

^{99m}Tc -EDDA/HYNIC-octreotate – a new radiotracer for detection and staging of NET. A case of metastatic duodenal carcinoid

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Abstract

Somatostatin receptor scintigraphy (SRS) has become a routine imaging method for the diagnostics of neuroendocrine tumours (NET). ^{99m}Tc -EDDA/HYNIC-octreotate (Polatom, Poland) is a new radiotracer with high affinity for SSTR2 and similar physiological biodistribution to ^{111}In -Octreoscan.

We present a case of a 47-year-old man with disseminated duodenal carcinoid. The patient had been operated due to the tumour mass detected in pancreatic head area. Histopathology revealed carcinoid of the duodenal wall with local lymph node and liver metastases. The patient was qualified for chemotherapy stopped due to severe leucopenia. ^{99m}Tc EDDA/HYNIC-octreotate scintigraphy was performed for staging and to de-

termine SSTR status of the tumour before planned ^{90}Y -DOTA-TATE therapy. The multiple metastatic lesions were detected all over the body. The high quality images with high target/non target ratio were obtained. ^{99m}Tc -MDP scintigraphy confirmed multiple bone metastases. On the basis of SRS result the patient was qualified for ^{90}Y -DOTA-TATE therapy. In conclusion, ^{99m}Tc EDDA/HYNIC-octreotate can be regarded as a promising tracer for staging and to determine SSTR status of NET.

Key words: ^{99m}Tc -EDDA/HYNIC-octreotate, SRS, duodenal carcinoid

Case report

Somatostatin receptor scintigraphy (SRS) has become a routine diagnostic procedure in the diagnostics of neuroendocrine tumours (NET). ^{99m}Tc labelled somatostatin analogues with specific and high receptor affinity and good biodistribution have been searched for. ^{99m}Tc -EDDA/HYNIC-octreotate (Polatom, Otwock-Świerk, Poland) is a new radiotracer with a high affinity for SSTR2 (somatostatin type receptor 2), which shows promising properties for detecting and staging NET [1–4]. Octreotate differs from octreotide by the more hydrophilic tyrosine in the third position and the terminal threonine. Physiological biodistribution of the tracer is similar to ^{111}In -Octreoscan but allows rapid imaging and detects more metastatic lesions with higher target/non-target ratios [4].

A 47-year-old man without a significant past medical history developed progressive dyspeptic symptoms over a few weeks with concomitant abdominal pain and weight loss. On physical examination there was tenderness and palpable mass in the epigastric area. Ultrasound examination showed an epigastric tumour 90 mm in diameter with enlargement of the retroperitoneal lymph nodes. Computed tomography scan revealed solid mass localized in the pancreatic head area with the lymphadenopathies of the epigastric area as well as two metastatic tumours within the 5th and 6th segments of the liver. Upper gastrointestinal endosco-

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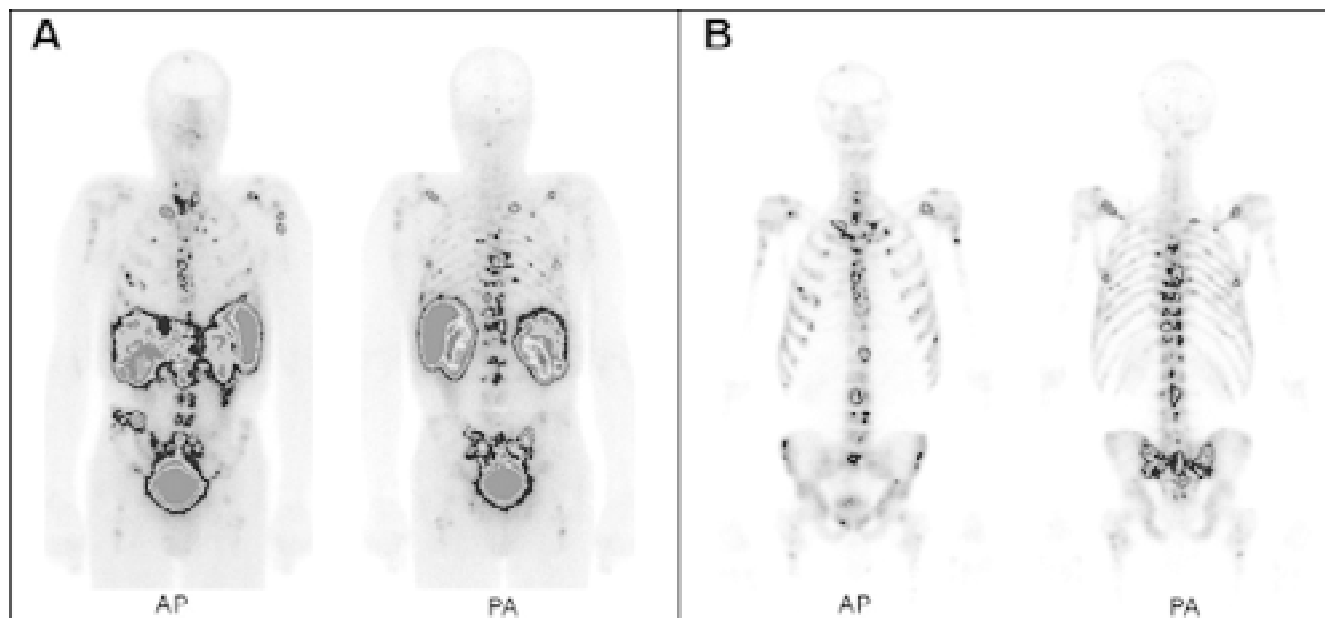


