Review Article

Guideline summary review: an evidence-based clinical guideline for the diagnosis and treatment of degenerative lumbar spondylolisthesis

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BACKGROUND CONTEXT: The North American Spine Society’s (NASS) Evidence-Based Clinical Guideline for the Diagnosis and Treatment of Degenerative Lumbar Spondylolisthesis features evidence-based recommendations for diagnosing and treating degenerative lumbar spondylolisthesis. The guideline updates the 2008 guideline on this topic and is intended to reflect contemporary treatment concepts for symptomatic degenerative lumbar spondylolisthesis as reflected in the highest quality critical literature available on this subject as of May 2013. The NASS guideline on this topic is the only guideline on degenerative lumbar spondylolisthesis included in the Agency for Healthcare Research and Quality’s National Guideline Clearinghouse (NGC).

PURPOSE: The purpose of this guideline is to provide an evidence-based educational tool to assist spine specialists when making clinical decisions for patients with degenerative lumbar spondylolisthesis. This article provides a brief summary of the evidence-based guideline recommendations for diagnosing and treating patients with this condition.

STUDY DESIGN: A systematic review of clinical studies relevant to degenerative spondylolisthesis was carried out.

METHODS: This NASS spondylolisthesis guideline is the product of the Degenerative Lumbar Spondylolisthesis Work Group of NASS’ Evidence-Based Guideline Development Committee. The methods used to develop this guideline are detailed in the complete guideline and technical report available on the NASS website. In brief, a multidisciplinary work group of spine care specialists convened to identify clinical questions to address in the guideline. The literature search strategy was developed in consultation with medical librarians. Upon completion of the systematic literature search, evidence relevant to the clinical questions posed in the guideline was reviewed. Work group members used the NASS evidence table templates to summarize study conclusions, identify study strengths and weaknesses, and assign levels of evidence. Work group members participated in webcasts and in-person recommendation meetings to update and formulate evidence-based recommendations and incorporate expert opinion when necessary. The draft guidelines were submitted to an internal peer review process and ultimately approved by the NASS Board of Directors. Upon publication, the Degenerative Lumbar Spondylolisthesis guideline was accepted into the NGC and will be updated approximately every 5 years.

RESULTS: Twenty-seven clinical questions were addressed in this guideline update, including 15 clinical questions from the original guideline and 12 new clinical questions. The respective recommendations were graded by strength of the supporting literature, which was stratified by levels of evidence. Twenty-one new or updated recommendations or consensus statements were issued and 13 recommendations or consensus statements were maintained from the original guideline.

CONCLUSIONS: The clinical guideline was created using the techniques of evidence-based medicine and best available evidence to aid practitioners in the care of patients with degenerative lumbar spondylolisthesis. The entire guideline document, including the evidentiary tables, literature search parameters, literature attrition flow chart, suggestions for future research, and all of the references, is available electronically on the NASS website at https://www.spine.org/Pages/ResearchClinicalCare/QualityImprovement/ ClinicalGuidelines.aspx and will remain updated on a timely schedule. © 2016 Elsevier Inc. All rights reserved.

Keywords: Clinical practice guideline; Degenerative spondylolisthesis; Degenerative lumbar spondylolisthesis; Evidence-based guideline; Spondylolisthesis; Systematic review
Introduction

In an attempt to improve and evaluate the knowledge base concerning the diagnosis and treatment of degenerative lumbar spondylolisthesis, the Degenerative Lumbar Spondylolisthesis Work Group of the North American Spine Society’s (NASS) Evidence-Based Clinical Guideline Development Committee updated the 2008 evidence-based clinical guideline on this topic. The Institute of Medicine defined clinical practice guidelines as “statements that include recommendations intended to optimize patient care. They are informed by a systematic review of evidence and an assessment of the benefits and harms of alternative care options” [1]. The application of the principles of evidence-based medicine to guideline development helps create an explicit linkage between the final recommendations in the guideline and the evidence upon which these recommendations are based [2]. When employing the principles of evidence-based medicine, the clinical literature is extensively searched to answer specific questions about a disease state or medical condition. The literature that is identified in the search is then rated as to its scientific merit using levels of evidence, determined by specific rule sets that apply to human, clinical investigations. The specific questions asked are then answered using studies of the highest possible levels of evidence that have been obtained from the searches. As a final step, the answers to clinical questions are reformulated as recommendations that are assigned grades of recommendation related to the best clinical evidence available at the time of answering each question. The intent of the grade of recommendation is to indicate the strength of evidence used by the work group in answering the question asked.

