The Professor Position and the Single-Stance Flexion Test May Clarify the Effect of Lumbar Spinal Stenosis or Pseudostenosis on Lower-Extremity Symptoms

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The effect of lumbar spinal stenosis on lower-extremity symptoms is often hard to ascertain in patients with multiple possible causes of symptoms. A positive response to two described maneuvers performed by patients in the office involving flexion of the spine can strongly corroborate the contribution of lumbar spinal stenosis to lower-extremity symptoms, although a negative response does not negate it. The professor position involves the patient standing and leaning in a gentle flexion position, with hands held secure behind the lower back. The single-stance flexion test has the patient gently leaning on support, with only a single symptomatic extremity supporting his or her body weight. Reduction or elimination of lower-extremity symptoms otherwise experienced in an erect position suggests that spine position contributes significantly to the overall lower-extremity symptoms, in addition to or instead of weightbearing or dependent positioning. These maneuvers may be effective in either lumbar spinal stenosis or pseudostenosis, a condition in which lower-extremity mechanical dysfunction induces spinal dysfunction mimicking or exacerbating symptoms of lumbar spinal stenosis. Success with either maneuver can suggest to both physician and patient the potential value of positional testing with a rolling walker as a therapeutic intervention. Further research is necessary. Clinical use may be indicated. (J Am Podiatr Med Assoc 103(2): 156-160, 2013)

Lumbar spinal stenosis can cause a variety of lower-extremity symptoms, including aching, burning, muscle weakness, loss of sensation, claudication, and others, labeled neurogenic claudication in the legs and thighs and neurogenic positional pedal neuritis in the feet.[1] Lumbar spinal stenosis is a great mimic, as these symptoms can also be caused by other conditions involving lower-extremity structures. It can also exacerbate symptoms coming from lower-extremity conditions such as diabetic or nondiabetic neuropathy, arthritis, poor circulation, and others. The prevalence of lumbar spinal stenosis increases with age, is common, and is reported to be 47.2% in individuals aged 60 to 69 years.[2] As many patients are asymptomatic despite radiographic evidence of significant stenosis, assessment of the contribution of lumbar spinal stenosis to lower-extremity symptoms must not be directed entirely by imaging results.[3]

It is well-known clinically, and confirmed radiologically,[4] that lumbosacral flexion opens the lumbosacral canal, which may, thus, reduce symptoms. Clinical benefit has been observed and reported to improve gait while pushing a grocery cart[5] or a wheeled walker.[1] This report presents two distinct and simple clinical maneuvers that may clarify the contribution of lumbar spinal stenosis to lower-extremity symptoms and that take advantage of this anatomical phenomenon. Positive results strongly support the presence of spinal nerve compression affecting lower-extremity symptoms, but a negative result does not negate it, as flexion does not always reduce or eliminate stenosis-induced symptoms.

The first maneuver is the professor position (Fig. 1). The patient is directed to stand erect until lower-extremity symptoms develop. The patient then places both hands behind his or her back, grabs one wrist with the other hand, and leans slightly forward. The patient stands and may walk in that position. If symptoms substantially reduce, it demonstrates that spine position contributes significantly to lower-extremity symptoms, in addition to or instead of weightbearing or dependent positioning. Holding the hands behind the back makes it easier for the patient to maintain that flexion position comfortably without putting muscle strain on the back.

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Figure 1. Professor position.

Figure 3. Comfortable slight lumbosacral flexion.

A second maneuver is the single-stance flexion test (Fig. 2), especially revealing in patients with asymmetrical symptoms. The patient stands erect in front of but not touching a counter or other source of support until lower-extremity symptoms develop. He or she leans forward, flexing the spine, and rests his or her hands on the counter. If that reduces or eliminates lower-extremity symptoms, the patient may perceive that it is the off-loading that provides relief. He or she then lifts the less symptomatic extremity off the ground, placing most of the body weight on the more symptomatic extremity. Maintaining relief in that position, and for some patients even bouncing up and down on that single extremity previously perceived as painful, demonstrates that spine position contributes greatly to the overall lower-extremity symptoms, in addition to or instead of weightbearing or dependent positioning.

Figure 2. Single-stance flexion test.

In addition to clarifying to the clinician and the patient the effect of spinal position on symptoms, these maneuvers may also clarify the potential value of positional testing[6] as therapeutic intervention. This previously reported protocol involves temporary full-time use of a rolling walker whose handle height induces comfortable lumbosacral flexion (Fig. 3). The reported protocol includes use of shower and kitchen stools to minimize erect positioning and modification of sleep position with a pillow underneath the thighs if sleeping on the back or between the thighs if sleeping on the side. The author's current expanded protocol also includes use of the professor position when walking without support, going down stairs backwards (Ira Fedder, MD, oral communication), using the seat of the four-wheel rollator walker as a tray to carry objects, and having a walker on each used floor of the domicile, the latter two behaviors facilitating maximum compliance. Combining these behavior modifications is hypothesized to create a positional decompression that by reducing pressure on spinal

Figure 4. Walker handle height that is too high induces lumbosacral extension. Shoulders are prominent. Individuals may flex their elbows or position the walker far in front of the body instinctively to try to achieve a comfortable flexion position.

