

Optimum Duration of Monocular Occlusion Test in Intermittent Exotropia

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Abstract

Intermittent exotropia (IXT) is the most common form of divergent strabismus and reported to develop in about 1% of children by 7 years of age. The point of this clinical investigation was to decide the perfect and best span of the demonstrative impediment test. Techniques: This investigation included 100 patients with discontinuous exotropia (IXT) (52 guys and 48 females), their edge of exotropic deviation were estimated prior and then afterward (DOT) after a legitimate clinical assessment. Results and end: There was no adjustment in the arrangement of medical procedure previously, then after the fact (DOT) in 54 patients while careful plans changed in 46 patients. Careful plans were changed in 18 patients with 60 minutes (DOT), in 12 patients with 3-hours (DOT), in 12 patients with 6-hours (DOT), and in 4 patients with 24-hours (DOT). The careful plans of these 46 patients were adjusted in view of a change equivalent to or more than 10PD between various fixing times or an adjustment in the kind of (IXT).

Keywords: Monocular, Occlusion test, Exotropia.

1. Introduction

Irregular exotropia (IXT) is the most widely recognized type of dissimilar strabismus and answered to create in about 1% of kids by 7 years old [1].

It is described by irregular outward deviation of either eye that whenever left untreated, it step by step advances to get consistent in around 33% of cases [2].

It is an enormous exophoria (XP) that discontinuously separates to an exotropia (XT) that normally becomes show when the patient gets exhausted, sick or wandering off in fantasy land. Impeding one eye breaks combination and a show (XT) will happen, while melding, the eyes are straight and the stereoacuity is magnificent. Roughly 80% of (IXT) cases will show dynamic loss of combination control and an expansion in the (XT) more than a while to years [3].

Decompensation of (IXT) is related with the lessening of tonic combination which happens with propelling age, the continuous diminishing of accommodative force, the improvement of concealment, and the expanded orbital dissimilarity with propelling age [4].

Two arrangement frameworks have been broadly utilized for grouping (IXT); they are Burian and Kushner frameworks. Burian framework depends on the fusional combination and dissimilarity and it relies upon the separation among close and separation deviations. In Burian framework, patients with separation deviation approaches close to deviation are the essential kind, patients with separation deviation surpasses close to deviation are the disparity abundance type; while patients with close to deviation surpasses far off deviation are the intermingling deficiency type [5].

In the uniqueness abundance type patients with expanded close to deviation inside 10 crystals of separation deviation after monocular impediment are known as the pseudo disparity overabundance type and subsequently the symptomatic impediment test have been utilized in patients with (IXT) for disposing of fusional union [6].

Kushner's grouping, is more unpredictable than Burian's characterization, in which the accommodative

union/convenience (AC/A) proportion is additionally utilized. Both characterization frameworks recommend utilizing the demonstrative impediment test (fix test) for assessing patients with (IXT) [5].

Monocular impediment test was prescribed by Scobee to expose exodeviations at close to obsession by hindering the fusional upgrades and upsetting the assembly strength. From that point forward, the analytic monocular impediment test has been utilized for separating between the valid and the pseudo difference overabundance exotropia [7].

A few investigations have exhibited that monocular impediment fundamentally expands the edge of exodeviation at separation and close to obsessions [8].

The motivation behind this imminent clinical investigation is to decide the perfect and best duration of the diagnostic occlusion test.

2. Patients and methods

In this forthcoming investigation 100 patients with discontinuous exotropia were selected from the strabismus unit of Ophthalmology division at Benha University medical clinic. An educated composed assent was gotten from all patients or their watchmen. Endorsement of the Research Ethics Committee of Benha Faculty of Medicine was taken before leading this investigation.

Incorporation models

- Intermittent exotropia for both separation and close.
- The capacity to participate adequately for estimations.
- No history of past strabismus medical procedure.
- No other visual illness or injury.

Avoidance models

- Patients with past history of strabismus medical procedure.
- Inability of the patient to participate adequately for estimation.
- Accompanied visual illness or injury.

