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14:15 - 15:15

study, three of the most used measurements were obtained from 3D reconstructions of a repeated backward free-flac. The effect of individual characteristics on the technical measurements was also assessed.

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P10Z-13

Impaired postural control of women with low back pain under various dynamic conditions

Marvi Mahnaz, Farahpour Nader, Allard Paul

Bu Ali Sina University, Iran

Keywords: low back pain, dynamic balance, center of gravity

Many studies have been conducted on the static balance evaluation of different disease such as low back pain. However, there is a little information on the dynamic balance impairments. The objective of this study was to compare the oscillations of the center of gravity (COG) of LBP patients with the healthy subjects under various dynamic conditions.

Thirty low back pain patients and 30 healthy females between 20 to 40 years of age voluntarily participated in this experiment. A dynamic stability platform system (BIODEX) was used to evaluate the anterior-posterior direction (AP) and medio-lateral (ML) directions and overall (total) COG sway during upright standing and standing with 45° trunk flexion postures. These tests were repeated with and without shoes as well as on stable and instable foot platform conditions. Multivariate analysis of variance was used for statistical analysis.

Results showed that in all the evaluations the COG sway was greater in LBP patients. In stable foot platform the patients' body sway was affected more in AP direction than in ML. Instability of the foot platform resulted in more abnormalities of the COG sway among patients ($p < 0.01$). Flexed posture decreased the body sway in both groups. Shoes did not have any influence on dynamic postural sway. There was a significant interaction between stability of foot platform, posture and LBP factors.

In conclusion the COG sway in LBP patients was significantly deviated from normal pattern. Voluntary motor control deficits were more obvious when standing on an instable base of support. There was an interaction between instability of base of support, posture and back pain factors.

P10Z-14

Comparative study on able-bodied and disabled freestyle swimmer

Schega Lutz, Pahst Jan, Witte Kerstin

Institute of Sport Rehabilitation, Sport Therapy and Adapted Physical Activity, Germany

Keywords: swimming of disabled, movement analysis, PSQ

In elite swimming the movement analysis is very important to judge the movement coordination of athletes. This approach allowed statements about the current movement behaviour and the level of movement coordination. Due to the variety of functional influences regarding to the impairments of disabled swimmers we can not transmit without further add the results of able-bodied athletes.

One disabled swimmer (athlete 1-A1) and one able-bodied swimmer (athlete 2-A2) were examined and performed a "step test" in freestyle in a swimming flume with constant

velocity. The flume velocity corresponded with the currently existing competition results and can be taken as optimal velocity of each swimmer. For 2-D video recording a camera was outstanding installed. Using the software SIMI Motion® the data evaluation of marked body points was carried out. The swim movement was characterized using the model of swimming phases by JÄHNIG et al. (1973).

For the results of both athletes we used the step $\pm 0N$ where swim movement isn't influenced by the flume (SCHEGA et al., 1997). The horizontal velocity of the hip of A1 was compared to A2. Differences were also determined by the examination of the cycle frequency. To characterize the movement efficiency in dependence on the increasing load we used the "Phase Structure Quotient (PSQ)" by BLASER et al. (1995), as quotient of the main phase and the sum of initiating, linking and preparing phase. The average PSQ for A1 was significant higher than for A2 (FRIEDMANN-test).

The described values of the swim movement are more favourable of A2 compared to A1. The PSQ prove this fact because the smaller the better effective is the swim movement. A possible different structure of propulsion caused by the functional impairment of A1 influences the swim movement.

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P10Z-15

Considerations about the fractures of the metacarpal bones

Tarnita Daniela, Grecu Dan, Didu Sorin, Tarnita Roxana

University of Medicine, Romania

Keywords: metacarpal bone, finite element method, fracture

The metacarpal bones are the longest and the least mobile but at the same time most solicited bones of the hand. This is why the frequency of fractures at these bones is very high.

The study material was represented by 247 fracture cases of the hand bones, studied at the Dolj County Hospital, during a period of 5 years.

The authors used the finite element method for the spatial model of the metacarpal bone. The geometry's and mechanical properties' natural variability of the bone system from one to the other is a big problem which makes real difficulties in the biomechanical researches. It must be watched so the idealized structure should be the best solution to many requests concerning the number of the junctions and of the elements, the types of elements, the number and type of the loading forces. The authors used the section method of the bone divided into 23 sections parts with the tomograph computer. We determined precisely the spatial coordinates of a 12 points set from every section's boundary. Then we built the spatial model of the metacarpal bone using the finite element ELEMENSA soft. At first, with the lines' method the points have been united by interpolation, giving the every section's form. Then, with the help of the surfaces' method there have been united close sections two by two and with the hyper surfaces' method the programme realized the spatial modelation of the whole bone. The modelation was realized with hexahedral finite elements. During this study we made a statistical analysis of the fracture cases, analysis on age and sex.