Comparing the swinging plus test to other sighting dominance tests used in the fitting of monovision contact lenses

Shane Jensen  
Pacific University

Kevin Jund  
Pacific University

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Comparing the swinging plus test to other sighting dominance tests used in the fitting of monovision contact lenses

Abstract
In the fitting of monovision contact lenses, the dominant eye or the preferred eye is usually fit with the distance correction. Some consider the Swinging Plus Test to be the most accurate way of determining the dominant eye for fitting monovision. An effort was made to compare the validity of the following sighting dominance tests to the Swinging Plus Test: Near Point of Convergence Break Out, Hole Card Test, Dominant Hand, Anisometropic Differences, and Wink Testing. In the past, dominant eye studies have been conducted on prepresbyopic subjects. This study exclusively used presbyopic subjects. We believe this provides more valid information in the fitting of monovision patients, since most monovision patients are presbyopic. This study showed that only the Hole-Card Test and The Handedness test agreed with the swinging plus test with a high percentage of agreement.

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COMPARING THE SWINGING PLUS TEST TO OTHER SIGHTING DOMINANCE TESTS USED IN THE FITTING OF MONOVISION CONTACT LENSES

By

SHANE JENSEN

&

KEVIN JUND

A thesis submitted to the faculty of the
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Pacific University
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Advisor:
Patrick Caroline, C.O.T.
Shane Jensen
Student Author

Kevin Jund
Student Author

Patrick Caroline, C.O.T.
Advisor
BIOGRAPHY

Shane Jensen received his Bachelor of Science degree in Biology from Utah State University. He is currently completing a Doctor of Optometry degree at Pacific University College of Optometry. Shane plans to serve the optometric profession in private practice.

Kevin Jund received his Bachelor of Science degree in Biology from North Dakota State University. He is currently completing a Doctor of Optometry degree at Pacific University College of Optometry. Kevin plans to serve the optometric profession in private practice.
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ABSTRACT

In the fitting of monovision contact lenses, the dominant eye or the preferred eye is usually fit with the distance correction. Some consider the Swinging Plus Test to be the most accurate way of determining the dominant eye for fitting monovision. An effort was made to compare the validity of the following sighting dominance tests to the Swinging Plus Test: Near Point of Convergence Break Out, Hole Card Test, Dominant Hand, Anisometropic Differences, and Wink Testing. In the past, dominant eye studies have been conducted on prepresbyopic subjects. This study exclusively used presbyopic subjects. We believe this provides more valid information in the fitting of monovision patients, since most monovision patients are presbyopic. This study showed that only the Hole-Card Test and The Handedness test agreed with the swinging plus test with a high percentage of agreement.

Key words: Ocular dominance, Swinging Plus Test, Sighting Eye, Hole-Card Test, Monovision.
INTRODUCTION

In the fitting of monovision contact lenses for presbyopic patients, most practitioners believe that the dominant eye should be corrected for distance viewing. Many tests are employed in the determination of the dominant eye in a clinical situation. These include: Swinging Plus Test, Near Point of Convergence Break Out, Hole Card Test, Dominant Hand, Anisometropic Differences, Telescope Test, and Wink Testing. The Swinging Plus Test is considered to be the most accurate determination of the dominant eye for monovision correction due to the fact that it better simulates the viewing condition of a monovision patient. Using the Swinging Plus Test as a standard, we found it necessary to compare other dominance testing to this standard. The results shed light on how accurate traditional ocular dominance tests are in choosing which eye to fit for which distance in a monovision situation.

It has been shown by McGill and Erickson that if the nondominant eye is set for distance, that there tended to be an esophoric shift and a decrease in vergence ranges as compared to having the dominant eye corrected for distance. As a consequence, binocular symptoms could decrease the success rate of a monovision fit. So, for this and other reasons such as adaptation, binocular visual acuity, and others, choosing the best eye for the best distance viewing condition can be critical in a monovision fit. The Malott Et. Al. article on ocular dominance testing said that the data collected in their study was limited due to the fact that their study was done using a majority of prepresbyopic patients. It also eluded that a study should be done using presbyopic patients. Due to the fact that the swinging plus test is a more “real world” replication of
a monovision fit and that a prepresbyopic population would probably behave differently on the swinging plus test than a presbyopic population, we found it necessary to exclusively use presbyopic patients.

The swinging plus test is done by having the subject view an isolated row of 20/25 letters at optical infinity. A +1.50 trial lens is handed to the patient and is instructed to alternately place the lens in front of each eye. The patient is then asked to choose with condition allows them to view the letters with the most clarity and comfort. The subject will be allowed to switch conditions until they are sure of their decision. The eye without the lens placed in front of it will be considered their preferred distance sighting eye.

One of the more common ocular dominance test used clinically is the Hole-Card test. To many, this is the standard of ocular dominance testing. To perform the Hole-Card test the patient is directed to sight a distance target through a hole in a card held at arms length. Next, the examiner alternately occludes one of the patient's eyes. The occlusion that makes the distance target disappear is considered to be the dominant eye.

Another simple method that has been used, is to extrapolate the handedness of an individual may be extended to ocular dominance. Hence, a right handed person would be right eye dominant.

