

What a racquet!

Racquet Sports Injury Prevention

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Racquet sports have had their ups and downs in popularity. In the late 1970s to mid-1980s racquet sports, especially tennis and racquetball, experienced a surge in popularity.¹ In 1987, a decade after the heyday of tennis, there were 21 million people playing the game in the U.S. 1987 was the peak of popularity for racquetball, with 10.4 million players in the U.S.¹ Now there are approximately 15 million tennis players and 5.3 million racquetball players.

Putting aside fad mentality, tennis, racquetball, squash and even badminton are all great sports, providing an excellent total body workout with cardiovascular benefits...and they are FUN! An intense racquetball session burns more calories per hour than the stair master or stationary bike, improves eye-hand coordination, and is the easiest racquet sport to learn.²

As with any fast-paced, competitive sport, racquet sports have many possibilities for traumatic and overuse injuries. Understanding the primary ways people get injured during racquet sports allows players to prepare and protect themselves from injury and hopefully be able to play safely for many years. There are some people with pre-existing conditions who should avoid racquet sports entirely.

Precautions

If you have a history of heart problems, you should probably avoid playing racquetball or squash completely.³ If you have a medical condition, are overweight, are over 40 years old or haven't exercised regularly, see your doctor for a check-up prior to taking up racquet sports.⁴

Because of the high forces and repetition encountered by the wrist and forearm in racquet sports, *anyone with any type of pre-existing wrist or forearm issues should not play racquet sports.* Even the strengthening exercises recommended to prevent injury can increase damage to muscles and tissues that are already injured from Repetitive Strain Injuries. In rehabilitation from tennis injury, strengthening is done after tissues have started to heal, not before.

Injury Prevention

The keys to avoiding overuse and traumatic injuries in racquet sports are:

- Conditioning
- Proper technique
- Proper equipment and court conditions
- Preparation and warm up prior to play
- Awareness during playing
- Cool down

1. Conditioning

Overall conditioning is important, so if you are out of shape, prepare your body by exercising at least 1 to 3 weeks before you start playing.³ A poor fitness level increases your risk for injury.⁴ If you plan to play squash, it is generally a good idea to begin by playing racquetball to develop fitness and skills prior to tackling the more intense game.⁴

Racquet sports require short bursts of speed, so getting in condition by just running or cycling won't do as much as doing sport-specific conditioning.² Doing wind sprints is an excellent way to build up endurance for the bursts of

speed needed on the court. It is recommended to intersperse several all-out killer sprints with several minutes of jogging; repeat several times.²

Strengthening exercises effectively prevent injury.² Because tennis is such a repetitious, dynamic sport, a high repetition/low weight routine is recommended to condition the muscles for the endurance and type of contractions necessary for tennis.⁵

Below is a table indicating the muscle group to be strengthened and the appropriate exercises.

| MUSCLE GROUP | EXERCISES | PURPOSE |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| Shoulder girdle | Prone rows, prone horizontal abduction, push-ups with an added push or turn at the end ⁵ Excellent illustrated exercises are available on the NISMAT website. ⁶ | Stability by strengthening the serratus anterior, rhomboids, trapezius and levator scapula |
| Shoulder girdle (con'd) | Diagonal rubber tubing exercises, ground stroke and serve simulation. ⁵ | Strengthen external rotators to avoid strength imbalance of the racket arm ⁵ |
| Wrist and forearm | Rubber tubing, wrist rollers, gripping ⁵ | Strength and endurance |
| Abdominals | Crunches, crunches with a turn, supine double leg raises, medicine ball throws from overhead and diagonally. Excellent illustrated exercises are available on the NISMAT website. ⁷ | Power and stability to the spine |
| Low back | Prone bilateral arm and leg raises ⁵ | Stability |
| Trunk | Diagonal sit-ups, medicine ball trunk rotations, ground-stroke simulation. ⁵ | Strength for the kinetic transfer of energy from lower to upper body. |
| Quadriceps | Lunge walks, diagonal lunges, side lunges, squats ⁵ | Strength for starts, stops and direction changes. |
| Knees | Straight leg raises, hip abduction, hip adduction, hip flexion. Excellent illustrated exercises are available on the NISMAT website. ⁸ | Strengthen all of the muscles of the lower body to take pressure off the kneecap. ⁸ |

