Cigna Medical Coverage Policies – Musculoskeletal Lumbar Decompression

Effective July 1, 2025

Instructions for use

The following coverage policy applies to health benefit plans administered by Cigna. Coverage policies are intended to provide guidance in interpreting certain standard Cigna benefit plans and are used by medical directors and other health care professionals in making medical necessity and other coverage determinations. Please note the terms of a customer's particular benefit plan document may differ significantly from the standard benefit plans upon which these coverage policies are based. For example, a customer's benefit plan document may contain a specific exclusion related to a topic addressed in a coverage policy.

In the event of a conflict, a customer's benefit plan document always supersedes the information in the coverage policy. In the absence of federal or state coverage mandates, benefits are ultimately determined by the terms of the applicable benefit plan document. Coverage determinations in each specific instance require consideration of:

1. The terms of the applicable benefit plan document in effect on the date of service
2. Any applicable laws and regulations
3. Any relevant collateral source materials including coverage policies
4. The specific facts of the particular situation

Coverage policies relate exclusively to the administration of health benefit plans. Coverage policies are not recommendations for treatment and should never be used as treatment guidelines.

This evidence-based medical coverage policy has been developed by eviCore, Inc. Some information in this coverage policy may not apply to all benefit plans administered by Cigna.

CMM-608: Lumbar Decompression

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CMM-608.1: General Guidelines

Application of Guideline

- The determination of medical necessity for the performance of lumbar decompression is always made on a case-by-case basis.
- For additional timing and documentation requirements, see **CMM-600.1: Prior Authorization Requirements**.

Urgent/Emergent Indications/Conditions

- The presence of urgent/emergent indications/conditions warrants definitive surgical treatment. **Imaging findings noted in the applicable procedure section(s) are required**.
  - The following criteria are **NOT** required for confirmed urgent/emergent conditions:
    - Provider-directed non-surgical management
    - Absence of unmanaged significant mental and/or behavioral health disorders (e.g., major depressive disorder, chronic pain syndrome, secondary gain, opioid and alcohol use disorders)
    - Timeframe for repeat procedure
- Urgent/emergent conditions for lumbar decompression include **ANY** of the following:
  - Acute/unstable traumatic spinal fractures or dislocations with **EITHER** of the following:
    - Neural compression
    - Traumatic cerebrospinal fluid (CSF) leak
  - Cauda equina syndrome (CES)
  - Documentation of progressive neurological deficit on two separate physical exams
  - **ANY** of the following due to a neurocompressive pathology:
    - Motor weakness of grade 3/5 or less of specified muscle(s)
    - Rapidly progressive symptoms of motor loss
    - Bowel incontinence
    - Bladder incontinence/retention
  - Epidural hematoma
  - Infection (e.g., discitis, epidural abscess, osteomyelitis)
  - Primary or metastatic neoplastic disease causing pathologic fracture, cord compression or instability
  - A condition otherwise meeting criteria listed in the applicable procedure section(s) with documentation of severe debilitating pain and/or dysfunction to the point of being incapacitated

Credentialed Spine Surgeon Required

- Endoscopic lumbar decompression requires the procedure be performed by a spine surgeon with surgical privileges at a hospital, hospital outpatient department, or

ambulatory surgery center to perform open surgical approach(es) for lumbar decompression.

CMM-608.2: Initial Primary Lumbar Decompression

Initial primary lumbar decompression is considered **medically necessary** when performed for **EITHER** of the following when **ALL** of the associated criteria are met:

Neurogenic Claudication

- Subjective symptoms include **BOTH** of the following:
  - Significant level of pain on a daily basis defined as clinically significant functional impairment (e.g., inability to perform household chores, prolonged standing, etc.)
  - Pain, cramping, weakness, or tingling in the lower back, buttock(s), and leg(s) brought about by walking or positions that cause thecal sac or nerve root compression (e.g., standing, extension) and **EITHER** of the following occur:
    - Symptoms worsen with standing and/or walking
    - Symptoms are alleviated with sitting and/or forward flexion
- Objective physical exam findings are concordant with MRI/CT
- Less than clinically meaningful improvement with at least **TWO** of the following (unless contraindicated):
  - Prescription strength analgesics, steroids, gabapentinoids, and/or NSAIDs for six (6) weeks
  - Provider-directed exercise program prescribed by a physical therapist, chiropractic provider, osteopathic or allopathic physician for six (6) weeks
  - Epidural steroid injection(s) or selective nerve root block(s) performed at the same level(s) as the requested surgery
- MRI/CT shows neural structure compression at the requested level(s) that is concordant with the individual's symptoms **and** physical exam findings and that is caused by **ANY** of the following:
  - Herniated disc(s) (retained disc material or a recurrent disc herniation)
  - Synovial cyst or arachnoid cyst
  - Central/lateral/foraminal stenosis
  - Osteophytes
- Absence of unmanaged significant mental and/or behavioral health disorders (e.g., major depressive disorder, chronic pain syndrome, secondary gain, opioid and alcohol use disorders)

Radiculopathy

- Subjective symptoms include **BOTH** of the following:
  - Significant level of pain on a daily basis defined as clinically significant functional impairment (e.g., inability to perform household chores, prolonged standing, etc.)
  - Persistent radiating pain into the buttock(s) and/or lower extremity(ies)
- Objective physical exam findings include **EITHER** of the following:
  - Nerve root tension sign including **ANY** of the following:
    - Positive straight leg raise
    - Crossed straight leg raise
    - Femoral stretch test
  - Neurologic deficit including **ANY** of the following:
    - Dermatomal sensory deficit
    - Functionally limiting motor weakness (e.g., foot drop, quadriceps weakness)
    - Reflex changes
- Less than clinically meaningful improvement with at least **TWO** of the following (unless contraindicated):
  - Prescription strength analgesics, steroids, gabapentinoids, and/or NSAIDs for six (6) weeks
  - Provider-directed exercise program prescribed by a physical therapist, chiropractic provider, osteopathic or allopathic physician for six (6) weeks
  - Epidural steroid injection(s) or selective nerve root block(s) performed at the same level(s) as the requested surgery
- MRI/CT shows neural structure compression at the requested level(s) that is concordant with the individual's symptoms **and** physical exam findings and that is caused by **ANY** of the following:
  - Herniated disc(s) (retained disc material or a recurrent disc herniation)
  - Synovial cyst or arachnoid cyst
  - Central/lateral/foraminal stenosis
  - Osteophytes
- Absence of unmanaged significant mental and/or behavioral health disorders (e.g., major depressive disorder, chronic pain syndrome, secondary gain, opioid and alcohol use disorders)

