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Case Report

ASYMMETRIC SPINAL CORD COMPRESSION BY INTRADURAL EXTRAMEDULLARY TUMOR AT THORACIC LEVEL: A CASE REPORT

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ABSTRACT

Introduction: Spinal tumors are rare, accounting for approximately 15% of all central nervous system tumors, and most commonly affect individuals of working age. Clinical manifestations include localized or radicular pain, progressive back pain, and, in advanced cases, severe motor deficits. Back pain is typically unrelated to activity and may worsen in the supine position. CT, MRI, histopathological, and immunohistochemical examinations assist in establishing the diagnosis. Surgery remains the mainstay of treatment. We report the case of a 44-year-old female patient with a spinal tumor treated at Bethesda Hospital Yogyakarta.

Case Summary: A 44-year-old female presented with complaints of back pain lasting one month and bilateral lower extremity edema. In 2014, the patient experienced a fall in the bathroom resulting in loss of consciousness, and she undergoes spinal surgery in 2022. A non-contrast MRI revealed an intradural extramedullary mass at the level of thoracic vertebrae T2–T3, located on the left posterolateral aspect. Histopathological examination showed tumor tissue consistent with meningothelial and psammomatous meningioma, with a differential diagnosis of schwannoma. The patient undergoes a laminectomy as definitive management.

Discussion: Intradural extramedullary lesions account for 40% of spinal tumors, with meningiomas predominantly affecting the thoracic region. Non-contrast MRI is vital for anatomical localization and cord assessment. Laminectomy achieves effective neural decompression, while histopathology and immunohistochemistry provide definitive diagnosis and subtyping.

Conclusion: Spinal tumors often present with pain and may result in severe motor deficits. Diagnosis is supported by imaging studies, histopathology, and immunohistochemistry to guide appropriate management.

Keywords: spinal tumor; back pain; non-contrast magnetic resonance imaging (MRI)

INTRODUCTION

Spinal tumors are more commonly found in individuals of working age (>20 years) and are considered rare, accounting for approximately 15% of all tumors in the central nervous system in the United States. The location and type of spinal tumor is important to determine as they relate to treatment and prognosis.[1] Based on their origin, spinal tumors are classified into two categories: primary spinal tumors (originating from the spine itself) and secondary spinal tumors (metastatic).[2] Spinal tumors can grow outside the dura (extradural) or within the dura layer (intradural). Intradural tumors are

further divided into two types based on their location: those that develop within the medulla (intramedullary) or outside the medulla (extramedullary). Extradural spinal tumors are typically metastases from other tissues outside the spine.[1] The vertebrae have good vascularization and lymphatic drainage systems, making them susceptible to metastasis. The most common locations for vertebral bone metastasis (70%) are the thoracic and thoracolumbar regions, while the lumbar and sacral regions account for more than 20%.[2]

The most common initial symptom is pain, which can be localized and nocturnal or radiate to the extremities, including the arms and/or legs. Back pain tends to be progressive, independent of activity, and sometimes worsens when lying down.[1] To diagnose a spinal tumor, a thorough physical examination combined with MRI is necessary. Spontaneous intratumoral hemorrhage is not uncommon in tumors of the nervous system. Two main theories exist regarding its etiology: the mechanical theory, which suggests that stress causes traction on tumor blood vessels leading to rupture, and the vascular theory, which attributes bleeding to spontaneous thrombosis of intratumoral vessels, ischemic necrosis, and secondary hemorrhage.[3]

CASE REPORT

A 44-year-old female patient visited the neurology outpatient clinic at Bethesda Hospital Yogyakarta on February 26, 2024, complaining of back pain, swollen and painful legs for the past month. In 2014, the patient had fallen in the bathroom and lost consciousness, and she had undergone surgery in 2022. The patient had a history of Herniated Nucleus Pulposus (HNP) in the last year. There was a family history of hypertension, and the patient has a history of Hypertensive Heart Disease (HHD). Physical examination results showed the patient's blood pressure at 170/100 mmHg, temperature at 36.4°C, pulse rate at 73 beats/min, respiratory rate at 20 breaths/min, and Glasgow Coma Scale (GCS) of E4V5M6.

