

## DECISION MAKING DILEMMAS IN SPINE SURGERY

Often in meetings or conferences, discussions on protocols for management of spinal disorders rarely reach any consensus. Although the field of spine surgery has rapidly grown, become much safer and effective in the last decade, there are still no fixed protocols for managing spinal disorders. This may be due to the fact that most of the spinal disorders are chronic in nature and emergency situations are a rarity.

Protocols for management of any medical condition work best in an emergency situation. Hence, we have protocols for life-threatening traumatic or non-traumatic conditions requiring patient revival (ATLS, ACLS etc).

At JISAR, we work as a team with uniform guidelines for the management of most of the spinal disorders. All patients undergo a disease specific preoperative counseling, surgery and postoperative care at our centre. However, variations in the treatment of individual patients are done in accordance to patients' needs for any given disorder. In our experience as a spine care centre, we found that no set protocols are strictly implementable on all our patients.

In forthcoming issues of our newsletters, we would like to bring to you, discussion on specific spinal disorders with case examples giving insight into the decision making and surgical goals in spine surgery.

In the present issue we would like to focus on decision making dilemmas in lumbar disc prolapse with few interesting examples.

### Dr. Mahesh B.H.

M.S. (Ortho) AIIMS, New Delhi  
Spine Surgeon and  
Head of Department

### Dr. Upendra B.N.

M.S. (Ortho) AIIMS, New Delhi  
Spine Surgeon

### Dr. Anand Jayaraman

MRC Psych (UK)  
Consultant Psychiatrist  
& pain management

### Dr. Shivanna Venkataramana

MBBS, MD (PGIMER), FRACA (UK), FIPP  
Consultant Anaesthetist and  
& pain management

### Dr. Vijay S.

M.S. (Ortho)  
Spine Fellowship (CMC Vellore)  
Spine Registrar

### Dr. Arun Kumar G.C.

M.S (Ortho)  
Spine Registrar

### Leena

Secretary & Co-ordinator

### Gangadhar A.S.

Co-ordinator

After 6-7 months the same patient came to us with sudden onset of back pain for 2 days. He did not have any radicular pains or deficit in his lower limbs at present. There was no numbness in his buttocks and his bowel bladder functions were normal. His MRI films showed a small annular tear at L4-5 level, which might have been the cause for his sudden back pain. At his L5-S1 level, the large extruded central disc fragment had resorbed completely with only the annular bulge left behind (Fig 11)



*The central disc extrusion seen in fig 9 with compression of the sacral roots (S2,3,4) has completely been resorbed with only the annular bulge left behind. Note the small annular tear at L4-5 with hyperintensity (HIZ zone) which is the cause of his sudden back pain.*

This gives objective evidence of the natural history of all extruded disc fragments in the canal.

All of them get phagocytised and resorbed (2). A surgical intervention for herniated disc is required for relieving the pressure on the neural structures. Hence, according to evidence based medicine, a discectomy is advised only when the patient has deficits corresponding to the root compressed by the disc or the radicular pain is not responding to conservative care for 4-6 weeks.

However, as discussed earlier, all evidence based recommendations are only guidelines for making decision on management of individual patients. In this patient, though he did not have any deficit during the first episode of L5-S1 disc extrusion, the possibility of him progressing to cauda equine syndrome was high. Further, the outcome of decompression after an established cauda equine syndrome is not good; hence we advised a decompressive surgery. We would still advise a decompressive surgery when we come across a similar patient in future.

### Learning points

Only after careful evaluation of the clinical situation and correlation with all the investigations, we can take decisions on management of individual patients.

As clinicians responsible for our patient's well-being, we need to take decisions best suited for a given patient and a given clinical situation, even if sometimes, it is not completely in accordance with the recommendation of western literature.

