

F18–fluorocholine as PET tracer to localize the dominant source of PTH in a patient with X-linked hypophosphataemia and hyperparathyroidism



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OBJECTIVES

Background: F18-fluorocholine is a PET tracer used in the diagnostic work-up of patients with prostate cancer but was incidentally found to detect other tumours such as meningiomas, pituitary and parathyroid adenomas.

¹⁸F-fluorocholine PET/CT is currently under investigation as an imaging tool for detecting hyperfunctioning parathyroid glands in primary or secondary hyperparathyroidism (Refs 1-5).

Aim: To test ¹⁸F-fluorocholine PET/MRI investigation as an imaging tool for detecting hyperfunctioning parathyroid glands in hyperparathyroidism.

METHODS

Patient: Since 2013, we considered ¹⁸F-fluorocholine PET/MRI for imaging hyperfunctioning parathyroid glands in patients with hyperparathyroidism. Since this expensive method has not been approved, we have thus far restricted it to a small subgroup of patients, especially to patients with indication and wish for parathyroid surgery where standard localization procedures, neck ultrasound and scintigraphy (dual-isotope ^{99m}Tc-tetrofosmin and ¹²³I sodium iodide SPECT) were discordant, equivocal, or both failed to localize an adenoma.

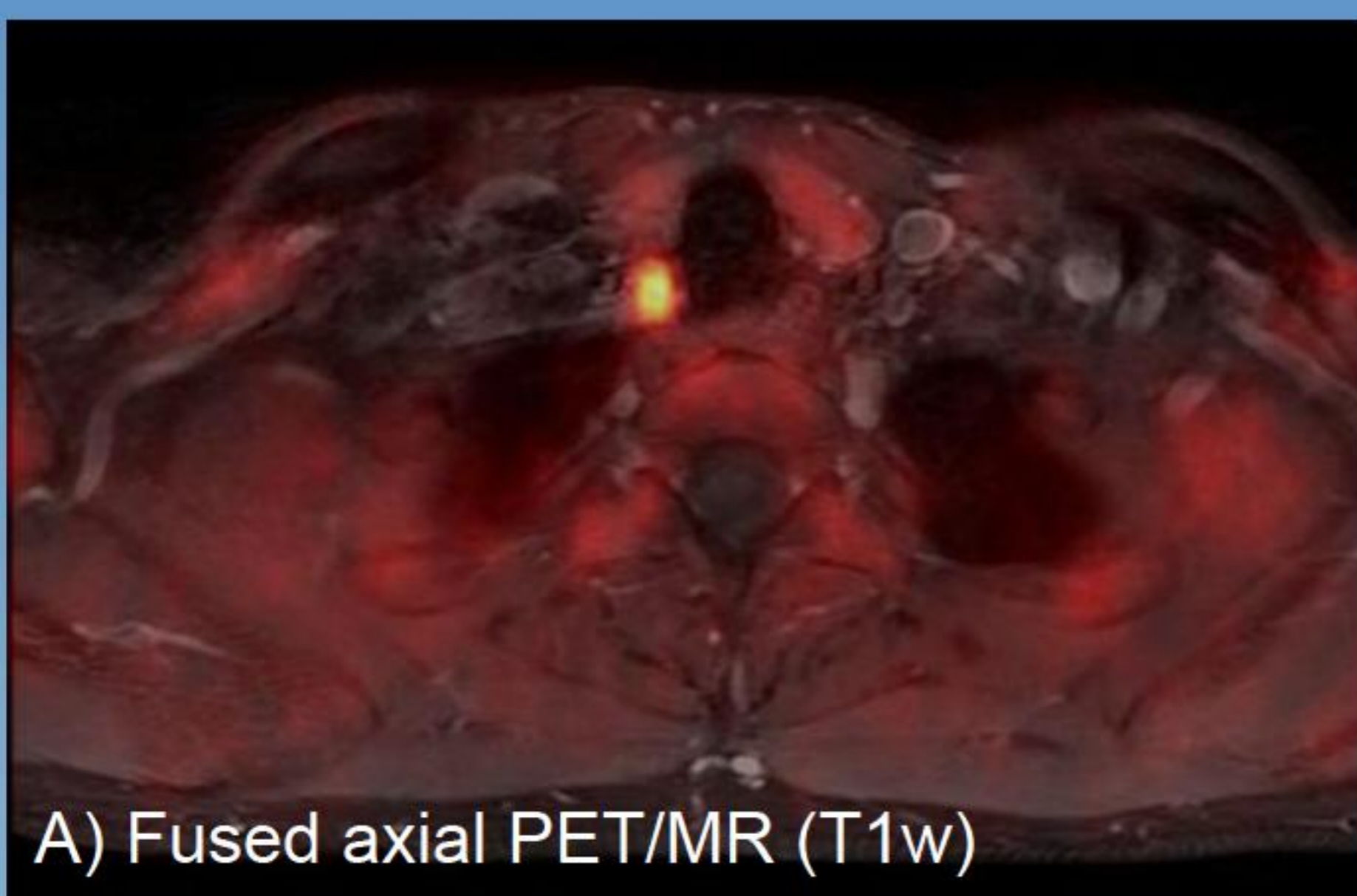
We here report the case of a patient with X-linked hypophosphataemic rickets (XLH), who developed hypercalcemia at the age of 23 years.

