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# Adolescent Lumbar Disc Herniation with a Peculiar Gait Pattern Managed by Transforaminal Endoscopic Spine Surgery

Prasad Patgaonkar<sup>1</sup>, Nandan A Marathe<sup>1</sup>, Vaibhav Goyal<sup>1</sup>, Utkarsh Agrawal<sup>1</sup>, Vivek Patel<sup>1</sup>

## Learning Point of the Article:

Transforaminal endoscopy is a useful technique for treating lumbar disc herniation in a minimally invasive manner.

## Abstract

**Introduction:** Lumbar disc herniation (LDH) is common manifestation of a degenerative disease involving tensile failure of the annulus to contain the gel like nuclear portion of the disc. Lumbar herniated discs can often cause muscle weakness, reduced motor function, and change in walking capacity and gait pattern.

**Case Presentation:** We present the case of an 18-year-old obese hypertensive male, with multiple level lumbar disc herniation, with a neurological deficit and failed conservative treatment. The patient was successfully operated by minimal invasive endoscopy approach and had a marked improvement in the neurological status post-surgery. Post-surgery, his neck regained normal posture, with no back or leg pain. At present, he is walking with a normal gait pattern after a 2-year follow-up.

**Conclusion:** Here, we describe a unique gait abnormality in a patient with adolescent LDH. Transforaminal endoscopic spine surgery had good functional outcomes with minimal morbidity.

**Keywords:** Lumbar disc herniation, endoscopy, minimally invasive.

## Introduction

Although relatively rare, lumbar disc herniation (LDH) affects not only adults but also children and young adults. Unique physiological nature of children and adolescents endow pediatric LDH with some distinctive features [1]. Over the years, the number of studies regarding pediatric LDH has been on the rise, which has led to a better understanding of this entity.

LDH is common manifestation of a degenerative disease involving tensile failure of the annulus to contain the gel like nuclear portion of the disc [2]. As understanding of human physiology has improved, the importance of preserving normal tissues has become increasingly clear in the field of spine surgery [3]. This understanding gave birth to the new concept of minimally invasive surgery that has conquered almost all surgical fields, including spine surgery. The primary goal of MISS is to achieve outcomes comparable to those of open

surgery while minimizing damage to the normal tissues and reducing recovery times [4, 5]. The spectrum of MISS has now broadened and ranges from simple disk surgeries to the most complicated spine surgeries, such as deformity correction. Of all MISS procedures, endoscopic spine surgery has attracted the most attention from the global spine surgery community and has enjoyed phenomenal advances in sophistication in the past decade [6].

Here, we present a case of adolescent disc herniation with a peculiar neck posture and gait pattern which was successfully managed endoscopically.

## Case Presentation

A 18-year-old male patient, obese (105 kg) and hypertensive, presented with complaints of low back pain since 6 months and

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## Author's Photo Gallery



Dr. Prasad Patgaonkar



Dr. Nandan A Marathe



Dr. Vaibhav Goyal



Dr. Utkarsh Agrawal



Dr. Vivek Patel

<sup>1</sup>Department of Spine, Indore Spine Centre, Indore, Madhya Pradesh, India.

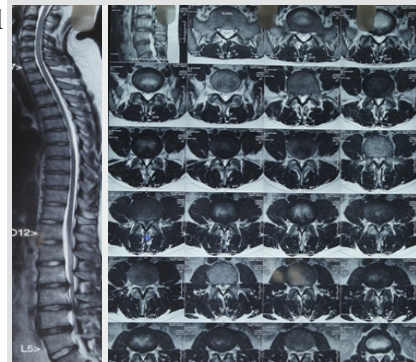
### Address of Correspondence:

Dr. Nandan A Marathe,  
Saraswati Prasad, Gaul Wada, Vasai (W) 401 201, Maharashtra, India.  
E-mail: nandanmarathe88@gmail.com

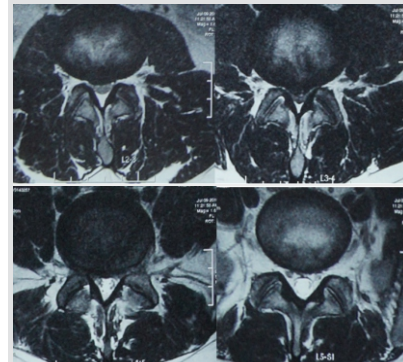




**Figure 1:** Pre-operative clinical picture: Neck maintained in flexion while walking.



**Figure 2:** Pre-operative MRI T2-weighted sagittal and axial images.



**Figure 3:** Pre-operative MRI T2-weighted axial images.

uneventful and patient was mobilized on post-surgery day 1 with a brace as per institutional protocol for endoscopic discectomy. Patients neck posture and gait improved immediately post-surgery (Fig. 8). Neurological recovery took 6 weeks' time. At present patient is

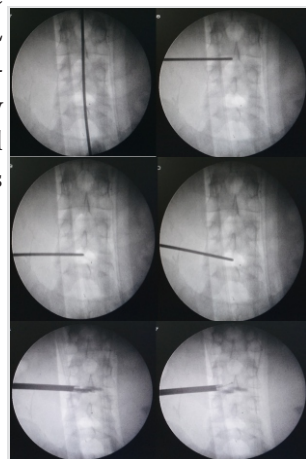
asymptomatic with a follow-up duration of 2 years and grade 5 MRC power in the lower limb.

eg pain since 3 months with a forward stoop and abductor lurch since 1 month. No cause for hypertension was found even after consultation with an endocrinologist. The patient maintained the neck in flexion (Fig. 1) and extension of the neck led to severe pain (VAS-8). Investigations included a complete hemogram which revealed elevated ESR (25 mm). MRI showed presence of multiple disc herniations at L2, L3, and L4 levels (Fig. 2, 3). X-ray revealed presence of vertebral body squaring at the thoracolumbar junction (Fig. 4). HLA B-27 was negative with positive spondyloarthritis ruled out by blood investigations.

