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(CASE REPORT)

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Imaging of intradural lipoma with tethered cord and herniation through spinal defect: A case report

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Abstract

Introduction: Spinal dysraphism encompasses congenital anomalies from defective neural tube closure, ranging from occult forms to severe myelomeningocele. Intradural lipomas, rare benign tumors (~1% of spinal cord masses), are often linked to tethered cord syndrome and spina bifida. These fatty lesions, typically dorsal, may herniate through spinal defects, exacerbating neurological deficits via compression or tethering. This report presents a case of intradural lipoma with tethered cord and herniation.

Case Report: A 26-year-old female presented with progressive lower back pain, leg weakness, and urinary incontinence. Physical exam revealed a lumbosacral subcutaneous mass. MRI confirmed an intradural lipoma (L3–S1) with tethered cord and herniation through an L5–S1 spinal defect.

Discussion: MRI is the gold standard investigation for diagnosis of Spinal lipoma with its herniation. It is seen as T1 hyperintensity lesion (fat signal) with fat-suppression confirmation associated with herniation through a posterior defect. Symptoms usually result from cord tethering and mass effect, often progressive without intervention.

Conclusion: Intradural lipomas with herniation are rare but require early MRI diagnosis and timely surgery to prevent irreversible neurological damage.

Keywords: Dysraphism; Lipoma; Tethered cord; Lumbosacral; Herniation

1. Introduction

Spinal dysraphism encompasses a spectrum of congenital anomalies resulting from defective closure of the neural tube during embryogenesis. It can manifest in various forms, ranging from asymptomatic occult spinal dysraphism to more severe conditions like myelomeningocele.

Among these, intradural lipomas are rare, accounting for approximately 1% of spinal cord tumors, and are frequently associated with tethered cord syndrome and spina bifida. [1] Intraspinal lipomas are benign fatty tumors that can occur in association with spinal dysraphism, often located dorsally and frequently connected to the subcutaneous tissue through a spinal defect. These often cause neurological deficits due to mass effect or tethering.[2]

A rare but severe complication is the herniation of intraspinal lipoma through a spinal defect, which can exacerbate neurological symptoms due to compression and traction on the cord.[3] This case report highlights the imaging findings, clinical presentation, and management of a patient with an intradural lipoma, tethered cord, and herniation through a spinal defect.

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2. Case Report

A 26 year old female presented with progressive lower back pain, bilateral leg weakness, and urinary incontinence over six months. Physical examination revealed a soft, subcutaneous mass in the lumbosacral region. Magnetic resonance imaging (MRI) of the spine was performed.

Based on the clinical presentation and imaging findings, a diagnosis of intradural lipoma with tethered cord and herniation through a lumbosacral spinal defect was made.

