

IMAGING GAMUT

Unusual appearance of ^{99m}Tc -HMPAO brain perfusion SPECT in unsuspected Paget's disease of the skull

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Key words: *Paget's disease, HMPAO, brain perfusion SPECT*

Background A 74-year-old woman was referred for a ^{99m}Tc -HMPAO (Hexamethylpropyleneamine Oxime) brain perfusion SPECT scanning for suspected early dementia.

Procedure Brain perfusion SPECT scan was performed 60 minutes after intravenous injection of 740 MBq ^{99m}Tc -HMPAO using a dual headed high resolution gamma camera. SPECT scan was acquired using 64 (30 sec) projections over 360° with a matrix size of 128 x 128. Images were reconstructed using filtered back projection algorithm, attenuation corrected, and the transverse slice oriented to parallel, coronal and sagittal views.

Findings The brain perfusion SPECT scan images demonstrated an unusual structural pattern with apparent marked increased thickness of the grey matter (Figure 1). This finding was highly unusual and inexplicable when compared with matching images of a representative normal brain perfusion SPECT scan (Figure 2).

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Conclusion The patient was referred for an MRI scan of the skull to determine the underlying cause of the rather bizarre pattern of uptake seen on the brain perfusion SPECT scan. The patient's MRI scan did not show any abnormality of the grey or white matter but showed gross skull base and vault thickening with appearances consistent with Paget's disease of the skull (Figure 3).

Comments The non-hormonal osteometabolic disorder of Paget's disease is characterised by a dramatic increase in local bone metabolism and increased vascularity. Consequently, in patients with Paget's disease of the skull the ^{99m}Tc -HMPAO is taken up both by the cerebral cortex and the highly vascular and thickened skull. As seen in this case, unsuspected Paget's disease of the skull can result in intense calvarial uptake of ^{99m}Tc -HMPAO with consequent loss of differentiation between the intracerebral and extracerebral uptake.

Concurrent calvarial or scalp pathology may produce an abnormal activity pattern on brain scans, often masking the intracranial disease and rendering them either non-diagnostic or resulting in an erroneous diagnosis. In the past, Paget's involvement of the skull has been reported to result in an abnormal pattern of uptake on brain scans performed with hydrophilic blood-brain barrier imaging agents.

