



A brief overview

Modern Approaches to Conservative Treatment of Lumbar Intervertebral Disc Herniation: From Resorption Mechanisms to Clinical Practice

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Abstract

Lumbar disc herniation is a leading cause of low back pain and temporary disability. Although spontaneous resorption occurs in 60–90% of cases, surgical activity remains high, including in Kazakhstan. The aim of this review is to summarize international evidence on lumbar disc herniation resorption and evaluate the potential of conservative and regenerative treatments in the context of Kazakhstan. A literature search and analysis was conducted in PubMed, Scopus, Web of Science, and Google Scholar (2010–2024) using the terms lumbar disc herniation, conservative treatment, spontaneous resorption, physiotherapy, platelet-rich plasma therapy. . Included were systematic reviews, meta-analyses, randomized controlled trials, prospective studies, and national data (Astana, Almaty). Spontaneous resorption is most frequent in sequestrations (87.7%) and extrusions (66.9%). International guidelines prioritize conservative management, including physiotherapy and platelet-rich plasma therapy. In Kazakhstan, surgical volumes remain high, but increasing adoption of non-invasive modalities indicates a gradual shift toward multidisciplinary, evidence-based care. Conservative management should be considered the first-line therapy for lumbar disc herniation, while surgical intervention retains a key role in the presence of absolute indications.

Keywords: lumbar disc herniation, resorption, conservative treatment, physiotherapy, platelet-rich plasma therapy, Kazakhstan.

1. Introduction

Lumbar disc herniation (LDH) remains one of the leading causes of low back pain and temporary disability, representing a major category of degenerative spinal diseases. According to the Spine Committee of the World Federation of Neurosurgical Societies (WFNS), the lifetime risk of developing symptomatic LDH is estimated at 1–3%, while spontaneous resorption occurs in 60–90% of cases [1-5].

Although LDH is common, contemporary studies indicate that the majority of cases demonstrate a favorable prognosis, attributable to intrinsic regenerative mechanisms and the natural ability of herniated fragments to regress. This raises questions regarding the persistently high rate of surgical interventions and emphasizes the necessity of broader application of conservative treatment strategies.

Risk factors for LDH include genetic predisposition, occupational exposures such as repetitive lifting, prolonged static postures, smoking, and obesity [6-10]. The condition most often affects men between 30 and 50 years of age, a socioeconomically significant group representing the core of the working population. Socioeconomic studies have demonstrated that expenditures on the

management of low back pain constitute one of the largest healthcare costs in developed countries [11,12].

Pathophysiologically, LDH results from annular rupture, allowing nucleus pulposus fragments to migrate into the epidural space. Herniations most commonly occur in the posterolateral direction, given the relative weakness of the posterior longitudinal ligament. Compression of neural structures induces inflammatory reactions and edema, leading to pain and neurological deficits [13-20].

Diagnosis relies on clinical examination (straight leg raise, contralateral tension test, sensory and motor assessment), with magnetic resonance imaging (MRI) serving as the gold standard for visual confirmation [20-25]. Emerging techniques, such as diffusion tensor imaging, provide additional opportunities to assess nerve root pathology and predict outcomes [26,27].

Thus, the study of LDH remains relevant not only because of its prevalence but also due to the need to optimize treatment paradigms. For Kazakhstan, where surgical activity remains disproportionately high, integrating conservative approaches is of particular importance.

2. Methodology

A literature search and analysis was performed in PubMed, Scopus, Web of Science, and Google Scholar covering the years 2010–2024. The following keywords were applied: lumbar disc herniation, conservative treatment, spontaneous resorption, physiotherapy, PRP therapy.

Inclusion criteria: systematic reviews, meta-analyses, randomized controlled trials (RCTs), prospective and cohort studies providing data on conservative management and spontaneous

resorption. Exclusion criteria: case reports without follow-up imaging, studies involving combined spinal pathologies, and papers lacking clinical outcomes.

National data from the National Center of Neurosurgery (Astana) and City Clinical Hospital No. 7 (Almaty) were also analyzed to highlight domestic experience [28-31].

3. Results

Mechanisms of Spontaneous Resorption

Spontaneous regression of LDH is explained by several mechanisms:

1. Dehydration of the nucleus pulposus, reducing the size of the fragment.
2. Phagocytosis of herniated tissue by activated macrophages.
3. Neoangiogenesis, enabling inflammatory cells to infiltrate the herniated fragment and accelerate resorption [32].

