



# Spondylolysis

## DESCRIPTION

Spondylolysis is a stress or fatigue fracture of the bones of the spine (vertebrae) that does *not* involve the main weight-bearing part of those bones, the body of the vertebra. Instead, it involves an area of the spine called the *pars interarticularis*, between the facets. Rarely, spondylolysis can be due to an acute traumatic fracture, and it tends to occur in adolescent athletes. The stress fracture occurs because the mechanisms of repair fail to keep up with the damage caused by the repetitive force.

## COMMON SIGNS AND SYMPTOMS

- Chronic dull ache in the low back that is worse with hyperextension and occasionally with flexion, such as bending at the waist
- Tightness of the hamstring muscles
- Occasionally, stiffness of the lower back

## CAUSES

Spondylolysis is caused by repetitive hyperextension (arching) of the back and excessive hyperextension with rotation of the back; it is sometimes due to excessive strength of the back muscles. This repetitive or excessive force causes injury that exceeds the bone's ability to heal. Rarely, spondylolysis can occur as the result of an acute fracture with severe trauma from a sudden blow.

## FACTORS THAT INCREASE RISK

- Any sport that causes hyperextension (arching) of the back, either excessively with rotation or repetitively, especially football, gymnastics, diving, weight lifting, dancing, rifle shooting, wrestling, tennis, swimming, running, volleyball, track and field, rugby, and contact sports
- Poor physical conditioning (strength, flexibility)
- Inadequate warm-up before practice or play
- Family history of spondylolysis
- Poor sports technique

## PREVENTIVE MEASURES

- Use proper sports technique.
- Wear proper protective equipment, and ensure a correct fit.
- Appropriately warm up and stretch before practice and competition.
- Maintain appropriate conditioning that includes back and hamstring flexibility, back muscle strength and endurance, and cardiovascular fitness.

## EXPECTED OUTCOME

Spondylolysis is usually curable with appropriate conservative treatment within 6 months, although healing may occur much faster—sooner than 6 weeks in some cases.

## POSSIBLE COMPLICATIONS

- Frequent recurrence of symptoms, resulting in a chronic problem; appropriately addressing the problem the first time decreases the frequency of recurrence.
- Chronic pain and nonhealing of the fracture
- Delayed healing or delayed resolution of symptoms, particularly if sports are resumed too soon
- Prolonged disability
- Progression to spondylolisthesis (slippage or movement of one vertebra onto another)

## GENERAL TREATMENT CONSIDERATIONS

Initial treatment consists of rest from activities that cause pain, such as hyperextension, and medications and ice to relieve pain. As pain subsides, exercises to improve strength and flexibility and to learn proper back mechanics are started. Referral to a physical therapist or athletic trainer may be recommended for evaluation and further treatment, including transcutaneous electronic nerve stimulation (TENS). A back brace may be recommended, but surgery is rarely necessary; it is reserved for those athletes who have persistent pain despite 6 to 12 months of appropriate conservative treatment. Surgery is performed to help the fracture heal or, more often, to fuse two or more vertebrae together.

## MEDICATION

- Nonsteroidal antiinflammatory medications, such as aspirin and ibuprofen (do not take for 7 days before surgery), or other over-the-counter pain relievers, such as acetaminophen, are often recommended. Take these as directed by your physician, and contact your physician immediately if any bleeding, stomach upset, or signs of an allergic reaction occur.
- Pain relievers may be prescribed for you as necessary. Use these only as directed. Do not use any heavy machinery or drive a car while taking these medications.

## HEAT AND COLD

- Cold is used to relieve pain and reduce inflammation for acute and chronic cases. It should be applied for 10 to 15 minutes every 2 to 3 hours as needed and

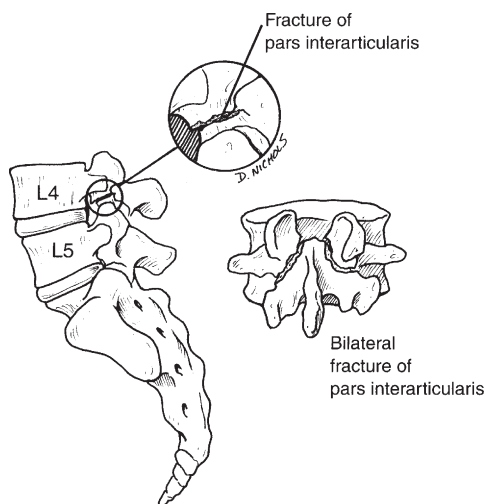
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immediately after any activity that aggravates your symptoms. Use ice packs or an ice massage.

- Heat may be used before performing stretching and strengthening activities prescribed by your physician, physical therapist, or athletic trainer. Use a heat pack or a warm soak.

### WHEN TO CALL YOUR DOCTOR

- Symptoms get worse or do not improve in 2 to 4 weeks despite treatment.
- You develop numbness, weakness, or loss of bowel or bladder function.
- New, unexplained symptoms develop. Drugs used in treatment may produce side effects.



**FIGURE 1** From Shankman GA: *Fundamental orthopedic management for the physical therapy assistant*, St Louis, 1997, Mosby Year Book, p 227.