Methods

The methods used to develop this guideline and member disclosure policy are detailed in the complete guideline and technical report available on the NASS website [3]. In brief (Fig. 1), a multidisciplinary work group of spine care specialists, including physiatrists, orthopedic surgeons, neurosurgeons, pain medicine physicians, and chiropractors, convened to identify clinical questions to address in the guideline. The literature search strategy was developed in consultation with medical librarians. Upon completion of the systematic literature search, evidence relevant to the clinical questions posed in the guideline was reviewed. Work group members used NASS evidentiary table templates to summarize study conclusions, identify study strengths and weaknesses, and assign levels of evidence according to the NASS Levels of Evidence for Primary Research Question scale [4]. Work group members participated in webcasts and in-person recommendation meetings to update and formulate evidence-based recommendations and incorporate expert opinion when necessary. The draft guidelines were submitted to an internal peer review process and ultimately approved by the NASS Board of Directors. Upon publication, the Degenerative Lumbar Spondylolisthesis guideline was accepted into the National Guideline Clearinghouse and is the only guideline in the clearinghouse on this topic. National Guideline Clearinghouse inclusion criteria [5] were updated in June 2014 to reflect the Institute of Medicine’s definition for Clinical Practice Guideline [1] and systematic review criteria [6]. NASS will convene a multidisciplinary work group to review and update the guideline approximately every 5 years.

Results

Twenty-seven clinical questions were addressed in this guideline update, including 15 clinical questions from the original guideline and 12 new clinical questions. A total of 636 articles were considered in the evidentiary review process. Work group members engaged in a two-step screening process to determine article eligibility, including title and abstract screening and evidentiary review. The total number of articles retrieved, eligible for critical appraisal, and meeting inclusion criteria for each individual clinical question can be accessed in the technical report. A total of 34 recommendations were issued in the guideline, including 21 new or updated recommendations or consensus statements and 13 recommendations or consensus statements maintained from the original guideline.

Summary of recommendations

Recommendations were graded according to the NASS Grades of Recommendation [7]. In summary, these are Recommendation Grade A=Good evidence, Recommendation Grade B=Fair evidence, Recommendation Grade C=Poor quality evidence, and I=Insufficient or conflicting evidence. The recommendations are summarized below.

Definition

What is the best working definition of degenerative lumbar spondylolisthesis?

An acquired anterior displacement of one vertebra over the subjacent vertebra, associated with degenerative changes, without an associated disruption or defect in the vertebral ring.

Work Group Consensus Statement (Maintained from original guideline)

Diagnosis and imaging

What are the most appropriate historical and physical examination findings consistent with the diagnosis of degenerative lumbar spondylolisthesis?

In the absence of evidence to address this question, it is the work group’s opinion that obtaining an accurate history and physical examination is important for the diagnosis and treatment of patients with degenerative lumbar
spondylolisthesis. Formulating appropriate clinical ques-
tions is essential to obtaining an accurate history that can be 
used in developing a treatment plan for patients.

Work Group Consensus Statement (Maintained from 
original guideline with minor word modifications)

What are the most appropriate diagnostic tests for 
degenerative lumbar spondylolisthesis?

The lateral radiograph is the most appropriate, noninva-
sive test for detecting degenerative lumbar spondylolisthesis 
[8–13].

Grade of Recommendation: B (Suggested) (Main-
tained from original guideline with minor word modifications)

In the absence of reliable evidence, it is the work group’s 
opinion that the lateral radiograph should be obtained in the 
standing position whenever possible.

Work Group Consensus Statement (New consensus 
statement)

The most appropriate, non-invasive test for imaging the 
stenosis accompanying degenerative lumbar spondylolisthe-
sis is magnetic resonance imaging (MRI) [14].

Work Group Consensus Statement (Maintained from 
original guideline)

Facet joint effusion greater than 1.5 mm on supine MRI 
may be suggestive of the presence of degenerative lumbar 
spondylolisthesis. Further evaluation for the presence of
Degenerative lumbar spondylolisthesis should be considered, including using plain standing radiographs [15,16].

Grade of Recommendation: B (New recommendation statement)

There is insufficient evidence to make a recommendation for or against the utility of the upright seated MRI in the diagnosis of degenerative lumbar spondylolisthesis [17].

Grade of Recommendation: I (Insufficient Evidence) (New recommendation statement)

There is insufficient evidence to make a recommendation for or against the use of axial loaded MRI to evaluate the dural sac cross-sectional area in patients with degenerative lumbar spondylolisthesis and spinal stenosis [18].

