Towards better scientific evidence on which to base patient-specific gait interpretation.

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Although diagnostic clinical gait analysis (GA) has been used for more than 30 years, there are still issues and debates concerning its utility and application. Diagnostic use means that it can be applied to an individual patient with the goal of defining the specific problems related to that individual’s movement disorder. The development of Single Event Multilevel Surgery (SEMLS) has largely been guided by modern GA. The benefit of GA in the application of SEMLS has been documented by comparing gait changes in patients in whom the surgical plan based on GA was followed to those patients where it was not. The utility of GA to monitor the outcome of gait change is also well established. Although the above benefits are widely accepted, major unresolved issues remain which continue to limit the universal application of GA in planning treatment. These problems include high expenses in both equipment cost and personnel. The need for specialized training to understand and interpret the data also remains an impediment. At this time, the area where there has been the least scientific evaluation are the specific parameters for interpretation. There are multiple problems related to a more scientific approach which include data that is still relatively basic. For example, muscle modeling is limited to origin-insertion lengths. Evaluation of spasticity relative to the pathologic versus beneficial effect is not defined. Most GA interpretation is based on predetermined treatment philosophy. An example is the approach to flexed knee gait, which can be accurately measured as the degree of stance phase knee flexion. Further interpreting the etiology of this pathology, which may involve muscle weakness, contracture, motor control, mechanical instability, spasticity, and skeletal malalignment, is often strongly influenced by preconceived ideology instead of scientifically established facts. The goal of this lecture will be to challenge the gait community to develop better scientific evidence on which to base specific gait interpretation.