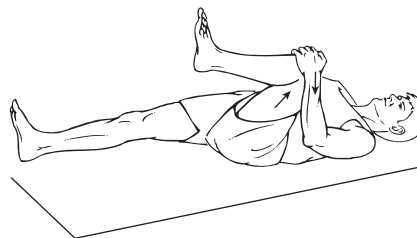
### RANGE OF MOTION AND STRETCHING EXERCISES

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The exact range of motion and stretching exercises that are most appropriate for you *usually* need to be determined on an individual basis. Emphasis is placed on flexion exercises (rounding your back; pulling your knees to your chest) rather than extension exercises (arching your back), which increase the stresses on the spine that are related to this type of injury. The key point to remember is that if any exercise—range of motion, stretching, or strengthening—causes pain to radiate away from your back and toward your buttocks or legs, *stop the exercise immediately*. The purpose of these exercises is to begin to decrease the intensity and the size of the area of your pain.

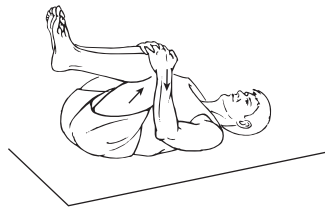
These are some of the *initial* exercises you may use to start your rehabilitation program, until you see your physician, physical therapist, or athletic trainer again, or until your symptoms resolve. Please remember:

- Flexible tissue is more tolerant of the stresses placed on it.
- A *gentle* stretching sensation should be felt.
- If pain or other symptoms radiate away from your back toward your buttocks or legs, *stop the exercises immediately*.



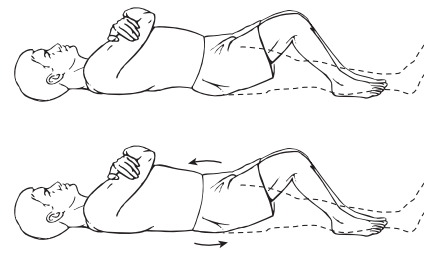
#### RANGE OF MOTION • Lumbar Flexion

1. Lie on your back with both legs flat on the floor.
2. Bend one hip and knee up toward your chest.
3. Grasp your knee and pull it gently toward your chest. Keep the other leg flat on the floor.
4. Hold each repetition for \_\_\_\_ seconds, and *slowly* return to the starting position. Repeat with the opposite side.
5. Repeat this exercise \_\_\_\_ times, \_\_\_\_ times per day.



### RANGE OF MOTION • Lumbar Flexion

1. Lie on your back with both legs flat on the floor.
2. Bend one hip and knee up toward your chest and then the other.
3. Grasp your knees and pull them gently toward your chest.
4. Hold this stretch position for \_\_\_\_ seconds.
5. Release one knee, allowing your leg to return to the floor, then release the other knee.
6. Repeat this exercise \_\_\_\_ times, \_\_\_\_ times per day.



### STRENGTH • Pelvic Tilt

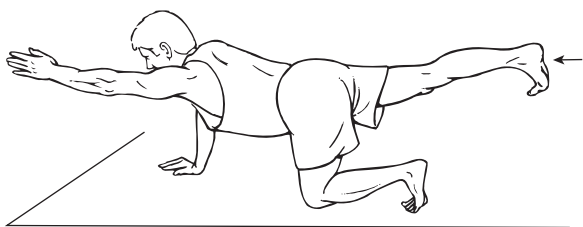
1. Lie on the floor as shown. You may do this exercise with your knee bent or straight, but it is harder with the knees straight.
2. Tighten your stomach and buttock muscles, and push back flat onto floor. If you do this properly, your pelvis will rotate in the direction shown in the diagram.
3. Hold each repetition for \_\_\_\_ seconds. Count out loud, and do not hold your breath.
4. Repeat this exercise \_\_\_\_ times, \_\_\_\_ times per day.

## STRENGTHENING EXERCISES

### Spondylolysis

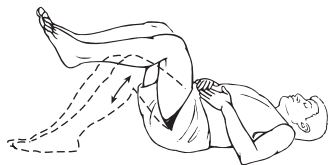
These are some of the *initial* exercises you may use to start your rehabilitation program, until you see your physician, physical therapist, or athletic trainer again, or until your symptoms resolve. Although emphasis is placed on strengthening your stomach muscles, other exercises are presented that promote maintaining proper posture and balance of all of the muscles that surround the spine. Please remember:

- Strong muscles with good endurance tolerate stress better.
- Do the exercises as *initially* prescribed by your physician, physical therapist, or athletic trainer. Progress slowly with each exercise under their guidance, gradually increasing the number of repetitions and weight used.



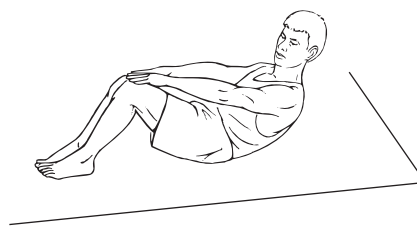
**STRENGTH • Quadruped Lift**

1. Position yourself on your hands and knees. Your back should remain flat and parallel to the floor. *Do not allow it to arch or move.*
2. Lift your *left* arm up to shoulder height. Hold this position and lift your *right* leg to the same height.
3. Balance and hold this position for \_\_\_\_ seconds. Count out loud, and do not hold your breath.
4. Return to the starting position, and repeat with the opposite arm and leg.
5. Repeat this exercise \_\_\_\_ times, \_\_\_\_ times per day.