Grade of Recommendation: I (Insufficient Evidence) (New recommendation statement)

Plain myelography or computed tomography (CT) myelography are useful studies to assess spinal stenosis in patients with degenerative lumbar spondylolisthesis especially in those who have contraindications to MRI [10,11,13,19,20].

Grade of Recommendation: B (Suggested) (Maintained from original guideline)

In patients with degenerative lumbar spondylolisthesis with associated spinal stenosis for whom MRI is either contraindicated or inconclusive, CT myelography is suggested as the most appropriate test to confirm the presence of anatomic narrowing of the spinal canal or the presence of nerve root impingement [14].

Work Group Consensus Statement (New consensus statement)

In patients with degenerative spondylolisthesis with associated spinal stenosis for whom MRI and CT myelography are contraindicated, inconclusive, or inappropriate, CT is suggested as the most appropriate test to confirm the presence of anatomic narrowing of the spinal canal or the presence of nerve root impingement [14,21].

Work Group Consensus Statement (New consensus statement)

New clinical question: What are the most appropriate diagnostic or physical exam tests consistent with the diagnosis of fixed versus dynamic deformity?

There is insufficient evidence to make a recommendation on the most appropriate diagnostic or physical exam test consistent with fixed or dynamic deformity in degenerative lumbar spondylolisthesis patients because of the lack of uniform reference standards that define instability.

There is no universally accepted standard to diagnose fixed versus dynamic spondylolisthesis. To evaluate instability, many studies employ the use of lateral flexion extension radiographs, which may be done in the standing or recumbent position; however, there is wide variation in the definition of instability. To assist the readers, the definitions for instability (when provided) in degenerative spondylolisthesis patients, are bolded below [15–18,22–29].

Grade of Recommendation: I (Insufficient Evidence) (New recommendation statement)

New clinical question: is dynamic MRI and/or dynamic CT myelography imaging (including standing imaging, imaging with axial loading) helpful in the diagnostic testing for degenerative lumbar spondylolisthesis?

There is insufficient evidence to make a recommendation for or against the utility of dynamic MRI and dynamic CT myelography in the diagnosis of degenerative lumbar spondylolisthesis [18,28,30].

Grade of Recommendation: I (Insufficient Evidence) (New recommendation statement)

Medical/interventional treatment

Medical/interventional treatment for degenerative lumbar spondylolisthesis, when the radicular symptoms of stenosis predominate, most logically should be similar to treatment for symptomatic degenerative lumbar spinal stenosis [14].

Work Group Consensus Statement (Maintained from original guideline)

An updated systematic review of the literature yielded no studies to adequately address any of the medical/interventional treatment questions from the original guideline posed below:

- What is the role of pharmacologic treatment in the management of degenerative lumbar spondylolisthesis?
- What is the role of physical therapy or exercise in the treatment of degenerative lumbar spondylolisthesis?
- What is the role of manipulation in the treatment of degenerative lumbar spondylolisthesis?
- What are the roles of ancillary treatments such as bracing, traction, electrical stimulation, and transcutaneous electrical stimulation in the treatment of degenerative lumbar spondylolisthesis?
- What is the long-term result (4+years) of medical/interventional management of degenerative lumbar spondylolisthesis?

What is the role of injections for the treatment of degenerative lumbar spondylolisthesis?

There is insufficient evidence to make a recommendation for or against the use of injections for the treatment of degenerative lumbar spondylolisthesis [31].

Grade of Recommendation: I (Insufficient Evidence) (New recommendation statement)
Surgical treatment

Does surgical decompression alone improve surgical outcomes in the treatment of degenerative lumbar spondylolisthesis compared with medical/interventional treatment alone?

Direct surgical decompression may be considered for the treatment of patients with symptomatic spinal stenosis associated with low-grade degenerative lumbar spondylolisthesis whose symptoms have been recalcitrant to a trial of medical/interventional treatment [32,33].

Grade of Recommendation: C (Updated recommendation statement)

There is insufficient evidence to make a recommendation for or against the use of indirect surgical decompression for the treatment of patients with symptomatic spinal stenosis associated with low-grade degenerative lumbar spondylolisthesis whose symptoms have been recalcitrant to a trial of medical/interventional treatment [34–36].

Grade of Recommendation: I (Insufficient Evidence) (Maintained from original guideline)

Does the addition of lumbar fusion, with or without instrumentation, to surgical decompression improve surgical outcomes in the treatment of degenerative lumbar spondylolisthesis compared with treatment by decompression alone?

Surgical decompression with fusion is suggested for the treatment of patients with symptomatic spinal stenosis and degenerative lumbar spondylolisthesis to improve clinical outcomes compared with decompression alone [32,37–44].

