



The Application of Bioengineering on Medical Rehabilitation

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Editorial

Development in medicine in large scale merits the development of biomechanical and biomedical engineering. This highly concerns with the medical rehabilitation, which according to the modern understanding is the interdisciplinary management aiming at recovering or improving efficiency of the organism which is beyond the ability of pure medical. For the creation of such features of rehabilitation in Poland main contributions were from founders of Polish rehabilitation model professor Viktor Dega from Poznań and Professor Marian Weiss from Konstancin and the team of their co-workers [1]. Model of Polish rehabilitation is based on four basic principles: early application of rehabilitation, its universality, complexion and continuity procedures [2]. Early application of rehabilitation prevents from development of unwanted changes such as: contractures, muscular atrophies, trophic abnormalities and decreases the negative outcomes due to long term immobilization and even sometimes the surviving chances for example after myocardial infarctions, operations of the chest, damages of the spinal cord in the cervical part. It's very important here to apply technical assistance in order to easily nursing and early rehabilitation such as: anti-bedsore mattresses, orthopaedic beds, in some cases to enable the passive verticalization and rehabilitation equipment so as to apply to the bed therapy. In many cases it is important to apply orthosis, scales which prevent non-functional position of the limbs and contractures. In the amputated persons early or at least short term application of prosthesis is also very important. Complexion principle defines the interdisciplinary rehabilitation character, paying attention at the importance increasing maximum care to improve the activities disabled, supplying him with necessary prosthetic orthotic equipment in order to ease the performance activities at home conditions, environment, and if possible come back to professional job. Continuity is also very important in application of orthotic equipment or in technical assistance.

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It mainly concerns with cripple children, who are equipped in prosthesis, orthopaedic footwear's, orthotics and who require permanent modification in the course development, growth and rarely changes of the form deformity. At present it's difficult imagine the function and further development of several disciplines, in the rehabilitation without close collaboration and application of the biomechanical discoveries in wide range application starting from issues concerned with explaining pathomechanism damages for example spine, joints, strains of the motion organs, diagnosis, by practical application of the rehabilitation: prosthetic equipment, orthotics, application of functional electrostimulation, to the composition of the objective methods to evaluated applied procedures, the improve of the stereotype posture, gait, locomotion. I would like to stress the importance of functional electrostimulation in improving the lost function following the damage of the central nervous system. First application of electrostimulation to stimulate organs of the man was introduced in thirties last century. In 1932 Hymon applied electrical impulses external generator to stimulate the function of the heart. It formed the base to what is currently widely applied for the stimulation of cardiac muscles in the cases of arrhythmia or other cardiac dysfunctions.

At present it is possible to apply functional electrostimulation to control the system of stimulators to excite the paralytic muscles in order to obtain active locomotion. Maybe in the near future functional electrostimulation will be a routine applied method for efficient walking paraplegic patients. In the Rehabilitation Centre in Konstancin with the cooperation of the team of Warsaw Polytechnic University an experiment was done to apply functional electrostimulation in the rehabilitation of the paralyzed hand patients with tetraplegia [3]. This led to the construction of

the hybrid orthosis to enable the simple functions of grasping of the paralyzed hand.

Mentioned selected problems and the application of functional electrostimulation show the importance and extent of topics dealt by biomechanics, indicating its close relationship with medicine, in this cause with rehabilitation, showing how more and still to be done in this field study.

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