

Clinical Disorders of the Aging Spine

■ Abstract ■

In spite of the slightly increased incidence of infections, malignancies and systemic illnesses affecting the older spine, about 90% of back pain in the elderly, as in younger patients, is mechanical. This article covers several of the common problems: neurogenic claudication, degenerative disc disease, degenerative spondylolisthesis, disc herniation, spinal deformity and osteoporotic compression fractures. Treatment is both non-operative and surgical and the decisions about which to choose and therefore when to refer depend as much on the age and functional capacity of the patient as upon the specific pathology.

Key words: *neurogenic claudication, degenerative disc disease, degenerative spondylolisthesis, disc herniation, spinal deformity, osteoporotic fractures, imaging*



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Introduction

As we age our spinal columns endure a number of unwelcome anatomical changes. Discs degenerate, joints become arthritic, thickened ligaments and joint capsules lose flexibility and the vertebral bodies sprout osteophytes. The spine loses its optimal balanced curve configuration becoming kyphotic while the increas-

ingly osteoporotic bone invites spontaneous fractures. Deterioration and tissue overgrowth lead to disc herniation, symptomatic spinal stenosis and spinal instability. The aging spine is subject to trauma and neoplasms, both primary and metastatic. The primary care provider is challenged to decide which changes are expected, irrelevant and asymp-

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tomatic and which require intervention. Today's aging population is vastly different from a century ago. They live longer; staying active and engaged well into their eighties or early nineties when they seek medical support for spinal ailments.

Back pain in the elderly, like back pain in younger patients, is more than 90% of the time a simple mechanical condition.¹ This article will highlight mechanical problems in older patients: neurogenic claudication, degenerative disc disease, degenerative spondylolisthesis, disc herniation, spinal deformity and osteoporotic compression fractures.

Neurogenic Claudication

Neurogenic claudication is a syndrome characterized by intermittent leg pain and weakness brought on by activity such as walking and is relieved by resting flexion. It is the result of nerve root ischemia usually caused by root compression within a narrowed spinal canal: spinal stenosis.² Other things that can reduce the available space include a thickened ligamentum flavum, bony hypertrophy of the facet joints or thickened joint capsules, a bulging annulus fibrosis or a synovial cyst. Because the symptoms come on with activity and are typically absent at rest the physical examination is often normal, a troubling mismatch between history and clinical assessment.

These patients often gain marked relief from their leg pain simply by assuming a forward flexed posture. Because using a shopping cart allows them to bend forward and thereby

improve their walking distance they would rather frequent the supermarket than the mall: a feature of neurogenic claudication that has been dubbed the “shopping cart syndrome.” The diagnosis is made based on history; hearing the story of hanging on to the cart or frequently sitting down to relieve the leg symptoms should be enough.

There are distinct differences with the main differential diagnosis: peripheral vascular claudication. The most obvious is that vascular patients do not have to flex to relieve their claudicant symptoms. The pulses in the foot may be absent or very difficult to palpate; of course since these are usually elderly patients, pulses in the neurogenic claudicants may also be minimal. Neurogenic claudication most often affects the thighs while, intermittent vascular claudication tends to affect the calves. Neurogenic patients will often avoid anything that arches or extends the low back including lying on their back while trying to sleep; they like to lie curled up on their side.

Conservative treatment includes posture correction with increased flexion, trunk strengthening and activity modification. Medication is of limited value. Narcotic analgesics are contraindicated. Short-term pain control is easily achieved with posture change, thus the risk of opioid addiction is not justified.

When should you refer to a spine surgeon? When disabling symptoms, typically an inability to walk sufficient distances to accommodate the necessary daily routine,



Key Point

The diagnosis of neurogenic claudication is made on the history of intermittent leg dominant pain brought on by activity, usually walking, and relieved by rest in flexion, usually by sitting down. The physical examination while the patient is at rest is often normal.

persist beyond six months patients may need surgery to directly address the pathology.³ Surgical treatment aims to decompress the cauda equina while maintaining the integrity and stability of the spine. Many patients can be treated by decompression alone,⁴ while fusion or stabilization procedures are reserved for those patients who are either unstable preoperatively or whose necessary decompression was so extensive that it rendered the spine vulnerable.

Surgery is a major undertaking for the elderly patient. Surgical success is significantly decreased when the stenosis affects multiple levels, particularly when there is substantial associated spinal deformity. Recovery can be arduous and slow; patient may not see any benefit for three or four months.³ The decision to have an operation, even for a patient with severe neurogenic claudication, is one that needs considerable thought.