Interlaminar Decompression Device in Open Lumbar Decompression

Use of an FDA-approved interlaminar decompression device (i.e., Coflex®) is considered **medically necessary** when used for an open lumbar decompression when **ALL** of the following criteria are met:

- Meets initial lumbar decompression criteria for **EITHER** Neurogenic Claudication or Radiculopathy
- The interlaminar decompression device will **not be used** in an open lumbar decompression performed with a lumbar fusion
- The interlaminar decompression device will only be used in one or two lumbar levels between L1-L5
- Meyerding Grade 1 degenerative spondylolisthesis with or without anticipated iatrogenic instability (created by disruption of the posterior elements due to facet joint excision that exceeds 50% bilaterally or 75% or more of a single facet during spinal decompression)

CMM-608.3: Lumbar Corpectomy

Lumbar corpectomy is considered **medically necessary** and can be performed for decompression when **ALL** of the following criteria have been met:

- Complete corpectomy or partial corpectomy (i.e., **removal of at least one-third of the vertebral body** [not for resection of osteophytes alone]) is being performed for **ANY** of the following:
  - Infection
  - Trauma
  - Tumor
  - Compression at or behind the level of the vertebral body
- **ALL** of the criteria have been met in the applicable procedure-specific section below:
  - **CMM-608.2: Initial Primary Lumbar Decompression**
  - **CMM-608.4: Repeat Lumbar Decompression at the Same Level**

  Note: Due to iatrogenic instability of the corpectomy procedure, lumbar fusion is appropriate.

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CMM-608.4: Repeat Lumbar Decompression at the Same Level

Repeat lumbar decompression at the same level is considered **medically necessary** when performed for **EITHER** of the following when **ALL** of the associated criteria is met:

Neurogenic Claudication

- Greater than 12 weeks since the prior lumbar decompression
- Subjective symptoms include **BOTH** of the following:
  - Significant level of pain on a daily basis defined as clinically significant functional impairment (e.g., inability to perform household chores, prolonged standing, etc.)
  - Pain, cramping, weakness, or tingling in the lower back, buttock(s), and leg(s) brought about by walking or positions that cause thecal sac or nerve root compression (e.g., standing, extension) **AND EITHER** of the following occur:
    - Symptoms worsen with standing and/or walking
    - Symptoms are alleviated with sitting and/or forward flexion
- Objective physical exam findings are concordant with post-operative MRI/CT
- Less than clinically meaningful improvement with at least **TWO** of the following (unless contraindicated):
  - Prescription strength analgesics, steroids, gabapentinoids, and/or NSAIDs for six (6) weeks
  - Provider-directed exercise program prescribed by a physical therapist, chiropractic provider, osteopathic or allopathic physician for six (6) weeks
  - Epidural steroid injection(s) or selective nerve root block(s) performed at the same level(s) as the requested surgery
- Post-operative MRI /CT shows neural structure compression at the requested level(s) that is concordant with the individual's symptoms **and** physical exam findings and that is caused by **ANY** of the following:
  - Herniated Disc(s) (retained disc material or a recurrent disc herniation)
  - Synovial cyst or arachnoid cyst
  - Central/lateral/foraminal stenosis
  - Osteophytes
- Absence of unmanaged significant mental and/or behavioral health disorders (e.g., major depressive disorder, chronic pain syndrome, secondary gain, opioid and alcohol use disorders)

Radiculopathy

- Greater than 12 weeks since the prior lumbar decompression
- Subjective symptoms include **BOTH** of the following:
  - Significant level of pain on a daily basis defined as clinically significant functional impairment (e.g., inability to perform household chores, prolonged standing, etc.)
  - Persistent radiating pain into the buttock(s) and/or lower extremity(ies)

- Objective physical exam findings include **EITHER** of the following:
  - Nerve root tension sign including **ANY** of the following:
    - Positive straight leg raise
    - Crossed straight leg raise
    - Femoral stretch test
  - Neurologic deficit including **ANY** of the following:
    - Dermatomal sensory deficit
    - Functionally limiting motor weakness (e.g., foot drop, quadriceps weakness)
    - Reflex changes
- Less than clinically meaningful improvement with at least **TWO** of the following (unless contraindicated):
  - Prescription strength analgesics, steroids, gabapentinoids, and/or NSAIDs for six (6) weeks
  - Provider-directed exercise program prescribed by a physical therapist, chiropractic provider, osteopathic or allopathic physician for six (6) weeks
  - Epidural steroid injection(s) or selective nerve root block(s) performed at the same level(s) as the requested surgery
- Post-operative MRI/CT shows neural structure compression at the requested level(s) that is concordant with the individual's symptoms **and** physical exam findings and that is caused by **ANY** of the following:
  - Herniated Disc(s) (retained disc material or a recurrent disc herniation)
  - Synovial cyst or arachnoid cyst
  - Central/lateral/foraminal stenosis
  - Osteophytes
- Absence of unmanaged significant mental and/or behavioral health disorders (e.g., major depressive disorder, chronic pain syndrome, secondary gain, opioid and alcohol use disorders)

Interlaminar Decompression Device in Open Lumbar Decompression

Use of an FDA-approved interlaminar decompression device (i.e., Coflex®) is considered **medically necessary** when used for an open lumbar decompression when **ALL** of the following criteria are met:

- Meets repeat lumbar decompression criteria for **EITHER** Neurogenic Claudication or Radiculopathy
- The interlaminar decompression device will **not be used** in an open lumbar decompression performed with a lumbar fusion
- The interlaminar decompression device will only be used in one or two lumbar levels between L1-L5
- Meyerding Grade 1 degenerative spondylolisthesis with or without anticipated iatrogenic instability (created by disruption of the posterior elements due to facet joint excision that exceeds 50% bilaterally or 75% or more of a single facet during spinal decompression)

