

CORRELATION OF KINETIC THERAPY WITH IMAGING INVESTIGATION IN THE TREATMENT OF LUMBAR DISC HERNIATION

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Abstract. According to worldwide statistics, the incidence of diagnosed lumbar disc herniation (LDH) among the population is estimated at 15%. Lifestyle changes have led to an accelerated decrease in age for the above-mentioned pathology. In the early stages, a herniated disc may be asymptomatic, which may delay the diagnosis; therefore, the real number of LDH-affected population is considered to be at least double. The complications associated with a herniated disc can have repercussions on the quality of life and can culminate with irreversible spinal cord injuries and functional impotence. Early detection of the condition can prevent the patient's functional degradation. Magnetic resonance imaging (MRI) is the main method to confirm suspected LDH, with a diagnostic accuracy of 97%. Through this research, we aim to highlight the importance of clinical imaging investigations (especially MRI), the stages of the rehabilitation programme for LDH patients and the close monitoring of their disease status. The study is conducted on a group of patients diagnosed with LDH and evaluated clinically, functionally and by imaging methods at the time of disease onset. The kinetic programme adapted for LDH recovery is addressed to both patients undergoing conservative treatment and patients undergoing surgery. Therapeutic progress is quantified through new functional clinical evaluations and imaging investigations. The dynamic monitoring of patients allows highlighting the quality/limitations of the kinetic programme. Therefore, we can conclude that imaging investigation is the starting point for establishing an accurate diagnosis and choosing the therapeutic protocol in LDH pathology.

Keywords: lumbar disc herniation, imaging investigation, kinetic therapy.

Introduction

Lumbar pain affects about half of the world's population. Globally, lumbar syndrome generates socioeconomic repercussions, sometimes leading to work incapacity for all patients with lumbar disc disease, 1% having radicular damage and 1-3% developing lumbar disc herniation (LDH). LDH is therefore a progressive phase of low back pain. Disc herniation affects 15% of a country's population. However, this is considered to be an estimate, as we only refer to diagnosed cases. The 30-45 age group is the most prone to disc herniation, with a male/female ratio of 2:1.

Herniation is located at lumbar level in 95% of cases, and of the total lumbar herniated discs, 50% occur at the L4 vertebra and 40% at the L5 vertebra. Lumbar disc herniation can be lateral (65%), medial (33%) or bilateral (2%).

Lumbar disc herniation is a spinal condition characterised by lumbar crises, sometimes along with neurological signs. In LDH, the nucleus pulposus of the intervertebral disc is herniated, which causes a compression phenomenon on the spinal cord or nerve roots. Thus, LDH is marked by a disc-root conflict and intraspinal herniation.

Clinical and evaluation aspects in lumbar disc herniation

- Etiopathogenesis and clinical issues

The factors leading to the appearance of LDH can be grouped into predisposing, favouring and determining factors. However, damage is not only neurological but also vascular, because disc herniation can cause stasis in the epidural and perimedullar veins, with an impact on the circulatory system. The mechanism of disc herniation is both extrinsic and intrinsic. If external factors (handling, intense effort or prolonged effort) can cause damage to the intervertebral disc, the inherent factors must also be mentioned. With the passage of time, the quality of the disc material decreases. Dehydration produces a cyclical phenomenon - the shocks absorbed so far by the discs will spread to the vertebral bodies and then to the entire body, which will lead to new degenerative changes.

Symptomatology - lumbar disc herniation is mainly characterised by pain that radiates into the leg, by sensations of paraesthesia, numbness, muscle weakness and rarely incontinence. According to the pathogenesis, pain can be classified as follows: harmful (superficial or deep somatic) pain, neuropathic (central nervous system, nerve, peripheral nerve) pain or psychosomatic (psychodynamic, cognitive, behavioural) pain. Another LDH indicator is the duration of pain. Depending on its intensity, pain is assessed using two scales, namely VAS (Visual Analogue Scale) and VSR (Verbal Rating Scale). In LDH, the path of pain differs according to the herniation site. When pain radiates into the front of the thigh and stops above the knee, sometimes with radiation into the groin area, an L2-L4 disc herniation is invoked. Pain radiating into the sacroiliac region, the buttock and the back of the leg is characteristic of L4-L5 levels and a reduced Achilles reflex. In L5-S1 herniation, pain is located in the back of the calf, the sole of the foot and the heel.

