



Lumbar Spinal Stenosis

by David Borenstein, MD

In a previous [article on low back pain](#), I reviewed the anatomy of the spine and discussed three causes of low back pain: muscle strain, herniated intervertebral disk with sciatica, and osteoarthritis (OA) of the joints connecting the vertebrae. In that article, I discussed how people begin to be affected by muscle strain in their 20's, by disk herniation in their 30's and 40's, and by OA of the lower (lumbar) spine in their 50's. Here I will examine a disorder that mainly affects people in their 60's and older: lumbar spinal stenosis.

The spine

First, let's review what you learned about the spine in my previous article. The spine has five parts: the cervical spine, the thoracic spine, the lumbar spine, the sacrum, and the coccyx. The *cervical spine* attaches to the base of the skull and is in the neck and upper back, the *thoracic spine* is in the middle back, and the *lumbar spine* is in the lower back. The *sacrum* and *coccyx* sit below the lumbar spine.

The three main sections of the spine (cervical, thoracic, and lumbar) are made up of bones called *vertebrae* that sit one on top of another. Each vertebra is separated from its neighboring vertebrae by gel-filled disks called *intervertebral disks*, which act as shock absorbers for the spine. The back portion of each vertebra is shaped like an arch, and these arches form a vertical column known as the *spinal canal*. The *spinal cord* — the bundle of nerves that transport messages and bring sensation to all parts of the body — runs down this canal from the brain to the highest vertebra of the lumbar spine. Through the whole length of the spinal cord, smaller nerves branch off and exit the spinal canal from openings in the vertebrae known as *neural foramina*. At the highest lumbar vertebra, the spinal cord itself branches out into smaller nerves, which exit the spine through the neural foramina of the lumbar spine.

What is spinal stenosis?

Spinal stenosis refers to narrowing in the spinal canal or neural foramina that puts pressure on the nerves within. As people age, the intervertebral disks get thinner, the vertebral arches grow bone spurs (known as osteophytes), and the neural foramina lose height. All of these changes can put pressure on the spinal nerves, either in the center of the spinal canal, on the sides of the spinal canal (known as the lateral canal), or in the neural foramina. (See an [illustration of vertebrae with and without stenosis](#).) Although stenosis can occur in any part of the spine, it is common in the lumbar spine.

When a spinal nerve is compressed, blood flow to the nerve — and therefore the nerve's supply of oxygen — is cut off. Without oxygen, the nerve loses its ability to function. A loss of nerve function can result in

pain, numbness, or weakness in the areas of the body that the affected nerve supplies. For example, if a nerve in the lower back that supplies sensation to the left foot is constricted, the result may be pain and numbness in the left foot. Reestablishing blood flow to the compressed nerve can quickly restore function and is the goal of therapy for lumbar spinal stenosis.

Who gets it?

According to the most recent data from the United States Census Bureau, the baby boom generation (those born from 1946 to 1964) includes 78.2 million people, or about a quarter of the total US population. Studies of x-rays have shown that up to one-fourth of people older than 40 have significant narrowing in the lumbar spine. From this data, we can calculate that in 20 years, almost 20 million Americans will have or be at risk for lumbar spinal stenosis.

Symptoms of spinal stenosis

Lumbar spinal stenosis can cause pain in any combination of locations from the low back to the feet, including the buttocks, thighs, and lower legs. Pain in the legs may be accompanied by numbness, tingling, and weakness. Even though lumbar spinal stenosis occurs in the lower back, the condition does not always cause back pain.

In people with spinal stenosis, certain physical activities cause more symptoms because of the effect these activities have on the amount of space in the spinal canal. Bending backwards, for example, tends to decrease the space in the spinal canal and neural foramina. Bending forward tends to increase the space in the canal. People with spinal stenosis may enjoy going to the grocery store, where they can walk while bending over the shopping cart.

The symptoms of spinal stenosis may depend on the location of the narrowing. Stenosis that affects the center of the spinal canal may compress more than one spinal nerve, and symptoms may occur in one or both legs. Narrowing in the side (lateral) portion of the canal tends to affect a single nerve and therefore only one leg. Stenosis in the neural foramina causes the most persistent leg pain, which may not be relieved by a change in position.

Making a diagnosis

A recent review of 24 studies reported that there was no “gold standard” for the diagnosis of lumbar spinal stenosis. The results of this report mean that spinal stenosis cannot be diagnosed using laboratory and imaging tests alone; a complete diagnosis requires a doctor’s review of specific complaints and physical findings. The diagnosis can then be confirmed by imaging tests showing compression of spinal nerves.

