

# Overcorrecting Minus Lens Therapy in Intermittent Exotropia

Submitted: 08 Feb, 2018  
Accepted: 04 June 2019

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## ABSTRACT

**OBJECTIVE:** To evaluate the use of overcorrected minus lenses in the correction of intermittent exotropia.

**METHOD:** Recording of Visual acuity and exotropic angle of deviation before and with overminus lens, home control, office control, fusional vergences and muscle functions were carried on sample size of 95 patients having intermittent exotropia using ETDRS chart, prism box, trial box, and pen torch. Screening tests were performed to find gross data. Data was quantified by the SPSS 20.

**RESULTS:** Decompensation of the deviation was present at near distance fixation with reduced binocular function measures and recovery of cover test at near and distance fixation. Only 29.47% patients having intermittent exotropia showed improvement with overcorrecting minus lens therapy and 70.53% had no improvement ( $p < 0.05$ ) in which most of them were in range of 5 to 11 years, visual acuity was from 0.2 to 0.0 with ETDRS chart. Fusional reserves were normal in range of Base out 35 Prism Diopter to 40 Prism Diopter, Base In 16 Prism Diopter at near fixation and Base out 16 Prism Diopter, Base In 8 Prism Diopter at distance fixation. Home control and office control were good and muscle functions were also normal in maximum patients having intermittent exotropia.

**CONCLUSION:** There is no great advantage of using over minus lenses for the non surgical management of intermittent exotropia.

**KEYWORD:** Intermittent exotropia, Overcorrecting minus lens therapy, Overminus treatment

## INTRODUCTION

Intermittent exotropia is a congenital form of strabismus. Mostly, intermittent exotropia is first noted in early childhood when intermittently outward deviation of eyes is seen. Patients with intermittent exotropia can control deviation, keeps their eyes straight most of the time and becomes manifest at the other time. This quality can be measured with control scores.<sup>1</sup>

Many treatment options can be considered as non surgical interventions until the decision to operate is made. These include spectacles, patching, prisms and use of overcorrecting minus lenses. The latter treatment has been advised for intermittent exotropia to prevent progression and has been used to control deviation at distance. The aim of this study is to determine whether overminus lens could be used to indicate a successful outcome in patients with intermittent exotropia.<sup>2</sup>

Overcorrecting minus lens therapy is based on principle that an exotropic deviation will be decreased by stimulating accommodative convergence with additional minus power in spectacles. Children with intermittent exotropia have subnormal convergence reserves at distance. The fusional reserves ratio correlates with control and may be useful in

grading the severity of intermittent exotropia.<sup>3</sup>

Another purpose of this study is to evaluate the use of overminus lenses as a primary treatment option in intermittent exotropia. There is usually good binocular function with normal fusional vergences and stereo acuity at near. Indications of treatment include worsening cosmesis with an increasing angle of deviation and decompensating deviation.

Non invasive options include prism therapy, occlusion therapy, orthoptic exercises and overminus lenses. Invasive treatment options include strabismus surgery and botulinum toxin A injection. Because of unpredictable surgical results, surgery is delayed until child gets older and strabismus becomes stable and manifest, but there are chances of losing binocular function and increase in angle of deviation.<sup>4</sup>

Patients with overcorrecting minus lens show an improvement in exotropia. Years later, they don't need overminus lens in their spectacles for satisfactory alignment. Patients with overcorrecting minus lens are differed from control group in the way that over correcting minus lens therapy patients show benefits over control group patients.<sup>5</sup>

There is a clinical need for a reliable assessment system to rule out the severity and measure the intermittent exotropia. Overminus lens therapy is the best method for measuring intermittent exotropia. The test takes few minutes to complete. The objective of this testing is to evaluate the reliability of overminus lens.<sup>6</sup>

In 2009, Rowe FJ conducted a study in which there were 13 female and 8 male patients with a mean age of 5 years at the start of treatment. There was significant reduction in angle of deviation after treatment. 24% patients with successful outcomes, 28% had a good outcome and 33% patients required surgery.<sup>7</sup>

In study of 2005 there were 24 patients in which 13 girls and 11 boys treated with minus lenses. The average age of patients was 4-15 years. The mean pretreatment angle was 28.5+/-10 prism diopters and mean post treatment angle was 18.3+/-8.9 prism diopters. By using minus lenses significant improvement in exotropia was observed.<sup>8</sup>

Recently, a study was done related to intermittent exotropia in which patients with intermittent exotropia used overminus lens for 16 months. Patients showed best outcomes after overminus lens therapy. 84% showed remarkable qualitative improvement and 16% with quantitative reduction in angle of deviation but with qualitative increase. Overcorrecting minus lens has been advocated as therapeutic treatment in intermittent exotropia.<sup>9</sup>