### REFERENCES

1. Canale & Beaty: Campbell's Operative Orthopaedics, 11th ed
2. Saal JA, Saal JS, Herzog RJ. The natural history of lumbar intervertebral disc extrusions treated nonoperatively. Spine. 1990;15:683-6.
3. James N. Weinstein; Tor D. Tosteson; Jon D. Lurie; et al: Surgical vs Nonoperative Treatment for Lumbar Disk Herniation The Spine Patient Outcomes Research Trial (SPORT): A Randomized Trial; JAMA. 2006;296(20):2441-2450 (doi:10.1001/jama.296.20.2441) <http://jama.ama-assn.org/cgi/content/full/296/20/2441>).
4. John M. Rhee, Michael Schaufele, and William A. Abdu. Radiculopathy and the Herniated Lumbar Disc. Controversies

**Case Report 1**

A 45 year old lady came to us with these MRI scans.

History : She presented with pain along L5-S1 dermatomes in both her lower limbs (Left side more than Right) with significant low back pain and inability to walk for more that 100mts. She had been taking physiotherapy and medications (pregabalin) for the past 4 months with minimal benefits. The pain had increased and her walking distance had come down significantly in the past 3 months. She reported of no bowel or bladder symptoms.

Aggravating/ relieving factors: Back and leg pains got relieved on rest. Back pain increased on sitting, getting up from the bed, turning in the bed and bending forwards. The leg pain increased while standing and walking. She had to sit down to relieve her leg pain after walking for 100mts; standing did not relieve the leg pain. (Neurogenic claudication - see Box 1)

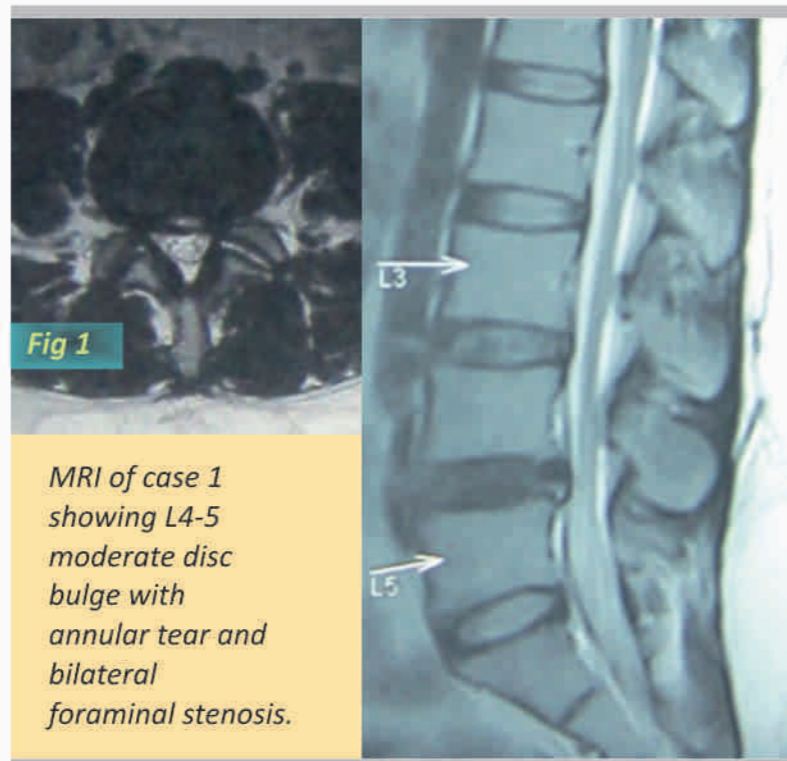


Fig 1

MRI of case 1 showing L4-5 moderate disc bulge with annular tear and bilateral foraminal stenosis.

**Box 1: Clues for Differentiating Vascular and Neurogenic Claudication<sup>1</sup>**

Evaluation	Vascular	Neurogenic
Walking distance	Fixed	Variable
Palliative factors	Standing	Sitting/bending
Provocative factors	Walking	Walking/standing
Walking uphill	Painful	Painless
Bicycle test	Positive (painful)	Negative
Pulses	Absent	Present
Skin	Loss of hair, shiny	Normal
Weakness	Rarely	Occasionally
Back pain	Occasionally	Commonly
Back motion	Normal	Limited
Pain character	Cramping—distal to proximal	Numbness, aching—proximal to distal
Atrophy	Uncommon	Occasional

**Past History**

She reported of frequent low back pains for the past 2-3 years. Leg pain was present only for last 4-5 months.

