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The Role of the Core Musculature In the Three Major Tennis Strokes: Serve, Forehand and Backhand

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Tennis players, like athletes in most ground-based sports, utilize the core/torso extensively throughout all movements on the court, but specifically during each tennis stroke. This article will highlight the three major tennis strokes—serve, forehand and backhand—with specific emphasis on the core/torso involvement in each of these strokes followed by exercises that are specifically intended to improve stroke performance on the court.

Typically the major core muscles include the following: transversus abdominis, multifidus, internal and external obliques, rectus abdominis, erector spinae. However, other muscles in the hips and torso also contribute to core stability and due to the dynamic multi-planar movements of tennis, the core must be considered the link between the lower and upper body and not simply individual muscles.

Tennis Serve

The core muscles are highly utilized in the service motion of all tennis players. The loading stage of the service motion (Figure 1) results in horizontal twisting of the trunk (in the transverse plane) which elicits a stretch-shortening cycle response with muscles of the trunk (3). For a right handed player this would predominately involve the storage of potential energy (via eccentric contractions) of the left oblique muscles, left erector spinae and multifidus. During this position, sometimes referred to as the rear lateral tilt, the shoulders and the hips are tilted down and away from the net. This is the major stage where power is stored during the serve (i.e., loading stage).

In the shoulder cocking stage of the serve (Figure 2) the leg drive has commenced and rotation occurs in the sagittal plane. Some coaches have a misconception that tennis players only need to train in transverse and sagittal planes. It is important to highlight the need to also include ample lateral trunk flexion training (3). It is also important to note that research has shown a strength imbalance in competitive tennis players between the anterior (abdominals) and posterior (lower back) muscles (5).

Forehand

The forehand typically has four major variations of stances: open, semi-open, square and closed (Figure 3). It must be understood that these forehand stances are situation specific, time specific and all use a combination of linear and angular momentum to power the stroke (4).

The loading position on the forehand varies slightly between the four different foot positions. However, the obliques (internal and external) are eccentrically contracted during the loading stage of the stroke and the trunk is required to rotate significantly around the pelvis to store the potential energy which will be released during the remainder of the forehand stroke.

The follow-through after ball contact requires eccentric strength especially in posterior muscles of the core (i.e., multifidus and erector spinae) and this is an area that typically receives less training and needs to be fully trained and considered when planning tennis-specific training sessions (1).

Backhand

The backhand is performed in a very similar manner to the forehand stroke, just on the opposite side of the body (i.e., left side of the body for a right-handed player). The four stances are utilized, but more preference is usually given to the square and semi-open stances (Figure 4). The open-stance backhand is usually used on wide balls when the athlete has very limited time. The majority of male

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Figure 1. Loading stage of the serve

and female players now utilize a two-handed grip on the backhand stroke as opposed to a single-handed grip. There are differences in the core/trunk utilization between the one and twohanded backhands. Greater upper trunk rotation has been observed in two-handed backhands than in one-handed backhands and this needs to be trained appropriately based on whether the athlete utilizes a one-handed or two-handed backhand stroke (2).

Conclusion

Backhand and forehand tennis strokes, as well as most movements on the tennis court, incorporate use of the core. So a weak core could be detrimental to the performance of an athlete if not addressed in their workout program. Included in this article are examples of tennis-specific core exercises that could be included in a tennis player's workout program to help improve core strength and stability.

Figure 2. Cocking stage of the serve

Figure 3. The Four Major Forehand Stances (1. Semi-Open, 2. Open, 3. Square, 4. Closed)



Figure 4. Two Major Backhand Stances: 1. Square, 2. Semi-Open

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Figures 5a – d. Serve-Specific Medicine Ball Exercise, Rotational Overhead Medicine Ball Service Throw



Figures 6a – d. Forehand-Specific Medicine Ball Exercise, Single-Leg (Right Leg) Medicine Ball Catch and Throw



Figures 7a – d. Backhand-Specific Medicine Ball Exercise, Single-Leg (Left Leg) Medicine Ball Catch and Throw