



# A Rare Case of L5 -S1 far Lateral Disc Herniation with Severe Radicular Symptoms: Case Report

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## Abstract

We describe a 60-year-old woman, a professionally active physician, who had recurrent, severe radicular pain in the lower left limb. This pain was due to a Far Lateral Disc Herniation (FLDH) at the L5-S1 level. The patient took medications, underwent rehabilitation, and had per radicular block, but these treatments did not improve her pain. Conservative treatment was given for 6 months. In the differential diagnosis, we included diseases of the sacroiliac joint and the iliolumbar ligament. When the patient developed neurological symptoms that indicated damage of the L5 nerve root, we repeated magnetic resonance imaging of the lumbar spine, which confirmed the L5-S1 herniation. Because the patient worsened clinically, we decided to operate. We performed microsurgery; we did a paramedian incision, separated the multifidus muscles, and used a paramedian extraforaminal approach. We compare this approach to other surgical approaches used to treat patients with lateral herniations. FLDHs account for about 7% of disc herniations. FLDHs usually occur at the L4-L5 level, but are very rare at the L5-S1 level. Because L5-S1 FLDHs are rare, surgeons have little experience in diagnosing and operating patients with this condition. We think that our description of the operating technique that we used to treat our patient with FLDH might help other surgeons to treat their patients.

## OPEN ACCESS

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**Keywords:** Far Lateral Disc Herniation; Paramedian access; Minimally invasive; L5-S1 level; Anatomical limitations

## Introduction

Over 90% of herniations of the nucleus pulposus occur inside the vertebral canal. Disc herniations are classified according to their location to help with both diagnostic imaging and planning of surgery [1]. Magnetic Resonance Imaging (MRI) and Computed Tomography (CT) are used to diagnose patients with disc herniations. In contrast to MRI, CT provides information on spinal bone architecture, which helps assess the degree of stenosis, osteophytes, pedicle breadth, and shape of articular processes that form the rim of the intervertebral foramen. This information on spinal bone architecture is important when one wants to use the extraforaminal access. Extraforaminal disc herniations are rare, and they are referred to as Far Lateral Disc Herniations (FLDHs). In published work, FLDHs account for about 7% of all disc herniations, and they usually occur at the L4-L5 level. Very rarely, FLDHs occur at the L5 -S1 level. In my experience, FLDHs have been most common at the L3-L4 level; usually, they cause an L3 monoradiculopathy and weakness of the quadriceps femoris muscle. In patients with FLDHs, symptoms and signs are caused by compression of a single nerve root (monoradiculopathy), and they include radicular pain, motor weakness, and sensory loss. The extraforaminal access for the treatment of patients with FLDHs cannot be used in those who have symptomatic vertebral canal stenosis or foraminal stenosis due to spondylolisthesis; other surgical techniques are better for these patients. Improper assessment of vertebral lesions might cause problems postoperatively. Here, we describe a patient with FLDH, and we discuss different surgical techniques that can be used to treat patients with FLDHs at the L5-S1 level. We hope that our report will help other surgeons to treat their patients.

## Case Presentation

A 60-year-old woman, a physician, developed pain that radiated to the left buttock; on the Visual Analogue Scale (VAS), the pain severity was 5 points. Initially, the pain lasted for two weeks, and the patient had no neurological symptoms. The pain appeared after the patient had worked



Figure 1: Disc herniation L5S1 lateral view.

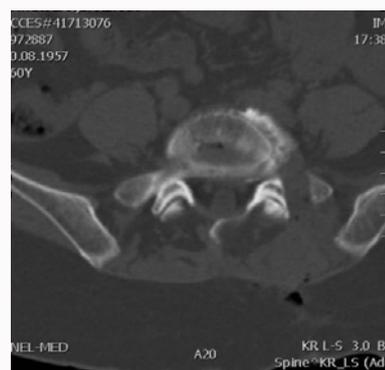


Figure 3: Resection of lateral part intravertebral joints.



Figure 2: Far lateral disc herniation L5-S1.