Examination positive findings: Had L4-5 tenderness; left EHL - 3/5; SLRT- 60 deg bilateral.

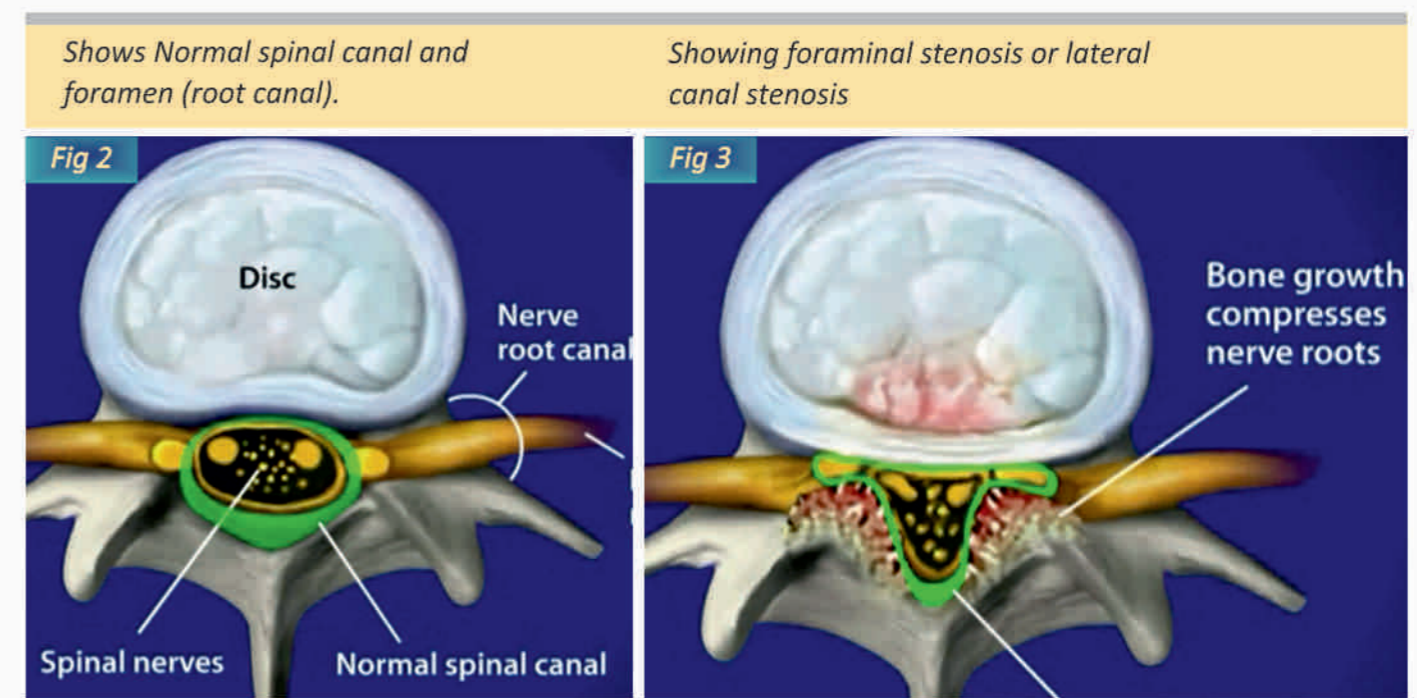
**How to proceed?**

Since the patient was having progressive claudication, not responding to conservative care and had a left EHL weakness, surgical decompression was required.

- Can we do a simple discectomy with foraminal decompression?
- Can we explain all her symptoms with moderate Disc prolapse and foraminal stenosis at L4-5 seen in her MR imaging?

