“Adjacent” Disc Degeneration of L3/4 after Fusion of L5/S1. A Matched-cohort Analysis

A. Tuschel¹, T. Vanicek², P. Becker², C. Eder², M. Ogon²
¹Orthopaedic Hospital Vienna Speising, Vienna, Austria, ²Orthopaedic Hospital Speising, Spine Unit, Vienna, Austria

Introduction: Symptomatic degeneration of a disc adjacent to a fusion (ASD) is one of the main issues in spinal surgery of the degenerative lumbar spine. There is controversy about influencing factors and about the question if and to which extent adjacent disc degeneration due to biomechanical reasons exists at all.

Materials and methods: The present study is a matched-cohort case-control analysis of patients with prospectively collected data. From all patients that underwent monosegmental lumbar fusion (PLIF) between 2002 and 2006, 70 patients could be matched into two groups according to demographic parameters, diagnosis and preoperative signs of degeneration: 35 patients underwent surgery at L4/5, 35 patients at L5/S1. We excluded patients who underwent surgery due to infections, tumor and trauma, as well as revision surgeries, and all patients with incomplete preoperative datasets. Preoperatively, and at last follow-up (mean follow-up: 38 months), standing x-ray films of the lumbar spine were analysed for disc degeneration of L3/4 in both groups and L4/5 in the group with PLIF L5/S1, using the grading system proposed by Wilke et al. in 2006. A multiple regression model was developed to evaluate the impact of different variables like age, length of follow up, diagnosis, preoperative disc status and the presence of an adjacent fusion. Moreover, to clarify clinical significance, SF36 and Oswestry-Disability-Index scores were collected preoperatively and at last follow-up and correlated with signs of adjacent segment degeneration.

Results: Progradent degeneration of L3/4 occurred in 48.6% after PLIF at L4/5 and in 11.4% after PLIF L5/S1. Moreover, the segment L4/5 showed signs of degeneration in 25.7% after PLIF L5/S1. There was a trend towards patients with a diagnosis of a degenerative disease (DDD and degenerative spondylolisthesis) having a higher risk for developing ASD than patients treated for lytic spondylolisthesis. No significant difference was found concerning the clinical outcome variables. Multiple regression analysis showed a statistical significant odd's ratio (OR) of 5 for the presence of an adjacent fusion to be the main risk factor for the development of ASD. Less important co-factors were age and length of follow-up.

Conclusions: This study suggests that there is appreciable data that supports the hypothesis of biomechanically induced adjacent disc degeneration in the lumbar spine. Patient's age and length of follow-up seem to be relevant co-factors.