

Patient Name:
Date of Birth:

Date:

SONORAN SPINE - REFERENCE

SPONDYLOLISTHESIS (SLIPPED VERTEBRA)

The term spondylolisthesis is used to describe several different spinal disease processes where one vertebra is out of its normal alignment with the adjacent vertebra. The term means "spine slip". This is clearly seen and measurable on routine x-rays. It should not be confused with the chiropractic community's concept of a vertebra being "out" (without any imaging abnormalities, including x-rays).

The typical appearance of spondylolisthesis is one vertebra slipping forward on the vertebra below. Retrolisthesis is a term used to describe when a vertebra is slipping backward on the vertebra below. Lateralolisthesis describes the vertebra that is displaced to the side of the vertebra below. Rotatory listhesis is a degenerative condition where a vertebra rotates on the vertebra below.

DIAGNOSIS

Routine standing spinal x-rays are the best way to diagnose vertebral malalignment such as spondylolisthesis. Flexion and extension (patient bending forward and backward with maximum effort) x-rays of the spine are also helpful to assess whether the spine moves excessively and is unstable.

Often spinal stenosis (pinched spinal nerves) accompanies spondylolisthesis and additional imaging studies are required to detect the presence of nerve compression within the spinal canal. An MRI scan is an excellent test to show the soft tissues of the spine in a way not possible with x-rays. A myelogram combined with a CT scan is another excellent way to evaluate nerve compression, especially when it is related to bone spurs and other arthritic processes which can narrow the spinal canal and compress nerves.

A CT scan by itself (without a myelogram) may be useful in diagnosing the type of spondylolisthesis

caused by a stress fracture. This type, called "isthmic" spondylolisthesis, can usually be diagnosed on the basis of oblique x-rays. Occasionally isthmic spondylolisthesis is diagnosed with a CT scan.

A bone scan can be helpful at identifying a recent stress fracture that could lead to spondylolisthesis. This has an important role in children who have back pain from an undiagnosed cause, and isthmic spondylolisthesis is suspected.

CAUSES

There are five general causes for spondylolisthesis. Isthmic spondylolisthesis results from a stress fracture in the back part of the spine, and most commonly develops between ages 5 and 8. It may or may not cause back pain. Five percent of the American population has it. Fifty percent of Eskimos and 10% of professional football linemen playing in the NFL have it. It is also a common source of back pain in highly competitive gymnasts, occurring in up to a third of these athletes.

The most common type of spondylolisthesis is caused by degenerative changes in the spine, particularly in the facet joints. As these joints wear out, they become lax and fail to maintain normal spinal alignment. The same arthritic process that wears out the joints in the spine can also cause bone spurs to grow which then cause nerve compression and spinal stenosis. Stenosis and degenerative spondylolisthesis occur together very often.

Rare causes of spondylolisthesis include tumors or infections that destroy the back part of the spine, and acute fractures through the back of the spine. These destructive processes disrupt spinal stability and allow the affected vertebra to slide forward on the one below it. Somewhat rare is the congenital type of

spondylolisthesis that features malformed joints in the back of the spine which allow the spine to slip.

SIGNS AND SYMPTOMS

Back pain is the most common complaint in people who have spondylolisthesis. The pain tends to correlate with the level of physical activity, with worsening pain with activity and improvement with rest. Most people find that the back pain is worse with standing and walking, and often better with sitting.

Another common complaint is ache in the buttock region. This can be pain referred from the degenerative joints in the low back, or could be a symptom of nerve root compression. Buttock pain can accompany back pain or occur by itself.

Leg pain that descends through the buttock, back of the thigh, past the knee and into the calf or foot is a common sign of nerve root compression. When a spinal nerve is pinched or irritated, burning, numbness, and tingling can also be present. Muscle weakness can also result.

The type of discomfort people have varies from person to person. In early stages, patients with spondylolisthesis may not have any pain. Pain may slowly increase to become intermittent, or even constant. Patients may also live their entire lives with this condition and not ever have any significant pain.

CONSERVATIVE TREATMENT OPTIONS

Most people with spondylolisthesis will find improvement in their back pain with conservative care. The foundation of a conservative program typically includes a short course in physical therapy leading to a daily home exercise program.

Developing a strong trunk (abdominal, oblique, and back muscles) is vital to removing stress and pain from the spine. Patients find that when they remember to do their back and abdominal exercises regularly, they have less back and buttock pain. In most cases, the time commitment for exercises need not be longer than 10 minutes a day.

Medications can play a role in pain control. Pain killers such as Percocet, hydrocodone, and other narcotics are used sparingly except in times of new onset of severe pain. These narcotics are best used short term. They are very addictive. Non-steroidal anti-inflammatory medications are the medications of choice. They can be helpful at controlling back and leg pain by reducing

the inflammation from arthritic joints. Muscle relaxants are rarely helpful, with the possible exception in the case of an acute muscle strain.

SURGICAL OPTIONS

Who Needs Surgery? There is only one circumstance where surgery is an emergency: *cauda equina syndrome*. This is a condition where the nerve roots within the spinal canal are severely compressed. The end result is loss of bowel or bladder control, severe leg pain, and numbness in the genital region. If the pressure on the nerves is not released immediately, control of bowel and bladder may never be recovered. For this reason, we consider cauda equina syndrome a surgical emergency.

