Case Report

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Far Lateral Disc Herniation Evaluated by Coronal Magnetic Resonance Imaging: Case Series

Uzak Lateral Disk Hernilerinin Koronal Manyetik Rezonans Görüntüleme ile Değerlendirilmesi: Olgu Serisi

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ABSTRACT

The extent of the slice thickness in spinal axial and sagittal magnetic resonance imaging (MRI) is limited. We therefore, propose the idea of using coronal MRI to better delineate lumbar far lateral disc herniations. Six patients with coronal MR images who underwent surgery are presented in this study. Simple 2D vertebral column X-ray and MRI scans were used to diagnose the far lateral herniated disc. Intraoperative findings confirmed our preoperative MRI diagnosis in all patients. Recovery was excellent in all patients. In conclusion, coronal lumbar MRI, a simple and useful technique to reveal the nerve roots in foraminal and/or far lateral (extraforaminal) areas, is a must for accurate diagnosis of foraminal and/or far lateral lumbar disc herniations.

KEYWORDS: Coronal MRI, Disc herniation, Far lateral, Foraminal

ÖZ

Spinal aksiyel ve sagittal manyetik rezonans (MR) görüntüleri uzak lateral yerleşimli lomber disk hernilerini değerlendirmede çoğu zaman yetersiz kalabilmektedir. Bu nedenle çalışmada bu tip disk hernilerini değerlendirmeye yönelik koronal kesitli MR görüntülerinin daha objektif ve etkili olabileceği düşülmüş ve ameliyat edilmiş altı hastalık bir seri ile bu düşünce desteklenmeye çalışılmıştır. Tüm hastaların intraoperatif bulguları ameliyat öncesi koronal MR görüntüleri ile konan klinik tanıyı olumlu yönde desteklemiştir. Tüm hastalarda tam iyileşme kaydedilmiş ve hepsi sorunsuz bir şekilde taburcu edilmiştir. Sonuç olarak koronal kesitli lomber MR spinal kanalı, nöral foramenleri ve foramen dışı anatomik oluşumları değerlendirmede oldukça yeterli ve etkili bir yöntem olup foraminal ve/ veya uzak lateral lomber disk hernilerinin değerlendirilmesinde ve tanısının konulmasında kolaylıkla kullanılabilir.

ANAHTAR SÖZCÜKLER: Koronal MRG, Disk hernisi, Uzak lateral, Foraminal

INTRODUCTION

Foraminal and extraforaminal (far lateral) lumbar disc herniations are uncommon compared to intraspinal disc herniations. These rare herniations most often compress the exiting dorsal root ganglion (DRG) rather than the descending nerve root. The exact extension of the far lateral disc herniation is important for the planning of the surgical approach but an accurate diagnosis is often difficult with routine spinal magnetic resonance (MR) scans that often consist of axial and sagittal T1- and T2-weighted images (1). The extent of the slice thickness in the axial and sagittal plane imaging is limited and coexisting intraspinal abnormalities such as spinal canal stenosis and the bony structures (sacral ala and iliac bone) can obscure far lateral entrapment of the lumbar spinal nerve (2).

We hereby present the use of coronal MR imaging to diagnose and treat lumbar far lateral disc herniation.

CASE REPORTS

Case 1

A 45-year-old-woman presented with intense right leg pain that had progressed for a month prior to admission. Her neurological exam revealed weakness of right knee extension without muscle atrophy, absent right patellar reflex, and hyperesthesia over the right L4 nerve dermatome (Table I). Both T1-weighted axial MR and T2-weighted sagittal MR images were suggestive of right L4-5 far lateral disc herniation but coronal T2-weighted MR images better demonstrated the right L4-5 far lateral disc herniation together with L4 nerve dorsal root ganglion compression (Figure 1). She underwent both intraspinal and extraspinal exploration of the L4 nerve and L4-5 microdiscectomy. Dura of the L4 dorsal root ganglion had to be opened for the relaxation of the ganglion itself. The intense pain went away immediately postoperatively but it took three months for the knee function to return to normal.