Grade of Recommendation: B (Maintained from original guideline with minor word modifications)

For symptomatic single-level degenerative spondylolisthesis that is low-grade (<20%) and without lateral foraminal stenosis, decompression alone with preservation of midline structures provides equivalent outcomes when compared with surgical decompression with fusion [37,39].

Grade of Recommendation: B (Suggested) (New recommendation statement)

New clinical question: Does the addition of lumbar fusion, with or without instrumentation, to surgical decompression improve surgical outcomes in the treatment of degenerative lumbar spondylolisthesis compared with medical/interventional treatment alone?

Surgical decompression with fusion, with or without instrumentation, is suggested to improve the functional outcomes of single-level degenerative lumbar spondylolisthesis compared with medical/interventional treatment alone [32,43–48].

Grade of Recommendation: B (New recommendation statement)

There is insufficient evidence to make a recommendation for or against efficacy of surgical decompression with fusion, with or without instrumentation, for treatment of multilevel degenerative lumbar spondylolisthesis compared with Medical/interventional treatment alone [47].

Grade of Recommendation: I (Insufficient Evidence) (New recommendation statement)

Does the addition of instrumentation to decompression and fusion for degenerative lumbar spondylolisthesis improve surgical outcomes compared with decompression and fusion alone?

The addition of instrumentation is suggested to improve fusion rates in patients with symptomatic spinal stenosis and degenerative lumbar spondylolisthesis [41,49].

Grade of Recommendation: B (Maintained from original guideline with minor word modifications)

The addition of instrumentation is not suggested to improve clinical outcomes for the treatment of patients with symptomatic spinal stenosis and degenerative lumbar spondylolisthesis [43,44,49,50].

Grade of Recommendation: B (Maintained from original guideline with minor word modifications)

How do outcomes of decompression with posterolateral fusion compare with those for 360 degree fusion in the treatment of degenerative lumbar spondylolisthesis?

There is insufficient evidence to make a recommendation for or against the use of either decompression with posterolateral fusion or 360° fusion in the surgical treatment of patients with degenerative lumbar spondylolisthesis [51,52].

Grade of Recommendation: I (Insufficient Evidence) (Maintained from original guideline)

New clinical question: Does 360 degree fusion with decompression lead to better outcomes versus 360 degree fusion without decompression for treatment of degenerative lumbar spondylolisthesis?

No evidence was found to address this question. Due to the paucity of literature addressing this question, the work group was unable to generate a recommendation to answer this question.

New clinical question: Do flexible fusions improve outcomes in the treatment of degenerative lumbar spondylolisthesis compared with medical/interventional treatment?

For the purposes of this guideline, the work group defined “flexible fusion” as a procedure involving dynamic stabilization without arthrodesis.
No evidence was found to address this question. Due to the paucity of literature addressing this question, the work group was unable to generate a recommendation to answer this question.

**New Clinical Question:** does the use of interspinous spacers in the treatment of degenerative lumbar spondylolisthesis improve outcomes compared with medical/interventional treatment?

There is insufficient and conflicting evidence to make a recommendation for or against the efficacy of interspinous spacers versus medical/interventional treatment in the management of degenerative lumbar spondylolisthesis patients [34–36].

Grade of Recommendation: I (Insufficient Evidence) (New recommendation statement)

**What is the role of reduction (deliberate attempt to reduce via surgical technique) with fusion in the treatment of degenerative lumbar spondylolisthesis?**

There is insufficient evidence to make a recommendation for or against the use of reduction with fusion in the treatment of degenerative lumbar spondylolisthesis [53–55].

Grade of Recommendation: I (Insufficient Evidence) (Revised wording, but Recommendation Grade maintained)

**New clinical question:** For patients undergoing posterolateral fusion, does the use of autogenous bone graft improve surgical outcomes compared with those fused with bone graft substitutes?

Due to the paucity of literature addressing this question, the work group was unable to generate a recommendation to answer this question.

There is insufficient evidence to make a recommendation for or against the use of autogenous bone graft or bone graft substitutes in patients undergoing posterolateral fusion for the surgical treatment of degenerative lumbar spondylolisthesis [56–60].

Grade of Recommendation: I (Insufficient Evidence) (New recommendation statement)

**New clinical question:** Do minimally invasive surgical treatments improve outcomes in the treatment of degenerative lumbar spondylolisthesis compared with

(a) conventional open decompression (laminectomy)?
(b) conventional (open) lumbar decompression and fusion, with or without instrumentation?

No evidence was found to assess the efficacy of minimally invasive surgical techniques versus open decompression alone in the surgical treatment of degenerative lumbar spondylolisthesis.

