



7 important upper body muscles for high performance tennis players

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ABSTRACT

This article focuses specifically on the training of key, yet sometimes overlooked by amateur players, muscles and muscle groups that play a major role in both injury prevention and performance enhancement. We can learn from many high performance and professional tennis players and coaches who have adopted these important upper body exercises. The purpose of the selected muscles is to assist in stabilizing a specific joint and additionally allow these joints their proper range of motion. This information is important for players as well as coaches in helping to their players obtain optimal tennis performance. Although many muscles and movement patterns could be addressed, the specific focus of this article is on those often characterized as secondary muscles of the upper body.

Key words: tennis, muscle groups, optimal performance, injury prevention.

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INTRODUCTION

This article provides a slightly different perspective than most in discussing the development of a strength training program for tennis athletes. We are fully aware of the important role Olympic lifts, previously highlighted sport specific movements and multi-joint exercises can and do play in preparing tennis athletes for proper performance enhancement as well as injury prevention (Ličen, et al, 2022; Roetert et al, 2009a; Roetert et al, 2009b; Reid et al, 2007). In fact, based on the specificity principle of training, training programs should be both physiologically and mechanically specific to the demands of tennis (Colomar et al, 2023; Baiget et al, 2019; Martin & Prioux, 2011). However, in addition to training the major muscle groups, we would also like to draw your attention to seven often less discussed muscles/muscle groups that might not be quite as obvious but should certainly not be overlooked. For the purpose of this article, we are specifically focusing on the upper body, especially since musculoskeletal adaptations in the dominant upper extremity have been reported for range of motion, strength, and scapular biomechanics (Ellenbecker, et al, 2022). The muscle/muscle groups highlighted are not the only ones that could have been selected, but they certainly qualify for our “top 7” list, particularly related to performance and injury prevention training. The functionality of each of these muscles is described in further detail throughout the text in this article.

PROTECTING THE BALL AND SOCKET

As is evident from both playing and watching matches, tennis is a dynamic sport that requires rapid, powerful and repeated muscle contractions. The shoulder is one of the most versatile joints of the human body based on the anatomy as well as function of the ball and socket structure. Stabilizing and protecting this ball and socket and avoiding muscle imbalances are some of the primary functions of the muscles surrounding this joint (Ellenbecker et al, 2014). Therefore, the first four muscles were an easy choice specific to tennis players as they make up the rotator cuff.

The supraspinatus is a relatively small muscle of the upper back that abducts the arm at the shoulder and also stabilizes the humerus relative to the glenoid. The main function of the infraspinatus is to externally rotate the humerus and to stabilize the shoulder (glenohumeral) joint. The primary function of the teres minor is to exert a controlling influence on the action of the deltoid, preventing the humeral head from sliding upward as the arm is abducted. It also functions to rotate the humerus laterally and like the infraspinatus is active eccentrically to decelerate the upper extremity during the follow-through phase of the throwing or serving motion. The subscapularis helps protect the front of the shoulder joint by preventing displacement of the head of the humerus. It rotates the head of the humerus medially (internal rotation) and adducts it and when the arm is raised, it draws the humerus forward and downward as a stabilizing force.

1. Supraspinatus
2. Infraspinatus
3. Teres Minor
4. Subscapularis
5. Serratus Anterior
6. Trapezius (lower)
7. Brachioradialis

RECOMMENDED EXERCISES

Exercise #1 - 90/90 External and Internal Rotation with Abduction

**Tennis Focus**

This exercise requires good shoulder stability and helps strengthen the muscles required to decelerate the arm following ball contact while serving. The movement pattern therefore focuses on the external rotators, which allow the muscles to act eccentrically. In addition, these muscles act concentrically during the loading (cocking) phase of the serve. These “decelerators” are often poorly trained by most tennis players in our experience.

