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Metastatic Osseous Disease masquerading as infection, diagnosed on Bone Scintigraphy and SPECT/CT: A case report.

Metastatic Osseous Disease on Bone Scintigraphy and SPECT/CT.

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Abstract:

We present a 72-year-old female with an osseous metastasis to the spine, which had an atypical appearance on both nuclear medicine and radiological modalities and was misdiagnosed as an abscess. We discuss the pitfalls of bone scintigraphy and the causes of photopenic metastatic lesions.

Keywords:

Bone

Scintigraphy

Metastases

Photopenic

Introduction:

Despite its low specificity, bone scintigraphy is the one of most commonly ordered tests in the investigation of suspected skeletal metastases *(1)*. Sclerotic metastases are typically radiopharmaceutical avid on bone scintigraphy and on SPECT/CT. Metastases may show bone destruction and/or an extraosseous soft tissue component *(2)*. This is a case report of an atypical metastasis which was not avid on bone scan and had a large cystic component causing diagnostic uncertainty.

Case Report:

A 72-year-old female presented with back pain and right leg radiculopathy. Past medical history included spindle-cell sarcoma of the left thigh treated with radiotherapy and surgery 1 year prior.

Contrast enhanced CT demonstrated a ring-enhancing lesion involving the posterior elements of the right L4 vertebra with a soft tissue component extending into the neural foramen and spinal canal.

On MRI the lesion was of uniform low T1 signal. T2 signal was mixed, with fluid-fluid levels, consistent with intralesional haemorrhage. Post-gadolinium there was peripheral enhancement and central non-enhancement (*fig 1*).

The patient was afebrile with a normal white cell count; however C-reactive protein levels rose from 12 to 175mg/L. The differential diagnosis was metastatic deposit versus infection.

Ultrasound-guided fine needle aspiration was performed and histology revealed large numbers of neutrophils and other inflammatory cells, with no malignant cells, diagnostic of a paraspinal abscess.

Despite these results, there was ongoing concern and bone scintigraphy was performed. Whole body imaging did not show any uptake of 99mTc methylene diphosphonate tracer within the lesion (*fig 2*).

The SPECT/CT images showed bony destruction of the right L4 pedicle, a typical location for a metastasis (*fig 3, 4, 5*). Nuclear Medicine played an important role, by identifying the photopenic lesion associated with lysis and remaining suspicious despite the apparent false-negative whole body study. This prompted CT-guided core biopsy. Histology revealed malignant spindle cells with marked nuclear

atypia and extensive necrosis, consistent with metastatic sarcoma. The patient proceeded for palliative radiotherapy.

Discussion:

Bone scans are frequently used to diagnose osseous metastases with high sensitivity rates of 95% *(3).* However, lesions can be photopenic and the interpreter must be aware of the causes for this. In our case, the highly aggressive, lytic nature of the lesion was the likely cause. For aggressive tumours such as this, FDG PET/CT can play a complimentary role and is indicated in staging for various types of sarcomas. Other photopenic osteolytic tumours include hepatocellular, renal and thyroid carcinoma, and tumours which are confined to the bone marrow, such as myeloma and lymphoma*(4).*

The case also highlights the importance of SPECT/CT as an adjunct to whole body imaging as the CT component adds significant information towards the overall diagnosis. It also emphasizes the importance of thorough review of prior cross-sectional imaging.

A final teaching point this case highlights is the sampling error inherent in fine needle aspiration. Core biopsy should always be preferentially obtained for conclusive histology.

Conclusion:

Metastatic osseous disease is a common disease frequently investigated with bone scintigraphy. It is important for staff involved in nuclear medicine to be aware of potential pitfalls and causes of false-negative whole body imaging. Correlation with SPECT/CT is crucial for detection of associated features of malignancy, particularly in unusual cases.

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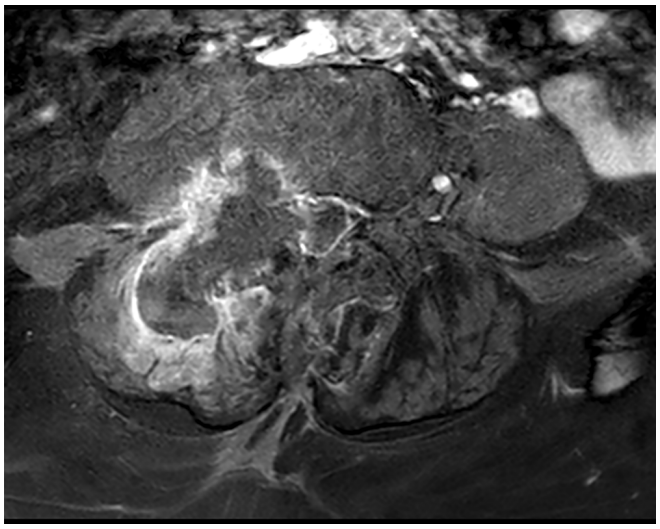

Figure 1 T1 weighted post-contrast axial MRI image through the lesion demonstrates central non-enhancement. Appearances were intially interpreted as a collection, hence infection was the initial proposed diagnosis.

