Texas Society of Neuroradiology (TSNR)
Educational Abstract
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Imaging Mimics of Spinal Metastatic Disease: Diagnostic Pitfalls and Differentiation Strategies

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Summary

To review common and uncommon imaging entities that mimic spinal metastatic disease, emphasizing distinguishing features across MRI, CT, and nuclear medicine studies. Through representative cases, the exhibit highlights characteristic imaging patterns, key differentiating clues, and frequent diagnostic pitfalls that may lead to misclassification. The target audience includes neuroradiology trainees and practicing radiologists seeking to improve diagnostic accuracy and confidence when evaluating suspected spinal metastases.

Educational Objectives

A) Identify common benign entities that mimic spinal metastatic disease on imaging. B) Differentiate metastatic lesions from mimics using multimodality imaging features and pattern recognition. C) Avoid common diagnostic pitfalls that may lead to unnecessary biopsy, treatment delay, or overtreatment.

Background and Purpose

This exhibit presents a curated series of cases demonstrating common mimics of spinal metastatic disease, including vertebral hemangiomas, degenerative endplate changes (Modic changes and Schmorl nodes), osteoporotic compression fractures, infectious spondylodiscitis, and lymphoma. Imaging findings on MRI, CT, bone scintigraphy, and FDG PET/CT are compared and correlated. Emphasis is placed on lesion distribution, marrow signal characteristics, enhancement patterns, cortical integrity, and associated soft-tissue findings.

Materials and Methods

This exhibit presents a curated series of cases demonstrating common mimics of spinal metastatic disease, including vertebral hemangiomas, degenerative endplate changes (Modic changes and Schmorl nodes), osteoporotic compression fractures, infectious spondylodiscitis, and lymphoma. Imaging findings on MRI, CT, bone scintigraphy, and FDG PET/CT are compared and correlated. Emphasis is placed on lesion distribution, marrow signal characteristics, enhancement patterns, cortical integrity, and associated soft-tissue findings.

Results

Distinct imaging features allowed reliable differentiation between metastatic disease and mimics. Benign lesions typically demonstrated preserved marrow fat, well-defined margins, lack of aggressive cortical destruction, or characteristic enhancement patterns. Degenerative and traumatic entities showed predictable anatomic distributions and associated mechanical features, while infection demonstrated discal involvement and inflammatory paraspinal changes. Awareness of these patterns reduced diagnostic ambiguity and improved confidence in excluding metastatic disease without invasive intervention.

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Conclusion

Numerous benign and non-neoplastic processes can mimic spinal metastatic disease on imaging. A systematic, multimodality approach emphasizing pattern recognition and key distinguishing features enables accurate diagnosis, prevents unnecessary procedures, and supports appropriate clinical management. Familiarity with these mimics is essential for neuroradiologists involved in oncologic imaging.

References

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Figures

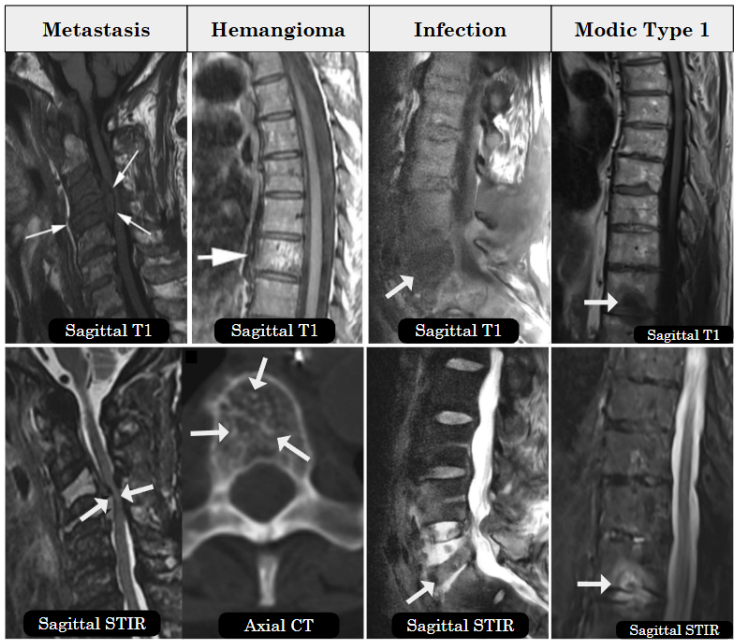

Figure 1. Common mimics of spinal metastatic disease.

