

Bilateral Comparison of Scapulohumeral Kinematics in Expert Whitewater Kayakers

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Kayaking is a unique sport as propulsion of the kayak is done without use of the lower extremities, placing high demands on the torso and upper extremities. Epidemiological studies have shown that unilateral shoulder injuries are very common in whitewater kayakers. It is speculated that symmetrical scapulohumeral kinematics play an important role in prevention of shoulder injuries, while at the same time facilitating effective forward propulsion of a kayak. However, bilateral asymmetries have been previously reported. Although the role of the scapula in shoulder injuries is well documented, analysis of scapular kinematics during kayaking has not been previously reported.

PURPOSE: To compare three-dimensional scapular and humeral kinematics at six time points during the kayak stroke

METHODS: Twelve healthy expert whitewater kayakers (37.0 ± 12.2 yrs, 175.6 ± 10.2 cm, 74.2 ± 10.0 kg) paddled on a kayak ergometer, while bilateral scapulohumeral kinematics were analyzed using an electromagnetic tracking device. Scapulothoracic upward/downward rotation, anterior/posterior tilting, internal/external rotation, protraction/retraction, elevation/depression and humeral elevation and horizontal abduction/adduction were analyzed while subjects paddled at a self-selected pace. Bilateral kinematics were compared at six corresponding time points during the kayak stroke. The averages of 10 strokes were compared with dependant t-test. Alpha levels were adjusted based on the number of comparisons made at each time point.

RESULTS: No significant differences were found for any variable at any time point. Scapular kinematics mean bilateral differences ranged from 0.2 - 7.4° while humeral kinematics differences ranged from 0.7 - 12.2° .

CONCLUSIONS: In this group of expert whitewater kayakers, it was shown that bilateral scapulohumeral symmetry exists during the forward kayak stroke. Bilateral symmetry may distribute high shoulder forces equally to prevent injury, while facilitating effective forward propulsion, in healthy kayakers. Future studies should evaluate the role of injury and fatigue on bilateral scapular kinematics while paddling.