

## Intermittent exotropia and vision therapy

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### ABSTRACT

**Purpose:** There are several treatments for intermittent exotropia which include both surgical and nonsurgical treatment options. Nonsurgical management of intermittent exotropia includes observation, patching, prisms, over-minus lenses and vision therapy. The goal is to determine whether visual therapy is effective for intermittent strabismus.

**Methods:** A search strategy was developed using a combination of the words intermittent exotropia, nonsurgical management, orthoptics, binocular vision therapy, exodeviations, fusion exercises. The most used electronic databases were: PubMed, ScienceDirect, ResearchGate, Google Scholar. A total of nineteen articles were used in this literature review.

**Results:** Research shows that vision therapy significantly improves the distance control of exodeviation and reduces the near exodeviation magnitude. Vision therapy is effective in reducing symptoms and improving signs of intermittent exotropia. The basic angle of deviation remained unchanged in most of the patients nevertheless significant functional and symptomatic improvement was obtained. A combination of vision therapy and surgery showed the best results in the treatment of intermittent exotropia.

**Conclusions:** More comprehensive randomized controlled trial studies are required to evaluate the effectiveness of vision therapy and these should include long term follow-ups.

**Keywords:** *Intermittent exotropia, vision therapy*

INTRODUCTION

Exodeviations may be divided in different groups. There are latent, intermittent and manifest exodeviations. In latent exodeviations, the patient’s eyes are aligned properly all the times. This deviation is called exophoria. In intermittent exodeviation or intermittent exotropia, the patient keeps the eyes aligned between 1% - 99% of the time. Manifest exodeviations, also referred to as constant exotropia, consist of a constant turn outward of one or both eyes (Burian, 1966).

An intermittent exodeviation may become manifest when the patient is tired, sick, daydreaming or inattentive, when the patient has a febrile illness or when the patient is slightly concussed (Burian, 1966; Heydarian et al., 2020). When the eyes of a patient with intermittent exotropia are aligned, he has more or less secure binocular vision. However, when the deviation becomes manifest, he may either experience double vision or suppress the visual stimuli from one eye (Burian, 1966). There are several factors which negatively affect intermittent exotropia: insufficient fusion, high AC/A ratio (accommodative convergence to accommodation ratio), refractive errors, genetic factors and neuro-mechanical factors (Heydarian et al., 2020).

Intermittent exotropia may be classified by two classification systems: Burian’s classification and Kushner’s classification. Burian’s classification is based on the distance and near measurements of exodeviation. Kushner’s classification is more complex and is based on the effective mechanism of distance and near deviation disparity (Heydarian et al., 2020).

Burian’s classification consists of three types of exodeviation. Each type may be latent, manifest or intermittent. When the eyes are properly aligned at all times, it is referred to as latent exodeviation. When the eyes are sometimes properly aligned and at other times the eyes are in a manifest exodeviation, it is named intermittent exotropia. When the eyes are aligned, the individual has a more or less normal binocular vision. When the deviation is manifest, the individual either suppresses the visual stimuli or sees double. The three types of exodeviation are listed in Table 1 (Burian, 1966; Heydarian et al., 2020). Burian concluded that it is important to determine the type of exodeviation because each type requires a different treatment (Burian, 1966).

Table 1. *Burian's three types of exodeviation (Burian, 1966)*

Burian’s three types of exodeviation	Description of the type
Basic type	Deviation varies only within physiologic limits in distance and near fixation.
Divergence excess	Distance deviation is significantly bigger than the near deviation.
Convergence insufficiency	Near deviation is bigger than distance deviation.

Kushner’s classification is based on the effective mechanism of distance and near deviation disparity, so the classification is more complex than Burian’s classification (Kushner, 1988). The classification of Kushner is depicted in Table 2.

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Table 2. *Kushner's classification (Kushner, 1988)*

Kushner’s types of exodeviation	Description of the type
High AC/A ratio	Distance deviation is bigger than near deviation, AC/A ratio is high.
Proximal convergence	Distance deviation is bigger than near deviation, AC/A ratio is normal (after 30-60 min of monocular occlusion the near measurement is the same).
Tenacious proximal fusion	Distance deviation is bigger than near deviation (after 60 min of monocular occlusion the near measurement increases).
Basic	Near and distance deviation is the same.
Low AC/A ratio	Near and distance deviation is the same, the AC/A ratio is low.
Fusional convergence insufficiency	Near deviation is bigger than distance deviation. There is a poor fusional convergence amplitude.
Pseudo convergence insufficiency	Near deviation is bigger than distance deviation. (after 60 min of monocular occlusion the distance measurement increases).

