



Western Neurosurgery REVIEW

A quarterly newsletter for referring doctors

Spring 1999

Neurosurgical Treatment of the Aging Painful Spine—Part 1

By William D. Smith, M.D.

(This is the first of a two-part discussion of spinal stenosis. In the next issue of the newsletter, the second-part article will cover the specifics of treatment.)

Many people think of a neurosurgeon's work as primarily involving brain tumors and other intracranial lesions. Although this is an inherent part of our work, residency training—which often lasts 7 years—immerses neurosurgeons in the diagnosis and treatment of a wide variety of complex spinal diseases.

Accordingly, spinal disease is a mainstay of most neurosurgery practices.

Spinal Disorders and Neuronal Function

As our knowledge of the pathophysiology of spinal disorders increases, so does the complexity and effectiveness of our treatment. As our understanding of the importance of the biomechanics of the spine and the development, as well as prevention, of spinal disorders increases, we find time and time again that the underlying cause of painful disorders

of the spine is due to a neuronal pain pathway. Given that the first and primary goal of all neurosurgeons in the treatment of all diseases is that of preservation of neuronal function, this gives a neurosurgeon special insight in the treatment of spinal disease. Whether dealing with the brain or spinal cord, neurosurgeons are trained to work through the hardest substance of the body—bone—to treat the most fragile and sensitive portion of the body—the nervous

The Aging Painful Spine, continued on page 2

Welcome to Western Neurosurgery Review

Welcome to the first issue of our practice's newsletter for referring physicians, *Western Neurosurgery Review*. We intend in these pages to provide pertinent neurosurgical update information, as well as news about our practice. As a practice serving a wide geographical region, we want to offer information in a quick-to-read format that is useful to you, our referring doctors, as you care for patients who may have conditions affecting the spine or brain.

About Our Practice

The Western Regional Center for Brain and Spine Surgery is a tertiary referral center for all adult and pediatric intracranial and spine problems. Since its establishment by **Dr. Steven Agata** in 1984, the practice has grown to be the largest neurosurgical group in southern Nevada,

also serving communities in Arizona, Utah, and California.

Neurosurgeons have been traditionally identified as devoted primarily to brain surgery. The services offered by our practice, however, also focus heavily on complete adult and pediatric spinal reconstructive procedures, surgery for acute and degenera-

elements, as well as trauma to the spinal canal itself. **Dr. Benjamin Venger**, who joined Dr. Agata in 1989, is also actively involved in developing a regional pain practice encompassing Las Vegas and all the affiliated communities that we serve.

Drs. Agata and Venger have welcomed the association of **Dr. William Smith** and **Dr. John Anson** to the practice. Both of these physicians, who have joined the Western Regional Center for Brain and Spine Surgery within



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tive disc disease, arthritis, inflammatory, and infectious diseases of the spine, neoplastic diseases of the vertebral bodies and neural

the last two and a half years, have an interest in complex

Welcome, continued on page 3

Aging Painful Spine, continued from page 1 **Spinal Problems in the Aging Population**

Having a sophisticated, well-rounded understanding of complex spinal problems is becoming more important given the increase in our aging population. In particular, lumbar canal stenosis is one of the most common diseases affecting the elderly spine. Although the link between spinal sac compression and claudication has been recognized for more than a century, it was only in 1949 that this was first described. In the past 50 years, our understanding of this disease process has increased significantly. It is estimated that 250,000 to 400,000 Americans have symptoms of lumbar spinal stenosis. It is estimated that, within 20 years, there will be a 50% increase in the diagnosis of spinal stenosis.

Unfortunately, it is not possible to predict which individuals will progress to lumbar stenosis. There is no race, sex or body type prevalence. Although symptoms can be partially alleviated by changes in lifestyle including exercise and diet, lumbar canal stenosis can not be prevented. It is thought that lumbar spinal stenosis is the natural progression of the aging spine. The constant wear and tear of being active and resisting forces of gravity results in thickening of the spinal elements that produces spinal stenosis. The result

Presentation

- Dull, severe pain in the lower back and buttocks is triggered by walking
- Pain radiates into one or both thighs and legs (60%) bilateral pain
- Numbness, weakness, paresthesia ("pins and needles") involving lower extremities
- Relief when sitting or bending forward

is progressive, chronic, debilitating pain from spinal nerve root compression.

Early diagnosis is important to help alleviate the years of suffering many patients undergo. Often patients endure years of increasing symptoms as they accept their

pain as an inevitable part of aging. Also, accurate diagnosis is important because failure to diagnose correctly often leads to unnecessary surgery—most commonly hip replacement surgery and vascular bypass surgery. Symptoms of spinal stenosis can mimic that of more serious conditions such



Spinal stenosis is the thickening of the facet joints between the vertebrae. This causes narrowing of the spinal canal, nerve root canal, and the intervertebral foramina resulting in pain, neurogenic claudication, and numbness with possible weakness of lower extremities.

as spinal tumors, spinal fractures, vascular claudication, and other more advanced degenerative processes of the spine.