**Clues for decision making:**

- 1) The patient had Progressive claudication pain (L5,S1 dermatome) with decreasing walking distance: Points to progressive foraminal Stenosis over time (fig 2,3); no buttock or perianal numbness with claudication pain- so central stenosis was minimal (S2,3,4 compression)
  - a) Therefore, Surgical decompression would require more of foraminal and root decompression; the surgeon needs to be careful of iatrogenic instability (if facet is destroyed during decompression), when only decompression is planned.
- 2) The patient had no or minimal leg pain at rest; nerve tension signs were not significant (SLRT): This indicated that at rest, the roots are not under severe compression. A severe compression would give rise to continuous radicular pains, present even at rest, along with severe restriction in SLRT.

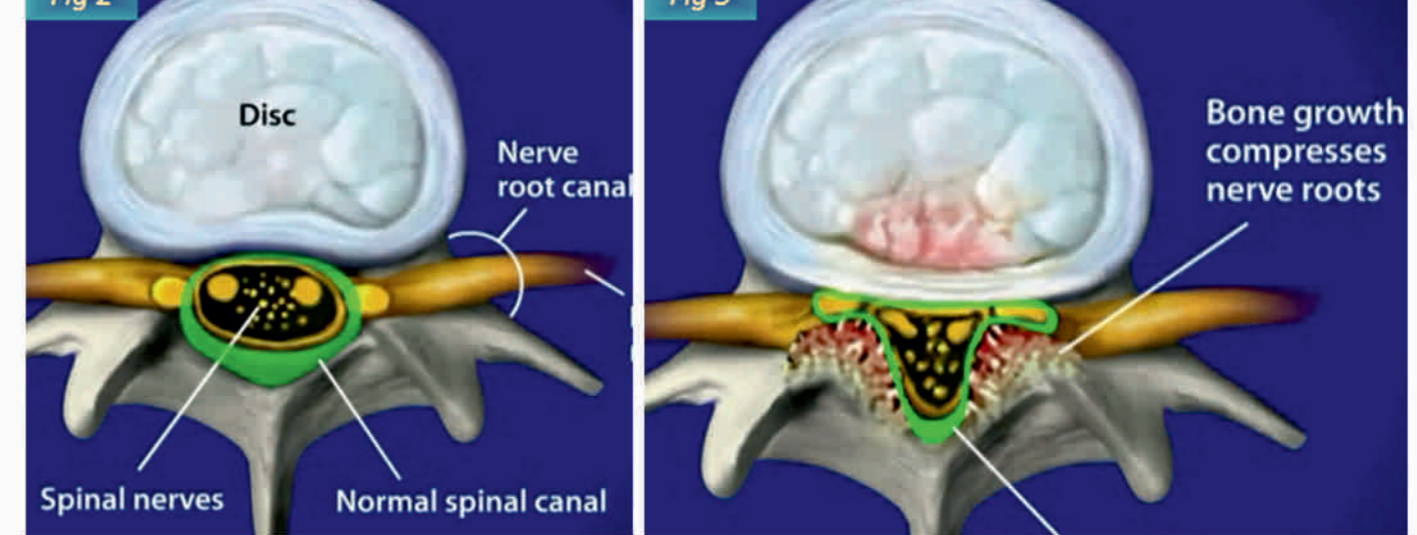


Shows Normal spinal canal and foramen (root canal).

Showing foraminal stenosis or lateral canal stenosis

Fig 2

Fig 3



3) The patient had significant back pain with chronic episodic LBA (2-3 years) along with back catches/spasms on getting up from the bed, turning in bed and bending forward - All these pointed towards an instability at L4-5 level.

An abnormal movement (instability) between L4-5 can be assessed with a Flexion and extension view on plain radiographs.

The instability at L4-5 explained most of the patient's symptomatology like chronic episodic back pain, minimal radicular pains and negative SLRT at rest. A progressive claudication with deficit, despite only a moderate disc bulge and foraminal stenosis on MR imaging again points towards a superimposed dynamic compression due to instability. Hence, the patient was counseled about the nature of the back problem she had and was advised L4-5 decompression and interbody fusion with posterior pedicle screw-rod instrumentation.

The patient underwent Surgery with decompression and interbody fusion of L4-5 with pedicle screw-rod instrumentation. She recovered uneventfully from the surgery and got about 80% relief in her claudication pain. She was able to walk for 2-3 km without any symptoms at 2 years Follow-up.

