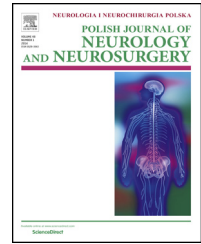


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Original research article

Minimally invasive decompression in patients with degenerative spondylolisthesis associated with lumbar spinal stenosis. Report of a surgical series and review of the literature

Nicola Montano^{*}, Vito Stifano, Fabio Papacci, Edoardo Mazzucchi, Eduardo Fernandez

Institute of Neurosurgery, Catholic University, Rome, Italy

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ABSTRACT

We reported the results of minimally invasive spinal decompression (MISD) in patients with degenerative spondylolisthesis (DS) associated with lumbar spinal stenosis (LSS) and performed a literature review in order to evaluate the clinical and radiological outcomes, the complications and reoperation rate of MISD procedures in these patients.

Data of 28 patients submitted to MISD for DS associated to LSS were reviewed. We evaluated the Visual Analogue Scale (VAS) both for low back pain (LBP) and legs pain, the Oswestry Disability Index (ODI) and the degree of the slippage. A PubMed search of the English literature was conducted. Only papers with more than 10 patients and reporting explicitly data of patients with DS were included in the analysis. We found a statistically significant improvement of LBP, legs pain and ODI in our series. The degree of slippage was stable at follow-up (FU) with no need of reoperation. No major complications occurred. In our literature review, we were able to analyze the differences in ODI in 156 patients and the differences in Japanese Orthopedic Association (JOA) score in 218 patients. We observed a statistically significant improvement of ODI and JOA score at FU compared to pre-operative. The percentage of slippage, evaluated in 283 patients, was unchanged at FU compared to pre-operative. The overall complication rate was 1.6%. The overall reoperation rate was 4.5%.

MISD procedures are safe and effective in patients with DS associated to LSS and are associated to low morbidity and significant improvement of disability without progression of slippage.

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^{*} Corresponding author at: Institute of Neurosurgery, Catholic University, Largo Agostino Gemelli, 8, 00168 Rome, Italy.
E-mail address: nicolamontanomd@yahoo.it (N. Montano).

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1. Introduction

Degenerative spondylolisthesis (DS) associated with lumbar spinal stenosis (LSS) is a common pathology which can cause progressive neurogenic claudication, radicular pain, and legs weakness. Usually when there is evidence of a failure of the conservative management, surgery is indicated [1–4]. The most widely used approach is open lumbar decompression with spinal fusion [5]. This technique has been demonstrated to significantly improve clinical outcome in patients with DS [6–10]. Nonetheless, spinal fusion has been associated with some complications such as fracture of the vertebral body and the pedicle [11–19], pedicle screw loosening and adjacent segment degeneration [20], requiring secondary spine surgery for lumbar adjacent instability [21]. In the last few years minimally invasive spinal decompression (MISD) procedures have been described [22–27] to overcome the problems, such as iatrogenic instability [28], associated with laminectomy. It has been reported that these techniques are as efficacious as laminectomy in terms of good clinical results in non-spondylolisthetic patients [22–27,29–31] with the advantage of a shorter hospital stay and a less postoperative pain compared to laminectomy [29–31]. These procedures seem to be associated to lower incidence of iatrogenic instability [26]. However, only few papers investigating the role of MISD procedures in patients with DS associated to LSS have been reported [16,32–41]. The aim of this study was to report the clinical and radiological outcomes of minimally invasive decompression (obtained by mean of a microsurgical approach) in patients with DS associated to LSS. We also performed a literature review of the pertinent papers in order to evaluate the clinical and radiological outcome, the complications and reoperation rate of MISD procedures in these patients.

2. Materials and methods

2.1. Patients

We retrospectively reviewed clinical and outcome data of 28 consecutive patients (13 M, 15 F) submitted to minimally invasive decompression for the treatment of DS associated to LSS, from July 2013 to July 2016. All patients provided written informed consent according to the research proposals approved by the local ethical committee. The mean age was 67.32 ± 13.01 years. The mean follow-up (FU) was 17.78 ± 9.50 months (range 6–39 months). All patients had no previous lumbar spine operation and complained of lumbar/legs pain and/or neurogenic claudication unresponsive to conservative (physical and medical) treatment for at least 1 year, with a magnetic resonance imaging (MRI), showing a DS associated to LSS. Patients were submitted pre-operatively and at FU to lumbar spine MRI and X-ray (anterior–posterior, lateral neutral and lateral flexion/extension projections). Patients with multilevel LSS were excluded from this study. The changes about pain were assessed using the Visual Analogue Scale (VAS) both for low back pain (LBP) and legs pain pre-operatively, one day post-operatively and at latest FU for

each patient. The Oswestry Disability Index (ODI) was used to evaluate the degree of disability of these patients pre-operatively and at latest FU for each patient. The degree of the slippage was evaluated pre-operatively and at FU as previously reported [41]. Statistical comparison of continuous variables and ordinal variables was performed by the t-Student test and by Wilcoxon signed rank test, as appropriate.

2.2. Surgical technique

Under general anesthesia and in prone position, the correct level of surgery was confirmed using intraoperative imaging. A midline skin incision was made to expose the fascia. Fascia was incised bilaterally with the supra and interspinous ligaments and the spinous processes preserved. The paraspinal muscles were stripped on both sides from the laminae and the capsules of the facet joints. Under microscopic view, a little rim of bone from the caudal aspect of the cranial lamina and the cranial aspect of the caudal lamina was removed, thereby creating a larger interlaminar space. The ligamentum flavum was removed bilaterally, and the spinal recess subsequently was opened bilaterally by undercutting minimal portions of the medial facet joints. At the end of the procedure, the dural sac and the nerve root were decompressed bilaterally.

2.3. Literature search

A PubMed search of the literature was conducted using combinations of the following terms: “spondylolisthesis” AND “unilateral approach for bilateral decompression” OR “ULBD” OR “muscle-preserving” OR “MILD” OR “interlaminar decompression”. Studies until January 2017 were revised. The majority of them were series of LSS including also patients with DS. We included in our review: only articles in English,

Table 1 – Clinical and outcome data of 28 patients submitted to minimally invasive decompression for spondylolisthesis associated to lumbar spinal stenosis, from July 2013 and July 2016.

Patients	28
Sex (M/F)	13/15
Mean age (years)	67.32 ± 13.01
Level	
L3/L4	7
L4/L5	19
L5/S1	2
Low back pain VAS	
Pre-operative	6.53 ± 2.45
Post-operative	3.85 ± 2.12
At follow-up	2.46 ± 2.18
Legs pain VAS	
Pre-operative	7.67 ± 1.41
Post-operative	4.28 ± 2.27
At follow-up	2.60 ± 2.49
Oswestry Disability Index (%)	
Pre-operative	62.39 ± 14.12
At follow-up	19.92 ± 17.38
Degree of slippage (%)	
Pre-operative	13.25 ± 4.61
At follow-up	13.68 ± 4.59
Mean follow-up (months)	17.78 ± 9.50

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