Fortunately, effective neurosurgical treatment is available. Long-term pain relief is the goal that most patients are able to achieve after surgery. The majority of patients are able to resume active lifestyles which had been stopped due to their chronic debilitating pain. Early treatment can make a difference in the rate of recovery as well as the ultimate outcome.

Two Forms of Spinal Stenosis

There are two forms of spinal stenosis. Primary lumbar stenosis is easily diagnosed because most patients are younger and lack complicating morbidity. The topic of our discussion in this first issue of our practice's newsletter is acquired lumbar stenosis or degenerative lumbar stenosis. In this disease, patients generally become symptomatic in their 50s or later.

For a primary care clinician, diagnosis of spinal stenosis is often challenging because symptoms usually differ from patient to patient and are often intermittent and

changing. Time and again, patients are seen in the latter stage of their disease process as they are able to manage the pain by limiting activity. By reducing their activity, and therefore limiting their lifestyle, their pain complaints are lessened. This makes it much more difficult to get a complete picture of their presenting condition. Also in the aging population, common co-morbidities such as back strain, osteoarthritis, and osteoporosis can also result in back pain.

Lumbar Canal Stenosis: A Working Definition

The working definition of lumbar canal stenosis is that of a narrowing of the spinal canal, nerve root canal, and the intervertebral foramina. In general, this stenosis is caused by hypertrophy of the bony and ligamentous structures. The normal process of aging is indeed thickening of the facet joints of the spine as well as the ligaments. As the discs desiccate, there is hardening and diminished flexibility of the spine. There is a constellation of anatomical changes that in many individuals results in compression of the spinal sac and nerve root. The symptoms that individuals typically present with are neurogenic claudication, lower back pain, lower extremity pain, and numbness with possible weakness of the lower extremities. Very rarely, individuals will present with bladder and bowel difficulties.

Common Presentations

The most common presentation of individuals is that they cannot walk as far as they once could. It is not uncommon for the neurosurgeon to see individuals who have difficulty walking a half block; many individuals wait for surgical treatment until they are unable to perform their daily shopping. Severe, dull, and aching pain in the lower back and buttocks can radiate into one or both legs. Paresthesias are often present. Symptoms generally disappear rapidly once the patient sits down.

A differentiating symptom from that of lumbar disc disease is that, in spinal stenosis, the strain of coughing and sneezing does

Aging Painful Spine, continued on page 3

Welcome to Western Neurosurgery Review, continued from page 1

cerebrovascular surgery. Dr. Anson has developed a pediatric practice encompassing not only neoplasms of the brain and spinal cord, but also craniofacial anomalies. Dr. Smith, prior to relocating in Las Vegas, was the head of the spinal reconstructive surgery division of the University of Arizona School of Medicine in Tucson. **Dr. Derek Duke**, who will join the practice this summer, also has a strong interest in complex spinal reconstructive procedures.

Locations

Since 1991, the Western Regional Center for Brain and Spine Surgery has been providing neurosurgical and spine surgery care for communities beyond its original **Las Vegas** clinic. Initially, the increased region of service began with the establishment of an office in **Laughlin**, Nevada. Since that time, additional clinics have been formed in the **Summerlin** area of Las Vegas, **Bullhead City**, **Kingman**, and **Lake Havasu City, Arizona**, as well as in **Cedar City** and **St. George, Utah**. Within the next few months, a ninth clinic will be added in **Needles, California**.

Establishment of Advanced Programs

The practice has facilitated the development of advanced programs normally not available outside of an academic or university setting. Within the last five years, we have welcomed the addition in Las Vegas of an interventional neuroradiologist. **Dr. Andrew Gyorke** will assist us in the embolization of complex intracranial and spinal vascular lesions, as well as the obliteration of many complex intracranial aneurysms.

Dr. Steven Agata has worked with **Dr. Ashley Sikand** (the first and only neurotologist in Nevada) to develop a skull-base team to approach many tumors and lesions located around the base of the skull, which were once thought to be inoperable. Dr. Anson performed the first vagal nerve stimulator insertion directed at the treatment of intractable epilepsy. And Dr. Venger has begun a program of deep brain stimulator placement for the treatment of Parkinson's disease, as well as other movement disorders.

We hope within the next year, the prac-

tice will open Nevada's only Gamma knife stereotactic radiosurgery center. Only a handful of these centers exist throughout the country and the establishment of one in our region will allow the treatment of many tumors and vascular lesions with stereotactically focused radiation.

