Risk Factors for Reherniation Following Lumbar Microdiscectomy: An Institutional Retrospective Analysis

Aidan Lindgren[1], Mirbahador Athari[1], Daniel Rusu[1], Henry Avetisian[1], Jessica Porras[1], Ryan Chang[1], Joshua Davood[1], Ji Chin[1], Jeffrey C. Wang[1], Raymond J. Hah[1], Ram K. Alluri[1]

[1] Department of Orthopaedic Surgery, Keck School of Medicine of the University of Southern California, Los Angeles, California.

arlindgr@usc.edu

Disclosures: Aidan Lindgren (N), Mirbahador Athari (N), Daniel Rusu (N) , Henry Avetisian (N), Jessica Porras (N), Ryan Chang (N), Joshua Davood (N), Ji Chin, (N), Jeffrey C. Wang (Biomet, Novapproach, Seaspine, Synthes, GS Medical, DepuySynthes, Bioretec, Bone Biologics, Electrocore, PearlDiver, Surgitech, Illuminant), Raymond J. Hah (ATEC, NuVasive, Medtronic, Globus, Orthofix, SI-Bone, Cerapedics, Evolution Spine), Ram K. Alluri (Orthofix, eCential Robotics, Globus, Medtronic, HIA technologies, NeoOnc, ATEC, Max BioPharma)

INTRODUCTION: Lumbar disc herniation is a leading cause of radiculopathy, and microdiscectomy remains the most common surgical treatment. However, reherniation continues to be a clinically relevant complication, occurring in up to 20% of patients. The aim of this study was to identify clinical and MRI-based risk factors for reherniation following primary single-level microdiscectomy at a single institution.

METHODS: We conducted a retrospective cohort study of adult patients who underwent single-level microdiscectomy between 2012 and 2022 at a single academic university hospital. Patients with prior lumbar surgery, trauma, tumor, or infection were excluded. Demographic and clinical variables included age, sex, body mass index (BMI), hypertension (HTN), diabetes mellitus (DM), smoking status, and obesity. Preoperative MRI variables included sagittal disc herniation size, anterior-posterior (AP) and mediolateral (ML) disc herniation size on axial views, and the ratio of disc herniation area to canal area (Disc/Canal ROI ratio). The primary outcome was symptomatic reherniation confirmed on MRI and treated surgically. Univariate and multivariate logistic regressions were performed. This study was approved by an institutional review board (HS-23-00758).

RESULTS: A total of 491 patients were included (mean age 41 ± 13 years; 72% male). Reherniation occurred in 102 patients (20.8%). On univariate analysis, higher BMI ($p < 0.001$), smoking ($p = 0.026$), and hypertension ($p = 0.003$) were significantly associated with increased reherniation risk (Table 1). Among MRI characteristics, sagittal disc size, anterior-posterior (AP) and mediolateral (ML) herniation size, and disc height did not significantly differ between groups (all p>0.05). However, the Disc/Canal ROI ratio demonstrated a trend toward significance ($p = 0.13$). In the final multivariate logistic regression model, smoking (OR 1.85, 95% CI 1.00–3.45; $p = 0.049$) and hypertension (OR 1.94, 95% CI 1.14–3.33; $p = 0.016$) remained independent predictors of reherniation (Table 2).

DISCUSSION: While MRI-based disc measurements did not independently predict reherniation, clinical risk factors such as smoking and HTN were significant predictors. The Disc/Canal ROI ratio may warrant further investigation with larger cohorts or advanced imaging analysis techniques. The significance of male sex disappeared in multiple regression analysis, suggesting HTN and smoking status–which correlate with sex–may be responsible for the effect observed on chi-squared analysis.

SIGNIFICANCE/CLINICAL RELEVANCE: Modifiable clinical factors such as BMI, smoking and HTN are significantly associated with reherniation after microdiscectomy. Radiographic parameters alone may not be sufficient to predict recurrence, highlighting the need for a multifactorial risk stratification approach.

Variable	OR (95% CI)	p-value
BMI	1.03 (0.99–1.07)	0.097
Smoking	1.85 (1.00–3.45)	0.049 *
HTN	1.94 (1.14–3.33)	0.016 *
Male Sex	1.45 (0.90–2.32)	0.127

Characteristic	Without reherniation N = 409	Reherniation N = 80	p-value[1]
Age	41 (32, 55)	41 (33, 52)	0.7
Sex			0.029
Female	178 (44%)	24 (30%)	
Male	230 (56%)	55 (70%)	
BMI	26.6 (23.7, 30.7)	29.2 (25.8, 33.7)	<0.001
Smoking	45 (11%)	16 (20%)	0.026
Obese	111 (27%)	28 (37%)	0.10
HTN	66 (16%)	24 (30%)	0.003
DM	25 (6.1%)	7 (8.8%)	0.4

Table 1: Baseline demographic and clinical characteristics of patients with and without recurrent disc herniation following microdiscectomy.

[1]Wilcoxon rank sum test; Pearson's Chi-squared test

Characteristic	Without reherniation N = 409	Reherniation N = 80	p-value[1]

Table 2: Multivariate logistic regression identifying predictors of recurrent disc herniation following Microdiscectomy.