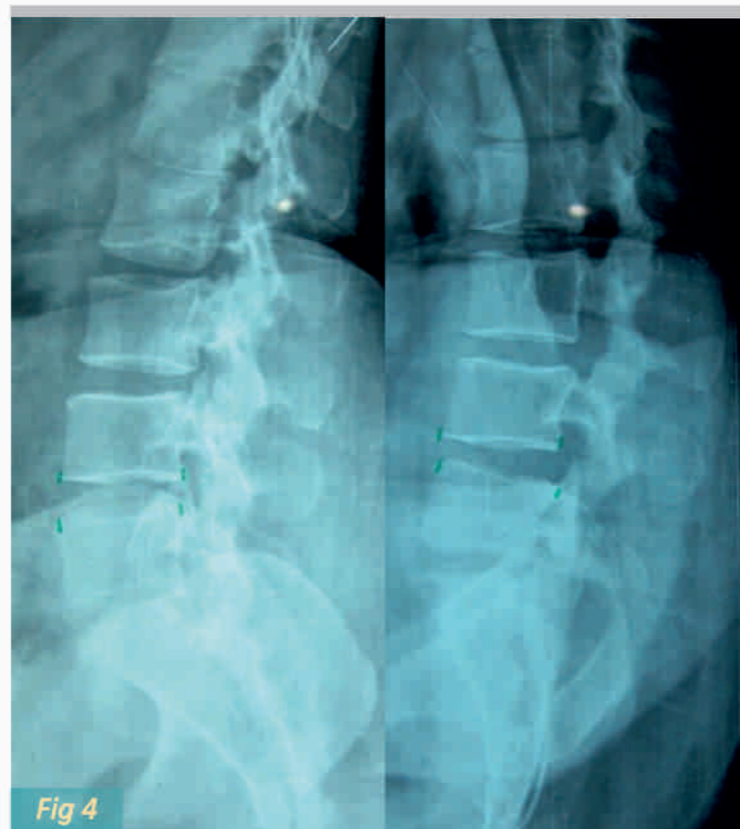


Fig 4

The Dynamic x-rays (Flexion and Extension Lateral films) showed both rotational and translational abnormal movement at L4-5.

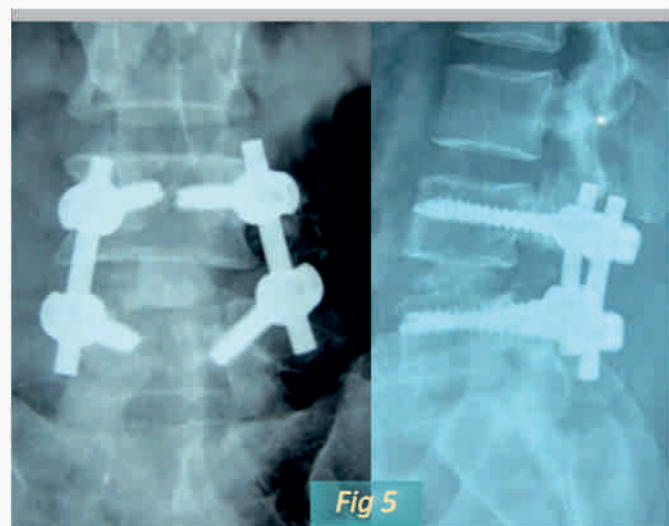


Fig 5

Postoperative Radiographs showing L4-5 decompression and interbody fusion with bone grafting and posterior pedicle screw-rod instrumentation.

**Learning points:**

A history of minimal radicular pain at rest and progressive neurogenic claudication should make one suspect a dynamic compression. A significant back pain with "instability back catches" on bending forward, turning in bed should make the suspicion of instability stronger.

However, not all patients with progressive claudication pain have instability. A significant canal stenosis on MR imaging can give rise to neurogenic claudication and deficit without instability. It is only when the stenosis is moderate and your clinical assessment points towards symptoms and neurological signs being disproportionately more than what can be explained by the disc prolapse or the stenosis seen on MR imaging, one needs to suspect the additional component of instability.

