Disc herniation

- Clinical evaluation and finite element analysis of bone cement-augmented anterolateral screw fixation versus percutaneous bilateral pedicle screw fixation co-applied with oblique lumbar interbody fusion for single-level lumbar degenerative diseases with osteoporosis
- Combining Metabolomics and Proteomics to Reveal Key Serum Compounds Related to Canine Intervertebral Disc Herniation
- Lumbar disc herniation modelling: a review of ex-vivo mechanical models and a comparison with clinical data
- Percutaneous transforaminal endoscopic discectomy in patients with lumbar disc herniation: a meta-analysis
- Reoperation Rates After Lumbar Discectomy in Pediatric Patients
- When can lumbar fusion be considered appropriate in the treatment of recurrent lumbar disc herniation? A systematic review and meta-analysis
- Dynamic behavior of the nucleus pulposus within the intervertebral disc loading: a systematic review and meta-analysis exploring the concept of dynamic disc model
- Evidence from Mendelian randomization analysis combined with meta-analysis for the causal validation of the relationship between 35 blood and urine metabolites and lumbar disc herniation

Herniated Nucleus Pulposus (HNP) is the prolapse of the intervertebral disk through a tear in the annulus fibrosus.

The needs of common practice make necessary a diagnostic term that covers the various permutations of disc material displaced beyond the intervertebral disc space. Herniated disc, herniated nucleus pulposus, ruptured disc, prolapsed disc (used nonspecifically), protruded disc (used nonspecifically), and bulging disc (used nonspecifically) have all been used in the literature in various ways to denote imprecisely defined displacement of disc material beyond the interspace.

The absence of clear understanding of the meaning of these terms and lack of definition of limits that should be placed on an ideal general term have created a great deal of confusion in clinical practice and in attempts to make meaningful comparisons of research studies.

For the general diagnosis of displacement of disc material, the single term that is most commonly used and creates least confusion is "herniated disc." Attempts to avoid whatever confusion has been created by lack of definition of the term "herniated disc" have included the recommendation to substitute the term "disc material beyond the interspace"

Herniation is defined as a localized displacement of disc material beyond the limits of the intervertebral disc space. The disc material may be nucleus, cartilage, fragmented apophyseal bone, anular tissue, or any combination thereof

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Herniated discs may take the form of protrusion or extrusion, based on the shape of the displaced material.

By convention, a "focal herniation" involves less than 25% (90°) of the disc circumference.

By convention, a "broad-based" herniation involves between 25% and 50% (90 –180°) of the disc circumference.

Symmetrical presence (or apparent presence) of disc tissue "circumferentially" (50 –100%) beyond the edges of the ring apophyses may be described as a "bulging disc" or "bulging appearance" and is not considered a form of herniation. Furthermore, "bulging" is a descriptive term for the shape of the disc contour and not a diagnostic category

The German Hubert von Luschka (1820-1875) described for the first time a herniated disc in a pathologic specimen.

Herniation of nuclear or disc material along with inflammatory chemokines such as prostaglandin E2, interleukin-6, matrix metalloproteinase and nitric oxide has definite correlations, possibly they are over produced ¹⁾.

Classification

Description of a Disc Herniation

Morphology

Protrusion

Extrusion

Intravertebral

- Containment
- Continuity
- Relation with PLL complex
- Volume
- Composition
- Location

Disc herniations may be further specifically described as contained, if the displaced portion is covered by outer anulus, or uncontained when absent any such covering. Displaced disc tissues may also be described by location, volume, and content

Herniated discs may take the form of protrusion or extrusion, based on the shape of the displaced material

Posterior central herniations.

A, Small subligamentous herniation (or protrusion) without significant disc material migration.

B, Subligamentous herniation with downward migration of disc material under the posterior longitudinal ligament (PLL).

C, Subligamentous herniation with downward migration of disc material and sequestered fragment

Types

Hard disc herniation.

Soft disc herniation.

Traumatic disc herniation.

Acute disc herniation

Disc herniation of a relatively recent occurrence. Note: Paradiscal inflammatory reaction and relatively bright signal of the disc material on T2-weighted images suggest relative acuteness. Such changes may persist for months, however. Thus, absent clinical correlation and/or serial studies, it is not possible to date precisely by imaging when a herniation occurred. An acutely herniated disc material may have brighter signal on T2-weighted MRI sequences than the disc from which the disc material originates.

Note that a relatively acute herniation can be superimposed on a previously existing herniation. An acute disc herniation may regress spontaneously without specific treatment. See chronic disc herniation. Aging disc: Disc demonstrating any of the various effects of aging on the disc. Loss of water content from the nucleus occurs before MRI changes, followed by the progression of MRI-manifested changes consistent with the progressive loss of water content and increase in collagen and aggregating proteoglycans. See Pfirrmann classification.

Observer variability is a major hurdle to radiologists in the assessment of discs due to the lack of consensus regarding the nomenclature of disc herniation $^{2)}$

Cervical disc herniation

Thoracic disc herniation

Lumbar disc herniation.

see recurrent disc herniation

Etiology

The cause of disc herniation is not well understood yet. It is assumed that heavy lifting and extreme postures can cause small injuries starting either in the inner anulus or from the outside close to the endplate. Such injuries are accumulated over years until its structure is weakened and finally a single loading event leads to a sudden failure of the last few intact lamellae.

Recent work showed an increased risk of cervical and lumbar intervertebral disc (IVD) herniations in astronauts.

Based on literature review the most likely cause for lumbar IVD herniations was concluded to be swelling of the IVD in the unloaded condition during spaceflight. For the cervical IVDs, the knowledge base is too limited to postulate a likely mechanism or recommend approaches for prevention. Basic research on the impact of (un)loading on the cervical IVD and translational research is needed. The highest priority prevention approach for the lumbar spine was post-flight care avoiding activities involving spinal flexion, followed by passive spinal loading in spaceflight and exercises to reduce IVD hyper-hydration post-flight ³⁾.

Treatment

Therapeutic armamentarium for symptomatic intervertebral disc herniation includes conservative therapy, epidural infiltrations (interlaminar or trans-foraminal), percutaneous therapeutic techniques and surgical options. Percutaneous, therapeutic techniques are imaging-guided, minimally invasive treatments for intervertebral disc herniation which can be performed as outpatient procedures. They can be classified in 4 main categories: mechanical, thermal, chemical decompression and biomaterials implantation. Strict sterility measures are a prerequisite and should include extensive local sterility and antibiotic prophylaxis. Indications include the presence of a symptomatic, small to medium sized contained intervertebral disc herniation non-responding to a 4-6 weeks course of conservative therapy. Contraindications include sequestration, infection, segmental instability (spondylolisthesis), uncorrected coagulopathy or a patient unwilling to provide informed consent. Decompression techniques are feasible and reproducible, efficient (75-94% success rate) and safe (>0.5% mean complications rate) therapies for the treatment of symptomatic intervertebral disc herniation. Percutaneous, imaging guided, intervertebral disc therapeutic techniques can be proposed either as an initial treatment or as an attractive alternative prior to surgery for the therapy of symptomatic herniation in both cervical and lumbar spine ⁴.

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