CMM-608.5: Non-Indications

Not Medically Necessary

- Lumbar decompression/discectomy/corpectomy performed without meeting the criteria in the **General Guidelines** (Credentialed Spine Surgeon Required; and, when applicable, Urgent/Emergent Indications/Conditions) **and** the criteria in the applicable procedure-specific section(s) (initial decompression, corpectomy, or repeat decompression) is considered **not medically necessary**.
- Lumbar decompression/discectomy/corpectomy performed for **ANY** of the following sole indications is considered **not medically necessary**:
  - Annular tears
  - Degenerative disc disease
  - Concordant discography
  - MR Spectroscopy results
- Coflex® is considered **not medically necessary** for **ANY** of the following scenarios:
  - Used without meeting the decompression criteria in the applicable procedure-specific section(s) (initial decompression or repeat decompression)
  - Used in the presence of Meyerding Grade 2 or higher degenerative spondylisthesis
  - Used in the presence of spondylolysis or isthmic spondylolisthesis
  - Used when a lumbar fusion is also being performed at the same level
  - Used when a lumbar decompression is not performed as an open procedure

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Experimental, Investigational, or Unproven (EIU)

- Percutaneous lumbar decompression (e.g., Vertos Medical MILD® Surgical Procedure) is considered **experimental, investigational, or unproven (EIU).**
- Interspinous process spacer devices and interspinous stabilization/distraction devices, and interspinous process decompression (IPD) systems/devices (e.g., Superion ISS Interspinous Spacer System, X-STOP Interspinous Process Decompression System, X-STOP PEEK Interspinous Process Decompression System, and Total Posterior Spine [TOPS™] System) are considered **experimental, investigational, or unproven** for **ALL** indications including, but not limited to, the following:
  - Lumbar interspinous distraction (without fusion) for indirect spinal decompression
  - Lumbar interspinous fixation with fusion (with or without decompression) for stabilization
  - Lumbar spinal stabilization with an interspinous process device device (without fusion) in conjunction with decompression laminectomy

Codes (CMM-608)

The inclusion of any code in this table does not imply that the code is under management or requires prior authorization. Refer to the applicable health plan for management details. Prior authorization of a code listed in this table is not a guarantee of payment. The Certificate of Coverage or Evidence of Coverage policy outlines the terms and conditions of the member's health insurance policy.

Code	Code Description/Definitions
22867	Insertion of interlaminar/interspinous process stabilization/distraction device, without fusion, including image guidance when performed, with open decompression, lumbar; single level
+22868	Insertion of interlaminar/interspinous process stabilization/distraction device, without fusion, including image guidance when performed, with open decompression, lumbar; second level (List separately in addition to code for primary procedure)
22869	Insertion of interlaminar/interspinous process stabilization/distraction device, without open decompression or fusion, including image guidance when performed, lumbar; single level
+22870	Insertion of interlaminar/interspinous process stabilization/distraction device, without open decompression or fusion, including image guidance when performed, lumbar; second level (List separately in addition to code for primary procedure)
62380	Endoscopic decompression of spinal cord, nerve root(s), including laminotomy, partial facetectomy, foraminotomy, discectomy and/or excision of herniated intervertebral disc, 1 interspace, lumbar
63005	Laminectomy with exploration and/or decompression of spinal cord and/or cauda equina, without facetectomy, foraminotomy or discectomy (e.g. spinal stenosis), 1 or 2 vertebral segments; lumbar, except for spondylolisthesis
63011	Laminectomy with exploration and/or decompression of spinal cord and/or cauda equina, without facetectomy, foraminotomy or discectomy (e.g., spinal stenosis), 1 or 2 vertebral segments; sacral
63012	Laminectomy with removal of abnormal facets and/or pars inter-articularis with decompression of cauda equina and nerve roots for spondylolisthesis, lumbar (Gill type procedure)
63017	Laminectomy with exploration and/or decompression of spinal cord and/or cauda equina, without facetectomy, foraminotomy or discectomy (e.g., spinal stenosis), more than 2 vertebral segments; lumbar
63047	Laminectomy, facetectomy and foraminotomy (unilateral or bilateral with decompression of spinal cord, cauda equina and/or nerve root(s), [e.g. Spinal or lateral recess stenosis]), single vertebral segment; lumbar
63048	Laminectomy, facetectomy and foraminotomy (unilateral or bilateral with decompression of spinal cord, cauda equina and/or nerve root[s], [e.g. spinal or lateral recess stenosis]), single vertebral segment; each additional segment, cervical, thoracic, or lumbar (List separately in addition to code for primary procedure)

Code	Code Description/Definitions
63052	Laminectomy, facetectomy, or foraminotomy (unilateral or bilateral with decompression of spinal cord, cauda equina and/or nerve root[s] [e.g., spinal or lateral recess stenosis]), during posterior interbody arthrodesis, lumbar; single vertebral segment (List separately in addition to code for primary procedure)
63053	Laminectomy, facetectomy, or foraminotomy (unilateral or bilateral with decompression of spinal cord, cauda equina and/or nerve root[s] [e.g., spinal or lateral recess stenosis]), during posterior interbody arthrodesis, lumbar; each additional segment (List separately in addition to code for primary procedure)
63087	Vertebral corpectomy (vertebral body resection), partial or complete, combined thoracolumbar approach with decompression of spinal cord, cauda equine or nerve root(s), lower thoracic or lumbar, single segment
+63088	Vertebral corpectomy (vertebral body resection), partial or complete, combined thoracolumbar approach with decompression of spinal cord, cauda equine or nerve root(s), lower thoracic or lumbar, each additional segment (List separately in addition to code for primary procedure)
63090	Vertebral corpectomy (vertebral body resection), partial or complete , transperitoneal or retroperitoneal approach with decompression of spinal cord, cauda equine or nerve root(s), lower thoracic, lumbar, or sacral; single segment
+63091	Vertebral corpectomy (vertebral body resection), partial or complete , transperitoneal or retroperitoneal approach with decompression of spinal cord, cauda equine or nerve root(s), lower thoracic, lumbar, or sacral; each additional segment (List separately in addition to code for primary procedure)
63102	Vertebral corpectomy (vertebral body resection), partial or complete, lateral extracavitary approach with decompression of spinal cord and/or nerve root(s) (e.g., For tumor or retropulsed bone fragments); lumbar, single segment
+63103	Vertebral corpectomy (vertebral body resection), partial or complete, lateral extracavitary approach with decompression of spinal cord and/or nerve root(s) (e.g., For tumor or retropulsed bone fragments); thoracic or lumbar, each additional segment (List separately in addition to code for primary procedure)
63267	Laminectomy for excision or evacuation of intraspinal lesion other than neoplasm, extradural; lumbar
63272	Laminectomy for excision of intraspinal lesion other than neoplasm, intradural; lumbar
63277	Laminectomy for biopsy/excision of intraspinal neoplasm; extradural, lumbar
0275T	Percutaneous laminotomy/laminectomy (interlaminar approach) for decompression of neural elements, (with or without ligamentous resection, discectomy, facetectomy and/or foraminotomy) any method under indirect image guidance (e.g., fluoroscopic, CT), single or multiple levels, unilateral or bilateral; lumbar