2.1. MRI findings

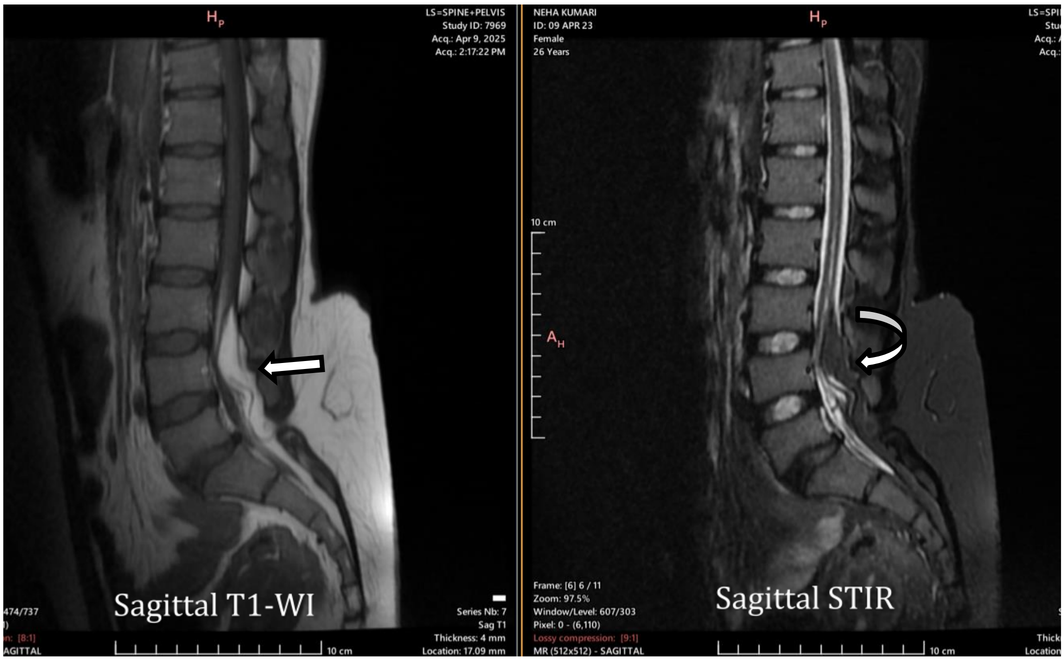

Figure 1 Sagittal T1-weighted and Sagittal STIR MRI

Sagittal T1-weighted and Sagittal STIR MRI (Image 1): Sagittal T1-weighted images demonstrated a well-defined, high-signal intensity mass (White block arrow) within the spinal canal, extending from the L3 to S1 vertebral levels. The mass was predominantly intradural and located dorsally, intimately associated with the conus medullaris and filum terminale, consistent with an intradural lipoma. There was evidence of a low-lying conus medullaris, indicative of a tethered cord. Notably, the lipoma was seen to herniate through a posterior spinal defect at the L5-S1 level, extending into the subcutaneous tissue as the palpable mass. Signal suppression of the mass seen on Fat Sat Sequences (Curved white block arrow).

Figure 2 Axial T1 and T2-weighted MRI

Axial T1 and T2-weighted MRI (Image 2): Herniation of the lipoma (black arrow) through a posterior spinal defect (white block arrows), associated with spina bifida. No associated syringomyelia or other spinal cord malformations were identified.

