Overminus Spectacles versus Part-Time Occlusion for Control of Intermittent Exotropia among Children

Thesis

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Merna Gamal Ahmed

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AC/A	:	Accommodative convergence/ accommodation
ARC	:	Anomalous retinal correspondence
BLR	:	Bilateral lateral rectus
BMR	:	Bilateral medial rectus
CI	:	Convergence insufficiency
CSM	:	Central, steady and maintained
D	:	Diopter
Dcc	:	Distance angle with correction
DE	:	Divergence excess
DS	:	Diopter sphere
Dsc	:	Distance angle without correction
ET	:	Esotropia
H	:	Hour
IDEX	:	Intermittent distant exotropia
IO	:	Inferior oblique
IR	:	Inferior rectus
LR	:	Lateral rectus
mm	:	Millimeter
MR	:	Medial rectus
NA	:	Not applicable
Ncc	:	Near angle with correction
NCS	:	New castle control score
NRC	:	Normal retinal correspondance
Nsc	:	Near angle without correction
OD	:	Right eye
OS	:	Left eye
OU	:	Both eyes
PACT	:	Prism alternate cover test
PD	:	Prism diopter

List of Abbreviations (Cont.)

PTO	:	Part-time occlusion
ScPh	:	Scobee phenomenon
SE	:	Spherical equivalent
SO	:	Superior oblique
SR	:	Superior rectus
TFC	:	Tonic fusional convergence
TPC	:	Tonic proximal convergence
TPF	:	Tenacious proximal fusion
VA	:	Visual acuity
X	:	Exophoria
X(T)	:	Intermittent exotropia
XT	:	Constant exotropia

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Abstracts

Purpose: To compare the short-term effectiveness of overminus spectacles versus part-time occlusion (PTO) in improving control of intermittent exotropia X(T).

Design: A clinical, randomized, prospective, pilot study.

Participants: A total of 60 children, from 2 to 10 years with X(T). Their distance office control score started from 2 or worse.

***Methods*:** Children were randomly assigned to overminus spectacles, PTO therapy and observation for 4 months followed by 2 months without treatment.

Results: The mean distance exotropia control score after 4 months of treatment improved significantly in the overminus spectacle and the PTO groups from (3.9 vs. 3.9) to (2.0 vs. 2.7) respectively. After stoppage of treatment for 2 months, the score deteriorated significantly to (3.3 and 3) respectively. The Observation group's score showed non-significant change all through the study period.

There was a significant improvement in both mean near and distance angles only in the overminus spectacle group after 4 months of treatment and a significant deterioration after 2 months without treatment. Both near and distance angles showed non-significant change in both PTO and observation groups all through the study period. There was also a significant correlation between the poor compliance of the patients and their deterioration in the PTO group.

Conclusion: Overminus spectacle therapy is proved to be more effective in control of X(T) than PTO therapy. Poor compliance in PTO therapy affects the treatment effectiveness. It's suggested to work on a protocol of treatment cessation in further studies.

Key words: Intermittent Exotropia, Overcorrecting minus spectacles, Part-time occlusion

Introduction

Exodeviation is an outward deviation of the eye resulting from certain obstacles to development or maintenance of binocular vision or due to defective action of the medial rectus (MR) muscle. It maybe primary, secondary (associated with poor vision), or consecutive (may follow an esotropia (ET) with time or after surgical correction). There are several descriptive terminologies used in exodeviation. According to fusion control, exodeviation could be latent or *exophoria(X)*; being asymptomatic as long as fusion is maintained with symptoms of asthenopia, blurring, photalgia (closing one eye in bright light) or even diplopia when decompensated or *constant exotropia (XT);* being present all the time or *intermittent exotropia"X(T)*"; ranging according to ease of dissociation, where large X intermittently breaks down to an XT. ***(Wright and Ning,2012;*** Alastair ***and Philip, 2014***)

Intermittent exotropia is the most common type of exodeviation. It is a large X that intermittently breaks down to an XT. Patients with late onset X(T) during late childhood or adulthood may experience diplopia when tropic. Approximately 80% of X(T) patients will show progressive loss of fusional control and an increase in the X(T) over several months to years.***(Wright and Ning,2012***;Alastair ***and Philip, 2014)***.

Intermittent exotropia maybe classified based on the difference between prism alternate cover test (PACT) measurements for distance and for near into ***(Suh et al.,2006***)

- ***Basic X(T):*** It is present when the exodeviation is approximately the same or within 10 PD for distance and near fixation.***(Suh et al.,2006***; Louis ***et al.,2015).***

- ***Convergence insufficiency (CI) X(T):*** It is present when the exodeviation is more than 10 PD greater for near than for distance.(Alastair ***and Philip, 2014;***Louis ***et al., 2015)***

- ***Intermittent distance exotropia (IDEX):*** It is the most common form of X(T). Patients initially have larger deviations for distances than for near fixation. IDEX is subclassified into either:(Louis ***et al., 2015;Huseyin et al.,2016)***

- ***True divergence excess (DE) X(T):*** It is the least common form of X(T). It's present when the distance deviation is greater than the near deviation by more than 10 PD, and the deviation doesn't equalize after monocular occlusion or with +3.00DS lenses at near.(Alastair ***and Philip, 2014; Huseyin et al.,2016)***

- **Pseudodivergence excess X(T)** in which patients initially have larger deviations at distances than at near fixation; as high accommodative convergence/ accommodation (AC/A) ratio and this difference becomes minimal after one hour monocular occlusion or with +3.00DS lenses at near.***(Suh et al.,2006***;Louis ***et al., 2015***)

Assessment of the patient's control of X(T)categorizes it as follows:

- ***Good control:*** X(T) manifests only after cover testing, and the patient resumes fusion rapidly without blinking or refixating.

- ***Fair control:*** X(T) manifests after fusion is disrupted by cover testing and the patient resumes fusion only after blinking or refixating.

- ***Poor control:*** X(T)manifests spontaneously and may remain manifest for an extended time.***(***Alastair ***and Philip, 2014***)

Non-surgical treatment of X(T) includes the followings:

- ***Overminus spectacles:*** Overminus lens therapy involves wearing full-time spectacles that have additional minus power between 2.00 DS to 4.00 DS over the cycloplegic refractive correction aiming to stimulate accommodative convergence to control or reduce the angle of the exodeviation in X(T). It is prescribed as a primary or a temporizing treatment in young children before surgery. However, in some patients, overminus lenses alone appear to be a sufficient treatment. Overminus lens therapy is usually discontinued after 6 months in children who did not have an adequate response to this therapy, whereas, children who had an improvement in their exodeviation were often treated for much longer periods.***(Wright and Ning,2012;*** Louis ***et al., 2015; PEDIG,2015;PEDIG,2016***)

- ***Part time occlusion (PTO):*** It is commonly prescribed in young children as a temporizing measure to delay potential surgery or until other forms of non-surgical treatment become feasible. It works through preservation of binocularity, reduction in the frequency and/or magnitude of the exodeviation and increase the fusional ability. Thus, it might improve the surgical results. For patients with fixation preference, PTO for the dominant eye (non-deviating) 3 to 4 hours a day. For patients without fixation preference, alternate PTO can be an effective treatment for small to moderate-sized deviations. ***(Caltrider and Jampolsky,1983;Suh et al.,2006; Wright and Ning,2012)***.