Although both minimally invasive techniques and open decompression and fusion, with or without instrumentation, demonstrate significantly improved clinical outcomes for the surgical treatment of degenerative lumbar spondylolisthesis, there is conflicting evidence which technique leads to better outcomes [61–64].

Grade of Recommendation: I (Insufficient/Conflicting Evidence) (New recommendation statement)

**What is the long-term result (4 or more years) of surgical management of degenerative lumbar spondylolisthesis?**

Decompression and fusion may be considered as a means to provide satisfactory long-term results for the treatment of patients with symptomatic spinal stenosis and degenerative lumbar spondylolisthesis [65–70].

Grade of Recommendation: C (Maintained from original guideline with minor word modifications)

**New clinical question:** Which patient-specific characteristics influence outcomes (and prognosis) in the treatment (surgical or any) of degenerative lumbar spondylolisthesis?

There is insufficient evidence to make a recommendation for or against the influence of a non-organic pain drawing on the outcomes/prognosis of treatments for patients with degenerative lumbar spondylolisthesis [71].

Grade of Recommendation: I (Insufficient Evidence) (New recommendation statement)

There is insufficient evidence to make a recommendation regarding the influence of age and three or more comorbidities on the outcomes of patients undergoing treatment for degenerative lumbar spondylolisthesis [72].

Grade of Recommendation: I (Insufficient Evidence) (New recommendation statement)

There is insufficient evidence to make a recommendation regarding the influence of symptom duration on the treatment outcomes of patients with degenerative lumbar spondylolisthesis [73].

Grade of Recommendation: I (Insufficient Evidence) (New recommendation statement)

There is insufficient evidence to make a recommendation regarding the influence of obesity (BMI >30) and its impact on treatment outcomes in patients with degenerative lumbar spondylolisthesis [48].

Grade of Recommendation: I (Insufficient Evidence) (New recommendation statement)
New clinical question: What is the effect of postsurgical rehabilitation including exercise, spinal mobilization or manipulation, or psychosocial interventions on outcomes in the management of degenerative lumbar spondylolisthesis (compared with patients who do not undergo postsurgical rehabilitation)?

There was no evidence found to address this question. Due to the paucity of evidence, a recommendation cannot be made regarding the effect of postsurgical rehabilitation on the outcomes of patients undergoing surgical treatment for degenerative lumbar spondylolisthesis.

Value/cost-effectiveness of spine care

New clinical question: What is the cost-effectiveness of the surgical treatment of degenerative lumbar spondylolisthesis compared with medical/interventional treatment alone (consider with and without fusion separately)?

There was no evidence found to address this question. Due to the paucity of evidence, a recommendation cannot be made regarding the cost-effectiveness of surgical treatment compared with medical/interventional treatment for the management of patients with degenerative lumbar spondylolisthesis.

New clinical question: What is the cost-effectiveness of minimal access-based surgical treatments of degenerative lumbar spondylolisthesis compared with traditional open surgical treatments?

There is insufficient evidence to make a recommendation for or against the cost-effectiveness of minimal access-based surgical treatments compared with traditional open surgical treatments for degenerative lumbar spondylolisthesis [40,74,75].

Grade of Recommendation: I (Insufficient Evidence) (New recommendation statement)

Discussion

This evidence-based clinical guideline for the diagnosis and treatment of degenerative lumbar spondylolisthesis has several functions. It is an educational tool for both clinicians and patients and as such this particular guideline is intended to assist practitioners who treat patients with degenerative lumbar spondylolisthesis. This guideline also serves to focus and rate the scientific data on this topic. An evidence-based guideline such as this allows a clinician access to the best and most current evidence and reduces the burden of “keeping up with the literature” that spans innumerable journals from a broad spectrum of disciplines. In addition, this evidence-based clinical guideline has the potential to improve the appropriateness and effectiveness of patient care by basing decisions on the best evidence available. Finally, updating this guideline serves to identify knowledge gaps in the clinical literature on degenerative lumbar spondylolisthesis. High-quality clinical guidelines ideally identify and suggest future research topics to improve guideline development and thus patient care, as detailed in the current guideline. The complete clinical guideline summarized in this article, along with extensive descriptive narratives on each topic outlining the evidence and the work group rationale for the answers to each question can be found on the NASS website at: https://www.spine.org/Pages/ResearchClinicalCare/QualityImprovement/ClinicalGuidelines.aspx.

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The full list of references can be found in the guideline at: http://www.spine.org/Pages/PracticePolicy/ClinicalCare/ClinicalGuidelines/Default.aspx.

References