Assessing symptoms. In making a diagnosis, a doctor has to consider where and when symptoms appear. Pain, weakness, or numbness caused by spinal stenosis typically occurs only in the legs and only after walking a certain distance. A person who is examined after being seated for a while may not exhibit any symptoms.

Considering other conditions. The doctor will also consider other common causes of leg pain in older people. A condition called *vascular claudication*, in which the blood vessels in the legs narrow and cut off blood flow, is one possible cause of leg pain. In people with vascular claudication, the leg pain is brought

on by increased physical activity. But in contrast to spinal stenosis, in which the pain radiates from the back to the foot, vascular claudication causes pain to radiate from the foot up toward the thigh. Also, people with spinal stenosis are able to ride a stationary bicycle without limitation, whereas people with vascular claudication experience calf pain when riding a stationary bicycle.

Hip arthritis may also be mistaken for spinal stenosis. It can cause pain while walking that radiates from the low back to the knee. Hip arthritis rarely causes lower leg pain unless knee arthritis is also present. To distinguish between hip arthritis and spinal stenosis, a doctor can have you move your hip joint without moving the lumbar spine. If this causes pain, hip arthritis may be the problem. X-rays of the hip joints are also helpful in confirming the presence of arthritis.

Another common problem in older people that can mimic lumbar spinal stenosis is *peripheral neuropathy*, a nerve problem that causes tingling or numbness in the feet (and sometimes the hands). Unlike the symptoms of spinal stenosis, the symptoms of peripheral neuropathy do not improve with a change in position. People who experience tingling in the feet while lying in bed are more likely to have peripheral neuropathy.

Imaging tests. Doctors use various imaging tests to help confirm a diagnosis of spinal stenosis. However, these tests have their limitations. For example, a plain x-ray of the lumbar spine of most people aged 60 or older will show that the intervertebral disks have degenerated and the cartilage on the joints connecting adjacent vertebrae has worn away. But these changes do not mean that a person has spinal stenosis. Many older people have these changes to the spine without experiencing pain. For this reason, an x-ray is not the best tool for pinpointing the specific area of the spine that is causing the symptoms.

More powerful imaging tests are often more helpful. *Magnetic resonance imaging* (MRI) scans use magnets to identify areas of nerve compression in the central or lateral portion of the spinal canal, as well as in the neural foramina. In general, MRI is better at detecting damage in soft tissues like the disks and nerves than in the bones. Also, people with a pacemaker or other electrical device implanted in their body cannot have MRI scans because of the effect of the magnets on the implanted device.

Another imaging technique, called *computed tomography* (CT), uses special x-rays to form sharp images of bones. CT can visualize the shape and size of the spinal canal as well as the nerves within it. Unlike MRI, CT can be used by people who have an implanted electrical device.

While MRI and CT scans are better than x-ray at pinpointing the exact part of the spine that is compressing a nerve, having this information is not essential unless you and your doctor are considering surgery as treatment for your symptoms. Surgical treatment requires that the doctor identify the problem causing area so that surgery can be performed on the appropriate part of the spine.

Treatment options

The treatment of lumbar spinal stenosis requires careful clinical judgment. The doctor will try to weigh the severity of the person's complaints against the benefits and risks of the available therapies. The main options for treatment are weight loss, exercises, medicines, spinal injections, and surgery. No therapy works for everyone, and you and your doctor may determine that some options are not worth the risks.

One problem in prescribing treatment is that when people have spinal stenosis, it is rarely their only medical problem. Medical problems that exist alongside other medical problems are called *comorbidities*. Common comorbidities of spinal stenosis include cardiovascular problems such as heart attack, congestive heart

failure, and stroke. Lung problems that cause shortness of breath are also relatively common. Another frequent comorbidity is diabetes, which can lead to peripheral neuropathy and blood vessel problems.

For a person with comorbidities, it is important to remember that you are, as the saying goes, only as young as your oldest part. For example, you may have leg pain from spinal stenosis, but it may not be your leg pain that limits your physical function. If you have heart or lung disease, you may be able to walk only a block or two before chest pain or shortness of breath causes you to stop. In this case, the non-spinal stenosis problems are your “oldest part” and should be the main focus of treatment. If you are otherwise healthy and spinal stenosis is your limiting factor, your spine is your oldest part and your spinal stenosis should be treated aggressively.

