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Cardiac Neuroendocrine Tumor Metastases on ⁶⁸Ga-DOTATATE PET/CT

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BACKGROUND

Neuroendocrine tumor (NET) metastases to the heart are found in 1-4% of NET patients and have been reported primarily in the form of individual cases. We investigated the incidence, clinical characteristics, imaging features, and outcomes of NET patients with cardiac metastases on ⁶⁸Ga-DOTATATE PET/CT.

METHODS

The medical records of 406 neuroendocrine tumor patients who underwent ⁶⁸Ga-DOTATATE PET/CT for their clinical care were individually reviewed to obtain their clinical characteristics and sites of metastatic disease. In patients with cardiac metastases, the cardiac SUVmax were compared to an external cohort of 11 patients with active cardiac sarcoidosis who underwent ⁶⁸Ga-DOTATATE PET/CT for research purposes. Clinical follow-up data were reviewed for cardiac adverse events. Overall survival among the metastatic NET patients with and without cardiac metastases was compared with Kaplan-Meier analysis.

RESULTS

There were 9 patients (2.2%) with focal areas of cardiac DOTATATE uptake consistent with metastatic disease. The median age was 61 (range: 54-77) and 78% were male. The most common primary site was the small intestine (7 patients), followed by the colon and pancreas (1 patient each). All patients had well-differentiated tumors, most commonly grade 1 (67%).

All 9 patients had extra-cardiac metastatic disease, most commonly in the liver (78%) and lymph nodes (78%), followed by bones (22%). The cardiac metastases were not specifically mentioned in 44% of clinical ⁶⁸Ga-DOTATATE PET/CT reports. The cardiac SUVmax in the NET cohort (mean \pm SD: 18.6 \pm 22.3) was significantly higher compared to the cardiac sarcoid cohort (2.4 \pm 0.6) without any overlap in values ($P < 0.05$). Similar results were obtained with SUVmax-to-background ratio (26.2 \pm 31.4 vs. 2.6 \pm 0.4, $P < 0.05$).

There were no adverse cardiovascular events attributable to cardiac metastases after a median follow-up of 46 months. Three patients deceased within 3 years and the remaining 6 patients were followed up for 39-61 months, yielding 3-year overall survival of 67%. While the overall survival was slightly lower compared to a cohort of 148 patients with non-cardiac metastatic grade 1-2 gastroenteropancreatic NETs (88% at 3 years), there was no statistically significant difference on Kaplan-Meier analysis ($P = 0.30$ on log-rank test).

CONCLUSIONS

Cardiac NET metastases are rare and are found only in the presence of other metastatic sites. Although they do not carry a meaningful prognostic significance, they can often be missed on routine interpretation of ^{68}Ga -DOTATATE PET/CT. A distinguishing feature of cardiac NET metastases is the high degree of DOTATATE uptake compared to focal myocardial inflammation.

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