

MRI features of degenerative spinal changes in patients with chronic back pain

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Relevance: Degenerative alterations of the spine are increasingly encountered due to population aging, sedentary lifestyles, and rising prevalence of obesity. These changes may affect intervertebral discs, vertebral endplates, facet joints, and surrounding ligamentous structures, resulting in chronic pain syndromes and neurological deficits. Conventional radiography has limited value in evaluating soft-tissue and neural structures, whereas Magnetic Resonance Imaging (MRI) provides detailed visualization of both osseous and non-osseous components of the spine. MRI has therefore become the preferred modality for detecting the full spectrum of degenerative spinal pathology and guiding therapeutic management.

Objective: to investigate the MRI manifestations of degenerative spinal diseases and determine the relationship between imaging findings and clinical symptoms in patients presenting with chronic back pain.

Materials and Methods: The study analyzed MRI examinations of 120 consecutive patients referred for persistent spinal pain lasting more than three months. The cohort included 69 females (57.5%) and 51 males (42.5%), aged between 28 and 79 years (mean age: 54.1 ± 12.3 years).

MRI studies were performed on a 1.5-T scanner using sagittal and axial T1-weighted, T2-weighted, and STIR sequences. Degenerative abnormalities were categorized into disc desiccation, annular bulging, disc extrusion, vertebral endplate degeneration, facet joint osteoarthritis, and spinal canal narrowing. Clinical severity was assessed using the Visual Analog Scale (VAS) for pain. Statistical significance was defined as $p < 0.05$.

Results: MRI demonstrated at least one degenerative abnormality in 112 patients (93.3%). Disc dehydration was the predominant finding, present in 87 patients (72.5%), followed by diffuse disc bulging in 74 patients (61.7%) and focal disc herniation in 46 patients (38.3%).

Among patients with disc herniation, posterolateral localization accounted for 67.4% of lesions, while central herniations represented 32.6%. Compression of adjacent nerve roots was observed in 29 patients (24.2%).

Facet joint degeneration was identified in 52 patients (43.3%), predominantly involving the lower lumbar segments. Endplate signal alterations consistent with degenerative marrow changes were detected in 34 patients (28.3%).

The average VAS pain score was significantly higher in patients with spinal canal stenosis compared to those without stenosis (7.2 ± 1.4 vs. 4.9 ± 1.7 ; $p < 0.001$). A positive correlation was found between the number of affected spinal levels and pain intensity ($r = 0.58$; $p < 0.001$).

Patients older than 60 years demonstrated a significantly greater frequency of multilevel degeneration than younger patients (81.8% vs. 46.3%; $p = 0.002$). Lumbar involvement constituted 64.8% of all detected degenerative lesions, making it the most commonly affected spinal region.

Conclusion: MRI provides a comprehensive evaluation of degenerative spinal disorders and reveals structural abnormalities that may not be visible on conventional imaging methods. The technique is particularly valuable for identifying neural compression, multilevel disease, and associated soft-tissue changes. The significant association between MRI findings and clinical pain severity confirms the important role of MRI in the diagnostic workup and management of patients with chronic spinal disorders.

Keywords: magnetic resonance imaging, degenerative spine disease, chronic back pain, disc degeneration, lumbar spine, spinal stenosis, facet arthropathy, MRI findings, musculoskeletal imaging.