

## Original article

## Does occlusion therapy improve control in intermittent exotropia?

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## Abstract

**Purpose:** The aim of this study was to evaluate the effectiveness of occlusion therapy in the control of intermittent exotropia (IXT) in children between 4 and 10 years in Saudi Arabia. This study will highlight the importance of patching IXT patients and assist to approach the proper use of occlusion therapy.

**Methods:** A clinical, prospective cohort pilot study was performed on 21 untreated IXT patients. Evaluation of the deviation angle, amplitudes, stereopsis and control before, during and after occlusion therapy was performed.

**Results:** Eleven percent of the subjects demonstrated a decrease in the deviation angle by 50% while 55.5% attained normal ranges for base-out fusional amplitudes and 77% attained success for the control.

**Conclusion:** We suggest that alternate occlusion therapy can improve the sensory status and strengthen the fusional amplitudes but does not improve the deviation angle and therefore is useful to postpone surgery in young children and may improve surgical outcome.

**Keywords:** Intermittent exotropia, Antisuppression therapy, Occlusion therapy, Patching

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## Introduction

Exotropia is an eye condition where the two eyes are not aligned along the same axes, but instead the axes diverge. Intermittent exotropia (IXT) is an exodeviation intermittently controlled by fusional mechanisms and spontaneously breaks down into a manifest exotropia. At other times the eyes are aligned and binocular single vision is maintained.<sup>1</sup>

Treatment of exodeviations is indicated if the patient is symptomatic and binocular function is affected. Surgical or non-surgical treatments aim to reduce episodes of manifest exotropia by reducing the angle of deviation and improving control of fusion.<sup>2</sup> The decision to perform surgery remains a contentious issue and each case has specific indications

including the age of the patient, angle of deviation, symptoms, cosmesis, fusion potential, history, onset, and prognosis. The reasons for non-surgical correction also vary, including patients who want to avoid surgery and clinicians/patients who want to delay surgical intervention for clinical/personal reasons.<sup>3</sup> Occasionally non-surgical treatment alleviates symptoms such that surgical intervention is unnecessary.<sup>3</sup> Occlusion therapy is considered an antisuppression therapy to prevent or eliminate suppression and to induce diplopia in some cases and therefore stimulate motor fusion. However, not all patients complain of diplopia in antisuppression therapy.<sup>2</sup> Part-time or full-time occlusion of the dominant eye, or alternate occlusion in patients without ocular preference, has been used for this therapy. In this study, we initi-

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ated antismpression (occlusion) therapy in an attempt to remove the suppression mechanism present under binocular conditions and therefore stimulate and/or improve binocularity by the end of treatment.

The aim of this study was to evaluate the effectiveness of occlusion therapy in the control of IXT and the angle of deviation in children between 4 and 10 years old in Saudi Arabia. To our knowledge, occlusion therapy has not been studied extensively in the literature and to address this gap, the objective of the current study was to provide clear methodology and success criteria for this type of therapy.

## Materials and methods

A clinical, prospective cohort pilot study was performed. Thirty-six children were initially enrolled and 21 were able to complete the study. The 21 children were from 4 to 10 years old and had untreated IXT. The angle of the divergence and the child's ability to control the deviation were measured and compared before, during and after antismpression (occlusion) therapy. The before and after test results were statistically analyzed in order to assess the effectiveness of occlusion therapy on IXT.

We included patients with diagnosed near and/or distance IXT of at least 10 PD, age range between 4 and 10 years and no amblyopia or history of previous ocular treatment and any coexisting ocular pathology.

Patients' testing was performed in a standardized manner to minimize dissociation of the eyes. We evaluated the deviation angle at distance and near, stereopsis at distance and near, base-out fusional amplitudes at distance and near, binocular visual acuity and the control score scale. Control score scale was assessed by the office based scale as described by Mohny and Holmes.<sup>4</sup>

The treatment regimen of occlusion was 50% of waking hours which is about 6 h a day of alternate occlusion. Each patient was assessed at four consecutive month intervals during occlusion treatment plus reassessment after one month without occlusion treatment.

## Statistical analysis

Data were analyzed using SPSS software version 17.0 and MedCal version 8.0. Descriptive and analytical statistics were performed. The Wilcoxon signed rank test was used to compare means for successive follow-ups. General linear model analysis of variance (ANOVA) for repeated measures was used to determine differences between follow-up visits. A *P* value less than 0.05 was considered statistically significant.

## Results

Success for the deviation was indicated by a 50% decrease in the deviation angle at near and distance. Success for stereopsis at near was 40 s of arc, and for stereopsis at distance success was 60 s of arc which are considered within the normal range. Success for base-out fusional amplitudes at near was 35 PD and 20 PD for distance which are considered within the normal range.<sup>5</sup> Success for binocular visual acuity was 0 LogMAR or better. Success for the control score scale was a rating of 0 or 1 for the distance and near control score.

Thirty-six IXT patients were enrolled in this study; fifteen patients did not attend after the first follow-up visit and were therefore excluded from the study. Twenty-one patients attended all the follow-up visits; yet, three did not complete the full duration of therapy and stopped during the second or third follow-up visits. Eighteen patients completed the full therapy (Table 1).

For individual deviation interpretation at distance, only three patients achieved success where the deviation decreased by 50% at the completion of the treatment while two patients (11%) attained success after the treatment visit and the success rate throughout the four follow-up visits was 4% (1/21), 14% (3/21), 15.7% (3/19) and 11% (2/18) for the second visit, third visit, fourth visit and fifth visit respectively. Although significant changes for the deviation at distance occurred at the first visit to the fourth and the first visit to the fifth visit, we will rely on our individual interpretation as it reflects a more detailed evaluation of our data for every individual throughout the five visits. The statistical analysis calculated the mean value of the deviation angle for all the patients in every visit and compared them as an average which reduces the accuracy of the statistical findings. According to our individual interpretation, a low success rate was reported for deviation measurements at distance after the end of the treatment. However, for individual interpretation of deviation at near, success was achieved in 44.4% of the eighteen patients who completed the full duration of treatment at their last visit (fifth visit) and there were significant changes when comparing the first visit to the fourth visit and the first visit to the fifth visit.

The success rate for stereopsis at distance was high starting from the third visit to the last visit. The minor differences between the third to the fifth visits in stereopsis at distance explain lack of significance between visits. Additionally, 27.7% of the patients were within normal stereoacuity at the outset which indicates there was little room for improvement in approximately a third of the cases and therefore this may explain the lack of statistical significance calculated by the Wilcoxon signed rank test. However, individual interpretation indicated a success rate of 94% at the last visit where 17 cases out of eighteen improved to normal stereoacuity. More than 50% of the subjects had normal near stereoacuity at the first visit which left little room for improvement and therefore warranted minor discussion or analysis.

Base-out fusional amplitudes at distance attained successful levels in 55.5% of the cases. The difference between the first and fourth visits and first visit and fifth visit was significant (*P* = 0.000, both comparisons). There were no significant differences between other visits (*P* > 0.05, all comparisons). In reviewing the data individually throughout the four follow-up visits, results of the fusional amplitudes measures were very similar during successive visits starting from the

**Table 1.** Cohort demographics and refractive error of intermittent exotropes who underwent occlusion therapy.

Variable	Mean	Standard Deviation	Min. range	Max. range
Age	8.50	1.47	6.00	10.00
Age of onset	4.70	1.59	2.00	7.00
OD SE	-1.25	1.30	-3.80	0.37
OS SE	-1.29	1.24	-3.75	0.25

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