ISAR Journal of Medical and Pharmaceutical Sciences
Vol-2, Iss-3 (Mar- 2024)
Abbriviate Tittle- ISAR J Med Pharm Sci
ISSN *(Online)*- 2584-0150
https://isarpublisher.com/journal/isarjmps

OPEN ACCESS

Approaches to Delivery in Pregnant Women with Lumbar Disc Herniation: An In-Depth Review of Management Strategies and a Case Report

Svetoslav K. Todorov[1,3], Zlatko Kirovakov[2,4*]

[1]Department of Neurosurgery, University Multi – Profile Hospital for Active Treatment – Burgas, Bulgaria;

[2]Deparment of Obstetrics and Gynaecology, University Multi – Profile Hospital for Active Treatment – Burgas, Bulgaria;

[3]Prof. Asen Zlatarov University, Faculty of Medicine, Burgas, Bulgaria;

[4]Prof. Asen Zlatarov Univeristy, Faculty of Public Health and Health Care, Burgas, Bulgaria.

***Corresponding Author**
Zlatko Kirovakov

Department of Neurosurgery, University Multi – Profile Hospital for Active Treatment – Burgas, Bulgaria.

Article History
Received: 06.02.2024
Accepted: 21.02.2024
Published: 06.03.2024

Abstract: Low back pain is a prevalent symptom experienced by a significant proportion of pregnant women, impacting over 50% of this population. Nevertheless, severe disc herniation is exceedingly uncommon and most patients experience recovery without the need for surgical intervention. The objective of this study is, to present a comprehensive analysis of conservative treatment approaches and delivery methods for pregnant individuals experiencing Lumbar Disc Herniation (LDH), excluding those with significant neurological impairments necessitating immediate surgical intervention. We conducted a study of the existing research using the PubMed database. This case report details the clinical progress of a pregnant woman who developed a lumbar hernia (L4-L5) at 34 weeks of gestation and exhibited symptoms of excruciating pain in the right lumbar region and lower limb. Until 36 weeks of pregnancy, the patient had conservative treatment with intravenous corticosteroids and non-steroidal anti-inflammatory drugs (NSAIDs). At that point, the patient spontaneously gave birth to a healthy baby who weighed 3.75 kilograms and measured 53 cm. The patient had a successful discectomy treatment to treat the herniated disc three months after giving birth, which resulted in a full recovery. The necessity of multidisciplinary care for pregnant women with lumbar hernias is highlighted in this example and conservative therapy followed by prompt surgical surgery might provide positive results.

Keywords: *Pregnant Women, Low Back Pain, Lumbar Disc Herniation, Non-Steroidal Anti-Inflammatory Drugs (NSAIDs), Postpartum, Discectomy Procedure*.

1. Introduction

Low back pain (LBP) is a persistent pregnancy discomfort that affects around half of all pregnant women. Some researchers hypothesize that the hormonal mechanisms influencing alterations in the pelvic joints may also impact the Inter Vertebral Discs (IVDs) and posterior longitudinal ligaments, encouraging lumbar disk protrusion and causing LBP. It has been calculated that 1 in 10,000 people with LBP will have real disc herniation that will damage the fetus. According to available data, Cauda Equina Syndrome (CES) is the primary factor for patients needing immediate surgical surgery for LDH, whereas only 15% of patients have significant neurologic impairments [1]. Additionally, most individuals with LDH-related radiculopathy recover without surgery, either on their own or medical care. When treating a pregnant patient, it's essential to consider both the mother's and the unborn child'sare well-being. A multidisciplinary team comprising experts in obstetrics, maternal-fetal medicine, neurology, and anesthesia is required for parturient patients [2]. The lumbar spine has a lordotic curve due to five vertebrae and IVDs. Associated with the pedicles, laminae, and articular edges of the adjacent vertebrae, the IVDs form the aperture through the spinal nerves escape the spine. The IVDs are secured to the vertebrae by an exterior annulus fibrosus (AF), cartilaginous endplates, and an inner nucleus pulposus (NP) [3]. The nucleus pulposus is an arrangement that resembles a gel and itis mostly composed of type 2 collagen and proteoglycans, with water accounting around 80% of its overall weight. The nucleus pulposus's larger aggrecan, one of the proteoglycans, stores hydration. Versican, a substance that binds to hyaluronic acid which is provided. This hydrophilic material keeps The IVD's height constant [4]. For a very long time, people have considered pregnancy to a risk factor for LDH. Due to loosened ligaments and increased lumbar spine stress during pregnancy, preexisting disc herniation or bulging may worsen. Most symptomatic pregnant women with LDH respond well to conservative therapies such as bed rest, physiotherapy, and medication. Surgery is recommended for patients with intractable pain unresponsive to non-surgical therapy or worsening neurological impairments [5]. Traditional surgical methods, such as open discectomy and micro discectomy are carried out while the patient is prone and sedated. Chemonucleolysis therapy, percutaneous endoscopic discectomy and percutaneous laser disc decompression are all parts of the standard treatment plan. However, all of these treatments have built-in potential for patient