Table I: Patient Data

	Age (year)	Sex	Symptom	Neurological examination finding	Disc level	Side	Disc location	Ganglion compression	Outcome
Patient #1	45	F	- Intense right leg pain	- Weakness of right knee extension - Absent right patellar reflex - Hyperesthesia over right L4 dermatome	L4-5	Right	- Far lateral	L4 DRG	Excellent
Patient #2	51	M	- Intense right hip pain - Intense right leg pain	- Absent right patellar reflex	L4-5	Right	- Far lateral	L4 DRG	Excellent
Patient #3	57	M	- Left leg pain	- Weakness of left ankle dorsal flexion	L5-S1	Left	- Far lateral	L5 DRG	Excellent
Patient #4	73	F	- Left leg pain	- Weakness of left knee extension - Absent left patellar reflex - Absent left Achilles reflex	L4-5	Left	- Foraminal - Far lateral	L4 DRG	Excellent
Patient #5	50	M	- Left leg pain	- Weakness of left ankle dorsal flexion	L5-S1	Left	- Foraminal - Far lateral	L5 DRG	Excellent
Patient #6	60	F	- Low back pain - Left leg pain	- Weakness of left ankle dorsal flexion	L5-S1	Left	- Foraminal - Far lateral	L5 DRG S1 DRG	Excellent

***M:** male; **F:** female; **DRG:** dorsal root ganglion.*

Case 2

A 51 year-old-man presented with 15-day history of intense right hip and right leg pain. His neurological exam disclosed absent right patellar reflex without muscle weakness (Table I). The axial and sagittal T1 WI and coronal T2 WI MR scan showed a right L4-5 far lateral disc herniation (Figure 2). He underwent both intraspinal and extraspinal exploration of L4 nerve root and its DRG and L4-5 microdiscectomy. The pain disappeared immediately.

Case 3

A 57-year-old-man presented with intense left leg pain. His neurological exam disclosed significant (60-70%) weakness of the left ankle dorsal flexion, and marked left leg pain with the straight leg raising test (Table I). Axial MR images were suggestive of L5-S1 far lateral herniation but coronal T2 WI MR scan better delineated left L5 nerve root compression (Figure 3). The patient underwent surgery consisting of intraspinal and extraspinal exploration and decompression of the L5 nerve root by removal of fragmented extruded discs plus standard L5-S1 discectomy. The recovery of the motor deficit was complete in 3 months.

Case 4

A 73-year-old-woman who had undergone surgery for L4-5 disc herniation elsewhere only 3 months ago continued to suffer from left leg pain. Her neurological exam disclosed significant weakness of left knee extension with absent left patellar and Achilles reflexes (Table I). Both axial T1 WI and coronal T2 WI MR images demonstrated left L4-5 foraminal and far lateral disc herniation. Coronal images better delineated the compression of the L4 nerve root and its DRG (Figure 4). Both intraspinal and extraspinal parts of the left L4 nerve root were explored and decompressed by relevant discectomy. Recovery was complete without residual weakness or pain.

Case 5

A 50-year-old man presented with left leg pain. Neurological exam showed significant weakness of left foot dorsal flexion (Table I). Both axial T1 WI and sagittal T2-weighted MR images were suggestive of left L5-S1 foraminal and far lateral disc herniation but coronal T2 WI MR scan clearly demonstrated the extruded fragments compressing the far lateral portion of the left L5 nerve root (Figure 5). Both intraspinal and extraspinal parts of the left L5 nerve root were explored and decompressed by removal of the extruded fragments as well as standard L5-S1 microdiscectomy. Recovery was complete without any residual weakness or pain.

Case 6

A 60-year old woman presented with low back and left leg pain. Her neurological exam revealed significant left ankle dorsal flexion weakness and marked left leg pain on the Lasegue maneuver (Table I). The axial, sagittal and coronal T2 WI MR scan disclosed a left L5-S1 foraminal and far lateral disc herniation (Figure 6). She underwent both intraspinal