The risks of progression of intermittent exotropia with age are suppression, increased distance between the eyes, decreased accommodation and tonic convergence. Not all intermittent exotropia develop to a constant exotropia after some years, several deviations remain stable for years. A small percentage even improves over time (Heydarian et al., 2020).

Quantifying the control of patients with intermittent exotropia may be done through multiple methods: the clinic control score, the Newcastle score and the updated Newcastle score. The clinic control score is scored from zero to five with five being the worst control of the intermittent exotropia. The score of five to three is based on a thirty second observation period: exotropia is observed during this time. Scores two and

below are based on the worst score of three times ten second observation with occlusion (Table 3). The Newcastle score and the updated Newcastle score include data from the clinic visit and from symptoms experienced at home. In this method scores

from zero to nine, with nine being the worst control. To calculate the final score, the scores from home, distance and near measurement are added (Cooper, 1977) (Table 3).

Table 3. *Methods to quantify the control in patients with intermittent exotropia (Cooper, 1977)*

<b>Exotropia Control Score</b>		
<i>Control Score</i>	<i>Description</i>	
5	Constant exotropia during 30 second observation before dissociation	
4	Exotropia >50% of the time during 30 second observation before dissociation	
3	Exotropia <50% of the time during 30 second observation before dissociation	
2	No exotropia noted unless dissociated, recovers in > 5 seconds	
1	No exotropia noted unless dissociated, recovers in 1 - 5 seconds	
0	No exotropia noted unless dissociated, recovers in < 1 seconds	
<b>The Newcastle Score</b>		
<i>Home control Score</i>	<i>Exotropia seen:</i>	
0	Never	
1	< 50% of time fixating at distance	
2	> 50% of time fixating at distance	
3	< 50% of time fixating at distance, also seen at near	
<i>Clinic Control score</i>	<i>Exotropia seen at near:</i>	<i>Exotropia seen at distance:</i>
0	Immediate realignment after dissociation	Immediate realignment after dissociation
1	Realignment with aid of blink or re-fixation	Realignment with aid of blink or re-fixation
2	Remains manifest after dissociation/prolonged fixation	Remains manifest after dissociation/prolonged fixation
3	Manifests spontaneously	Manifests spontaneously
= ...	= Total score (home + near + distance)	

Intermittent exotropia is a common form of strabismus. This form of deviation occurs in 25% of all the strabismic cases and in 1% of the general population. The age of onset is often between six months and four years. Jerkins reported that countries near the Equator have a higher prevalence of exodeviation. In areas with an affluence of sunshine (subequatorial Africa, the Middle East and East of Asia) the prevalence of exodeviations is also higher than in the USA and Central Europe (Heydarian et al., 2020). Adequate management of the exodeviation is important as this deviation may lead to social and psychological problems resulting in an impact on adult life with problems of self-image, at work and in personal relationships (Joyce et al., 2015).

There are different treatment options, which may be divided into two large categories: surgical and nonsurgical treatment options. In the case of surgical treatment, reoperation is commonly part of the treatment management (Joyce et al., 2015; Pang et al., 2021; Heydarian et al., 2020; Ma et al., 2019). The most important factor determining the outcome of surgery is the duration of the follow-up. The success rate decreases with extended follow-up. Xu et al. revealed that more than fifty percent of the total amount of exodrift occurred within the first post-operation year. Other studies have reported that the main recurrence occurred within two years after surgery (Xu et al., 2023). Burian stated that surgical treatment is essential for exodeviations except for those with pure convergence insufficiency (Burian, 1966). When there is no underlying basic exodeviation and there is a clear convergence insufficiency a nonsurgical treatment and not a surgical treatment is required. Therefore, it is important to classify the exotropia in the correct category.

Preoperative and postoperative nonsurgical treatment (occlusion therapy and/or vision therapy) is sometimes advised to increase the fusional vergences. Different ophthalmologist advise this, however this is rather based on clinical impressions than on solid evidence (Xu et al., 2023). These ophthalmologists notice that the success rate is higher when preoperative and postoperative nonsurgical treatment is combined with the surgery.

