Case Report: Nondysraphic Thoracic Intradural intramedullary Lipoma in a 35-Year-Old Female

1.Abstract

Background: Nondysraphic intramedullary lipomas (NILs) are exceptionally rare, representing a minute fraction of primary spinal cord lesions that occur within an intact spinal column, often clinically mimicking more common myelopathies.

Case Description: We present the case of a 35-year-old patient exhibiting subacute neurological decline. Diagnostic imaging confirmed a fatty intramedullary mass. Management involved microsurgical decompression and subtotal resection, prioritizing the preservation of neural integrity over radical excision.

Outcomes: Postoperatively, the patient showed immediate stabilization of neurological deficits. At the six-month follow-up, significant improvement in motor strength and sensory function was observed, with no evidence of symptomatic tumor regrowth on serial imaging.

Conclusion: Success in Nondysraphic intramedullary lipoma management hinges on recognizing the "liponeural interface." Because the absence of a proper distinct surgical plane carries a high risk of iatrogenic injury, a conservative operative strategy focused on decompression rather than gross total resection remains the gold standard for favorable long-term outcomes.

2. Introduction

While adipose tissue is ubiquitous in the human body, its presence within the spinal cord parenchyma is a clinical anomaly. Clinically intramedullary lipomas are divided into those associated with spinal dysraphism (common in pediatrics) and the nondysraphic variety, which typically presents in the second to fourth decades of life.

The primary challenge of these lesions is their hamartomatous nature. They are not encapsulated tumors but rather masses of mature adipocytes that intercalate between functional neural fibers. This paper discusses the diagnostic journey and the strategic "debulking" approach required for these rare lesions[1].

3. Case Presentation

3.1 History and Examination

A 35-year-old female presented to the neurosurgery outpatient department with Progressive spastic weakness in both lower limbs since last 6 months.

The patient presents with a classic picture of thoracic myelopathy.

The combination of upper motor neuron signs (hyperreflexia , Babinski sign) and a clear sensory level suggests a lesion affecting the spinal cord at or above the T6 level.

Neurological Grading & Classifications

To better quantify her functional impairment, we apply the following scales:

- Motor Strength: Grade 3/5 (Active movement against gravity, but not against resistance).

- Sensory Level: T6 Dermatome (Upper mid-thoracic).
- Modified McCormick Scale (MMCS): Grade 3
  (The patient is ambulatory but requires an assistive device for mobilization)
- Nurick Classification: Grade 3 (Gait disturbance which prevent full time work)

No history of bladder/bowel incontinence or previous spinal trauma.

There were no cutaneous stigmata (like tufts of hair or dimples) on the back.

3.2 Radiological Evaluation

MRI of the dorsal spine was performed:

Figure 1; (Section 3.2);Pre operative Mri image of dorsal spine saggital view

(Sagittal T1-weighted image showing a well-circumscribed, hyperintense intramedullary lesion with lack of contrast enhancement extending from T3 to T6)

Magnetic Resonance Imaging (MRI) remains the gold standard. The lesion demonstrated:

- Signal Characteristics: Pathognomonic hyperintensity on T1-weighted sequences, mirroring subcutaneous fat And lack of contrast enhancement.(FIGURE 1)

4. Surgical Procedure

A T3–T6 laminectomy was performed under general anesthesia with posterior midline myelotomy was performed with Intraoperative Neuromonitoring(IONM) using SSEP/MEP[4].

Intraoperative Monitoring (IONM)

- SSEP/MEP: Stable baselines were maintained throughout the approach.
- Alert: A transient decrease in MEP amplitude occurred during dissection of the firm mass.
- Outcome: Following the decision for subtotal resection and irrigation, signals stabilized. Final potentials remained within 80% of baseline, indicating preserved motor pathways

Upon exposure, the lesion appeared as a firm, yellowish mass.

The Surgical Plane; Extensive microscopic inspection confirmed that there is no distinct cleavage plane[3].

The Strategy; To avoid permanent paraplegia microsurgical decompression and subtotal resection was executed. Using microsurgical scissors and blunt dissection.

Closure; A duraplasty was performed in water tight fashion.

Immediate Post-Operative Outcome

- Neurological: Minimal transient weakness in the lower extremities (MRC Grade 3-4/5), consistent with the intraoperative MEP alerts.