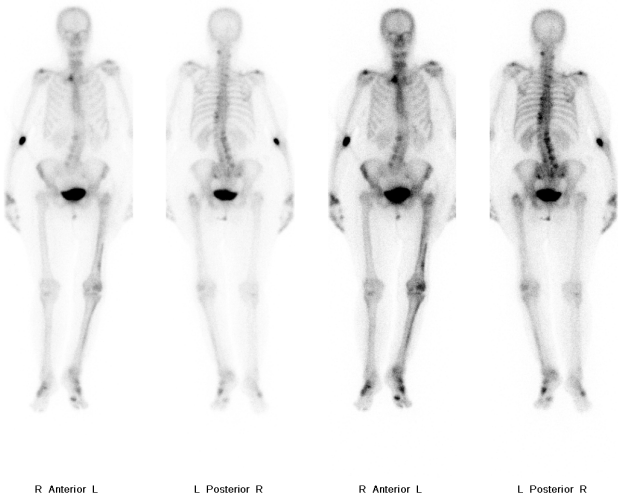

Figure 2 Whole body bone scan demonstrates areas of uptake within the lumbar spine secondary to degenerative change but no tracer uptake in the metastatic lesion. Asymmetric uptake in the left lower limb due to previous surgery, radiotherapy and altered biomechanics.

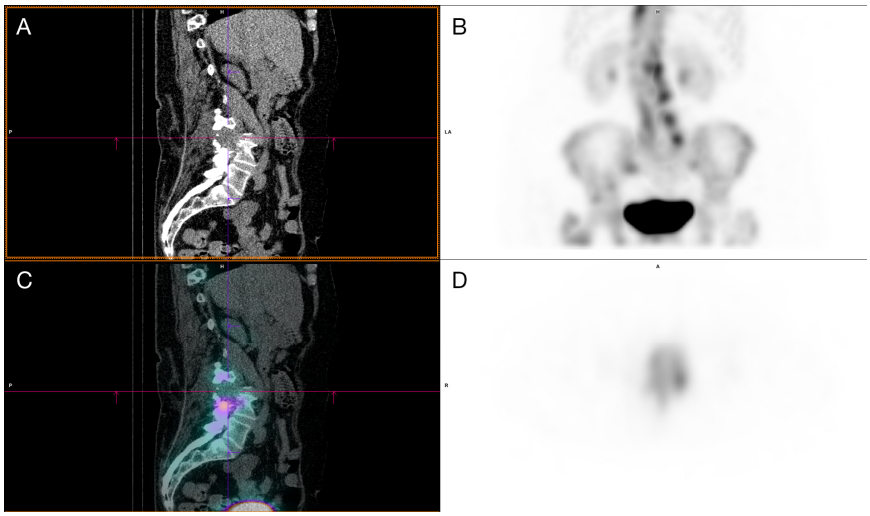

Figure 3 SPECT/CT taken 3 hours after IV administration of 99mTc MDP which shows that the lesion is photopenic, however a soft tissue mass and associated lysis of the right L4 pedicle is evident. A) Sagittal soft tissue reformat, non-contrast CT. B) Maximum intensity projection of SPECT/CT. C) Sagittal soft tissue fused SPECT/CT. D) Axial SPECT acquisition at L4 level.

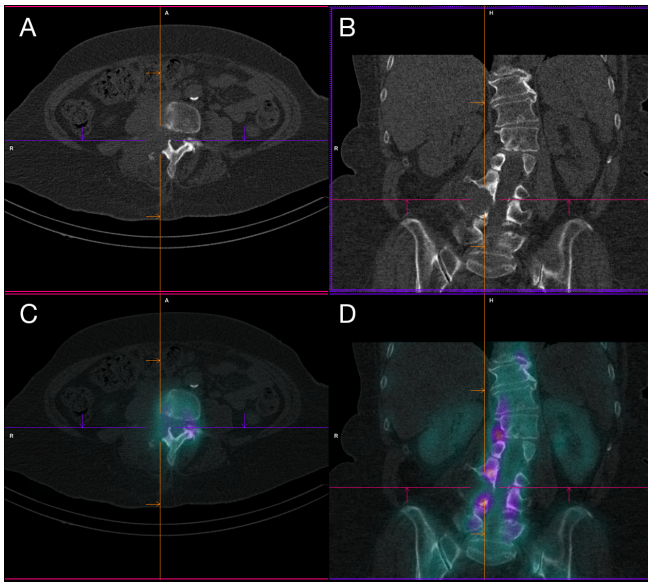

Figure 4 SPECT/CT taken 3 hours after IV administration of 99mTc MDP gives both structural and functional information. A) and B) Axial and coronal bone window CT acquisition. C) and D) Axial and coronal bone window fused SPECT/CT.

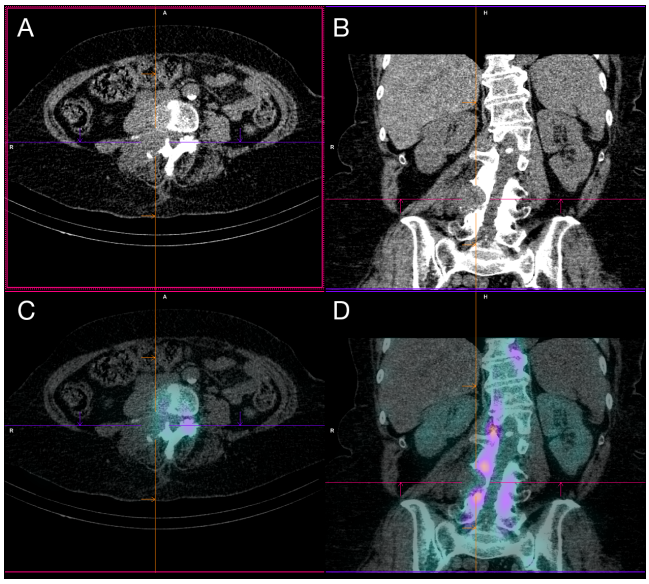

Figure 5 SPECT/CT taken 3 hours after IV administration of 99mTc MDP demonstrating extensive soft tissue involving L4 confirming the diagnosis of metastatic sarcoma. A) and B) Axial and coronal CT soft tissue reformats. C) and D) Axial and coronal fused SPECT/CT.