Case 1. Top: T1W image shows pathologic fracture of C4 and epidural tumor compromising the spinal canal (arrows). Bottom: STIR image shows the deformity and compression of the spinal cord (arrows).

Case 2. Top: T1W image shows areas of bright signal in T8 vertebral body (arrow). Bottom: Axial CT scan image from chest study shows typical thickened vertical trabeculae within the T8 hemangioma (arrows).

Case 3. Top: T1W image shows low T1 signal involving adjacent vertebral endplates and intervening disc space (arrow). Bottom: Marked STIR signal within the involved disc and adjacent vertebral bodies (arrow), consistent with marrow edema and discal inflammation.

Case 4. Top: T1W image shows low signal involving the vertebral body marrow immediately adjacent to the affected endplate (arrow). Bottom: High STIR signal at the same endplate-adjacent region (arrow), reflecting marrow edema (Modic type 1 change).

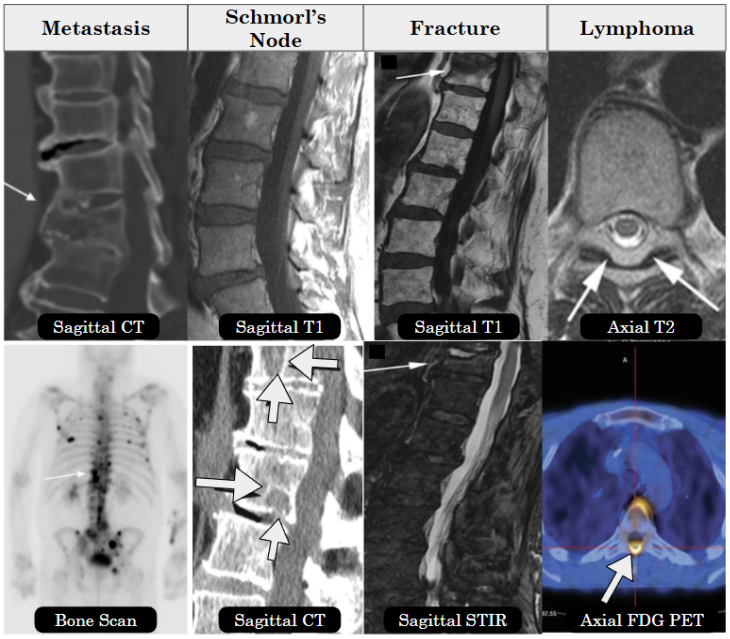

Figure 2. More imaging mimics of spinal metastatic disease across modalities.

Case 1. Top: CT shows a compression deformity at T12 (arrow). Bottom: Skeletal scintigraphy posterior projection shows numerous focal areas of increased uptake involving the thoracolumbar spine (arrow), ribs and pelvis.

Case 2. Top: MRI obtained 12 years ago showing normal bone marrow at L1 and T11. Bottom: Suspicious new lucent areas were identified in the L1 and T11 vertebral bodies (arrows). Subtle endplate defects indicating that the disc has herniated through the endplate into the vertebral body (Schmorl's node).

Case 3. Top: T1W image shows linear low signal in deformed upper T11 vertebral body (arrow). Bottom: STIR image shows high signal in deformed upper T11 vertebral body (arrow) compatible with compression fracture.

Case 4. Top: T2W image shows subtle low signal in posterior epidural space which is slightly enlarged. Similar low signal was seen on T1W images. Bottom: FDG PET images show high metabolic activity in posterior thoracic epidural space (arrow) compatible with patients hx of lymphoma.