Evidence Discussion (CMM-608)

Lumbar Decompression

Risks of lumbar decompression surgery include, but are not limited to, the following: infection; neurovascular injury; persistent or incomplete relief of symptoms; possible need for more surgery; dural tear; deep vein thrombosis; pulmonary embolus; paralysis; and, death. Given the potential possibility for significant complications, proper surgical candidacy selection is critical to minimize the risk benefit ratio.

As recommended by the North American Spine Society (NASS) *Coverage Policy Recommendations: Lumbar Decompression: Laminectomy, Laminotomy, & Foraminotomy*, symptoms, physical exam findings, and imaging findings should support lumbar decompression surgery. Subjective symptoms and examination findings need to be concordant with imaging as is not uncommon for asymptomatic individuals to have abnormalities on MRI.

Multiple studies and reports have shown most cases of acute back pain and sciatica are self-limited and typically improve within six (6) weeks with conservative care. Therefore, a six (6) week course of non-operative treatment is recommended prior to surgical intervention. However, the presence of an urgent/emergent condition (e.g., cauda equina syndrome, infection, epidural hematoma) would obviate the need for conservative treatment.

Jackson et al. (2020) noted higher rates of postoperative complications and worse functional outcomes in individuals with psychological disorders undergoing spinal surgery. It was concluded that proper identification and treatment of these conditions prior to surgery may significantly improve many outcome measures in this population.

References (CMM-608)

1. A Pivotal Study of the Premia Spine TOPS™ System. ClinicalTrials.gov ID NCT03012776. Updated June 17, 2024. Available at: https://clinicaltrials.gov/ct2/show/NCT03012776.
2. Ahn Y, Youn M, Heo D. Endoscopic transforaminal lumbar interbody fusion: a comprehensive review. *Expert Rev Med Devices*. 2019;16(5):373-380. doi:10.1080/17434440.2019.1610388.
3. American Medical Association. Code 20660 as an Independent or Unrelated Procedure- Coding Tip. *CPT® Assistant Newsletter*. April 2012:11. Accessed October 5, 2023. Available at: https://ocm.ama-assn.org/OCM/CPTAA/Newsletters.do?articleType=IssueArticle&filename=20120411&hitTerms=corpectomy.
4. Andreisek G, Hodler J, Steurer J. Uncertainties in the diagnosis of lumbar spinal stenosis. *Radiology*. 2011;261(3):681-684.
5. Backstrom KM, Whitman JM, Flynn TW. Lumbar spinal stenosis-diagnosis and management of the aging spine. *Manual Therapy*. 2011;16(4):308-317.
6. Bae HW, Davis RJ, Lauryssen C, Leary S, Maislin G, Musacchio M. Three-yer follow-up of the prospective, randomized, controlled trial of coflex interlaminar stabilization vs instrumented fusion in patients with lumbar stenosis. *Neurosurgery*. 2016;79(2):169-181. doi:10.1227/neu.0000000000001237.
7. Bae HW, Lauryssen C, Maislin G, Leary S, Maislin G, Musacchio MJ Jr. Therapeutic sustainability and durability of coflex interlaminar stabilization after decompression for lumbar spinal stenosis: a four year assessement. *IntJ Spine Surg*. 2015;9:15. doi:10.14444/2015.
8. Barton C, Kalakoti P, Bedard NA, Hendrickson NR, Saifi C, Pugely AJ. What Are the Costs of Cervical Radiculopathy Prior to Surgical Treatment? *Spine*. 2019;44(13):937-942. doi:10.1097/brs.0000000000002983.
9. Benyamin RM, Staats PS, MiDAS Encore. MILD® is an effective treatment for lumbar spinal stenosis with neurogenic claudication: MiDAS ENCORE randomized controlled trial. *Pain Physician*. 2016;19(4):229-242.
10. Boonstra AM, Schiphorst Preuper HR, Balk GA, Stewart RE. Cut-off points for mild, moderate, and severe pain on the visual analogue scale for pain in patients with chronic musculoskeletal pain. *Pain*. 2014;155(12):2545-2550. doi:10.1016/j.pain.2014.09.014.
11. Brox JI, Nygaard OP, Holm I, Keller A, Ingebrigtsen T, Reikeras O. Four-year follow-up of surgical versus non-surgical therapy for chronic low back pain. *Ann Rheumatic Dis*. 2010;69(9):1643-1648.
12. Chen Z, Zhang L, Dong J, et al. Percutaneous Transforaminal Endoscopic Discectomy Versus Microendoscopic Discectomy for Lumbar Disc Herniation: 5-year Long-term Results of a Randomized Controlled Trial. *Spine*. 2022;Publish Ahead of Print. doi:10.1097/brs.0000000000004468.
13. Chin BZ, Yong JH, Wang E, et al. Full-endoscopic versus microscopic spinal decompression for lumbar spinal stenosis: a systematic review & meta-analysis. *Spine J*. 2024;24(6):1022-1033. doi:10.1016/j.spinee.2023.12.009.
14. Choi D, Crockard A, Harms J, et al. Review of metastatic spine tumour classification and indications for surgery: the consensus statement of the Global Spine Tumour Study Group. *Eur Spine J*. 2010;19(2):215-222. doi:10.1007/s00586-009-1252-x.
15. Chou R, Fu R, Carrino JA, Deyo RA. Imaging strategies for low-back pain: systematic review and meta-analysis. *Lancet*. 2009;373(9662):463-472. doi:10.1016/S0140-6736(09)60172-0.
16. Chou R, Huffman LH. Medications for acute and chronic low back pain: a review of the evidence for an American Pain Society/American College of Physicians clinical practice guideline. *Ann Intern Med*. 2007;147(7):505-514.
17. Chou R, Loeser JD, Owens DK, et al. Interventional therapies, surgery, and interdisciplinary rehabilitation for low back pain: an evidence-based clinical practice guideline from the American Pain Society. *Spine*. 2009;34(10):1066-1077. doi:10.1097/BRS.0b013e3181a1390d.
18. Chou R, Qaseem A, Snow V, et al. Diagnosis and treatment of low back pain: a joint clinical practice guideline from the American College of Physicians and the American Pain Society. *Ann Intern Med*. 2007;147(7):478-491. doi:10.7326/0003-4819-147-7-200710020-00006.
19. Cohen SP, Hanling S, Bicket MC, et al. Epidural steroid injections compared with gabapentin for lumbosacral radicular pain: multicenter randomized double blind comparative efficacy study. *BMJ*. 2015;350:h1748. doi:10.1136/bmj.h1748.
20. Conn A, Buenaventura RM, Datta S, Abdi S, Diwan S. Systematic review of caudal epidural injections in the management of chronic low back pain. *Pain Physician*. 2009;12(1):109-135.
21. Curlee PM. Other disorders of the spine. In: Canale ST, Beaty JH, eds. *Campbell's Operative Orthopaedics*. 11th ed. Philadelphia, PA. Mosby Elsevier. 2008:2273-2352.
22. Darouiche RO. Spinal epidural abscess. *NEJM*. 2006;355(19):2012-2020.
23. Davis R, Auerbach JD, Bae H, Errico TJ. Can low-grade spondylolisthesis be effectively treated by either coflex interlaminar stabilization or laminectomy and posterior spinal fusion? Two-year clinical and radiographic results from the randomized, prospective, multicenter US investigational device exemption trial: clinical article. *J Neurosurg Spine*. 2013;19(2):174-184. doi:10.3171/2013.4.SPINE12636.

