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Case Report

Transdural Spinal Cord Herniation in MRI: A Case Report and Literature Review

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Abstract: This article presents a rare clinical case of transdural spinal cord herniation detected by MRI (Magnetic Resonance Imaging). Transdural spinal cord herniation, characterized by the displacement of a portion of the spinal cord through a defect in the dura mater, is an infrequent condition that can result from trauma, surgical interventions, or be idiopathic. We discuss the diagnostic aspects, clinical presentation, therapeutic options, and prognostic implications of this pathology, highlighting the important role of MRI in accurate diagnosis and treatment planning.

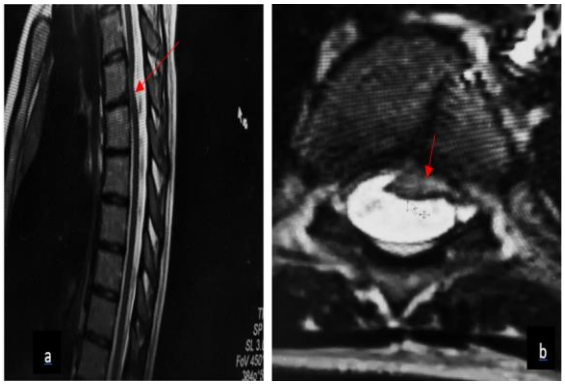
Keywords: Transdural spinal cord herniation, MRI, spinal cord, dura mater, neurosurgery.

INTRODUCTION

Transdural spinal cord herniation is an exceptional pathological entity where a segment of the spinal cord traverses an abnormal opening of the dura mater to extend into the extradural space. Although its pathogenesis is diverse, it is often associated with post-traumatic or postoperative factors. The clinical symptomatology varies according to the location and extent of the herniation, ranging from minor signs to severe neurological deficits. MRI plays a decisive role in the recognition of this condition, offering a detailed visualization of the dural discontinuity and the herniated medullary tissue.

OBSERVATION

We report the case of a 20-year-old female patient without a history of vertebral trauma or surgical intervention, presenting with a medullary syndrome characterized by intercostal neuralgia at the T6 dermatome level, paraparesis more pronounced in the left limb, and anal and vesical sphincter disorders. MRI of the spine revealed a localized anterior deviation and angulation of the spinal cord at levels T5-T6 in the sagittal cut, enlargement of (Figure 1), the posterior subarachnoid spaces, obliteration of the anterior subarachnoid spaces, and anterolateral displacement of the spinal cord in the axial cut, with adherence of the dura mater without signs of underlying medullary suffering, all suggesting a thoracic transdural spinal cord herniation with a segment of the spinal cord extending through a dural defect and displacement into the extradural space. The patient underwent surgery; a dural plasty was performed, allowing for the stabilization of symptoms.



a) Spinal cord MRI in T2-weighted sagittal sequences: Widening of posterior subarachnoid spaces with effacement of anterior subarachnoid spaces
b) MRI in fine axial sections in T2 weighting: Show the medulla pressed against the vertebral body without visualization of CSF interposition with: A posterior side of the spinal cord taking on the appearance of an open book or fan secondary to the phenomenon of aspiration

DISCUSSION

Transdural spinal cord herniation (TSCH) constitutes an unusual etiology of progressively developing myelopathy. Since the advent of magnetic resonance imaging (MRI), the number of identified cases of this disease has increased. The first case was documented by Wortzman and collaborators in 1974 [1]. Typically, this anomaly is manifested by the protrusion of medullary tissue into the thoracic spinal column, often located between the T4 and T7[2], vertebrae, through a defect in the anterolateral or anterior wall of the dura mater, which may be either congenital or acquired. Etiologically, the origins of idiopathic TSCH remain unclear. Several factors could be involved in the formation of a dural tear, including undetected recurrent microtraumas, the presence of a congenital posterior arachnoid cyst, a calcified disc herniation eroding the dura mater, or a duplication of the latter. The adhesion of the spinal cord to this opening is encouraged by its specific anatomical location within the thoracic spinal canal and is exacerbated by the natural pulsation of cerebrospinal fluid. The spinal cord herniation then leads to constriction, which is the origin of the observed clinical manifestations. A slowly evolving Brown-Sequard syndrome is frequently reported, representing more than half of the documented cases. Unilateral spastic paresis often appears as the first indicator. Other symptoms may occur, including unilateral pyramidal manifestations, pain, and sphincter dysfunctions. MRI [3], is the key examination for diagnosing TSCH. Sagittal T2 sequences are generally sufficient to confirm the diagnosis, revealing an anterior displacement of the spinal cord characterized by a C- or S-shaped deformation at the level of the herniation, an increase in the posterior subarachnoid space, and a reduction of the anterior subarachnoid space. These sequences can also indicate spinal cord atrophy accompanied by a hyper signal, a sign of medullary lesion (myelomalacia) [4], which may have implications for the functional prognosis after surgery. On axial images, the spinal cord appears to be compressed against the vertebral body without intervening cerebrospinal fluid space, presenting an "open book or in a fan shape due to a suction phenomenon, different from what is observed in the presence of a posterior arachnoid cyst. The posterior arachnoid cyst represents the main differential diagnosis and source of diagnostic error. In case of diagnostic difficulties, cine MRI allows for the exclusion of the arachnoid cyst diagnosis by showing the persistence of a normal CSF flow at the posterior part of the spinal cord at the level of the herniation. The treatment is surgical, allowing to stabilize an evolving symptomatology with sometimes a significant improvement if the diagnosis is made early. Several techniques are possible, of which the method of choice is the repair of the anterior defect by dural plasty (dural patch), and long-term follow-up after surgery is recommended to screen for any possible recurrence.

CONCLUSION

Transdural spinal cord herniation is a rare condition with significant clinical implications. A breach in the dura mater of uncertain etiopathogenesis is at the origin of the cord herniation pushed by the flow of CSF. Conventional MRI sequences strongly suggest the diagnosis. Thus, MRI is indispensable for an accurate diagnosis and constitutes the cornerstone of the therapeutic strategy.

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