Execution

Using elastic tubing equipment, attach the tubing at approximately shoulder height. Stand erect, feet shoulder-width apart, facing the tubing attachment. Grasp the resistance tubing at shoulder height with a 90-degree angle at the shoulder and 90-degree angle at the elbow. This is the starting position. Slowly externally rotate the shoulder against the resistance. The forearm starts parallel to the floor and is perpendicular to the floor at the top of the movement (external rotation at the shoulder). Hold near the end range of motion for one to two seconds. Slowly return to the starting position and repeat for 10 to 12 repetitions. Then perform the same movement with the opposite arm if you have time. It is most important to train the dominant (serving) arm for this exercise if time is limited.

Exercise #2 - Elbow-to-Hip Scapular Retraction

**Tennis Focus**

This exercise is focused on the muscles that are involved in maintaining good scapular position. This is particularly important for tennis players as many have weaker than required scapula-stabilizing musculature. Strengthening these muscles helps to stabilize the scapula, therefore providing for better posture and more efficient strokes. Thereby, they aid in the prevention of injury and resulting in greater power production.

Execution

Stand erect with feet shoulder-width apart and knees slightly bent, with a 90-degree angle at the shoulders and a 90-degree angle at the elbows. This is the starting position. Slowly lower the elbows toward the hips in a controlled manner by contracting the lower trapezius and rhomboids in the upper back and cueing the shoulder blades to retract and shift down (“pinching of the scapulae”). Hold at the bottom of the movement for two to four seconds. Slowly raise the arms to the starting position.

PUSHING AND PULLING FOR SUCCESS

In addition to training the rotator cuff muscles to balance strength in a tennis player's shoulder, exercises to strengthen the muscles surrounding the scapula (should blade) are very important. The scapular stabilizers work hard, both concentrically (shortening) and eccentrically (lengthening), particularly during the groundstrokes, serves and overheads. Research has indicated that many tennis players have weaker than required scapular stabilizers (Kovacs et al, 2016). Therefore, we selected two exercises that will help in the prevention of injuries to the shoulder and upper extremity in general and allow for more efficient stroke mechanics resulting in safely creating greater power production of the tennis strokes.

The serratus anterior acts to pull the scapula forward around the thorax. As it protracts, it also stabilizes the scapula and plays an important role in its upward rotation, such as when lifting a weight overhead. The lower trapezius muscle participates in the movement of the scapula in the opposite direction of the serratus anterior by pulling and rotating the scapulae medially, essentially holding the scapulae into the thorax wall (retraction). Protraction and retraction are opposite anterior-posterior movements of the scapula. Protraction of the scapula occurs when the shoulder is moved forward, as when pushing against something or hitting a forehand. Retraction is the opposite motion, with the scapula being pulled posteriorly and medially, toward the vertebral column, such as pulling something or hitting a one-handed backhand.

RECOMMENDED EXERCISES

Exercise #1 - Shoulder punches



Tennis Focus - This exercise develops the serratus anterior which is an important scapular stabilizer. A relatively low resistance level and high amount of repetitions are recommended to train the endurance component of these muscles to match the repetitive nature of tennis.

Execution - Lie on your back with your shoulder flexed to 90 degrees and elbow straight while holding a medicine ball. Keeping your elbow straight, raise your hand toward the ceiling as far as you can. Slowly return to the starting position. If executed properly, your hand position will move about six inches up and down. We suggest starting with a 2-3lbs ball and progress appropriately.

Exercise #2 - Kneeling Lat. Pull-Down



Tennis Focus - The posterior aspect of the shoulder is a major contributor to decelerating the arm after a tennis stroke (particularly related to the forehand and serve). Retraction of the shoulder blades helps strengthen the scapular muscles. The largest and most powerful muscles of the back (i.e. Trapezius, Latissimus Dorsi) are included in this exercise. However, don't forget the Rhomboids (Major and Minor) in protecting the scapulae.

