

Spondylolysis & Spondylolisthesis

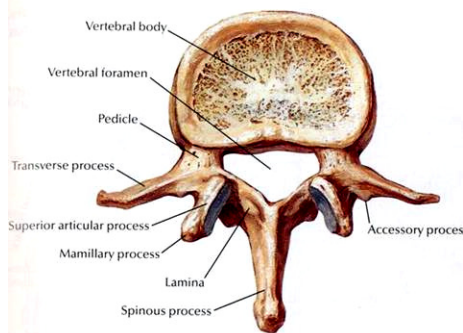
INTRODUCTION

Your child has been diagnosed with spondylolysis and/or spondylolisthesis. Spondylolysis means that there is a defect in the posterior ring of one of the vertebral bones, usually the 5th lumbar vertebra. Spondylolisthesis means that there is a slippage of one spinal vertebral bone relative to the spinal bone below it. The most common site is the 5th lumbar vertebra slipping anteriorly on the sacrum. Most children with a spondylolisthesis will also have a spondylolysis defect, which reduces stability and allows the vertebral bone to slip forward. Most of the time, the slip is mild and stable. Pain, if present, can usually be managed with physical therapy. Surgery is sometimes needed if the slip remains painful or if the slip is progressive.



BACKGROUND

The spine consists of a series of vertebral bones held together to give support for the trunk and upper body and to protect the spinal cord and nerves arising from it. Each vertebral bone consists of an anterior vertebral body, and a posterior bony ring connected to the body by 2 pedicles (posts) and covered by the lamina (roof). The posterior ring has spikes (processes) which extend to the side and posteriorly and have joints (facets) which articulate with the vertebral bones above and below it. The vertebral body is connected to the vertebral bodies above and below it by tough shock absorbing disks and strong ligaments. The combination of the anterior disks and the posterior ring facet joints give the spine stability with motion for bending and twisting.



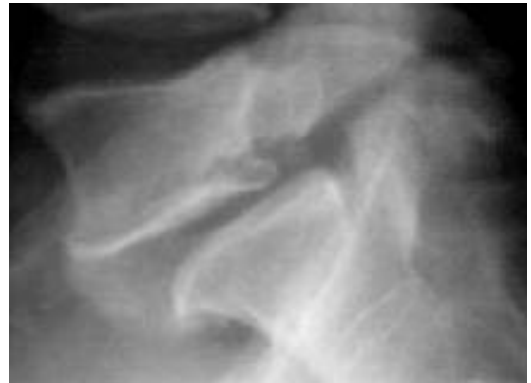
The cause of spondylolisthesis is the combination of increased mechanical stresses acting on a weak or damaged structure. The structure may be weak for several reasons. The most common cause of weakness is a developmental defect in the posterior ring. Other problems include trauma, arthritic changes, or under-developed (dysplastic) joint surfaces. It is unclear why or when some people develop the posterior ring defect. About 6% of adults have this spondylolysis defect without pain or other problems. In certain racial groups, like Eskimos, the incidence is as high as 40%, suggesting a genetic factor. Spondylolysis is very rare before age 4, but the incidence increases with age. Activities of living can create mechanical overload, which also clearly contribute to the incidence of spondylolysis



defects, which are seen more commonly in gymnasts, weight-lifters, and football linemen. These activities put a lot of extension stress on the lower back. Scientists believe that most individuals with a spondylolysis defect were born with a "weak" area in the posterior ring and the repeated stresses with activities during the growth years causes a defect, which then heals with fibrous scar tissue rather than bone.

CLINICAL FINDINGS AND DIAGNOSIS

Patients usually present to the orthopedic doctor with pain in the lower part of the back, which has usually been present for months or longer. Xrays are often obtained previously and have shown the spondylolysis defect or the spondylolisthesis. The patient may have been referred to the orthopedist for the pain or because of the xrays findings. Usually, by the time the orthopedic doctor is involved, the back pain may have improved or even resolved. Sometimes, the pain is new and related to a fall or other accident. Sometimes there is limited spinal motion in flexion due to very tight hamstring muscle. The physician will do a careful exam to localize and characterize the pain. It is important to assess spinal motion and to do a careful neurologic examination. The diagnosis of spondylolysis is usually by oblique view xray or occasionally by CT scan. The diagnosis of spondylolisthesis is made by xray and shows the slippage of the spinal vertebral bones. If there is spondylolisthesis, the lateral view will show it best.



Sometimes, a child is brought in by the parents because of poor posture or funny gait. This is usually due to spondylolisthesis, causing muscle spasm in the back or legs that makes the back or hips stiff, causing the child to walk with short strides and bent knees. Sometimes, there is an associated scoliosis that is more obvious to the observer than the spondylolisthesis.

TREATMENT

Almost all children and adults with spondylolysis are not symptomatic. Most children with spondylolisthesis also have no symptoms, and may grow up unaware that they have the condition. For children who have symptoms and have xrays that show a spondylolysis or spondylolisthesis, back pain is the most common symptom. The most common age for symptoms to develop is during the adolescent growth spurt. There is often a history of trauma or sports, usually trivial injuries, with onset of pain. X-rays reveal the spinal condition previously present, but is often called a "fracture" or "slip". If the child continues to have good range of motion of the back, it is probably safe to say that the spondylolysis or spondylolisthesis is not due to that particular injury, but a result of years of cumulative stress of the back with an inherent weak area in the posterior ring. In other words the "fracture" or "slip" is not new, but has been present for years prior to the recent injury and onset of pain.