Finally, the Western Regional Center for Brain and Spine Surgery is actively engaged in many research projects dealing with the development of new procedures and technologies for both intracranial and spine surgery. The results of this will benefit individuals in southern Nevada and throughout the regional communities affiliated with our practice.

Conclusion

Your inquiries pertaining to any aspect of neurosurgery or spine-related problems are welcome, as are any comments about how our practice might better serve you or your patients. Our commitment is to provide comprehensive neurosurgical care for the patients in southern Nevada and the communities we serve in Arizona, Utah, and California. We invite you to contact any of us with topic suggestions for future issues of this newsletter.

Aging Painful Spine, continued from page 2

not aggravate the condition. Very frequently, members of the family will note that the patient's posture has gradually changed to a very stooped one. In addition, leg pain with ambulation or neurogenic claudication is, in general, the most common presenting symptom. Obviously, back pain, sensory changes, and weakness are also very common. Although symptoms are not consistent from patient to patient, symptoms generally are consistent for each individual patient.

Pathophysiology of Lumbar Stenosis

A clear understanding of the pathophysiology of lumbar stenosis improves our treatment. The normal process of aging includes spinal dehydration. As lumbar discs dehydrate with age, significant compres-

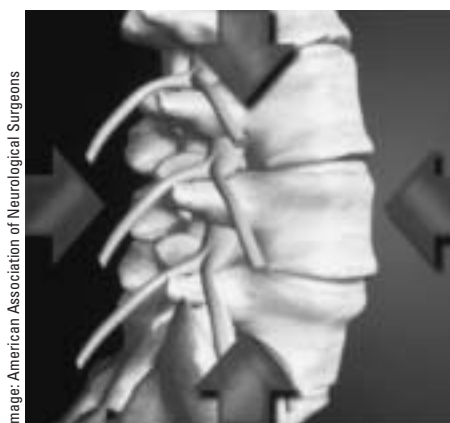


Image: American Association of Neurological Surgeons
Spinal structure changes may be caused by disc dehydration, osteophyte formation, or ligamentum flavum hypertrophy and are often complicated by arthritis.

sion occurs. As it occurs, one can see tilting, slippage, or rotation of vertebral bodies. Similarly, with years of physiological stress-

es, bone growth develops. This narrows the overall intraspinal diameter as well as the lateral recesses of the spine.

Bone spurs and osteophytes occur, often narrowing the neural foramina, increasing the opportunity for nerve root impingement. Also, the posterior structural ligaments of the spine undergo significant hypertrophy, ossification, and redundancy. As this occurs, the spinal canal is reduced. The extension causes buckling of the ligamentum flavum, further reducing the spinal sac and compressing the nerve root. This is why it is a very common presentation to see individuals walking in a flexed posture to partially open up the canal and diminish ligamentous buckling and compression.

Aging Painful Spine, continued on page 4



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Aging Painful Spine, continued from page 3

Finally, facet arthropathy or arthritic degeneration cause overgrowth of the facet joints which also contributes significantly to nerve root compression and lumbar spinal stenosis.

“What Causes Spinal Stenosis?”

A common question asked by patients is often, “Why do I have these symptoms?” In general, there are four major etiologies of acquired spinal stenosis.

- 1) Most common is that of degenerative conditions of the spine. These would include scoliosis, spondylolisthesis, and spondylosis.
- 2) The second major category is that of traumatic and postoperative stenosis.
- 3) The less common presentation comes from those individuals with

either skeletal or metabolic etiologies. These would include individuals with rheumatoid arthritis, Padgett’s disease, and spondylitis.

- 4) More rarely, individuals with pseudogout, acromegaly, and renal osteodystrophy can also present with lumbar stenosis.

Diagnosis

There is no single test that can identify lumbar canal stenosis. It is a complex diagnosis requiring insightful history taking and a directed physical examination with radiologic confirmation. In history taking, the most common differential diagnosis to be eliminated is that of vascular claudication. In general, vascular claudication produces cramping pain, whereas neurogenic claudication usually results not only in crampy but also radicular symptoms. In both vascular claudication as well as neurogenic claudi-

cation, symptoms are improved when the patient is at rest. However, with vascular claudication, flexing the spine, sitting, or lying down does not provide relief. It is interesting that riding a bicycle often provides relief for the patient with neurogenic claudication.

In physical examination, the most important aspect is checking the peripheral pulses. Obviously, in vascular claudication one would expect the peripheral pulses to be decreased, whereas with neurogenic claudication, these pulses are usually normal. In the neurologic examination, occasionally reflexes will be diminished. In general, however, the neurologic examination is normal. If an individual does indeed have neurologic deficit, immediate urgent neurosurgical evaluation is strongly recommended. ■