

# AMSER Case of the Month:

## Thoracic Spinal Meningioma

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# Patient Presentation

## HPI

- Patient P. is a 69 y.o. male with a known, small, and previously asymptomatic spinal mass discovered incidentally on low back pain workup.
- He presents with 1 year of gradually worsening, right-sided, shooting and burning pain at the level of the navel.
- He denies incontinence of any kind, lower extremity weakness, fevers, night sweats and weight loss.
- On physical exam, there is diminished vibratory sensation at bony prominences from the knees down. There are no other abnormal findings.
- Basic labs were normal.

What Imaging Should We Order?

# Select the applicable ACR Appropriateness Criteria

**Clinical Condition:** Low Back Pain

**Variant 3:** Acute, subacute, or chronic low back pain or radiculopathy. One or more of the following: suspicion of cancer, infection, or immunosuppression.

Radiologic Procedure	Rating	Comments	RRL*
MRI lumbar spine without and with IV contrast	8	Contrast is useful for neoplasia patients suspected of epidural or intraspinal disease.	○
MRI lumbar spine without IV contrast	7	Noncontrast MRI can be sufficient if there is low risk of epidural and/or intraspinal disease.	○
CT lumbar spine with IV contrast	6	MRI is preferred. CT is useful if MRI is contraindicated or unavailable and/or for problem solving.	⊗⊗⊗
CT lumbar spine without IV contrast	6	MRI is preferred. CT is useful if MRI is contraindicated or unavailable and/or for problem solving.	⊗⊗⊗
X-ray lumbar spine	5		⊗⊗⊗
Tc-99m bone scan whole body with SPECT spine	4	SPECT/CT can be useful for anatomic localization and problem solving, in particular if looking for widespread tumor burden. It is valuable when multifocal metastases are suspected.	⊗⊗⊗
FDG-PET/CT whole body	4	MRI is preferred. This procedure can be indicated if MRI is contraindicated or nondiagnostic. It can distinguish benign versus malignant compression fractures.	⊗⊗⊗⊗
CT lumbar spine without and with IV contrast	3	MRI is preferred. This procedure can be indicated if MRI is contraindicated or nondiagnostic.	⊗⊗⊗⊗
CT myelography lumbar spine	3	MRI is preferred. This procedure can be indicated if MRI is contraindicated or nondiagnostic and can be useful for anatomic localization and problem solving.	⊗⊗⊗⊗
<b>Rating Scale:</b> 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			<b>*Relative Radiation Level</b>

This imaging modality was ordered. Note, it was a MRI Thoracic spine.



Sagittal T1-weighted MRI of thoracic spine



Sagittal T2-weighted MRI of thoracic spine



Sagittal T1-weighted MRI of thoracic spine with contrast



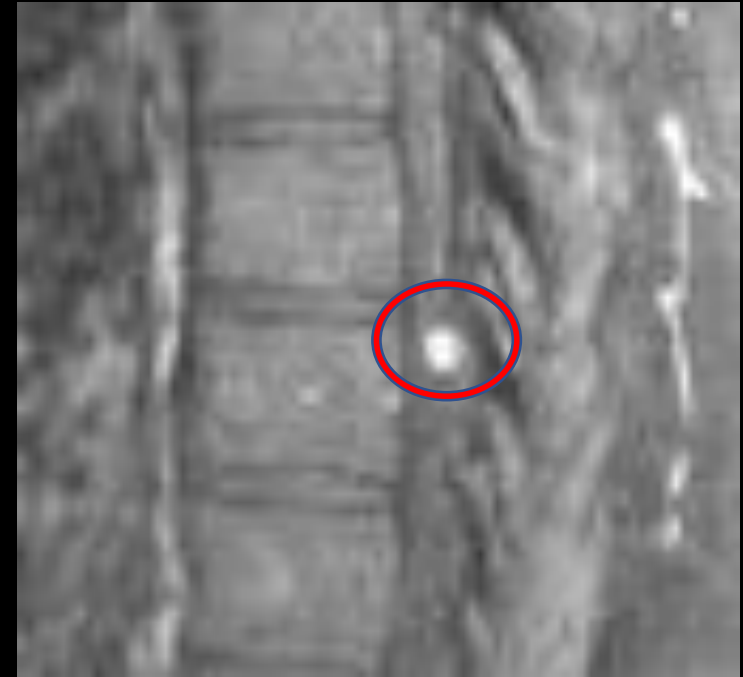
Sagittal T1-weighted MRI of thoracic spine