- Functional and clinical assessment in LDH

Static changes (frontal/sagittal deviations) can be observed in disc herniation when inspecting the spine. Painful median or lateral vertebral points can be noticed upon palpation. The range of motion of the spine is often limited; this is assessed by region-specific tests. Pain assessment scales are also used.

Specific tests in LDH diagnosis:

- the Lasègue sign - thigh flexion on the pelvis, calf extension on the painful thigh;
- the Lasègue-Frost test (straight-leg raise test) - in the supine position, the patient raises the lower limb until sciatica pain occurs; if the pain occurs at a 60-degree angle with the bed plane, the sign is positive;
- the Cram test - in the supine position, the patient raises the symptomatic lower limb with the knee bent, extends the knee and observes when pain occurs;
- the Bechterew-Fajersztajn test - lifting the affected lower limb generates pain in the collateral leg, leading to median LDH;
- the Charnley test - active leg lift with knee extension and pain occurrence at an angle lower than 30 degrees;
- the Neri test - ventral bending of the head together with passive lifting of the extended lower limb causes pain.

The imaging exam is the way of confirming the clinical examination. The paraclinical examination provides information about the straightness of the spine, changes in its shape and

structure, the size of vertebral bodies, the integrity of intervertebral discs, ligaments and nerve threads in the proximity of the analysed segment. Paraclinical investigations are involved in supporting the diagnosis of herniated disc. Diagnostic accuracy for LDH, which is based on imaging examination (RX), Computed Tomography (CT) and Magnetic Resonance Imaging (MRI), helps to adopt effective recovery techniques. MRI is the basic imaging method to confirm suspected LDH with 97% diagnostic accuracy and high reliability. The presence of T2-weighted hypersignal in the vicinity of the posterior disc bulge (10% posterior to the disc diameter) is highly suggestive for disc herniation.

Different scoring systems are used in medicine to help diagnose and measure the severity of intervertebral disc diseases and achieve a standardised classification of disc degeneration. A unanimously accepted scale is the Pfirrmann grading system. The system includes classes from 1 to 5, where grade 1 means a normal disc with homogeneous hyperintensity visible on MRI, and grade 5 means a collapsed disc space.

Therapeutic approach in lumbar disc herniation

Prophylaxis - is the first form of treatment addressed to patients with lumbar pain. Prophylactic measures are aimed at strengthening the muscle and ligament systems, increasing exercise endurance and avoiding pathogens. Working conditions are particularly important, therefore trauma, excessive exertion, lumbar strain (lifting heavy objects from the ground with knees outstretched), prolonged exposure to cold, etc., should be avoided.

Curative treatment - is composed of hygienic-dietary treatment, mental health correction and medication. Hygienic-dietary treatment consists of a protein-based diet. Hypercaloric diet (excess carbohydrates) will be avoided, as there is a risk of overweight. Medication is based on painkillers and anti-inflammatory agents.

Orthopaedic treatment - consists of resting on a hard plane (bed) for 15 to 20 days. In addition, lumbar traction and vertebral handling along with lumbar support are advised.

Surgical treatment - is not a routine treatment of disc herniation, being reserved for particular clinical forms only. Surgical intervention becomes mandatory for patients who do not respond to conservative treatment or those who suffer from cauda equina syndrome or severe neurological impairments.

Physical-kinetic recovery therapy - is recommended at all LDH stages, but individualisation is required depending on the clinical form and each patient's specificities. Preparing protocols is useful for physical-kinetic treatment. Physical therapy can include hydrotherapy, thermal therapy, electrotherapy and massage. All therapeutic forms listed above aim at reducing/combating pain, preventing complications, stabilising the spine, restoring muscle tone and balance, reducing the risk of recurrence and helping patients to resume their daily activities.