**Case Report 2**

History: A 25 year old male presented to us with severe right sided radicular pain in his L4 and L5 dermatome of 15 days duration. The pain was continuous, severe and was not relieved by sitting, standing or lying down. The pain had disturbed his sleep in the last 2 weeks with minimal relief with medications or physiotherapy. He had minimal back pain. He had no previous history of chronic back pain or similar episodes of leg pain.

On Examination: The pain radiated from his buttocks to the lateral aspect of his thigh and anterior and lateral aspect of his legs. SLRT was restricted to 20 degrees on right side and opposite side SLRT was 70 degrees. His EHL on right side was 2/5 and dorsiflexion of the right foot stopped at neutral position with 2/5 power. Ankle and knee jerks on both sides were normal.

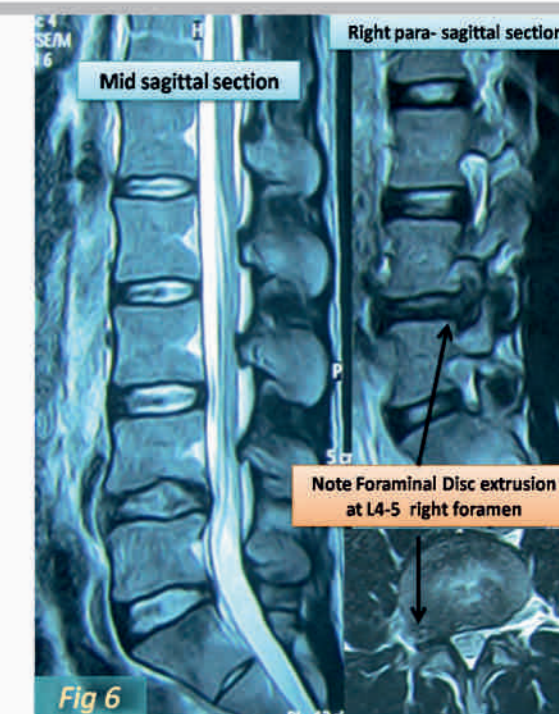


Fig 6

MRI pictures of Case 2 showing right sided L4-5 foraminal disc extrusion.

His MR imaging (Fig 6) showed a black disc at L4-5 on mid-sagittal sections with no disc prolapse or thecal compression. However, on careful evaluation of the axial sections at L4-5 level revealed a foraminal disc extrusion on the right side at L4-5.

The foraminal disc can be identified clearly in the right para-sagittal sections obliterating the right L4-5 foramen. The MRI report had missed to mention the foraminal disc as the radiologist did not have the benefit of clinical information. Hence, it is highly desirable that the treating physician should in person examine the MRI films and should not base his diagnosis merely on the MRI reports.

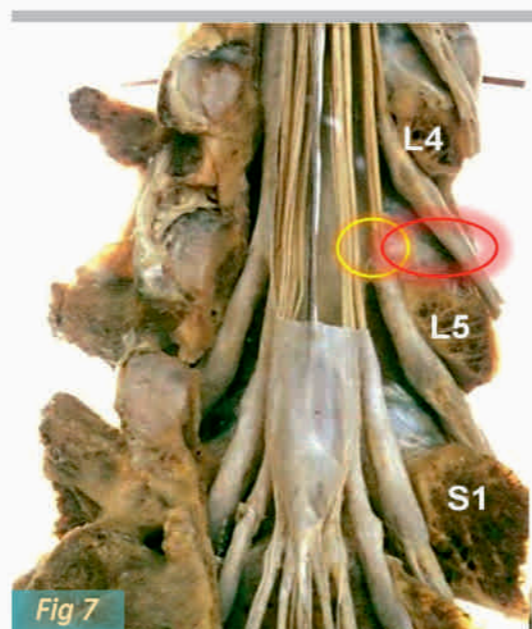
**Clues for decision making**

This is a more straight forward case with no suspicion for instability. The foraminal disc, though small, causes a more severe compression on the root due to the small bony root canal. The rest pain, with no relieving factors and severe root tension signs (SLRT) point to the severe static compression on the root.