The nonsurgical treatment methods are: correction of refractive errors, observation, occlusion therapy, overcorrecting minus lens therapy, prism therapy, vision therapy/orthoptic exercises and botulinum toxin. When treating an intermittent exotropia patient it is important to first correct the refractive error to improve the sensory and subsequently, motor fusion and enhance the ability to control the deviation. The next step is observation, which is rather an assessment method than a treatment option. Overcorrecting minus lens therapy can only be used on those patients who have sufficient accommodative power. The advantage of this treatment option is that it is more convenient and acceptable compared to other methods such as occlusion therapy and vision therapy, however it bears the concern of possibly inducing myopia. Studies show conflicting ideas about the latter. Some suggest it induces the myopia whereas others suggest it does not. Therefore, this treatment option is less often used. Occlusion therapy is used to achieve anti-suppression and has a short-term effect. More long-term studies are needed to show the effectiveness of exclusive occlusion therapy. Studies on patching were not significant enough for physicians to change their practice patterns (Lavrich, 2015). Prism therapy is used when the deviation is lower than twenty to twenty-

five prism diopter. Prism therapy and occlusion therapy may be combined with vision therapy or not. Vision therapy includes fusion, accommodative and anti-suppression therapy. Examples of exercises are tranaglyphs, pencil push up, and more. Vision therapy may be combined with another treatment option, but may also be the sole treatment option. Botulinum toxin is as effective a treatment option as surgery. It consists of an injection to paralyze the lateral rectus muscle (Heydarian et al., 2020). However, long term studies are needed to assess the stability of its results with time (Lavrich, 2015). Botulinum toxin treatment shows a low incidence of complications (12.4%). The latter include transient vertical deviations (2%), subconjunctival haemorrhages (1%) and ptosis (8.4%), all of which were resolved by the six week follow up.

The intermittent exotropia management is commended by both the angle of the deviation, the ability to control the deviation and the classification of the exodeviation (Heydarian et al., 2020). The benefit of using vision therapy as treatment option for exodeviation is that it is non-invasive and is successful in selected cases. It is the purpose of this paper to research the effectiveness of vision therapy in intermittent exotropia cases (Pejic et al., 2006).

## METHODS

A search strategy was developed using a combination of the words: intermittent exotropia, nonsurgical management, orthoptics, binocular vision therapy, exodeviations, fusion exercises. Electronic databases were consulted: PubMed, ScienceDirect, ResearchGate, Google

Scholar, scopus, web of science. The latter two were least used for they contained a minority of articles. Restrictions and filters were not applied to find more articles. To select all the information a literature review template was used which held the following information: source, study population, problem scope/size, social, context (social, political, economic, health), public (affected, influential), current knowledge, attitude, beliefs, behaviors, factors influencing behavior (individual, family, community, society, health system) and communication channels. There was a total of fifty-nine articles with these keywords, after exclusion there only were nineteen left who could be used for the literature review.

## RESULTS

The study of Pejic et al. (2006) showed that binocular function significantly improved, particularly the control of strabismus and stereoacuity for distance. This study consisted of a control group and treatment group (each with forty-eight subjects) and the groups matched for age, sex and race. The treatment group was asked to perform exercises twice daily. The treatment was standardized as follows:

- Simple convergence exercises: these are activities before starting fusion exercises for near distance. The exercises were presented to the patients with convergence insufficiency.
- Near distance fusion exercises: good fusion vergence for near is a precondition for successfully performing the distance fusion exercises. These exercises were presented to the patients with a good near point convergence and the ability to

control their exodeviation for near most of the time.

- Far distance fusion exercises: this is the final and most difficult part of the treatment. The patients first needs to build up a good fusion vergence for near and intermediate distance.

The fusion exercise “cat stereogram” (Figure 1) was introduced to patients who had some degree of control over their exodeviation. This activity was giving for near and distance.

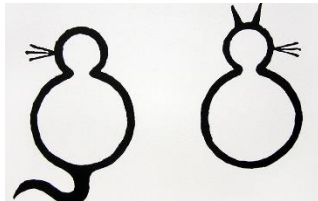


FIGURE 1. CAT STEREOGRAM

The study showed that the treatment group showed significant improvement of binocular function in comparison with the control group. The average duration of the treatment was 18 weeks (range from 12 – 36 weeks). Before treatment, the binocular status of the treatment group was poor for 35.40%, fair for 45.80%, good for 18.70% and excellent for 0.0%. After treatment, the binocular status of the treatment group was poor for 0.0%, fair for 8.3%, good for 41.60% and excellent for 50%.

