Lumbar Spinal Stenosis

Diagnosis/Condition:	Spinal stenosis, Lumbar region Central lumbar stenosis, Lumbar Lateral Recess Stenosis
Discipline:	DC, ND
ICD-10 Codes:	M48.06
Origination Date:	2008
Review/Revised Date:	01/2024
Next Review Date:	01/2026

The general term "spinal stenosis" can be applied to a variety of pathologic conditions that can constrict the central spinal canal, the lateral recess, or the intervertebral foramen. Lumbar Central Stenosis (LCS) is narrowing of the central spinal canal that may be due to a variety of conditions and can involve the spinal cord (cauda equine). In contrast, Lumbar Lateral Recess stenosis (LLRS) is narrowing and possible nerve entrapment that occurs in the lateral aspects of the spinal canal. typically involves an individual nerve root. Causes of stenosis include congenital[1] (e.g. achondroplasia, ossification of the posterior longitudinal ligament (OPLL), Paget's, or idiopathic) and acquired (e.g. DISH, degenerative). Of these, degenerative change is the most common. Compression can be caused by one or more of three mechanisms: disc protrusion or herniation, osteophytic or ligamentous overgrowth into the spinal canal or the foramina, and spondylolisthesis or some combination of these. Lumbar spinal stenosis (LSS) is particularly common in the 5th and 6th decade of life although it occurs occasionally in younger patients. An estimated 1.2 million individuals in the United States (U.S.) experience back or leg pain from stenosis. LSS is the most common cause of lumbar spine surgery in patients >60 years old.[2,3]

Degenerative lumbar spinal stenosis describes a condition in which there is diminished space available for the neural and vascular elements in the lumbar spine secondary to degenerative changes in the spinal canal. When symptomatic, this causes a variable clinical syndrome of gluteal and/or lower extremity pain and/or fatigue which may occur with or without back pain.

Symptoms of LSS can range from none to severely disabling and the natural history of the condition is variable. Johnson, et. al. followed 32 untreated lumbar stenosis patients over 4 years and found 75% did not change, 10% worsened and 15% improved.[4] Treatments vary from "watchful waiting" to aggressive spinal surgery.[5,6] Rates of surgery in the Medicare population are increasing and there is evidence of 12-fold geographic variation in decision-making surrounding, types of surgery (e.g. decompression vs. fusion) chosen, and rates of surgery across the U.S. While surgery appears to produce better results in the short term, long-term results are similar among surgical and non-surgical patients. Conclusions from an 8-10 year follow up study "support a shared decision-making approach among physicians and patients when considering treatment options for lumbar spinal stenosis."[7] A Cochrane Collaboration

review in 2016 concluded that "… it should be noted that the rate of side effects ranged from 10% to 24% in surgical cases, and no side effects were reported for any conservative treatment. These findings suggest that clinicians should be very careful in informing patients about possible treatment options, especially given that conservative treatment options have resulted in no reported side effects."[8] Another study (lacking a control group) showed little difference in physical function between patients who received surgical and non-surgical therapies.[9]

Subjective Findings and History

- Symptoms of pseudoclaudication (radiation of nerve pain down legs mimicking sensation of true claudication from peripheral vascular disease) are associated primarily with central lumbar stenosis. Neurogenic claudication has a predictive value of about 96% for central stenosis.
    - Pain improved with forward bending or sitting.
    - Pain worse with extended walking.
- Patients with purely lateral recess stenosis.
    - Usually do not develop symptoms of neurogenic claudication.
    - Typically have radicular symptoms in a specific dermatomal pattern.
    - Often have pain at rest, at night, and with the Valsalva maneuver.
    - Tend to be younger (mean age 41 years) than patients with central canal stenosis (mean age 65 years).
    - Variable degrees of mechanical low back pain are very common.
- Usually, > 60 years of age.
- Symptoms can be classified as mild, moderate, or severe.
- Pain may be felt in the low back, legs, or buttocks.
- The legs may feel fatigued, cramping or burning.
- Patients commonly walk with a broad-based "simian" gait; hunched over with the hips and knees bent, supported on a walker or shopping cart. Symptoms worsened or relieved on posture dependency could be evident of neurogenic claudication.
- Patients may experience frequent falling, clumsiness, numbness, tingling, and hot or cold feelings in the legs.
- Symptoms may be unilateral or bilateral, but not usually symmetrical.
- Nocturnal leg cramps are common in LCS patients.[10]

The presence of symptomatic LSS may increase the risk of spondylotic cervical cord compression.[11]

Risk factor:[12]

- Age >40 years.
- Manual labor.
- Previous back surgery.
- Family history of back pain.