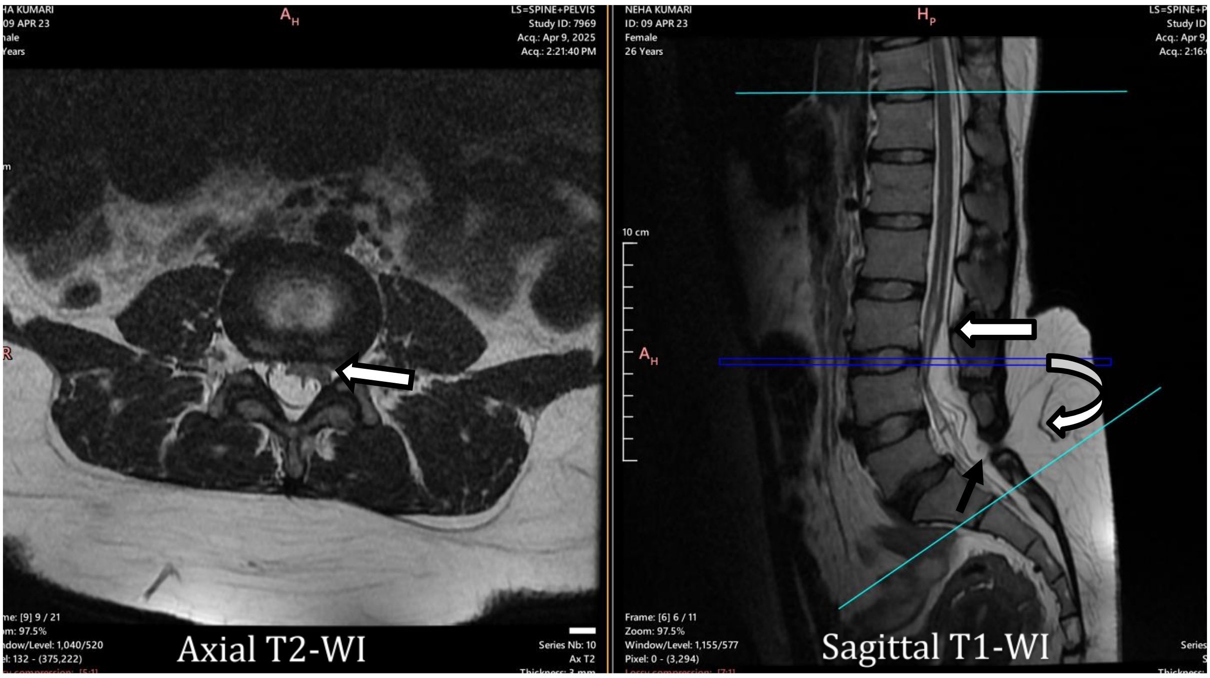

Figure 3 Axial T2 and Sagittal T2WI sequence

Axial T2 and Sagittal T2WI sequence (Image 3): Tethered cord ((Straight white block arrow)) is seen which is displaced anteriorly by the spinal mass. Posterior spinal defect is seen (Black arrow), through which the spinal lipoma is seen herniating into the subcutaneous plane (Curved white block arrow).

3. Discussion

3.1. Spinal Dysraphism and Intradural Lipomas

Spinal dysraphism is classified into open (e.g., myelomeningocele) and closed (e.g., spina bifida occulta) forms. Intradural lipomas are a subtype of closed dysraphism, often associated with tethered cord syndrome (TCS), where the spinal cord is abnormally anchored, leading to progressive neurological deficits. [4] These are rare lesions, accounting for approximately 1% of all spinal cord tumors. The clinical presentation of intraspinal lipomas is variable and depends on the size, location, and extent of cord tethering. Symptoms can range from subtle cutaneous findings to progressive neurological deficits, including motor weakness, sensory disturbances, bowel and bladder dysfunction, and gait abnormalities, as seen in our patient. The age of onset of symptoms also varies, with some patients presenting in childhood and others in adulthood as the effects of tethering and mass effect become more pronounced.

3.2. Pathogenesis and Imaging

Intradural lipomas arise from abnormal separation of the neuroectoderm from the cutaneous ectoderm during early fetal development, leading to the inclusion of mesenchymal fatty tissue within the spinal canal.

Imaging, particularly MRI, is crucial for the diagnosis and preoperative planning of intraspinal lipomas. MRI clearly delineates the extent of the lipoma, its relationship to the spinal cord and nerve roots, the presence of cord tethering, and any associated spinal defects or herniation through a bony defect, as seen in this case, which may worsen symptoms due to mechanical compression.[5] The high signal intensity on T1-weighted images and signal suppression on fat-saturated sequences are characteristic features of lipomatous tissue. Fat-suppressed MRI sequences are essential to differentiate lipomas from hemorrhage or proteinaceous cysts.[6]

3.3. Management

The management of symptomatic intraspinal lipomas with tethered cord and herniation typically involves surgical intervention. The goals of surgery are to decompress the neural elements, release the tethered cord, and resect the extradural component of the lipoma to alleviate mass effect and prevent further neurological deterioration. However, complete resection of the intradural component is often not feasible due to the intimate association with the spinal cord, and aggressive resection can lead to significant neurological morbidity. A meticulous surgical approach with intraoperative neurophysiological monitoring is essential to maximize neurological outcomes.[7] The long-term prognosis depends on the extent of neurological deficit at presentation and the success of surgical intervention in achieving decompression and preventing retethering. [8]

4. Conclusion

Intradural lipomas with tethered cord and herniation through a spinal defect represent a rare but clinically significant entity. MRI is critical for diagnosis, and surgical management aims to alleviate cord tethering and compression. Early detection and intervention are key to preventing irreversible neurological damage.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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