On February 27, 2024, the patient returned to the neurology outpatient clinic for follow-up as she still experienced back pain and had paraparesis. On February 28, 2024, the patient was referred to the neurosurgery clinic with the same

complaints as the previous day, but her right and left legs had become weaker, with suspicion of schwannoma at thoracic vertebrae 2-3. The patient returned to the neurosurgery outpatient clinic on March 13, 2024 with complaints of back numbness and swelling in both legs. On March 20, 2024, the patient came in for a follow-up with the same complaints, and the plan was for a laminectomy excision. On March 27, 2024, the patient revisited the neurosurgery clinic with complaints of persistent numb back pain for 1.5 years and was scheduled for laminectomy. The patient was admitted on March 29, 2024, for planned laminectomy, complaining of continuous back pain and limited mobility. On April 24, 2024, the patient had a post operative follow-up at the neurosurgery clinic with complaints of pain and swelling in the legs and an infection at the surgical site.

On February 26, 2024, the patient undergoes routine blood tests, urea creatinine, glucose level, uric acid, histopathology, and radiology (Table 1). Histopathology examination was performed on April 6, 2024, showing macroscopic examination of five tumors with a diameter of 0.5-1 cm, irregular shapes, firm texture, and brownish color. Microscopic examination showed tumor tissue fragments arranged in lobules, surrounded by numerous psammoma bodies. The cells were relatively monomorphic, medium-sized, with moderate to abundant cytoplasm, round, oval, or spindle-shaped nuclei, regular, fine chromatin, some with intranuclear pseudoinclusions, and stroma with dilated blood vessels, with no signs of malignancy. The conclusion of this examination was the presence of tumor tissue in the thoracic spinal region 2-3, with histopathology findings indicating meningothelial meningioma and psammomatous meningioma, with a differential diagnosis of schwannoma. The patient undergoes non-contrast thoracic spine MRI on February 26, 2024, showing a well-defined intradural extramedullary nodule at the level of thoracic vertebrae 2-3, in the postero-lateral left aspect on a sagittal T2 fat saturation image (Figure 1). A chest X-ray performed on March 21, 2024, showed coarse bronchovascular markings, no prominent air bronchogram (within normal limits), and normal size of the heart (Figure 3).

Table 1. Laboratory Test Result

Item	Result	Normal Range
Routine Blood Test		
Hemoglobin	11,6 g/dL	11,7-15,5
White Blood Cells (WBCs)	12,5 thousand/mm^3	4,5-11,5
Eosinophils	4,1%	2-4
Segmented neutrophils	68,5%	50-70
Lymphocytes	21,3%	18-42
Total lymphocytes	2,7x10^3/UL	1,5-3,7
Neutrophil-to-Lymphocyte Ratio (NLR)	3,19	<3,13
Hematocrit	35,7%	35,0-49,0
Red Blood Cells (RBCs)	4,24 million/mm^3	4,20-5,40
Platelets	451 thousand/mm^3	150-450
Platelet Distribution Width (PDW)	7,8 fL	9,0-13,0
Random blood sugar	132,9 mg/dL	70-140
Kidney Function Test		
Urea	20,1 mg/dL	20,0-43,0
Creatinine	0,83 mg/dL	0,55-1,02
Uric Acid Test		
Uric acid	6,8 mg/dL	2,4-6,0

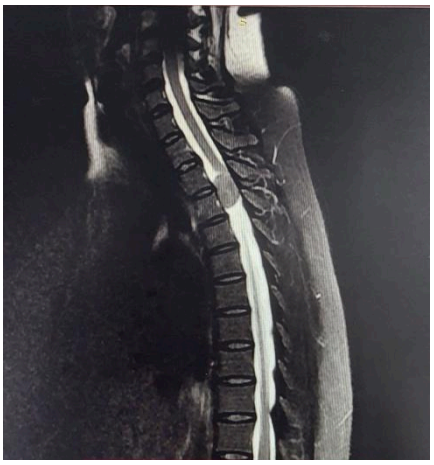

Figure 1. Non-contrast MRI sagittal T2 *fat saturation* section shows a well-defined nodular lesion, intradural extramedullary at the level of Th 2-3, in the left posterolateral aspect, with signal intensity relatively iso-intense to the spinal cord