**STRENGTH • Double-Leg Hold**

1. Lie on your back with your hips and knees bent, and bend your legs toward you as shown.
2. Tighten your stomach muscles, and press your back flat into the floor.
3. Keeping your back flat on the floor, *slowly* lower your legs to the floor. When you feel your back start to arch, stop and hold that position. *Count out loud to \_\_\_\_, and do not hold your breath.*
4. Return to the starting position.
5. Repeat this exercise \_\_\_\_ times, \_\_\_\_ times per day.



**STRENGTH • Partial Sit-ups**

1. Lie flat on your back with your hands resting on your thighs.
2. Tuck your chin to your chest, and slowly sit up, until you touch the top of your knees.
3. Hold this position for a count of \_\_\_\_\_. *Count out loud, and do not hold your breath.*
4. Return to the starting position.
5. Repeat this exercise \_\_\_\_ times, \_\_\_\_ times per day.

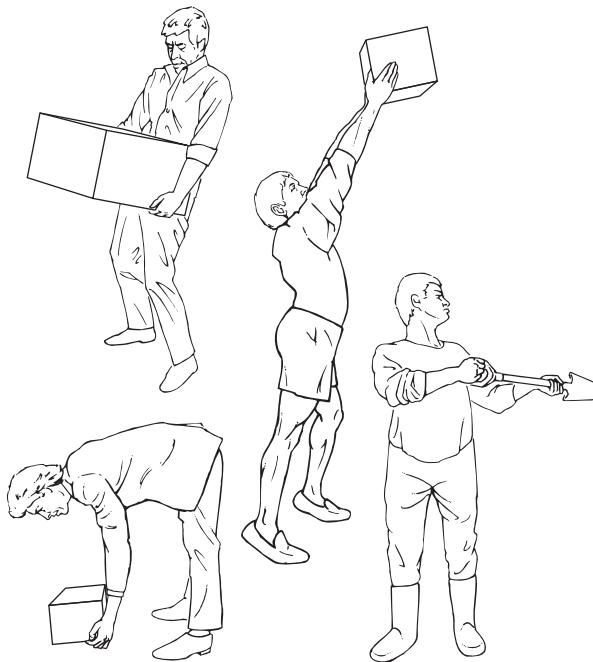
**POSTURE AND BODY MECHANICS**  
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Maintaining good posture and using correct body mechanics can have a significant effect on back pain. The following are basic suggestions regarding proper posture and body mechanics. These should be discussed with your physician, physical therapist, or athletic trainer based on your specific needs. Please remember:

- Good posture minimizes the stress and strain on any portion of your spine.
- Incorporate these posture principles into all of your daily and recreational activities.

**CORRECT LIFTING TECHNIQUES****DO**

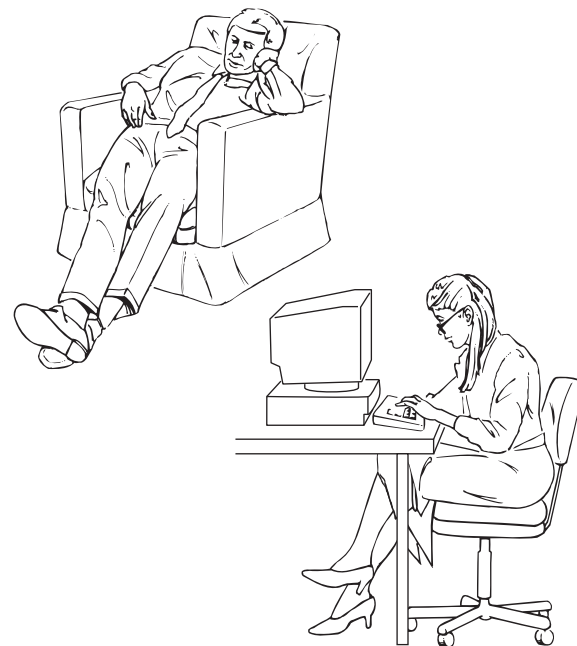
- Lift with your legs, keeping your back straight.
- Use a footstool for objects that need to be placed or retrieved from high locations.
- Use two people to lift heavy or awkward objects.

**INCORRECT LIFTING TECHNIQUES****DO NOT**

- *Do not* lift with your legs straight and your back bent.
- *Do not* lift heavy objects over your head.
- *Never* lift and twist at the same time.
- *Do not* lift an object that is too heavy or awkwardly shaped without help.

**CORRECT SITTING POSTURES****DO**

Sit erect. Use a lumbar roll, cushion, or pillow behind your lower back when sitting. Use a chair that has a high enough back to support your back up to your shoulder blades.

**INCORRECT SITTING POSTURES****DO NOT**

Do not slouch or slump, and maintain a proper position in the chair. You should sit all the way back and provide support to the lumbar area.