Key Point

Mechanical back pain associated with disc degeneration is seldom an indication for surgery and can usually be adequately managed through a combination of education, activity modification, general fitness and exercises selectively tailored to improve the pain-producing positions and movements.

NEUROGENIC CLAUDICATION

Symptoms

Intermittent leg dominant pain (usually thigh more than calf) brought on by activity in extension (usually walking) and relieved by flexion (usually sitting down)

Non-operative management

Activity modification to increase flexion; walking aids; trunk strengthening exercises; limit walking distances

Referral

After failure of non-operative care and several months of disabling leg symptoms substantially restricting functional activity

Degenerative Disc Disease

Degenerative disc disease in the elderly without associated nerve root involvement or unmistakable structural failure is rarely an indication for surgical management. The changes seen on imaging are usually no more than can be considered normal age-related disc dehydration. In the absence of constant leg-dominant radicular pain or claudication symptoms, it is unlikely that these patients are appropriate for surgical intervention.

While mechanical disc failure can be painful and temporarily disabling it can often be successfully managed with non-operative measures such as fitness training,⁵ stretching, exercise,⁵ weight reduction,⁵ lifestyle modification,⁵ short-time bracing,⁶ reassurance⁷ and education.⁸

DEGENERATIVE DISC DISEASE

Symptoms

Back dominant pain (low back, buttocks, coccyx, trochanters, groin) affected by movement and position. Increased with sitting or standing and reduced by lying down. Associated with back stiffness.

Non-operative management

Education⁸; life style modification⁵; reassurance⁷; direction-specific movements and exercise;⁵ general fitness; weight loss;⁵ short-term bracing⁶.

Referral

Not appropriate in most cases. Surgery has a limited and specific impact and is not a treatment for generalized back pain or a solution for disability.

Maintaining range of motion, mobility and strength are important but often ignored fundamental principles in this population.⁹ Physiotherapists and fitness instructors are valuable assets.

When should you refer to a spine surgeon? Rarely, if at all. Surgery for back pain, usually fusion or another type of stabilizing procedure, is unpredictable and frequently leads to additional problems.¹⁰ In the absence of a recognized structural abnormality, localizing the pain generator is problematic so determining both the location and the nature of the surgery is controversial.

Degenerative Spondylolisthesis

Degenerative spondylolisthesis is a condition in which adjacent vertebrae slide out of alignment due to a failure of the disc and linking facet joints. It can present as mechanical back dominant pain or, if there is significant compromise of the spinal canal, as neurogenic claudication. Treatment depends upon the presentation and the severity of the symptoms. Back pain alone is usually not a surgical indication and can be managed as a degenerative disc problem.

When should you refer to a spine surgeon? If the shift in the vertebral alignment reduces the dimensions of the spinal canal to a point that produces nerve root ischemia causing claudicant symptoms, decompression and fusion are frequently required.¹¹ The timing of the surgery depends on the severity of the symptoms and, more impor-

DEGENERATIVE SPONDYLOLISTHESIS

Symptoms

Presents as back dominant pain like that seen with degenerative disc disease.

Progresses to neurogenic claudication with increased deformation of the spinal canal.

Non-operative management

Back dominant pain: treat as degenerative disc disease.

Neurogenic claudication: treat as for claudication from spinal stenosis.

Referral

Back dominant pain: after failure of non-operative care and when debilitating back pain is associated with radiographic evidence of a major slip.

Neurogenic claudication: when intermittent leg dominant pain is brought on by walking distances insufficient to allow functional daily activities.

tantly, on the level and duration of the patient's disability.

Disc Herniation

Disc herniations producing radicular pain or sciatica in the elderly are rare but they do exist. As in the younger patient, they can be treated non-operatively and, again as in the younger cohort, the success rate is high.^{12,13}

When should you refer to a spine surgeon? The option for surgery in the elderly individual generally is based on the symptom duration and the ability of the patient to cope with the severity of the pain. If the leg dominant pain is severely



Key Point

Disc herniation producing acute sciatica is uncommon in the older patient and the diagnosis should be made with caution. True radicular pain is constant and leg dominant. Referred, intermittent leg pain frequently accompanies back dominant pain and should not be treated as sciatica.¹⁴



Key Point

Enduring spine surgery is a major challenge for the elderly patient. The decision to operate must be made after comprehensive consultation, emphasizing the prolonged recovery and weighing the potential benefits against the inevitable risks, including the risk to life.