Objective Findings

- Diagnostic criteria include:
    - Loss of vibratory sensation in the lower extremities
    - Changes in static balance.[13]
    - A sensory or motor deficit occurs in about half of patients with symptomatic lumbar central stenosis; the specificity of this finding is about 80%. The deficit may occur bilaterally and in a polyradicular pattern.
    - Symptoms aggravated by standing and extension and often relieved with lumbar flexion.
    - Motor findings are typically mild, and functionally limiting weakness is uncommon.
    - The Romberg maneuver may reveal a wide-based gait and unsteadiness due to involvement of proprioceptive fibers in the posterior columns.
    - Patients may have muscle spasms and trigger points in the glutei and piriformis muscles.
    - There are no pathognomonic signs in LLRS.
    - Variable straight-leg tension signs.
    - Diminished reflexes in specific root distributions.
    - Assess for intersegmental and SIJ (sacroiliac joint) dysfunction.
    - Gait and lumbar extension loading tests are frequently used for assessment.[14]

Imaging

- Plain radiographs including dynamic flexion and extension studies allow the intervertebral foramen to be depicted, but findings must be correlated with the history and examination findings because false positives on x-ray are common.
- Plain radiographs are not routinely needed. Radiographs may show spondylolisthesis, the extent of disk-space narrowing, end-plate sclerosis, facet-joint hypertrophy, and foraminal osteophytes, suggesting foraminal stenosis. Clinical symptoms and plain radiographs results may not correlate.[15,16,]
- Electromyogram (EMG) or nerve conduction studies can identify damage to or irritation of the nerves and help determine location of nerve involvement.
- CT imaging allows better detection of bony encroachment on the lateral recess.
- Magnetic resonance imaging (MRI) or computed tomography (CT) may confirm the presence of spinal stenosis, but up to 20% of patients > 60 years have positive imaging findings with no symptoms or signs of stenosis.[17] The findings most suggestive of stenosis on MRI include a foramen of diminished size and a paucity of perineural fat surrounding the nerve root on T1-weighted images. Clinical symptoms and imaging results may not correlate.[18,19]
- There is very little evidence that correlates the degree of narrowing of the lumbar spine with the presence or severity of the signs, symptoms, or conditions associated with stenosis.[20,21]

Assessment

History and physical examination provide some evidence to make a presumptive diagnosis of symptomatic LSS but there is no single objective standard for identifying the condition. Most findings have modest discriminating ability, and positive imaging findings with symptoms is loosely associated.[22]

Diagnosis and treatment decisions are often complex due to heterogeneity and lack of standard criteria for diagnosis. Certainly, ruling out the **"red flags"** for conditions such as cauda equina syndrome is crucial. In extreme cases, lumbar stenosis can cause this syndrome, which is characterized by neuromuscular dysfunction, and may result in permanent nerve damage. Cauda equina syndrome is a true surgical emergency and suspicion should be acted on immediately.

Symptoms of LSS overlap with several other conditions and the differential for LSS includes vascular claudication, mechanical and neurological causes of low back and lower extremity pain, peripheral neuropathies, osteoarthritis of the spine or hip, and trochanteric bursitis. Assess relative and absolute contraindications to spinal manipulation (e.g. spondylosis, advanced degenerative joint/disc disease (DJD/DDD).