24. Davis RJ, Errico TJ, Bae H, et al. Decompression and coflex interlaminar stabilization compared with decompression and instrumented spinal fusion for spinal stenosis and low-grade degenerative spondylolisthesis: two-year results from the prospective, randomized, multicenter, Food and Drug Administration Investigational Device Exemption trial. *Spine (Phila Pa 1976)*. 2013;38(18):1529-1539. doi:10.1097/BRS.0b013e31829a6d0a.
25. Deyo RA, Mirza SK, Martin BI, Kreuter W, Goodman DC, Jarvik JG. Trends, major medical complications, and charges associated with surgery for lumbar spinal stenosis in older adults. *JAMA*. 2010;303(13):1259-1265.
26. Du MR, Wei FL, Zhu KL, et al. Coflex interspinous process dynamic stabilization for lumbar spinal stenosis: Long-term follow-up. *J Clin Neurosci*. 2020;81:462-468. doi:10.1016/j.jocn.2020.09.040.
27. Eliyas JK, Karahalios D. Surgery for degenerative lumbar spine disease. Dis Mon. 2011;57(10):592-606. doi:10.1016/j.disamonth.2011.09.001.
28. Errico TJ, Kamerlink JR, Quirno M, et al. Survivorship of coflex interlaminar-interspinous implant. *SAS J*. 2009;3(2):59-67.
29. Farshad M, Burgstaller JM, Held U, et al. Do preoperative corticosteroid injections increase the risk for infections or wound healing problems after spine surgery? *Spine*. 2018;43(15):1089-1094.
30. Fu KMG, Smith JS, Polly Jr DW, et al. Morbidity and mortality in the surgical treatment of 10,329 adults with degenerative lumbar stenosis. *J Neurosurg Spine*. 2010;12(5):443-446. doi:10.3171/2009.11.SPINE09531.
31. Gadjradj P, Harhangi B, Amelink J, et al. Percutaneous Transforaminal Endoscopic Discectomy Versus Open Microdiscectomy for Lumbar Disc Herniation. *Spine (Phila Pa 1976)*. 2020;46(8):538-549. doi:10.1097/brs.0000000000003843.
32. Gadjradj PS, Rubinstein SM, Peul WC, et al. Full endoscopic versus open discectomy for sciatica: randomised controlled non-inferiority trial. *BMJ*. 2022;376:e065846. doi:10.1136/bmj-2021-065846.
33. Ghany WA, Amer A, Saeed K, et al. Evaluation of interspinous spacer outcomes in degenerative lumbar canal stenosis: clinical study. *World Neurosurg*. 2016;95:556-64.
34. Ghogawala Z, Dziura J, Butler W, et al. Laminectomy plus Fusion versus Laminectomy Alone for Lumbar Spondylolisthesis. *NEJM*. 2016;374(15):1424-1434. doi:10.1056/nejmoa1508788.
35. Grinberg S, Simon R, Dowe C, Brecevich A, Cammisa F, Abjornson C. Interlaminar stabilization for spinal stenosis in the Medicare population. *Spine J*. 2020;20(12):1948-1959. doi:10.1016/j.spinee.2020.06.015.
36. Guyer R, Musacchio M, Cammisa FP Jr, Lorio MP. ISASS recommendations/coverage criteria for decompression with interlaminar stabilization-coverage indications, limitations, and/or medical necessity. *Int J Spine Surg*. 2016;10:41. doi:10.14444/3041..
37. Heo D, Son S, Eum J, Park C. Fully endoscopic lumbar interbody fusion using a percutaneous unilateral biportal endoscopic technique: technical note and preliminary clinical results. *Neurosurg Focus*. 2017;43(2):E8. doi:10.3171/2017.5.focus17146.
38. Hsu KY, Zucherman JF, Hartjen CA, et al. Quality of life of lumbar stenosis-treated patients in whom the X STOP interspinous device was implanted. *J Neurosurg Spine*. 2006;5(6):500-507. doi:10.3171/spi.2006.5.6.500.
39. Hutchins TA, Peckham M, Shah LM, et al. *ACR Appropriateness Criteria®: Low Back Pain*. Revised 2021. American College of Radiology. Available at: https://acsearch.acr.org/docs/69483/Narrative/.
40. Jackson KL, Rumley J, Griffith M, Agochukwu U, DeVine J. Correlating Psychological Comorbidities and Outcomes After Spine Surgery. *Global Spine J*. 2020;10(7):929-939. doi:10.1177/2192568219886595.
41. Jensen MC, Brant-Zawadzki MN, Obuchowski N, Modic MT, Malkasian D, Ross JS. Magnetic resonance imaging of the lumbar spine in people without back pain. *N Engl J Med*. 1994;331(2):69-73. doi:10.1056/NEJM199407143310201.
42. Kalichman L, Hunter DJ. Diagnosis and conservative management of degenerative lumbar spondylolisthesis. *Eur Spine J*. 2008;17(3):327-35.
43. Kamson S, Lu D, Sampson P, Zhang Y. Full-Endoscopic Lumbar Fusion Outcomes in Patients with Minimal Deformities: A Retrospective Study of Data Collected Between 2011 and 2015. *Pain Physician*. 2019;1(22;1):75-88. doi:10.36076/ppj/2019.22.75.
44. Kanayama M, Hashimoto T, Shigenobu K, Oha F, Togawa D. Effective prevention of surgical site infection using a Centers for Disease Control and Prevention guideline-based antimicrobial prophylaxis in lumbar spine surgery. *J Neurosurg Spine*. 2007;6(4):327-329.
45. Kim J, Yoo H, Choi D, Park E, Jee S. Comparison of Minimal Invasive Versus Biportal Endoscopic Transforaminal Lumbar Interbody Fusion for Single-level Lumbar Disease. *Clin Spine Surg*. 2020;34(2):E64-E71. doi:10.1097/bsd.0000000000001024.
46. Klein G, Mehlman CT, McCarty M. Nonoperative treatment of spondylolysis and grade I spondylolisthesis in children and young adults: a meta-analysis of observational studies. *J Pediatr Orthop*. 2009;29(2):146-156.
47. Kreiner DS, MacVicar J, Duszynski B, Nampiaparampil DE. The MILD procedure: a systematic review of the current literature. *Pain Med*. 2014;15(2):196-205. doi:10.1111/pme.12305.
48. Kumar N, Shah SM, Ng YH, et al. Role of coflex as an adjunct to decompression for symptomatic lumbar spinal stenosis. *Asian Spine J*. 2014;8(2):161-169.
49. Kushchayev SV, Glushko T, Jarraya M, et al. ABCs of the degenerative spine. *Insights Imaging*. 2018;9(2):253-274. doi:10.1007/s13244-017-0584-z.

