



Tennis Anatomy: Conditioning for the arms and wrists.

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ABSTRACT

For a tennis player, the arms and wrists link the lower body and torso to the racket, which is the last link before ball contact. If the arms and wrists are not strong or flexible, the power produced throughout the lower body and core will not efficiently transition into the ball. This results in reduced power and spin on the stroke. This article will outline exercises applied to tennis that can help not only to strengthen the wrists and forearms, but also to prevent injury in a vital area of the athlete's body.

Key words: Conditioning, injury prevention, forearms, wrists.

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TENNIS STROKES AND ARM AND WRIST MOVEMENT

Tennis has evolved much over the past 30 years, due in part to racket and string technology. Because of these advances, we see many more open-stance groundstrokes. The strokes have become more violent, requiring more strength to help protect the surrounding joints, especially for the arm muscles. The muscles of the upper arm must contract concentrically to provide force for the different strokes, but they also need to provide eccentric strength to slow down the swing during the follow-through. We have seen an increase in wrist injuries due to the more vigorous radial and ulnar deviations modern rackets allow. Strengthening the flexors and extensors and the abductors and adductors is a must. Proper balance in each of these muscle groups is the key.

The triceps at the back of the upper arm is an important muscle for a tennis player because it provides support for the shoulder and elbow. From a performance perspective, the triceps plays an important role in the serve, overhead, backhand, and volley. For example, one of the last segments of the kinetic chain in a tennis serve or overhead is extension at the elbow just before contact with the ball. This motion is produced by a forceful contraction of the triceps that transfers forces from the trunk and upper arm into the racket. From an injury prevention perspective, a strong triceps alleviates stress on the wrist, elbow, and shoulder joints, reducing the risk of injury. Because tennis is played with a racket and matches can last many hours,

grip and forearm strength and muscular endurance are vital for a tennis player to develop. The more grip and forearm strength a tennis player has, the less stress she will place on the wrist and elbow joints. Sufficient forearm and grip strength also can reduce the likelihood of shoulder-related injuries. A player who has a weak grip or forearm may try to overcompensate with the shoulder, increasing the risk of injury.

EXERCISES FOR THE ARMS AND WRISTS

When applied correctly, the following exercises will develop arm strength and muscular balance. In general, you want to strengthen the dominant and non-dominant arms equally. This is appropriate for both the upper and lower arms, even though the dominant arm will develop more strength because of the nature of the sport. Strengthening exercises should focus on muscular balance and endurance. Therefore, it is recommended to use lighter weights and more repetitions, especially for the lower arms. Weights typically won't exceed 8 pounds (3.63 kg), and the number of repetitions will usually be 12 to 15 unless otherwise noted. Movements in several directions that are similar to the movement path of the strokes should be incorporated into a training program and have been outlined in the following exercises. Properly strengthened arms will help you perform better on the court and also protect the shoulders, elbows, and wrists from injury.

CABLE OVERHEAD TRICEPS EXTENSION

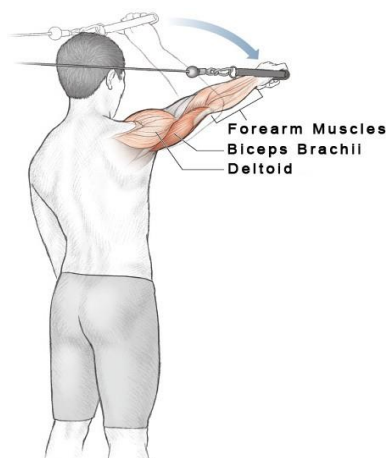


Figure 1. Execution of cable overhead triceps extension.

Execution

1. Stand upright, feet together, and face away from the cable or pulley machine. Grasp the handle in one hand. Start with your arm bent, with approximately a 90-degree angle at the elbow.
2. Slowly extend your arm forward by contracting the triceps until the elbow straightens. Maintain a stable core and shoulder position.
3. At the end of the movement, pause and then slowly return the handle to the starting position via an eccentric triceps contraction. Repeat the movement for 10 to 12 repetitions, and then switch to the opposite arm.

Muscles Involved

Primary: Triceps brachii

Secondary: Deltoid, forearm muscles

Tennis Focus

The cable overhead triceps extension strengthens the triceps for both injury prevention, particularly of the shoulder and elbow joints, and performance enhancement (more powerful serves, overheads, and backhands). The upward phase of the swing in the serve and overhead requires significant triceps extension just before contact as well as during and immediately after contact. The cable overhead triceps extension exercise is highly specific to the serve and overhead movement. It develops the triceps to contract in a similar plane of movement to that experienced during the serve and overhead.