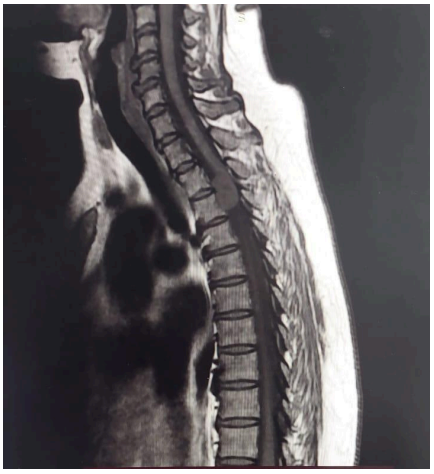

Figure 2. Non-contrast MRI sagittal T1 section on the thoracic vertebrae shows a well-defined intradural extramedullary nodule at the level of thoracic vertebrae 2-3. There is also spinal nerve compression at that level.

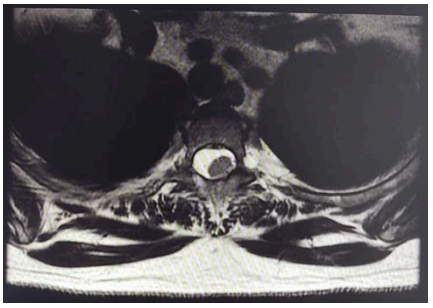

Figure 3. A well-defined hyperintense mass is seen at the T2–T3 level on axial T2-weighted non-contrast MRI of the thoracic spine. The lesion causes asymmetric spinal cord deformity, with the cord displaced to the right.

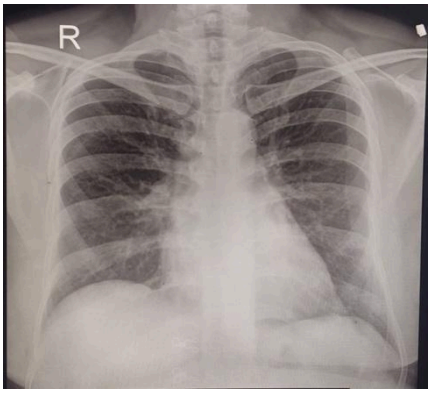

Figure 4. Chest X-ray shows increased bronchovascular markings, air bronchogram within normal limits, and normal heart size

DISCUSSION

Spinal tumors are considered rare, accounting for approximately 15% of all central nervous system tumors, with 90% of cases occurring in individuals of working age (>20 years). The exact prevalence of spinal cord tumors in Indonesia remains unknown. In the United States, the estimated incidence is

approximately 2–10 cases per 100,000 people per year. The most common early symptom is localized or nocturnal pain, or pain radiating to the extremities, including the arms and/or legs. Back pain is typically progressive, unrelated to activity, and may worsen when lying down.[1] There is a known association between spinal tumors and trauma, which may lead to pathological fractures. Tumors often originate within the vertebral body, initially causing bone remodeling and cortical thinning, which may subsequently lead to fracture and invasion of paravertebral structures. When a fracture occurs, symptoms such as nerve compression, neurological deficits, and gait instability may develop.[2]

Spinal tumors are classified into two categories based on etiology: primary and secondary. Primary spinal tumors are rare and often asymptomatic. Their exact etiopathogenesis remains unclear, though potential contributing factors include viral infections, genetic mutations, and exposure to carcinogenic substances. Genetic history plays a role in increasing the incidence among family members (syndromic group), as seen in neurofibromatosis type 1.[1] Primary spinal tumors are a group of tumors that originate from the spinal cord (intradural) or the vertebrae themselves (extradural).[4] Extradural spinal tumors are usually metastatic, originating from cancers in other organs. Secondary (metastatic) tumors arise when cancer cells spread hematogenously, infiltrate spinal vasculature, and establish new tumor foci in the spine.[1]