***Corresponding Author: Zlatko Kirovakov**

damage. As a result, there is an unmet currently pressing need for an LDH therapy that is efficient and secure but doesn't need intrusive procedures [6].

Pregnant women with LDH are advised to have conservative treatment until nonsurgical care has failed or there are warning signs. Over 85% of LDH-positive pregnant women report symptom relief after six weeks of conventional medicine. The benefits and drawbacks of therapy for the mother and fetus must be considered while planning pregnancy-related LDH therapies. Therefore, clinical choices must be made by a multidisciplinary squad (MDS) composed of obstetricians, neonatologists, surgeons, and anesthesia specialists. [7].If surgery is required for treatment, the effects of patient positioning, anesthesia, fetal heart rate surveillance, rapid delivery arrangements, aspiration prophylaxis and tocolysis to prevent preterm labor must be considered. There is insufficient information on the best LDH care strategies during pregnancy [8]. No randomized controlled data is available and most of the published research is made up of case reports. Despite several narrative evaluations being available, a systematic examination whichcannot be used as a resource. This study's objective was to comprehensively examine the literature and conduct a critical analysis evaluate the effectiveness of various therapeutic techniques for pregnant women with LDH [9].The number of LDH patients has dramatically grown due to changes in employment and lifestyle habitsas well as they are younger individuals. LDH is one of the major illnesses that pose a danger to human health since it harms patients' physical and emotional well-being. Therefore, getting a precise diagnosis of the illness is crucial to receiving a customized course of therapy. Radiographic assessment, myelography, Magnetic Resonance Imaging (MRI), and Computed Tomography (CT) are frequently used to diagnose IDH [10]. There are two main LDH therapy options: surgical surgery and conservative treatment. For the majority of individuals with a newly diagnosed LDH conventional therapy is the initial option. Significant therapeutic approaches usually lasting at least six weeks, include traditional Chinese medicine, bed rest, pharmaceutical therapy, exercise therapy, and lumbar compression. The majority of LDH symptoms may be treated conservatively. In other patients, the herniated section of the IVD shrank or even disappeared after imaging procedures like MRI and CT. The clinical name for the phenomenon of a herniated lumbar IVD spontaneously contracting or disappearing without surgical treatment is "reabsorption" [11]. A well-known clinical finding is the spontaneous reabsorbing of LDH. Clarifying the clinical characteristics and molecular processes of the reabsorbing of herniated IVD is critically needed by studies to make better decisions on the conservative therapy of LDH.The study focused on the genetic process of IVD re-absorption, which offers animportant foundation for medicalforecastwithidentification of IVD absorption and enables healthcare providers to create management programs based on common clinical indicators [12].This paper aims to describe a non-invasive technique for LDH reabsorption. Clinical signs of the patient include pain and neurological impairment.

2. LDH that is prone to reabsorption: clinical and imaging aspects

In LDH patients IVD reabsorption occurs often. There are two main approaches are treating LDH: conservative therapy and surgical treatment. The herniated IVD's imaging characteristics and other clinical variables determined the chosen course of therapy. When formulating a clinical LDH treatment strategywhich isthe kind of LDH, the extent of the protrusion the characteristics of the herniated IVD and the increase of the MRI signal surrounding the tumor must be considered[13].