According to result of a previous study, 38 patients used 2.00 to 4.00 diopters of overminus lenses. During treatment, 46% improved their quality of fusion and 25% showed reduction in angle of deviation. 28% were those patients who didn't show improvement in fusion quality and no reduction in angle of deviation. 2 patients had gone to esotropia from their intermittent exotropia during overminus lens therapy. 65% who showed good response were at 1 year follow visit, not continuing this therapy maintained good qualitative fusion and quantitative reduction in angle of deviation.<sup>10</sup>

Study done in 1954 by Kushner shows that 40 exotropic patients, age range 2 to 13 years, were recommended overminus lens range -1.50 to -2.75 for a time period of 8 to 10 months. A notable link was found between the initial angle of deviation and reduction in angle of deviation after overminus lens therapy. Overminus lens means additional minus lens power with the corrective lenses.<sup>11</sup>

**MATERIALS AND METHODS**

95 patients of intermittent exotropia, with ages between 5-18 years, angle of deviation 15prism diopter to 40 prism diopter were included in this quasi experimental study. Subjects having paresis or paralytic squint were excluded. The study was conducted at Orthoptics clinic of College of Ophthalmology & allied Vision Sciences, Mayo Hospital Lahore.

In intermittent exotropia, angle was recorded at 6 meters and 1/3 meter. In most of cases angle at distance was from

26 prism diopter to 40 prism diopter and at near from 15 prism diopter to 25 prism diopter. Visual acuity ranged from 0.2 to 0.0 on ETDRS visual acuity chart.

Patients having intermittent exotropia were treated with overminus lens therapy. To test this, I performed prism cover test to check angle at distance and near with overcorrection of minus lens. I also examined the visual acuity, muscle functions and control, and fusional vergences of these patients. In my research data mostly the patients with improvement were 29.47%. Their extraocular motility was normal and fusional vergences were good. Those who had no improvement in their angle with overminus lens were 70.53%. Poor fusional vergences were found in 25.3% patients.

Data were collected by clinical examination and recording the readings by self designed Performa after getting informed consent of patient.

**RESULTS:**

**Table 1:** Improvement in angle of deviation for Near

15 – 25 pd		AAN		Total
		26 – 40 pd		
DOA	Yes	19	9	28
	no	60	7	67
Total		79	16	95

**chi square value =6.634, p= 0.00992**

Table 1 shows that 28 patients shows improvement in deviation while there is no improvement of angle at near in 67 patients having intermittent exotropia with overcorrecting minus lens therapy. The difference is significant statistically meaning that majority of the patients do not get benefit from therapy

**Table 2:** Improvement in angle of deviation for Distance

15pd to 25pd		AAD		Total
		26pd to 40pd		
DOA	yes	12	16	28
	No	13	54	67
Total		25	70	95

**chi square value =5.6022, p= 0.017938**

Table 2 shows that 28 patients had improved their deviation with overminus lens therapy but 67 patients had no improvement in angle at distance in intermittent exotropia. P value of 0.017 shows statistically significant difference between those who got improved against those who did not.

**Table 3:** Fusional Vergences

	Frequency	Percent
Good	71	74.7
Poor	24	25.3
Total	95	100.0

Table 3 shows good fusional vergences in 74.4% patients with intermittent exotropia but 25.3% were with poor fusional vergences.

### DISCUSSION

Many non surgical options can be tried before surgery is attempted for intermittent exotropia.<sup>12-14</sup> These including patching, prisms, use of overminus lenses etc among others. Use of overminus lenses has sometimes alone proven to be sufficient to correct the deviation.<sup>15</sup> Most of the studies done previously are retrospective studies with no comparison group. Hence they have variable success rates. One study that included a control group was a randomized control trial pilot study and it noted that therapy with over minus lenses could be effective<sup>14</sup>

Our study was a quasi experimental study of short duration and without control group due to time constraints. 95 patients visiting orthoptic clinic, in Mayo hospital Lahore were recruited. The parameters studied were medical history, ocular history, diagnosis, visual acuity, and angle of deviation in subjects having intermittent exotropia. By using overminus lens treatment, control muscle functions and fusional vergences were measured again and any improvement (or otherwise) was noted.

My result is that good improvement in angle with overcorrecting minus lens therapy does not occur in patients having intermittent exotropia because the overminus lens does not affect much on intermittent exotropia. This is somewhat not in accordance with most of studies but that could be due to non-employment of control/ comparison group as well as shorter follow up due to time constraint

### CONCLUSION

Using overminus lenses for non surgical management of intermittent exotropia did not show much encouragement in this study as only one fourth of patients showed some improvement. However our study was limited due to time constraint, lack of a control/ comparison group and small sample size. A large scale randomized control trial could be carried out with a longer follow up to arrive at a more conclusive result.

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