50. Lee BS, Nault R, Grabowski M, et al. Utility of repeat magnetic resonance imaging in surgical patients with lumbar stenosis without disc herniation. *Spine J*. 2019;19:191-198.
51. Lewandrowski K. Successful outcome after outpatient transforaminal decompression for lumbar foraminal and lateral recess stenosis: the positive predictive value of diagnostic epidural steroid injection. *Clin Neurol Neurosurg*. 2018;173:38-45.
52. Li AM, Li X, Yang Z. Decompression and coflex interlaminar stabilisation compared with conventional surgical procedures for lumbar spinal stenosis: A systematic review and meta-analysis. *Int J Surg*. 2017;40:60-67. doi:10.1016/j.ijsu.2017.02.056.
53. Li T, Yan J, Ren Q, Hu J, Wang F, Liu X. Efficacy and Safety of Lumbar Dynamic Stabilization Device Coflex for Lumbar Spinal Stenosis: A Systematic Review and Meta-analysis. *World Neurosurg*. 2023;170:7-20. doi:10.1016/j.wneu.2022.11.141.
54. Lonne G, Johnsen LG, Rossvoll I, Andresen H, Storheim K, Zwart JA, Nygaard OP. Minimially invasive decompression versus X-Stop in lumbar spinal stensosis: a randomized controlled multicenter study. *Spine*. 2015;40(2):77-85.
55. Lurie JD, Tosteson TD, Tosteson A, et al. Long-term outcomes of lumbar spinal stenosis: eight-year results of the spine patient outcomes research trial (SPORT). *Spine (Phila Pa 1976)*. 2015;40(2):63-76.
56. McCoy S, Tundo F, Chidambaram S, Baaj AA. Clinical considerations for spinal surgery in the osteoporotic patient: a comprehensive review. *Clin Neurol Neurosurg*. 2019;180:40-47.
57. Moojen WA, Arts MP, Jacobs WCH, et al. Interspinous process device versus standard conventional surgical decompression for lumbar spinal stenosis: randomized controlled trial. *BMJ*. 2013;347:f6415. doi:10.1136/bmj.f6415.
58. Musacchio MJ, Lauryssen C, Davis RJ, et al. Evaluation of decompression and interlaminar stabilization compared with decompression and fusion for the treatment of lumbar spinal stenosis: 5-year follow-up of a prospective, randomized, controlled trial. *Int J Spine Surg*. 2016;10(6). doi: 10.14444/3006.
59. Nandakumar A, Clark NA, Peehal JP, et al. The increase in dural sac area is maintained at 2 years after X-stop implantation for the treatment of spinal stenosis with no significant alteration in lumbar spine range of movement. *Spine J*. 2010;10:762-768.
60. North American Spine Society (NASS). *Appropriate Use Criteria: Degenerative Lumbar Spondylolisthesis*. 2020. Burr Ridge, IL. © North American Spine Society (NASS). Available at: https://www.spine.org/Research-Clinical-Care/Quality-Improvement/Appropriate-Use-Criteria.
61. North American Spine Society (NASS). *Coverage Policy Recommendations: Lumbar Decompression: Lamionectomy, Laminotomy, & Foraminotomy*. Jan 2022. Burr Ridge, IL. © North American Spine Society (NASS). Available at: https://www.spine.org.
62. North American Spine Society (NASS). *Coverage Policy Recommendations: Endsocopic Decompression.* Feb 2019. Burr Ridge, IL. © North American Spine Society (NASS). Available at: https://www.spine.org.
63. North American Spine Society (NASS). *Coverage Policy Recommendations: Interspinous Devices without Fusion*. May 2014. Burr Ridge,IL. North American Spine Society (NASS). Available at: https://www.spine.org.
64. North American Spine Society (NASS). *Coverage Policy Recommendations: Interspinous Fixation with Fusion*. Dec 2019. Burr Ridge; IL. © North American Spine Society (NASS). Available at: https://www.spine.org.
65. North American Spine Society (NASS). *Coverage Policy Recommendations: Laser Spine Surgery*. May 2014. Burr Ridge, IL. © North American Spine Society (NASS). Available at: https://www.spine.org.
66. North American Spine Society (NASS). *Coverage Policy Recommendations: Lumbar Discectomy*. Dec 2019. Burr Ridge, IL. © North American Spine Society (NASS). Available at: https://www.spine.org/coverage.
67. North American Spine Society (NASS). *Coverage Policy Recommendations: Lumbar Interspinous Device without Fusion*. May 2018. Burr Ridge, IL. © North American Spine Society (NASS). Available at: https://www.spine.org.
68. North American Spine Society (NASS). *Coverage Policy Recommendations: Lumbar Interspinous Device without Fusion and with Decompression*. May 2018. Burr Ridgle, IL. © North American Spine Society (NASS). Available at: https://www.spine.org/coverage.
69. North American Spine Society (NASS). *Evidence-Based Clinical Guidelines for Multidisciplinary Spine Care: Diagnosis and Treatment of Degenerative Lumbar Spinal Stenosis.* 2011. Burr Ridge, IL. © North American Spine Society (NASS). Available at: https://www.spine.org.
70. Ong KL, Auerbach JD, Lau E, et al. Perioperative outcomes, complications, and costs associated with lumbar spinal fusion in older patients with spinal stenosis and spondylolisthesis. *Neurosurg Focus*. 2014;36(6).
71. Oster BA, Kikanloo SR, Levine NL, Lian J, Cho W. Systematic Review of Outcomes Following 10-Year Mark of Spine Patient Outcomes Research Trial (SPORT) for Degenerative Spondylolisthesis. *Spine*. 2020;45(12):820-824. doi:10.1097/brs.0000000000003485.
72. Oster BA, Kikanloo SR, Levine NL, Lian J, Cho W. Systematic Review of Outcomes Following 10-Year Mark of Spine Patient Outcomes Research Trial for Intervertebral Disc Herniation. *Spine*. 2020;45(12):825-831. doi:10.1097/brs.0000000000003400.
73. Oster BA, Kikanloo SR, Levine NL, Lian J, Cho W. Systematic Review of Outcomes Following 10-year Mark of Spine Patient Outcomes Research Trial (SPORT) for Spinal Stenosis. *Spine*. 2019;45(12):832-836. doi:10.1097/brs.0000000000003323.