In the treatment group, thirty percent of the cases with absent distance stereoacuity gained stereoacuity of at least 120sec of arc. Forty-four percent reached at least a two grades higher level of depth perception after treatment. None of the patients showed a deterioration unlike in the control group where twelve percent of patients showed

deterioration and no patients gained improvement of the distance stereoacuity.

The fusional vergence responded well to the treatment. For distance, ninety-three patients showed an increased fusional vergency of at least fifty percent. For near there was an improvement for eighty-two subjects, a little less than for distance because there was a wider range of fusional vergence to begin with. Eighty percent of the treatment group manifested better control for distance. As opposed to the control group which showed no improvement and twenty percent of the patients even exhibited a deterioration of the control for distance.

The study found that the angle of the tropia improved with one third of the initially value (initial angle was between ten and forty prism) in fifty-eight percent of the subjects in the treatment group. The study concludes that the treatment of intermittent exotropia in the majority of cases is successful, particularly in the convergence insufficiency type. The consistency and technique of fusion exercises performed at home are the key factors of success.

In 2019, Ma et al., (2019) did a pilot study to evaluate the changes in the office based vergence/accommodative therapy for intermittent exotropia. This test was an unmasked pilot study. Fourteen Chinese participants aged between 6 and 18 years old with an intermittent exotropia were enrolled (convergence insufficiency type was excluded). There was a sixty minute office-based vergence and accommodative therapy, saccades and pursuits, anti-suppression and monocular fixation in binocular field techniques for all participants throughout twelve weeks combined with fifteen minute home-based therapy five times a week

during the twelve weeks. The office-based vergence/accommodative therapy procedures consists of four phases, each with specific activities that are constructively difficult for anti-suppression, convergence, near vergence, accommodation, saccades and distance vergence. The home-based activities also include activities of anti-suppression at near, anti-suppression at distance, gross convergence, near vergence, distant vergence, accommodation and saccades.

The study's outcome is that there is a significant change for: distance office control score after treatment, LACTOSE distance control (look and cover, then ten seconds observation scale for exotropia), near angle of exotropia and distance positive fusional vergence. There was no significant change for: near score, LACTOSE near control, angle of distance exodeviation, near positive fusion vergence, distance stereopsis, near stereopsis, near point of convergence break point and accommodation amplitude. The conclusion of this study is that there is an improvement of distance control of exodeviation and reduced near exodeviation magnitude after twelve weeks of standardized office-based vergence and accommodative therapy with home reinforcement. When treating intermittent exotropia, the main goal is to improve control of the exodeviation and not the magnitude of the angle of deviation. Because the determining factor whether surgery is needed is the control of the exodeviation.

Aziz et al. (Aziz et al.,2006) evaluated the role of exercises in intermittent exotropia. This was a retrospective study where clinical records of patients diagnosed with intermittent exotropia (basic, convergence insufficiency and divergence excess type of

intermittent exotropia) were reviewed. The clinical evaluation included the following tests: detailed history, cycloplegic refraction, corrected and uncorrected visual acuity, dilated funduscopy, ocular motility testing including cover test at near and distance, AC/A ratio and measurement of near point of convergence. Patients with best corrected visual acuity equal to or greater than 20/25 at distance and near, willingness to wear glasses or contact lenses to correct the refractive error and who saw crossing lines in the Bagolini test were included. The patient with amblyopia, constant strabismus, history of strabismus surgery, vertical heterophoria of more than 1 prism diopter, latent or manifest nystagmus, patients who have an attention deficit/hyperactivity, patients who have a learning disability, patients who have any systemic disease known to affect accommodation vergence and ocular motility, and patients who take any systemic medication known to affect accommodation or vergence, were excluded. In total, seventy four patients were included of which 58.1% had a basic type of exodeviation, 29.7% had a convergence insufficiency type of exodeviation and 12% had a divergence excess type of exodeviation.

The exercises were practiced in the office and at home, the latter on a daily basis. The office therapy depended on the degree of the deviation. In cases with a degree less than 20 prism diopter, office therapy was scheduled weekly for one month and biweekly for one month. When the degree of deviation was higher than 20 prism diopter office therapy was scheduled weekly for two months and then biweekly for one month. Treatment existed of pencil push-ups (three sets of twenty pencil push-ups) and the 3D stereogram test, and occlusion was



performed on patients who showed suppression. Occlusion was on the dominant eye for half an hour to an hour each day. The success rate of the therapy depended on the type of intermittent exotropia. For the basic type of intermittent exotropia, 88.3% of the patients were treated successfully. The treatment was successful for 88.8% in the divergence group for and all patients were treated successfully in the convergence insufficiency group.

