complete focal esotropia, 10% partial focal esotropia, and another 17% nonfocal esotropia. In contrast, 8% had congenital, 6.5% acquired, 6.5% sensory esotropia, and esotropia related to the normal central nervous system was recorded in 11%, and the rest had an undetermined primary cause of esotropia.[18]

In a retrospective cross-sectional study conducted at Farabi Hospital in Tehran from 2008 to 2014, Masoud Khorrami-Nejad et al[19] reported the prevalence of

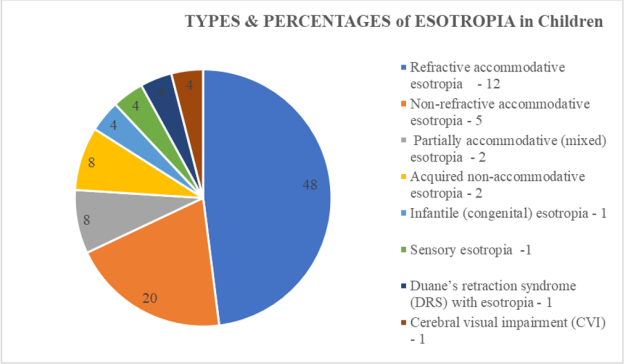

Figure 3: Showing distribution according to type of esodeviation

various types of esotropia as accommodative esotropia (39.72%), non-accommodative esotropia (17.83%), Partially accommodative esotropia (16.48%), DRS type 1 (5.7%), Sensory esotropia (0.68%) and also of other types.

In our study spectacles with full correction of the hypermetropia was prescribed in children with refractive accommodative esotropia, in partially accommodative (mixed) esotropia, in acquired non-accommodative esotropia and in a patient with sensory esotropia. In a prospective study, C J MacEwen et al.[20] In 2008, it was concluded that children with fully beneficial esotropia who were fully corrected hypermetropic showed a smaller and more controllable deviation angle than those who were not corrected by only 1 diopter. This supports the practice of providing maximum hyperopic correction for childhood esotropia. Another study by Brennan et al.,[21] published in J Paediatr Ophthalmol Strabismus 2020, concluded that children with compound esotropia will have a more complete result compared to partial esotropia if the complete delay of hyperopic correction glasses is reduced. For all 5 patients with non-refractive esotropia, we prescribed Executive Bifocal glasses with supplementation + 3D for near vision, which reduces esotropia. Previously, Kim WK et al 6 stated that children with AC / A ratio or Block eyes in the distance and residual esotropia in the near point should be considered for bifocals.

In the child seen in Figure 4 with Infantile (Congenital) esotropia I performed the squint surgery under GA before 1 year of age, with bilateral Medial rectus recession of 5 mm in each right and left eye and also added a 7 mm Lateral rectus resection in the left eye to correct the 40 PD of esotropia.

Kirandeep Kaur, Bharat Gurnani, Aravind Eye Hospital, Pondicherry, January 2023, said that the best time for surgery in this patient is between 6 months and 2 years. Bilateral resection is generally better than unilateral resection/resection procedures.[14] Based on the angle of contraction, a third muscle is added in the form of bi-muscular surgery (i.e, double reduction) or lateral

Figure 4: Infantile (congenital) esotropia in LE, operated by me with BE: MR recession and with LE: LR resection

rectus resection. The Congenital esotropia surveillance examination (CEOS) defines a clinical profile where esotropia 40 Δ or greater in at least two visits of 2.5 months will be sufficient to calculate the duration of esotropia for early surgical correction to be considered.[22] One of the largest series in Europe was 58 more than 100 clinical sites conducted by the Early and late Infant strabismus study (ELISS) cohort to evaluate the early and late effects of surgery on stereopsis in children with esotropia.[23] The results showed that early surgery, in less than 24 months, resulting in more patients in that group achieving binocular vision and stereopsis.

We follow 'Amblyopia treatment (ATS)' as evaluated by the Pediatric eye diseases investigation group (PEDIG) 16 until visual acuity improves and with half-day occlusion of the normal eye for 4-6 hours per day, until visual acuity improves and not. Further improvement. We found that amblyopia remained in 17 of 25 children (68%) after initial treatment, with 5 cases of mild amblyopia, 8 cases of moderate amblyopia, and 4 cases of severe amblyopia, with a visual acuity of 6.9 years after 3 months of occlusion. Children younger than 7 years. Angela M. Chen et al.[24] found that in 3- to 8-year-old children successfully treated with patches, approximately 25% experienced relapse in the first year of treatment, and most relapses occurred within 3 months of stopping treatment. Mosley et al[25] concluded that the mainstay of amblyopic treatment remains refractive correction and vision and occlusion therapy. Cleary et al[26] determined that the most improvement in vision was obtained after four hundred hours of occlusion therapy.

5. Conclusion

We summarize from our study that refractive accommodative esotropia is the commonest type of esodeviation in children and that spectacles with full correction of the hypermetropia is to be prescribed early. This is in concurrence with all previously published studies worldwide. Early detection and correction of refractive errors, squint and amblyopia is an important activity in the vision 2020: Right to sight India: strategic plan 2021-2026.We conclude that early management of the various types of esodeviations in children along with the associated amblyopia maintains a more stable ocular alignment and reduces the risk of later visual and employment

disadvantages.

6. Source of Funding

None.

7. Conflict of Interest

None.