RESULTS

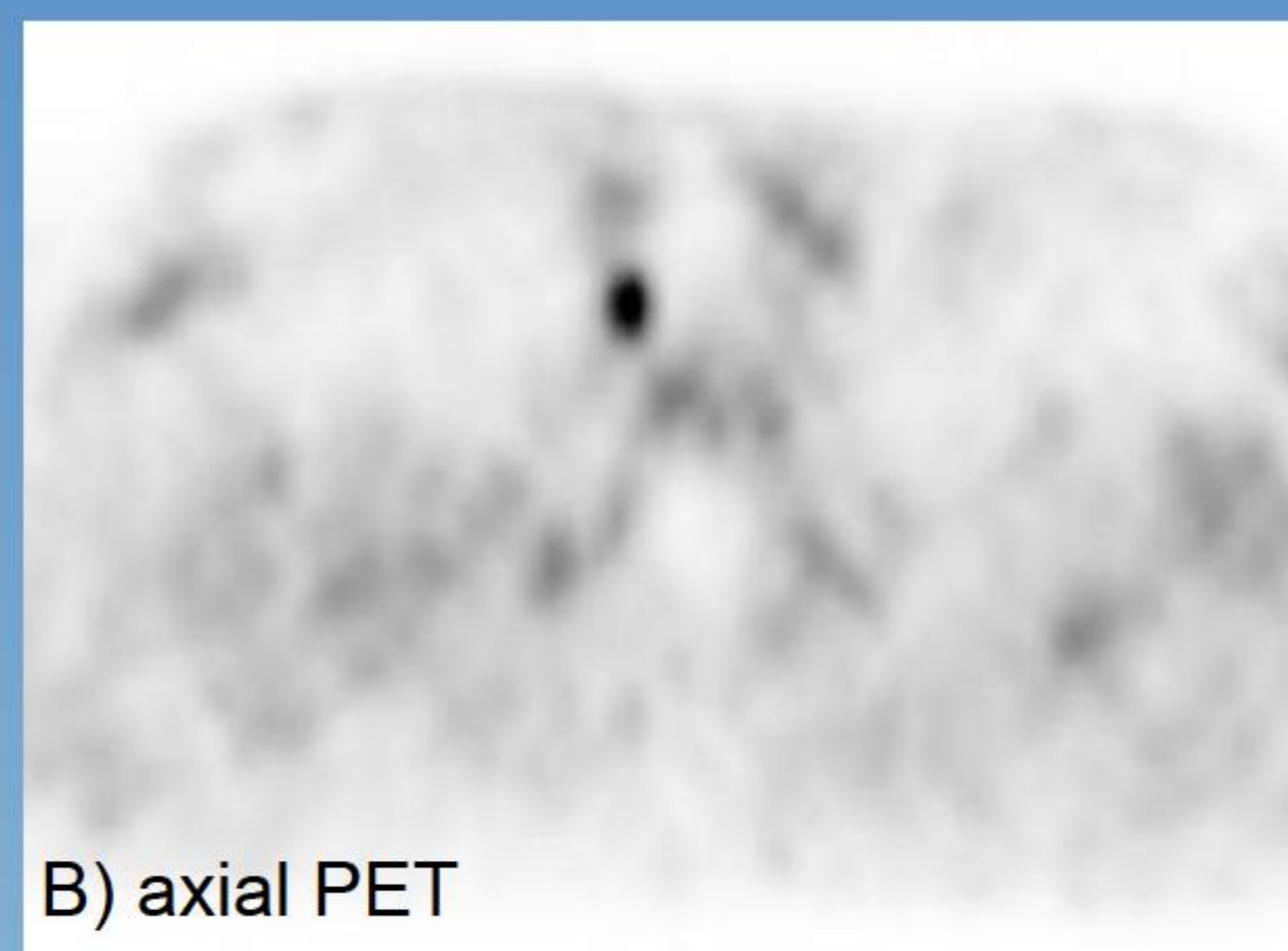
The patient was diagnosed with XLH at the age of five years with severe dwarfism and leg deformities. He was treated with phosphate supplements and calcitriol (and several orthopaedic correction surgeries). He gradually developed hypercalcemia, reaching a calcium level of 2.88 mmol/l at the age of 23 years.

The patient consented to surgery, and, after both neck ultrasound and dual-isotope ^{99m}Tc-tetrofosmin and ¹²³I sodium iodide SPECT had failed to localize an adenoma, to imaging with ¹⁸F-fluorocholine PET/MRI.

