

Guidelines for the performance of fusion procedures for degenerative disease of the lumbar spine. Part 9: fusion in patients with stenosis and spondylolisthesis

DANIEL K. RESNICK, M.D., TANVIR F. CHOUDHRI, M.D., ANDREW T. DAILEY, M.D.,
MICHAEL W. GROFF, M.D., LARRY KHOO, M.D., PAUL G. MATZ, M.D.,
PRAVEEN MUMMANENI, M.D., WILLIAM C. WATTERS III, M.D., JEFFREY WANG, M.D.,
BEVERLY C. WALTERS, M.D., M.P.H., AND MARK N. HADLEY, M.D.

Department of Neurosurgery, University of Wisconsin, Madison, Wisconsin; Department of Neurosurgery, Mount Sinai Medical School, New York, New York; Department of Neurosurgery, University of Washington, Seattle, Washington; Department of Neurosurgery, Indiana University, Indianapolis, Indiana; Departments of Orthopedic Surgery and Neurosurgery, University of California at Los Angeles, California; Department of Neurosurgery, University of Alabama at Birmingham, Alabama; Department of Neurosurgery, Emory University, Atlanta, Georgia; Bone and Joint Clinic of Houston, Texas; and Department of Neurosurgery, Brown University, Providence, Rhode Island

KEY WORDS • lumbar spine • stenosis • spondylolisthesis • fusion • practice guidelines

Recommendations

Guidelines. The performance of a lumbar PLF is recommended for patients with lumbar stenosis and associated degenerative spondylolisthesis who require decompression. There is insufficient evidence to recommend a treatment guideline.

Options. Pedicle screw fixation as an adjunct to lumbar PLF should be considered as a treatment option in patients with lumbar stenosis and spondylolisthesis in cases in which there is preoperative evidence of spinal instability or kyphosis at the level of the spondylolisthesis or when iatrogenic instability is anticipated.

Rationale

Patients with lumbar stenosis often present with concomitant degenerative spondylolisthesis. Decompression

alone in this population may result in deformity progression. Lumbar PLF has been used as a means to prevent postoperative deformity progression and to improve functional outcome after decompressive surgery in this population. The purpose of this review is to examine the literature concerning the role of fusion after decompression surgery in patients with degenerative spondylolisthesis and stenosis.

Search Criteria

A computerized search of the database of the National Library of Medicine from 1966 to August 2003 was conducted using the search terms “fusion and degenerative spondylolisthesis.” The search was restricted to the English language and yielded 217 references. The titles and abstracts of each of these references were reviewed, and papers not concerned with the use of fusion with degenerative spondylolisthesis were discarded. Eighty-five references were identified that provided either direct or supporting evidence relevant to the use of fusion for degenerative lumbar spondylolisthesis. These papers were reviewed, and relevant references from the bibliographies were identified. All papers providing Class III or better medical evidence are summarized in Table 1. Additional

Abbreviations used in this paper: DPQ = Dallas Pain Questionnaire; JOA = Japanese Orthopaedic Association; PLF = posterolateral fusion; SF-36 = Short Form-36; VAS = visual analog scale.

TABLE 1

Summary of studies involving lumbar interbody fusion in patients with degenerative lumbar disease*