The difference between the three groups of intermittent exotropia is not significant. There is a significant difference in reduction of the near and far angle of deviation at eight weeks and last follow up in the basic type of intermittent exotropia. In the convergence insufficiency type of intermittent exotropia, the near deviation is significantly less at eight weeks and the last follow up compared to the baseline measurement. There was a significant difference between the baseline distant measurement and the follow ups for the distant deviation. In basic and convergence insufficiency type of intermittent exotropia, the near point of convergence is significantly better at the last follow up compared to the baseline measurement, there was no significant difference for the near point of convergence in the divergence excess type of intermittent exotropia. There was no recurrence over 10PD found at the end of the follow ups.

In 1992, Singh et al studied the role of nonsurgical treatment in thirty patients with intermittent exotropia (Singh et al., 1992). The patients were enrolled by a complete; clinical evaluation including detailed history, cycloplegic refraction, corrected and uncorrected visual acuity, cover test for near and distance, prism bar cover test for near and distance, AC/A ratio, Maddox rod,

Maddox wing, synoptophore, and more. All patients were given glasses to correct the visual acuity, anti-suppression exercises were given by form of part time occlusion (six hours a day) weekly alternate occlusion, BAR reading exercises, convergence and fusional exercises. The evaluation was done at 4 weeks, 8 weeks, 12 weeks and at the time of the last examination. The treatment was continued for a period of 12 weeks to 16weeks in patients who showed satisfactory improvement in symptoms and signs. When there was no satisfactory improvement, the treatment was discontinued at 8 weeks. The results were evaluated on the basis of the following parameters; symptomatic relief, improvement in binocular functional status and change in the maximum angle of deviation.

After completing eight weeks of treatment, 53.3% of the patients showed no significant improvement in relief of symptoms or in the basic angle. The treatment of these patients was discontinued in view of the need for surgical treatment. There was a total of 46.7% of the patients did notice improvement and for this group treatment was continued. For these 46.7% of the patients, there was follow up after 12 weeks and at the last examination.

The degree of symptom relief at the time of the last exam (moment of discontinuation of the treatment) remained 57.1% for asymptomatic patients, 28.6% of patients were mildly symptomatic, and 14.3% were moderately symptomatic. There were no patients who noticed no relief in their degree of symptoms. The outcome was that 14.3% of the patients had a good binocular response, 85.7% of the patients perceived a fair or poor improvement of their binocular functional status. Despite of the latter, all

patients with a exodeviation of 25 prism diopter or less noticed an improvement in symptoms.

There was no significant reduction in the angle of exodeviation in the patients with a deviation of more than 25 prism diopter. When the angle of exodeviation was 25 prism diopter or less there was a significant reduction of angle in 28.6% of the patients. Most of these patients were the convergence insufficiency type.

## DISCUSSION

There are a limited number of studies of fusion exercises for intermittent exotropia. One of the limitations in these studies is the follow up after completion of the treatment. It would be important to have information about the binocular functions six months after completion of the treatment, even so on the long term, for example five years after completion of the treatment. Pejic et al. (Pejic et al., 2006) published results immediately after completion of the therapy. This results in a lack of follow-up and the effects of training in intermittent exotropia cases cannot be assessed adequately.

Another important note is that when treating intermittent exotropia, the main goal is to improve control of the exodeviation and not the magnitude of the angle of deviation, because the determining factor in whether surgery is needed, is the control of the exodeviation. Thus, the primary outcome of the study may not be the magnitude of the angle, since the angle often does not improve much and the control over the exodeviation is better.

It is also important to do more research on the impact of vision therapy on the different types of intermittent exotropia. Singh (Singh et al., 1992) stated that there was not a significant difference between the groups, while Burian posed the opposite and formulated that surgical treatment is essential for exodeviations except for those with pure convergence insufficiency (Burian, 1966). For the pure convergence insufficiency type, he asserted that nonsurgical treatment is necessary.