Plan

Most guidelines and treatment recommendations suggest a trial of non-surgical treatment before consideration of surgery. Due to the lack of clear diagnostic and treatment guidelines, patients and health care providers should engage in shared decision-making conversations that include full disclosure of evidence involving surgical and nonsurgical treatments for LSS. Symptomatic relief may include reducing nerve pain and psychosocial symptoms such as depression and isolation.[23] No clear benefits were observed with surgery versus non-surgical treatment.[24]

Passive Care:

- Motivational interviewing.[25,26]
- Steroid and lidocaine injections in the lumbar spine (epidural)[27,28] to decrease inflammation and swelling.
- Pulsed radiofrequency (PRF).[29]
- Manual therapy/individualized exercise consisting of spinal mobilization, stretches, and strength training.[30]
- Spinal cord stimulation.[31]
- Acupuncture.[32,33]
- Bilateral facet joint steroid injections with botulinum for severe cases of LSS was superior to transforaminal epidural steroid injections.[34]
- GOLDIC therapy.[35]
- Medications including gabapentin (Neurontin) and pregabalin (Lyrica).
- Pain medications, including opioids, are frequently prescribed for acute use. There are obvious concerns with long term use, and long term use may be counterproductive.

- A small RCT (n=54) suggests that a TCM herbal formula (Shao Yao Gan Cao Tang) may be effective against muscle cramps associated with CLS.[36]
- Anti-inflammatory botanicals have shown benefit in other spinal and joint problems and may be used as supportive therapy.[37] Herbs such as willow bark tea (Salix alba), and topical wintergreen (Gaultheria spp) have anodyne effects. Nervine herbs such as hops (humulus spp), valerian, kava kava, and lavender can all be useful in reducing pain and promoting sleep in painful conditions.
- Multimodal program (soft tissue and neural mobilization, chiropractic spinal manipulation, lumbar flexion-distraction, and muscle stretching), structured home-based exercises, physiotherapy interventions, and instruction of self-management strategies.[38,39,40,41]

Active Care:

- Exercises, e.g. "cat and camel", "nerve flossing".
- Tobacco cessation.[42]
- Spinal stabilization and/or mobilization exercises, as necessary.
- Lifestyle modifications (diet, exercise, pedometer use, education).[43,44]

Outcome Assessment Tools (OATs):

- Oswestry Disability Index (ODI). Available at our website www.chpgroup.com, behind the Provider Log-in under Clinical Tools and at: http://www.rehab.msu.edu/_files/_docs/Oswestry_Low_Back_Disability.pdf
- Visual Analog Scale (VAS). Quadruple VAS. Available at our website www.chpgroup.com, behind the Provider Log-in under Clinical Tools and at: http://www.chiro.org/LINKS/OUTCOME/Quadruple_VAS.pdf
- Short Form 12 (SF-12). Available at: https://www.hss.edu/physician-files/huang/SF12-RCH.pdf
- Core Outcome Measures Index (COMI). Available at: http://www.eurospine.org/cm_data/SSE_lowback_COMI_E.pdf
- Patient Specific Functional Scale. Available at: http://www.aptsnc.com/wp-content/uploads/2012/11/Patient-Specific-Functional-Scale.pdf
- Measure Yourself Medical Outcome Profile (MYMOP2). Available at our website www.chpgroup.com, behind the Provider Log-in under Clinical Tools and at: https://doctormoroz.files.wordpress.com/2010/05/mymop-initial-profile.pdf

Referral Criteria

- Failure to respond to treatment.
- Worsening neurological signs and symptoms, including loss of bowel and bladder control and loss of sexual function (cauda equina syndrome).

Resources for Clinicians

Lurie J, Tomkins-lane C. Management of lumbar spinal stenosis. *BMJ*. 2016;352:h6234.

Watters WC, Baisden J, Gilbert TJ, et al. Degenerative lumbar spinal stenosis: an evidence-based clinical guideline for the diagnosis and treatment of degenerative lumbar spinal stenosis. *Spine J.* 2008;8(2):305-10.

Resources for Patients

Medline Plus
http://www.nlm.nih.gov/medlineplus/spinalstenosis.html

https://www.spine.org/Portals/0/assets/downloads/ResearchClinicalCare/Guidelines/LumbarStenosis.pdf

Clinical Pathway Feedback

CHP desires to keep our clinical pathways customarily updated. If you wish to provide additional input, please use the e-mail address listed below and identify which clinical pathway you are referencing. Thank you for taking the time to give us your comments.

