日本代表選手と全国大会出場選手における背泳ぎの抵抗力と泳動作の特徴
－ 手部動作と体幹の傾きに着目して －

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【要 約】

本研究の目的は，競技レベルの異なる 2 名の泳者を対象に，背泳ぎの抵抗力と泳動作について調査することであった．対象者は背泳ぎを専門種目とし，日本代表経験を有する選手と，全国大会出場経験を有する選手の 1 名ずつであった．泳速度は 1.20 m/s とし，実験は全て実験用回流水槽にて実施した．抵抗力は MRT 法を用いて評価し，抵抗力を身体表面積で除して抵抗係数を算出した．泳動作は 3 次元モーションキャプチャシステムを用いて分析した．体幹の傾きを評価する指標として，第一胸椎棘突起と大転子の位置関係を評価し，手部の動作スピードは 3 次元方向と推進方向のそれぞれを分析した．結果として，抵抗力と抵抗係数の両方で競技レベルの高い泳者が大きな値を示したが，身体表面積で除した抵抗係数では両者の差が小さくなっており，体格の違いが背泳ぎでの抵抗力に影響したことが示唆された．泳動作について，ストローク頻度と手部の動作スピードでは競技力の低い泳者が高い値を示し，一方で体幹の傾きではわずかに競技力の高い泳者が高い値を示した．これらのことから，背泳ぎにおける抵抗力は，競技レベルが高い泳者の抵抗力が必ずしも低くなるわけではないことが示唆された．

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Characteristics of resistive force and swimming motion in the backstroke of an international-level swimmer and a national-level swimmer: hand movements and inclination of the trunk

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Key words: MRT (measuring residual thrust) method, resistance coefficient, three-dimensional motion analysis, stroke frequency, hand speed

【Abstract】

The present study compared the resistive force and swimming motion of two swimmers who were at different competitive performance levels. Both swimmers specialized in the backstroke; one of them had been selected as a member of Japan's national team, the other had participated in a national tournament. The study was conducted in a swimming flume at a swimming speed of 1.20 m/s. Resistive force was measured using the method of measuring residual thrust (MRT method); the resistance coefficient was calculated by dividing the resistive force by the surface area of the swimmer's body. Swimming movements were analyzed with a three-dimensional motion capture system. In order to determine the index of inclination of the trunk, the relationship between the position of the acantha of the first thoracic vertebra and the greater trochanter was analyzed. The speed of movement of the hands was measured in three dimensions and in the direction of propulsion. The results showed that the international-level swimmer had higher values both in resistive force and resistance coefficient, although the difference between the two participants in the resistance coefficient was rather small. This suggests that the difference in the physical size of their bodies may have been reflected in the resistance force. The national-level swimmer had a higher stroke frequency and faster hand movements, whereas the international-level swimmer had a slightly higher inclination of the trunk of his body. These results suggest that the resistive force when swimming backstroke may not necessarily be less in swimmers who are at a higher competitive level.