74. Panagopoulos J, Hush J, Steffens D, Hancock MJ. Do MRI Findings Change Over a Period of Up to 1 Year in Patients With Low Back Pain and/or Sciatica? *Spine*. 2017;42(7):504-512. doi:10.1097/brs.0000000000001790.
75. Park S, Yoon SH, Hong TP, et al. Minimum 2-year follow-up result of degenerative spinal stenosis treated with interspinous U (Coflex™). *J Korean Neurosurg*. 2009;46:292-299.
76. Park SM, Park J, Jang HS, et al. Biportal endoscopic versus microscopic lumbar decompressive laminectomy in patients with spinal stenosis: a randomized controlled trial. *Spine J*. 2020;20(2):156-165. doi:10.1016/j.spinee.2019.09.015.
77. Patel VV, Nunley PD, Whang PG, et al. Superion® interspinous spacer for treatment of moderate degenerative lumbar spinal stenosis: durable three-year results of a randomized controlled trial. *J Pain Res*. 2015;8:657-662.
78. Patil CG, Sarmiento JM, Ugiliweneza B, et al. Interspinous device versus laminectomy for lumbar spinal stenosis: a comparative effectiveness study. *Spine J*. 2014;14:1484-1492.
79. Pazarlis K, Frost A, Försth P. Lumbar Spinal Stenosis with Degenerative Spondylolisthesis Treated with Decompression Alone. A Cohort of 346 Patients at a Large Spine Unit. Clinical Outcome, Complications and Subsequent Surgery. *Spine (Phila Pa 1976)*. 2021;47(6):470-475. doi:10.1097/brs.0000000000004291.
80. Pearson A, Lurie J, Tosteson T, et al. Who should have surgery for spinal stenosis?: treatement effect predictors in SPORT. *Spine (Phil Pa 1976)*. 2012;37(21):1791-1802.
81. Pintauro M, Duffy Al, Vahedi P, et al. Interspinous implants: are the new implants better than the last generation? A review. *Curr Rev Musculoskelet Med*. 2017;10:189-198.
82. Porchet F, Vader JP, Larequi-Lauber T, et al. The assessment of appropriate indications for laminectomy. *J Bone Joint Surg [Br]*. 1999;81-B:234-239.
83. Puvanesarajah V, Shen FH, Cancienne JM, et al. Risk factors for revision surgery following primary adult spinal deformity surgery in patients 65 years and older. *J Neursurg Spin*e. 2016;25(4):486-493.
84. Radcliff K, Vaccaro AR, Hilibrand A, et al. Lasers in spine surgery. *J Am Acad Orthop Surg*. 2019;00:1-12.doi:10.5435/JAAOS-D-18-00001.
85. Rasouli MR, Rahimi-Movaghar V, Shokraneh F, Moradi-Lakeh M, Chou R. Minimally invasive discectomy versus microdiscectomy/open discectomy for symptomatic lumbar disc herniation. *Cochrane Database Syst Rev*. 2014 9:CD010328.
86. Richter A, Halm HF, Hauck M, et al. Two-year follow-up after decompressive surgery with and without implantation of an interspinous device for lumbar spinal stenosis: a prospective controlled study. *J Spinal Disord Tech*. 2014;27(6):336-341.
87. Richter A, Schutz C, Hauck M, et al. Does an interpsinous device (Coflex™) improve the outcome of decompressive surgery in lumbar spinal stenosis? One-year follow up of a prospective case control study of 60 patients. *Eur Spine J*. 2010;19:283-289.
88. Ries ZG, Glassman SD, Vasilyev I, Metcalfe L, Carreon LY. Updated imaging does not affect revision rates in adults undergoing spine surgery for lumbar degenerative disease. *J Neurosurg Spine*. Published online Nov 2018. 2019;30(2):228-223. doi:10.3171/2018.8.spine18586.
89. Roder C, Baumgartner B, Berlemann U, et al. Superior outcomes of decompression with an interlaminar dynamic device versus decompression alone in patients with lumbar spinal stenosis and back pain: a cross registry study. *Eur Spine J*. 2015;24:2228-2235.
90. Sansur CA, Reames DL, Smith JS, et al. Morbidity and mortality in the surgical treatment of 10,242 adults with spondylolisthesis. *J Neurosurg Spine*. 2010;13(5):589-593. doi:10.3171/2010.5.SPINE09529.
91. Schizas C, Theumann N, Burn A, et al. Qualitative Grading of Severity of Lumbar Spinal Stenosis Based on the Morphology of the Dural Sac on Magnetic Resonance Images. *Spine (Phila Pa 1976)*. 2010;35(21):1919-1924. doi:10.1097/brs.0b013e3181d359bd.
92. Schmidt s, Franke J, Rauschmann M, et al. Prospective, randomized, multicenter study with 2-year follow-up to compare the performance of decompression with and without interlaminar stabilization. *J Neurosurg Spine*. 2017. Published online Jan 26, 2018.
93. Schenck C, Terpstra S, Moojen W, et al. Interspinous process device versus conventional decompression for lumbar spinal stenosis: 5-year results of a randomized controlled trial. *J Neurosurg: Spine*. Dec 2021:1-9. doi:10.3171/2021.8.spine21419.
94. Shafshak TS, Elnemr R. The Visual Analogue Scale Versus Numerical Rating Scale in Measuring Pain Severity and Predicting Disability in Low Back Pain. *J Clin Rheumatol*. 2020;27(7):1. doi:10.1097/rhu.0000000000001320.
95. Siddiqui M, Karadimas E, Nicol M, et al. Influence of X-Stop on neural foramina and spinal canal area in spinal stenosis. *Spine*. 2006;31(25): 2958-2962.
96. Siddiqui M, Nicol M, Karadimas E, et al. The positional magnetic resonance imaging changes in the lumbar spine following insertion of a novel interspinous process distraction device. *Spine*. 2005;30(23):2677-2682.
97. Simpson A, Lightsey H, Xiong G, Crawford A, Minamide A, Schoenfeld A. Spinal endoscopy: evidence, techniques, global trends, and future projections. *Spine J*. 2022;22(1):64-74. doi:10.1016/j.spinee.2021.07.004.
98. Song Q, Zhu B, Zhao W, Liang C, Hai B, Liu X. Full-Endoscopic Lumbar Decompression versus Open Decompression and Fusion Surgery for the Lumbar Spinal Stenosis: A 3-Year Follow-Up Study. *J Pain Res*. 2021;(14):1331-1338. doi:10.2147/jpr.s309693.

