



Unilateral Foot Drop as the Only Manifestation of Cauda Equina Syndrome: A Case Report and Literature Review

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Abstract

Cauda Equina Syndrome (CES) is a rare but serious neurological emergency resulting from compression of the lumbosacral nerve roots within the spinal canal. It typically presents with bilateral lower limb weakness, saddle anesthesia, and bladder or bowel dysfunction. However, atypical or incomplete clinical presentations may occur and can pose significant diagnostic challenges for clinicians. We report the case of a 32-year-old male who presented with acute unilateral right-sided foot drop as the only neurological manifestation. Magnetic Resonance Imaging (MRI) of the lumbar spine revealed a large lumbar intervertebral disc herniation at the fourth to fifth lumbar vertebral level (L4 - L5) causing compression of the right-sided cauda equina nerve roots. Emergent decompressive laminectomy was performed within 12 hours of diagnosis. The patient underwent postoperative rehabilitation and achieved full motor recovery at one-month follow-up without sensory or autonomic deficits. This case highlights that isolated foot drop may represent an early or incomplete form of CES. Early recognition, prompt imaging, and urgent surgical decompression are crucial to optimize neurological outcomes and prevent progression to irreversible deficits.

Subject Areas

Orthopedics

Keywords

Cauda Equina Syndrome, Foot Drop, Lumbar Disc Herniation, L4 - L5, Neurological Emergency, Decompressive Laminectomy

1. Introduction

Cauda equina syndrome (CES) is a neurosurgical emergency characterized by compression of the lumbosacral nerve roots within the spinal canal, potentially leading to permanent motor, sensory, and autonomic dysfunction if not promptly treated [1] [2]. Classical CES presents with bilateral lower extremity weakness, saddle anesthesia, and bladder or bowel dysfunction [3].

However, incomplete or atypical forms of CES are increasingly recognized, particularly in younger patients, and may present with isolated or subtle neurological deficits [4]. Among these, unilateral foot drop as the sole manifestation is exceedingly rare and may mimic more common conditions such as isolated L5 radiculopathy or peroneal neuropathy [5].

Early recognition of such atypical presentations is essential, as delayed diagnosis may result in progression to complete CES with irreversible deficits. This report describes a case of isolated unilateral foot drop caused by lumbar disc herniation resulting in incomplete CES and highlights the importance of careful clinical and radiological evaluation.

2. Case Presentation

A 32-year-old previously healthy male presented with sudden-onset right-sided foot drop following lifting a heavy object, accompanied by mild low back pain [5] [6]. He denied saddle anesthesia or bladder/bowel dysfunction. Neurological examination revealed 2/5 strength in right ankle dorsiflexion, intact reflexes, and mild hypoesthesia in the right L5 dermatome; left lower limb and rectal tone were normal.

Emergent magnetic resonance imaging of the lumbar spine demonstrated a large right posterolateral L4 - L5 disc herniation compressing the right-sided lumbosacral nerve roots of the cauda equina [1] [6] (See **Figure 1**).



Figure 1. Lumbar magnetic resonance imaging showing a right posterolateral L4 - L5 disc herniation compressing the cauda equina nerve roots (red arrow).

Given the imaging findings and risk of neurological deterioration, a diagnosis of incomplete cauda equina syndrome was established. The patient underwent emergent decompressive laminectomy within 12 hours of diagnosis [7] [8].

Differential diagnoses, including peroneal nerve palsy, peripheral neuropathy, and central nervous system pathology, were considered. Peroneal neuropathy was deemed unlikely due to the absence of fibular head tenderness, preserved inversion strength, and corresponding spinal imaging findings. Central causes were excluded based on the absence of upper motor neuron signs and normal clinical examination.

Postoperative management included physiotherapy and progressive mobilization. At one-month follow-up, the patient demonstrated complete recovery of motor function (5/5 strength), resolution of sensory deficits, and no evidence of bladder or bowel dysfunction.

3. Discussion

Cauda equina syndrome represents a neurological and surgical emergency requiring prompt diagnosis and intervention to prevent permanent deficits. It most commonly results from a large lumbar disc herniation, particularly at the L4 - L5 or L5 - S1 levels, causing compression of multiple lumbosacral nerve roots.

The classical presentation includes bilateral lower extremity weakness, saddle anesthesia, and bladder or bowel dysfunction. However, incomplete CES may present with isolated or unilateral neurological deficits, particularly in early stages before autonomic fibers are affected. Recent literature highlights that incomplete cauda equina syndrome may present with subtle or isolated motor deficits, further complicating early diagnosis [9] [10].

In this case, the patient presented with isolated unilateral foot drop, an uncommon manifestation typically associated with L5 radiculopathy. However, several features supported the diagnosis of incomplete CES rather than isolated radiculopathy. MRI demonstrated a large central disc herniation compressing multiple cauda equina nerve roots rather than a focal foraminal lesion affecting a single nerve root. Additionally, the acute onset, subtle sensory deficit, and risk of progression justified classification as incomplete CES.

Foot drop results from dysfunction of the L5 nerve root, affecting muscles responsible for ankle dorsiflexion and toe extension. While this is most commonly due to radiculopathy or peroneal neuropathy, clinicians must consider more serious etiologies when presentation is acute and associated with back pain.

The differential diagnosis of acute foot drop includes peroneal nerve palsy, lumbar radiculopathy, peripheral neuropathy, central nervous system lesions, and traumatic injury. Careful neurological examination and imaging are essential to distinguish these conditions. In this case, clinical findings and MRI excluded peripheral and central causes.

MRI remains the gold standard imaging modality for suspected CES, allowing accurate visualization of neural compression. Early diagnosis is critical, as multi-

ple studies have demonstrated improved outcomes with surgical decompression within 24 - 48 hours [6]-[8].

In the present case, rapid diagnosis and surgical intervention within 12 hours resulted in complete neurological recovery. This highlights the importance of maintaining a high index of suspicion for CES, even in the absence of classical symptoms.

4. Conclusions

Isolated unilateral foot drop may represent an early or incomplete manifestation of cauda equina syndrome. Although uncommon, this presentation requires prompt recognition to avoid delayed diagnosis and potential neurological deterioration.

Early MRI evaluation and urgent surgical decompression are essential for optimal outcomes. Clinicians should consider CES in the differential diagnosis of acute foot drop, particularly when associated with back pain or sudden onset.

5. Limitations

This report describes a single case, which limits the generalizability of the findings. Additionally, the follow-up period was relatively short, and long-term outcomes could not be assessed.

Patient Consent and Ethics Statement

Written informed consent was obtained from the patient for publication of this case report and accompanying images. Ethical approval was not required for this study in accordance with institutional guidelines for single case reports.

Author Contributions

Mahd, S.: Conceptualization, case management, manuscript drafting.

Alhasat, Z.: Literature review, manuscript editing, supervision.

Statement

No artificial intelligence tools were used in the preparation of this manuscript.

Conflicts of Interest

The authors declare that they have no conflict of interest.

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