

Description

An abdominal muscle strain is a partial muscle tear or muscle pull of one of the abdominal muscles. Usually, the non-dominant rectus abdominis is affected, but the oblique muscles (external and internal) may also be injured (*figure 1*). Abdominal muscular injuries are common in tennis players at all levels of competition. The tennis serve is commonly involved in the injury mechanism. During the cocking phase, the lumbar spine is in hyperextension, in order to increase distance for racquet speed. When the player's axial skeleton is completely extended, the abdominal muscles are maximally stretched, storing elastic energy. On movement reversal, these abdominal muscles contract powerfully, using this stored elastic energy (eccentric-concentric contraction). This is a high-risk moment for an abdominal muscle strain. When the ball is hit behind the body, such as with a kick service, the back is arched even more, resulting in more abdominal muscles stretch, increasing the risk for an abdominal muscle strain. The open stance forehand has also been implicated in these injuries, because of the powerful trunk rotation. Symptoms are a sudden stabbing pain upon forceful use of the muscles (such as with serving or doing sit ups), indicating a (partial) rupture has occurred. There is tenderness over the affected area. Pain can be elicited if the player lies flat and tries to perform a sit up or lift his leg against resistance.

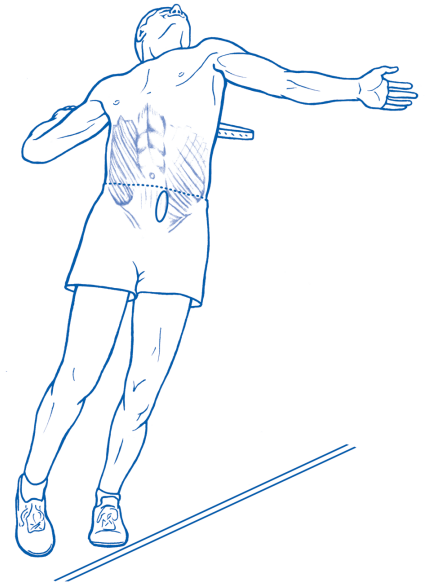


figure 1. The abdominal muscle injury

First Aid

The following action should be taken as quickly as possible, certainly within 48 hours.

- Rest (immobilisation). Stop playing, or at least refrain from making overhead shots
- Cool the painful area directly with ice or a cold pack for ten to fifteen minutes and repeat this several times a day. Do not place ice on the bare skin. Place a towel between the skin and the ice pack to avoid injury from the ice pack.

Immediate and effective first aid is essential for a rapid recovery. Have a sport physician examine the injury if it looks serious. In some cases the player will be referred to a (sport) physiotherapist.

How to Ensure the Best Recovery

As soon as the worst of the pain and swelling have subsided (several days to a week) you can resume training. Pain is a warning to stop and rest. Be careful: exceeding the pain threshold will only prolong the healing process! Rehabilitation progresses in three stages, from light to demanding.

Here is a list with descriptions and tips for doing these exercises.

Stage 1. Improvement of Normal Function

Gentle stretches and isometric contractions of the abdominal muscles will stimulate their natural recovery.

- Isometric contraction tensing of the right abdominal muscles. Lie down on your back and place your feet flat on the floor. Tense your stomach muscles and press your back into the floor. Hold this position for five seconds and relax. Do three series of ten to twenty repetitions.
- Isometric contraction of the oblique abdominal muscles. Stand in front of a door opening, with your right hand on the doorframe. Push gently with your right hand until you feel tension in the stomach muscles. Keep your upper body straight and look straight ahead.
- Pushing away the tips of your fingers. Push the tips of the fingers of both hands gently a few centimetres into the stomach muscles. Push the fingers out by tensing the stomach muscles, meanwhile continuing to apply counter-pressure with the fingers. Hold this position for five seconds and then let go. Repeat this exercise ten to twenty times.
- Stretching the abdominal muscles. Lie down on your stomach with your hands in the 'push-up' position (*figure 2*). Push yourself up slowly with your hand so that your shoulders are raised from the ground, while hip and legs maintain contact with the ground. Make sure that your back and buttocks stay relaxed. Hold this position for fifteen to twenty seconds and then return to the initial position. Repeat this exercise three times and do it twice a day.

Stage 2. Returning to Training

As soon as you are able to perform the exercises described above easily and without pain, you can start training again.

