



Intermittent Exotropia and Overminus Lens Therapy in Macedonia

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Abstract

AIM: Intermittent exotropia (IXT) is the most common form of exodeviations. The aim of our study was to investigate the outcome after overminus lens therapy in children and young adults with IXT.

METHODS: Fifty-three children and young adults with IXT, aged 3–33 years, from Macedonia, underwent slit-lamp examination, ocular motility, and refraction. For assessing near control in children and young adults with IXT, we used an office-based Mayo Scale.

RESULTS: Most of the patients had Mayo score 1 (30.2%) and Mayo score 2 (26.4%). A Mayo score of 3 was presented in 18.9% of the patients, and Mayo score of 0 in 15.1%. A Mayo score of 4 was presented in 5.7%, and Mayo scored only in 3.8% of the IXT patients. After prescribing overminus glasses, 43.4% of the IXT patients showed better outcomes with better punctum proximum convergence and/or, better stereoacuity, and/or smaller near angle of deviation (in pdp). 52.8% same motility and sensory outcome was observed, whereas only in 3.8% worse findings were reported.

CONCLUSIONS: Our study group was with a mean age over 5 (10.2 years) and we used lower overminus therapy (add. -0.75 D). The following studies of overminus lens therapy on IXT children and young adults over 5 years of age, should confirm our findings of a high percentage of improvement in terms of Mayo near control assessment.

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Introduction

Exotropia is a manifest outward deviation of the eye that occurs in 1–2% of the pediatric population [1]. The incidence of esotropia versus exotropia is 4:1 in children and 2:1 in adults [2].

Exodeviations (divergent strabismus) occur more frequently in latent or intermittent form compared to esotropias (convergent strabismus) [3].

There is a racial predominance of different types of strabismus. Asian people mostly have exotropia [4], and Caucasians, regardless of where they live in the world, mostly have esotropia [5].

Many patients with divergent deviation vary between exophoria and exotropia, and this fluctuating condition is called intermittent exotropia (IXT).

IXT is the most common form of exodeviations [6]. Usually, IXT presents after 1 year of age. In some children, IXT remains noticed later – at 7–8 years of age [7].

When IXT becomes manifested, it either remains unchanged or gradually passes into constant exotropia. In

IXT there are different: -phoric phase and -tropic phase. The -tropic phase of IXT is emphasized by a number of factors, including: Weakness, illness, strong light (such as sunlight), and distance vision [7]. Some patients may manifest an intermittent -tropic phase for months or years, becoming constantly exophoric and never exotropic [5].

Children with IXT usually have good visual acuity in both eyes, with binocular vision present when the visual axes are straight, but with suppression of one eye when the deviation is manifested.

IXT is the most common form of childhood exotropia with an incidence of 32.1/100.000 in children under 19 years of age [6].

The prevalence of exotropias in the strabismus cohort in Macedonia was 27% (80/296), whereas the prevalence of IXT in the exotropia cohort was 37.5% (30/80) [8]. The prevalence of IXT in the USA exotropic cohort was 47.7% [9].

Rowe *et al.* [10] in their prospective non-randomized longitudinal study recommend the use of minus hypercorrection (therapeutic minus) as the primary therapeutic option for IXT, which may be followed by subsequent surgery.

In the present study, we studied the success rate of overminus therapy lenses in the IXT cohort in Macedonia, using lower overminus correction than the pediatric eye disease investigator group (PEDIG) study, in older subjects.

Materials and Methods

The medical records of 53 patients with IXT, aged 3–33 years, were retrospectively evaluated from August 2017 through July 2019 in Medika Plus Polyclinic, capital of Skopje, Macedonia.

The patients were referred by the general practitioners and general ophthalmologists for a second opinion examination.

The ophthalmological examination included: Visual acuity, fixation assessment, near ocular deviation using Hirschberger's corneal reflex method, cover test, punctum proximum convergence (PPC) using an accommodative fixation target (Lang near viewing stick), sensory testing (Lang 1 stereotest – present 550 “600” “1200” of arc) (whenever possible), cycloplegic refraction, and evaluation of the anterior and posterior ocular segments.

For assessing near control in children and young adults with IXT, we used an office-based Mayo scale [11]. Mayo- an office-based scale is useful in quantifying control of the exodeviation. The scale ranges from 0 (phoria, best control) to 5 (constant exotropia, worst control). We use direct ophthalmoscopic light at 60 cm for assessing near control.

The patients were analyzed at the first visit and after 6 months of overminus treatment. Overminus glasses (add. -0.75 D) were prescribed after cycloplegic refraction.

Results

The mean age of the patients at the first visit was 10.2 years (range 3–33 years). All the IXT patients were Caucasians. In our study population, 24 (45%) of the IXT children and young adults were male, 29 (55%) female (Table 1).

Regarding eye deviation laterality, there was a similar distribution: 51% (27/53) right eye and 49% (26/53) left eye.

Best Corrected Visual Acuity was 0.90 in the right eye, whereas 0.92 in the left eye.