Other less frequently used tests include using Anisometropic differences to determine dominance for monovision by setting the most myopic eye for near.

Yet another clinically used method, is to find which eye "breaks out" during the near point of convergence test. The eye that does not break out is considered by some to
be the dominant eye. An obvious drawback to this test is the fact that many people can converge to their nose and do not have an eye that breaks out upon convergence.

The telescope test is a simple and quick test used by some to determine ocular dominance. A tube is handed to the patient and is asked by the examiner to sight a particular target with the tube as if it were a telescope. The eye to which the tube is brought in front of is said to be the dominant eye.

Another simple test hypothesized to be a quick determination of ocular dominance is the wink test. This is based upon the assumption that a person winks with their non-dominant eye. It has been postulated that the dominant eye would want to stay open during a wink for physiological reasons and due to the fact that we all experience monocular viewing situations that simulate wink; such as sighting a gun, using a telescope, or looking through a hole.6,7

The purpose of this study is to compare the results of the before mentioned ocular dominance tests to the Swinging Plus Test. With the results, optometric practitioners will know which of the dominance tests agree more closely to the Swinging Plus Test. This study exclusively used 21 presbyopic patients who were interested in the monovision modality for presbyopic correction.
SUBJECTS AND PROCEDURES

Subjects

Twenty-one presbyopes served as subjects: nineteen were female (mean age: 48.6) and three were male (mean age: 52.5). All of the subjects were at least forty years of age. The amplitude of accommodation of each subject was less than two dioptrors as measured via positive relative accommodation. All subjects had no known visual field abnormalities and no ocular pathologies. The subjects also all had no amblyopia or presence of esotropia or exotropia. The subjects all had visual acuities correctable to 20/30 or better for each eye at both near and distance. Before participating in the experiment, the subjects read and signed the Statement of Informed Consent. These subjects also participated in a monovision fitting thesis, which was completed after the following procedures were performed.

Procedures

First, the swinging plus test will be conducted by placing a +1.50 lens in front of the right eye while the subject is looking at a 20/40 line at a distance of 6 meters. Next, the +1.50 lens will be placed in front of the left eye. The subject will then be asked to choose which presentation provided the best distance vision as well as the best visual comfort. This procedure will be repeated as needed. The dominant eye will be considered to be the eye without the +1.50 lens in front of it which provided the best distance vision and comfort.³
Next, the Hole Card Method will be performed. This will be done by having the patient hold a 5" x 5" card with a 1" diameter hole in the center at arms length. While holding the card, the subject will be asked to sight the examiner’s right eye through the hole. The examiner will note the eye used. This will be considered to be the dominant eye.4

Next, another test similar to the hole card test called the telescope test is done. A cardboard tube 4.5 cm in diameter and 27.5 cm in length (standard paper towel tube) will be given to the subject. The subject will then be asked to bring the tube up to their eye as if they were looking through a telescope without any mention of which eye to use. The eye that is used for viewing will be considered the dominant eye.

After this, the Near Point of Convergence Breakout test will be done. During this test the subject will follow a fixation bead towards his/her nose until an eye breaks out (deviates temporally). The eye that does not break out is the dominant eye.

The Wink Test is used by some doctors to save time. We will do the Wink Test by asking the patient to wink. The nonwinking eye is considered to be the dominant eye.6,7

Each patient will be asked which hand they write with. This will determine the dominant hand, and theoretically the dominant eye.5

Once the subjects are done with the monovision fitting thesis, their refractive errors will be recorded to look at which eye is the least myopic. This is considered by many to be the dominant eye.
RESULTS

The following graphs will illustrate the results of the previously mentioned tests as compared to the swinging plus test (distance). Each graph illustrated the number of agreements and disagreements between tests.
Not all patients had a near point of convergence breakout, only 29% did.
In an attempt to distinguish between preferred distance and near eyes in a monovision correction, the swinging plus test was also performed at near, and the results from the two were compared.
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(Responses: R = right eye or right handed, L = left eye or left handed, FE = fixating eye)
DISCUSSION

Of the seven different tests for determining the preferred eye, only the hole card test and preferred hand agreed over 80% of the time with the plus lens test (distance), these two tests had an 81% agreement. The other tests had a lower agreement percentage:

- Telescope (76%)
- Wink test (62%)
- Near point of convergence breakout test (50%)
- Refractive error (38%)
- Plus lens test (near) (19%)

The results for the NPC breakout and refractive error could not be interpreted for all subjects, because not subjects had NPC breakout and some patients had the same refractive error in each eye.

Of the tests performed, only two showed a high percentile rate of agreement. If chosen, these two tests (hole card, preferred hand) may increase the odds of a successful monovision adaptation.

Comparing the results of the distance and near swinging plus lens test, it was found that only 19% showed the ideal situation of one preferred for distance and one eye being preferred for near vision. Although infrequent, if the patient is found with this pattern of dominance, the chance of successful monovision adaptation is high.
From our data it appears that no strong conclusion can be make to correlate any ocular dominance tests to the swinging plus test (distance). Even though the hole card and handedness agreed 81% of the time, it is seems logical for a practitioner to perform the swing plus test (distance) which most closely simulates a monovision contact lens fit.

References: