Scintigraphic pitfall: delayed radionecrosis

Case illustration

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The use of [18F]2-fluoro-2-deoxyglucose positron emission tomography (FDG-PET) and 201 Tl-single-photon emission computerized tomography (SPECT) is helpful in characterizing the presence of space-occupying lesions in patients in whom brain masses are otherwise not clearly demonstrated. These neuroimaging procedures may help to overcome the limited specificity of magnetic resonance (MR) imaging or cerebral CT scanning, especially in patients who have previously undergone radiotherapy. Nevertheless, in rare cases cerebral radionecrosis can also be seen to mimic malignancy on scintigraphic imaging studies in which various radiopharmaceutical agents and combinations thereof are used.

More than 20 years after undergoing total resection and postoperative radiotherapy for the treatment of malignant melanoma of the forehead, this 76-year-old patient presented with evidence of high glucose metabolism, high Tl uptake, and slow Tl washout found in a space-occupying lesion of the left frontal cranium (Figs. 1 and 2). Examination of the scintigraphic images and uptake indices demonstrated characteristics that were typical of malignancy due to recurrent metastasis or radiation-induced glioma. Therefore, we performed open surgery for the complete resection of the lesion.

Histopathological examination revealed radionecrosis without evidence of malignancy, and the postoperative cerebral CT, neurological examination, and clinical follow-up evaluation were unremarkable. Thus false-positive findings on FDG-PET and 201 Tl-SPECT can be demonstrated in patients with a history of radiotherapy even when this therapy had been undertaken more than two decades earlier and when clinical, morphological, and scintigraphic data are indicative of malignancy.

References


Fig. 1. Contrast enhanced T1-weighted MR image, transaxial view, revealing a space-occupying lesion in the left frontal lobe. There is distinct circular contrast enhancement in the wall of the cystic lesion, and the solid, contrast-enhanced tumor part is present occipitolaterally.

Fig. 2. Preoperative nuclear imaging demonstrating (left) intense initial left frontal uptake of thallium-201 (early scan obtained 15 minutes after injection of radiopharmaceutical), high trapping of thallium-201 in the delayed scan (center, 3 hours after injection of contrast agent), and (right) radiopharmaceutical uptake on FDG-PET study. Arrows indicate the lesion.