

Indeterminate single bone lesion on multimodality imaging of prostate cancer

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DESCRIPTION

A 70-year-old asymptomatic man presented to hospital in 2017 for routine surveillance of previously stable prostate cancer being managed with a 'watch and wait' approach. The medical history was unremarkable, performance status 0. Initial diagnosis was 8 years prior with T2aN0M0 Gleason 3+3, Prostate specific antigen (PSA) 7.60 ng/mL.

On active surveillance, his PSA had slightly risen to 8.30 ng/mL.

Imaging restaging with ^{99m}Tc methylene hydroxydiphosphonate bone scintigraphy (^{99m}Tc -HDP) revealed a solitary bone abnormality in the proximal right tibia (figure 1), and pelvic MRI demonstrating localised nodal disease, T3bN1. Template biopsy confirmed prostate adenocarcinoma, now graded as Gleason 4+3.

The multidisciplinary cancer meeting requested an ^{18}F -choline Positron emission tomography-computed tomography (PET/CT) (figure 2) to further assess. The patient would be eligible for radical prostate and nodal radiotherapy if free of metastatic bone disease. ^{18}F -choline PET/CT confirmed avid tracer uptake in the left pelvic nodes (figure 3). The left tibial lesion showed abnormal choline uptake with a corresponding morphological abnormality on CT. This was a single site of abnormal bone uptake. This was felt to be an atypical site of bony metastatic disease. Further imaging with plain radiography and MRI did not clarify the nature of the lesion. Biopsy of the abnormal tibial lesion was performed. This remained an indeterminate lesion which was MNF-116 cytokeratin negative, effectively excluding metastatic disease.¹ With metastatic disease excluded, a pragmatic approach was taken to treat the prostatic primary and local nodal disease with radical radiotherapy, ipso facto, the tibial lesion was considered an incidental finding of no clinical relevance.

The patient received 74 Gy in 37 f of pelvic nodal radiotherapy and responded well. In follow-up of 2018, PSA at 1 year dropped from a previous 8.30 ng/mL to 0.07 ng/mL following the radiotherapy to the prostate and pelvic nodes and maintenance by luteinizing hormone releasing hormone (LHRH) analogue.

While ^{99m}Tc methylene di-phosphonate bone scintigraphy (^{99m}Tc -MDP-bone scan) remains the gold standard of staging for bony metastatic disease in prostate cancer, newer techniques such as MRI with whole body diffusion imaging and PET/CT using ^{18}F -choline

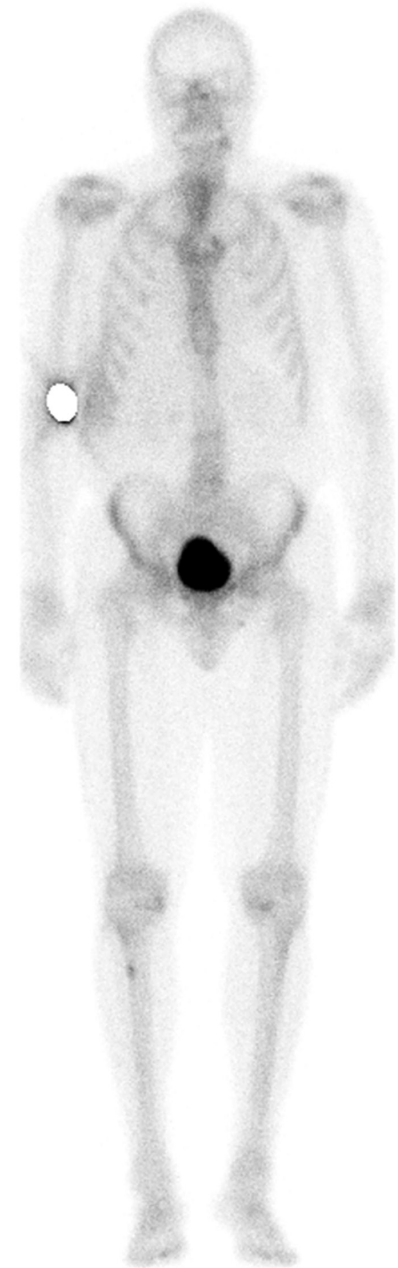


Figure 1 Anterior whole-body planar image of ^{99m}Tc -HDP bone scan showing increased uptake in the proximal right tibial cortex lesion.

