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## ***Physical Therapy Update***

*The clinical staff at Frederick Sport and Spine Clinic regularly reviews articles, discusses the content and implements the information into our patient treatments. As a service to the local medical community, we are offering a summary of these articles to Physicians and Medical Practitioners. It is our intention to provide only the most pertinent info in these ½ page summaries. Further info is available at the clinic. Please take a moment to peruse the information below and contact us if you have any questions about the subject matter. Enjoy!*

### ***Comparison of Ball-and-Racquet Impact Force Between Two Tennis Backhand Stroke Techniques***

By Wu, PT, Gross, PT, Prentice, PT, Yu, PhD;  
JOSPT, 2001;31(5):pages 247-254

The kinematics of the tennis swing are complex and subtle changes in the stroke/swing can have a profound impact on the forces generated. As the force on the ball at impact with the racquet increases, the chance of injury increases as well. Using the proper mechanics and appropriate technique to generate the desired force can insure safe participation.

The one-handed backhand stroke is commonly used in the game of tennis and has been found to be a source of overuse injuries in the upper extremities of players. Incorrect strokes have been seen as the main etiology of lateral humeral epicondylitis. Weakness of forearm muscles, poor timing and the arc of the swing can create a situation for tissue breakdown. The preparation phase with the racquet, or backswing, can influence the force at impact with the ball as well.

This study asked advanced and beginner tennis players to use both a *long* and *short* backswing to hit balls from a tennis ball machine. 3-dimensional coordinates of critical landmarks and a mathematical model were used to determine peak impact force and the contact duration.

What they found was that a one-handed backhand stroke with a *short* backswing had a significantly shorter contact duration and a greater peak impact force when compared to a *long* backswing. This means that when a long backswing is used, the ball stays on the racquet longer. When the ball contact is longer, the resultant force transmitted through the racquet to the extremity decreases. When the force to the tissue decreases, there is a resultant decrease in micro-trauma to those muscles most used in the mechanics – the wrist extensors and the rotator cuff complex. This then reduces the chance of overuse injury. The skill level of the player did not significantly affect the peak resultant impact force.

This example can be transferred to any number of sports involving swinging/hitting. The longer the contact, the less strain to the muscles supplying the energy. We encourage you to instruct your patients to have their mechanics assessed by a physical therapist, especially when recovering from an injury, to further reduce the chance for re-injury.

Reviewer: Mark Acierno, MSPT  
November 30, 2001