Figure 4: The air near intravertebral foramen.

in a forced position for several weeks in a workplace that was not ergonomic. Initial treatment with non-steroidal inflammatory drugs and analgesics improved the pain. Because, after two weeks, the pain returned in the buttock and in the projection area of left sacroiliac joint, we obtained a radiograph of the joint. However, the radiograph was normal. Magnetic Resonance Imaging (MRI) of the lumbosacral spinal canal showed compression of the left L5 nerve root. Because of a low quality of the images, however, the diagnosis of FLDH was missed, and the patient was not qualified for surgery (ex post, I was able to see FLDH on that scan). An intense physical therapy did not improve the patient's condition, and the patient received medications to reduce the pain (VAS, 5-8). Because of the symptoms around the sacroiliac joint, we included sacroiliitis and iliolumbar ligament syndrome (iliolumbar syndrome or iliac crest pain syndrome) in the differential diagnosis [2-10]. During two weeks before a neurosurgical consultation, the pain increased considerably (VAS, 9), and it did not improve after treatment with analgesics. After about 2 months of conservative treatment, the patient developed side effects of non-steroidal anti-inflammatory drugs. Because of the severe pain, the patient was no longer independent in activities of daily living, and she needed assistance with walking; moreover, she walk in a forced position. The patient was consulted by a neurosurgeon, who did not work in our center. The neurosurgeon evaluated the MRI scan that had been previously done, and he performed a paravertebral block. However, this treatment was ineffective. During the last consultation before surgery, I noticed a forced body position, right-sided compensatory scoliosis, radicular pain (VAS, 9-10), a positive straight leg raise (60 degrees), and weakness of dorsiflexion in the left foot (Lovette, 3). Moreover, the patient had sensory loss in the lower leg and dorsum of the foot; the ankle reflex and the plantar reflex were

absent. Because I suspected an L5-S1 FLDH, I explained to the patient that further workup is necessary. The patient underwent another MRI in a high field strength scanner (3T); the previous study was done in a 0.3T scanner. The 3T-MRI showed an FLDH that compressed the L5 nerve root (Figure 1 and 2), and we decided to operate. Under general anesthesia, the patient was placed on the abdomen. First, we identified the L5-S1 vertebral level with lateral radiography. Next, after preparing the operating filed, we did a paramedian incision on the left, 55 mm from the midline. The incision was 50 mm in length. We dissected the subcutaneous tissue and cut the fascia (60 mm incision). During cutting of the fascia, we noticed the posterior margin of the iliac crest, which limited access to the paravertebral space. We bluntly dissected multifidus muscles and reached the articular processes of the L5-S1 vertebrae. A natural access to the L5 transverse process and to the intervertebral foramen was not feasible with direct visualization and blunt dissection because of calcifications. During dissection, we found that the iliolumbar ligament was hypertrophied. Only after removing both a medial fragment of the posterior part of the iliac crest and a fragment of the lower margin of the iliolumbar ligament, were we able to insert a tissue retractor. When inserting a spatula spreader to get access to the level of the transverse process, we found anatomical limitations: the posterior iliac crest degenerated articular processes, calcifications, ligament hypertrophy, and osteophytosis. Thus, the anatomical space that allows access to the external part of the intervertebral foramen was limited. We had to remove the calcified iliolumbar ligaments and a fragment of the medial part of the iliac crest to change the inclination angle of the retractor; this allowed us to access the external part of the intervertebral foramen. because of the anatomical limitations, to widen the access to the foramen and then to remove the FLDH, we additionally removed the lower margin

of the L5 transverse process and lateral parts of the hypertrophied L5 and S1 articular processes (we preserved the articular surfaces). Because the foramen was tight, we did lateral-access for aminotomy to remove a hypertrophied ligamentum flavum and osteophytes. The FLDH elevated the nerve sheath from underneath, and it immobilized the nerve root. After slightly moving down the root, we removed the FLDH and controlled the intervertebral space. With minimal dissection techniques, we were able to fully decompress the nerve root. After achieving hemostasis, we closed the muscles and skin. The postoperative course was uneventful. The neurological symptoms resolved. The patient became fully independent. Two months after the surgery, the radicular pain and motor deficit subsided. However, there was some sensory loss in the big toe and intermittent paresthesias in the big toe and the dorsum of foot.

