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Performance of 68Ga-DOTATATE PET/CT, 18F-FDG PET/CT, CT, and MRI Spine in the Detection of Spinal Bone Metastases in Metastatic Pheochromocytoma/Paraganglioma

Abhishek Jha[1], Mayank Patel[1], Babak Saboury[2], Corina Millo[3], Alexander Ling[4], Ritu Shah[4], Clara C. Chen[2], Leah Meuter[1], Sara Talvacchio[1], Marianne Knue[1], Frank I. Lin[5], Geraldine O'Sullivan Coyne[6], Alice P. Chen[6], Naris Nilubol[7], Peter Herscovitch[3], David Taïeb[8], Ali Cahid Civelek[9], Jorge A. Carrasquillo[10], and Karel Pacak[1].

[1]Section on Medical Neuroendocrinology, Eunice Kennedy Shriver National Institute of Child Health and Human Development, National Institutes of Health, Bethesda, MD; [2]Nuclear Medicine Division, Radiology and Imaging Sciences, Warren Grant Magnuson Clinical Center, National Institutes of Health, Bethesda, MD; [3]Positron Emission Tomography Department, Warren Grant Magnuson Clinical Center, National Institutes of Health, Bethesda, MD; [4]Radiology and Imaging Sciences, Warren Grant Magnuson Clinical Center, National Institutes of Health, Bethesda, MD; [5]Molecular Imaging Program, National Cancer Institute, National Institutes of Health, Bethesda, MD; [6]Division of Cancer Treatment and Diagnosis, National Cancer Institute, National Institutes of Health, Bethesda, MD; [7]Surgical Oncology Program, Center for Cancer Research, National Cancer Institute, Bethesda, MD; [8]Department of Nuclear Medicine, La Timone University Hospital, CERIMED, Aix-Marseille University, Marseille, France; [9]Nuclear Medicine, Radiology and Radiological Science, Johns Hopkins Medicine, Baltimore, MD; [10]Molecular Imaging and Therapy Service, Memorial Sloan Kettering Cancer Center, New York, NY.

BACKGROUND

To evaluate and compare the diagnostic performance of ^{68}Ga-DOTATATE PET/CT to ^{18}F-FDG PET/CT, CT of neck, chest, abdomen and pelvis (CT), and MRI of cervical, thoracic, and lumbar spine (MRI spine), for the detection of spinal bone metastases in metastatic pheochromocytoma and/or paraganglioma (PPGL).

METHODS

Between 2014 and 2019, 41 consecutive metastatic PPGL patients (19 females; mean age, 43 years) underwent ^{68}Ga-DOTATATE PET/CT, ^{18}F-FDG PET/CT, and MRI (sagittal T1w, sagittal STIR, axial T1w, and axial T2w) for evaluation of spinal bone metastases. Thirty patients also underwent CT (iv and oral contrast). The mean (±standard deviation) duration between ^{68}Ga-DOTATATE PET/CT and ^{18}F-FDG PET/CT was 21±46 days, between ^{68}Ga-DOTATATE PET/CT and CT 18±40 days, and between ^{68}Ga-DOTATATE PET/CT and MRI spine 27±40 days. Per patient and per lesion detection rates of ^{68}Ga-DOTATATE PET/CT, ^{18}F-FDG PET/CT, CT, and MRI spine was calculated. Counting of spinal bone metastases was limited to a maximum of one lesion per vertebrae. A composite of all the scans served as an imaging comparator. McNemar test was used to compare detection rates between the scans. Two-sided p values <0.05 were considered statistically significant.

RESULTS

All patients were positive for spinal bone metastases, with 484 lesions on the imaging comparator. ^{68}Ga-DOTATATE PET/CT demonstrated a per lesion detection rate of 401/484 [82.9%, 95% confidence interval (CI): 79.2-86.1%]. ^{18}F-FDG PET/CT, MRI spine, and CT showed significantly lower per lesion detection rates of 262/484 (54.1%, 95% CI: 49.6-58.6%; p<0.0001), 350/484 (72.3%, 95% CI: 68.1-76.3%; p=0.001), and 117/327 (35.8%, 95% CI: 30.6-41.2%; p<0.0001), respectively. The per patient detection rates of ^{68}Ga-DOTATATE PET/CT was 41/41 (100%, 95% CI: 91.4-100%), and that of ^{18}F-FDG PET/CT, MRI spine, and CT was 36/41 (87.8%, 73.8-95.9%), 39/41 (95.1%, 83.5-99.4%), and 25/30 (83.3%, 65.3-94.3%), respectively. Further, ^{68}Ga-DOTATATE PET/CT was found to detect greater or equal lesions compared to ^{18}F-FDG PET/CT, MRI spine, and CT in 38/41 (92.7%), 30/41 (73.2%), and 27/30 (90.0%) patients, respectively.

CONCLUSIONS

^{68}Ga-DOTATATE PET/CT showed a significantly superior detection rate of spinal bone metastases compared to ^{18}F-FDG PET/CT, CT, and MRI spine. Besides providing a whole-body analysis, it maybe the modality of choice to evaluate metastatic spine disease especially in the treatment planning and response assessment of the targeted radionuclide therapy (223Ra, 177Lu/90Y, 131I).

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