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Research Paper Review

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Comparison of Radicular Symptoms Caused by Lumbar Disc Herniation and Lumbar Spinal Stenosis in the Elderly

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ABSTRACT

Study Design

Comparative study using combined data from 2 prospective cohort studies.

Objective

To expose the differences between the clinical characteristics of neurogenic claudication from magnetic resonance image-documented lumbar spinal stenosis (LSS) and lumbosacral radicular syndrome from acute, magnetic resonance image-documented, lumbar disc herniation (LDH).

Summary of Background Data

LSS and LDH are the common lumbar disorders that produce lower extremity pain. Though known factors such as pain induced by walking for LSS and the rapid onset of symptoms for LDH are useful for differentiating these disorders, exploration of differences in other factors has received limited study.

Methods

This study included participants aged 60 yr or older from 2 previous studies. One examined walking limitations caused by LSS and the second the natural history of LDH in elderly adults. The clinical features of both groups were compared by calculating means, medians, and standard deviations for continuous variables, and frequencies for categorical variables. χ *test was used to explore differences between LSS and LDH for categorical variables, and Student t test or Mann-Whitney test for continuous variables.*

Results

Participants with LSS had more medical comorbidity, less intense leg pain, and less disability than those with LDH. Leg pain was more common in the anterior thigh, anterior knee and shin in LDH, and in the posterior knee in LSS. Trunk flexion was more impaired in LDH. Positive straight leg raising and femoral

stretch signs were common in LDH, and rare in LSS. Abnormal Achilles reflexes were noted more frequently in LSS.

Conclusion
In addition to established factors, greater leg pain intensity, greater disability, and pain in the anterior leg are more common in the elderly with LDH than in the elderly with LSS. Normal trunk flexion, absence of nerve root tension signs and abnormal Achilles reflexes are more common in LSS.

Level Of Evidence: *3.*

ANALYSIS

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Background Information

Two of the most common syndromes presenting with radiating pain into the lower limb are neurogenic claudication (NC) due to lumbar spinal stenosis (LSS) and lumbosacral radicular syndrome (LSRS, also called lumbosacral radiculopathy) from a lumbar disc herniation (LDH). Both conditions can result in lower extremity pain, with or without low back pain. Despite their different logical clinical presentations, it can often be difficult to differentiate the two in a clinical setting. Here is what we know…

Typically, NC is described as pain or discomfort that radiates into the buttocks, thigh and lower leg, which is increased with lumbar extension, standing and walking, and alleviated with flexion of the lumbar spine (1, 2). The condition is associated with degenerative lumbar spinal stenosis, which is defined as a narrowing of the vertebral canal, with resultant compression of the thecal sac and lumbar nerve roots (3). Most commonly, LSRS can occur due to a deformity of the annulus fibrosis and/or extrusion of the nucleus pulposus into the spinal canal or intervertebral canal. LSRS could feature a combination of radicular pain, dermatomal sensory symptoms, and/or weakness in the distribution of the affected nerve root (4, 5).

Although the features of each condition can be quite distinctive logically, many times the respective symptom picture of each disorder may vary greatly on a patient-to-patient basis, making them difficult to differentiate clinically in elderly individuals. It was thus the goal of this study to explore the symptoms and signs in a group of elderly patients with confirmed diagnoses of either NC from LSS or LSRS from LDH, and uncover any differences in their presentation and physical examination, aside from those outlined above.

PERTINENT RESULTS

Fifty participants with LSS and 48 participants with LDH were included in this analysis:

- Average age and back pain intensity were similar in both groups.
- Fifty-eight percent of those with LSS, and 52% of those with LDH were retired; this difference was not statistically significant (keep in mind, the demographic information of these participants: they were all elderly. No younger individuals were included,). For those who were employed, workplace disability was similar in both groups.

Results Regarding Lumbar Disc Herniation (LDH)

- LDH participants typically had leg symptoms that were unilateral, while bilateral symptoms were reported by 52% of participants with LSS.
- The LDH group reported greater leg pain intensity, and higher ODI scores.
- 87% of those suffering from LDH were classified as having an extrusion or sequestration, while 46% of confirmed LDHs were located within or lateral to the neural foramina, with the L3/L4 and L4/L5 being the most common location of herniation.
- Patients with LDH were more limited in trunk flexion and were more likely to have positive nerve root tension signs (58%).
- Broken down by percentage, the frequency of herniation at each lumbar level were as follows in descending order: L4 – 33%, L3 – 27%, L5 – 19%, L2 and S1 – 13%.

Results Regarding Lumbar Spinal Stenosis (LSS)

- Symptoms were of longer duration in the LSS compared to the LDH group.
- Individuals suffering from LSS reported greater frequency of medical comorbidity.
- L3/L4 and L4/L5 were the most common level of spinal stenosis, with 2 or more stenotic levels noted in 42% of the participants. The stenosis, as rated from imaging, was determined to be severe in 54% of the participants, and moderate in 38%.
- Those suffering from LSS were more likely to have diminished Achilles reflexes. Nerve root tension signs were found infrequently in those with LSS (8%).

