

Parathyroid hyperplasia detected by F-18-Choline PET/CT, negative on Tc-99m-MIBI SPECT/CT and F-18-Deoxyglucose PET/CT scans

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A 51-year-old man with primary hyperparathyroidism was referred for radionuclide localization of hyperfunctioning parathyroid glands. He was complaining of weakness, nausea, excessive urination, and occasional heart palpitations. Laboratory values were the following: elevated parathyroid hormone level 184 pg/ml (normal

range, 14–72 pg/ml), hypercalcemia—a calcium level of 11.1 mg/dl (normal range, 8.7–10.4 mg/dl) and normal renal parameters. Cervical ultrasonography and contrast enhanced computed tomography (CT) of the neck were negative. Early Tc-99m-methoxyisobutylisonitrile (MIBI) images, Tc-99m-MIBI/Tc-99m-sodium pertechnetate subtraction and Tc-99m-MIBI single photon emission computed tomography (SPECT)/CT failed to identify a focal area of increased uptake. F-18-Deoxyglucose positron emission tomography (PET)/CT was also negative. F-18-Choline PET/CT demonstrated two foci of increased radiotracer uptake localized behind the lower poles of the thyroid gland consistent with hyperfunctioning parathyroid glands. The patient underwent excision of these two bilateral lesions and the subsequent pathology examination confirmed the presence of parathyroid hyperplasia. The parathyroid hormone and calcium level normalized after the surgery. In the presented

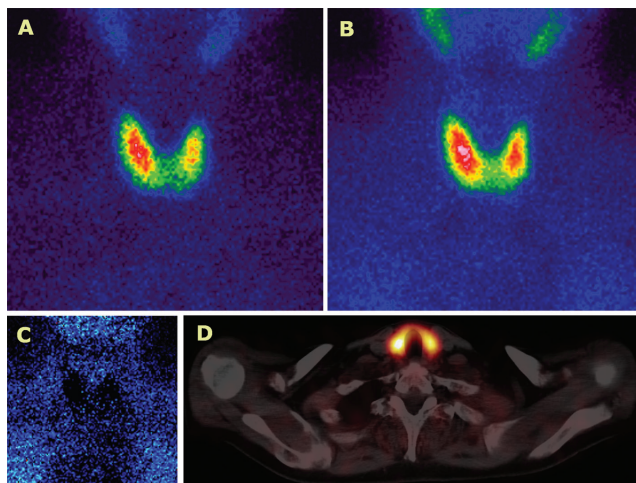


Figure 1. Tc-99m-sodium pertechnetate planar image (Symbia TruePoint T-16 SPECT/CT scanner, Siemens, Germany) acquired 20 minutes after injection of 111 MBq of radiopharmaceutical (A). Tc-99m-MIBI planar scan obtained 15 minutes after injection of 370 MBq of radiopharmaceutical did not reveal any foci of increased uptake (B). Subtraction image without areas of abnormal uptake (C). An axial scan of Tc-99m-MIBI SPECT/CT performed after planar acquisition, negative for hyperfunctioning parathyroid glands (D)

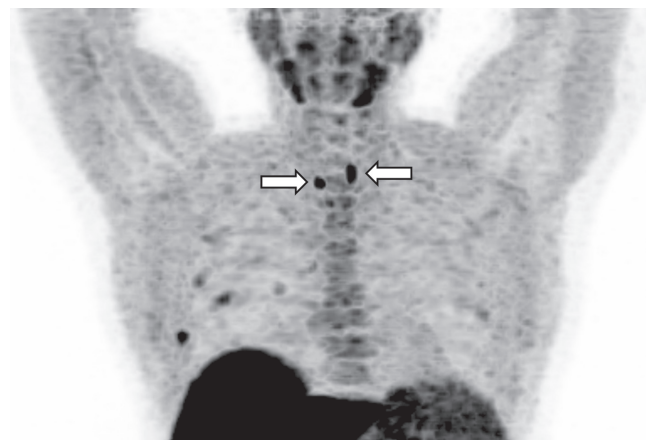


Figure 2. Maximum intensity projection PET (Biograph 64, Siemens, Germany) performed 60 minutes after injection of 200 MBq of F-18-Choline, revealed two foci of increased radiotracer uptake (arrows) localized bilaterally in the lower neck. The image showed multiple focal lesions of increased activity in the ribs and the right scapula resulting from the disease

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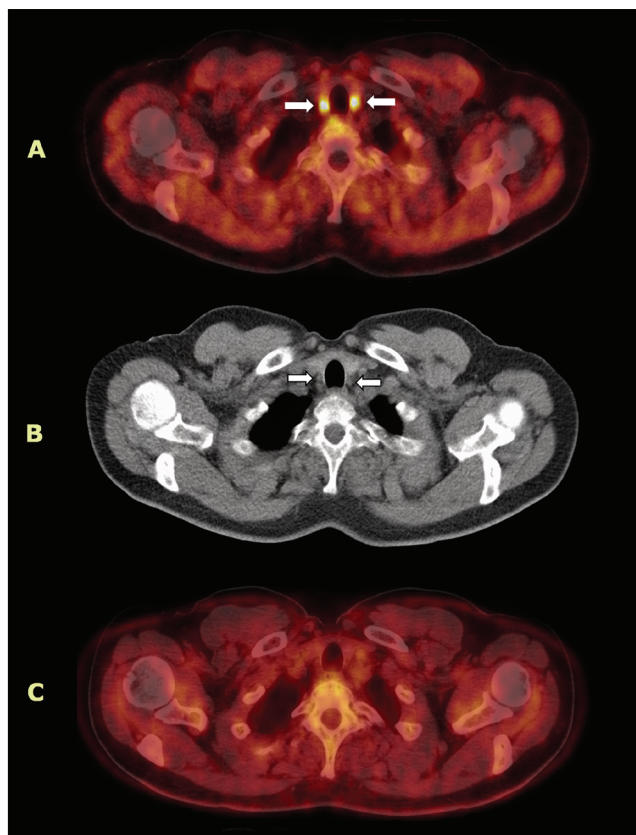


Figure 3. **A.** Axial scan of F-18-Choline PET/CT demonstrated two foci (arrows) of markedly increased uptake localized posteriorly to both inferior parts of the thyroid lobes; **B.** Hyperfunctioning parathyroid glands on CT axial scan (arrows), the diameters of the glands were: 4x4mm on the right side and 8 × 5mm on the left; **C.** F-18-Deoxyglucose PET/CT scan was negative for abnormal uptake in this region

case, abnormal parathyroid glands were correctly localized by F-18-Choline PET/CT, whereas conventional Tc-99m-MIBI scintigraphy was false negative. The results of few recent studies and case reports suggest the usefulness of F-18-Choline PET/CT in imaging of the hyperfunctioning parathyroid tissue, particularly when multiple lesions occur. Further research is necessary to evaluate the diagnostic performance of this radiopharmaceutical for localization of parathyroid hyperplasia or adenoma.