Flexibility is also very important for injury prevention. For example, adequate flexibility of the hip muscles is critical for avoiding back injuries.⁵ Flexibility is improved by stretching the quadriceps, hamstrings, iliotibial band, gastrocnemius-soleus complex, and tensor fascia, as well as myofascial release of the lateral retinaculum.^{5,9} Footwork drills are very useful in improving proprioception, balance, and flexibility.^{5-Book} The NISMAT website, in addition to illustrating strengthening exercises, has stretches to improve flexibility of these muscle groups.⁸

In addition, the risk of wrist can be minimized with wrist taping to avoid excessive wrist movement, but wrist-strengthening exercises are critical to prevent injury.⁵

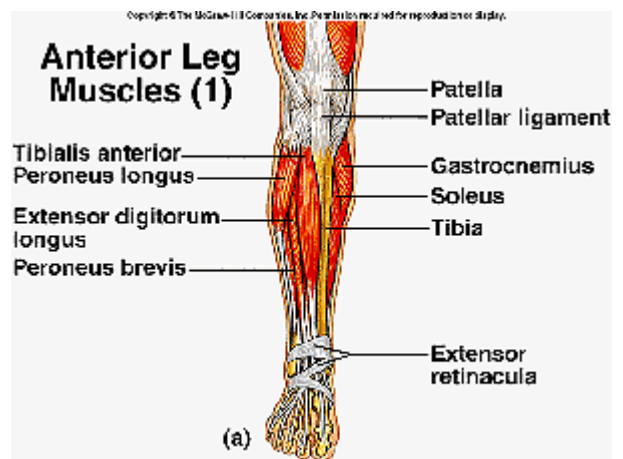










Illustration courtesy of Owensboro Community & Technical College
<http://www.octc.kctcs.edu/gcaplan/anat/Notes/API%20Notes%20J%20%20Muscles%20of%20the%20Leg.htm>

2. Technique

Poor technique puts unnecessary strain on joints and muscles and is the number one cause of tennis injuries.^{4,5} Even though racquetball and squash are not complex sports, take a lesson or two to make sure you have the correct technique.² Tennis is more difficult to master, so lessons from a tennis pro are advisable for both beginner and experienced players to develop and maintain correct technique.

Stroke analysis can eliminate potential sources of wrist injury, specifically grip, grip size, swing path, and contact point.⁵ An eastern grip during both forehand and one-handed backhand strokes in tennis is the most stable position for the wrist.⁵ Stroke modifications, such as altering the swing plane to be more horizontal and making sure the contact point for all ground strokes is near or in front of the front foot to ensure a vertical racket position at impact are important in preventing wrist injury.⁵

| Forehand | Backhand |
|--------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
|  <p data-bbox="422 856 560 890">Eastern Grip</p> |  <p data-bbox="1055 856 1193 890">Eastern Grip</p> |
|  <p data-bbox="414 1117 560 1150">Western Grip</p> |  <p data-bbox="1047 1176 1193 1209">Western Grip</p> |
|  <p data-bbox="389 1453 592 1486">Full Western Grip</p> |  <p data-bbox="1023 1449 1226 1482">Full Western Grip</p> |
|  <p data-bbox="381 1774 600 1808">Semi-Western Grip</p> |  <p data-bbox="1015 1795 1226 1829">Semi-Western Grip</p> |

Illustrations courtesy of <http://opus111-web.hp.infoseek.co.jp/soft-tennis/encyclopedia/A/eastern.htm>

The motion of tennis requires rhythm, timing, and sequential movement, transferring force smoothly from the ground upward.⁵ If there is a "kink" in this smooth transition, momentum is lost and additional force is required to hit the ball hard enough.⁵ Timing is also important; a pause in continuous motion adds extra force throughout the body.⁵

Avoid arching the back unnecessarily when serving or reaching for an overhead shot.¹⁰

3. Equipment and Court Conditions

Clothing that "breathes" prevents excessive sweating and an unhealthy amount of water loss.³ Wear cotton clothing and avoid rubberized clothing or non-breathable fabrics.^{3,4}

Good shoes are very important in racquet sports. Shoes with a wide bottom accommodate the quick starts and stops, as well as the lateral movements that can cause ankle sprains.² For added support, invest in support socks.¹⁰ The following are characteristics necessary in a good racquet sport shoe:⁵

- Insole support to provide optimal foot support and cushion.
- Heel counters that add stability and support, preventing the heel from shifting and slipping.
- Thick rubber outsoles that are enhanced over the toe area to increase durability.
- Reinforced mid-foot support to provide optimal lateral stability during quick changes in direction.
- Wide toe box that allows the toes to spread sufficiently.
- Optimal tread pattern that is suitable for the surface. A small, shallow tread pattern is desirable for tennis played on a clay court. A wide tread pattern with deep flex grooves is best for a hard court.