Tolerant evaluation

The determination of irregular exotropia depended on the history given by the patients, their families and assessment of the patients in the workplace. History required for the conclusion included continued turning outwards of one or the two eyes, patients were considered to have discontinuous exotropia if the deviation was irregularly showed either separation or close while the patient was being analyzed.

The entirety of the guardians were given some information about: birth history, the period of beginning, span among beginning and assessment, family ancestry, any past medication (glasses, medical procedure, impediment ... and so on.) and now and then past photographs for the patients were acquired from their families.

General assessment: the sum total of what patients have been analyzed for any related dysmorphic highlights or potentially irregular head pose before initiating the orthoptic assessment of the eyes.

Orthoptic assessment: routine orthoptic assessments were performed before the indicative impediment test in all patients,

Symptomatic impediment test (Patch test): The demonstrative impediment test was performed by setting a fix more than one eye of every patient and fixing was performed for 1, 3, 6, and 24 hours.

Estimation of point of deviation (Alternate crystal spread test): Distance and close to deviations were estimated by the other crystal spread test after expulsion of the fix. With the patient wearing their full refractive correction and focusing on a suitable objective at separation (6 meters) and close (0.33 meters) the point of deviation was estimated in all fields of look for separation and in essential situation of look for close to utilizing a solitary crystal with its back surface was opposite to the patient's view. During the other spread test a bit by bit expanding base in single crystal was put before the eye to recognize the biggest crystal quality at which exodeviation was neutralized.

2.1 Statistical analysis

The collected data were tabulated and analyzed using SPSS version 16 software (SpssInc, Chicago, ILL Company). Categorical data were presented as number and percentages, McNemar's Bowker test was used to find whether there is a categorical shift from pre to post-treatment. Z test for 2 independent proportions was used to compare 2 percentages. Fisher's exact test (FET)-Montecarlo method-, was used to analyze categorical variables in tables more than 2x2. Non parametric Quantitative data were tested for normality using Shapiro-Wilks test assuming normality at $P > 0.05$. Normally distributed variables were expressed as mean \pm standard deviation. Median, IQR and range were added if non parametric. Matched variables were analyzed by

Friedman's test. Significant Friedman's test was followed by post hoc multiple comparisons using Bonferroni adjusted Wilcoxon test to detect the significant pairs. $P \leq 0.05$ was considered significant.

3. Results

This study is a hospital-based, prospective, observational study of patients having intermittent exotropia underwent diagnostic occlusion test for 1, 3, 6- and 24-hours periods. Hundred patients were enrolled (52 males and 48 females) in this study with established diagnosis of intermittent exotropia and who met the inclusion criteria. The mean age was 6.75 ± 2.5 (ranged 4 to 15 years) Table (1).

Table (1) Demographic characters of the studied sample.

| Variable | Patients group (n=100) | |
|-------------|---------------------------|----------------|
| | Mean \pm SD | |
| Age (ys) | Mean \pm SD | 6.75 \pm 2.5 |
| | Median (Range) | 6.0 (4-15) |
| Sex | | No. % |
| | Male | 52 52.0 |
| | Female | 48 48.0 |

The mean distant exotropic deviations were 25.5PD before patching, 25.3PD after 1-hour patching, 25.1PD after 3 hours patching, 25.6PD after 6 hours patching and 24.2PD after 24 hours patching Fig (1). Compared with pre-patching, there was a statistically significant decrease in the mean distant deviations after 24 hours DOT ($p=0.001$). However, the differences in the mean distant deviation before patching and after 1,3- and 6-hours DOT were non-significant. The difference in the mean distant deviation between 24 hours DOT and after 1,3- and 6-hours DOT times was statistically significant.

The change in the angle of distant deviation after 1,3,6 & 24 hours DOT: After 1-hour patching, 80 patients showed no change in their distant exotropic deviation, 10 patients showed increase (≥ 5 PD) in their distant exotropic deviation while 10 patients showed decrease (≥ 5 PD) in their distant exotropic deviation, compared with pre-patching values. There was a significant change in the number of patients regarding their change in the angle of distant exotropic deviation after 6-hours DOT in comparison to 1-hour DOT ($P=0.004$) and also, a significant change after 24-hours DOT in comparison to 1-hour, 3-hours & 6-hours DOT ($P=0.001$, $P=0.009$, $P=0.002$, respectively). However, there was no significant change after 3-hours DOT in comparison to 1-hour and 6 hours DOT ($P=0.112$, $P=0.072$, respectively). Compared with pre-patching values, the largest number of patients who showed significant change in their distant deviation were observed after 6-hours and 24-hours DOT Fig (2).

