THE EFFECTS OF AGING ON THE HIP AND SPINAL MOTIONS IN THE GOLF SWING

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The purpose of this study was to determine the effect of aging on the kinematics of the lumbar spine and hips in the golf swing. Aging was shown to alter the joint coupling but not the magnitude of joint loading.

KEY WORDS: spine and hip motion, spine and hip coupling, golf.

INTRODUCTION: There are two primary motions in the golf swing, body rotation and arm movement. Body rotation occurs predominantly in the spinal and hip joints. As an individual ages, biological changes gradually affect the mechanics of the human body (Adams, 2006). The resulting decrease in muscle strength, endurance and a reduction in flexibility may compromise spinal functions. Therefore a natural consequence of the aging process is a decrease in golf swing performance. The spine-hip coupling may compensate for the reduced spinal flexibility. Therefore the aim of this research is to determine how the kinematics of the spine and hips and their coupling change with increased age.

METHODS: Data Collection: Data was collected on healthy golfers (handicap 10-20) in two age groups: young (age=18-30) and older (age=46+). Participants must not have had back pain for 6 months prior to data collection and no previous surgery. All participants signed an informed consent form approved by the University Ethics Committee. Following a warm-up, four electromagnetic motion sensors (Fastrak, Polhemus Ltd) were placed on T12, L5/S1, and the lateral sides of the right and left thigh. Participants completed 5 maximal shots with their own 7 iron, and 3D motion data were collected with respect to the previously recorded neutral positions. The best shot, defined by distance and accuracy, was chosen for analysis.

Data Analysis: To assess the effect of aging on the range of motion, ANOVA was conducted between the 2 groups for the 3-D motions at the top of the backswing. Cross-correlation of the movement-time curves was conducted to study spine-hip coupling.

RESULTS: It was shown that the back swing was mainly accomplished by forward flexion, side bending and axial rotation of the spine, (43.7 ± 5.7^o, 32.5 ± 5.0^o and 42.6 ± 2.8^o respectively) and flexion and axial rotation of the hips (35.0 ± 11.2^o and 41.1 ± 11.2^o). There was minimal abduction or adduction of the hips. There was strong coupling between the movements of the spine and hip. Cross correlation analysis showed that the coefficient was significantly reduced in the older age group (mean r=0.81 for the young group and r=0.64 for the older group). However, aging did not appear to affect the range of motions.

DISCUSSION and CONCLUSION: The results indicate that aging affects the kinematics of the golf swing. It does not appear to alter the magnitude of joint motions, but the coordination between different joints. This may affect golf performance. Coaches should be aware of the change in coordination in aged golfers as this cannot be corrected by altering the magnitude of motion of the spine and hips.

It is concluded that aging affects coordination of motions of spine and hips during a golf swing, and this needs to be taken into account in designing training programme.

REFERENCES:

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