

Role of Ga68-Dotatoc the management of Neuroendocrine tumors

L.Benrabah*, A.Taibi*, S.Rahabi*, I.Bougara, H.Messaour*, SE Bouyoucef*

*Department of Nuclear medicine, CHU Bab El Oued Algiers Algeria

Email: salaedine@yahoo.fr

Introduction

Dotatoc-Ga68-PET/CT (positron emission tomography/computed tomography) is widely used as a staging tool for patients with neuroendocrine tumors (NETs). The objective of this study is to compare the usefulness of ^{68}Ga -labeled DOTATOC PET/CT and $^{99\text{m}}\text{Tc}$ -octreotide acetate SPECT/CT both situation of detecting primary cancer and distant metastasis.

Patients and methods

In this prospective study, 59 patients known or suspected for Neuro endocrine tumors have undergone both ^{68}Ga -labeled DOTATOC PET/CT and a $^{99\text{m}}\text{Tc}$ -octreotide-acetate SPECT/CT. Biologic parameter, guided biopsy when applied and other morphologic imaging modalities (CTscan, MRI, US) were also collected for the study.

Self-shielded $^{68}\text{Ge}/^{68}\text{Ga}$ generator provided metal-free $^{68}\text{GaCl}_3$ ready for peptide labeling in the fluidic labeling module after elution with 4 mL of 0.05N HCl. The compact system was readily housed in a laminar flow cabinet allowing an ISO class-4 environment. ^{68}Ga labeling of peptides using GMP kits of Dotatoc was performed in 15-20 min, and the total production time was 45-50 min. Batch release quality control specifications were established to meet with European Pharmacopeia. The activity injected to patients was calculated according the weight of patient and ranged between 200MBq and 260MBq of ^{68}Ga -labeled DOTATOC. One PET/CT (Discovery IQ PET/CT, CT 64 slices) scan was acquired for each patient at 60mn post injection.

Results

All 59 patients have had Both scans ^{68}Ga -labeled DOTATOC PET/CT and an $^{99\text{m}}\text{Tc}$ -octreotide SPECT/CT (Intevo Siemens, CT 64 slices) in the interval of two to three months maximum without change in therapy management. Patients have had updated morphologic imaging modalities (CTscan, MRI, US) before the two scans. Comparison of both uptake in ^{68}Ga -labeled DOTATOC PET/CT and $^{99\text{m}}\text{Tc}$ -octreotide SPECT/CT have been done indirectly by choosing liver uptake and supra-renal glands.

	Number of	^{68}Ga -labeled DOTATOC PET/CT	($^{99\text{m}}\text{Tc}$)- octreotide
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	patients		acetate SPECT/CT
Primary NET	23/59	17/23	15/23
Several lesions seen in both scans	47/59	➤ 38/59	>27/59
Quantitation	47	SUVmax High in 31	Higher uptake in 16

Discussion

Our results show that both ^{99m}Tc -octreotide SPECT/CT and ^{68}Ga -labeled DOTATOC PET/CT are finding the primary neuro endocrine tumors with slightly different rate since PET/CT Dotatoc has 73% and SPECT/CT Octreotide 65%. Both exams have find similar primary tumor in 15 patients out of 23. Meanwhile PET/CT has found the NET primary in two more patients. This fact was due mostly to the better resolution of the images of pancreas with PET/CT. Also nodes involvement has been better shown by ^{68}Ga -labeled DOTATOC PET/CT than in ^{99m}Tc -octreotide SPECT/CT.

Regarding the assessment and secondary lesions of NET, ^{68}Ga -labeled DOTATOC PET/CT was more powerful since more lesions have been seen in PET/CT than in SPECT/CT. This fact also is due to the better resolution and also to high sensitivity of PET/CT comparing to this of SPECT/CT. Therefore ^{68}Ga -labeled DOTATOC PET/CT has shown more lesions in 38 patients (65%) meanwhile $^{99\text{m}}\text{Tc}$ -octreotide SPECT/CT has shown multiple lesions in 27 patients only (45%). That difference is due mainly to lymphadenopathies and bone lesions which are less seen with SPECT/CT.

The quantitative assessment of lesions interesting findings have been deducted since more lesions showed high avidity to ^{68}Ga -labeled DOTATOC visible in PET/CT than with $^{99\text{m}}\text{Tc}$ -octreotide demonstrated by SPECT/CT. The visual score has been assisted by the ratio of lesion/supra-renal gland in PET/CT (Liver uptake too) and for SPECT/CT was done by the ratio lesion/liver uptake. This shows that is not really accurate to do an inter assessment PET/CT versus SPECT/CT.

Conclusions

The ^{68}Ga -labeled DOTATOC CT helps to localize primary tumor of NET with better resolution than $^{99\text{m}}\text{Tc}$ -octreotide SPECT/CT within the pancreatic region. Our findings indicate also significant correlation of SUV max values with detection of lymph nodes involvement and secondary bone lesions with a higher sensitivity for ^{68}Ga -labeled DOTATOC CT than $^{99\text{m}}\text{Tc}$ -octreotide SPECT/CT.