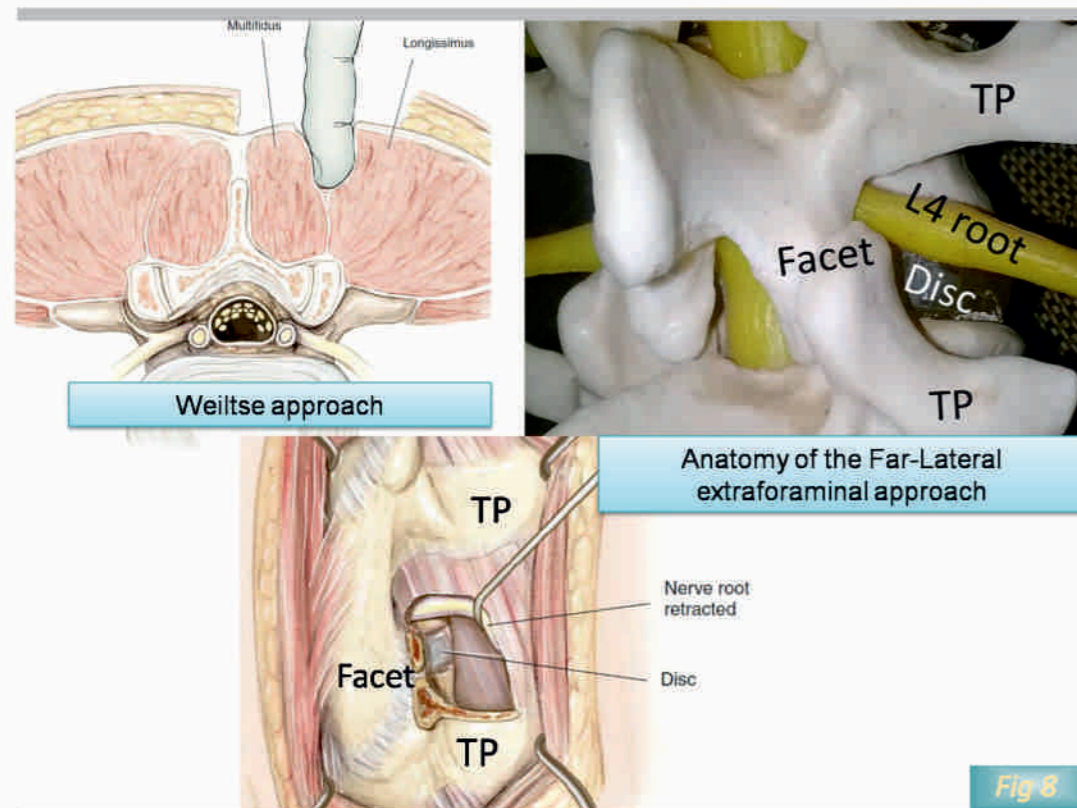
**Management:** Since the patient was having significant deficit on his L4 and L5 roots with corresponding foraminal disc extrusion, surgical decompression was advised. The patient was counseled accordingly and a lateral approach to decompress the L4-5 foramen was planned.

**Surgery:** A lateral approach inbetween the multifidus and longissimus muscle groups (weiltse's approach) was undertaken for the foraminal disc decompression (Fig 8).

The patient did well postoperatively and regained 4/5 power in his ankle dorsiflexion 2-3 weeks postoperatively.



**Fig 7**  
Cadaver photograph showing the position of the posterolateral L4-5 disc extrusion (Yellow Circle) and the lateral oval (Red) showing the position of foraminal disc extrusion.



Showing the weitse's approach, the anatomy and the overview of foraminal disc surgery.

