研究業績　英文表記

和文	
表題	クロール泳における肩関節の角速度と手の推進力の関係
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英文	
Title	Relationship between the angular velocity of the shoulder joint and hand propulsion in front crawl stroke.
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Abstract	This study investigated the relationship between the angular velocity of the shoulder joint and hand propulsion in the front crawl stroke. Eleven skilled swimmers participated in this study. A motion capture system was used to measure the upper trunk, shoulder and hand kinematics of the swimmers during the front crawl stroke at their maximal sprinting pace. Twelve pressure sensors were attached on the right hand and used to measure pressures on the twelve points to estimate hand propulsion (HP) during the front crawl stroke. A shoulder joint coordinate system relative to an upper trunk coordinate system was used to calculate the angular velocities of the shoulder joint. HP due to drag (HPD) and lift (HPL) was computed using the hand kinematics and the pressures on the hand. The average angular velocities of horizontal adduction/abduction (Omega hor-add/abd), internal/ external rotation (Omega int/ext), and elevation/depression (Omega ele/dep) of the shoulder joint, HP, HPD, and HPL were computed in the pull and push phases. There were negative, moderate and significant relationship between Omega hor-add/abd and HP ($r = -0.786$, $p = 0.004$), and negative, strong and significant relationship between Omega int/ext and HP ($r = -0.835$, $p = 0.001$) in the pull phase. Based on the relationships, the magnitude of HP and selected kinematic values, different stroke technique in the pull phase was discussed in term of increasing HP and decreasing active drag on the body.
keyword	Skilled swimmers, shoulder coordinate systems, pull and push phases.

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