Figure 1A. ^{99m}Tc-EDDA/HYNIC-octreotate images; **B.** ^{99m}Tc-MDP images.

py identified circular ulceration with an infiltration of the duodenal wall above the major duodenal papilla. Multiple surface biopsies of the infiltration, as well as USG-guided fine needle aspiration biopsies of the tumour, did not reveal neoplastic cells. An exploratory laparotomy revealed solid tumour infiltrating the duodenum. Intraoperative ultrasonography showed metastases in both lobes of the liver. Whipple pancreatoduodenectomy was performed and histopathology revealed carcinoid of the duodenal wall with metastases to the regional lymph nodes. After recovery, the patient was qualified for the palliative chemotherapy with streptozocin (Zanosar, Upjohn, Kalamazoo, USA) and 5-fluorouracil. After 4 series of chemotherapy the treatment was stopped because of leucopenia, and the patient was referred to a Nuclear Medicine Unit for SRS. ^{99m}Tc EDDA/HYNIC-octreotate scintigraphy was performed for staging and to determine the SSTR status of the tumour.

Abdominal SPECT and whole body scintigraphy with ^{99m}Tc-HYNIC-octreotate (740 MBq) were performed. A dual-head, large view field E.CAM gamma camera (Siemens, Erlangen, Germany) equipped with low-energy, high resolution (LEHR) collimators with an e.soft operating system was used. A whole-body scan in the anterior and posterior projections (256 × 1024 matrix, 6 cm/min) was performed 10 min, 4 h and 24 h after *i.v.* injection. The SPECT study was performed 4 h after tracer injection using a 360° orbit (180° for each head), step and shoot mode, at 30 s per view. Focal tracer accumulation was considered to be specific when visualised on both 4 h and 24 h scans. Semi-quantitative region of interest (ROI) analysis of the metastatic lesions was performed and the target/non-target ratios were assessed. ^{99m}Tc-MDP bone scintigraphy was performed in the routine manner.

High quality images were obtained with multiple metastatic lesions visible all over the body (Figure 1A). The highest target/non-target ratio was obtained 4 h post injection (liver–3:1, lung–2,8:1, bone–6,8:1). ^{99m}Tc-MDP scintigraphy two weeks later con-

firmed multiple bone metastases (Figure 1B). On the basis of SRS result the patient was qualified for ⁹⁰Y-DOTA-TATE therapy.

Conclusions

^{99m}Tc EDDA/HYNIC-octreotate can be regarded as a very promising radiopharmaceutical for detecting and staging NET. It detects SSTR positive tissue with a high target/non-target ratio. Dissemination detected with ^{99m}Tc EDDA/HYNIC-octreotate can be an indication for ⁹⁰Y-DOTA-TATE therapy. Fast (4 h p.i.) tumour visualisation is expected to significantly simplify this procedure for patients and hospital schedules in comparison to ¹¹¹In-Octreoscan imaging. The presented case report suggests that several biopsies can fail to confirm the NET tumour. According to the literature in such cases diagnosis can be based on clinical symptoms, combined with radiological and scintigraphic findings [5].

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