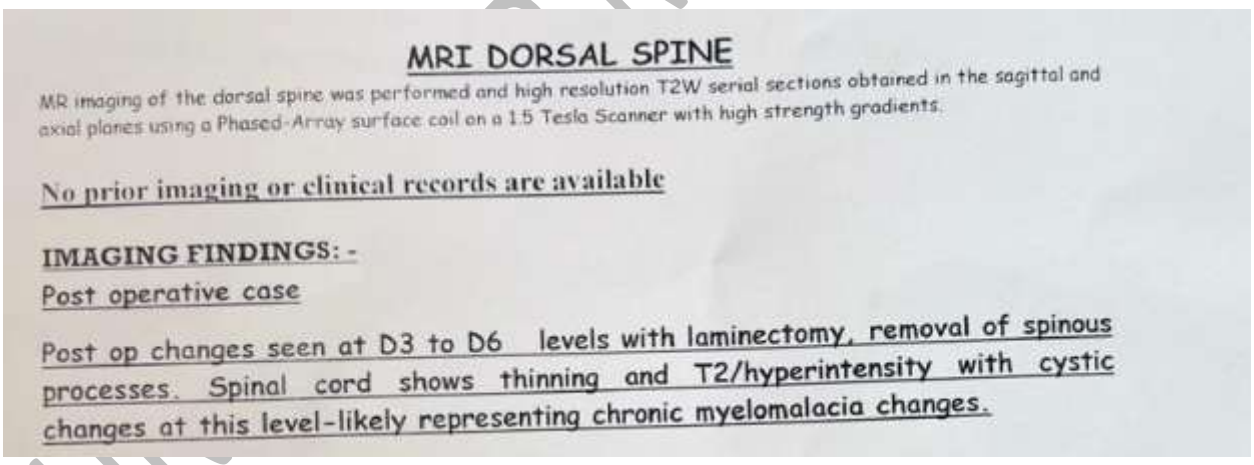
- Sensory: New-onset T4-level paresthesia; proprioception remained intact.
- Surgical: Wound remained dry with no evidence of CSF leak; duraplasty was successful.

Figure 2: (section4):-Excised IDIM tumour

(Intraoperative photograph showing the excised intradural intramedullary (IDIM) tumor. The specimen is characteristically lobulated, yellowish, and firm, consistent with mature adipose tissue)

Figure 3: (section4):-post operative mri image of dorsal spine

(Postoperative sagittal T1-weighted MRI demonstrating significant decompression of the spinal cord following internal debulking. While residual fatty signals may be visible at the liponeural interface, the mass effect on the cord parenchyma has been successfully relieved, and the CSF pathways are restored)



MRI DORSAL SPINE

MR imaging of the dorsal spine was performed and high resolution T2W serial sections obtained in the sagittal and axial planes using a Phased-Array surface coil on a 1.5 Tesla Scanner with high strength gradients.

No prior imaging or clinical records are available

IMAGING FINDINGS: -

Post operative case

Post op changes seen at D3 to D6 levels with laminectomy, removal of spinous processes. Spinal cord shows thinning and T2/hyperintensity with cystic changes at this level-likely representing chronic myelomalacia changes.

Figure 4: (section4):- postoperative mri report of dorsal spine

5. Discussion

5.1 Pathogenesis: The Dysembryogenetic Model,

The most accepted theory for nondysraphic lipomas is the "premature disjunction" theory. This model suggests that during primary neurulation, if the cutaneous ectoderm separates from the neuroectoderm prematurely, the paraxial mesenchyme gains access the neural groove. This trapped tissue then differentiates into fat, creating a subpial mass that grows in proportion to the patient's overall adipose metabolism.

5.2 Surgical Philosophy: Total vs. Subtotal

Historically, surgeons debated the necessity of total excision. However, the modern consensus favors maximal safe resection[2].

Clinical Pearl; Because these lipomas are metabolically active, they can expand if the patient experiences significant weight gain, however they rarely recur aggressively like malignant tumors. Therefore, "decompression" is the primary goal.

5.3 Differential Diagnosis

It is vital to differentiate NILs from:

1. Dermoid Cysts; These usually show mixed signals and may contain hair or sebum.

2. Teratomas; These contain multiple germ layer derivatives (e.g.,bone or cartilage).

3. Ependymomas; Unlike lipomas, these usually have a well-defined plane and show contrast enhancement.

This case illustrates the classic presentation of a nondysraphic lipoma. In the Indian context, as noted by **Muthukumar** (2002) and **Bhatoe** (2004), the "dorsal" location is the most common site for these lesions[1].

The surgical philosophy must remain conservative. Because these lesions are hamartomatous rather than neoplastic, they do not infiltrate but instead

"interdigitate" with the spinal cord.Consiquently , radical removal is associated with a high risk of paraplegia.Subtotal decompression, as performed in this 35-year-old patient, provides excellent long-term symptomatic relief with minimal risk of recurrence.

6. Conclusion

Thoracic IDIM lipomas should be considered in the differential diagnosis of progressive myelopathy in 35year old Indian women. MRI with fat-suppression sequences is diagnostic.

Nondysraphic intramedullary lipomas represent a surgical paradox: a benign pathology that carries high surgical risk. A conservative microsurgical approach aimed at decompressing the spinal cord, rather than radical/total excision, provides the best balance between symptom relief and the prevention of iatrogenic injury.

7.References

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8. Key words

Nondysraphic, Intramedullary, Lipoma, Spinal cord, Microsurgery.