PPC was with normal values (PPC: 3–5 cm) in 60.4% (32/53) of the patients, whereas in 39.6% was abnormal with values over 6 cm.

Table 1: Demographic and refractive data of IXT (Exotropia intermittens) patients (53)

Variable	Value
Age, years mean \pm SD	10.2 \pm 6.7
Sex	
Male, <i>n</i>	24 (45)
Female, <i>n</i>	29 (55)
BCVA	
Right eye, <i>n</i>	0.9
Left eye, <i>n</i>	0.92
Eye deviation laterality	
Right eye, <i>n</i>	27 (51)
Left eye, <i>n</i>	26 (49)
Angle of deviation (pdp), mean \pm SD	17.3 \pm 2.3
Lang 1- stereotest	
Positive, <i>n</i>	45 (84.9)
Negative, <i>n</i>	8 (15.1)
Punctum proximum convergence	
Normal, <i>n</i>	32 (60.4)
Abnormal, <i>n</i>	21 (39.6)
Refractive errors	
Emmetropia, <i>n</i>	36 (67.9)
Anisomyopia, <i>n</i>	8 (15)
Myopia, <i>n</i>	5 (9.4)
Astigmatismus mixtus, <i>n</i>	4 (7.6)

IXT: Intermittent exotropia, BCVA: Best corrected visual acuity.

Positive Lang 1 stereotest (present 550 “600” “1200” of arc) was found in 45 of 53 patients (84.9%), whereas negative Lang 1 stereotest was present in 15.1% of the patients.

The mean value of the angle of deviation was 17.3 pdp (prism diopters).

Of the 53 IXT examined patients, regarding the distribution of the refractive errors, 67.9% (36/53) showed emmetropia (no refractive error), 8 patients (15%) were with anisomyopia, 5 (9.4%) with myopia, and 4 (7.6%) with astigmatismus mixtus (Table 1).

For assessing near control in children and young adults with IXT, we used an office-based Mayo Scale [11], with grading the near score 0–5. Most of the patients had Mayo score 1 (30.2%) and Mayo score 2 (26.4%). Mayo score of 3 was present in 18.9% of the patients, and Mayo score of 0 in 15.1%. Mayo score of 4 was presented with 5.7% and Mayo score of 5 with 3.8% of the IXT patients (Table 2).

Table 2: Mayo IXT scoring in 53 patients before overminus therapy and outcome after overminus therapy

Variable	Value (%)
Mayo IXT scoring	
Mayo score 0	8 (15.1)
Mayo score 1	16 (30.2)
Mayo score 2	14 (26.4)
Mayo score 3	10 (18.9)
Mayo score 4	3 (5.7)
Mayo score 5	2 (3.8)
Outcome after overminus therapy	
Better outcome, <i>n</i>	23 (43.4)
Same outcome, <i>n</i>	28 (52.8)
Worse outcome, <i>n</i>	2 (3.8)

IXT: Intermittent exotropia.

After prescribing overminus glasses, 43.4% of the IXT patients showed better outcomes with better PPC, and/or better stereoacuity, and/or smaller near angle of deviation (in pdp).

52.8% same motility and sensory outcome was observed, whereas only in 3.8% worse findings were reported.

Discussion

Mayo Scale is a clinically-based, easy-to-use quantitative measure of the severity and duration of the manifest component of the exodeviation. However, Mohney [11] has not fully studied whether it is more useful to numerically add the distance and near scores or evaluate them individually as separate measures. In our study, we use only IXT control Mayo near scores as separate measurements.

In a randomized clinical trial by Chen *et al.* [12] in children 3–7 years old with IXT, minus therapy with spectacles improved distance control at 8 weeks. Bayramal *et al.* [13] reported that 84% achieved good control scores based on both Newcastle's control score (NCS) and Jampolsky's system. Watts *et al.* [14] reported 72% success rate (using NCS), and Rowe *et al.* (2009) 51% (with the same NCS). Finally, Agdham *et al.* [15] reported 66.8% success rate, comparable with the previous studies.

In the PEDIG study [16], children 3–10 years of age had improved distance exotropia control when assessed wearing overminus spectacles after 12 months of overminus treatment; however, this treatment was associated with increased myopic shift. The beneficial effect of overminus lens therapy on distance exotropia control was not maintained after treatment was tapered off for 3 months.

In our Macedonian study group (53 IXT patients, age 3–33 years), near exotropia control was assessed wearing overminus therapy after 6 months. About 43.4% of the patients showed better outcomes with better PPC and/or stereoacuity, and/or smaller near angle of deviation (in pdp). It is commonly believed that overminus treatment (PEDIG – add. –2.50 D) is indicated in IXT children until 5 years of age. Our study group was with a mean age over 5 (10.2 years) and we used lower overminus therapy (add. –0.75 D).

Conclusion

Overcorrecting minus lens treatment has a reasonable rate of success and may be advised as a primary therapeutic alternative.

The following studies of lower overminus therapy on IXT children and young adults over 5 years of age should confirm our findings of a high percentage of improvement in terms of Mayo near control assessment.

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