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## Original research article

# Clinical and psychological outcome after surgery for lumbar spinal stenosis: A prospective observational study with analysis of prognostic factors



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## ABSTRACT

**Background:** The identification of psychological risk factors is important for the selection of patients before spinal surgery. Moreover, the effect of surgical decompression in lumbar spinal stenosis (LSS) on psychological outcome is not previously well analyzed.

**Aim of paper:** to investigate clinical and psychological outcome after surgery for LSS and the effect of depressive symptoms and anxiety on the clinical outcome.

**Materials and methods:** A total of 25 patients with symptomatic LSS underwent decompressive surgery with or without spinal stabilization were prospectively enrolled in this observational surgery. The Symptom Checklist-90-Revised (SCL-90-R) was used to assess global psychological distress with a summary score termed Global Severity Index (GSI) and single psychological disorders including depression (DEP) and anxiety (ANX). The clinical outcome of surgery was evaluated with the Oswestry Disability Index (ODI) and visual analogue scale (VAS) pain assessment.

**Results:** Compared with baseline, there was a statistically significant improvement in VAS, ODI and GSI after surgery ( $p < 0.05$ ) in all patients. Univariate analysis revealed that patients with high GSI and anxiety and depression scores had significantly higher ODI and VAS scores in the follow-up with a bad outcome.

**Conclusions:** Surgery for spinal stenosis was effective to treat pain and disability. In this prospective study baseline global psychological distress, depression and anxiety were associated with poorer clinical outcome.

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## 1. Introduction

Lumbar spinal stenosis (LSS) is a common spinal disorder that most typically affects middle-aged and older adults. The surgical treatment is usually safe and effective when conservative therapy fails [1]. Still today factors that influence the clinical outcome are controversial [2,3]. Psychological factors are important and previous research have documented an association between depressive symptoms and poorer surgery outcome [4–5–9] while the role of anxiety and global psychological distress are still under debate [6–9]. Furthermore, many authors have documented that depressive symptoms have biological effects on wound healing and pain through neuroendocrine-immune alterations [9].

The knowledge of the patient's psychological asset before surgery would be very helpful to choose supporting therapies in preoperative and mostly in postoperative time [10–16]. This would mean to be able to prepare the patient to the best for the surgical procedure in order to achieve good results.

## 2. Aim of paper

The aim of this prospective observational study was to investigate clinical and psychological outcome after surgery for LSS and the effect of global psychological distress, depressive symptoms and anxiety on surgical outcome. Others clinical and radiological baseline factors were analyzed to assess the impact of neurological and psychological outcome.

## 3. Materials and methods

The study included 25 patients with radiologically and clinically defined LSS who underwent decompressive laminectomy with or without fixation from March 2015 to March 2016. The inclusion criteria were the presence of severe back pain, leg pain and claudication neurogenic with radiographic evidence of dural sac or nerve root compression by degenerative changes. All patients had an history of ineffective responses to conservative treatment for almost six months.

The indication for a dynamic stabilization was preoperative MRI evidence of pathological disc (Pfirrmann 2–3–4) at the same level of the planned laminectomy; on the contrary in patients with associated degenerative scoliosis (Schwab classification VB0) and or first grade spondylolisthesis the rigid fixation was preferred [10,11]. None of the patients had undergone previous spinal surgery or suffered from infections or tumours.

All patients received both an oral and a written explanation of the questionnaire and signed an informed consent form confirming their agreement to join the present study.

Patient demographics, clinical presentation, neurologic examination, indications for surgery, radiological studies and pre-operative psychological variables were prospectively collected in each case. Patient-reported outcome measures were prospectively obtained via clinical evaluation by independent investigator with a set of questionnaires in the preoperative period (7 days before surgery) and 1, 3 and 12

months after the surgery. Questionnaires included the Symptom Checklist-90-Revised (SCL-90-R), the Oswestry Disability Index (ODI) and visual analogue scale (VAS).

The Symptoms Checklist-90 Revisited (SCL-90-R) consists of a list of 90 symptoms of psychopathology and psychosomatic disorders for which the subject is asked to indicate the extent of suffering over the last seven days, attributing every symptom scored on Likert five-point scale from “not at all” (0 points) to “very much” (4 points).

The tool assesses the presence and severity of psychological distress symptoms in the last week before surgery concerning obsessive-compulsive symptoms, interpersonal sensitivity, hostility, phobic anxiety, paranoid ideation, somatization, anxiety and depression [12].

The arithmetic average of every SCL-90-R score determined the Global Severity Index (GSI) which quantifies the overall psychopathological suffering of the subject. The score of each individual symptom domain has been calculated on the answers to the questions related to the specific domain. The final score is expressed as a deviation from the median of the general population (denoted by 0) with respect to a standard deviation (+1/–1). In the present study, the SCL-90-R was used to assess the domains of depression (DEP) and anxiety (ANX).

Statistical methods included the Student *t* test or the Mann-Whitney *U* test with continuous variables, depending on the distribution. Categorical values were compared using a chi-square test. Univariate logistic regression analyses were used to investigate the predictors for the surgical outcome on 1-year follow-up.

Statistical significance was accepted at a *p* value <0.05. Statistical analyses were performed using SPSS version 11.0 for Mac.

## 4. Results

Results were obtained in 25 patients, including 14 males (56%) and 11 females (44%). The mean age at baseline was 70.4 years (range 50–84 years).

The presence of co-morbidities was calculated using Charlson Co-Morbidity Index with an average value of 4.88 [13]. The surgical strategy (decompressive laminectomy with or without rigid or flexible stabilization) was chosen line with the data of the literature [14,15]: 14 patients out of 25 were decompressed without stabilization and 11 pts have been stabilized with transpedicular screws and rods (7 with a rigid device and 4 with hybrid device). The number of levels decompressed ranged between a minimum of 1 and a maximum of 4, with an average value of 2.6 level for each patient. The number of instrumented levels ranged between a minimum of 1 and a maximum of 4, with an average value of the instrumented levels of 2.27 for patient. The average length of postoperative hospital stay was 6 days.

At baseline, the patients' mean VAS score was 7.4, mean ODI score 49% and mean GSI score 0.60.

At admission neurogenic claudication was present in 14 patients out of 25 with a limitation of walking capacity between 5 and 500 m (mean 134 m). All patients presented severe leg pain and among these 11 pts severe back pain.

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