

クロスカントリースキー・V2 スケーティング走法中の推進力に対する上肢と下肢の貢献

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Abstract

This study aims to quantify the degree of contribution of arms and legs during V2 skate in cross-country skiing from the viewpoint of the force along the direction of acceleration. Method: Six male cross-country skiers performed V2 skate at a speed of 6 m/s, and the pole and ski reaction forces were measured. In addition, using a high-speed camera, the three-dimensional coordinates of each part of the body were obtained, and the velocity, the pole, and ski angles were calculated, which were then converted to the force along the direction of movement. Results: The peak and mean forces along the direction of movement were 100 ± 20 and 63 ± 12 N, respectively, for the pole (one side) and 202 ± 48 and 106 ± 18 N, respectively, for the ski (one side). Those suggested that in V2 skate at a speed of 6 m/s, the degree of contribution of the force due to arms (push of both poles) and leg (push-off of right or left ski) are approximately the same. Furthermore, when pushing off with the ski, although the force component perpendicular to the ski comprises a large proportion, it was shown that the force can be divided into lateral and horizontal directions by converting it to a global coordinate system using the ski edge and orientation angle. In addition, ski edge angle was changed depending on abduction of hip joint. Ski force propulsion was generated by abduction of hip joint and extension of hip and knee joint. Hence, this implies that in order to increase the force of push-off for hip abduction and extension and knee extension movement, it is important to point the force along the direction of movement while exerting a force perpendicular to the ski.

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