Initially, the patient was advised conservative line of management in the form of bed rest and analgesics. Challenges involved in this case included presence of multiple disc herniations in an adolescent in the presence of obesity and hypertension; and no changes in screening MRI of the cervical spine. Hence, the stooped neck posture and gait pattern remained unexplained even after consultation with neurologist. Explaining the possibility of recurrences, herniation at other levels, need for a second non-fusion stabilization or fusion surgery; a written informed consent was taken and patient was operated by transforaminal endoscopic spine surgery under local anesthesia. Surgical procedure performed included (Fig. 5-7) left L4-5 selective endoscopic discectomy (considering left EHL and EDL weakness) and left L3-4 selective endoscopic discectomy (considering MRI and dermatomal pain pattern). Procedure was



**Figure 4:** Pre-operative X-ray of the lumbosacral spine.



**Figure 5:** Intra-operative confirmation of the level of surgery



**Figure 6:** Location of skin entry point with endoscope.

regarding extent of removal of herniated pulposus, it has been shown that more aggressive disc removal may lead to unfavorable biomechanics. Hence, pediatric LDH requires special consideration with

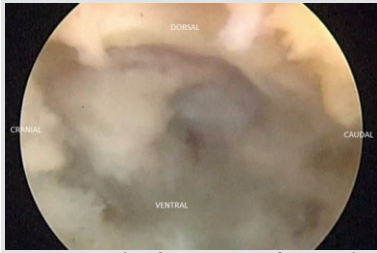
### Discussion

The rapid evolution of MIS surgery in the past decade has laid the ground for its applications in newer and more complex spinal pathologies [7, 8]. Essentially, MIS defers from traditional spine surgery by laying stress on decreasing muscle crush injuries during retraction and avoiding the disruption of osseo-tendinous complex of paraspinal muscles. By emphasizing on the above strategies, MIS aims to achieve the desired goals of spine surgery, while incurring minimal collateral damage to the bones, tendons, and muscles that actively control movement and contribute to the dynamic stability of the lumbar spine [8]. Of all the MISS procedures, endoscopic spine surgery has attracted the most attention from the global spine surgery community and has enjoyed phenomenal advances in sophistication in recent times [9].

Disc herniation has been described as a pathological process attributed to the degenerative disease of the spine. Several biochemical, environmental, genetic, and mechanical factors have been described in the etiopathogenesis of disc degeneration [10, 11, 12]. Compared to adult LDH, pediatric patients presenting with LDH have unique characteristics regarding clinical findings, radiology, and cause unlike adult LDH, which is mostly a consequence of chronic degeneration. During a discectomy procedure, the goal is to remove herniated nucleus pulposus. The annular tear may be widened, if needed, to remove adequate disc material. While there is controversy

regarding extent of removal of herniated pulposus, it has been shown that more aggressive disc removal may lead to unfavorable biomechanics. Hence, pediatric LDH requires special consideration with





**Figure 7:** Final endoscope view after complete decompression.



**Figure 8:** Post-operative clinical picture showing a normal gait.

respect to this aspect as aggressive disc removal may result in future degenerative problems for these patients [13, 14]. The main obstacle

in the treatment of adolescents with LDH is the delay in diagnosis. Previous literature states that spondylo-discitis and tumors which are potentially serious etiologies should be assessed and taken into consideration [14, 15].

In our study, the emphasis was on the pre-operative peculiar neck posture and gait of the patient. The patient maintained neck in forward flexion and had symptoms of neck pain which exacerbated on neck extension. In various studies pertaining to this, notable cause to be ruled out is the hamstring tightness. In adults, tight hamstrings may be overlooked because of the coexisting signs and symptoms of intervertebral disc protrusion. If gait abnormality accompanies the clinical picture of lumbar disc disease and persists after surgery, this syndrome should be considered. There have been several reports stating that prolonged periods of conservative treatment with adult herniation accelerated their disability, thereby, leading to gait abnormalities. However, in this case, the patient was symptomatic for a period of 6 months only and it is highly unlikely that there can be gait anomaly due to disuse atrophy of

muscles. Gait anomaly in lumbar disc herniations is also present in cases where severe compression leads to muscle weakness and an abnormal gait pattern. However, in this case, the neurological deficit also did not correspond to the pattern of walking. One of the theories that can be considered is presence of adhesions between the disc and the dura which may lead to a tug or pull on the dura with the extension of the neck.

The results of the surgery were astonishing in our case because, although the neurological recovery took 6 weeks, there was an immediate change in posture of neck and gait pattern post-surgery. The authors wanted to report the peculiar abductor lurch on the left side along with the neck posture which has not been previously reported in the literature in cases of adolescent disc herniation. The mechanism behind the post-surgery recovery of pain with change in posture and gait remains a debatable topic. A multi centric case series with a longer follow-up will throw more light on this type of symptom complex.

### Conclusion

Adolescent LDH lumbar disc herniation may present with unique gait abnormalities. Surgical treatment with transforaminal endoscopy is curative.

### Clinical Message

This case was reported due to the peculiar gait pattern associated with a lumbar disc herniation. The analysis of more number of cases will help to understand the mechanism behind this gait pattern. Transforaminal endoscopy is truly minimally invasive and a novel technique for treating lumbar disc herniation.

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**Conflict of Interest:** Nil

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**Consent:** The authors confirm that Informed consent of the patient is taken for publication of this case report

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