2.1 Various types of LDH

The morphology of LDH was classified by MRI imaging as bulging, protrusion, extrusion, and sequestration. These four types of LDH has occasionally absorbed in some people. Extrusion and sequestration are two types of LDH that are acknowledged to be more prone to recurring than others. In 2014, the potential for the recovery of various types of LDH which has studiedcarefully. After conservative therapy, the majority of LDH may be naturally absorbed [14] because both IVDs has a propensity to pierce the posterior longitudinal ligament and the annulus fibrosus when exposed to the epidural space's circulatory system, extrusion, and sequestration LDH showed faster rates of reversal than bulging and protrusion LDH. LDH that extrudes and sequesters material is the most harmful. The extrusion and sequestration waspresented with theclassic radicular symptoms and even spinal cord compression due to the intense mechanical compression and inflammatory activation of the dural sac and nerve root. Given these risk factors and concerns for LDH discharge and confinement security, we suggested careful treatment as a first resort [15].

2.2 The dimension of LDH

During the medical diagnostic, the physician wouldddetermine the patient's number of herniated discs and not a surgical operation was necessary. Generally speaking, a more giant herniated disc increased the likelihood of surgery. Howeverthefollowing six weeks of conservative treatment, the degree of IVD displacement cannot be utilized to determine if surgery was required, according to a recent study. Similarly, incidents of reabsorbing huge herniated discs has been widely documented [16]. Therefore, in addition to patients with motor neurological deficiencies and the CES condition who need emergency surgery, clinicians should consideredtheconservative therapy when making medical choices since these situations may substantially avoid surgery's cost burden and negative effects.

3. Treatment and Management

Most LDH symptoms are transient and resolve in six to eight weeks, they are treated conservatively at first until there are warning signals of urgent diseases like CES or deteriorating neurologic function. It was shown that the medium and long-term results of surgical and conservative therapy were equal. Other research has shown that surgical treatment has a better prognosis since it may lead to quicker symptom alleviation and better quality of life [17]. There are relative reasons for surgical treatment in individuals with warning signs, even though no study exists on absolute non-operative vs. operational criteria. Considering the examination that the severity of the symptoms and the patient's preferences, a doctor and patient dialogue will ultimately choose the kind of therapy for non-emergent LDH.

3.1 Conventional Medical/Interventional Treatment

This method is preferred forfirst therapy when a patient exhibits acute LDH symptoms. Primary care doctors may initiate the treatment, if required with a brief time of rest, suitable patient education, and suggestions for exercise, a dose of painkillers and biological treatment. Physical treatment was not advised until three

weeks have passed since the beginning of symptoms since, in most instances, the symptoms will recover within few weeks. Opioid analgesics are the next line of defense in the fight against pain if moderate nonsteroidal anti-inflammatory medications fail [18]. Opioids should be provided for the shortest amount of time feasible, considering the dangers and adverse effects that should be considered and addressed with the patient. Transforaminal or interlaminar injections of epidural steroids may be recommended in some persons with LDH with radiculopathy if symptoms last longer than six weeks. To provide more precise epidural steroid injection administration, contrast-enhanced fluoroscopy was advised. In most cases of LDH, medical and interventional therapy improved the functional results and surgical intervention was unnecessary because of radiculopathy [19].

3.2 Surgical treatment

Even though surgical intervention was usually a last choice, discectomy and laminotomy procedures are performed in 180,000 to 200,000 cases in the US each year to address radiculopathy caused by LDH. Surgical surgery has recommended for individuals with chronic, incapacitating symptoms that do not improve with medication and conservative therapy [20]. "Surgery performed within six months to a year after a patient's symptoms requiring surgical attention has associated with speedier recovery and better long-term results. The surgical operation can be performed in various ways, including an open approach and a less-invasive method." The open microsurgical discectomy was accomplished in this way. In the last two decades, the minimally invasive technique for spine surgery has become more popular. Small incisions and tube access are also possible [21]. Endoscopic and microsurgical techniques are the two primary subsets. The surgical team selects a technique from a range of options depend on the structure and place of the LDH. Comparing minimally invasive procedures to open discectomy, the former has associated with shorter recovery times, less blood loss, no variations in issues, reconstructive surgery rates, or wound infections. Nevertheless, there has no distinction between open and minimally invasive procedures regarding long-term patient-centered outcomes [22].