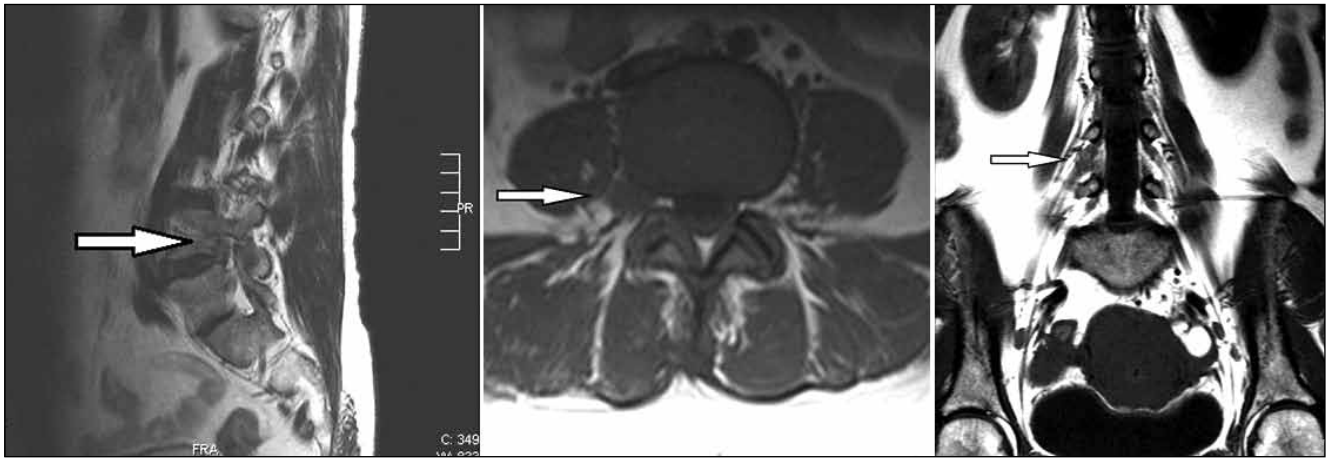

Figure 1: Sagittal T2 WI MR, axial and coronal T1 WI MR scans reveal a right L4-5 far lateral disc herniation which caused L4 nerve compression.

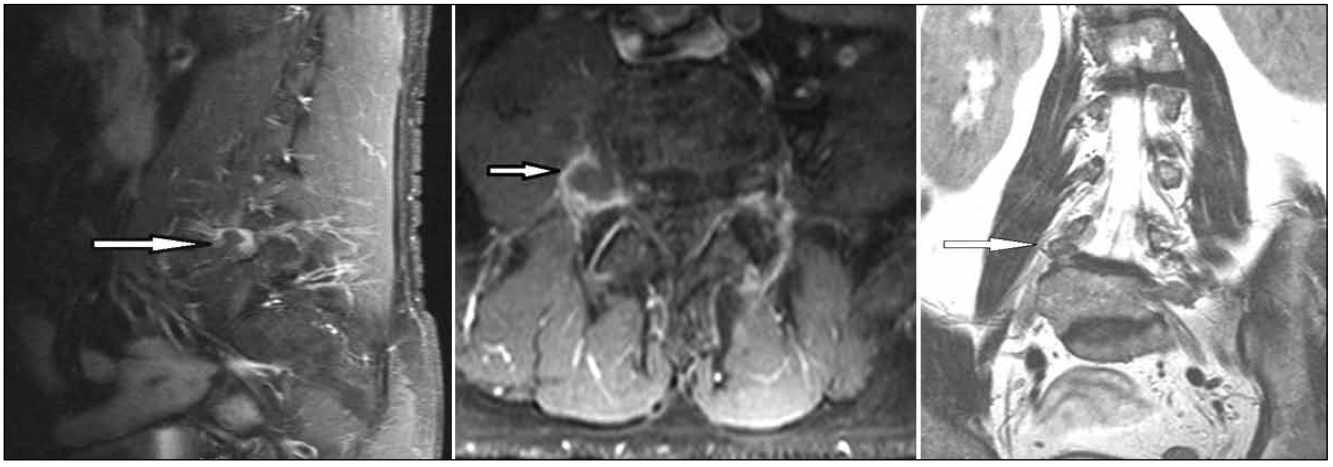

Figure 2: Sagittal and axial T1 WI and coronal T2 WI MR scans show a right L4-5 far lateral disc herniation.

