Yoked Prism Effects on Body Posture and Spatial Perception in Normal Population

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INTRODUCTION

Visual, vestibular and somatosensory information are integrated to provide posture and balance stability.

Previous study found yoked prisms to be helpful in reducing the angle of trunk misalignment in patients with adolescent idiopathic scoliosis (Wong, et al. 2002) and rehabilitation of Visual Midline Shift Syndrome (VMSS) (Padula, et al. 2009) in right brain damaged patients showing left hemiparesis and rightward shift of midline perception. Spatial board has been used clinically for detecting the effectiveness of yoked prisms (Valenti, 1996) and believed to reveal the association between “proprioceptive” and “visual” reference frames (Wilkinson, 1971) with multiple experiments confirming this concept (Wallace, 1977; Wallace, et al. 1975).

RESEARCH DESIGN

The aim of the study was to examine the immediate and direct prismatic effects of yoked prisms on body posture and spatial perception before adaptation, as part of the Doctorate thesis.

Subjects were tested randomly with three pairs of lenses: Plano (V.P.), 8 Δ yoked prisms Base Up (B.U.) and 8 Δ yoked prisms Base Left (B.L.). In all testing conditions subjects were not allowed to move around or engage in any eye-hand coordination activities in order to discourage adaptation from taking place.

EXPERIMENT 1

Fifty four subjects were asked to stand still in a natural and relaxed position viewing a single letter representing 20/30 at 3 meters. Frontal and side photos were taken with each pair after one minute. Postural parameters were measured with PostureScreen Mobile™ and ScrrenScales software (Fig. 1).

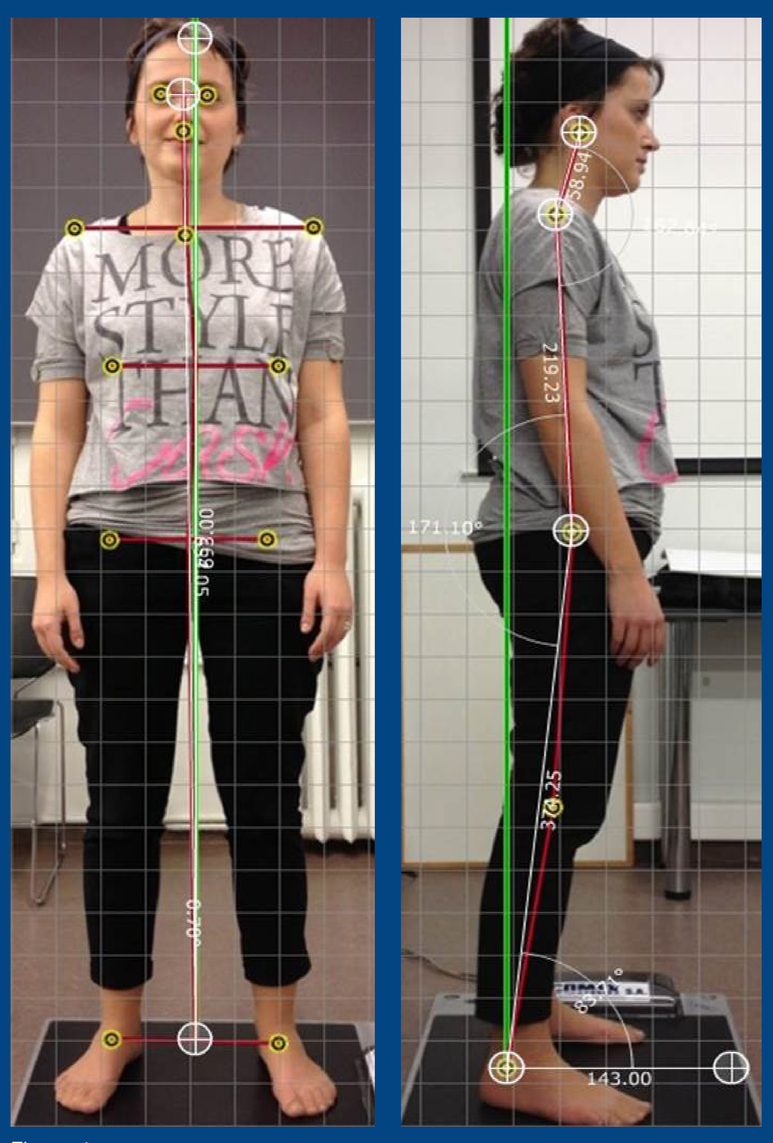

Figure 1.

EXPERIMENT 2

During the second experiment, thirty two subjects were asked to mark three reference points (left, center and right) on a spatial board (VTE) with all three pairs of prismatic glasses already mentioned (V.P., B.U., B.L.) (Fig. 2).