International Data

- United Kingdom: A systematic review demonstrated that sequestrations and extrusions have the highest probability of resorption. Younger age, larger fragment size, and shorter symptom duration were associated with improved outcomes.

- In the meta-analysis conducted by Zou et al., the overall resorption rate was 70.39% [21]. Stratified by type: sequestration 87.77%, extrusion 66.91%, protrusion 37.53%, bulging 13.33%.

Resorption typically occurred within the first six months.

Regional variation was observed: Korea (83.5%), Turkey (83.7%), UK (78.3%), USA (61.7%), Italy (56.7%) [33].

- China: Conservative management is prioritized, encompassing pharmacotherapy, physiotherapy, acupuncture, and traditional medicine. Surgery is indicated only for severe neurological deficits or lack of response after 6–8 weeks [33].

- Russia: Predictive models have been developed. Multilevel herniations are associated with higher BMI, endplate defects, and lower likelihood of resorption [35].

- USA and Europe: Adopt a delayed-surgery paradigm, recommending 6–8 weeks of conservative management before considering surgical intervention [36].

In Kazakhstan, up to 2,000 surgeries for LDH are performed annually, with more than 1,000 procedures recorded in a single neurosurgical center [37]. The most commonly affected segments are L5–S1 (48%) and L4–L5 (46%) [38].

Despite the introduction of minimally invasive methods (laser nucleotomy, endoscopic discectomy), many patients seek medical care at advanced stages, limiting conservative options. Furthermore, a large proportion rely solely on symptomatic treatment (analgesics, manual therapy) without structured rehabilitation [39].

In recent years, innovative non-surgical modalities have gained popularity, including shockwave therapy, high-intensity laser therapy, intratissue electrostimulation, and platelet-rich plasma (PRP) therapy. Preliminary results suggest significant improvements in pain reduction, herniation size, and functional recovery [40].

4. Discussion

Comparative analysis shows that lumbar disc herniation is a condition with a high likelihood of spontaneous resorption, particularly in sequestrations and extrusions. In many Western countries, conservative therapy is regarded as the standard first-line approach, whereas surgical intervention is primarily reserved for patients with severe neurological deficits [41,42].

In Kazakhstan, patient choices regarding treatment are strongly shaped by social factors. Social media platforms play a significant role in disseminating unverified advice and promoting the services of unlicensed practitioners. Many patients, relying on such sources, turn to these practices before seeking certified medical care. This often results in delayed diagnosis, complications, and symptom exacerbation. In such cases, apparent “improvement” may be due either to spontaneous regression or temporary pain reduction, thereby creating a misleading impression of recovery [43,44].

For these reasons, conservative treatment should be delivered exclusively by licensed and certified specialists. This approach ensures patient safety and aligns with the principles of evidence-based medicine. The absence of proper regulation and the use of unqualified services partly explain why surgical

activity in Kazakhstan remains disproportionately high. Additional contributing factors include late presentation, limited public awareness of conservative options, and restricted access to modern physiotherapeutic modalities [45,46].

Nevertheless, recent years have shown a positive trend: PRP therapy and high-intensity physiotherapeutic technologies are being increasingly adopted, marking a gradual shift toward multidisciplinary, evidence-based care. The combination of PRP injections with physiotherapeutic modalities demonstrates a clear synergistic effect by enhancing resorption of herniated material, reducing inflammation, and accelerating recovery.

Beyond clinical outcomes, the socioeconomic dimension is equally important. Chronic low back pain remains one of the leading causes of temporary and permanent disability worldwide. Reducing unnecessary surgical interventions has the potential not only to alleviate the burden on healthcare systems but also to improve patient quality of life and preserve professional productivity.

5. Conclusions

Spontaneous resorption of LDH is a well-documented phenomenon, particularly in sequestrations and extrusions. Conservative management (pharmacotherapy, physiotherapy, PRP therapy) should be regarded as the first-line strategy in most cases, consistent with international recommendations. Kazakhstan continues to demonstrate a high surgical burden, largely due to delayed diagnosis and insufficient availability of conservative programs. The adoption of innovative, non-invasive modalities and the development of national clinical protocols may reduce surgical volumes and improve patient outcomes.

