

Overcorrecting Minus Lens Application for Intermittent Exotropia

Emel Başar¹, MD, Halit Oğuz², MD, Samet Ermiş¹, MD.

Purpose: To determine the value of overcorrecting minus lenses in the treatment of intermittent exotropia.

Methods: 22 patients ranged in age from 2 to 14 years (mean±SD, 6.4 ± 1.1) were divided into three groups according to their pretreatment deviations measured with alternate cover test and prism bar. Group I included seven patients with exotropia more than 25Δ, Group II included seven patients between 20-25Δ exotropia, and Group III consisted of eight patients less than 20Δ exotropia. They were followed 6 to 20 months (mean, 14 months) after the application of overcorrecting minus lenses in between -0.50 and -4.0 diopters (mean, -1.85) which were added to baseline refractive error. Success was defined as a conversion to orthophoria, pure exophoria and/or intermittent exotropia of 10Δ or less.

Results: The success rates were 42.8% in Group I, 57.1% in Group II, 87.5% in Group III. The overall success rate was 63.6%.

Conclusion: Overcorrecting minus lens treatment in intermittent exotropia can delay or eliminate surgical treatment. As the deviation size of intermittent exotropia decreases the success rate increases. Ann Med Sci 2000;9:132-134

Key words: Intermittent exotropia, overcorrecting minus lens, overminus lens.

Intermittent exotropia shows as a manifest exotropia at distant fixation and absence of deviation at near fixation¹. The angle of deviation may change according to differences in accommodative convergence. In such patients, a high accommodative convergence to accommodation ratio (AC/A) is usually present². Non-surgical treatment of intermittent exotropia includes the use of orthoptic sessions, occlusion, weak cycloplegic agents, prisms and overcorrecting minus lenses^{2,3}. A persistent monocular small angle esotropia with the danger of amblyopia and decreased stereoacuity can be the result of surgery on eyes which have good preoperative visual acuity and normal stereopsis. So, non-surgical methods for treatment of intermittent exotropia are chosen by many ophthalmologists. Non-surgical therapy has its objective as an increase in the length of time in case children have bifoveal fixation. Also, there is a possibility of avoiding inducement of a small angle esotropia by surgery if the surgery can be delayed with non-surgical treatment³.

If overcorrecting minus lenses are added to the full cycloplegic refraction of patients with intermittent exotropia, accommodative convergence is encouraged, and exodeviation can be controlled well^{3,4}.

The results of the treatment with overcorrecting minus lenses were investigated in this study.

Patients and Methods

Twenty two children with intermittent exotropia, 12 females and 10 males were followed from 6 to 20 months (mean, 14 months). Their ages ranged from 2 to 14 years (mean±SD, 6.4 ± 1.1). Five of these children had myopia, and 17 of them had hyperopia. Baseline refractive error ranged from +2.25 to -4.0 diopters (D) with a mean of +1.25 D. None of the children had past ocular surgery, amblyopia,

Originally received: November 15, 1999.
Revision accepted: May 31, 2000.

¹Istanbul University Cerrahpaşa Faculty of Medicine, Department of Ophthalmology,
Istanbul-TÜRKİYE,
²Harran University Faculty of Medicine, Department of Ophthalmology², Şanlıurfa-TÜRKİYE,

Table 1. Success rate increases with decreasing angle of deviation

	Success	Failure
Group I (XT>25Δ)	3/7 (42.8%)	4/7 (57.1%)
Group II (XT-20-25Δ)	4/7 (57.1%)	3/7 (42.8%)
Group III (XT<20Δ)	7/8 (87.5%)	1/8 (12.5%)

significant A or V pattern or neuro-developmental problems.

All children had a complete eye examination including a cycloplegic refraction using atropine. Visual acuity was evaluated with Snellen chart, E game or picture charts. Ocular deviations were measured with alternate cover test and prism bar while the child viewed an accommodative fixation target at both 6 meters and 0.33 meters. Stereoacuity was assessed using TNO or Titmus tests. All of the children had normal biomicroscopic and fundusoscopic examination findings.

Overcorrecting minus power between -0.50 and -4.0 D (the mean, -1.85) was added to basic refractive error for continuous spectacle wear concerning age, tolerance to overcorrecting minus lenses and refractive status of children. The cases were divided into three groups according to their pretreatment angle size with glasses at distant fixation. Group I included seven children with exodeviation more than 25Δ, group II included seven patients between 20-25Δ exodeviation, and group III consisted of eight patients less than 20Δ exodeviation (Table 1). Success was defined as a conversion to orthophoria, pure exophoria and/or intermittent exotropia of less than 10Δ.