WRIST CURL

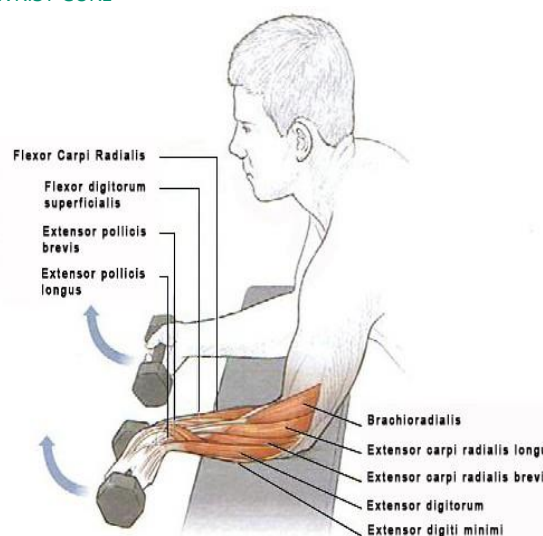


Figure 2. Execution of wrist curl.

Execution

1. Kneel beside a weight bench. Prop your elbows on the bench, with your arms bent at approximately 90 degrees. Grasp two separate dumbbells using an underhand grip (palms turned up). Place your forearms on the edge of the weight bench.
2. Lower the dumbbells by bending (extending) your wrists, pointing your knuckles toward the floor.
3. Raise the weight by contracting the forearm flexors. Repeat for 10 to 12 repetitions.

Muscles Involved

Primary: Forearm extensors (brachioradialis, extensor carpi radialis longus, extensor carpi radialis brevis), extensor digitorum, extensor carpi ulnaris, extensor pollicis brevis, extensor pollicis longus, flexor carpi radialis.

Secondary: Finger extensors and flexors.

Tennis Focus

The wrist curl works forearm strength. This is important from a number of perspectives. Forearm rotation (pronation and supination) and flexion and extension help prepare the muscles for repeated stresses from each of the strokes. In addition, open stances and modern equipment have changed the game. These advances, particularly new racket technology, allow for more forceful groundstrokes incorporating both ulnar and radial deviation. A well-rounded training program for the arms and wrists should incorporate each of these exercises.



FOREARM SUPINATION

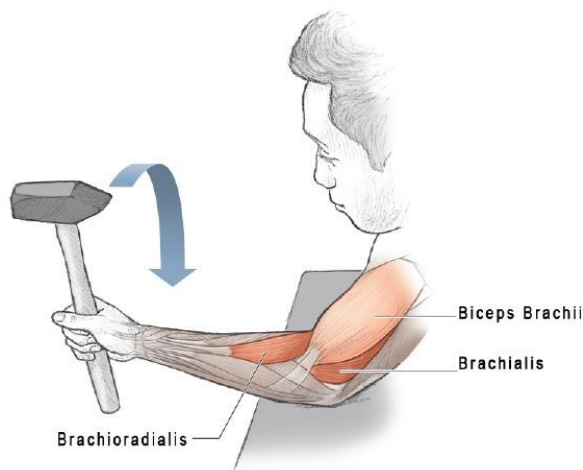


Figure 3. Execution of forearm supination exercise.

Execution

1. Sit or kneel beside a weight bench. Position your forearm and elbow on the bench. Establish a stable and rigid shoulder position. Grasp a hammer or other piece of equipment with a weighted head in one hand. Begin with the hammer head pointed to the ceiling.

2. Slowly and with control rotate your forearm. Take two to four seconds to rotate your forearm to avoid using momentum. If the hammer is in your right hand, your thumb will move to the right as you rotate your forearm. At the end of the movement, hold the position for two seconds, and then slowly return to the starting position.

3. After performing a set with one arm, switch arms and perform the same movement pattern on the other arm.

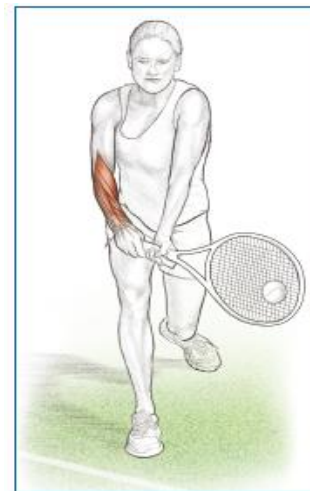
Muscles Involved

Primary: Brachioradialis, brachialis, supinator (anterior)

Secondary: Biceps brachii

Tennis Focus

During the backswing and follow-through of a two-handed tennis stroke, the top hand facilitates supination of the forearm. Developing appropriate strength and endurance in the forearm muscles will help with shot execution and also reduce the risk of wrist and shoulder injuries. Forearm supination helps involve the wrists in the stroke, allowing for greater spin and the potential to create angles that would not be possible without this movement. Developing strength in the forearm is also very beneficial to improve performance on both the forehand and backhand volley as well as the slice backhand.



CONCLUSION

As a tennis player builds ground reaction forces from the ground up, these forces are transferred sequentially through the legs, hip, trunk, shoulder, arm and racket to form a linked system. This article has highlighted just one particular part of that kinetic chain- the arms and wrists. Exercises and their relevant application to tennis have been outlined in order to prepare a tennis player for the physical demands placed on them in the modern game.

REFERENCES

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