The *aim* of this research is to analyse a number of studies using conservative or combined physical therapy programmes applied in LDH, whose results are demonstrated by imaging methods such as MRI. The current review includes a sample of studies meant to express the benefits or limitations of various therapies for patients diagnosed with disc herniation.

Methodology

Search methods for the identification of studies

MEDLINE, MEDLINE In-Process, EMBASE, AMED and CINAHL have been searched since October 2020, as well as the following occupational therapy and physiotherapy databases: OTseeker, Physiotherapy Evidence Database (PEDro), Chartered Society of Physiotherapy Research Database and REHABDATA. A search strategy was developed for MEDLINE by using a combination of terms and free text.

The keywords used for the search strategy were:

1. LDH OR Lumbar disc hernia OR Low back pain OR Lumbar pain OR Lumbar disc surgery OR Herniated disc OR Degenerated lumbar disc
2. MRI OR Magnetic resonance OR Imaging methods OR Paraclinical Investigation
3. Exercise OR Exercise therapy OR Physical exercise OR Stabilising exercises OR Physical therapy OR Rehabilitation programme OR Kinetic therapy
4. 1 AND 2 AND 3

Study selection

A flowchart of the literature search is presented in Figure 1. Thus, 258 full papers were identified, 145 duplicates were removed, 67 titles were screened and 47 were excluded as not relevant. Twenty papers were eligible out of the 67, but only 10 were retained for our review, because the other 10 were not relevant for the physical therapy approach or included healthy people. The selection criteria for these studies covered issues related to LDH assessment, imaging, kinetic and physical therapy.

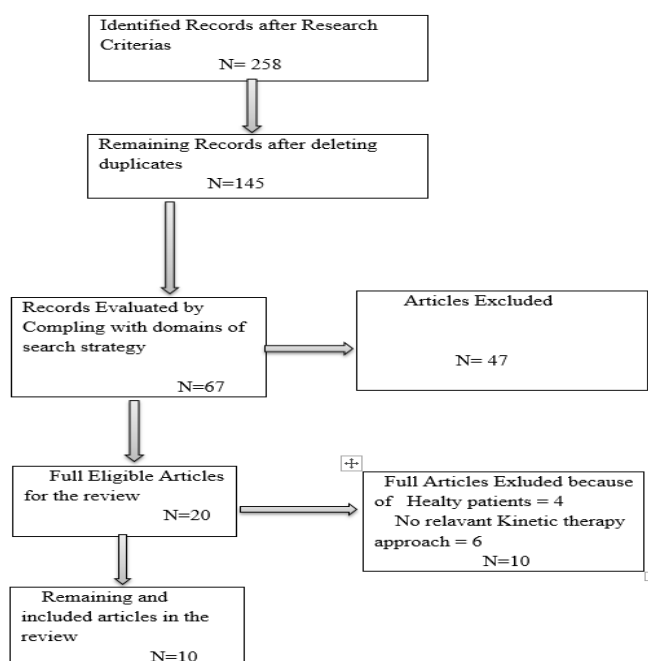


Figure 1. PRISMA diagram of the selection process

Results

Current state of the recoverable therapeutic approach to LDH and progress monitoring were based on the analysis of selected studies, including the number of participants, the therapeutic approach, the evaluation method and the results obtained (Table 1). It should be noted that all patients included in the studies were diagnosed with LDH.