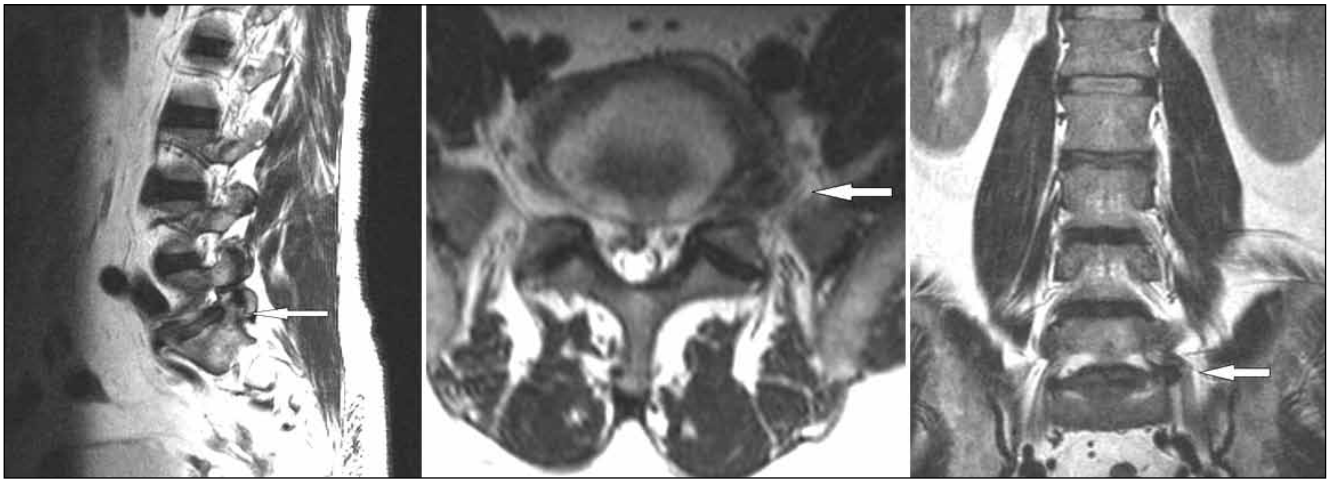

Figure 3: Sagittal, axial and coronal T2 WI MR scans reveal a left L5-S1foraminal and far lateral disc herniation.

and extraspinal exploration of L5 nerve root and S1 nerve root ganglion and L5-S1 microdiscectomy. She recovered well without weakness and leg pain.

DISCUSSION

Foraminal and/or far lateral herniated discs compress the exiting nerve root rather than the descending nerve root (e.g. far lateral herniated disc between L3-4 compresses the L3 nerve root exiting the extraforaminal space). Today, in radiology routine, lumbar MR scans are usually performed in T1- and T2-weighted only sagittal and axial plans. Although a conventional lumbar axial and sagittal MR scan can detect and reveal centrally (intraspinal) herniated lumbar discs with maximum accuracy, the diagnosis of pathologic extraforaminal lesions is not as straightforward (2). Far lateral soft disc herniation appears as a isointense or hypointense

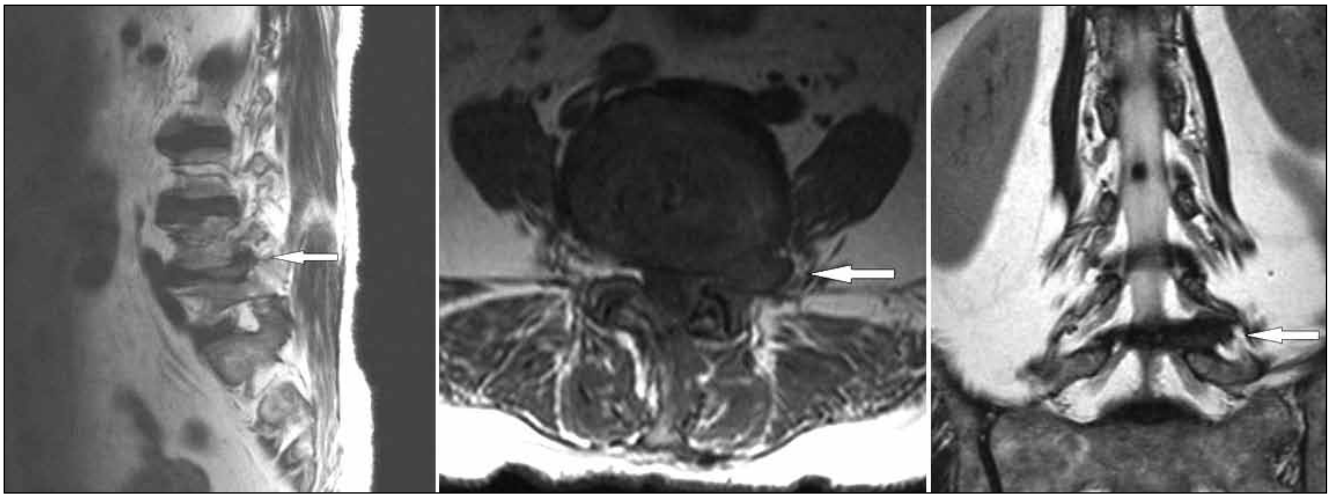

Figure 4: Sagittal, axial T1 WI and coronal T2 WI MR scan discloses a left L4-5 foraminal and far lateral disc herniation.

Figure 5: Sagittal T2WI, axial T1 WI, and coronal T2 WI MR scans show a left L5-S1 foraminal and far lateral disc herniation.

