Abstract

**Introduction:** The Multifactorial Motion Analysis is instrumental method of evaluation of the body’s motion on the basis of a biomechanical model. We aimed a descriptive retrospective study of the population of children recorded in the Gait Lab in order to highlight the benefits and applications in clinical problems.

**Material and Methods:** 677 patients with age between 1 and 19 years and with different gait problems were evaluated in our Gait Lab from February 2015 to December 2018. The Gait Lab provides information about the spatial and temporal parameters of the gait, the 3D kinematics of the lower limbs during gait, the kinetics (ground reaction forces, joints’ moments and powers) and the dynamic muscular activation, using an infrared cameras system, a force plate and an EMG wireless surface system.

**Results and discussions:** Among the 677 patients, 56.8% were children with cerebral palsy, 17.8% children with gait problems of orthopedic origin, 9.6% peripheral neuropathies and muscular diseases, 4.9% post-trauma neurological status (brain or medullar injuries), 10.9% other gait disorders. All these data provided by the gait analysis, considered into a clinical examination, helped us to understand and quantify the gait disorders and to ensure a correct multidisciplinary management of the therapeutic recommendations. It helped us to define precisely the targets in physical rehabilitation process, to indicate and adapt the most suitable walking orthotics (66.4% patients), choosing the targeted muscles for the botulinum toxin injection protocol in order to improve function (65.4%), directing the most suitable type of orthopedic interventions (29.6%). The Gait Analysis was repeated for 9% of patients in this period, showing the functional benefits of the treatment and following up the evolution of gait problems in children during growth period.

**Conclusions:** The Multifactorial Gait Analysis is a very important and accurate method of evaluation of gait disorders, with a major role in the multidisciplinary therapeutic approach of neurological and orthopedic pathology in children.

**Keywords:** 3D gait analysis, children,