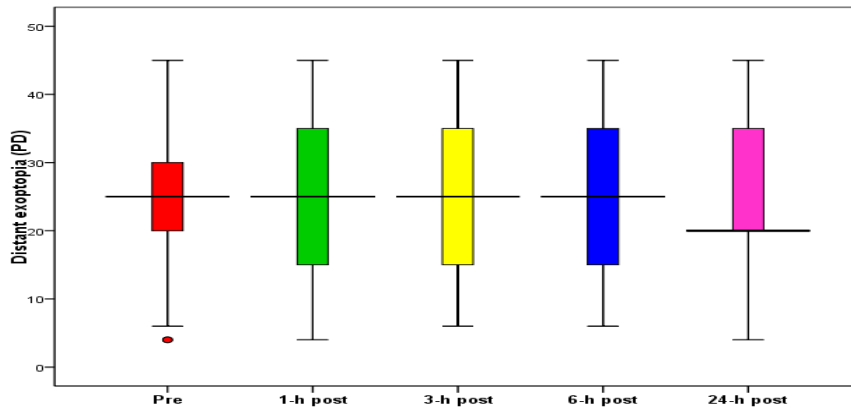


Fig (1) Box plot showing median and inter-quartile range (IQR) of distant exotropia.

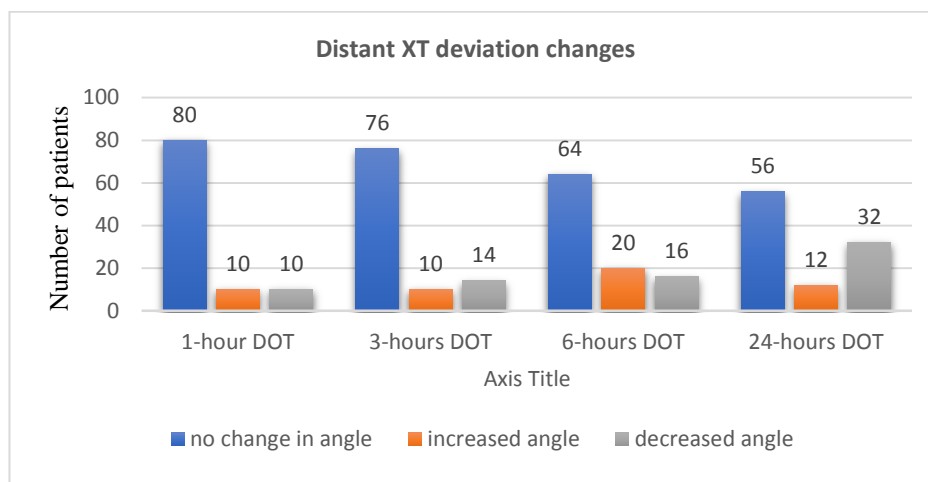


Fig (2) Patients showing change in their angle of distant exotropic deviation after 1, 3, 6- & 24-hours DOT.

The mean Near exotropic deviations were 27.7PD before patching, 28.1PD after 1-hour patching, 27.6 PD after 3 hours patching, 27.9PD after 6 hours patching and 24.9PD after 24 hours patching Fig (3). There was a statistically significant decrease in the mean near deviations before patching and after 24 hours DOT.

However, the differences in the mean near deviation before patching and after 1,3- and 6-hours DOT were non-significant. The difference in the mean near deviation between 24 hours DOT and after 1,3- and 6-hours DOT times was statistically significant.

