

Horizontal Dynamic Visual Acuity Testing Considerations for Management of Sport-Related Concussion

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Context: Impairment of the vestibular system can result from concussion. Therefore, post-concussion assessment of the vestibular system is vital. Testing the vestibular ocular reflex (VOR), the ability to focus on an object while moving the head, provides clinical information about vestibular function. The C3 Logix concussion test battery includes a Horizontal Dynamic Visual Acuity Test (HDVAT) to identify VOR deficiencies. However, HDVAT can provoke symptoms in some healthy athletes. Understanding the impact of symptom provocation and past medical history (PMH) on HDVAT performance would allow clinicians to draw appropriate conclusions from post-concussion testing. **Objective:** To determine whether symptom provocation or past medical history affect HDVAT performance in healthy athletes. **Design:** Descriptive study. **Setting:** Controlled laboratory. **Patients or Other Participants:** 198 NCAA athletes volunteered (122 Males; 76 Females; 20.04±1.26 years old; 176.86±10.47cm; 81.31±16.03kg). **Interventions:** Participants provided informed consent and completed a health history form including assessment of pre-existing conditions (e.g., motion sickness, concussion, etc.), before completing the HDVAT. The HDVAT requires test-takers to read and recite letters from eye charts in two conditions: first with static head position (STATIC), then while rotating their head 30° in each direction (DYNAMIC). Under both conditions, participants read decreasingly-sized letters. Participants wore headgear that ensured appropriate head range of motion. A metronome cued the pace of head turns at a rate of one full side-to-side rotation per second. Researchers verbally asked, then recorded, symptom scores (0-10) for headache, dizziness, nausea and foggy eyes three times: at baseline, after STATIC, and after DYNAMIC. A total symptom score (TSS) was calculated by adding the four scores, yielding a 0-40 scale. **Main Outcome Measures:** Dependent variables included TSS and HDVAT performance score. The performance score is the number of STATIC lines read minus DYNAMIC lines read, scored directly in C3 Logix. Pearson and Spearman's rho correlation analyses were used to describe relationships between performance and past medical history, and performance and symptom provocation. **Results:** There was a weak correlation ($r=0.048$) found between performance score ($1.50\pm.977$) and post-HDVAT symptom scores (1.18 ± 2.42 ; $p=0.499$). Weak correlations were also found between performance and corrective lenses ($[r]=-0.003$, $p=0.967$), hearing impairment ($[r]=-0.065$, $p=0.367$), learning disability ($[r]=0.03$, $p=0.682$), motion sickness ($[r]=0.047$, $p=0.517$), vertigo ($[r]=-0.055$, $p=0.488$), migraine ($[r]=0.067$, $p=0.35$), psychological disorder ($[r]=-0.044$, $p=0.538$), and previous concussion ($[r]=-0.059$, $p=0.409$). **Conclusions:** Previous medical history and symptom provocation during C3 Logix HDVAT testing did not appear to be related to test performance in this healthy, collegiate population. The C3 Logix HDVAT may be valuable as part of a comprehensive concussion protocol. It may be helpful to repeat this study in different healthy and injured populations to expand generalizability. **Word Count:** 427 words.