DISC HERNIATION

Symptoms

Constant leg dominant pain aggravated by all spinal movements and associated with positive neurological findings such as a positive straight leg test (reproduction of the leg dominant pain) and/or loss of normal motor, sensory or reflex function.

Non-operative management

Frequent scheduled rest positions throughout the day in the position that best reduces the leg pain (i.e. Z lie²); no active stretches or exercises; directed activity modification; short-term narcotic analgesic medication during the acute phase.

Referral

When the constant leg dominant pain prevents even limited activity. The scheduled rest periods should be interspersed with some basic functional movement.

Urgent referral for Acute Cauda Equina Syndrome.

restricting activity we suggest that surgery be expedited. The older patient will become debilitated more quickly exhibiting muscle atrophy, stiffness and all of the other negative effects of immobility. Recovery will be slow and coming back, both mentally and physically, from a prolonged period of inactivity can be difficult. It is extremely rare to see an acute cauda equina syndrome in the elderly but that is always something to be considered.

Spinal Deformity

Mild to moderate and even severe spinal deformity in older patients usually requires no treatment. Spinal

deformity with back pain can generally be managed by the same non-operative measures employed for degenerative disc disease. Treating neurogenic claudication depends on the severity of the symptoms and the approach is the same as for patients with uncomplicated spinal stenosis.

When should you refer to a spine surgeon? Surgical correction is a substantial undertaking and should be reserved for those patients who are highly symptomatic, have a degree of deformity, such as a severe kyphosis, that impacts function, or who demonstrate a rapid deterioration of the contour of their spine. Patients with degenerative scoliosis, a curvature of the spine resulting from uneven disc collapse

SPINAL DEFORMITY

Symptoms

Subtle or prominent cosmetic deformity. The altered posture may be associated with back dominant pain or neurogenic claudication. In severe cases it may interfere with normal function.

Non-operative management

Asymptomatic spinal deformity usually requires no treatment.

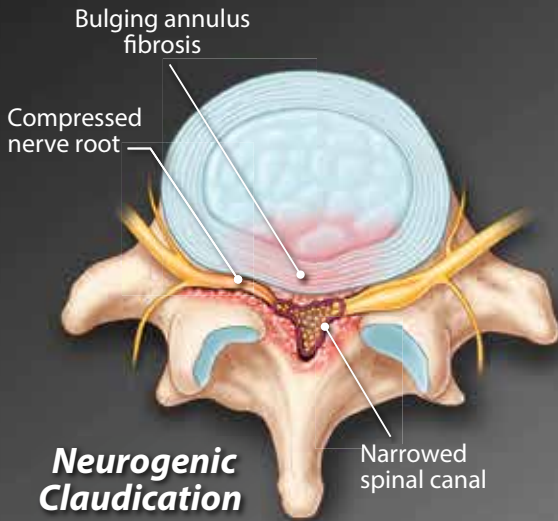
Back dominant pain: treat as degenerative disc disease.

Neurogenic claudication: treat as for claudication from spinal stenosis.

Referral

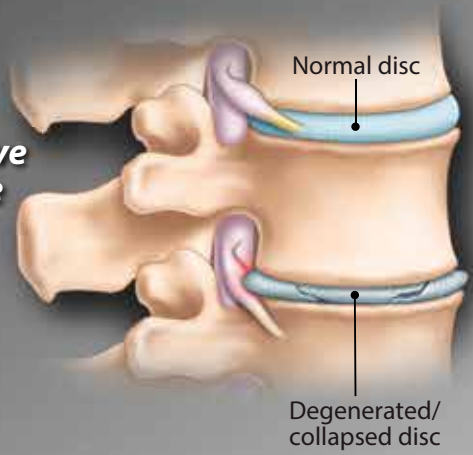
Patients should be under the age of 80 and have disabling symptoms of radicular or claudicant pain. Surgery for a severe painful deformity or deformity impairing function requires extensive consultation.