Intradural tumors may be intramedullary, extramedullary, or both. Extramedullary tumors arise from peripheral nerve roots or meninges, while intramedullary tumors develop from glial cells within the spinal cord.[4] Intradural-extramedullary tumors are more common than intradural-intramedullary tumors, accounting for around 40% of all spinal tumors, whereas intramedullary types comprise approximately 5%. Common intramedullary tumors include ependymomas, astrocytomas, and hemangioblastomas. The most frequent intradural-extramedullary tumors are schwannomas and meningiomas.[1] Meningiomas represent about 25% of all spinal tumors, with 80% located in the thoracic region, 25% in the cervical region, 3% in the lumbar region, and

2% at the foramen magnum.[1]

Imaging is the most crucial diagnostic modality for evaluating spinal tumors. Computed tomography (CT) provides detailed information on cortical bone and tumor calcification, while magnetic resonance imaging (MRI) is superior for visualizing soft tissues, paraspinal lesions, spinal cord involvement, and epidural extension.[5] MRI helps differentiate between extradural, intradural-extramedullary, and intramedullary tumors, and correlates well with histopathological findings. Radiological features must be interpreted alongside age, gender, tumor location, and imaging characteristics to establish an accurate differential diagnosis. MRI is also essential for treatment planning and therapy monitoring.[6] Additional diagnostic tools include biopsy, which is recommended for lesions not suspected of malignancy or those with bony destruction. The four types of biopsy techniques are: fine-needle aspiration biopsy (FNAB), core needle biopsy, incisional biopsy, and excisional biopsy.[5] Immunohistochemistry is another essential diagnostic approach. Numerous antibodies are available to profile tumor subtypes; hence, selecting the appropriate antibody panel is crucial. Factors such as tumor histomorphology, anatomical location, clinical history, and the sensitivity/specificity of the antibodies guide this selection.[7]

A 44-year-old female undergoes a plain chest X-ray showing increased bronchovascular markings, no prominent air bronchogram (within normal limits), and a normal heart size. Routine blood tests revealed anemia (low hemoglobin), thrombocytosis, elevated white blood cell count, increased eosinophils, elevated neutrophil-to-lymphocyte ratio, and raised uric acid levels. Platelet distribution width (PDW) was decreased.

A non-contrast MRI of the thoracic spine revealed a well-defined intradural-extramedullary nodule at the T2–T3 level in the left posterolateral aspect, seen on sagittal T2 fat-saturation and T1-weighted images. Histopathological analysis showed lobulated tumor fragments containing numerous psammoma bodies. The tumor cells were relatively monomorphic, medium-sized, with moderate to abundant cytoplasm, round-to-oval

or spindle-shaped nuclei, regular chromatin, occasional intranuclear pseudoinclusions, and stromal vascular dilation, without evidence of malignancy. Differential diagnoses included schwannoma and meningioma. The patient undergoes a laminectomy for tumor resection.

Spinal tumors are treated using surgical and/or non-surgical methods. Surgery is the mainstay of treatment, aiming to achieve tumor control, decompress the spinal cord, and restore spinal stability. In primary tumors, surgical excision is performed with curative intent; in metastatic tumors, surgery is palliative to relieve symptoms.[8] Laminectomy is a common surgical approach for tumor resection while preserving nerve integrity.[9] Non-surgical management includes chemotherapy, radiotherapy, and immunotherapy. Chemotherapy is used for inoperable or advanced tumors, although high systemic doses are required to reach effective spinal concentrations. Radiotherapy is often employed preoperatively, postoperatively, or when surgery is contraindicated. Immunotherapy aims to enhance immune recognition and destruction of tumor cells.[8] Surgical strategies for metastatic spinal tumors are guided by a classification system based on three prognostic factors: histological grade of the primary tumor, presence of visceral metastases (e.g., lungs, liver, kidneys, brain), and bone metastases, including spinal involvement.[2]

CONCLUSION

Spinal tumors may be classified as primary or secondary. The patient presented with back pain and bilateral lower limb weakness. A definitive diagnosis was made using MRI and histopathology. Laminectomy was performed as the treatment of choice. Immunohistochemical analysis is recommended for further tumor subtyping.

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