



MORPHOLOGICAL STRUCTURE OF THE INTERVERTEBRAL DISC IN HERNIAS IN YOUNG PATIENTS

Azimov Ulugbek Mekhritdinovich

Navruzov Rustam Rashidovich

<https://orcid.org/0000-0002-8848-0795>

Bukhara State Medical Institute, Republic of Uzbekistan, Bukhara city

<https://doi.org/10.5281/zenodo.17731422>

ARTICLE INFO

Received: 24th November 2025

Accepted: 25th November 2025

Online: 26th November 2025

KEYWORDS

intervertebral disc, herniated disc, morphology, nucleus pulposus, annulus fibrosus, young age, spine, degenerative changes.

ABSTRACT

This study analyzes the morphological changes of the intervertebral disc in young patients with herniated discs. It examines the structural features of the nucleus pulposus and annulus fibrosus across different spinal regions — cervical, thoracic, and lumbar. In young individuals, the nucleus pulposus retains high elasticity and hydration, which contributes to the formation of large hernias without significant age-related degeneration. The impact of mechanical stress and trauma is highlighted, leading to annulus fibrosus tears, nucleus protrusion, and inflammatory reactions in surrounding tissues. The findings are important for understanding the pathogenesis of intervertebral hernias in young patients and for developing effective treatment strategies.

Research results

The study involved 50 young patients aged 18 to 35 years with a diagnosis of intervertebral hernia located in various parts of the spine. Morphological analysis of intervertebral discs revealed the following features:

80% of patients were diagnosed with annulus fibrosus ruptures, mainly in the lumbar spine. The most frequent localization of ruptures was in the posterolateral direction, which coincides with the clinical symptoms of nerve root compression. The pulpous nucleus in most patients retained its hydrophilic properties and high elasticity. Histological studies confirmed the absence of pronounced degenerative changes characteristic of the elderly. The nucleus consisted of cells with a preserved structure and a moderate content of proteoglycans. In the cervical intervertebral disc, smaller but frequent ruptures of the fibrous ring were observed, accompanied by bulging of the pulpous nucleus. In 30% of cases, there were signs of local inflammation of the tissues surrounding the disk. The thoracic region was the least susceptible to the development of hernias, which were detected only in 10% of cases. These hernias were of a limited nature with local annular ruptures and minimal inflammatory changes. Pronounced inflammatory processes and soft tissue edema were detected around the area of herniated protrusions, which confirms the active immune response of the body to disk damage.

In most cases, the end plates retained their anatomical integrity. However, in large hernias, their deformity and sclerosis were observed, which indicates compensatory changes and the beginning of bone remodeling processes.

Biochemical analysis showed a decrease in the concentration of glycosaminoglycans in the affected discs, which may be associated with impaired metabolism and a decrease in the ability of the nucleus to retain water.

Clinical data confirmed the association between the degree of morphological changes and the severity of neurological symptoms, such as pain, paresthesia, and decreased muscle strength.

Conclusions:

In young patients, intervertebral hernias are characterized mainly by mechanical damage to the fibrous ring while maintaining the elasticity of the pulposus nucleus. Inflammatory changes around the hernial protrusion play a significant role in the formation of symptoms. The morphological picture differs from age-related degeneration and requires a specific approach to diagnosis and treatment.

List of literature:

1. Simon, H. M. and Lee, J. S., Morphological changes in the intervertebral disc during growth: an MRI analysis in children and adolescents, *Pediatric Radiology*. - 2024. - Vol. 54, No. 2. - pp. 250-258.
2. Salvini J., Mariani F. Degenerative changes in the vertebral column: from anatomy to visualization and functional assessment // *Journal of Personalized Medicine*, 2022, vol. 12, No. 11, 1810.
3. Kovalskaya N. V., Bondarenko S. I. Morphology of intervertebral discs in degeneration: a literature review *Медицина и морфология*. - 2023. - No. 4. - pp. 65-72.
4. Fischer, J. and Pasternak, A., Embryonic development and cellular composition of the intervertebral disc: modern Concepts, *European Spine Journal*, 2015, vol. 24, no. 8, pp. 1501-1511.
5. Morphometric analysis of intervertebral discs: comparison of manual and computer methods // *Biomedical Engineering*. - 2024. - Vol. 11, No. 5. - pp. 320-328.
6. Schultz, T. J. and Karlson, K., Morphology of cervical intervertebral discs in young and elderly primates, *Spine*, 2000, vol. 25, no. 11, pp. 1301-1308.
7. Li Kh., Yang S. Morphological features of paravertebral muscles in young patients with herniated discs // *Clinical Spine Surgery*. - 2023. - Vol. 36, No. 3. - pp. 215-222.
8. Gordeev I. I., Kuzmina T. P. Modern approaches to the study of intervertebral hernias in young people // *N. N. Priorov Bulletin of Traumatology and Orthopedics*. Приорова- 2022. - No. 1. - pp. 45-50.