Editorial

Gait Analysis: Creating Balance

Human gait has always interested clinicians in all fields of medicine since any abnormality raises suspicion of various disorders mostly of the nervous system. And notably, ambulation is the primary measure of independence for an individual and hence any disorder causing its impairment is of concern to both the patient and the physician. The physician has the prime responsibility in reaching a diagnosis and treating the underlying disorder while a major aspect of offering meaningful independence and improved quality of life lies in the domain of the rehabilitation physician. The rehab expert/physician gets down to the analysis of the abnormality and thereon creates the plan of recovery in a goal oriented manner.

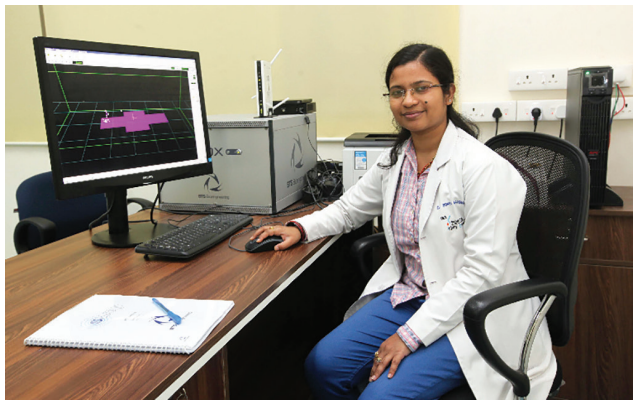

Fig. 1: Gait lab at Postgraduate Institute of Medical Education and Research, Chandigarh, India

Studying the gait has been carried out in a myriad of ways ranging from different simple observational technique to sequential still camera pictures to video cameras and Infra red camera recording. Close observation of the gait has provided deep understanding of patterns and deviations of normal gait. Normal human gait appears simple and effortless to the casual observer. However, it is actually a complex phenomenon with the typical gait cycle having a stance and swing phase. Stance comprises of 60% of the gait cycle which is further sub-divided into 5 events while the swing phase is sub-divided into 3 events.[1] A perfectly coordinated sequence of events between both the lower limbs is the prerequisite for a normal gait. Deviations from normal gait occur in mainly in various neurologic and orthopedic conditions leading to mobility restriction.

Modern gait analysis can be done by a gait lab (Fig. 1) which captures gait related information in a quantitative and objective manner. The data collected analyzes and identifies walking and posture deficits, load anomalies and muscle failure, which cannot be measured by usual clinical examination. The gait lab's digital synchronization of different analysis tools helps to simultaneously compare, frame by frame, the patient's movements of limbs and muscles and force distribution on the surface during the patient's movements.

Gait abnormalities are mainly caused by muscular weakness/paralysis, joint muscle range-of-motion (ROM) limitation, central/neurogenic gait disturbances, pain and leg length discrepancy. Many neurologic disorders lead to gait abnormalities include stroke, multiple sclerosis, Parkinson's disease and numerous neurodegenerative disorders.[2,3]

The use of gait analyses is not restricted to evaluation of walking pattern of individuals with conditions affecting locomotion and to plan their management but it continually serves to improve the person's ability to walk thereby maximizing function and maintaining/improving quality of life. Gait analysis has proved its utility in following areas:

- Diagnosis of biomechanical cause of impaired walking
- Prognostication of chronic progressive/non-progressive illnesses
- Prescription and designing of appropriate orthosis/assistive devices
- Planning management through specific exercises targeting affected movements
- Monitoring of response to/appropriateness of rehabilitative intervention
- Assessment of outcomes of rehab programs and effectiveness of innovative treatments
- Clinical Research purposes by providing objective, quantitative data.

Despite great progress made in the area of gait analysis in last few decades, there are limitations in the existing systems as it requires controlled environment for assessment and insufficient consideration of temporal influences on gait such as clothes, shoes, carrying conditions, health states and body build variations due to weight, etc.[4]

With further advancement in measurement techniques, gait analysis will continue to provide us with a better understanding of both normal and abnormal biomechanical and neuro-physiologic function. The role of gait analysis is much more than a functional measurement tool as it can help us determine the complex relationships between impairment, functional limitations and disability.

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