Conservative treatment. The basic goal of therapy is to maximize the space in the spinal canal for the blood vessels that supply the nerves. Consider the following recommendations as part of a conservative self-management program for lumbar spinal stenosis:

- Try to reach and maintain a healthy weight. If you lose weight, there will be less strain on the spine, and walking will require less effort. Even a small amount of weight loss can be helpful.
- Stay as active as possible. A stationary bicycle is an excellent way to burn calories and maintain cardiovascular health while limiting strain on the lumbar spine. Water exercise can be a good form of exercise for people who have difficulty walking short distances on land.
- Try physical therapy. Physical therapy programs that include strengthening exercises for abdominal muscles can improve overall physical function. Strengthening thigh and buttock muscles can offer additional benefits.
- Stop smoking today. Lowering levels of carbon monoxide in the blood can help spinal nerves starved for oxygen.
- Educate yourself about your condition and how to improve it. Good self-management skills can have a powerful effect on the success of treatment.

Drug treatment. Medicines can be effective in improving physical function and decreasing pain in people with spinal stenosis. Nonsteroidal anti-inflammatory drugs (NSAIDs), which include ibuprofen (Advil, Motrin IB) and naproxen (Aleve), have the dual benefit reducing inflammation and relieving pain. NSAIDs can decrease soft tissue swelling in the spinal canal, allowing greater room for the spinal nerves. The downside of NSAIDs is their potential side effects, which include gastrointestinal ulcers and bleeding, high blood pressure, and edema (swelling caused by water retention) in the legs. People considering long-term NSAID use need to think carefully about the benefits and risks of these drugs and be sure that they take the smallest effective dose.

People who experience too many side effects with NSAIDs may consider opioids. Opioids such as hydrocodone (Vicodin) and oxycodone (Percocet) are effective pain relievers but have their own list of side effects, especially in older people. Opioids can cause severe constipation and may also bring about mental clouding, dizziness, and loss of balance.

Epidural injections are sometimes used for spinal stenosis if exercise and NSAIDs have not relieved symptoms well enough. Epidural injections are delivered into the spine. Most people know about their use in pregnant women during delivery, when anesthetics are injected into the spine to numb the lower half of the body. In people with spinal stenosis, the injected drug is a corticosteroid, a powerful anti-inflammatory that can shrink swollen tissues. The injection is given at the area of the spine that has the greatest degree of narrowing, as determined by MRI or CT. Also, people have to stop taking NSAIDs or other blood-thinners

before getting the injection.

People receiving corticosteroid injections need to consider the possible side effects of the drugs, which include high blood glucose, high blood pressure, and low bone mass. Because of the possibility of side effects, only three injections of corticosteroids should be administered in a given six-month period. If leg pain returns, people can receive an injection every two months thereafter, but may also decide to delay subsequent injections until leg pain with walking recurs. Epidural corticosteroid injections can be given over many years if necessary and if side effects do not become too troublesome.

Surgery. People should consider lumbar spine surgery only if they are physically incapacitated by spinal stenosis and have not had success with drug therapy. Candidates for surgery have leg pain after standing 10–15 minutes or walking short distances. In some people, spinal stenosis affects nerves that aid in bladder or rectal function. Surgery may be required for people who experience incontinence as a result. Age is not a deciding factor in the decision to undergo surgery; general medical health is more important. People who are 80 or 90 years of age and are in good health may benefit from surgery.

The goal of surgical treatment for lumbar spinal stenosis is to remove enough bone or disk to re-establish blood flow to the compressed nerve without causing instability to the spine. This is called decompression. The main difficulty for the surgeon performing this type of surgery is to identify which changes in the spinal anatomy correspond to significant narrowing and compression of the spinal nerves. Anyone considering spinal surgery should thoroughly discuss the procedure with the spinal surgeon, either an orthopedic surgeon or neurosurgeon. (To find an orthopedic surgeon, visit [the Web site of the American Academy of Orthopaedic Surgeons](#); to find a neurosurgeon, visit [the Web site of the American Association of Neurological Surgeons](#).) Some people who have instability in their spine may need a spinal fusion, which can include the insertion of metal parts designed to keep the spine stable.

Which treatment is best?

Which form of therapy is best for improvement of the problems associated with lumbar spinal stenosis — surgical or nonsurgical? Very few studies are available to answer this question. Successful lumbar spine surgery for spinal stenosis offers better short-term results than drug therapy. People with fewer comorbidities are more likely to have a better result from surgery. However, the difference in benefits diminishes over time, and some people treated with medicines experience symptom relief for extended periods. If you are considering surgery to treat your lumbar spinal stenosis, you should first have a thoughtful discussion with your doctor about your condition and its potential for improvement.

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