The correct Racquet is also very important for injury prevention.

- A grip that is too small often results in the inability to hold onto the racket adequately.⁵ A grip that is too big often results in constant contraction of the forearm muscles because the player is afraid they will lose their grip.⁵ Measure from the lower crosswise crease on the palm to the tip of the fourth finger to determine the correct grip size in inches.^{5,11} If the measurement is between grip sizes, a smaller size is recommended because grip tape can be wrapped easily around the grip to increase the size.⁵
- An oversized racket with a larger sweet spot provides more stability, less twisting and reduced arm vibration.⁵
- A stiffer racket frame also reduces vibration and dampens vibration more quickly.⁵
- Cushioned grip tape increases racket dampening by up to 100%.⁵
- Lowering string tension creates a trampoline effect which absorbs some of the shock from ball impact.^{5,9}
- A tether will keep the racquetball racquet from flying out of your sweaty grip and possibly hitting your opponent or yourself.²

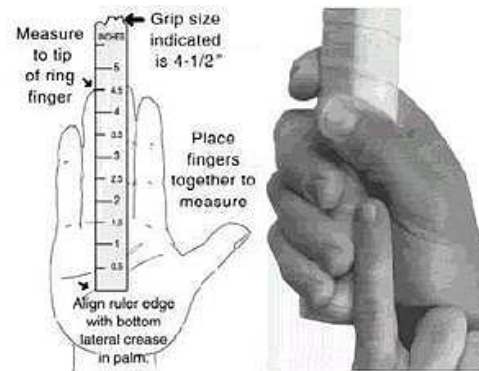


Illustration courtesy of Reference 11

With a proper fitting grip, you should be able to fit the index finger of your non-hitting hand between the palm and ring finger as shown.¹¹

Ball characteristics. Squash balls are color coded to indicate their speed and bounce. Use a ball that is appropriate for your skill and fitness level.⁴

Court conditions. Avoid playing tennis on very hard surfaces such as asphalt or cement.¹⁰ Lower back injuries are very common in tennis players who play on hard surface courts, but they can be reduced by wearing special heel inserts in the shoes to absorb the shock.¹⁰

Sun. Outdoor tennis increases your exposure to the sun and thereby increases your risk for skin cancers. Wear sunscreen and UV protection sunglasses to protect your eyes. Wear a hat and clothing that reduces your exposure to the sun.

4. Preparation and Warm Up

You will lose water as you play, so drink 16 to 32 ounces of fluid 1 to 2 hours before a game.³ Drink plenty of fluids during and after the game, too.⁴ Sports drinks are not necessary; water is fine.³

Warm up your body and then do some stretching to loosen up prior to play.^{2,5} Warm up by walking briskly or jogging in place for 5 to 10 minutes prior to playing.^{4,10}

5. Awareness

Do not ignore cramps, pain or fatigue. Most major injuries result when a player keeps playing after an injury.³ Racquet sports can cause re-injury to previously injured areas, especially the ankle.⁴ Be aware of your physical weaknesses and "listen" to what they are telling you. Respect your physical limitations and don't continue playing when you are fatigued.⁴ Stop playing immediately if someone is injured. Continuing to play will aggravate the injury.⁴

Always allow at least one and a half feet between you and your opponent during play.^{3,4} Hold your swing or stop play if you think you might hit your opponent with the ball or the racquet.³

In racquetball and squash, many injuries occur when one player is more experienced than the other.³ If you are more experienced, tone down your shots and keep your guard up. If you are the less experienced player, do not take unnecessary chances and expect to defeat your opponent. Learn from your opponent's tactics and safety measures.³

6. Cool Down

Allow 5 minutes to cool down by walking around until your heart rate returns to normal. Jumping into a hot shower or running out to the car right after a game can upset your body's sweating system.^{3,4}

In summary, adequate warm-up, stretches, strengthening, conditioning, and a heightened awareness and respect for any discomfort are all extremely important in injury prevention.

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