Table 1. *Characteristics of selected studies*

Author and year of publication of the study	Number of patients included in each study	Study period	Study organisation	Therapeutic approach	Evaluation method	Results
Broscăţan & Dogaru, 2013	28 patients	10 days	1 Group of 20 patients	Kinetic rehabilitation + Medication	VAS Pain	75% of patients improved VAS score
			1 Group of 8 patients	Medication		25% of patients improved VAS score
Ozkara et al., 2013	30 patients	12 weeks	1 Group of 15 patients	Surgery with specific physical therapy	VAS Pain	80% of patients improved VAS score
			1 Group of 15 patients	Surgery with basic recovery programme		66% of patients improved VAS score
Henry, 2017	168 patients	5 years			VAS Pain	96% of patients improved VAS score
Gugliotta et al., 2016	370 patients	104 weeks	1 Group 297 patients	Surgery	NASS Pain Scale Quality of life - SF-36 MRI	Recurrence of disc herniation
			1 Group 73 patients	Conservative programme		
El Barzouhi et al., 2013	267 patients	1 year	1 Group 131 patients 1 Group 136 patients	Surgery Conservative programme	Disc herniation – MRI	84% favourable results
Benson et al., 2010	34 patients	7 years	1 Group 30 patients	Conservative programme	Work reintegration	90% rehabilitated
			1 Group 4 patients	Surgery		50% rehabilitated
Altun & Yüksel, 2017	23 patients	5 years		Conservative programme	Disc herniation – MRI	74% regression of herniated disc
Bakhtiary et al., 2005	60 patients	4 weeks		Conservative programme	Time to cover 10 m Time to climb stairs	39.7% improvement for 10-m distance 48.3 % improvement in climbing stairs
Chun-Pu Chu et al., 2020	1 patient	1 year		Kinetic therapy	VAS Pain	VAS score reduced from 7/10 to 3/10
Yildirim et al., 2008	31 patients	13 months		Kinetic therapy	VAS Pain	100% reduced VAS score

Note: LDH = lumbar disc herniation; VAS = Visual Analogue Scale; NASS = North American Spine Society; SF-36 = Short Form 36; MRI = Magnetic Resonance Imaging

In this scientific approach, we aim to identify the correlation between imaging aspects at different stages of LDH and its clinical and functional evolution under physical-kinetic treatment. A first phase of the research refers to the approach of this topic in the literature. Thus, we performed a review of 10 studies published in scientific journals.

The study by Broscăţan and Dogaru (2013) analysed 28 patients (17 women and 11 men) previously diagnosed with lumbar disc herniation and episodic pain. They were divided into

two groups: the first included 20 patients and the second consisted of 8 patients. The two groups followed rehabilitation programmes for 10 days. The first group underwent a kinetic rehabilitation programme and was also given medication. Conservative treatment methods involved massage, hydrokinetic therapy, electrotherapy (interference current/ultrasound/TENS) and physical exercise. Patients were regularly informed about the importance of the therapeutic programme to better understand their condition. The second group received medication consisting of painkillers and anti-inflammatory drugs. On completion of the rehabilitation programme, 75% of the first-group patients showed an improvement in the VAS score, while only 25% of the second-group patients improved their VAS scores.

The study by Ozkara et al. (2013) included 30 patients diagnosed with disc herniation, who were divided into two groups. Both groups underwent surgery. The first group started recovery immediately after the intervention. Physical therapy was used for 12 weeks. The second group of patients followed the recovery programme consisting of basic exercises. The kinetic programme mostly included exercises for regaining muscle strength and increasing endurance in order to improve spinal mobility and develop abdominal muscles. Patient assessment was based on VAS Pain and social reintegration. The results showed that 80% of patients in the first group and 66% of patients in the second group had improved their VAS scores, which highlighted the importance of applying a patient-adapted kinetic programme.

In the study carried out by Henry (2017), 168 cases diagnosed with LDH were followed up over 5 years. Patients received conservative treatment (physical therapy and spine decompression) for 8 weeks. During this time, 15 sessions of physical therapy and spine manipulation were conducted using decompression. Physical therapy exercises consisted of lower limb exercises performed in both the supine position (calf bending on the thigh, thigh bending on the pelvis, limb abduction and adduction) and the upright position (lumbar spine bending and extension, stretching exercises). Patients were advised to perform 5 repetitions per type of exercise, once a day. The results were assessed based on the pain felt by the patient. Pain was assessed at the beginning of therapy on a scale of 1 to 10. The same process was followed by the patient and at the end of therapy. In this study, 96% of patients showed an improvement in the VAS score and a reduction in paraesthesia.