3.3 Currently available LDH Treatment

Although ruptured LDH reabsorption occurs naturally, treatments may help speed reabsorption process. Multiple research investigations has demonstrated that selecting an efficient non-surgical therapy for LDH patients might assist them in lessening their clinical signs and accelerating extensions' reabsorption. One of the key LDH therapy strategies was reducing inflammation to control pain. However, anti-inflammatory drugs could make it harder for LDH to be absorbed [23]. However, in certain case studies, it has been demonstrated that oral NSAIDs or spinal steroids cause' protrusion reabsorption, this may be related to decline in local inflammatory edema. Shortly following the period of LDH absorption that was aggressive, the early inflammatory response worked to mobilize macrophages and produce substances that aid in absorption. NSAIDs and intraspinal steroids are increasingly often utilized to relieve pain by lowering local inflammation. However, the use of these medications may prevent reabsorption [24]. Anti-inflammatory medications decrease the absorption of LDH, according to the group's retrospective investigation.Dehydrating substances may also be utilized to treat the edema the localized inflammatory reaction at the site of the disc herniation. Dehydrating substances may work in one of two ways. The first has to reduce the edema in the nerve root to change the compressive relationship between it and the herniated IVD. The second possibility was a dehydrating substance might act on a herniated nucleus pulposus tissue with high water content, leading the area to atrophy and dry. The process mentioned above a theory without reliable experimental support [25].

4. Materials and methods

The authors used the phrases pregnant or pregnancy, lumbar disc hernia or lumbar disc herniation or lumbar herniated disc, childbirth or delivery, together with the terms ANDandOR, to perform a literature search utilizing the PubMed database. Additionally, a complete hand search was done. Humans, English-speaking adults, full-text and abstract availability and academic publications were utilized as filters. **Inclusion criteria** were English language papers, research on pregnant adults, case reports, reviews, abstracts, and full-text availability. **Exclusion criteria**: articles published in a language other than English, instances that necessitated surgery, or stories about postpartum surgeries. The duplicates were examined. When 40 articles were found first, 30 were irrelevant to this subject or written in a foreign language. 5publications were left after all selection criteria were applied and these were used in the current research.

5. Results

Only 5 of the 30 publications that the first search matched the inclusion requirements and 25 instances were extracted. Due to the papers' status as case reports or briefcase series, we could not conduct a quantitative systematic examination.The women's average gestational age and age upon diagnosis were 33 and 33 weeks respectively. Out of the 5 cases that were reported, 2 patients had LDH in the first trimester and 3 in the third. Table 1 includes information on gestational age, signs and symptoms upon diagnosis, radiographic findings, therapeutic approach, and delivery technique.

No parturient patient in the five cases under consideration had CES, undergone an immediate postpartum L5/S1 laminectomy, or experienced a postoperative neurological impairment [27]. At 30 weeks gestation, one woman had labor induction; she went to have a vaginal delivery; the installation failed, and she delivered via cesarean section. During labor induction, this patient developed CES and had a microdiscectomy after giving birth. She experienced instant relief from the radicular limb discomfort following surgery and over the next 12 days, her bladder control steadily improved [29]. A cesarean section, which was used in 3 out of 5 instances was the preferred delivery procedure.

Table 1: Management strategy, Delivery method, and Radiographic findings

Ref. No	Author	Year	Maternal age and Age of pregnancy at delivery	Symptoms	Management strategy	Delivery method	Radiographic findings
[26]	Butenschoen V.M	2021	33Y / 33W	Back pain	CTG/ultrasound device monitoring	Cesarean delivery	pregnancy with a paresis of left foot extension and L4-L5
[27]	Babici D	2021	32Y/ 4 W	Throbbing, hurting, and stabbing back pain	Conservativetreatment, including physical therapy	Cesarean delivery	L4-5 disc herniation
[28]	Heydari Z	2022	Under 40Y/ 20W	back pain and pelvic pain	Modified lumbar pelvic belt	-	-
[29]	Kim J	2021	32Y/ 30W	lower back pain and right leg pain	Physical therapy, medication, interventional treatment	Spontaneous vaginal delivery.	Catheter insertion at L5/S1
[30]	Ghaffari-Rafi A	2022	28Y/ 25W	lower back pain	Conservative	Cesarean delivery	L4-5 dural protrusion

5.1 Case report

One month after giving birth, a 30-year-old multiparous lady with a 4-month history of LBP radiating to the right lower limb was sent to our department. The patient experienced a straightforward vaginal birth and later she reported a month-long worsening of her symptoms that began the day, after giving birth. A significant right L4-L5 disc herniation was detected using MRI. Figure 1 depicts the development of a lumbar hernia (L4-L5) in a pregnant lady who had symptoms of unbearable pain in her right lumbar region and lower limb at 34 weeks of gestation. The patient had conservative care with intravenous corticosteroids and NSAIDs up until 36 weeks of pregnancy. At that time, the woman gave birth to 3.75-kilogram, healthy 53-cm baby. After the L4-L5 microdiscectomy, the patient's symptoms immediately improved and there were no lasting neurological effects.