## Discussion

FLDHs account for about 1 in 12 cases of vertebral disc herniation. Among my patients operated on for FLDHs (several dozen patients), the L3-L4 hernias were most common. In published work, L4-L5 FLDHs are most common, and L5-S1 FLDHs are rare [1,11-13]. Because FLDHs cause monoradiculopathy, herniations at different levels (L3-L4, L4-L5, L5-S1) cause different symptoms. Patients with FLDHs should undergo surgery when symptoms do not improve with conservative treatment. Patients with worsening of neurological symptoms and pain need prompt surgery. Long-term use of non-steroidal anti-inflammatory drugs can cause side effects and multi-organ toxicity; thus, it should not be recommended. If non-steroidal anti-inflammatory drugs are toxic in the first month of treatment, prompt surgery should be considered, but the decision to operate should always be based on the patient's clinical state. In patients with disc herniations, all neurological signs are important for both differential diagnosis and qualification for surgery, because we treat all symptoms of disc herniations. Microdiscectomy is safe and should be considered in patients with disc herniations when long-term conservative treatment is ineffective. Microsurgery, when done by an experienced surgeon, poses only a low risk for the patient. Toxicity of non-steroidal inflammatory drugs can be serious, and it affects the gastrointestinal tract, hematopoietic system, and cardiovascular system [14-18]. Patients with diseases of the intervertebral disc should undergo detailed MRI assessment. Poor image quality and inappropriate MRI techniques may lead to inadequate decisions and delayed treatment. In my opinion, thin-slice imaging, which allows visualization of the intervertebral foramina and paravertebral space, should be used in patients with suspected FLDHs in addition to a detailed clinical examination [19 -22]. Because removal of FLDHs requires a different access than the removal of disc herniations inside the vertebral canal, operations in patients with FLDHs might be challenging. In our opinion, precise minimally invasive surgery requires experience, good knowledge of anatomy, and intraoperative radiography. Different surgical techniques have been used to treat patients with FLDH, including laminectomy, hemi-laminectomy, total or partial facetectomy, and inter-articular access. Also, surgeons have used an inter-transverse access with resection of ligaments and intertransversarii muscles. Regarding spinal kinetics, resection of anatomical structures to gain surgical access usually leads to segmental vertebral instability. Thus, we tried to obtain a minimally invasive access in our patient. We used a microscope and an endoscope to get an anatomical, endoscopic trans-foraminal access [23-26]. In our opinion, anatomical elements that determine the range of vertebral segmental movements and vertebral stability must be saved. In

all patients operated on for FLDHs, we accessed the intervertebral foramen via the paramedian approach, in which we made a paramedian incision, dissection of multifidus muscles, partial medial resection of inter-transverse elements, and resection of articular processes with preservation of joint surfaces (in some cases). It seems that the paramedian access allows a very good visualization, which is essential to effective surgery. Resection of lateral parts of the articular processes is not necessary in all patients, and it depends mainly of the degree of hypertrophic degeneration. Resection of articular processes improves the visibility of the intervertebral foramen. However, it is important to preserve as much joint surface as possible in the adjoining articular processes to ensure a normal range of motion in the vertebral segment operated. Similarly, resection of the medial part of the upper margin of the transverse process can help visualize the entry to the intervertebral foramen and thus helps identify the course of nerve roots. Importantly, an adequate retractor and a microscope are necessary to perform minimally invasive surgery in patients with FLDHs. Getting access to the L5-S1 intervertebral disc in patients with FLDHs is difficult due to many anatomical obstacles and degeneration of some the dissected structures, which depends of the age of patients. The extraforaminal access to the L5-S1 intervertebral space is narrow, because the posterior margin of the iliac crest may makes it difficult to use spatula retractors. Spatula retractors are usually used to gain extraforaminal access to intervertebral foramina at higher spine levels. In my opinion, it is very important to ensure proper visualization of the operating field to prevent potential complications such as root damage, dura damage, recurrent herniation, leakage of cerebrospinal fluid, and neuropathic pain secondary to nerve damage in nerve roots or dorsal root ganglia, which may be caused by improper technique [1]. However, chronic neuropathic pain is not always due to nerve damage caused by surgical dissection; in some patients, it is due to ineffective conservative therapy. When giving conservative treatment, doctors should always remember about the mechanisms of chronic pain and pathological central and peripheral sensitization [27-31], which may cause treatment failure postoperatively. Accurate diagnosis and visualization of the operating field (microscope) reduce the risk for patients who undergo operations due to FLDHs, and they are important during dissection of nerve roots and the region of dorsal root ganglia. When planning surgery and gaining surgical access in patients with L5-S1 FLDHs, surgeons should remember that partial resection of the iliac crest, iliolumbar ligament, and partial lateral resection of hypertrophied articular process might be necessary. The surgical access in the patient reported herein is presented on computed tomography images acquired postoperatively (Figure 3 and 4). In our patient, the described surgical access did not limit the range of movements in the operated vertebral segment, and vertebral stability was preserved.

## Conclusion

1. L5-S1 FLDHs are rare. Surgeons should take into account anatomical limitations when planning surgery in patients with FLDHs.
2. A minimally invasive access to remove FLDHs and visualization of the operating field are ensured by partial resection of the iliac crest, iliolumbar ligament, and articular processes with preservation of articular surfaces to maintain joint function.
3. Multi-organ toxicity of chronic pharmacological treatment and persistent pain may lead to sensitization; thus, these factors must be taken into account when qualifying patients with FLDHs for

surgery.

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