Gugliotta et al. (2016) studied 370 patients who were monitored to observe in parallel the LDH development in patients undergoing surgery compared to patients following only a conservative programme. They were monitored in dynamics, with a careful study of their progress over time. Of the 370 patients, 297 underwent surgery and 73 followed treatments consisting of ergonomic instructions, active physical therapy and anti-inflammatory medication. For accurate monitoring, the NASS form was used to assess pain and the SF-36 form was used to assess quality of life. The assessments were performed after 6, 12, 52 and 104 weeks. The study failed to prove the effectiveness of surgical treatment over a long period of time. At a first assessment (after 3 weeks), patients undergoing surgery showed significantly reduced pain compared to patients following conservative therapy. However, the situation was not maintained at the assessment made 3 months later, when the difference between the two groups was no longer noticeable. In the above study, post-surgical MRI investigation describes the recurrence of a subligament herniated disc. Scars are observed in the soft perivertebral and left epidural structures (Figure 2).

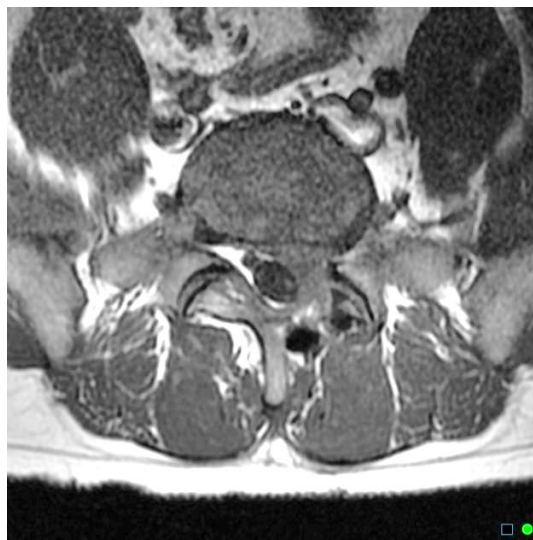


Figure 2. Axial MRI image with L5-S1 left laminectomy obtained at 4 months after the start of the recovery programme

In the study by El Barzouhi et al. (2013), 267 patients diagnosed with sciatica and LDH followed both surgical and conservative treatments - anti-inflammatory, analgesic medication and physical therapy. Of the 267 patients, 131 were assigned to undergo surgery and 136 were assigned to receive prolonged conservative treatment. Physical therapy consisted of passive and then active mobilisation of the lower limbs and torso in compliance with each patient's degree of movement tolerance. Massage was used as an additional movement technique. All patients were assessed by MRI when the condition was diagnosed and 1 year after diagnosis. The 1-year clinical evaluation showed that 84% of patients had favourable results, with less pain (by about 50%) than at the time of disease diagnosis. However, at 1-year follow-up, the MRI assessment revealed the presence of intervertebral disc herniation in 35% of patients with favourable results and 33% of patients with unfavourable results. For patients who have undergone either surgery or conservative therapy, the MRI image taken 1 year after the disease onset still shows the herniated disc. Nevertheless, a lower degree of disc prolapse can be observed on the MRI image for patients classified as clinically rehabilitated.

Benson et al. (2010) conducted a study on 34 patients monitored over 7 years and demonstrated the effectiveness of conservative treatment for LDH patients. The results obtained are supported by imaging examinations. Of the 34 patients, only 4 underwent surgery. The 30 patients involved in the conservative recovery programme benefitted from kinetic exercise and physical therapy. Only 1 patient included in the conservative programme group had frequent pain during the rehabilitation process and 2 patients had late relapse. By comparison, of the 4 patients undergoing surgery, 1 patient had frequent pain and 1 had late relapse. Along the 7 years of monitoring, both groups were evaluated every 6 months, and the results showed 90% rehabilitation among patients who had followed conservative therapy, compared to 50% rehabilitation for patients who had undergone surgery.