99. Staats PS, Chafin TB, Golovac S, et. al. Long-term safety and efficacy of minimally invasive lumbar decompression procedure for the treatment of lumbar spinal stenosis with neurogenic claudication: 2 year results of MiDAS ENCORE. *Reg Anesth Pain Med*. 2018;43(7):789-794.
100. Thomé C, Zevgaridis D, Lehta O, et al. Outcome after less-invasive decompression of lumbar spinal stenosis: a randomized comparison of unilateral laminotomy, bilateral laminotomy, and laminectomy. *J Neurosurg Spine*. 2005;3(2):129-141. doi:10.3171/spi.2005.3.2.0129.
101. Tran de QH, Duong S, Finlayson RJ. Lumbar spinal stenosis: a brief review of the nonsurgical management. *Canadian J Anaesthesia*. 2010;57(7):694-703.
102. Tome-Bermejo F, Pinera AR, Alvarez L. Osteoporosis and the management of spinal degenerative diseases. *Arch Bone Jt Surg*. 2017;5(6):363-374.
103. Watters 3rd WC, Bono CM, Gilbert TJ, et al. An evidence-based clinical guideline for the diagnosis and treatment of degenerative lumbar spondylolisthesis. *Spine J*. 2009;9(7):609-614. doi:10.1016/j.spinee.2009.03.016.
104. Weinstein JN, Lurie JD, Tosteson TD, et al. Surgical compared with nonoperative treatment for lumbar degenerative spondylolisthesis. four-year results in the Spine Patient Outcomes Research Trial (SPORT) randomized and observational cohorts. *JBJS Am*. 2009;91(6):1295-1304. doi:10.2106/JBJS.H.00913.
105. Weinstein JN, Tosteson TD, Lurie JD, et al. Surgical versus Nonsurgical Therapy for Lumbar Spinal Stenosis. *NEJM*. 2008;358:749-810. doi:10.1056/NEJMoa0707136.
106. Weinstein JN, Tosteson TD, Lurie JD, et al. Surgical versus nonoperative treatment for lumbar spinal stenosis four-year results of the Spine Patient Outcomes Research Trial. *Spine*. 2010;35(14):1329-1338. doi:10.1097/BRS.0b013e3181e0f04d.
107. WU A, Zhou Y, Li QL, et al. Interspinous spacer versus traditional decompressive surgery for lumbar spinal stenosis: a systematic review and meta-analysis. *PLOS ONE*. 2014;9(5).
108. Yaksi A, Özgönenel L, Özgönenel B. The Efficiency of Gabapentin Therapy in Patients with Lumbar Spinal Stenosis. *Spine*. 2007;32(9):939-942. doi:10.1097/01.brs.0000261029.29170.e6.
109. Yuan W, Su Q, Liu T, et al. Evaluation of coflex interspinous stabilization following decompression compared with decompression and posterior lumbar interbody fusion for the treatment of lumbar degenerative disease: a minimum 5-year follow-up study. *J Clinl Neurosci*. 2017;35:24-29.
110. Zhao X, Ma J, Ma X, et al. Interspinous process devices (IPD) alone versus decompression surgery for lumbar spinal stenosis (LSS): a systematic review and meta-analysis of randomized controlled trials. *Int J Surg*. 2017;39:57-64.
111. Zhong J, O'Connell B, Balouch E, et al. Patient Outcomes After Single-level Coflex Interspinous Implants Versus Single-level Laminectomy. *Spine (Phila Pa 1976)*. 2021;46(13):893-900. doi:10.1097/BRS.0000000000003924.