RESULTS

Preliminary results of the statistical analysis revealed some interesting findings:

Photographic analysis showed that BL yoked prisms had a significant effect on head shift ($p<.001$), head tilt ($p=.048$), shoulder tilt ($p<.048$), hips shift ($p=.001$) and angular midline shift ($p<.001$) towards to the right on the x-axis. On the z-axis , BL yoked prisms showed a significant shoulder shift backwards ($p=.032$)

BU yoked prisms had a significant effect on the z-axis by shifting head forward ($p<.001$) and decreasing head-shoulder angle, bringing chin closer to the chest ($p=.006$).

On spatial board, B.L. yoked prisms indicated some interesting results showing that their main effect was on z axis by inducing a clockwise rotation of visual space and not actually shifting to the right as would be expected according to geometrical optical effects of the lenses ($p<.001$) (Fig. 3).

Figure 2.

CONCLUSIONS

Yoked prisms can have a significant effect on body posture even before any adaptation. Postural changes are in relative agreement with what is perceptually expressed on the spatial board.

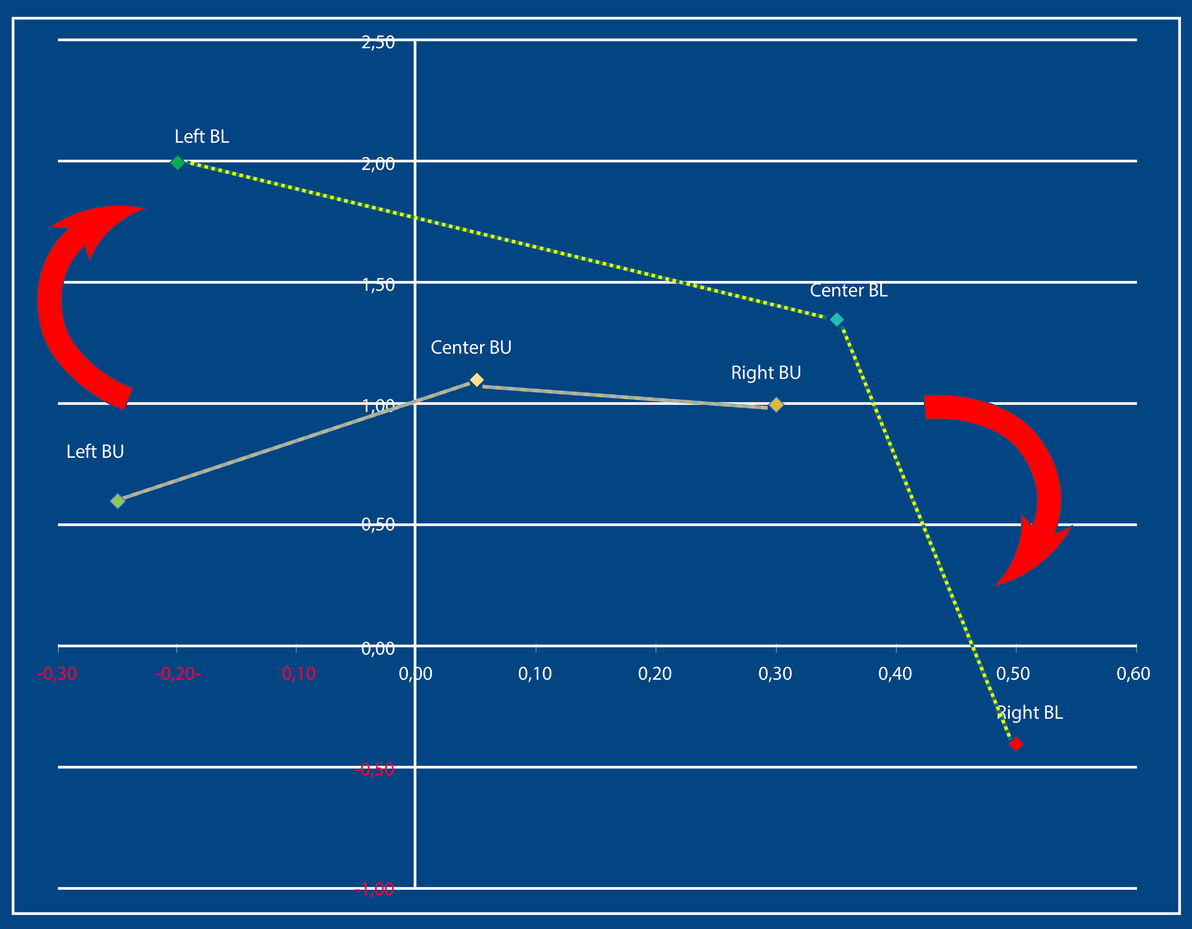

Figure 3. Meridian differences of B.U. and B.L. yoked prisms for each fixation point on spatial board (left, center, right)

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