

Outcome of strabismus surgery and vision therapy in a case of intermittent exotropia

Abstract

Background: Horizontal ocular deviations in which the visual axis deviates outward are called exodeviations. Children with exodeviations typically present during the first decade. The prevalence is approximately 1 percent in children younger than 11 years.¹ Intermittent exotropia is a common form of strabismus occurring in about 25% of all strabismic cases and in 1% of the general population. Its age of onset varies but is often between 6 months and 4 years²⁻³ it is an ocular deviation that at times is completely controlled by positive fusional vergence and presents as an exophoria and at other times is not controlled by positive fusional vergence and presents as an exotropia.² In view of the intermittent nature of the problem and unclear course of the disease, very often the patients are reluctant to accept as first choice the surgical form of treatment which therefore is avoided or delayed. Intermittent exotropia is the most common exodeviation of childhood, affecting almost 1 percent of the general population. The usual onset occurs when the child is two to three years of age.⁴ Strabismus surgery is performed for functional reasons, to create comfortable single binocular vision or, if this cannot be accomplished, to re-establish a normal facial configuration by aligning the eyes. As an alternative, various non-surgical approaches to the problem have been tried with varied results.⁵ Regarding orthoptic management, a lot of controversy still exist.⁶ Some authors deny the role of orthoptic treatment,⁷ while others found it to be effective in certain types of intermittent exotropia,⁸ while still others considered that combined therapy (surgery with orthoptic treatments) is a better approach to attain long term stability of results.⁹

Case: Bilateral lateral rectus recession was done along with passive vision therapy by spectacles and active vision therapy by Brock string exercise was given to a 19 years old male from Thankot, Kathmandu who presented to the OPD of B.P. Koirala Lions Center for Ophthalmic Studies having intermittent exotropia for both near and distance. He presented to the OPD for plan of strabismus management. He had been wearing his current prescription of glasses since one year and had deviation of eyes on and off since 2 years. His presenting visual acuity was 6/6⁻³ in right eye and 6/9⁻² in left eye with prescription of -1.75 DS and -4.00DS in right and left eye respectively. Cover test revealed intermittent exotropia of 45Δ intermittent exotropia with 6Δ L/R for both near and distance. The full cycloplegic refraction was performed with best corrected visual acuity of 6/6 with -1.50 DS in OD and 6/6 with -4.00/-0.50 X 090 in OS. Bilateral 8.5mm Lateral rectus recession was performed and vision therapy was given. After one year of vision therapy and surgical correction he had only 4Δ esophoria for both near and distance. He had no symptom of asthenopia and vision related complain at the completion of the therapy.

Conclusion: Active and passive vision therapy along with strabismus surgery helps in the management of intermittent exotropia and helps in the restoration of binocular single vision with clear and comfortable vision and good cosmesis of the eyes.

Keywords: intermittent exotropia, active vision therapy, passive vision therapy

Volume 2 Issue 1 - 2015

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Received: September 19, 2014 | **Published:** January 28, 2015

Introduction

Intermittent exotropia is more common and tends to develop later in life. When considering the surgical approach to exotropia, an initial overcorrection may result in better long-term motor alignment.^{10,11} Specific recommendations for overcorrection of patients with intermittent exotropia vary: Raab and Parks¹² advised overcorrection by 10Δ to 20Δ; Scott and colleagues,¹³ 4Δ to 14Δ; McNeer,¹⁴ 0Δ to 10Δ. Burian¹⁵ defined the condition of patients whose distance deviation is equalled the near deviation as a basic type of exotropia and recommended treatment with unilateral recession-resection surgery. He based these recommendations on the hypothesis that bilateral lateral rectus recessions would affect the distance deviation more than the near deviation and that the recession-resection procedure would affect the distance and near deviation equally. Other authors^{16,17} have recommended symmetric lateral rectus recessions in patients with

basic intermittent exotropia. Kushner¹⁸ reported that bilateral lateral rectus recessions tended to affect the distance and near deviation in a similar manner. Nevertheless, he stressed that further study would be needed to determine whether increasing the amount of recession would produce better results with symmetric lateral rectus recessions in basic intermittent exotropia. In other studies the success rate of symmetric lateral rectus recessions for intermittent exotropia was reported to be as low as 55% by Burian and Spivey,¹⁹ 41% by Pratt-Johnson et al.²⁰ and 56% by Richard and Parks. In addition, patients with basic intermittent exotropia operated on with bilateral lateral rectus recessions tend to develop an increase in the near deviation or a secondary convergence insufficiency postoperatively. Vertical deviations often coexist with Exotropic horizontal strabismus and have been described in up to 50% of the patients who present with exotropia.²¹ This report focuses on the constant, small-angle vertical

tropia, unrelated to oblique dysfunction, dissociated vertical deviation (DVD), or paretic muscle. This small-angle vertical tropia can be present in patients with intermittent exotropia, consecutive exotropia, constant exotropia, and congenital exotropia. There are few current studies devoted to surgical management of exotropia that clarify the surgical management of the vertical tropia in these patients.

Case report

A 19 year old male presented the OPD of B.P Koirala Lion's Center for Ophthalmic Studies with a chief complain for management of ocular deviation. He had been wearing his present glasses since 3 years. He had previous eye check-up and was planned for strabismus surgery. He complained for deviation of LE since 3 years. He has asthenopic headache for last 2/3 years. He sustained no ocular trauma and didn't perform ocular surgery. His presenting visual acuity was 6/6⁻² with -1.75 DS in RE and 6/9⁺² with -4.00 DS in LE. He underwent complete cycloplegic refraction with 1% cyclopentolate and his best corrected visual acuity was 6/6 with -1.50 DS in RE and 6/6 with -4.00/-0.50 X 090 in LE on post mydriatic test. Orthoptic evaluation was performed after refractive correction. In orthoptic evaluation, cover test revealed intermittent exotropia for both near and distance. On prism cover test there was basic exodeviation of 45Δ with 6Δ L/R. On distance Worth Four Dot test, binocular single vision was maintained most of the time. The TNO stereopsis revealed 100" of arc of stereopsis. In objective measurement of deviation by synaptophore there was 30° deviation. The prism fusional range was 4Δ base out for distance and 14Δ base out for near. The extraocular motility was clinically full ranged in all diagnostic cardinal gazes. With diagnosis of basic exodeviation for near and distance the patient was advised for strabismus surgery.

Fundus examination under mydriatics (0.5% tropicamide) revealed disc of pink, round with sharp margin, cup disc ratio of 0.5:1:0.4, macula was healthy with good foveal reflex and blood vessel pattern was within normal limit. On the subsequent follow up the patient underwent bilateral Lateral Rectus Recession 8.5mm. On the first post-operative day there was no history of diplopia. On extra-ocular motility assessment there was slight restriction in adduction of both eyes. The patient was under medications of eye drop chloramphenicol with dexamethasone on tapering dose. On second follow up after 3 weeks the temporal bulbar conjunctiva had little fibrosis and little subconjunctival haemorrhage. Rest of the findings were within normal limits. Cycloplegic retinoscopy was performed which suggested visual acuity of 6/6 in RE with -1.75/-1.25 X 015 and 6/6 in LE with -4.50/-1.50 X 170. He was again under same medications. Orthoptic test was again performed and on cover test there was intermittent exotropia with left eye hypertropia. The prism cover test revealed 20Δ exodeviation with 8Δ L/R for distance and 28Δ exodeviation with 4Δ L/R for near. Binocular single vision was present for near and it was maintained for distance. The TNO stereo test revealed 100" of arc. The convergence and accommodation were within normal limits for age and prism fusional range was 25Δ base in for distance and 30 Δ base in for near. The patient was advised for brock string exercise with refractive correction and advised to follow up after one month. Cat stereogram exercise along with line dot cards was given as home therapy as a part of active vision therapy. After one month of follow up, the patient complained of headache and dizziness. On examination the extraocular motility was full ranged in all gazes. There was no significant change in objective retinoscopy. On orthoptic test, cover test revealed intermittent exotropia with left eye hypertropic. On prism cover test there was 18Δ exodeviation with 12Δ L/R for near and 12Δ

exodeviation with 15Δ L/R for distance. Binocular single vision was present for both near and distance as tested by Worth Four Dot test. TNO stereopsis test revealed 80" of arc of stereopsis. The convergence and accommodation were within normal limits for age. On fusional range test by synaptophore the positive fusional vergence was +30° and negative fusional vergence was -4°. The prism fusional range was 25Δ BO for distance and 35Δ BO for near. With the provisional diagnosis of intermittent exodeviation with left eye hypertropia the patient was advised to continue brock string exercise and asked to follow up after one month. On 12 week of post-operative day the patient was apparently well. He had no complained of diplopia. There was no significant change in retinoscopy power. The anterior and posterior segments were with normal limits. The extra-ocular motility was full ranged in all diagnostic gazes. On orthoptic test the cover test revealed orthophoria for distance and small esophoria with quick recovery for near. On prism cover test there was 4Δ esophoria for near. Binocular single vision was present for both near and distance as tested by Worth Four Dot test. There was 60" of arc of stereopsis as tested by TNO stereopsis test. The convergence and accommodation were within normal limits. The fusional range test by synaptophore the positive fusional vergence was +30° and negative fusional vergence was -4°. Prism fusional range there was 25Δ for distance and 35Δ for near. With the final diagnosis of orthotropia for distance and esophoria for near the patient was asked to continue active home vision therapy and be on regular follow up for every 3 months for one year.

Discussion

The clinical course of intermittent exotropia is unclear. It has been reported to be a progressive disorder. Progression or deterioration over time may take different forms. The intermittent exotropia may increase in size, may spread to another fixation distance, may become more frequent, or may become constant with loss of binocular vision and stereopsis.²² Some of the factors leading to progression include decreased tonic convergence, decreased accommodation, suppression and increased separation of the orbits with age. Treatment interventions for intermittent exotropia are aimed at establishing binocular alignment and preserving or establishing binocular single vision. The treatment of choice for intermittent exotropia is still unclear. In some centers, intermittent exotropia is considered to be a surgical condition with only decision being whether or not to operate. At other institutions, more emphasis is placed on the sensory aspects of retaining binocularity. Treatment approaches include: over minus lenses; feedback training to improve range of sensory fusion; occlusion therapy (anti suppression treatment); horizontal rectus surgery with/without oblique muscle surgery for A or V pattern exotropia; and prism therapy.²³

Some studies imply that observation may be ideal in some patients with intermittent exotropia (particularly small angle strabismus). Von Noorden²⁴ followed 51 patients with intermittent exotropia who were not treated for an average of 3.5 years. In 25% of the cases the intermittent exotropia either remained unchanged or improved. Rutstein and Corliss in a recent retrospective study on 73 patients concluded that exodeviations did not progress with age and approximately 36% cases were phoric/orthophoric at the last visit (mean follow-up: 10 years). Chia et al.²⁵ reported that without treatment, 18% of patients with intermittent exotropia for distance and 6% of patients with intermittent exotropia for near improved to orthophoric state (initial exodeviation averaged 36 PD for far, 26 PD for near). Hiles et al.²⁶ studied the course of 48 exotropia patients (mean follow-up: 11.7 years) and observed that 65% improved to exophoria <20 PD without

any treatment. On the other hand, some studies emphasize the need for intervention for patients with intermittent exotropia. Carta et al.²⁷ evaluated treatment of intermittent exotropia patients divided into four groups: orthoptic exercise, surgery, exercises combined with surgery and no therapy. Highest failure rates were observed in patients not treated. Another group of studies, report the effect of combining orthoptic exercises with surgery versus surgery alone. Hardesty et al.²⁸ in a review of the long-term results of 100 surgically-treated intermittent exotropia cases (mean follow-up: 6.1 years), reported a 50% success in patients treated with surgery and orthoptic treatments and a 32% success with surgery alone. Higher success rates of surgery with vision/occlusion therapy over surgery alone were also reported by Cooper and Leyman.²⁹ They reported success rate of 42% for surgery alone and 52% for combined surgery and vision therapy group. However, Velez³⁰ observed a 40.2% (29/72) success in patients who had surgery and preoperative orthoptic treatments and 41.1% (14/34) in patients who had surgery only. Some studies indicate that orthoptic exercises alone are useful in the management of patients with intermittent exotropia. In one clinical series of 31 exotropes, most having constant deviations, Sanfilippo and Clahane³¹ reported a success rate of 64% with vision therapy alone after 4.5 years. Fournier and colleagues³² treated 35 of their 65 patients with either vision therapy prisms, or over-minus lenses and reported that the average distance exotropia decreased from 21 PD to 15.6 PD, whereas for the 30 patients not receiving treatment, the magnitude remained relatively stable. In a study conducted by Freeman and Isenberg,³³ all of 11 exotropes undergoing part-time occlusion of the dominant eye from 4 to 6 hours a day, converted to hetero - or orthophoria, at least temporarily. In the study done by Suh et al.³⁴ on 44 children with basic type and 26 children with convergence-insufficiency type intermittent exotropia, after 3 months occlusion for 3 hours each day, the near deviation measurements decreased significantly in both the basic and convergence-insufficiency type of intermittent exotropia. The reduction of the exoangle was greater on the near measurement than on the distance measurement during the 3 months of patching. These results indicate fissional ability increases with part-time occlusion therapy, especially with regard to the near measurements.

