Update

Balance Retraining After Stroke Using Force Platform Biofeedback

Balance is a somewhat ambiguous term used to describe the ability to maintain or move within a weight-bearing posture without falling.[1,2] Balance can further be broken down into three aspects: steadiness, symmetry, and dynamic stability.[3] *Steadiness* refers to the ability to maintain a given posture with minimal extraneous movement (sway). The term *symmetry* is used to describe equal weight distribution between the weight-bearing components (eg, the feet in a standing position, the buttocks in a sitting position), and *dynamic stability* is the ability to move within a given posture without loss of balance.[3]

All of these components of balance (steadiness, symmetry, and dynamic stability) have been found to be disturbed following stroke.[2,4,5] Balance testing of patients with hemiparesis secondary to stroke has revealed a greater amount of postural sway during static stance,[1,4] asymmetry with greater weight on the nonparetic leg,[2,4] and a decreased ability to move within a weight-bearing posture without loss of balance.[2,4] Furthermore, research has demonstrated moderate relationships between balance function and gait speed ($r=-.67$ and .42, respectively),[6,7] independence ($r=.62$),[7] appearance (defined as "significantly abnormal," "slightly abnormal," and "nearly normal") ($r=.50$),[7] dressing ($r.55-.69$),[8] wheelchair mobility ($r=.51$),[8] and reaching ($r=.49-.78$).[9]

Thus, a principal construct within physical therapy practice is the reestablishment of balance function in patients following stroke. Recent advances in technology have resulted in the commercial availability of numerous force platform systems for the retraining of balance function in patient populations, including patients with stroke. These systems are designed to provide visual or auditory biofeedback to patients regarding the locus of their center of force (COF) or center of pressure (COP), as well as training protocols to enhance stance symmetry, steadiness, and dynamic stability. Typical force platform biofeedback systems consist of at least two force plates to allow the weight on each foot to be determined, a computer and monitor to allow visualization of the COF or COP, and software that provides training protocols and data analysis capabilities. Some units allow auditory feedback in addition to the visual feedback in response to errors in performance.

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