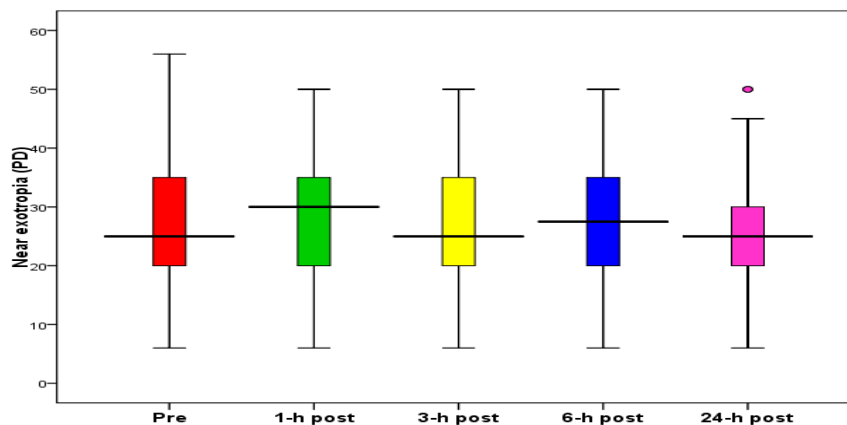


Fig (3) Box plot showing median and inter-quartile range (IQR) of near exotropia.

The change in the angle of near deviation after 1,3,6 &24 hours DOT: After 1-hour patching, 80 patients showed no change in their near exotropic deviation, 16 patients showed increase (≥ 5 PD) in their near exotropic deviation while 4 patients showed decrease (≥ 5 PD) in their near exotropic deviation. There was a significant change in the number of patients regarding their change

in the angle of near exotropic deviation after 3-hours (DOT) in comparison to 1-hour (DOT) ($P=0.002$), a significant change after 6-hours (DOT) in comparison to 1-hour (DOT) ($P=0.015$) and also a significant change after 24-hours (DOT) in comparison to 1-hour, 3-hours and 6-hours (DOT) ($P<0.001$, $P<0.001$, $P<0.001$, respectively) Fig (4).

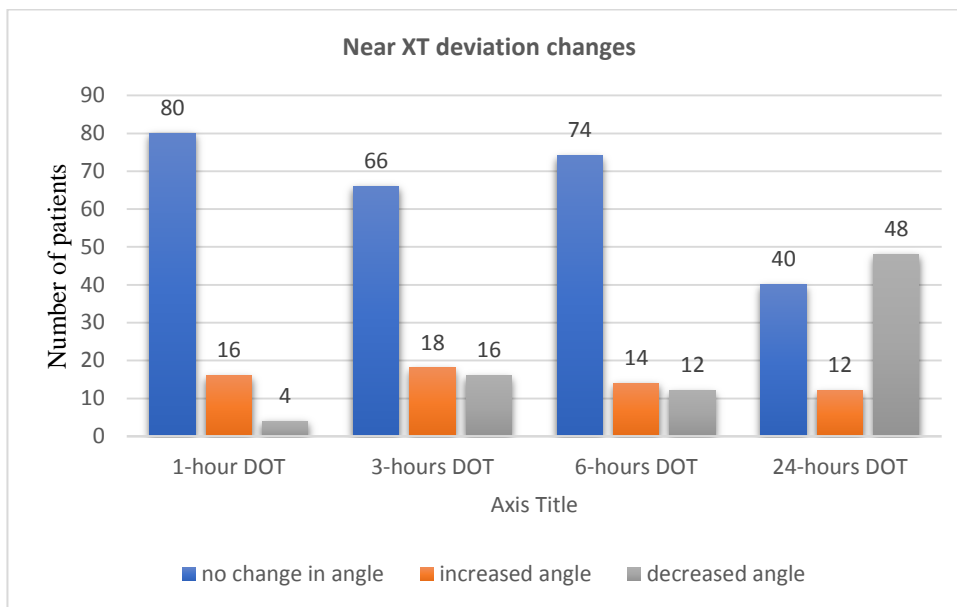


Fig (4) The change of the angle of near exotropic deviation after 1, 3, 6- & 24-hours DOT.

4. Discussion

In this planned examination, we attempted to decide the perfect and best term of the indicative impediment test. We looked at the inaccessible and close to edges of exotropic deviation for (IXT) patients when 1, 3, 6-and 24-hours DOT.