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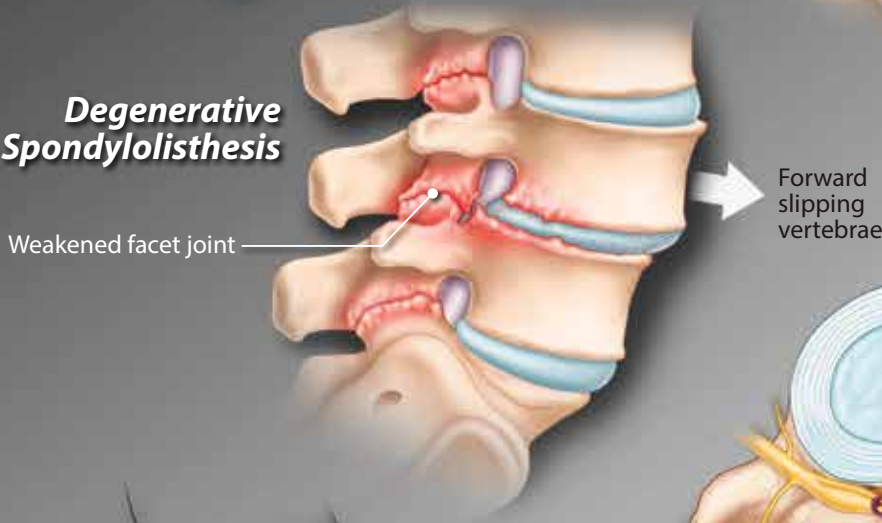


Neurogenic Claudication

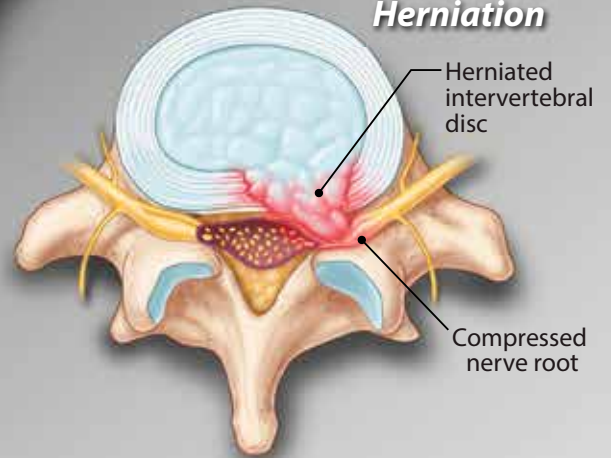
Degenerative Disc Disease



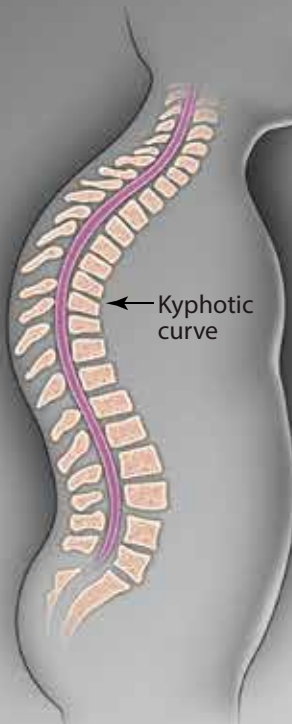
Degenerative Spondylolisthesis



Disc Herniation



Spinal Deformity



Osteoporotic Fractures



and multiple facet failures can fall into that third category. Cases where the deformity produces radicular leg pain can often be treated with limited decompression without destabilizing the spine.¹⁵ When the amount of necessary decompression risks increasing the deformity the situation is very different; an iatrogenically unstable spine can be devastating. When considering a major correction, necessitating both decompression and fusion, the preoperative planning can be extensive. The patient must be fit enough to withstand a major prolonged operation; this type of surgery is not applicable for most octogenarians. Obviously we cannot always avoid surgery but, if at all possible, surgically addressing spinal deformity should not be done beyond the 70s.¹⁶ The morbidity/mortality of such procedures is significant¹⁷ and the conversation between the primary care provider, the surgeon, the patient and the patient's family is complex. The balance between the potential benefits and the inevitable risks, including a substantial risk to life, must be fully understood.

Osteoporotic Fractures

Osteoporotic compression fractures often occur without trauma and can be debilitating. If there is no recognized event producing the fracture, the patient must be investigated for any underlying pathological processes.¹⁸ Typically, an osteoporotic compression fracture heals uneventfully within a matter of a few weeks but, sadly, that is not always the case.

Some elderly individuals need to be hospitalized because of poor pain management. Once you have ruled out significant pathological processes such as a primary or metastatic malignancy or infection, consider ambulatory bracing. Although the osteoporotic fracture itself may not need a brace the extra protection and sense of stability from a lumbosacral corset improves mobility for the elderly patient.

