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Application of ultrasonography in the assessment of overhand movement

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Statement of the Problem: Repetitive overhand movements generate significant mechanical stress on the shoulder and elbow joint. A specific focus on the ultrasound-based acute marker changes would make significant contribution to practical application to injury prevention, particularly to the design of intervention programs that reduce the likelihood of upper extremity injury. Through quantitative ultrasound examination of the elbow, acute changes in the joint structure at pre- and post-fatigue stages of similar overhand movements were investigated and the effects of fatigue on forearm muscle control over overhand movements were determined.

Methodology & Theoretical Orientation: Ultrasonographical measurement of the length of the ulnar collateral ligament and its strain under the valgus stress test was performed. 12 tennis players performing first serves and 15 baseball pitchers performing fastball pitching were enrolled. The distances between the ulnar nerve and the tip of the medial epicondyle of the transverse images were measured in the various positions of the elbow, and a direct trace and ellipse tool provided by the high-resolution ultrasonograph in this study helped the calculation of the distance.

Findings: The distance from the nerve to the medial condyle between the tennis players and baseball pitchers showed significant differences in the pre-fatigue stage ($p = 0.006$) as the elbow flexed to 90°.

Conclusion & Significance: Significant differences were observed in the distance from the ulnar nerve to the medial condyle between serving (tennis) and pitching (baseball) because the distance increases as the elbow flexes from 0° to 120°. Wide application of ultrasound imaging to investigate the impact of local fatigue on sports performance is expected in the future.

Biography

Lin-Hwa Wang, a professor of the Institute of Physical Education, Health & Leisure Studies of National Cheng Kung University and the president of Taiwan Society of Biomechanics in Sports (2009-2011) in Taiwan, received the Ph.D. degree in Institute of Biomedical Engineering from National Cheng Kung University in Taiwan in 2010. She has been an outstanding researcher with high efficiency, precision and passion. Her work requires very little supervision and has earned high reputation in the areas of biomechanics. She has all of the attributes and potential that one might seek in a researcher. Main research focuses on relationship study on the biomechanical assessment of performance and injury of sports.

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