Biomechanics of Serve Motion in Wheelchair Tennis Players

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Purpose: Shoulder injuries to wheelchair tennis players are often linked to the serve. This study aims to investigate the characteristics of serve motion in wheelchair tennis players. We compared the shoulder angle and muscle activations during serve motion of wheelchair and non-wheelchair tennis players.

Subjects: Eight wheelchair tennis players participated in this study.

Methods: A six-camera 250 Hz Vicon motion analysis system and surface electromyography were employed to record the serve of eight wheelchair tennis players. Student's t-test was used to determine statistically significant differences between the serve motions of wheelchair and non-wheelchair tennis players.

Results: At maximum external rotation of the racket arm, wheelchair tennis players had a significantly lower shoulder external rotation angle and a larger abduction and horizontal adduction than non-wheelchair tennis players. At ball-racket impact, wheelchair tennis players had a significantly lower shoulder abduction angle and a larger horizontal adduction than non-wheelchair tennis players. In addition, in the forward-swing phase, the anterior deltoid was more active and the posterior deltoid was less active than that in non-wheelchair tennis players. Furthermore, the pectoralis major was not significant.

Conclusion: These results indicate that wheelchair tennis players serve in an unstable shoulder position compared to non-wheelchair tennis players. This suggests that wheelchair tennis players are more prone to shoulder injury than non-wheelchair tennis player. In addition, a wheelchair tennis player may biomechanically suffer shoulder injuries during the serve motion.