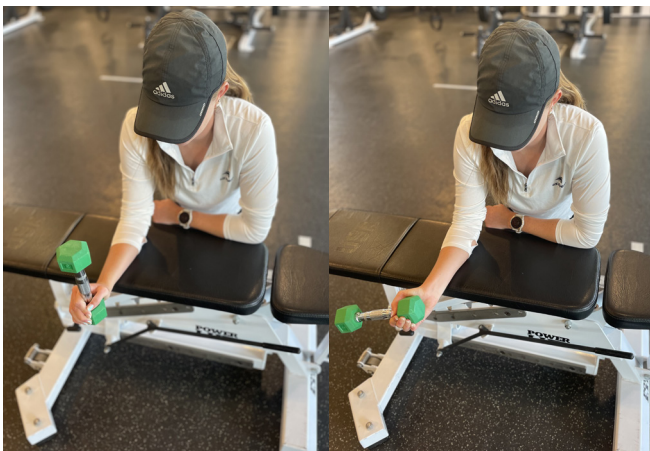
Execution - Kneel on a mat, facing a cable machine. Grab the bar with your hands slightly wide than shoulder-width apart, palms facing out. Establish a stable core and activate the gluteal muscles. Pull the bar down in front of your head to approximately the level of the sternum (breastbone). Focus on squeezing the shoulder blades together. Slowly return to the starting position and repeat.

FOREARM

The brachioradialis is a muscle of the forearm that flexes the elbow and also rotates the forearm. It is also capable of both pronation and supination, depending on the position of the forearm. The main purpose of the brachioradialis is to flex the elbow along with the biceps and brachialis muscles. When the forearm is pronated, the brachioradialis tends to supinate as it flexes the elbow. In a supinated position, it typically also pronates as it flexes the elbow. This also assists the biceps brachii and stabilizes the elbow. An additional benefit is that, when properly trained, the strength and stability in this muscle can also assist in grip function which is important for tennis players of all levels.

RECOMMENDED EXERCISES

Exercise #1 – Forearm Pronation/Supination



Tennis Focus

Although most people combine pronation and supination actions as a unit, we will hereby focus specifically on the supination activity since it provides a greater involvement of the brachioradialis. Developing appropriate strength and endurance in the forearm muscles helps with shot execution and also reduces risk of wrist and shoulder injuries. Forearm supination helps involve the wrists, particularly in hitting a two-handed backhand. This action allows for greater spin and the potential to create angles that would not be possible without this movement. Developing strength in the forearm is also beneficial to improve performance of both forehand and backhand volleys and helps to also prevent tennis elbow.

Execution

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

Exercise #2 - Hammer Curl



Tennis Focus

Tennis requires you to handle a racket for hours during a match, therefore sufficient grip and forearm strength and muscular endurance are important. The muscles developed in the arm curl exercise play a role in the follow-through of both forehand and backhand groundstrokes. On the forehand, the deceleration of the arm during the backswing is partially aided by the contractions of the biceps, brachialis and brachioradialis. This action supports the decelerators of the shoulder. During the backswing and follow-through on the backhand groundstroke, the biceps is recruited to help support other muscles of the shoulder and upper back.

Execution

Stand with a stable lower body position. Hold a dumbbell in each hand, arms extended by your sides with your core muscles contracted. Lift one dumbbell toward your shoulder in a straight path by bending the elbow to approximately 90 degrees while maintaining a stable core and lower body position. Pause at the end of the movement and slowly lower the dumbbell to the starting position. Repeat with the other arm. Alternate arms for 10 to 12 repetitions.

SUMMARY

Training tennis athletes requires a combination of movements for the development of strength, power and endurance to improve acceleration and deceleration in various planes of motion. The purpose of this article was to highlight some of the sometimes overlooked, yet critically important upper body muscles that play a complementary role in the major movements of successful tennis players with the purpose of injury prevention as well as performance enhancement. Although larger muscle groups are critical for success, these complementary muscles should be considered for tennis players and their coaches at all levels of performance. The goal is to highlight the need to improve the training of some of these auxiliary exercises that should be incorporated into a tennis players training program in addition to the more commonly utilized exercises that are focused for strength, power and muscular endurance.

CONFLICT OF INTEREST AND FUNDING

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