

ABDOMINAL MUSCLE STRAIN

Diagnosis

An abdominal muscle strain is a partial tear or pull of one of the abdominal muscles. The injury usually affects the (non-dominant side of the) straight abdominal muscles (rectus abdominis) (figure 1), but the internal and external oblique abdominal muscles (the obliquus internus abdominis and obliquus externus abdominis) may also be injured. Abdominal muscular strains are a common occurrence for tennis players at all levels. The tennis serve is the movement which involves the highest risk of sustaining an abdominal muscle strain.

Just before making the stroke, whilst bending back during the cocking phase, the abdominal muscles are under a great deal of tension. As soon as you start to hit the ball, these muscles start to contract, using the elastic energy stored in the abdominal muscles.



Fig 1. Straight abdominal muscles (rectus abdominis).

The power released moves across the body, from the dominant shoulder to the leg of the non-dominant side of the body. This movement, whereby the muscles stretch and then contract (eccentric-concentric contraction), is a high-risk moment for the abdominal muscles.

When you arch your body back even further than you do for a standard serve, such as for a kick serve or topspin serve, this increases the risk of sustaining an abdominal muscle strain even more. The open stance forehand, which involves a powerful rotation of the torso, may also lead to an abdominal muscle strain.

Symptoms of an abdominal muscle strain are a sudden stabbing pain upon contraction of the injured muscle. This pain is for example felt during the serve or when doing abdominal muscle exercises. Furthermore, the injured muscle is sensitive upon palpation.

What should you do? First Aid!

The first phase of the treatment consists of activity modification and cooling of the injured area. Once the pain has somewhat subsided, you can start the rehabilitation process. Immediate and effective first aid is essential for a rapid recovery. If the injury seems to be serious or if in doubt, have a (sports) physician examine you. In certain cases you will be referred to a (sports) physiotherapist.

How to Ensure the Best Recovery

As soon as the worst of the pain has subsided (after one to five days), you can start the build-up process. During this build-up pain is a warning sign to stop and rest.

Be careful: do not exceed your pain threshold, as this will only delay the healing process! The build-up consists of three stages, ranging from easy to demanding. Here are the exercises, along with some tips.

Stage 1. Improvement of Normal Function

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

- Stretching the abdominal muscles. Lie down on your stomach with your hands in the 'push-up' position (figure 2). Slowly push yourself up with your hands so that your shoulders are raised from the ground, while hips and legs maintain contact with the ground. Hold this position for 15 to 20 seconds and then return to the original position. Try to ensure that your back and buttock muscles remain relaxed throughout this exercise.

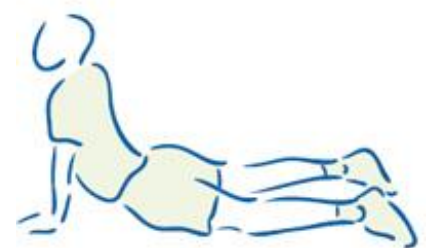


Fig 2. 'Push-up' position stretch

- Isometric contraction of the right abdominal muscles. Lie down on your back with bent knees and your feet placed flat on the floor. Tense your stomach muscles and press your back into the floor. Hold this position for five seconds and release.
- Isometric contraction of the oblique abdominal muscles. Stand in front of a door opening, with your right hand on the door frame. Push your right hand against the door frame very gently, until you feel tension in the abdominal muscles. Keep your upper body straight and keep looking straight ahead
- Pushing away your finger tips. Gently push the finger tips of both hands into your abdomen, by a few centimetres. Push your fingers outwards by tensing the stomach muscles, whilst your fingers continue to apply counter-pressure. Hold this position for five seconds and then release.

Stage 2. Returning to Training

As soon as all of the above exercises can be performed confidently and free of pain, you may start training again.

- Strengthening the straight abdominal muscles (straight crunch, figure 3). Lie on your back with your knees bent and your feet flat on the ground. Place your fingertips behind your head, so that your elbows are pointing outwards. Look straight ahead and try to relax your head and neck. Contract your abdominal muscles and ensure that your back maintains contact with the floor. Raise your torso to the point whereby your shoulders are just off the ground. Hold this position for a few seconds and slowly return to the original position. Keep your lower back on the ground throughout the entire exercise. Repeat the exercise as often as you possibly can.



Fig 3. Straight crunch

- Strengthening the oblique abdominal muscles (oblique crunch, figure 4). Lie on your back with your knees bent and your feet flat on the ground. Place your left foot across your right knee. Place your finger tips behind your head, so that your elbows are pointing outwards. Look straight upwards and try to relax your head and neck.



Fig 4. Oblique crunch

Contract your abdominal muscles and curl your body up with a twisting motion. Now bring your right elbow towards your left knee, to a point whereby your right shoulder blade just comes off the ground. Hold this position for a few seconds and slowly come back down. Repeat the exercise as often as you can. Then change legs (right foot across left knee) and repeat the exercise for the oblique muscles on the other side.

- The next step is to start running. Start off at a slow pace, followed by faster pace work, and then include pivots and turns. Finally, start introducing short sprints.

Stage 3. Return to Play

With an abdominal muscle strain you can sometimes just continue to play tennis. However, whilst it is still painful it is best if you avoid serves and overhand strokes.

- Start off by playing against the practice wall or with a game of mini tennis, which will allow you to move backwards slowly. Avoid serves, smashes, high forehand and backhand strokes and high volleys.
- Strengthening the abdominal muscles. Up to this point, the abdominal muscles have been trained in a normal position, whereby they contracted during the exercise. It is important for them to also be strengthened in a slightly stretched position, like in a serve, so that they are able to cope with the strain when performing this movement. Sit down on a bench which is either straight or tilted slightly backwards. Lean back slightly, hold this position for a few

seconds and slowly come back to the original position. Maintain the contraction in the abdominal muscles and repeat the movement. Do three sets of 10 to 20 repetitions.

- Medicine ball exercises. In this exercise muscles undergo a rapid stretch and contraction ('stretch-shortening'), similar to the action when performing a serve. Hold a medicine ball above your head with two hands (figure 5). Throw the ball to your partner and then catch it above your head. Slightly spring back with the ball and then throw the ball back in one go. Start by using a relatively light weight ball (0.5 – 1 kg), and slowly build it up over several weeks. Repeat three sets of six to eight repetitions.



Fig 5. Medicine ball exercise

- You can now start performing second serves, smashes, and high forehand and backhand strokes during play. Once this is going well, you can start performing some first serves. Gradually increase the frequency and speed of the serve.
- You can now start playing practice sets and practice matches. Once you have played practice matches for two weeks without pain, you can start playing competition matches again.

Preventing Re-injury

Unfortunately, abdominal muscle strains cannot always be avoided. However, you can minimise the risk by observing the following guidelines:

- Ensure that you have good basic fitness.
- Strengthen your abdominal muscles.
- Ensure you have a good service technique, with a regular ball toss.
- Ensure that you rest sufficiently between training sessions, games, competitions and matches.