For all other patients with spondylolisthesis, there is no emergency. Surgery is planned when symptoms or circumstances warrant it. Reasons to consider surgery include:

- Back pain failing to improve with conservative care
- Leg pain failing to improve with conservative care
- Progressive leg or foot numbness or weakness
- Progression in the amount of vertebra slippage
- High grade spondylolisthesis (grades 3-5)
- Signs, symptoms, and presence of nerve compression failing conservative care

"WHAT IF I DON'T HAVE SURGERY?"

Since surgery is usually done for relief of pain, the decision to postpone surgery is essentially a decision to live with the pain a bit longer. Most patients know very clearly when they are ready to have their spinal problem surgically corrected. Their pain is intrusive and constant, work is difficult, social life or hobbies are impossible, family life is compromised and the level of function is in every way sub-optimal.

RISKS OF SURGERY

As with any surgery there are risks with spinal surgery to correct spondylolisthesis. The risks depend on the procedure being performed, the complexity of the spinal problem, and the health of the patient. Some of the more common problems with posterior surgery (surgery from the back) include infection (1-3%), failure of fusion (3-15%), nerve root injury (1%), dural leak (1-5%), hardware failure (1%) and excessive blood loss (5%).

Complications unique to anterior surgery (surgery through the abdomen) include prolonged resumption of bowel function, injury of blood vessels or bowel,

incisional hernia and retrograde ejaculation in males (1-3%).

General complications that can occur with any surgery include blood clots, deep vein thrombosis, pulmonary embolus, heart attack, pneumonia, urine infection, incision infection, virus transmission through blood transfusion and others. The general health risk from surgery depends on the health of the patient. A complete physical is recommended for anyone with health problems before undergoing major spinal surgery.

POSSIBLE SURGICAL APPROACHES

POSTERIOR SPINAL FUSION

This approach involves placing bone graft on the back and/or sides of the slipped vertebra and the one below. When the bone heals, it will fuse and stabilize the slipped vertebra. Fusion rates in children are excellent. In adults, failure of fusion can approach 60% if spinal instrumentation is not used. As in all cases of spondylolisthesis, if nerves are compressed, a laminectomy is also performed. Performing a laminectomy and fusion without instrumentation is the historic approach for this condition and still has a place in current surgical practice for low-grade slippage in children and in degenerative listhesis in adults who do not have much back pain.

POSTERIOR SPINAL FUSION WITH INSTRUMENTATION

This is the most common technique used today to address the instability caused from spondylolisthesis. Adding spinal instrumentation (screws in the vertebrae linked together with rods to immediately stabilize the spine) greatly increases the success of the fusion. Postoperative pain is improved and long term outcomes are better than with fusions without instrumentation. Fusion rates when instrumentation is used are about 95%.

ANTERIOR INTERBODY FUSION

This technique was renewed in the mid 1990's and involves placing a titanium or plastic cage into the disk below the slipped vertebra. This is done through an incision in the abdomen. The cage or dowel contains the patient's own bone. Success rates are good if the procedure is limited to vertebrae that are not slipped more than a few millimeters in patients without significant nerve compression. Fusion rates are likely in the 85% range when bone is used and 95% or better if Bone Morphogenetic Protein (BMP) is used. Rehabilitation after surgery is quicker than with posterior procedures.

POSTERIOR INTERBODY FUSION

The spine is approached from the back and anything pinching the nerves is removed. The disc below the slippage is removed from the same approach and a cage is inserted into the disc to fuse it. This technique has a higher fusion rate than the two above techniques, since it combines fusions on both the front and back of the spine. Spinal instrumentation is used to further stabilize the spine and add to the success rate.

COMBINED ANTERIOR AND POSTERIOR

In complex cases involving revision surgery, or in instances of marked instability, there is an advantage to fusing the spine both from the front and from the back. When the spine is fused from the front, the disc can be distracted better than from the back. Distracting the disc maintains or improves the natural arch in the low back and allows patients to stand erect effortlessly. Spinal instrumentation is used posteriorly (in the back) to stabilize the spine. With bone in the front and back of the spine, fusion rates approach 98%. The tradeoff is in the increased complication rate from 2 different surgeries (front and back).

REDUCTION OF THE SLIPPED VERTEBRA

With high grade or severe spondylolisthesis, there is significant trunk shortening, arching of the low back, and instability. Correction of the slip in these cases is generally thought to be superior to fusing the spine in the deformed position. Reduction is accomplished from the posterior, and instrumentation is always required. In experienced hands, this technique provides very good results with few complications.

RECOVERY FROM SURGERY

Most patients leave the hospital 2 to 4 days after surgery. Help is needed at home for a few weeks with some of the more common activities of daily living. For patients who do not have help at home, a short stay at a rehabilitation center can be helpful in becoming more independent. From the first day home from the hospital, patients should be able to get in to the bathroom and get in and out of bed or a chair on their own.

If a patient wants to get back to work at a sedentary job, this can be done as soon as 4-6 weeks in a part-time status. During the first 3 months, walking is the only exercise permitted. After 3-4 months, physical therapy is started in an effort to regain trunk strength and stamina. Therapy usually lasts 4-8 weeks, culminating in a home exercise program to be done on

a daily basis. By 6 to 9 months, most people are safe to be released to unrestricted activities.

Patients are followed on a yearly basis for several years. This is necessary to make certain the fusion is solid, and to watch for degenerative changes that can develop next to the fusion (15% risk).

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