THE RELATIONSHIP BETWEEN BALANCE AND CONCUSSION IN A DUAL-TASK PARADIGM

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Introduction
Concussion rates are steadily increasing in the athletic population. The goal of this project was to explore the role of the vestibular system in balance, how balance relates to concussion, and current balance assessments for pre- and post-concussion. This project synthesizes the current evidence-based research to an athletic population in order to evaluate the implications on physical therapy evaluation and management of athletes who sustained a concussion.

Results / Discussion
Research suggests that balance deficits may occur secondary to impairment of brain centers responsible for central integration of vestibular, visual, and somatosensory stimuli, damage to peripheral receptors causing erroneous senses of motion, or concentration and attention impairments that may exist post-concussion. While the cause of postural instability and balance disturbance post-concussion may not be certain, it is certain that these deficits do exist, and like other concussion signs and symptoms, they are transient in nature.

Further research regarding the relationship between balance and concussions is necessary to ensure proper screening, preventative care, and rehabilitation protocol. The creation of a comprehensive balance assessment to be included in a standardized concussion management protocol is warranted. A newly evolving paradigm in research is a dual-task assessment that encompasses cognitive and motor tasks simultaneously. Dual-task is especially relevant when studying athletes because sports require athletes to process cognitive and sensory stimuli simultaneously.

Example of Dual-Task Assessment

Motor Task: subject reaches foot in various directions while standing on one leg

Cognitive Task: subject responds to auditory question by raising blue or orange ball when appropriate

*These tasks are performed simultaneously.

Future Research: Dual-Task Assessment
A dual-task paradigm has the ability to replicate an athlete’s performance in a “game-like situation” to evaluate multiple systems concurrently. It would be beneficial to use pre-season athletic screenings to identify underlying impairments athletes may have that could increase their risk for injury, as well as to determine that person’s individual baseline score. It may also be a sensitive tool to measure long term post-concussive balance deficits that are no longer profoundly present, but still exist clinically. Using dual-task to create a more consistent assessment for concussion diagnosis and management will decrease the risk of premature return to play.

Relevance to Physical Therapy
As of late, the incidence of sport-related concussions is increasing, therefore physical therapists will see this population of patients more frequently. Discovering pre-season or post-concussive balance impairments provides physical therapists with a unique opportunity to perform vestibular rehabilitation with athletes.

♦ Focusing on balance and vestibular therapy can help to improve an athlete’s balance and proprioception to decrease predisposition to injuries, such as concussion.

♦ Balance and vestibular rehabilitation may also be implemented post-concussion to decrease symptoms and increase body awareness and postural stability prior to an athlete’s return to play.

Proposed concussion management legislation emphasizes balance and vestibular assessment and treatment as within the scope of physical therapy practice. This would necessitate incorporating more vestibular content and concussion management information into doctordate of physical therapy programs nationwide. This creates a new area for specialization and increases the variety of patients seen by physical therapists.