Sagittal T2-weighted MRI of thoracic spine

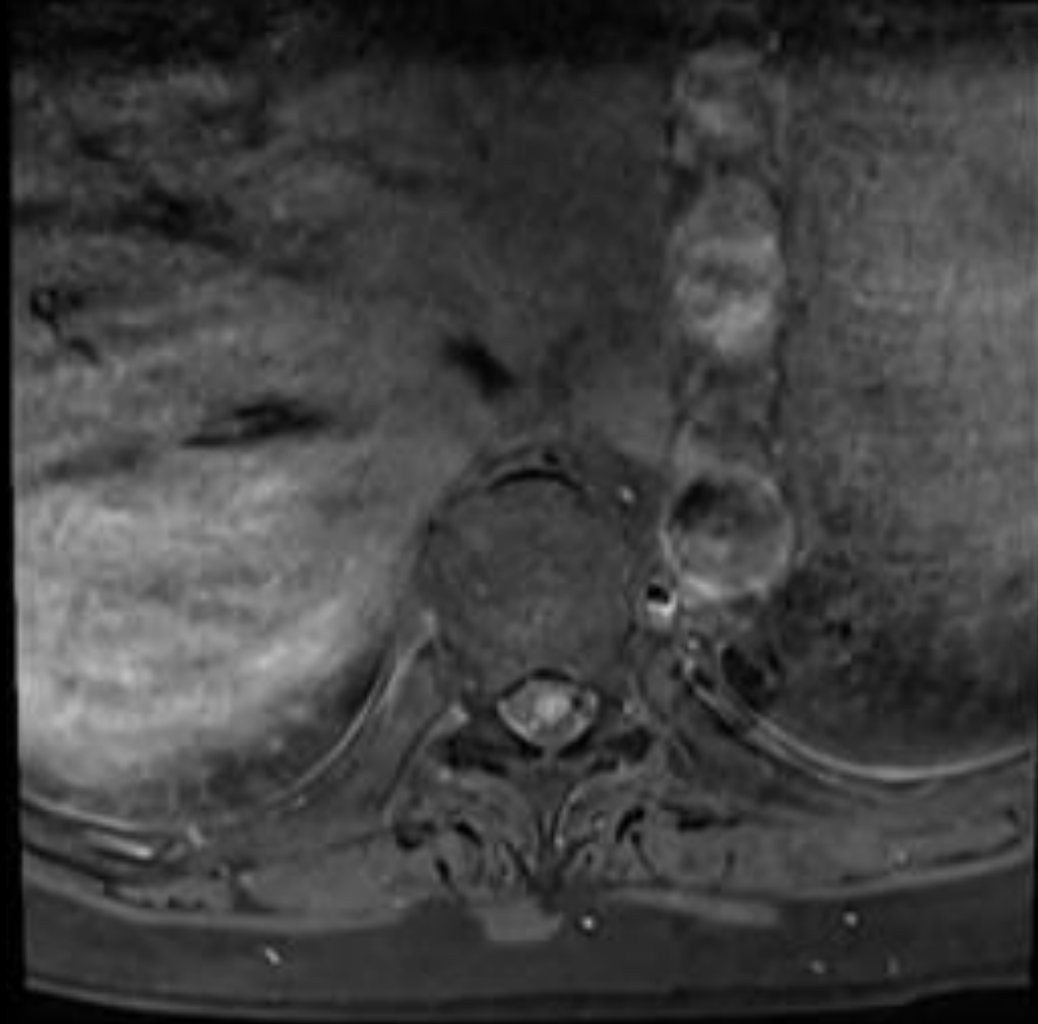


Sagittal T1-weighted MRI of thoracic spine with contrast



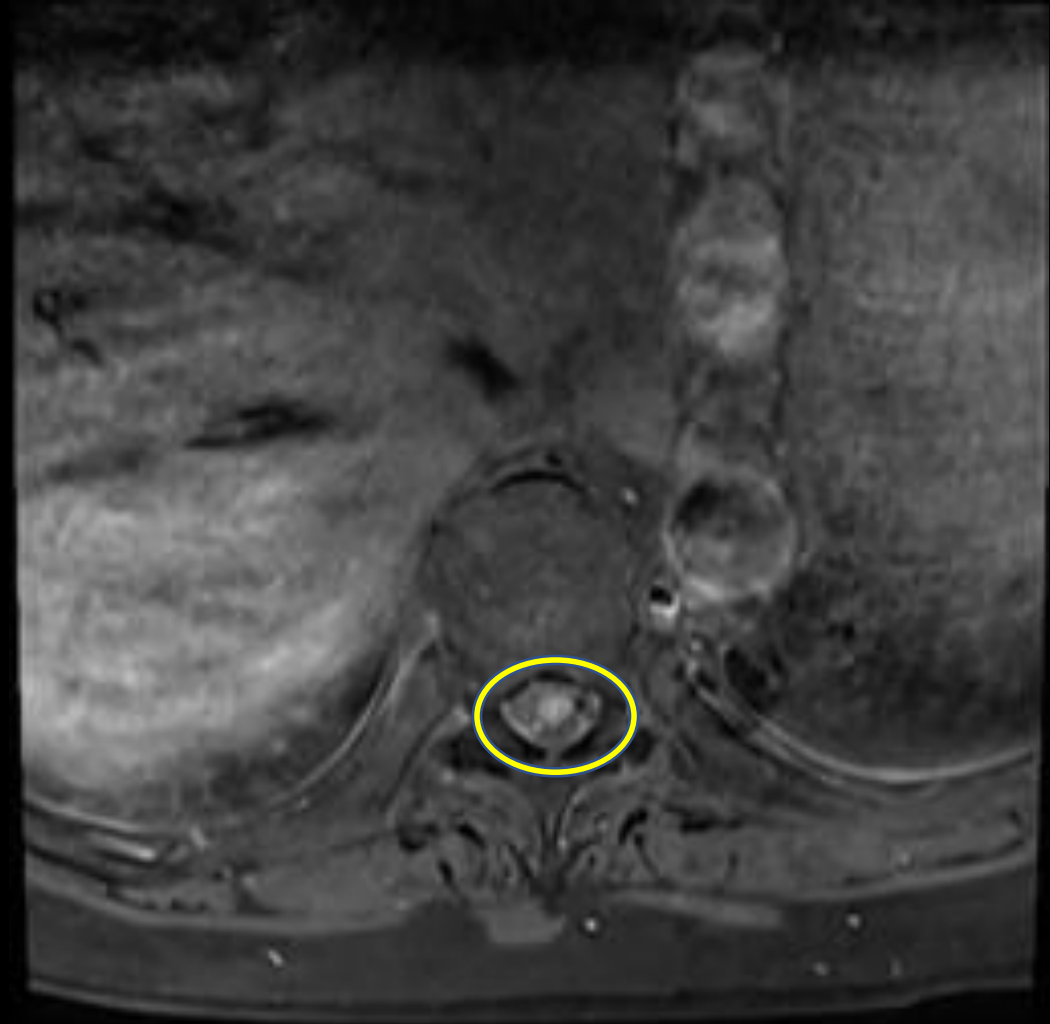
Thoracic MRI demonstrates a 0.8 cm, round lesion that is (A) T1 isointense with the spinal cord, (B) T2 isointense with the spinal cord, and (C) avidly enhances with contrast. The lesion arises from the dura, encroaches dorsally and appears to compress the adjacent cord.

T1-weighted, contrast-enhanced, axial fat-saturated MRI of the thoracic spine



T1-weighted, contrast-enhanced, axial fat-saturated MRI of the thoracic spine

- This image demonstrates a contrast-enhancing lesion encroaching dorsally on the spinal cord.