Clinical Services Department: cs@chpgroup.com

Disclaimer Notice

The CHP Group (CHP) Clinical Pathways are a resource to assist clinicians, and are not intended to be nor should they be construed/used as medical advice. The pathways contain information that may be helpful for clinicians and their patients to make informed clinical decisions but they cannot account for all clinical circumstances. Each patient presents with specific clinical circumstances and values requiring individualized care which may warrant adaptation from the pathway. Treatment decisions are made collaboratively by patients and their practitioner after an assessment of the clinical condition, consideration of options for treatment, any material risk, and an opportunity for the patient to ask any questions.

CHP makes no representation and accepts no liability with respect to the content of any external information cited or relied upon in the pathways. The presence of a particular procedure or treatment modality in a clinical pathway does not constitute a representation or warranty that this service is covered by a patient's benefit plan. The patient's benefit plan determines coverage.

---

[1] Battié MC, et al. Lumbar spinal stenosis is a highly genetic condition partly mediated by disc degeneration. Arthritis Rheumatol. 2014 Dec;66(12):3505-10.
[2] Genevay S, Atlas SJ. Lumbar spinal stenosis. *Best Pract Res Clin Rheumatol*. 2010;24(2):253-65.
[3] Deyo RA. Treatment of lumbar spinal stenosis: a balancing act. *Spine J* 2010;10:625-7.
[4] Johnsson KE, Rosen I, Uden I. The natural course of lumbar spinal stenosis. *Clin Orthop*. 1992;279:82–86.