Figure 5. Patient with kyphosis appears to bend excessively, but this position was necessary to eliminate back and leg pain and was extremely helpful in extending walking distance. Elbows are flexed, but this was maximal elbow extension for this patient.

nerves may rapidly reduce local inflammation and, thus, reduce symptoms and enhance walking capability. A previous publication reports quick improvement,[7] and this report reiterates that patients who improve with positional testing do so within 3 days, with 70% good to excellent success documented in a small study. After 10 days, patients who improve shift to positional therapy[7] in which they reduce walker use to the amount necessary to maintain improvement. Many are able to discontinue use of the walker and maintain improvement, whereas others require part-time or even full-time use to maintain improvement. Patients with incomplete improvement of lower-extremity symptoms after positional testing, or recurrence after discontinuation of walker use, should again be examined for contributing lower-extremity pathologic features or other pathologic conditions.

Walker handle height is essential. Many patients report improvement in symptoms with a 1- or 2-inch adjustment from previously used walkers, or if the prescribed walker provided through the durable medical equipment provider was not set at the prescribed height, a not uncommon occurrence. Standard walker protocol, in which the patient is directed to stand straight with the elbows bent at 20° to 30°, is recognized conventional wisdom but has not been reported in investigatory trials and is not directed to accommodate sagittal plane position optimization in patients with lumbar spinal stenosis. In contrast, this protocol directs the patients to have the arms straight, comfortably flexing the lumbosacral spine, with the walker within approximately 1 foot of the body. If the walker handle height is too high, attempting to lean forward requires flexion of the elbows and shoulders (Fig. 4) that may cause uncomfortable upper-extremity muscular and joint strain that can make long-term walking difficult and may also induce shortness of breath in patients with reduced functional capacity caused by pulmonary or cardiac pathologic disorders. Holding the walker too far in front of the body induces flexion but can cause arm, shoulder, and neck discomfort. If the walker handles are too low, excess flexion can cause lumbosacral discomfort. Such affect of minor positional changes results in the walker not inducing improvement and possibly inducing discomfort. An important note of caution is that walker use on hills can be problematic because of inconsistent induced position.

It is not possible to direct handle height simply based on the patient's height, in that individual physical characteristics, including arm length, leg height, kyphosis, and the amount of flexion needed

Figure 6. A pediatric walker is often needed for patients shorter than approximately 4 feet 10 inches.

to open the lumbar spinal stenosis, affect handle height selection (Fig. 5). Patients shorter than 4 feet 10 inches often require a pediatric standard walker (which should have wheels in the front and skis in the back) to achieve a comfortable flexion position (Fig. 6).

Although strongly suggestive of stenosis or other proximal pathology, improvement with lumbosacral flexion is not pathognomonic. Commonly, improvement may also occur in a pseudostenosis phenomenon. In contrast to a 1983 article[8] that defines pseudostenosis as a condition in which a spinal pathologic disorder other than true lumbar spinal stenosis can cause similar symptoms, the present article defines pseudostenosis as a condition in which a mechanical pathologic disorder of the lower extremities causes spinal structures to function more narrowed, inducing or exacerbating spine or lower-extremity symptoms identical to those of lumbar spinal stenosis. Symptoms are, thus, mediated through the spine, although the primary anatomical or functional pathologic condition may be in the lower extremities. Pseudostenosis may be present in the presence or absence of structural lumbar spinal stenosis and seems to be a frequent cause of failure of conventional lumbar spinal stenosis treatment.

With pseudostenosis, symptoms and suggestive physical examination signs may be identical to those seen with lumbar spinal stenosis. Spine and lower-extremity symptoms usually improve with flexion. Physical examination of patients suspected of having peripheral neuropathy may show atypical loss of sensation (greater loss proximally than distally) or asymmetrical loss of sensation.[1] Extremity nerves often show hypersensitivity to palpation, including the posterior tibial nerve, tibial nerve (medial approach, midcalf), femoral nerve (medial approach, midthigh), and intermetatarsal nerves.[1] With lumbar spinal stenosis and pseudostenosis, the second, third, and fourth interspaces are often tender, whereas the first interspace nerve is usually not tender, suggesting a first interspace fine sign. This pattern is often worse in the longer leg in patients with limb-length discrepancy. Similar to the rapid improvement of painful symptoms, this nerve sensitivity usually resolves within a few days with effective biomechanical treatment for pseudostenosis or positional testing that may be effective for either lumbar spinal stenosis or pseudostenosis. Similarly, the unilateral equinus seen in the short limb often resolves within a few days of proper support for the short limb.

Common lower-extremity pathologic conditions that may cause pseudostenosis include limb-length discrepancy, pes planus including functional hallux limitus, asymmetrical or severe lower-extremity arthritis, neuromuscular dysfunction such as footdrop, or any condition in which severity of pain induces significantly altered gait. Previous publications have reported that lower-extremity pathologic disorders can induce low-back symptoms that improve with biomechanical treatment, including lifts for limb-length discrepancy[9] and orthotic devices for pes valgo planus.[10]

It is essential to understand that because spine and lower-extremity symptoms of pseudostenosis may also improve with the maneuvers and treatment protocols described for lumbar spinal stenosis, such improvement does not obviate the need for lower-extremity examination and possible management.

These protocols, which I have used in evolving forms for 12 years, are clearly inadequately investigated. The professor position, single-stance flexion test, and other original observations of this report are only evidence level V. Positional testing and positional therapy are only level IV. It is hoped that this report will stimulate the further research that is necessary. Until that time, clinical use may be considered.

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