# Differential Diagnosis

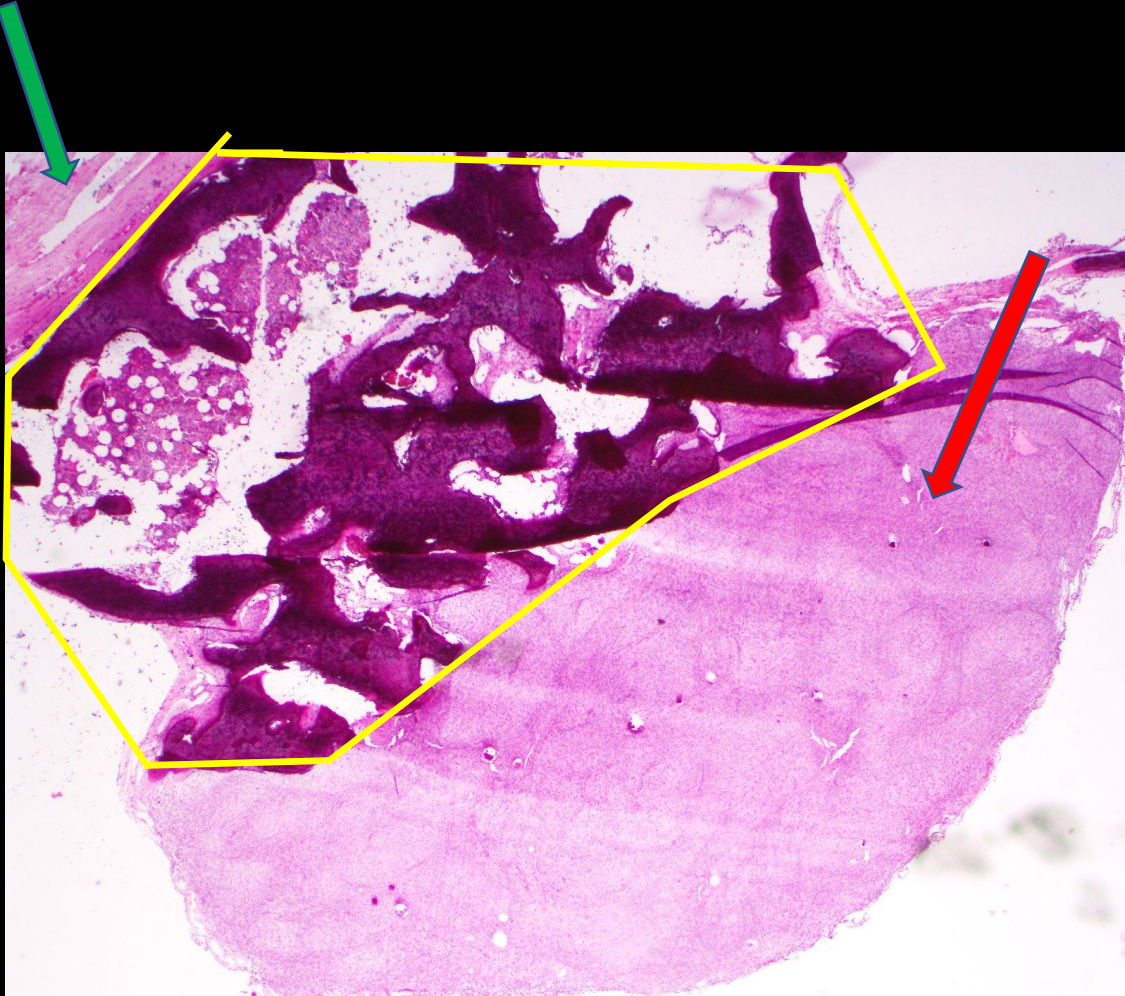
- Meningioma
- Solitary fibrous tumor
- Dural metastasis