[5] Rihn JA, Hilibrand AS, Zhao W, et al. Effectiveness of surgery for lumbar stenosis and degenerative spondylolisthesis in the octogenarian population: analysis of the Spine Patient Outcomes Research Trial (SPORT) data. *J Bone Joint Surg Am*. 2015;97(3):177-85.
[6] Arnold PM. Minimally invasive spinal surgery and spinal stenosis. *J Neurosurg Spine*. 2015;22(4):337-8.
[7] Atlas, S, et.al. Long-Term Outcomes of Surgical and Nonsurgical Management of Lumbar Spinal Stenosis: 8 to 10 Year Results from the Maine Lumbar Spine Study. Prospective Cohort Studies *Spine*. 30(8):936-943, April 15, 2005.
[8] Zaina F, Tomkins-Lane C, Carragee E, Negrini S. Surgical versus non-surgical treatment for lumbar spinal stenosis. *Cochrane Database Syst Rev*. 2016;2016(1):CD010264. Published 2016 Jan 29.
[9] Delitto A, Piva SR, Moore CG, Welch WC. Surgery Versus Nonsurgical Treatment of Lumbar Spinal Stenosis. *Ann Intern Med*. 2015;163(5):397-8.
[10] Matsumoto M, Watanabe K, Tsuji T, Ishii K, Takaishi H, Nakamura M, et al. Nocturnal leg cramps: a common complaint in patients with lumbar spinal canal stenosis. *Spine*. 2009 Mar 1;34(5):E189–94.
[11] Adamova B, et al. Does lumbar spinal stenosis increase the risk of spondylotic cervical spinal cord compression? *Eur Spine J.* 2015 Dec;24(12):2946-53.
[12] Delitto A, Piva SR, Moore CG, Welch WC. Surgery Versus Nonsurgical Treatment of Lumbar Spinal Stenosis. Ann Intern Med. 2015;163(5):397-8.
[13] Truszczynska A, et al. A comparative analysis of static balance between patients with lumbar spinal canal stenosis and asymptomatic participants. *J Manipulative Physiol Ther*. 2014 Nov/Dec;37(9):696-701
[14] Takahashi N, Kikuchi S, Yabuki S, Otani K, Konno S. Diagnostic value of the lumbar extension-loading test in patients with lumbar spinal stenosis: a cross-sectional study. BMC Musculoskelet Disord. 2014 Jul 31;15:259.
[15] Hong JH, Lee MY, Jung SW, Lee SY. Does spinal stenosis correlate with MRI findings and pain, psychologic factor and quality of life? *Korean J Anesthesiol.* 2015 Oct;68(5):481-7.
[16] Kim YU, et al. Clinical symptoms of lumbar spinal stenosis associated with morphological parameters on magnetic resonance images. *Eur Spine J.* 2015 Oct;24(10):2236-43.
[17] Andreisek G, et al. LSOS working group. Consensus conference on core radiological parameters to describe lumbar stenosis - an initiative for structured reporting. Eur Radiol. 2014 Dec;24(12):3224-32.
[18] Kuittinen P, et al. Correlation of lateral stenosis in MRI with symptoms, walking capacity and EMG findings in patients with surgically confirmed lateral lumbar spinal canal stenosis. BMC Musculoskelet Disord. 2014 Jul 23;15:247
[19] Splettstößer A, Khan MF, Zimmermann B, et al. Correlation of lumbar lateral recess stenosis in magnetic resonance imaging and clinical symptoms. World J Radiol. 2017;9(5):223–229. doi:10.4329/wjr.v9.i5.223
[20] Goni VG, et al. Comparison of the oswestry disability index and magnetic resonance imaging findings in lumbar canal stenosis: an observational study. Asian Spine J. 2014 Feb;8(1):44-50.
[21] Tomkins-Lane CC, Battié MC, Hu R, Macedo L. Pathoanatomical characteristics of clinical lumbar spinal stenosis. J Back Musculoskelet Rehabil. 2014;27(2):223-9.
[22] Katz JN, Harris MB. Lumbar Spinal Stenosis. *N Engl J Med.* 2008; 358:818-825.
[23] McKillop AB, Carroll LJ, Battié MC. Depression as a prognostic factor of lumbar spinal stenosis: a systematic review. *Spine J.* 2014 May 1;14(5):837-46.
[24] Zaina F, Tomkins-Lane C, Carragee E, Negrini S. Surgical versus non-surgical treatment for lumbar spinal stenosis. *Cochrane Database of Systematic Reviews* 2016, Issue 1. Art. No.: CD010264.
[24] Murphy DR, Hurwitz EL, Gregory A, Clary R. A non-surgical approach to the management of lumbar spinal stenosis: a prospective observational cohort study. *BMC Musculoskeletal Disorders.* 2006 Feb 23, at http://www.biomedcentral.com/content/pdf/1471-2474-7-16.pdf
[25] Skolasky RL, Maggard AM, Li D, Riley LH, Wegener ST. Health behavior change counseling in surgery for degenerative lumbar spinal stenosis. Part I: improvement in rehabilitation engagement and functional outcomes. *Arch Phys Med Rehabil*. 2015;96(7):1200-7.
[26] Skolasky RL, Maggard AM, Li D, Riley LH, Wegener ST. Health behavior change counseling in surgery for degenerative lumbar spinal stenosis. Part II: patient activation mediates the effects of health behavior change counseling on rehabilitation engagement. *Arch Phys Med Rehabil.* 2015;96(7):1208-14.
[27] Liu K, Liu P, Liu R, Wu X, Cai M. Steroid for epidural injection in spinal stenosis: a systematic review and meta-analysis. Drug Des Devel Ther. 2015;9:707-16.