References

1. Helveston EM. Understanding, detecting, and managing strabismus. *Community Eye Health*. 2010;23(72):12–4.
2. Zhang XJ, Lau YH, Wang YM, Kam KW, Ip P, Yip WW, et al. Prevalence of strabismus and its risk factors among school aged children: The Hong Kong Children Eye Study. *Sci Rep*. 2021;11(1):13820.
3. Hashemi H, Pakzad R, Heydarian S, Yekta A, Aghamirsalim M, Shokrollahzadeh F, et al. Global and regional prevalence of strabismus: a comprehensive systematic review and meta-analysis. *Strabismus*. 2019;27(2):54–65.
4. Gisselbaek S, Hoeckele N, Klainguti G, Kaeser PF. Clinical Classification of Acquired Concomitant Esotropia. *Klin Monbl Augenheilkd*. 2021;238(4):482–7.
5. Oystreck DT, Lyons CJ. Comitant strabismus: Perspectives, present and future. *Saudi J Ophthalmol*. 2012;26(3):265–70.
6. Greenberg AE, Mohney BG, Diehl NN, Burke JP. Incidence and types of childhood esotropia: a population-based study. *Ophthalmology*. 2007;114(1):170–4.
7. Chavasse FB. Worth's squint on the binocular reflexes and the treatment of strabismus. 7th ed. Philadelphia: P. Blakiston's Son & Co; 1993.
8. Hiles DA, Watson BA, Biglan AW. Characteristics of infantile esotropia following early bimedial rectus recession. *Arch Ophthalmol*. 1980;98(4):697–3.
9. Babinsky E, Candy TR. Why do only some hyperopes become strabismic? *Invest Ophthalmol Vis Sci*. 2013;54(7):4941–55.
10. Kim WK, Kang SY, Rhiu S, Chung SA, Lee JB. The analysis of AC/A ratio in nonrefractive accommodative esotropia treated with bifocal glasses. *Korean J Ophthalmol*. 2012;26(1):39–44.
11. Oh SY, Lee JY, Park KA, Oh SY. Long-Term Changes in Refractive Error and Clinical Evaluation in Partially Accommodative Esotropia after Surgery. *PLoS One*. 2016;11(12):e0166695.
12. Jacobs SM, Green-Simms A, Diehl NN, Mohney BG. Long-term follow-up of acquired nonaccommodative esotropia in a population-based cohort. *Ophthalmology*. 2011;118(6):1170–4.
13. Raouf S, Kodsi S. Spontaneous consecutive sensory esotropia: a case series. *J AAPOS*. 2021;25(1):64–5.
14. Guthrie ME, Wright KW. Congenital esotropia. *Ophthalmol Clin North Am*. 2001;14(3):419–24.
15. Repka MX, Beck RW, Holmes JM, Birch EE, Chandler DL, Cotter SA, et al. A randomized trial of patching regimens for treatment of moderate amblyopia in children. *Arch Ophthalmol*. 2003;121(5):603–11.
16. Scheiman MM, Hertle RW, Beck RW, Birch E, Cotter SA, Crouch ER, et al. Randomized trial of treatment of amblyopia in children aged 7 to 17 years. *Arch Ophthalmol*. 2005;123(4):437–47.
17. Holmes J, Lazar EL, Melia BM, Astle WF, Dagi LR, Donahue SP, et al. Effect of age on response to amblyopia treatment in children. *Arch Ophthalmol*. 2011;129(11):1451–7.
18. Greenberg AE, Mohney BG, Diehl NN, Burke JP. Incidence and types of childhood esotropia: a population-based study. *Ophthalmology*. 2007;114(1):170–4.
19. Khorrami-Nejad M, Akbari MR, Khosravi B. The prevalence of strabismus types in strabismic Iranian patients. *Clin Optom (Auckl)*. 2018;10:19–24.
20. MacEwen CJ, Lymburn EG, Ho WO. Is the maximum hypermetropic correction necessary in children with fully accommodative esotropia? *Br J Ophthalmol*. 2008;92(10):1329–32.
21. Brennan R, Mccance P, Yeong JL, Adamson G, Mallett J. Esotropia Outcomes and the Influence of Delay to Wearing Full Hypermetropic Correction. *J Pediatr Ophthalmol Strabismus*. 2020;57(2):85–9.
22. Spontaneous resolution of early-onset esotropia: Experience of the congenital esotropia observational study. *Am J Ophthalmol*. 2002;133(1):109–18.
23. Simonsz HJ, Kolling GH, Unnebrink K. Final report of the Early vs late infantile strabismus surgery study (ELISS), a controlled, prospective, multicenter study. *Strabismus*. 2005;13(4):169–99.
24. Chen AM, Cotter SA. The Amblyopia Treatment Studies: Implications for Clinical Practice. *Adv Ophthalmol Optom*. 2016;1(1):287–305.
25. Mosley MJ, Fielder AR, Irwin M, Jones HS, Auld RJ. Effectiveness of occlusion therapy in ametropic amblyopia: a pilot study. *Br J Ophthalmol*. 1998;81(11):956–61.
26. Cleary M. Efficacy of occlusion for strabismic amblyopia: can an optimal duration be identified? *Br J Ophthalmol*. 2000;84(6):572–8.

Author biography

Suresh Ramanarao Addagarla, Professor https://orcid.org/0009-0008-7318-5460

Cite this article: Addagarla SR. Clinical study of esodeviations in children. *Indian J Clin Exp Ophthalmol* 2024;10(1):126-131.