# Pathology (Gross)



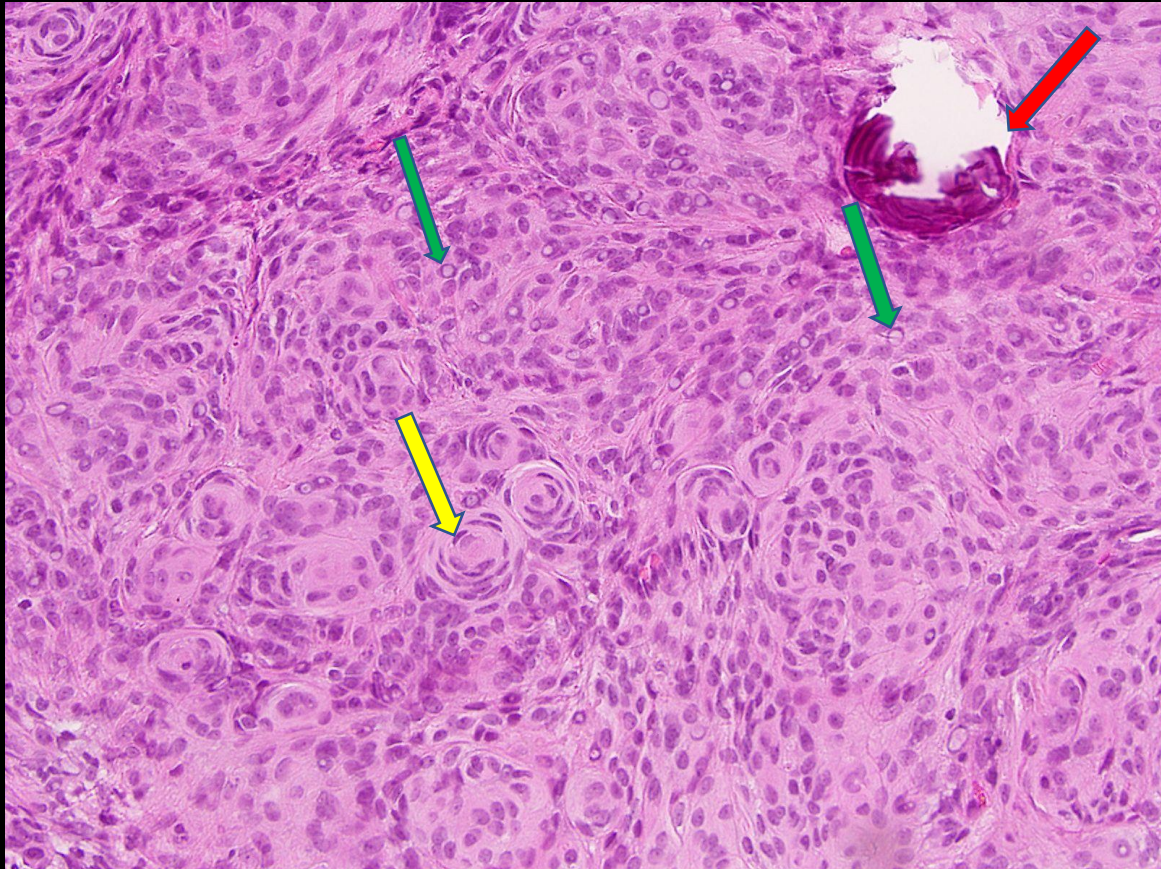
- This gross view of the dural-based mass post resection via vertebral laminectomy shows a tan-yellow surface (yellow arrow) with a bone plug and some associated dura (red arrow).

# Pathology(Micro)



- This low power microhistology shows an associated dural layer (green arrow), a middle bone plug layer with medullary bone bordered by darker cortical bone (yellow-bordered area), and a well-circumscribed, highly cellular mass (red arrow).

# Pathology(Micro)



- This high power microhistology shows a field of spindle-shaped cells with prominent nuclei and intranuclear pseudo-inclusions (green arrows). The cells are occasionally arranged in whorls (yellow arrow) which are sometimes secondarily calcified (red arrow).

# WHO Grade 1 Meningioma

# Case Discussion

- Meningioma is the most common CNS tumor and arises from meningocytes of the dura mater.
- Sporadic meningioma occurs at median age 65 in females more than males.
- Inherited syndromes: neurofibromatosis, schwannomatosis.
  - Patients presenting with meningioma before age 4 should undergo genetic screening for neurofibromatosis II (mutated NF2 gene of chromosome 22).
- Risk factors: radiation exposure
- Association between meningioma occurrence and hormonal exposure. Meningiomas can be responsive to estrogen and/ or progesterone and therefore may grow during pregnancy.
- Meningiomas most frequently occur intracranially at dural reflections such as the falx cerebri and tentorium cerebelli.
- Fewer than one third of meningiomas occur in the spine.
- Typically asymptomatic but may present with seizures, headache, vision changes, or focal neurologic deficits.

# Management

- Management of meningiomas is guided by symptomatology and **WHO grade**, a histologic designation:
- WHO I meningiomas lack features of higher grades.
- WHO II meningiomas demonstrate high mitotic activity, increased nuclear: cytoplasmic ratio, invasive behavior, or necrosis.
- WHO III meningiomas demonstrate many of the same traits in greater amounts. For example, greater than 20 vs greater than 4 mitoses per high-powered field are required for WHO III grading.
- Small, WHO I, asymptomatic meningiomas may be observed with MRI every 3-6 months.
- Aggressive, higher-grade, or symptomatic meningiomas are resected, as in our patient who underwent resection via laminectomy.
- Unresectable meningiomas require radiotherapy.

# Radiologic and Pathologic characteristics

- Meningiomas are isointense to gray matter on both T1- and T2-weighted MRI
- Isodense to gray matter on CT imaging
- Avidly contrast-enhancing in both modalities.
- They are dural-based, typically not invasive, displace adjacent tissue via mass-effect, and often demonstrate a dural tail.
- They most often occur at dural reflections.
- Pathologically, WHO I meningiomas demonstrate whorls of spindle-like meningothelial cells with cleared-out intranuclear “pseudo-inclusions.” There may also be whorled and secondarily calcified psammoma bodies.



# References:

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