Future research should focus on combined approaches (PRP + physiotherapy) and predictive models of resorption to guide individualized treatment.

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Белдің омыртқааралық диск жарығын консервативті емдеудің заманауи тәсілдері: Резорбция механизмдерінен клиникалық тәжірибеге дейін

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Түйіндеме

Бел омыртқааралық диск жарығы – бел ауруының және уақытша еңбекке жарамсыздықтың негізгі себептерінің бірі. Жарық фрагменттердің 60–90% жағдайда өздігінен резорбциялануына қарамастан, хирургиялық белсеңділік жоғары деңгейде қалып отыр, соның ішінде Қазақстанда да. Бел омыртқааралық диск жарығы резорбциясы феномені бойынша халықаралық деректерді жинақтау және Қазақстан жағдайында консервативті және регенеративті емдеу әдістерін қолдану перспективасын бағалау. 2010–2024 жылдар аралығындағы PubMed, Scopus, Web of Science және Google Scholar дерекқорларында «lumbar disc herniation», «conservative treatment», «spontaneous resorption», «physiotherapy», «PRP therapy» түйін сөздері бойынша жүйелі іздеу жүргізілді. Іріктеуге жүйелі шолулар, мета-талдаулар, рандомизацияланған бақылаулы зерттеулер, проспективті жұмыстар және ұлттық (Астана, Алматы) деректер енгізілді. Ең жоғары резорбция ықтималдығы секвестрациялар кезінде (87,7%) және экструзияларда (66,9%) байқалады. Халықаралық ұсынымдар физиотерапия мен PRP-терапияны қамтитын консервативті емдеуге басымдық береді. Қазақстанда хирургиялық белсеңділік жоғары болғанымен, инвазивті емес заманауи әдістерге қызығушылықтың артуы байқалуда, бұл дәлелді медициналық тәжірибеге біртіндеп көшу үрдісін көрсетеді. Бел омыртқааралық диск жарығы кезінде консервативті емдеу алғашқы қатардағы емдеу ретінде қарастырылуы тиіс, ал хирургиялық араласу абсолюттік көрсеткіштер болған жағдайда өзектілігін сақтайды.

Түйін сөздер: бел омыртқааралық диск жарығы, резорбция, консервативті емдеу, физиотерапия, плазмолифтинг, Қазақстан.

Современные подходы к консервативному лечению поясничных грыж межпозвоночных дисков: От механизмов резорбции до клинической практики

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Резюме

Поясничная грыжа межпозвоночного диска является одной из наиболее распространенных причин боли в пояснице и временной утраты трудоспособности. Несмотря на то что в 60–90% случаев отмечается спонтанная резорбция грыжевых фрагментов, хирургическая активность остается высокой, в том числе в Казахстане. Цель обзора – обобщить международные данные о спонтанной резорбции поясничной грыжи межпозвоночного диска и оценить перспективы внедрения консервативных и регенеративных методов лечения в условиях Казахстана.

Проведен поиск и отбор литературы в базах данных PubMed, Scopus, Web of Science и Google Scholar за период 2010–2024 гг. с использованием следующих ключевых слов: «lumbar disc herniation», «conservative treatment», «spontaneous resorption», «physiotherapy», «platelet-rich plasma therapy». В обзор включены систематические обзоры, мета-анализы, рандомизированные контролируемые исследования, проспективные работы, а также национальные данные (Астана, Алматы). Наиболее высокая вероятность резорбции наблюдается при секвестрациях (87,7%) и экструзиях (66,9%). Международные рекомендации отдают приоритет консервативной терапии, включая физиотерапию и плазмолифтинг. В Казахстане, несмотря на высокую хирургическую активность, отмечается рост интереса к современным неинвазивным методикам, что свидетельствует о постепенном переходе к доказательной медицинской практике. Консервативное лечение должно рассматриваться как терапия первой линии при поясничная грыжа межпозвонкового диска, тогда как хирургическое вмешательство сохраняет ключевое значение при наличии абсолютных показаний.

Ключевые слова: поясничная грыжа межпозвонкового диска, резорбция, консервативное лечение, физиотерапия, плазмолифтинг, Казахстан.