All patients were examined monthly in the follow up period.

The research protocol complied with the Declaration of Helsinki of the World Medical Association, and the signed informed consent forms have been obtained from the parents of the study subjects.

Results

In Group I the success was achieved in three patients (two of them were converted to intermittent exotropia less than 10Δ, and one of them changed to exophoria) with overcorrecting minus lens, and the success ratio was 42.8%. Four patients in Group II were treated successfully (two cases resulted in exotropia less than 10Δ, and two cases changed to exophoria), and the success ratio was 57.1%. In Group III the success was achieved in seven patients (four of them were converted to exophoria, and three of them changed to orthophoria), and also the success ratio was 87.5%. When all patients were evaluated, orthophoria, pure exophoria and/or intermittent

exotropia of less than 10Δ were achieved in 14 of 22 patients, and the success ratio was 63.6%. The results were shown in Table 1.

In the examinations, stereopsis was found to be positive in 15 of 22 patients, and the success ratio was 66.7% in the patients with stereopsis, 57.1% in the patients without stereopsis.

Discussion

Overcorrecting minus lens therapy is based on stimulation of accommodative convergence. Thus, it is aimed to decrease the frequency or size of trophic phase. Accommodative convergence is also activated by orthoptic therapy, as such resembles overminus lens therapy⁵. If the AC/A ratio is sufficiently high, minus lenses may be used to decrease an exodeviation by stimulating accommodative convergence⁶. Caltrider and Jampolsky stated that often little accommodative effort could trigger a surprisingly large vergence response which can be enough to permit the child to keep the exodeviation latent by using large fusional convergence amplitudes⁵.

In our study the success rate was 63.6% when all patients were considered. Reynolds and co-workers achieved a success rate of 61.7% in a group of patients including consecutive and residual intermittent exotropias. Caltrider and Jampolsky also reported a success rate of 72% in their series^{3,5}.

We found the success rate increasing with decreasing deviation angles of intermittent exotropia. Reynolds and co-workers reported success rates respectively 23.5%, 62.5% and 92.0% in case grouped in the same manner as in our study according to the angle of deviation including consecutive and residual intermittent exotropias. They stated that success rate was higher in cases with small angle exotropias⁵.

Moreover, Reynolds and co-workers⁵ stated that it was difficult to speculate whether the lower degree of stereoacuity impacted on the response to overminus therapy. In our study the success rate was 66.7% in cases with stereopsis, 57.1% in cases without stereopsis.

The disadvantages of overminus lens therapy are that it may cause accommodative asthenopia, and it can be used only in children with high accommodative amplitude^{6,7}. A concern of some clinicians is that the added accommodative effort required with minus lenses either induces myopia or enhances myopia progression. Rutstein and associates concluded that exotropia patients treated with overminus lenses will not demonstrate more myopia progression than would normally be expected, and similar refractive changes would probably have occurred even without the overminus lenses⁴.

In conclusion, overcorrecting minus lens treatment in intermittent exotropia can delay or eliminate surgical treatment, and can be a successful alternative to orthoptic exercises especially in children too young to be cooperative for exercises. As the deviation size of intermittent exotropia decreases the success rate increases.

References

1. Sanaç AŞ. Exodeviations. Strabismus and Management. Ankara: Pelin Press, 1994: 85-91.
2. Wilson FM. Pediatric Ophthalmology and Strabismus. In: Hecht KA, ed. Basic and clinical science course. San Francisco: American Academy of Ophthalmology, 1990-1991; 268.
3. Caltrider N, Jampolsky A. Overcorrecting minus lens therapy for treatment of intermittent exotropia. Ophthalmology 1983; 90: 1160-1165.
4. Rutstein RP, Marsh-Tootle W, London R. Changes in refractive error for exotropes treated with overminus lenses. Optom Vis Sci 1989; 66: 487-491.
5. Reynolds JD, Wackherhagen M, Olitsky SE. Overminus lens therapy for intermittent exotropia. Am Orthopt J 1994; 44: 86-91.
6. Von Noorden GK. Exodeviations. In: Binocular vision and ocular motility. Theory and management of strabismus. St Louis: Mosby, 1996: 323-336.
7. Hidaji F, Nelson LB, Olitsky SE. Exodeviations of childhood. Ophthalmol Clin North Am 1996; 9: 191-192.