[28] Manchikanti L, Cash KA, Mcmanus CD, Damron KS, Pampati V, Falco FJ. A randomized, double-blind controlled trial of lumbar interlaminar epidural injections in central spinal stenosis: 2-year follow-up. Pain Physician. 2015;18(1):79-92.
[29] Koh W, Choi SS, Karm MH, et al. Treatment of chronic lumbosacral radicular pain using adjuvant pulsed radiofrequency: a randomized controlled study. Pain Med. 2015;16(3):432-41.
[30] Comer C, Williamson E, McIlroy S, Srikesavan C, Dalton S, Melendez-Torres GJ, Lamb S., Exercise treatments for lumbar spinal stenosis: A systematic review and intervention component analysis of andomized controlled trials, Clin Rehabil. 2023 Sep 16:2692155231201048. doi: 10.1177/02692155231201048.
[31] Giugno A, Gulì C, Basile L, et al. Spinal Cord Stimulation: An Alternative Concept of Rehabilitation?. Acta Neurochir Suppl. 2017;124:15-18.
[32] Oka H, Matsudaira K, Takano Y, et al. A comparative study of three conservative treatments in patients with lumbar spinal stenosis: lumbar spinal stenosis with acupuncture and physical therapy study (LAP study). BMC Complement Altern Med. 2018;18(1):19.
[33] Sun YN, An Y, Zhou YJ, Wang XY, Yu CH. Non-pharmaceutical Chinese medical therapies for degenerative lumbar spinal stenosis: A systematic review and meta-analysis of randomized controlled trials. Complement Ther Med. 2023 Jun;74:102949. doi: 10.1016/j.ctim.2023.102949. Epub 2023 Apr 14.
[34] Lee S.H., Choi H.H., Chang M.C., The Effectiveness of Facet Joint Injection with Steroid and Botulinum Toxin in Severe Lumbar Central Spinal Stenosis: A Randomized Controlled Trial, Toxins (Basel). 2022 Dec 23;15(1):11. doi: 10.3390/toxins15010011.
[35] Godek P, Szczepanowska-Wolowiec B, Dominik. Golicki D, GOLDIC therapy in degenerative lumbar spinal stenosis: randomized, controlled trial, Randomized Controlled Trial Regen Med. 2022 Oct;17(10):709-718. doi: 10.2217/rme-2022-0047. Epub 2022 Jul 28.
[36] Takao Y, Takaoka Y, Sugano A, et al. Shakuyaku-kanzo-to (Shao-Yao-Gan-Cao-Tang) as Treatment of Painful Muscle Cramps in Patients with Lumbar Spinal Stenosis and Its Minimum Effective Dose. Kobe J Med Sci. 201
[37] Nafiseh Shokri-Mashhadi 1, Mohammad Bagherniya 2, Gholamreza Askari 2, Thozhukat Sathyapalan 3, Amirhossein SahebkarAdv Exp Med Biol A Systematic Review of the Clinical Use of Curcumin for the Treatment of Osteoarthritis. Adv Exp Med Biol. 2021;1291:265-282. doi: 10.1007/978-3-030-56153-6_16.
[38] Ammendolia C, Chow N. Clinical outcomes for neurogenic claudication using a multimodal program for lumbar spinal stenosis: a retrospective study. J Manipulative Physiol Ther. 2015 Mar-Apr;38(3):188-94.
[39] Schneider MJ, Ammendolia C, Murphy DR, et al. Comparative Clinical Effectiveness of Nonsurgical Treatment Methods in Patients With Lumbar Spinal Stenosis: A Randomized Clinical Trial. JAMA Netw Open. 2019;2(1):e186828.
[40] Temporiti F, Ferrari S, Kieser M, Gatti R., Efficacy and characteristics of physiotherapy interventions in patients with lumbar spinal stenosis: a systematic review, Eur Spine J. 2022 Jun;31(6):1370-1390. doi: 10.1007/s00586-022-07222-x. Epub 2022 May 5.
[41] Ammendolia C, Hofkirchner C, Plener J, Bussières A, Schneider MJ, Young JJ, Furlan AD, Stuber K, Ahmed A, Cancelliere C, Adeboyejo A, Ornelas J., Non-operative treatment for lumbar spinal stenosis with neurogenic claudication: an updated systematic review. BMJ Open. 2022 Jan 19;12(1):e057724. doi: 10.1136/bmjopen-2021-057724. PMID: 35046008
[42] Bydon M, Macki M, De la garza-ramos R, et al. Smoking as an independent predictor of reoperation after lumbar laminectomy: a study of 500 cases. *J Neurosurg Spine*. 2015;22(3):288-93.
[43] Tomkins-Lane CC, et al. The spinal stenosis pedometer and nutrition lifestyle intervention (SSPANLI): development and pilot. *Spine J.* 2015 Apr 1;15(4):577-86.
[44] Kim ER, Kang MH, Kim YG, Oh JS. Effects of a Home Exercise Program on the Self-report Disability Index and Gait Parameters in Patients with Lumbar Spinal Stenosis. *J Phys Ther Sci*. 2014 Feb;26(2):305-7.