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Clinical Utility of Somatostatin Receptor Positron Emission Tomography Imaging Biomarkers for Characterization of Meningioma Among Incidental Central Nervous System Lesions

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BACKGROUND

Somatostatin receptor (SSTR) PET imaging is utilized with increasing frequency in the clinical management of neuroendocrine tumors. Incidental PET-avid CNS lesions are commonly noted and presumed to be meningiomas. However, SSTR PET lacks specificity for meningioma identification. This study aims to clarify the role of SSTR-based imaging for classification of incidental CNS lesions

METHODS

Patients who had undergone both Ga-68-DOTATATE PET and brain MR imaging and had an incidental CNS lesion identified with a radiographic prediction of meningioma via one (discordant prediction) or both (concordant prediction) imaging modalities were retrospectively analyzed. Imaging indication, semi-quantitative measures, and corresponding clinical history were recorded.

RESULTS

Among 48 patients with a CNS lesion identified on both imaging modalities, most scans were performed for a history of neuroendocrine tumor (64.6%). Cases with concordant lesion type prediction of meningioma between imaging modalities (N = 24) displayed a significantly higher SUV max (median 7.9 vs. 4.0, p = 0.008) and Krenning score (median 3.0 vs. 2.0, p = 0.005) on Ga-68-DOTATATE PET compared to cases with a discordant prediction of meningioma (N=24). In cases with lower SUV max values Ga-68-DOTATATE was more likely to discordantly predict meningioma without agreement by the corresponding MRI. Prior cranial radiation or use of a somatostatin mimetic did not affect quantitative radiographic measures, and MRI-based tumor size was similar across groups.

CONCLUSIONS

Lesions with increased avidity may be more confidently predicted as meningioma in Ga-68-DOTATATE PET scans, and caution should be exercised in lesion type prediction among low SUV cases. The continued development of SSTR-based imaging biomarker signatures across incidental CNS lesion subtypes will further define the role of this imaging modality in the clinical diagnosis and management of presumed meningiomas.

ABSTRACT ID 21355