When should you refer to a spine surgeon? When the pain is sustained and intractable and mobilization, even with a brace, is not possible, there may be a place for surgically augmenting the vertebral body with kyphoplasty or vertebroplasty.¹⁹ The procedure can facilitate an earlier discharge from hospital.

More fundamentally, we need much better treatment for osteoporosis. Prevention is clearly better

OSTEOPOROTIC FRACTURES

Symptoms

Sudden onset of constant back pain (often in the thoracic spine) without a history of trauma. Pain is aggravated by all movement but particularly by flexion.

Non-operative management

Activity modification; scheduled rest periods; short-term bracing to increase mobility; non-narcotic analgesics.

Referral

Persistence of disabling back pain over 6 weeks in spite of appropriate non-operative care. Findings suggestive of an underlying sinister pathology.



Key Points

The diagnosis of neurogenic claudication is made on the history of intermittent leg dominant pain brought on by activity, usually walking, and relieved by rest in flexion, usually by sitting down. The physical examination while the patient is at rest is often normal.

Mechanical back pain associated with disc degeneration is seldom an indication for surgery and can usually be adequately managed through a combination of education, activity modification, general fitness and exercises selectively tailored to improve the pain-producing positions and movements.

Disc herniation producing acute sciatica is uncommon in the older patient and the diagnosis should be made with caution. True radicular pain is constant and leg dominant. Referred, intermittent leg pain frequently accompanies back dominant pain and should not be treated as sciatica.

Enduring spine surgery is a major challenge for the elderly patient. The decision to operate must be made after comprehensive consultation, emphasizing the prolonged recovery and weighing the potential benefits against the inevitable risks, including the risk to life.

than treating a fracture. This is an area where the endocrinologist can be of greater help than the spine surgeon.

Imaging

The images of the elderly spine show a back that is as old as the patient. The correlation between symptoms, signs and findings on a CT or MRI is very poor.²⁰ Imaging must have a purpose and the findings should influence further treatment decisions. Do not get an MRI just to “see” what is going on. Unless there are clear indications of an underlying sinister pathology such as nocturnal pain awakening the patient, weight loss, anorexia or diaphoresis, the investigations will create more problems than they solve and lead to unneeded aggravation, fear, expense and a poor outcome.¹⁹ The primary care physician involved with the continuity of care will recognize when a previously healthy patient has begun to

deteriorate and the art of medicine might dictate the need to investigate. Think carefully about when your patient needs to have imaging, about what type of image is required, and, once the results are available, do not hesitate to discuss the findings with the radiologist or spine surgeon. A foraminal stenosis on the left has absolutely nothing to do with leg pain on the right. If you live long enough, every disc degenerates.

A Few Final Thoughts

The authors believe that many patients who need major spinal surgery would benefit from a “prehabilitation” program. This could include selected exercises directed at the specific pathology, such as a stationary exercise bike where flexing forward eliminates the claudicant symptoms or trunk and paraspinal muscle strengthening for mechanical back pain, dieting and maximizing the medical man-



Clinical Pearls

Osteoporotic vertebral body compression fractures frequently occur without a recognized history of trauma. The pain, often in the thoracic or upper lumbar area, appears suddenly, is aggravated by movement (particularly bending forward) and is reduced but not eliminated by lying down. The acute phase can last several weeks but usually subsides without specific treatment. Multiple compression fractures over time will produce a kyphotic spine.

Back pain in the elderly should be managed with a minimum of medication. Mechanical pain can usually be controlled with the appropriate mechanical measures and additional analgesia is not required. Recourse to pain medication as a first line of treatment is not recommended and when employed should be limited to non-narcotic formulations. With the possible exceptions of acute sciatica and recent vertebral compression fractures, opioids should not be used.

agement of co-morbidities.²¹ The more we can improve the preoperative situation, the easier it will be to recover in the postoperative period, and perhaps surgery can be avoided altogether.

Many elderly patients want to be a vibrant, active part of their community and are doing whatever they can to stay away from nursing homes and hospitals. The primary care provider needs to be able to identify and to do something about the spinal conditions that can interfere with the patient's life, and learn to ignore the ones which are simply a normal part of aging. The distinction and the appropriate therapy may not be clear. Seek as many opinions as you need: the fitness instructor, dietician, physiotherapist, physiatrist, rheumatologist, endocrinologist, radiologist and spine surgeon.²²

The aging spine is a relatively new area of medical expertise and we are still recognizing the challenges. We are only now discovering the most effective non-operative measures and exploring the limits of our surgical capabilities.

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