

Contemporary Rehabilitation Strategies for Lumbar Disc Herniation: Conservative Management with Underwater Lumbar Extension Therapy in Pavel Banya Rehabilitation Resort, Bulgaria and Indications for Surgical Intervention

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ABSTRACT

Background: Lumbar disc herniation (LDH) is a leading cause of radicular pain, gait impairment, and disability. While surgical treatment is indicated in selected cases, the majority of patients benefit from conservative rehabilitation approaches.

Objective: To review contemporary evidence on conservative management of LDH with a focus on physiotherapy, rehabilitation, and underwater lumbar extension therapy as applied in spa-based medical rehabilitation (Pavel Banya, Bulgaria), and to define clinical criteria for conservative versus surgical treatment.

Methods: A narrative evidence-based review of current clinical guidelines, systematic reviews, and rehabilitation studies was performed using PubMed, Cochrane Library, and clinical consensus guidelines.

Results: Conservative treatment-including exercise therapy, manual therapy, and traction-based decompression-provides clinically significant improvement in most LDH patients without neurological emergencies. Underwater lumbar extension therapy, used in balneological rehabilitation centers such as Pavel Banya, may enhance spinal unloading through hydrostatic pressure reduction and buoyancy-assisted traction. Surgical treatment remains indicated in cases of progressive motor deficit, cauda equina syndrome, or refractory pain after adequate conservative management.

Conclusion: Conservative rehabilitation, including underwater lumbar extension therapy, is effective in most patients with LDH and radicular symptoms. Surgery is reserved for clearly defined neurological and refractory clinical conditions.

Keywords: Lumbar Disc Herniation; Radiculopathy; Underwater Traction; Physiotherapy; Rehabilitation; Pavel Banya; Spinal Decompression; Conservative Treatment; Surgery Indications

Introduction

Lumbar disc herniation (LDH) is a degenerative spinal disorder characterized by displacement of nucleus pulposus through annular fibers, often resulting in nerve root compression and radiculopathy. Clinical manifestations include low back pain, radiating leg pain, sen-

sory disturbances, motor weakness, and gait impairment. According to modern clinical guidelines, conservative treatment is the first-line approach in the absence of severe neurological deficits. Surgical intervention is reserved for cases with progressive motor weakness, cauda equina syndrome, or persistent disabling pain despite adequate rehabilitation.

Pathophysiology and Clinical Presentation

LDH develops through progressive disc degeneration involving:

- Loss of disc hydration and proteoglycans
- Annulus fibrosus fissuring
- Nucleus pulposus migration
- Local inflammatory cytokine activation
- Mechanical nerve root compression

Radicular symptoms occur due to both mechanical compression and chemical irritation of the nerve root.

Common clinical features include:

- Sciatica (dermatomal leg pain)
- Sensory deficits (paresthesia, hypoesthesia)
- Motor weakness (e.g., foot drop)
- Antalgic gait and reduced walking tolerance

Diagnostic Approach

Clinical Examination

Diagnosis is primarily clinical and includes:

- Straight leg raise (Lasègue test)
- Neurological motor and sensory testing
- Reflex assessment
- Functional gait analysis

Imaging

MRI is the gold standard for confirming disc herniation and nerve root compression.

Importantly, imaging findings must correlate with symptoms, as asymptomatic disc herniations are common.

Conservative Rehabilitation Management

Modern guidelines strongly support non-surgical management as first-line therapy in most patients.

Physiotherapy-Based Treatment

Includes:

- Core stabilization exercises
- Motor control training
- Neural mobilization techniques
- Functional gait rehabilitation
- Pain education and load management

Systematic reviews confirm clinically meaningful improvements in pain and disability.

Spinal Decompression and Traction

Traction-based therapy may:

- Reduce intradiscal pressure
- Increase intervertebral space
- Reduce nerve root compression
- Improve symptoms in selected patients

Evidence shows moderate clinical benefit, although heterogeneity remains high.

Underwater Lumbar Extension Therapy (Pavel Banya Approach)

Balneological rehabilitation, widely used in Bulgaria (including Pavel Banya spa medicine centers), incorporates underwater spinal traction and extension therapy.

Mechanisms include:

- Buoyancy-induced spinal unloading
- Hydrostatic pressure reduction on paraspinal structures
- Passive lumbar extension positioning
- Muscle relaxation through warm aquatic environment
- Improved microcirculation and pain modulation

Aquatic traction and underwater exercises are recognized as beneficial components of comprehensive rehabilitation programs for disc pathology.

Conservative Vs Surgical Treatment: Clinical Indications

Indications for Conservative Treatment

Conservative therapy is indicated in:

- Mild to moderate radicular pain
- No progressive neurological deficit
- Stable motor weakness (non-progressive)
- Absence of cauda equina syndrome
- Patient preference for non-surgical approach

Most patients improve within 6–12 weeks.

Indications for Surgical Intervention

Surgery is indicated when one or more of the following are present:

- Cauda equina syndrome (emergency)
- Progressive motor deficit (e.g., worsening foot drop)
- Severe or intractable radicular pain unresponsive to conservative treatment
- Significant functional disability after ≥ 6 –12 weeks of rehabilitation
- Correlation of imaging with clinical deterioration

Common surgical procedures include microdiscectomy and minimally invasive discectomy techniques.

Discussion

This review highlights that LDH is predominantly a self-limiting condition in most patients, with high rates of improvement under conservative care.

Spa-based rehabilitation systems such as those used in Pavel Banya may provide additional therapeutic benefits due to:

- Combined hydrotherapy and traction effects
- Reduced axial spinal loading
- Enhanced patient tolerance to movement
- Integration with kinesitherapy and manual therapy

However, current evidence on underwater lumbar extension therapy remains limited to observational and case-based studies, and further randomized controlled trials are needed [1-14].

A multimodal rehabilitation strategy remains the gold standard, combining:

- Exercise therapy
- Manual therapy
- Education
- Traction / decompression techniques
- Aquatic rehabilitation

Conclusion

Conservative rehabilitation, including physiotherapy and underwater lumbar extension therapy as applied in spa medicine environments such as Pavel Banya, represents an effective first-line treatment for lumbar disc herniation with radicular symptoms. Surgical intervention should be reserved for clearly defined neurological emergencies or failure of conservative management.

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