In a retrospective study of 673 cases, Cooper and Leyman²⁹ reported that orthoptic treatments alone had the highest success rate (59%) and lowest failure rate (5%), as compared with the three other therapeutic approaches; occlusion only, surgery only and orthoptic treatments and surgery. In a recent randomized controlled study of 60 adult patients with CI, Birnbaum et al.³⁵ found that office-based vision therapy was successful in 61.9% of patients while home-based vision therapy was successful in only 10.5% of patients. Convergence exercises, by increasing the range of fusional vergence, correct the CI form of intermittent exotropia^{36,37} Occlusion therapy limits binocular stimulation, avoiding and correcting abnormal retinal correspondence and suppression³⁸ Patching has sensory and motor effects on intermittent exotropia: sensory effects are a reduction in scotoma size (measured on haploscopic devices) and motor effects are improved fusional amplitudes.³⁹ The current study reports a high successful treatment rate for intermittent exotropia after orthoptic therapy at a mean of 7-month follow-up. Our results confirm the work of others³⁶⁻³⁷ who have studied the effect of orthoptic treatment. In spite of these publications, sensory treatment of intermittent exotropia is still largely ignored in many parts of the world.⁴⁰

In the surgical management of exotropia, there is widespread agreement that an initial overcorrection is needed because there is a tendency toward a postoperative exotropic drift. Raab and Parks⁴¹

reported that an overcorrection of 10Δ to 20Δ provided the best outcome. Scott et al.¹³ advised an overcorrection of between 4Δ and 14Δ. Moreover, good correlations between the initial and final measurements after surgery for intermittent exotropia have been reported by others.^{42,43} The treatment of a constant small-angle vertical tropia associated with exotropia and unrelated to oblique dysfunction, paretic muscle, or DVD has been enigmatic.

Pratt-Johnson and Tillson⁴⁴ have stated that there is no advantage in eliminating a vertical component of 5D or less. Moore and Stockbridge's study⁴⁵ described the coincidental finding of spontaneous resolution of the vertical tropia during prism adaptation for the horizontal deviation alone in intermittent exotropes. The potential for binocular stereopsis and spontaneous resolution of the vertical deviation during surgical correction of an intermittent exotropia is a confounding factor in determining the corrective effect of vertically offsetting the horizontal muscles. The authors of only one study⁴⁶ have looked at the vertical offset effect in exotropia alone. However, in this study all of the vertical deviations were less than 10D in patients who apparently had no barriers to stereopsis. In another study,⁴⁷ investigators eliminated the potential for spontaneous resolution. Of the vertical deviation by including only patients deemed to have "no potential for sensory fusion".

Conclusion

In summary, intermittent exotropia improved both quantitatively and qualitatively for many of patients. Intermittent exotropia may not be a progressive disorder for many patients. The appropriate amount of surgical correction along with good active and passive vision therapy the intermittent exodeviation even when associated with certain amount of vertical deviation can be managed with horizontal muscle correction only. The time to time assessment of the patient with regular follow up is a must. Even when vision therapy is prescribed in home basis it should be performed well and the patient compliance should be good. The limitation of this study was multiple case reports should have to be taken instead of single case study. A long-term prospective study that carefully monitors the magnitude and quality of intermittent exotropia is needed to add to our knowledge of this type of strabismus.

Acknowledgments

None.

Conflicts of interest

Author declares that there is no conflict of interest.

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