are increasingly playing a part in multimodality imaging of prostate cancer however despite a high sensitivity are not completely specific to



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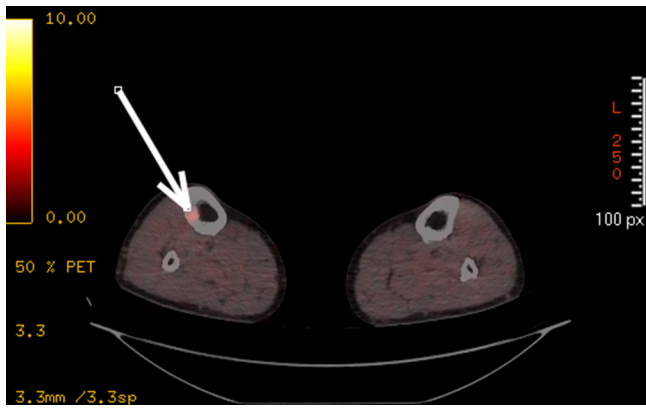


Figure 2 Axial fused ^{18}F -choline PET/CT, arrow showing an abnormally increased tracer uptake within the right tibial cortex lesion.

prostate cancer metastases.² The sensitivity and specificity of ^{18}F -choline PET/CT increases with PSA and Gleason grade.

Choline is a precursor of the phospholipids in cell membranes via the Kennedy pathway. The increased cell membrane synthesis seen in prostate cancer (and other

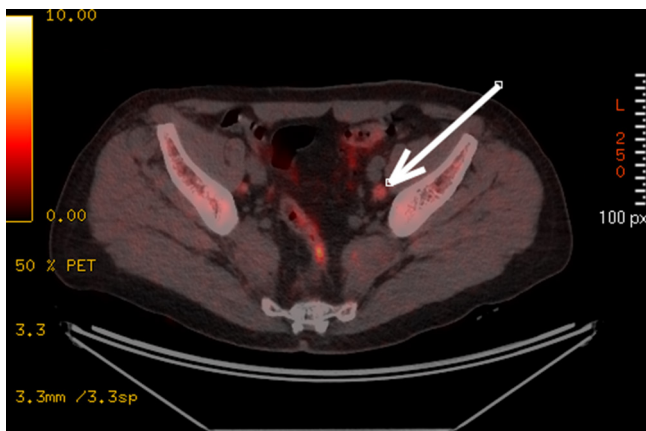


Figure 3 Axial fused ^{18}F -choline PET/CT, arrow showing an abnormally increased tracer uptake within an abnormal left external iliac node.

malignant/inflammatory/infective processes) is the reason for the increased tracer uptake seen on PET/CT.

Newer PET/CT tracers such as ^{18}F -fluciclovine and ^{68}Ga -PSMA are increasingly finding a role in prostate cancer imaging. ^{18}F -PSMA tracers are in clinical development which will provide the combination of high lesion sensitivity without the downside of a short half-life which limits ^{68}Ga -PSMA distribution.³

Learning points

- ▶ ^{18}F -choline PET/CT may be used as a complementary imaging modality agent to ^{99}Tc -MDP-bone scintigraphy in cases of bone metastases in prostate cancer and can clarify indeterminate findings due to its advantage of being a hybrid CT and PET modality.
- ▶ ^{18}F -choline PET/CT is indicated to clarify staging on conventional imaging and to exclude metastases prior to localised prostate or prostate \pm local nodal treatment.
- ▶ No imaging biomarker is completely specific to prostate cancer cells so imaging information from complementary studies is required, with the use of lesion biopsy in indeterminate cases.

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Patient consent Obtained.

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