There is discussion about how long the time of impediment ought to be to uncover the most extreme point of deviation [5], [8].

Gürlü and Erda [8] consistently estimated the deviation point following 1, 3 and 24 hours of impediment in patients with (IXT) and announced that the separation deviation settled following 1 hour of impediment and the close to deviation balanced out following 3 hours of impediment. From Gürlü's investigation, deviation estimated following 1 day of impediment may not be bigger than that deliberate following 1 hour of impediment. Albeit 1 hour of impediment has been appeared to ordinarily expand the deviation, a more drawn out impediment of around 1 day could go about as hostile to concealment and may diminish the deviation.

Han et al, [6] estimated the point of deviation in (IXT) cases at separation and close to obsession with at least three back to back assessments then a 24-hours time of (DOT) was performed and the edge of exodeviation was estimated. They revealed that lone a little extent of the patients demonstrated an expansion in the point of deviation at separation and close to obsession of (≥ 5

PD) following a 24-hours time of impediment. The most extreme edge of deviation estimated during numerous assessments before impediment was altogether bigger than that deliberate after impediment. This inferred considerably following 1 day of monocular impediment, the muscles may not be totally loose and the greatest point of deviation has not been uncovered. In this way, as a rule of exotropia, different assessments could be more viable than a solitary estimation after analytic impediment in deciding the most extreme edge of exodeviation during close and separation obsession.

In our investigation, 32% of patients indicated an amazing decline (of ≥ 5 PD) in their removed exotropic deviation following 24-hours (DOT) while 48% of patients demonstrated a momentous reduction (of ≥ 5 PD) in their close exotropic deviation following 24-hours (DOT). 20% of patients demonstrated a striking increment (of ≥ 5 PD) in their far off exotropic deviation following 6-hours (DOT)

The reduction in far off and close exotropic deviation following 24 hours (DOT) suggests that considerably following 24-hours fixing, the muscles may not be loose totally and the greatest edge of exotropic deviation has not been uncovered. Along these lines, much of the time of (IXT), numerous assessments could be more viable than a solitary estimation after symptomatic impediment in deciding the most extreme point of exodeviation during close and separation obsession.

Numerous variables have been assessed with respect to their impact in the change in removed and close to points of exotropic deviation after (DOT)

Concerning affecting the difference in (≥ 5 PD) in far off exotropic deviation, clearly both age and normal cycloplegic refraction of patients assume a job in the change in far off exotropic edge after (DOT)

As the time of patient expands, the level of patients who indicated no adjustment in their edge of removed exotropic deviation following 1-and 24-hours (DOT) increments. So also, as the age builds, the level of patients who indicated no adjustment in their point of deviation following 3-hours (DOT) increments. Nonetheless, this was apparent up to the age of 8 years. Following 8 years, the exponential connection among age and soundness of far off deviation estimations was lost. The connection between dependability of inaccessible deviation following 6-hours (DOT) with various age subgroups gave a few changes.

As to sort of exotropic deviation, half of patients with uniqueness overabundance (XT) demonstrated an expansion in their close exotropic deviation following 3-and 6-hours (DOT). 77.8% of patients with combination deficiency (XT) indicated a decline in their close exotropic deviation following 24-hours (DOT). 45.9% of patients with fundamental sort (XT) demonstrated an abatement in their close (XT) deviation following 24-hours (DOT).

Not many examinations have been distributed concerning the elements impacting the reaction to (DOT). Neikter, [9] indicated that analytic impediment of going amiss eye could uncover a vertical deviation that had not been recorded at first.

Han et al, [6] found that patients with hyperopia were probably going to show a huge increment during close to obsession after (DOT), and they ascribed the finding to accommodative assembly. Interestingly, Arnoldi and Gills, [10] detailed that indicative impediment didn't build the point of deviation in patients who had poor fusional limits.

Jung, [11] detailed that refractive blunder and fusional control didn't contrast altogether among the three gatherings of increment, decline and no change bunches in the point of exotropic deviation post-fixing.