The study by Altun and Yüksel (2017) supports and complements the importance of conservative treatment in LDH recovery. The study was conducted from 2010 to 2015 in the Neurosurgery Department of the Kahramanmaraş Hospital on a group of 23 patients with

LDH at L3-L4, L4-L5 and L5-S1 levels. The Lasègue test and neurosensory examination showed mild neurological deficits for 16 patients. All patients underwent a conservative programme consisting of medication, kinetic exercise therapy and bed rest, without disturbing the patient's lifestyle. To have a clearer picture of physical-kinetic therapy, patients underwent MRI assessments. The correlation between the patient's clinical condition and the information provided by paraclinical investigations was thus envisaged. For this purpose, MRI images were taken when the condition was diagnosed and on completion of the rehabilitation programme. MRI images of a patient diagnosed with LDH at the level of L5/S1 are shown in Figure 3. While the first two images illustrate the moment when the condition was diagnosed, the other two show the same patient 12 months later, after completing all steps of the therapy programme. The MRI image indicates a 74% regression of the herniated disc. According to the study, the average duration of recovery in terms of symptoms, associated with a regression of the herniated disc (visible on MRI), was 13.6 ± 5.4 months.

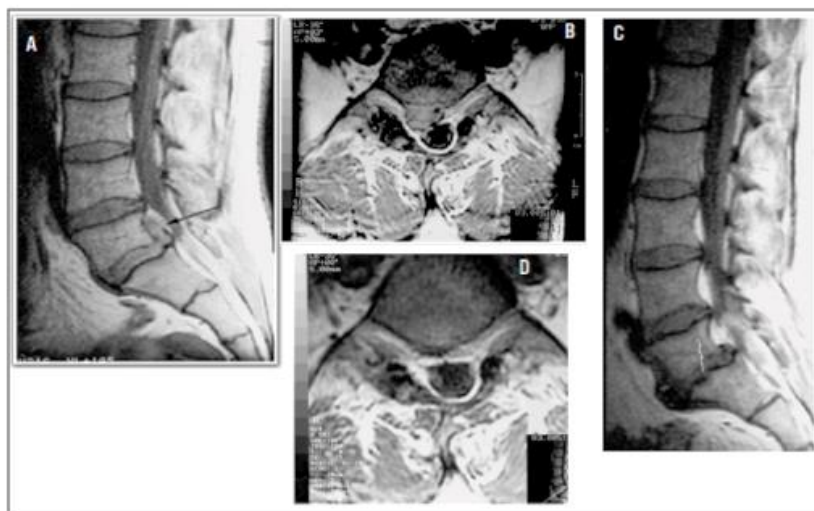


Figure 3. (A, B) Sagittal and axial MRI images showing L5/S1 subligament disc herniation before the start of the recovery programme; (C, D) Sagittal and axial MRI images taken 12 months later, after completing the recovery programme

The importance of lumbar stabilisation exercises for the recovery of patients with LDH is highlighted by Bakhtiary et al. (2005) in a study conducted on 60 patients aged 22 to 55 years, with LDH located at L4-L5 and L5-S1 levels. The lumbar stabilisation exercise programme lasted 4 weeks. The results were assessed by measuring the time needed to cover 10 meters or the time needed to climb 5 steps. At the end of the 4 weeks of therapy including lumbar stabilisation exercises, an improvement was seen in both activities. Thus, 39.7% of patients obtained improved results for the coverage of the 10-meter distance, and 48.3% of patients obtained improvements in the time needed to climb stairs.

