

thrust motion with the distance of 2.2m to the target. We obtained joint kinematic data of the foot eversion-inversion and shank rotation angles to the foot during the single support phase of the kendo motion. Our result demonstrated that the foot inversion and shank external rotation movements occur during the single stance phase in experienced kendo athletes in good health. In addition, the foot arch height-length ratio was significantly related to the total range of shank rotation to the foot.

KEY WORDS: lower extremity, sword fighting, motion analysis, joint couple

P12.5 – ID 591

COMPARATIVE BIOMECHANICS ANALYSIS OF HURDLE CLEARANCE TECHNIQUES

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The purpose of this study was to investigate Yin Jing's hurdle clearance techniques. Through a follow-up study on his training, some experiments were performed using 3D kinematics. The best one of each year's performances from 2007 to 2009 was chosen for comparative analysis in this paper. It was found that his techniques improved significantly and became more stable, but the supporting time needs to be reduced.

KEY WORDS: biomechanics, hurdle clearance, technique.

P12.6 – ID 499

COMPARISON OF PLAYER'S CENTER OF MASS MOVEMENT BETWEEN HIGH AND LOW IMPACT POSITIONS IN TENNIS FOREHAND STROKE

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During the tennis forehand stroke, the displacement of body center of mass (COM) changes with the body movement. The COM movement influences the recovery from one stroke to the next. Therefore, the purpose of this study is to investigate the differences of COM movement and joint kinematics between high and low-impact positions on different skilled players. This study adopted a 3-D motion analysis system for recording and tracing the advanced (n = 5; level 3-4) and intermediate (n = 7; level 5-6) athletes' motion of whole body during high and low-impact positions in tennis forehand stroke. The results showed that significant difference was not found between both impact positions and level groups in ball velocity. Advanced group showed greater anterior/posterior displacement than the intermediate group in low-impact position that increased the kinetic energy.

KEY WORDS: strategy, displacement, velocity.

P8.8 – ID 501

THE RELATIONSHIP BETWEEN FRONT CRAWL PERFORMANCE AND HYDRODYNAMICS IN YOUNG FEMALE SWIMMERS

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The aim of this study was to analyse the relationship between front crawl performance and hydrodynamic variables during leg kicking. Sixteen female swimmers (9.2±0.6 years) participated in this study. The 200m front crawl performance, the 200m front crawl kicking performance and the active drag during leg kicking were measured. The velocity perturbation method was used to determine active drag. The 200m front crawl performance was significantly correlated with performance in 200m kicking (0.89), with hydrodynamic drag force during leg kicking (-0.70), and power output in kicking (-0.64). Drag coefficient was not related to the performance in 200 m front crawl. These findings underline the importance of leg kicking to performance in front crawl swimming in these ages and suggests the important role of kicking tasks during training in young swimmers.

KEY WORDS: swimming, children, kicking tasks.

P8.9 – ID 596

A KINEMATIC ANALYSIS OF THE BREASTROKE KICK

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The study investigated the contribution of the ankle joint in the breaststroke kick using three dimensional kinematic analyses. Methodology included applying reference markers to the right leg using anatomical reference points and then videotaping twelve competitive swimmers performing the breaststroke. A Matlab script was used to calculate relative angles (between the foot and shank), angular and relative angular velocities, and linear velocities. The results of a linear regression at p<.05 showed that there was no statistical significance between the foot angular displacement and linear hip velocity, but there was a statistical significance between the local angular velocity and linear hip velocity in the anterior-posterior dimension. The results of the study suggest that the ankle joint and the foot are important contributors to the breaststroke kick.

KEY WORDS: underwater motion analysis, Euler parameters, quaternions.