General Results for Both Conditions – LDH & LSS

- For both sets of participants, leg pain was most commonly found in the posterior and lateral thigh, and calf. Pain in the distal leg was less common, but when experienced it appeared on the dorsum of the foot, and was more common in the patients with LSS; while more common, there was no statistical significant difference between groups. Pain located in the anterior thigh and shin was more common in those suffering from LDH, while those with LSS more commonly experienced pain on the posterior aspect of the knee.
- Diminished sensation to pinprick and abnormal muscle strength were relatively common and similar in both groups.

CLINICAL APPLICATION & CONCLUSIONS

This study noted several clinical characteristics that may help clinicians differentiate elderly adults suffering from leg symptoms stemming from LSS versus LDH. Those suffering from LSS had significantly more medical comorbidity, lower ODI scores and less intense leg pain. Leg pain was more frequent in the anterior thigh and shin in the LDH group, while the posterior aspect of the knee was more common in those with LSS. Trunk flexion was more commonly decreased in those with LDH, while diminished Achilles reflexes were more commonly found in elderly patients with LSS.

The finding that anterior thigh and shin pain was more common in elderly patients suffering from LDH is noteworthy. This is likely because there is a greater frequency of individuals in the elderly community suffering from L3 and L4 radiculopathies, compared to younger cohorts. The researchers also conclude that the higher ODI scores are more common in those suffering from LDH because the condition interferes with a variety of activities such as personal care, sitting and sleeping, and with the perceived greater pain associated with LDH in this population. Curiously, trunk extension was similar in both groups – the researchers offer no explanation for this finding, other than to say that the occurrence of pain with trunk flexion and extension was not recorded in the studies included in this analysis, and that a limitation in flexion range of motion due to pain cannot be verified as an explanation for these differences.

This is one of the first studies on this topic. Evidence-informed clinicians can integrate these results into their clinical assessment and thought process while assessing elderly patients with leg pain of suspected spinal origin.

STUDY METHODS

This analysis examined the combined participant databases from 2 previous prospective cohort studies. The first study (6) included elderly individuals who had a recent onset of radicular pain in a lumbar or sacral dermatomal pattern, and also had a diagnosed LDH in the corresponding symptomatic neurological level using MRI. The second study (7) evaluated the various walking limitations caused by neurogenic claudication from LSS. The second study included individuals who had degenerative LSS diagnosed via MRI or CT who had unilateral or bilateral NC with or without neurological symptoms of weakness, sensory loss or poor balance. The included participants also had a limited self-reported walking ability secondary to NC of ? 30 minutes and a duration of symptoms for at least 3 months.

The investigators collected pertinent information about each patient, including age, gender, ethnicity, duration of symptoms, location of leg pain, history of prior low back pain, previous surgical procedures to the lumbar spine, employment status and workers compensation status. Additionally, they collected data from the self-administered disability questionnaire, which analyzes the burden of medical and psychiatric cormorbidity, the Oswestry Disability Index (ODI), and from MRI findings which described the intervertebral level and severity of LSS or LDH. MRI findings were used to evaluate the degree of stenosis (grade 1-3 depending on the reduction in canal area), lumbar disc herniation morphology (protrusion, extrusion or sequestration) and location of the herniation, described as central (central, paracentral, subarticular, lateral recess subcategory locations) or foraminal herniation (foraminal or extraforaminal subcategory locations). Additionally, the location of leg pain symptoms

were recorded as present or absent in the following areas: thigh (anterior, posterior, lateral), groin, knee (anterior or posterior), shin, calf (lateral, medial and posterior), ankle/foot (lateral, anterior and medial) and heel/sole of the foot.

The investigators of both studies performed identical physical examinations in both the LSS and LDH studies. A single inclinometer technique was used to quantify trunk flexion and extension in the standing posture. Also included were nerve root tension tests, such as the straight leg raise test (L5-S1 nerve roots) and the femoral nerve stretch test (L3-4 nerve roots), and were defined as positive if they provoked radicular pain. Motor function was analyzed using manual muscle testing of hip flexion (L2), hip abduction (L5), ankle dorsiflexion (L4, L5), great toe extension (L5), and were rated on an 0-5 ordinal scale, with 5 representing normal strength. Functional testing using the patient's own body weight, such as single leg sit-to-stand, performance of a step-up test onto an 18 cm footstool (L3-L4 myotomes) and raise-onto-toes test (S1) were also used. The functional tests were qualified as abnormal if they could not be performed on the symptomatic leg. Lower limb deep tendon reflexes, lower extremity pinprick sensitivity were also performed.

STUDY STRENGTHS / WEAKNESSES

Considerations & Weaknesses

- The study combined data from 2 different studies that were performed sequentially, not simultaneously. There was no intention when the studies were performed to do a comparison between LSS and LDH.
- The patients included in the study were almost exclusively white individuals over the age of 60, which may limit generalizability of findings.
- The inclusion and exclusion criteria were developed to expose clinical differences in spinal pathology, thus limiting the enrollment of individuals with LSS for the LDH study, and LDH for the LSS study. However, because LDH can be a predetermining factor in the development of LSS, some contamination of the data might have occurred.

Strengths

- Consistency of the data acquisition, physical examination and recruiting physician in both studies allows for greater reliability of the findings.

Additional References

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