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Clinical vignette

^{99m}Tc-Octreotide-Avid brain mass in a patient with poorly differentiated papillary thyroid carcinoma, hope in despair

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Case Report

We present a 58-year-old woman with a history of poorly differentiated papillary thyroid carcinoma (PTC) that showed elevation of serum thyroglobulin (Tg) levels during routine follow up. She had also undergone neck dissections for three times in the last two years and treated with 5550 MBq ^{131}I. The recent ultrasonography showed suspicious metastatic lymph nodes and diagnostic ^{131}I-SPECT/CT revealed moderate cervical uptake which was interpreted as residual lymph node metastases as well as multiple pulmonary nodules without ^{131}I uptake. She experienced vertigo and headache during radioiodine treatment planning for lymph node metastases. Brain CT scan and neurosurgery consult was consistent with a suspicious brain mass with invasion to the bony structures of the skull base and due to patient history and her possible mass location; she was suitable for neither tissue sampling nor surgical intervention. Brain MRI with and without contrast was performed and no clear abnormality was reported.

We decided to perform ^{99m} Tc-Octreotide scintigraphy to determine the patient's somatostatin receptor status and see if the patient is a good candidate for ^{177}Lutetium-DOTATATE therapy. The whole-body octreotide scan was performed four hours after IV administration of 740 MBq (20 mCi) of ^{99m} Tc-Octreotide, using a dual-head gamma camera equipped with low-energy, high-resolution collimator. Also, brain SPECT, with 128 × 128 matrices and 64 projections over 3600 with 20 seconds per step, was performed and reconstructed using an iterative method (OSEM, number of iterations 8, subsets 4). Whole-body octreotide scan revealed multiple zones of avid lesions in the right side of the brain, both sides of the neck, upper mediastinum and the right lung (Fig. 1) which brain lesion was confirmed in the skull SPECT images (Fig. 2). Retrospectively, brain MRI images were reviewed and an abnormal focal lesion with low signal T1 and high signal T2 sections was at the level of the medulla and spinal cord junction in the right side which was confirmed in the

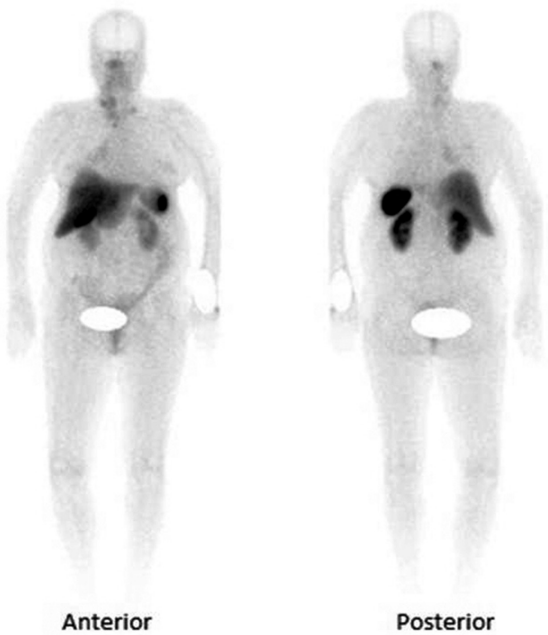

Figure 1. Whole-body octreotide scan revealed multiple zones of octreotide avid lesions in the right side of the brain, both sides of the neck, upper mediastinum and the right lung

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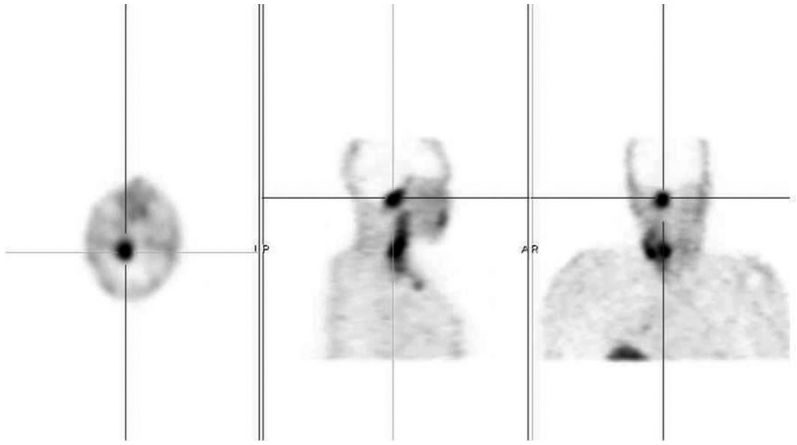

Figure 2. The skull SPECT image confirmed the brain lesion in the right side of the skull base

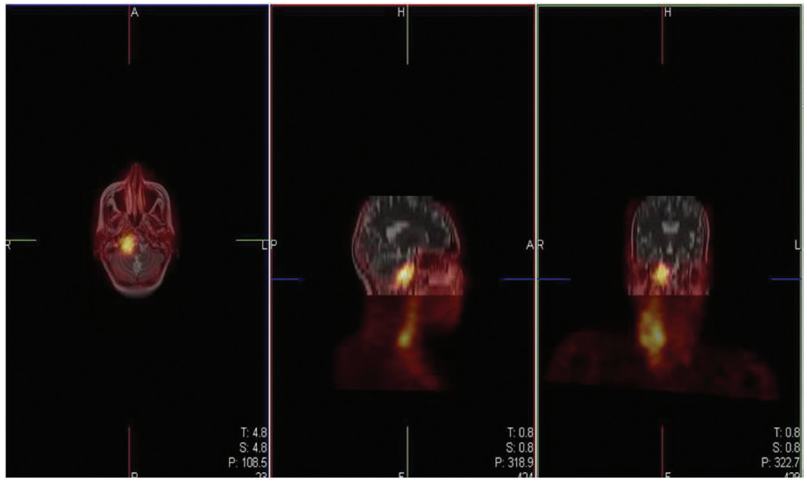

Figure 3. Fused SPECT/MRI images confirmed the abnormal lesion in the right side of the skull base in the junction of the medulla and spinal cord

reconstructed fused SPECT/MRI images (Fig. 3). As the skull bone metastasis showed acceptable uptake in ^{99m}Tc-Octreotide scintigraphy, the patient became a good candidate for Peptide receptor radionuclide therapy (PRRNT).

Discussion

Brain metastases of PTC are rare and occur in 0.1–5% of this population, especially in the poorly differentiated types [1]. Poorly differentiated thyroid carcinoma (DTC) variants usually fail to concentrate iodine [2–5], therefore accompanied by negative iodine scan [6]. Presence of somatostatin analogue receptors is seen on the thyroid follicular cells of the majority of DTC patients that show elevated serum Tg levels [7–8]. Our case indicates that ^{99m}Tc-Octreotide scintigraphy could be a valuable method in the selection of cases for radionuclide therapy (PRRNT) with radiolabeled somatostatin analogs.

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