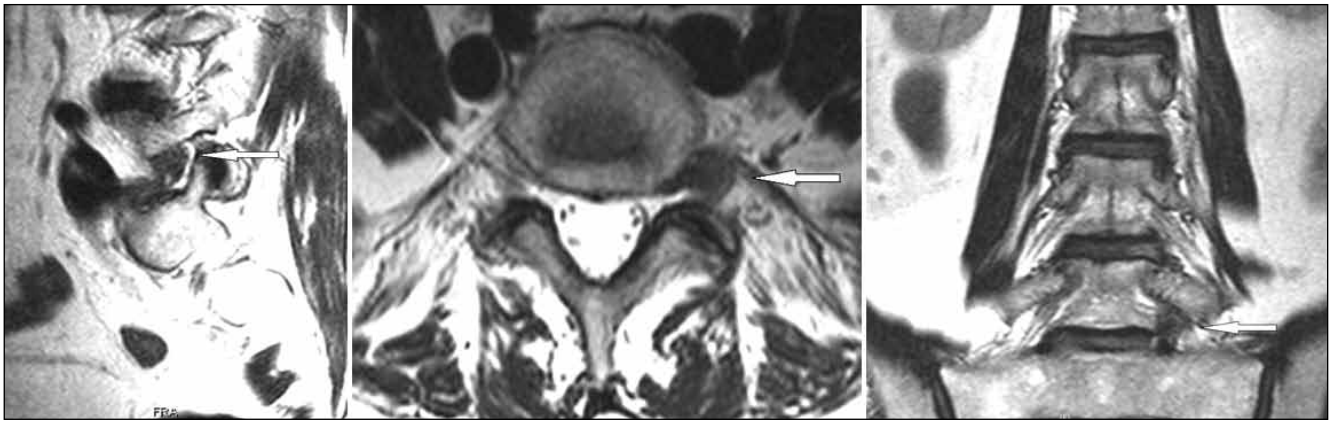

Figure 6: Sagittal, axial, and coronal T2 WI MR scans show a left L5-S1 foraminal and far lateral disc herniation.

lesion on MR images. Parasagittal MR imaging can technically demonstrate the neural foramen, far lateral compartment and their components such as nerve roots relevant with the spinal cord, dorsal root ganglion, perigangliomic fat, facets and pedicles (1). However bony deformities such as spurs, arthrotic facet with hypertrophy, degenerative spondylolisthesis and scoliosis may confuse the images and diagnosis of the herniated disc (2). Some authors suggest the use of computed tomography (CT) scans that define and demonstrate the extent of bony disease. They also recommend MR scan with gadolinium as it may differentiate tumor, scar tissue and sequestrated far lateral disc (non-enhancing). CT can show the facet and vertebral anomalies, but even the cumbersome myelo-CT cannot demonstrate the far lateral compartment elements because the CSF circulation ceases beyond the proximal neural foramen where the arachnoid root sleeve ends. Rarely, discography may demonstrate a far lateral lesion by extravasation of contrast material far laterally (1, 3). Taking into account these unfavourable conditions mentioned above, we propose coronal plane MR scan to diagnose and treat lumbar far lateral disc herniations.

In the present study, all patients except one were in fourth or fifth decade of life and they did not have a severe degenerated vertebral column that could obscure the use of ordinary diagnostic procedures. We therefore just used simple 2D vertebral column X-rays and MR scan to diagnose the herniated disc; and because of their radioactive and/or invasive properties we did not use CT, myelo-CT, selective lumbosacral radiculography or discography that have been reviewed in the literature (1). Heo et al. (2009) suggested in their report that simple oblique MR imaging can precisely demonstrate the nerve roots and disc herniation in foraminal and extraforaminal areas (2). Lee et al. (2009) also stated that foraminal and extraforaminal disc herniations could be diagnosed by parasagittal MR. However, they also pointed out that these images did not precisely show the foraminal and extraforamial anatomic structures that sagittal spinal MR could not visualize the purely extraforaminal (far lateral) disc herniation and it should be correlated with axial MR images. Additionally, they asserted that simple oblique MR imaging technique is not generally included in routine spinal MR protocols (4). In this study, we wanted to demonstrate the efficiency of the coronal lumbar MR technique in the evaluation of foraminal and/or far lateral disc herniations and planning of the surgical approach. The coronal plane MR scan, which is simple and non-invasive, can easily and clearly demonstrate the foraminal and/or far lateral herniated or sequestrated discs in the lumbar region of patients without intraspinal pathologies corresponding to their complaints or neurological findings. Actually, the coronal imaging technique helps in comparison of the exiting and descending nerve roots bilaterally.

CONCLUSION

MR imaging is a triplanar technique. Coronal lumbar MR imaging, which is a simple and useful technique for revealing nerve roots in foraminal and/or far lateral (extraforaminal) areas, is a must for accurate diagnosis of foraminal and/or far lateral lumbar disc herniation.

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