The case study by Chun-Pu Chu et al. (2020) analysed a 67-year-old male patient complaining of high-intensity acute lumbar pain, movement difficulty (the maximum distance the patient could cover with support was 50 m), low muscle strength and decreased range of motion that was limited by pain. MRI images supported the clinical manifestation,

showing both dehydration of the intervertebral disc and herniated discs at L3/L4 and L4/L5 levels with radicular compression. The patient was advised to see a physiotherapist and follow a recovery programme involving ultrasound examination, lumbar handling and low-intensity strength exercises. Exercises were performed on a daily basis for a week. Decompression exercises were introduced after the first week. Therapy was performed twice a week for the next 3 months, and later, only once a week. The patient followed the recovery programme and was reassessed 6 days after the start of therapy, when a reduction in pain was reported - 3/10 compared to 7/10, as measured at the beginning of therapy. Six months after starting the therapy, the patient was recovered and could easily perform daily activities. One year after the disease onset, MRI images revealed significant changes. Sagittal and axial MRI images taken when the patient was diagnosed with LDH allow observing the disc herniation at L3/L4 and L4/L5 levels (Figure 4 A, B, C). In dynamics, one can see the patient's progress after 11 months. The structure of intervertebral discs with significant regression of the disc bulge after the therapeutic programme is shown in Figure 4 D, E, F.

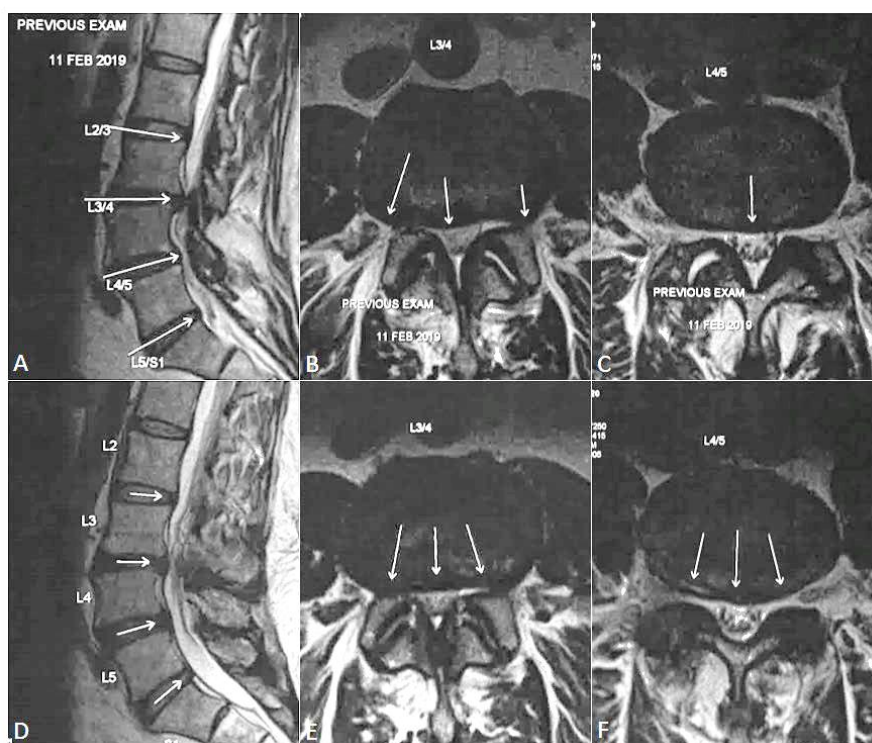


Figure 4. (A) Sagittal MRI image when the condition was diagnosed; (B, C) Axial MRI images when the condition was diagnosed; (D) Post-therapy sagittal improvement 11 months after the disease onset; (E, F) Post-therapy axial improvements 11 months after the disease onset

In certain situations, LDH treatment can only consist of surgery, in which case post-surgical kinetic intervention plays a key role in the recovery process.

These statements are supported by Yildirim et al. (2008), who conducted a study on 31 patients undertaking surgery for lumbar disc herniation. The study took place in the Neurosurgery Department of Dokuz Eylul University Hospital, Izmir, Turkey, for 13 months,

from April 2003 to May 2004. The assessments were repeated 2, 4 and 6 months after surgery. Limited activity was recommended to patients in the first 6-8 weeks post-operatively. Exercises for abdominal muscles and back extensors as well as coordination exercises were given to patients from the beginning of the recovery programme. All patients followed the same recovery programme, the difference being made by the number of repetitions of each exercise, which was adapted to the patient's medical condition. The number of repetitions for each exercise varied from 2×15 (in the second month) to 3×30 at the end of the rehabilitation period. Patients were regularly assessed from the point of view of the pain experienced at rest and throughout the activity, but also in terms of the degree of achievement of various activities. A comparison of the results obtained at 2, 4 and 6 months found major differences, with poor results 2 months after the start of therapy and significantly higher after 6 months of rehabilitation.