If your child has spondylolysis, treatment is indicated if there is pain. Pain usually responds well to treatment used for mechanical (muscle related) back pain. Your doctor will provide more details but the treatment focuses on changing activities to protect the back while doing home

stretching and strengthening exercises to build back strength and flexibility. Symptomatic care with anti-inflammatory medications, heat, ice, massage, etc. is also beneficial. In more severe cases, a lumbosacral support may be ordered. After the pain goes away, the child may resume sports and other activities.

If the spondylolysis is very new, related to a severe trauma, and has significant pain with tight spastic muscles, this may be suggestive that the spondylolysis is new and like a fracture. A special nuclear bone scan may be done to check if the spondylolysis defect is active like a fracture. If so, it may be beneficial to place the child in a rigid lumbosacral orthosis or even a body cast with the goal of getting the spondylolysis to heal with bone. The immobilization is continued for 3 months, followed by 3 months of limited activity to allow time for healing.



In most patients with spondylolisthesis, the treatment depends on several factors, depending on age, sex, and severity of slip. A younger child has a higher chance of further slippage with growth. Girls are more prone to progression than boys. Severity of slip is estimated on the lateral view on X-ray, and depends on the amount of contact between the L5 and S1 vertebral bodies. Grade 1 indicates more than >75% contact, grade 2 >50%, grade 3 >25%, and grade 4 <25%. The higher the grade of slip, the more serious the problem, and the higher the chances of further slip. A CT scan or even an MRI may sometimes be needed to further elucidate the bone and nerve problem before treatment is started. Mild slips <50%, are treated if there is pain. They are treated like children with spondylolysis (see section above). If the pain does not improve, or if follow-up X-rays demonstrate further slippage, surgery may be needed. Treatment of severe slips >50% is controversial. In older children, it may be appropriate to treat symptomatically and observe for signs of progression. The majority of children, especially younger children with severe slips >50% probably benefit from surgery to fuse the involved bones together. Depending on the degree of slip and other factors, the fusion of the vertebrae may be "as is", or after attempting to reduce the slip. If the slip is reduced, this is usually done with screws and rods to pull the bone into alignment and hold them for healing. This latter technique entails risk to the nerves and this must be taken into consideration. Following surgery, the patient is usually immobilized in a rigid brace or a body cast for 3 months, followed by 3 months of limited activity to allow ample time for healing.



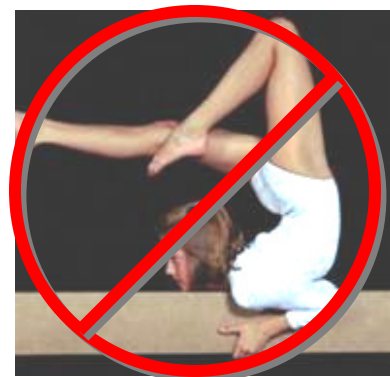
EXPECTED OUTCOMES

The idea of a defect in a vertebral bone, especially with enough instability for an actual or potential spondylolisthesis slip is very disconcerting for families. Fortunately, there is long term data available. Patients with spondylolysis do as well as individuals without spondylolysis. As stated earlier, most people with a spondylolysis never know they have a

spondylolysis. Patients with a mild (<50%) spondylolisthesis slippage do nearly as well as people without spondylolysis or spondylolisthesis. In the long run, these patients do as well with respects to getting an education, having families of their own, and having productive careers. However, they do seem to have more discomfort in their backs, which seems to influence recreational and occupation choices toward lower demand activities. In other words, they seem to have more back aches which do not limit activities of daily living, but they do tend toward careers in less physically demanding fields (ie they are less like to be construction workers) and to choose less demanding recreational activities (ie bike riding over bungie jumping). There is not sufficient evidence to know that more aggressive treatment such as surgery would improve these generally very good long term outcomes for patients with spondylolysis and mild <50% spondylolisthesis.

It is important to view this information with the understanding that about 90% of people have trouble with their backs during the course of their lives. Therefore, while we can say that children with spondylolysis or mild spondylolisthesis do as well, or nearly as well, as unaffected people, it cannot be said that they will not have back problems in the future. In fact, since it is very likely for most people to have problems with their back, it is also very likely the children with spondylolysis or spondylolisthesis will have future problems. These future problems are not significantly different for children with or without spondylolysis or mild <50% spondylolisthesis.

For spondylolysis and spondylolisthesis with >50% contact (grades 1 & 2), conservative treatment is usually successful. If your child has spondylolysis discovered incidentally, and has no symptoms at all, there is no need for treatment or activity restrictions. Patients with symptomatic spondylolysis and all patients with spondylolisthesis should be followed for progressive spondylolisthesis with X-rays every 3 to 6 months. If the patient responds to conservative treatment with pain resolution and good spinal flexibility and strength, the patient is allowed to return to sports and other activities. Patients with spondylolysis can return to all sports. Patients with spondylolisthesis should avoid sports with hyperextension stresses like gymnastics, cheerleading, weightlifting, and football.



MORE INFORMATION

More information can also be obtained from the American Academy of Orthopedic Surgeons. Further information can also be obtained on the internet. Two good sites for expert and peer reviewed information are the American Academy of Orthopedic Surgeons at www.aaos.org and the Pediatric Orthopedic Society of North America at www.orthokids.org.