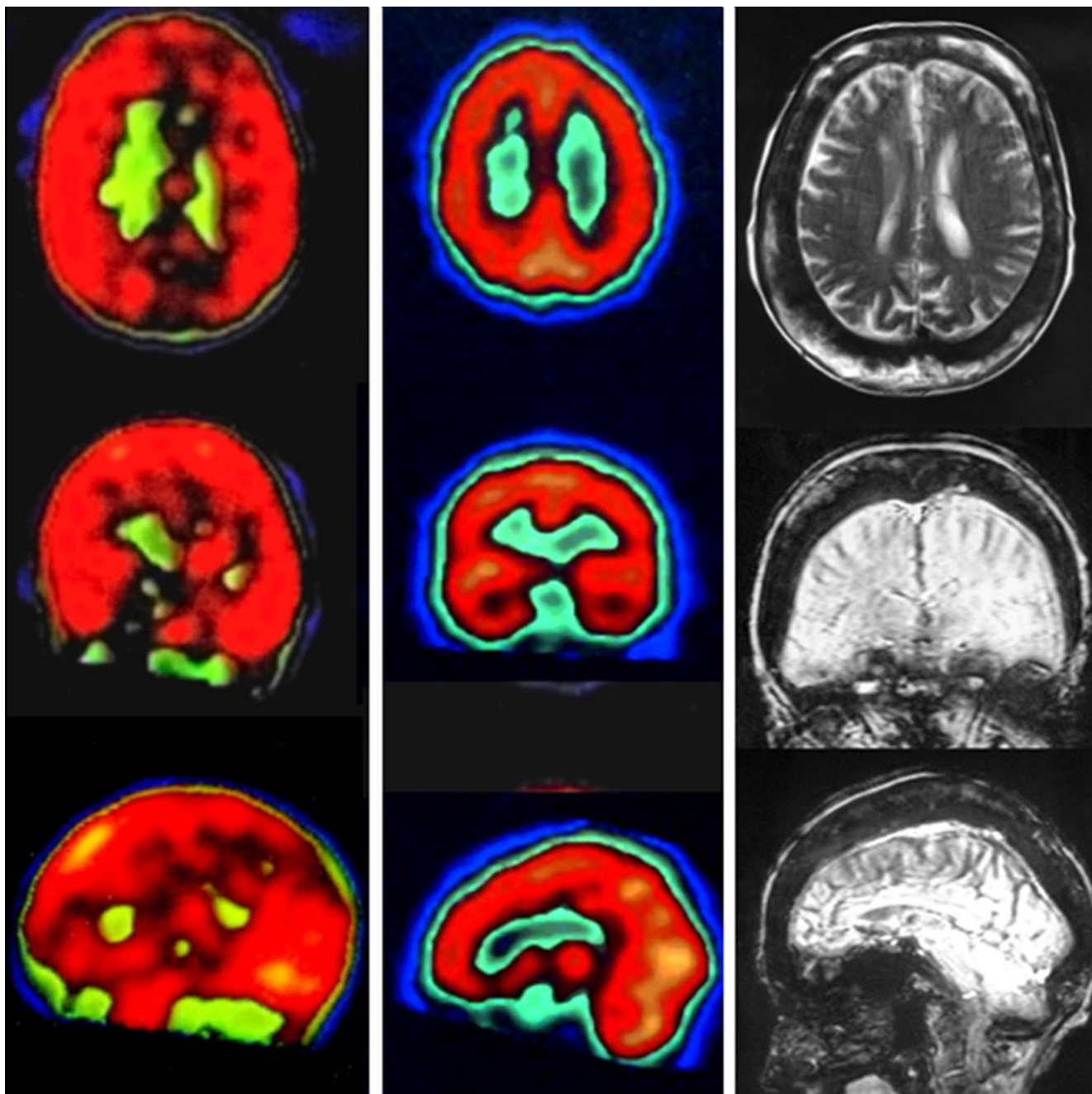


Figure 1 (Left) ^{99m}Tc -HMPAO brain SPECT scan transaxial (top), coronal (middle) and sagittal (bottom) images showing apparent marked thickening of the grey matter

Figure 2 (Middle) Representative brain scan images of a normal patient shown for comparison in the middle column above

Figure 3 (Right) The MRI scan shows gross skull base and vault thickening, an increase in marrow space and abnormal bone remodelling with hyperintense areas depicting preserved yellow marrow and markedly hypointense areas depicting areas of sclerosis. These findings are typical of Paget's disease of the skull. The underlying brain parenchyma appears intact with no abnormality of the grey or white matter seen

This abnormal uptake may result in a positive scan consistent with an incorrect diagnosis or mask the underlying pathology. The ^{99m}Tc pertechnetate brain scans have been reported as positive in patients with known Paget's disease of the skull [1, 2]. In one patient with previously unsuspected Paget's disease, the ^{99m}Tc -pertechnetate scan was reportedly positive with the appearances suggestive of a subdural haematoma [3]. In another patient, a positive ^{99m}Tc -DTPA brain scan was reported to mask the underlying cerebrovascular disease [4]. However, this potential source of error has not been previously reported with the current lipophilic brain imaging agents such as the ^{99m}Tc -HMPAO in brain perfusion SPECT imaging.

References

1. Kieffer SA and Loken MK. Positive brain scans in fibrous dysplasia and other lesions of the skull. *AM J Roentgenol Radium Ther Nucl Med* 1969;106:731-738.
2. Fitzr PM. Nuclide angiography in Paget's disease of the skull: Case report. *J Nucl Med* 1975;16:619-621.
3. Preimesberger KF, Loken MK, Shaferr B. Abnormal brain scan in Paget's disease of bone-confusion with subdural hematoma. *J Nucl Med* 1974;15(10):880-3.
4. Kenneth R Hofstetter, Dennis D Patton and Robert E Henry. Cerebral Perfusion Deficit Masked by Paget's Disease of Skull. *J Nucl Med* 1978;19:197-199.