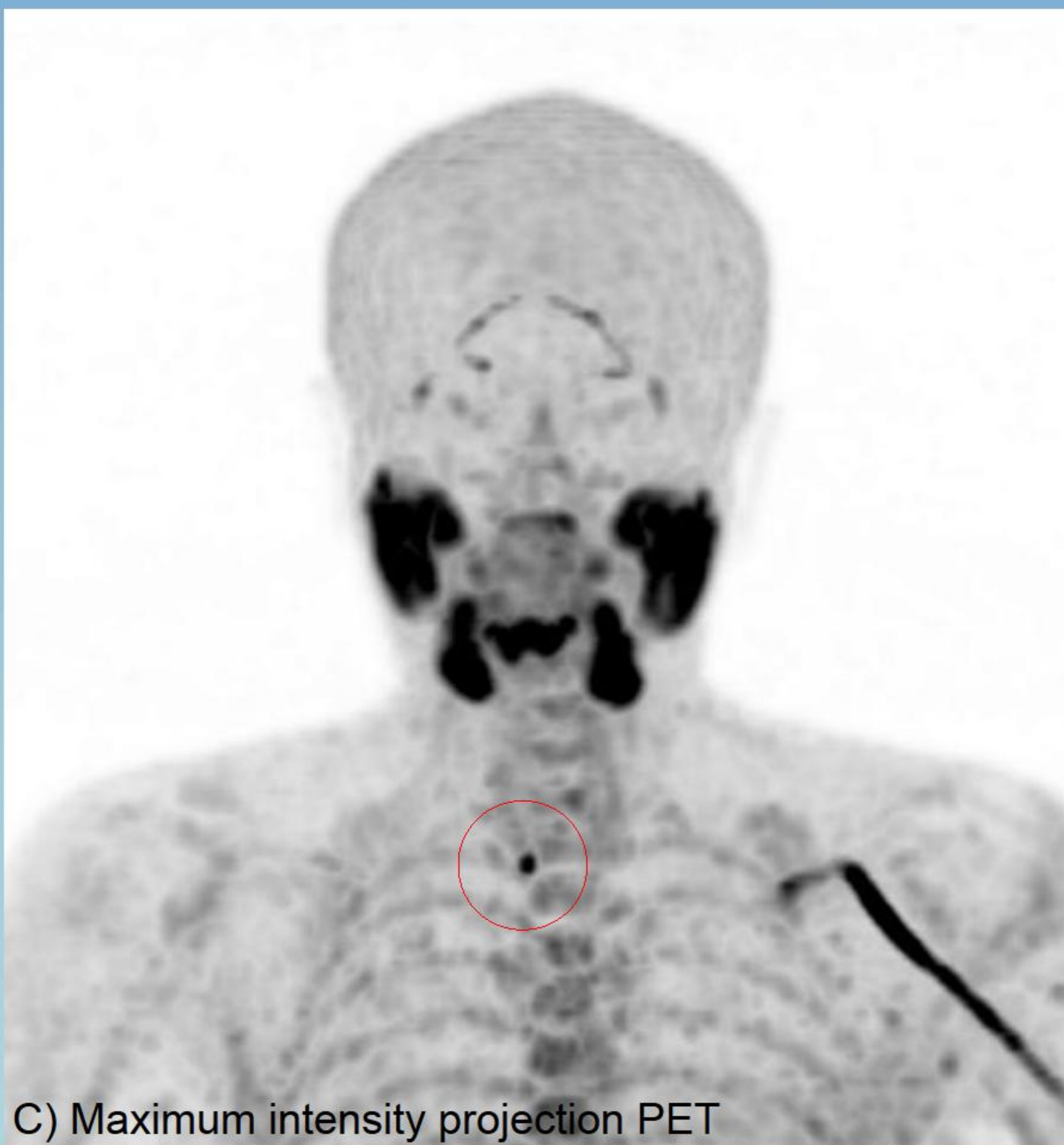
Minimally invasive videoassisted selective parathyroidectomy (MIVAP, removal of the ¹⁸F-fluorocholine-positive lesion, 0.5g parathyroid) was performed, resulting in an intraoperative drop of PTH from 258 to 73 ng/l and subsequently to a normal serum calcium. Calcium (2.43 mmol/l) and PTH (25.9 ng/l) remain normal for more than a year of follow-up, up to this writing.



A) Fused axial PET/MR (T1w)



B) axial PET



C) Maximum intensity projection PET

PET 60 min after injection of 153 MBq ¹⁸F-choline, revealing an intense focal uptake, located dorsocaudally to the right thyroid lobe. SUVmax was 8.7.

CONCLUSIONS

Our finding suggests that ¹⁸F-fluorocholine PET/MR is a helpful and sensitive functional imaging to localize the dominant source of PTH in difficult selected cases where conventional imaging has failed and minimally invasive selective parathyroidectomy is considered the treatment of choice.

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