Discussion

In the short term, surgical and orthopaedic treatments contribute to an increase in the patient's quality of life, having a clear advantage over physical therapy. However, the effects of physical therapy extend for a long time, and their results are felt even after several years. Physical therapy involves joint mobilisation, which is guided and gradually applied in accordance with the patient's condition. Continuation of physical therapy after completing the recovery programme helps prevent potential relapse.

It is imperative for patients diagnosed with LDH to first undergo an assessment aimed at staging their condition. Depending on the results obtained and the neurological impairment, the patient is assigned to either receive conservative treatment or undergo surgery. The latter option will be chosen when conservative therapy does not produce or cannot produce results that have a positive impact on the patient's quality of life.

Both surgical and conservative treatments have long-term benefits for herniated disc symptoms. Compared to conservative treatment, surgical treatment contributes to relieve pain much faster, but 3 months post-intervention, no relevant clinical difference between the two categories of patients is noted. Surgical treatment may be more attractive to patients with severe symptoms or for whom conservative treatment does not produce the expected results.

The physical therapy programme needs to be adapted depending on the location and intensity of lumbar pain. The exercises recommended by most studies consist, in the first phase, of placements aimed at reducing the painful threshold and intervertebral decoaptation. In many cases, placement in ventral decubitus, sometimes with a cushion under the abdomen, relieves pain. Medication also plays an important role in the acute phase of the disease. Subsequent movements concern the abdominal muscles, back muscles and lower limb muscles. The programme should be designed with the objective of increasing the patient's quality of life. Since an effective physical therapy programme is completed over a relatively long period of time, the effectiveness of the chosen programme will be regularly monitored.

The MRI image shows the structure of the intervertebral disc, the disc protrusion or extrusion and root compression. However, the same image can be seen in both patients identified as recovered and unrecovered. Pain is felt differently by each patient. The subjective factor thus plays a decisive role. Therefore, we can say that, in certain situations,

MRI images do not overlap with the clinical examination. This is due to the relativity of pain, its perception by each individual.

MRI images usually converge with the patient's symptoms. In a large number of cases in which patients did not initially feel pain but MRI images described a herniated disc, the clinical course was detrimental to the patient, tending towards specific LDH symptoms.

Conservative treatment of disc herniation is recommended prior to surgical treatment; while the effects of conservative therapy are less visible in the short run, long-term surgical treatment is more often associated with relapse and the onset of compensating disabilities.

Conclusion

The literature review highlights the following aspects:

1. Physical therapy reduces pain and significantly contributes to improving the lives of patients diagnosed with LDH.

2. Well-structured exercise treatment is recommended for patients with lumbar disc herniation before undergoing surgery.

3. Non-surgical lumbar decompression treatment in addition to physical therapy will reduce symptoms in patients with LDH.

4. Physical exercise that begins immediately after LDH surgery is much more effective than home exercise, which is proved by improved results on VAS Pain.

5. Through regular exercise, low positions significantly improve movement, posture and reduce lumbar pain. The patient's functional abilities to perform daily activities are improved.

6. MRI assessment allows diagnosing the lumbar spine condition and the stage of intervertebral disc condition, confirming the diagnosis of lumbar disc herniation.

7. Early and correct diagnosis of lumbar disc herniation (also using imaging techniques) and regular exercise increase the chances of recovery.

Physical therapy helps improve the quality of life of patients with lumbar disc herniation in terms of their physical activity, as well as their mental and emotional states.

The literature review has proven the importance of physical therapy both alone and in conjunction with other forms of treatment, resulting in reduced disability and symptoms associated with this pathology. Imaging is a way to enforce a therapeutic protocol for the most accurate choice of the kinetic programme.

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