An important disadvantage of these studies is that they did not use parallel training sessions (different number of sessions, other exercises). Because of this, there can be no comparison. Since the type of exercise and the time span over which the therapy is spread can also be decisive factors for the success of the training. It would be advisable to perform studies on the effect of certain exercises and the effect of the duration. For example, is the 12 weeks of training as in the study of Ma et al. (2019) better than the treatment in the study of Pejic et al. (2006) with duration of 12 - 36 weeks (on average 18 weeks) and other activity? Parallel training is expedient according to time and type of exercises.

There is a surgical and nonsurgical treatment of intermittent exotropia, and both can be combined. Carta et al. (1994) divided the treatment of intermittent exotropia into four groups: vision therapy, surgery, vision therapy combined with surgery and no treatment. The highest failure rate was observed in patients who were not treated. Other studies (Singh et al., 1992) also researched the effect of combining vision therapy with surgery and treatment with surgery alone. Hardesty et al (1978) performed a long term study on a

hundred patients with intermittent exotropia who had surgery and found that 50% of the subjects were successfully treated when using a combination of surgery and vision therapy. The success rate when a patient is treated with surgery alone was 32%. Cooper and Leyman (1977) also reported a higher success rate in patients with intermittent exotropia who were treated with a combination of surgery and vision therapy/occlusion compared with subjects whose treatment consisted of surgery alone. They found that 42% was treated successfully with surgery alone and 52% after treatment with surgery and vision therapy/occlusion.

Figueira & Hing (2006) stated that surgery with preoperative vision therapy/occlusion had the highest success rate. The combination of surgery and exercises was more effective in reducing the exodeviation in comparison with surgery alone. Preoperative vision therapy most likely prepares the motor and sensory systems to maintain postoperative binocular alignment more effectively than seen after surgery alone. Xu et al studied the effect of vision therapy in children with intermittent exotropia after surgery (Xu et al., 2023). The patients received at least two months of vision therapy such as anti-suppression, vergence and accommodation training. Patients in the control group were only prescribed refractive correction. The outcome of the study was that early post operative vision therapy combined with home reinforcement vision therapy may decrease the incidence of suboptimal surgical outcomes and improve fusional control of binocular function in intermittent exotropia.

These studies showed that surgery combined with vision therapy is an alternative treatment option for treating intermittent exotropia to those with good compliance. This conclusion was confirmed in the study of Hardesty et al(1978) in a review of long term results in intermittent exotropia cases. It reported a 50% success rate in the group of patients who were treated with surgery and vision therapy and a lower 32% success rate in patients who only received surgical treatment. The study Cooper & Leyman (1977) also reported a higher success rate with combined therapies compared to surgery only (Figueira & Hing, 2006). A controlled clinical trial of the different treatment involving basic, divergence excess, convergence insufficiency and pseudo divergence excess form of intermittent exotropia will help to confirm the conclusion of these studies.

More specific studies are needed to know what kind of treatment is necessary in combination with the surgery (preoperative vision therapy or postoperative vision therapy or maybe both), or to know whether vision therapy combined with surgery would be better than vision therapy alone.

Findings include that surgical treatment of childhood exotropia is associated with high recurrence rates and frequent overcorrection (Lavrich, 2015). At the same time, nonsurgical treatment options appear to be less effective in improving the angle of deviation.

There are still some unanswered questions such as which patients will respond best to vision therapy (type of deviation, onset of deviation, ...) or how long and at what frequency vision therapy has to be done for maximal efficacy. Other questions are: what

is the endpoint of treatment, what is the long-term stability of these results, and more. To obtain answers more studies should be carried out on vision therapy, intermittent exotropia and the treatment plan. Surgical and nonsurgical treatment options should also be included, because it is important to have more standardized studies including parameters for measurements, strict motor and sensory criteria in the assessment of success, as well as a minimum long-term follow up to improve the comparability and to yield more information on the most effective treatments for intermittent exotropia (Lavrich, 2015).

## CONCLUSION

Vision therapy is in the majority of cases successful, mainly in convergence insufficiency type. With vision therapy, intermittent exotropia improved quantitative and qualitative for many patients. It is found that the binocular function has improved, particularly in distance stereoacuity.

Further studies are needed, in these studies parameters for measurements, stringent motor and sensory criteria, long term follow-up are needed to find more information on the most effective treatment for the intermittent exotropia patients. The studies are also recommended to evaluate the effectiveness of these procedure and identify the most effective strategy (duration of treatment, type of exercises,...)

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