Figure 1: MRI lumbal hernia L4-L5

5.2 Discussion

Twenty-one individuals had operations while pregnant. Thirty-three years was the median mother age, while 13 full weeks was the median gestational age. There were several warning signs including lumbar disk prolapse, unstable spine injuries, a Schwann cell nerve root tumor that causes high-grade paresis of an infection and an intramedullary tumor that causes paraparesis. One patient had vaginal bleeding without any other fetal concerns, two patients had transitory gestational diabetes and one patient had the condition. No significant obstetric problems, stillbirths or miscarriages happened before delivery. After surgery, all patients saw neurological improvement [26]. The patient was brought into the surgical room after receiving fully informed permission. The anesthesia team administered a 150 mg bupivacaine epidural regional block at L3–L4 using a Whitacre 3.5 cm needle under ultrasound supervision. The patient was not under any sedation or sleep. A single intraoperative fluoroscopic picture verified and confirmed the surgical location when the patient was placed on the Wilson frame in the prone position. A midline incision and subperiosteal dissection revealed the right L4 lamina. A second and final fluoroscopic picture was taken after the MLD retractor was positioned in the L4-5 disc region to validate the level of interest[27].Both the regular belt and the personalized lumbar pelvic belt for treating low back and pelvic pain in pregnant women were tested in this study. All the individuals in the research had pelvic and lower back discomfort as early as the 20th week of gestation. After 3-week monitoring period, the pain intensity reduced in the two belt-using groups. Similar research found that wearing pelvic belts helped to lessen the discomfort. However, the modified belt group experienced less pain than the existing belt group. A redesigned belt that surrounds the lumbar area and PG as a single structure improves force transmission and relieves spin strain reducing back and pelvic discomfort [28].

The safest approach for diagnosing disc herniation and lower back discomfort during pregnancy, according to a comprehensive evaluation is MRI. Although CT shouldn't be used as the primary diagnostic tool because of the significant radiation dose, it can be utilized after 25 weeks of gestation, CT at doses under 100 mGy has no teratogenic consequences. A lumbar or thoracic spine CT scan typically has an effective radiation dosage range of less than 10 mSv. It was calculated that this patient's total radiation exposure throughout the ER appointment was less than 20 mSv, and the practical exposure of the lumbar spine series with an angled view was 1.91 mSv [29]. After three years, the patient had transient leg weakness and acute searing dysesthesias in both L4-5 dermatomes. After the lumbar MRI indicated substantial L4-5 spinal stenosis, the patient had a second MIS treatment; this time she experienced sufficient symptom relief. But 20 days after her surgery, she had bilateral limb and foot weakness, CES and anal dysfunction. We found a tight L4-5 dural protrusion during open surgical investigation. A significant IDH with a ventral dural rupture was discovered during a dorsal durotomy. The ventral rip was fixed after debulking the IDH and an expansile duraplasty was done. Overall, the patient's discomfort, hypoesthesia, motor ability, bowel and bladder function all improved [30].

6. Conclusion

There is no consensus on the ideal delivery technique for expectant LDH patients. The explanation is a lack of cases and insufficient experience. The collaboration between obstetricians and neurosurgeons are the MRI data appear to be connected to the best decisions and outcomes. First-line treatment options should include analgesics, reduced activity, physical therapyandavoiding potentially dangerous medicines during pregnancy. The study underlines that surgical treatments like microdiscectomy or percutaneous procedures may be considered when conservative approaches prove ineffective, but after theconsultation with a multidisciplinary team of healthcare professionals. Critical factors include the timing of the operation, ideally in the second trimester and the adoption of methods that reduce the fetus' exposure to radiation. The importance of diligent monitoring and follow-up during pregnancy, and the postpartum period is also emphasized in this review, to ensure that any newly discovered neurological abnormalities or issues are treated right away.

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