

Attentional Tests Can Best Detect Reduced Gait Stability Following Concussion

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ABSTRACT

Current standards for concussive treatment do not adequately take into account evidence of prolonged effects of concussions¹, increased susceptibility to subsequent concussions², or increased neurological damage after multiple concussions³. Return to normal activity levels usually occurs long before normal gait stability is reestablished⁴. The purpose of this study was to determine a sensitive dynamic measurement of the effects of concussion, comparing previously utilized methods. Fourteen individuals suffering from a grade II concussion and 14 matched controls performed a single task of level walking, a continuous sequential question and answer task while walking, and an obstacle-crossing task. Common gait spatial/temporal measurements, whole-body center of mass motion, and the center of pressure trajectory were assessed. Concussed individuals demonstrated slower sagittal plane velocity and quicker coronal plane velocity while performing all tasks. Concussed individuals adopted a more conservative gait strategy to maintain gait stability, but still showed signs of possible instability. These effects were demonstrated during the obstacle-crossing task, however, they were most evident with 24% less A/P separation of the center of mass and center of pressure, 14% slower A/P velocity at a corresponding time point, and 26% greater side-to-side sway compared to controls specifically during the Q&A task. The question and answer task was most sensitive to distinguishing concussed individuals from matched healthy individuals, supporting the use of a similar dual-task modality in future testing after concussion to determine a proper time for return to activity.

REFERENCES

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