**Fig 8**

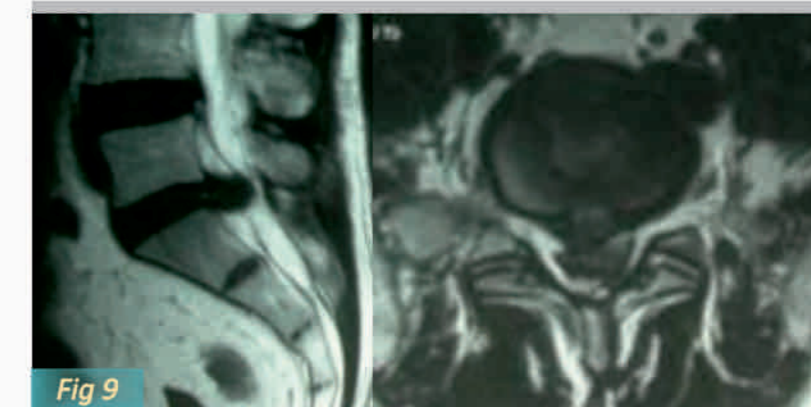
**Case Report 3**

A 40 year old man came to us with a history of sudden onset low back pain with stooping and buttock pain for 2 weeks. The pain was constant but did not radiate below his knees. The pain aggravated with standing and lying supine in bed. He was partially relieved with folding his legs and stooping on standing. Coughing or straining caused excruciating buttock pains with numbness over his buttocks and perineal region. There were no symptoms related to his bladder or bowel functions.

On examination: He had no sensory or motor deficits in both his lower limbs. The radicular pains were restricted to buttocks and posterior aspect of the thigh (S2,3,4 dermatomes). Perianal sensations and anal tone was normal. SLRT was 60 deg on both sides.

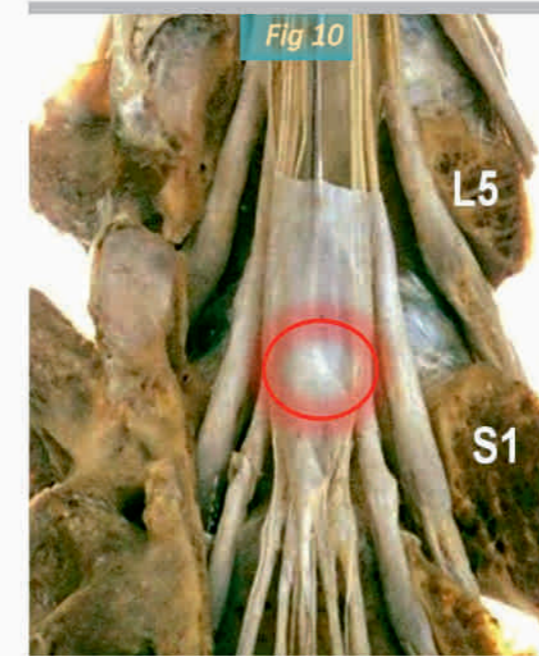
How do we proceed?

According to evidence base medicine, the patient can undergo a trial of conservative management for 4-6 weeks in a disc prolapse, when there is no neurological deficit.



**Fig 9**  
L5-S1 large central disc extrusion with compression of cauda equina. Note the free foramina on both sides.

Lumbar disc herniation has a very favorable natural history i.e the patients improve without much intervention. 80% of the patients improve in six weeks and 90%, after twelve weeks(2). Also the majority of disc herniations seen on MRI diminish in size over time, with 80% decreasing by >50% in 6-12months1 Therefore nonoperative treatment is the initial "default" pathway for the majority of patients with lumbar radiculopathy due to disc herniation(3,4).(Evidence Based Practice)



The red oval denotes the central disc extrusion with compression of the sacral roots (S2,3,4). L5 and S1 roots are not affected.

However, this patient was unlikely to develop any root deficits as the compression is on the central roots (S2, 3,4) at L5-S1 level (Fig 10). The fact that the patient complains of numbness in his buttocks with significant compression on S2,3,4 roots, the likelihood of the patient progressing to a frank cauda equine syndrome are high. Further, the prognosis for recovery of bowel bladder functions after an established cauda equine syndrome is not very good (60-70% chances of recovery, if decompression is done within 48hrs of bowel / bladder involvement). Therefore, the patient was counseled in detail about the impending nature of cauda equine syndrome and was advised discectomy at the earliest. However, the patient did not come back to us.