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Initial Experience Using 0.55T MRI for Detection of Liver Metastases in NET Patients

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BACKGROUND

0.55T MRI is a new MRI technology offering increased patient accessibility with a wider bore (80cm) and reduced acoustic noise. We compared the sensitivity of liver metastases detection on gadoxetate-enhanced 0.55T MRI to ⁶⁸Ga-DOTATATE PET/CT while evaluating patient experience.

METHODS

Nine patients with neuroendocrine liver metastases were imaged using gadoxetate-enhanced 0.55T MRI (MAGNETOM Free.Max, Siemens Healthineers, Erlangen, Germany). Eight patients also received ⁶⁸Ga-DOTATATE PET/CT and five received 3.0T MRIs for comparison. The presence of liver metastases was assessed on CT, PET from PET/CT, diffusion weighted imaging (DWI), and hepatobiliary phase imaging (HBP), and positivity rates were compared. Up to five lesions measuring under 1 cm and five over 1cm per patient were included for analysis. Maximum standardized uptake values (SUVmax) of DOTATATE PET/CT were determined.

Sound pressure level (SPLmax) of DWI and HBP were measured at 0.55T and 3.0T by placing a decibel meter 2m from each magnet's front panel and SLPmax was calculated over five repetitions.

RESULTS

Nine patients (average age 63 [5 female, age range 47-75]) with 69 total liver lesions were successfully imaged at 0.55T MRI. 63 lesions were visualized at 0.55T and 42 were seen on DOTATATE PET/CT. Mean SUVmax of hepatic lesions was 18.7 ± 10.5 on DOTATATE PET/CT. HBP and DWI at 0.55T had increased detection of liver metastases over DOTATATE PET/CT. Qualitatively, HBP was superior on 0.55T compared to 3.0T for 4/5 patients.

Table 1. Sensitivity for the detection of liver lesions by imaging technique broken down by lesion size.

	0-1cm	>1cm	Total
0.55T HBP	88%	100%	94%
0.55T DWI	85%	94%	90%
3.0T HBP	89%	100%	94%
CT	44%	82%	65%
DOTATATE PET	67%	75%	71%

SPLmax was significantly lower for DWI and HBP sequences on a 0.55T system (DWI 76.3 ± 0.6 dB, HBP 78.5 ± 1.1 dB) compared to a 3.0T system (DWI 86.6 ± 1.1 dB, HBP 90.5 ± 1.3 dB) (p value < 0.0001).

CONCLUSIONS

Routine imaging of patients with neuroendocrine tumor metastases is feasible at 0.55T with HBP imaging showing an increased detection rate for hepatic metastases compared to ^{68}Ga -DOTATATE PET/CT. Low-field MR imaging has potential to improve patient experience without sacrificing diagnostic capability.

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