- Strengthen the straight abdominal muscles (straight crunch, *figure 3*). Lie on your back on a firm surface with your knees bent and your feet flat on the ground. Place the tips of your fingers behind your head and let your elbows stick out sideways. Look straight ahead and make sure your head and neck are relaxed. Tense the abdominal muscles and raise yourself to a point where your shoulders are just off the ground. Hold this position for three seconds. Repeat as often as possible.
- Strengthen the oblique abdominal muscles (oblique crunch, *figure 4*). Lie on your back on a firm surface, with your right knee bent. Place your left knee across your right knee. Place your fingertips behind your head, so that the elbows are pointing outwards. Look straight ahead and make sure your neck and head are relaxed. Tense the abdominal muscles and curl your body up with a twisting motion, bringing your right elbow towards your left knee, to a point just above the ground. Hold this position for three seconds and repeat as often as possible. Then repeat the exercise on the other side, crossing the right knee over the left leg.
- The next step is to start running. The first few times out, run at a slow pace. After a few training sessions you can start introducing some faster paces, followed by turning and pivoting exercises. Conclude with short sprints.

Stage 3. Return to Play

- You are now ready to go back to the tennis court, as long as you bear in mind that overhead strokes should be avoided at first. Start off by playing against the practice wall or with a game of mini tennis, which will allow moving backwards slowly. Avoid hitting services, smash hits, high forehand and backhand shots and high volleys.
- Strengthen the abdominal muscles. Up to this point, the abdominal muscles have been trained in a normal position, being shortened during the exercise. It is important for them to also be strengthened in a stretched position, so that they can cope with the strain during service. Sit down on a bench that is tilted straight back, or slightly inclined. Lean back slightly, hold this position for a few seconds and come back slowly to the original position. Maintain the tension in the abdominal muscles and repeat the movement. Build up to three series of ten to twenty repetitions.
- Medicine ball exercises. In these exercises muscles undergo a rapid 'stretch-lengthening', similar to the action of the service. Hold a medicine ball with two hands above your head. Throw the ball to your partner and then catch it above your head, cushioning the catch. Throw the ball back immediately in a springy and fluid motion (*figure 5*).
- While you are playing, you can now try some second services, smashes and high forehand and backhand shots.
- If this goes well, you can hit first services. Gradually increase the frequency and speed of your service.
- You can now start playing practice sets and practice matches. Once you have played for two to four weeks without pain, you can resume playing competition matches.

Preventing Re-injury

Unfortunately it is not always possible to prevent a recurrence of an abdominal muscle injury. You can, however, reduce the risk by observing the following guidelines:

- Make sure you are in general good condition.
- Train the abdominal muscles daily.
- Work on a good service technique with a regular ball-toss.
- Do not play too many matches after each other; try to take regular periods of rest.

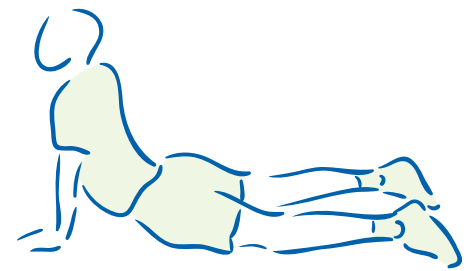


figure 2. Stretching the abdominal muscles

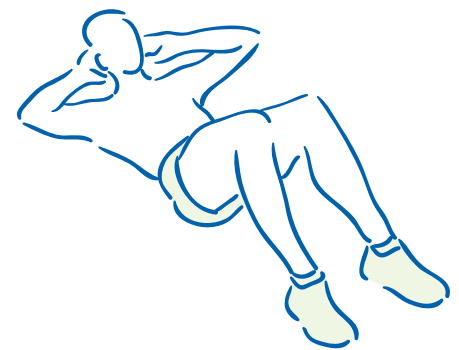


figure 3. Strengthening the straight abdominal muscles

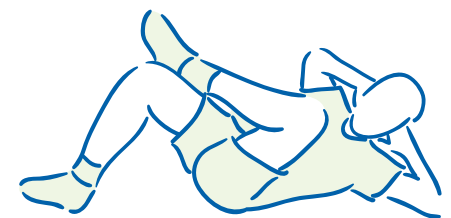


figure 4. Strengthening the oblique abdominal muscles

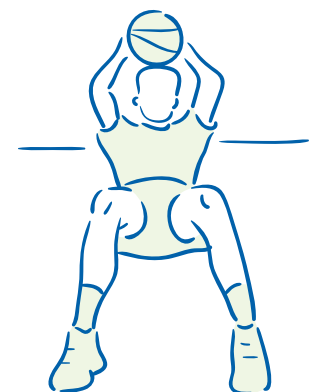


figure 5. Medicine ball throwing