The kind of exotropia was changed over after impediment in a significant number of patients not just with fundamental (XT) and difference abundance gathering yet in addition with combination deficiency gathering.

Among 74 essential (XT) patients there was a striking change in their determination in impressive number of patients. The finding changed in 13.5%, 18.9%, 18.9% and 10.8% of patients after 1, 3, 6-and 24-hours (DOT) separately.

Among 18 assembly deficiency (XT) patients there was an amazing change in their determination in impressive number of patients. The determination changed in 33.3%, 33.3%, 55.6% and 55.6% of patients after 1, 3, 6-and 24-hours (DOT) separately.

Among 8 disparity abundance (XT) patients there was a wonderful change in their determination simply following 3-hours (DOT), while there was an immaterial change in the analysis of dissimilarity overabundance (XT) following 1, 6-and 24-hours (DOT). The analysis changed in 75% of patients following 3-hours (DOT).

With respect to aftereffects of (DOT), there was no adjustment in the arrangement of medical procedure prior and then afterward (DOT) in 54 patients while careful plans changed in 46 patients. Careful plans were modified in 18 patients with 60 minutes (DOT), in 12 patients with 3-hours (DOT), in 12 patients with 6-hours (DOT), and in 4 patients with 24-hours (DOT). The careful plans of these 46 patients were modified as a result of a change equivalent to or in excess of 10 PD between various fixing times or a change in the type of (IXT).

5. Conclusion

The current study evaluated the effect of different times of DOT on distant deviation, near deviation, subtype of deviation and surgical planning in 100 patients with IXT. Regarding the distant and near exodeviation, the results have shown that, and while the mean distant and near IXT significantly decreased after 24-hours DOT, there was no significant difference between pre-patching values and values following 1, 3-and 6-hours DOT.

References

- [1] M. Govindan, B.G.Mohney, N.N.Diehl, and J.P.Burke, "Incidence and types of childhood exotropia: a population-based study," *Ophthalmology*, Vol. 112, PP. 104–108, 2005.
- [2] J. J. S.W.Kwok, G.S.L.Chong, S.T.C. Ko, and J.C.S.Yam, "The natural course of intermittent exotropia over a 3-year period and the factors predicting the control deterioration," *Sci. Rep.*, Vol. 6, PP. 1–6, 2016.
- [3] Y.N.J.Strube and K.W.Wright, "Color Atlas Of Strabismus Surgery: Strategies and Techniques." Springer, Vol. 3, 1, pp 24-65, 2015.
- [4] G.K.VonNoorden, "Binocular vision and ocular motility," *Theory Manag. strabismus*, Vol. 1, PP. 43-65, 1990.
- [5] B.J.Kushner, "Selective surgery for intermittent exotropia based on distance/near differences," *Arch. Ophthalmol*, Vol. 116, PP. 324–328, 1998.
- [6] J.M.Han, H.K.Yang, and J.M.Hwang, "Efficacy of diagnostic monocular occlusion in revealing the maximum angle of exodeviation," *Br. J. Ophthalmol*, Vol. 98, PP. 1570–1574, 2014.
- [7] H.M.Burian, "Exodeviations: their classification, diagnosis and treatment," *Am. J. Ophthalmol*, Vol. 62, PP. 1161–1166, 1966.
- [8] V.P.Gürlü and N.Erda, "Diagnostic occlusion test in intermittent exotropia," *J. Am. Assoc. Pediatr. Ophthalmol. Strabismus*, Vol. 12, PP. 504–506, 2008.

- [9] B.Neikter, "Original papers: effects of diagnostic occlusion of the deviated and the dominant eye in intermittent exotropia," *Strabismus*, Vol. 3, PP. 1–11, 1995.
- [10] L.K.Gill and K.Arnoldi, "Binocular vision outcomes following surgery for long-standing large angle exodeviation," *Strabismus*, Vol. 21, PP. 123–126, 2013.
- [11] E. H. Jung, S.-J. Kim, and Y. S. Yu, "Comparison of the characteristics of patients with intermittent exotropia according to response to diagnostic monocular occlusion," *Jpn. J. Ophthalmol*, Vol. 62, PP. 243–248, 2018.