Authors & Year	Class	Description	Comment
Dall & Rowe, 1985	III	17 patients w/ DS had decompressions: 1 group w/ laminect & facetect & the other w/ laminect w/ foraminot. At 20-mo FU, 5/6 w/ facetect were better & only 4/11 w/ foraminot were better. Overall poor results led authors to recommend extensive decompressions as better than laminect w/ just foraminot.	
Feffer, et al., 1985	III	19 patients w/ DS underwent decompression w/ & w/o fusion: 8 patients w/ decompression/fusion & 11 w/ decompression alone. Of the 8 w/ fusion, 5 had good results, 3 were fair, & 0 were poor. Of the 11 w/o fusion, 5 had good results, 3 were fair, & 3 were poor. 4 patients w/o fusion suffered gross instability.	Fusion-treated patients did better than those receiving decompression alone.
Lombardi, et al., 1985	III	47 patients w/ DS. Treatment groups of wide decompression w/ facetectomy, decompression, & decompression w/ fusion. Good-to-excellent results were 33, 89, & 90%, respectively. The addition of a fusion was beneficial.	Large benefit to adding fusion to decompression.
Kaneda, et al., 1986	III	54 patients w/ unstable DS treated by decompression & fusion. 96% fusion rate w/ excellent clinical results.	
Inoue, et al., 1988	III	36 patients w/ DS treated w/ anterior interbody fusion. All fused & did well clinically.	
Fujiya, et al., 1990	III	40 patients w/ unstable DS underwent decompression & fusion. 1 patient suffered a nonunion. At a mean FU of 26 mos, 75% had excellent, 20% good, 5% fair, & 0% poor results.	Case series—no formal outcomes measures.
Takahashi, et al., 1990	III	34 patients having anterior decompression & interbody fusion for DS: 76% w/ satisfactory results at 10-yr FU.	Survivorship analysis of fusions for DS.
Herkowitz & Kurz, 1991	I	50 patients w/ DS & stenosis (25 w/ fusion & 25 w/o fusion). In a mean FU of 3 yrs, patients w/ a fusion did better.	Good study demonstrating direct benefit of fusion compared w/ no fusion.
Herron, et al., 1991	III	24 patients w/ DS having decompression only w/o fusion at mean FU of 34 mos: 20 w/ good results, 3 w/ fair, & 1 w/ poor.	Small no. of patients & short FU.
Postacchini, et al., 1991	III	32 patients w/ DS treated w/ decompression & some w/ various forms of decompression w/ or w/o fusion. Overall, 17 w/ fusion & 15 w/o. W/ fusion, all 17 had good or excellent results, whereas in those w/o fusion, 10 had good or excellent results & 5 had fair or poor results. Authors stated no statistical difference btwn fusion & nonfusion & recommended fusion for unstable situations.	Small nos. show trend for better results w/ fusion, but not statistically different.
Chang, et al., 1993	III	85 patients w/ spondylolisthesis (57 w/ DS) underwent op. Patients w/ instrumentation had better fusion rates & clinical outcomes (60% w/ complete relief of pain).	57 patients w/ DS had good fusion-related results.
Sanderson & Wood, 1993	III	31 patients w/ decompression w/o fusion (19 w/ DS). Of the poor results, 3 were in patients w/ DS.	In subset of 19 patients w/ DS undergoing decompression alone: 3/19 w/ poor results & 16 w/ good results.
Soini, et al., 1993	III	51 patients (13 w/ DS) having decompression & fusion. Instrumentation resulted in higher fusions, but all did well.	Small series of patients doing well w/ fusion.
Axelsson, et al., 1994	III	71 patients w/ spinal fusion (subset of 43 w/ DS). 29/43 had good results. In the patients w/ DS, a healed fusion correlated w/ a good result, but not so w/ the other diagnoses.	43 patients w/ DS in whom good outcome was associated w/ healed fusion.
Lee, 1994	III	52 patients w/ unstable DS treated w/ reduction & fusion (no formal decompression). 1-yr min FU: 89% had satisfactory outcomes w/ regard to back pain. The remaining w/o satisfactory outcome had formal decompression.	Unstable DS, better w/ decompression & fusion.
Markwalder, et al., 1995	III	Prospective study of 100 patients w/ DS having decompression & fusion. 95 patients w/ good or excellent results.	W/o successful fusion, unsatisfactory results in terms of back pain.
Gertzbein, et al., 1996	III	Circumferential fusion for various conditions. 67 patients available for 2-yr FU: 15.2% had DS w/ stenosis. 97% successful fusion. 18% returned to either lighter work or job retraining, & 23% were not working. Thus, 77% were performing the same or lighter levels of activity & 23% were not working. In diagnostic categories, the nos. not working were as follows: DDD, 25%; PA, 33%; & SS, 8%. Pain significantly reduced on VAS from 7.1–2.1 (back) & from 5.8–1.5 (leg) ($p < 0.006$ & 0.0001 , respectively).	Good results.
Hanley, 1996	III	20 patients w/ DS & stenosis undergoing decompression & fusion. At a min 2-yr FU, satisfactory results were found in 17 (85%).	In subgroup of patients w/ DS, more return to work; more favorable subgroup in overall favorable study.
Fischgrund, et al., 1997	II	76 patients w/ symptomatic stenosis associated w/ lumbar DS were prospectively studied. All underwent posterior decompression & posterolateral intertransverse process arthrodesis. Patients randomized to a segmental transpedicular instrumented or noninstrumented group. 67 were available for a 2-yr FU. Clinical outcome was excellent or good in 76% w/ instrumentation & in 85% of those w/o instrumentation ($p = 0.45$). Successful arthrodesis in 82% of instrumented vs 45% of noninstrumented cases ($p = 0.0015$). Overall, successful fusion did not influence outcome ($p = 0.435$). In patients undergoing 1-level PLF for DS & spinal stenosis, PSs may lead to a higher fusion rate, but clinical outcome shows no improvement in back & lower-limb pain. Clinical outcome 78% w/o instrumentation & 85% w/ instrumentation (good or excellent).	Prospective study, lumbar DS, decompression & fusion w/ or w/o fixation. Improvement w/ decompression & fusion.
Katz, et al., 1997	II	Prospective multicenter observational study of 272 patients having op for degenerative lumbar stenosis. 123 identified as having DS or scoliosis. The 1st set of analyses used all patients in the cohort; the 2nd was restricted to patients w/ typical indications for arthrodesis: DS of < 5 mm &/or scoliosis of $< 15^\circ$. Patients undergoing arthrodesis were significantly younger & mostly female. 97% were Caucasian. The 3 groups had similar levels	Subgroup had DS or scoliosis & a nonstatistically significant trend of better results in patients w/ noninstrumented fusion. Other outcomes similar btwn nonfusion, fusion w/ instrumentation, & fusion

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