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Clinical utility of preoperative DOTATATE-PET in small bowel neuroendocrine tumors

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BACKGROUND

Peptide Receptor Radionuclide Therapy (PRRT) is effective for gastroenteropancreatic (GEP) neuroendocrine tumors (NETs) and received FDA approval after demonstrating improved progression-free-survival (PFS) in advanced midgut NETs. We investigated a two-decade experience with PRRT, hypothesizing that PRRT confers PFS and overall-survival (OS) advantages in patients who progress after surgery.

METHODS

A retrospective single institution cohort study was performed between January 2013 and December 2023. All adult patients diagnosed with well-differentiated primary SBNET, grade 1-3, with or without distant metastasis who underwent primary tumor resection and had preoperative DOTATATE-PET imaging were included. Preoperative imaging reports and final pathology reports were reviewed and compared. Patient characteristics, pathologic tumor characteristics and imaging characteristics were analyzed. Nodal upstaging was defined as pathologic finding of more positive lymph nodes than identified on DOTATATE-PET. Usual descriptive statistics were applied.

RESULTS

A total of 162 patients with well-differentiated grade 1-3 SBNET were identified, of which 53 (33%) had preoperative DOTATATE-PET imaging included for analysis. Most patients were male (58%) with mean age at diagnosis of 61 years (SD 11.1). Pathologic evaluation of resected specimens identified multifocal tumor in 45% of patients (n=24) and lymph node (LN) metastasis in 91% (n=48). Preoperative DOTATATE-PET identified multifocal SBNET in 19% (n=10) and LN metastasis in 85% (n=45). Imaging was accurate in identifying the number of tumors in 53% of patients and LNs in 17% of cases. Surgical resection resulted in nodal upstaging in 72% of patients (n=38). Median number of LN examined was 18 (IQR 3-48), with a higher positive LN ratio in patients with nodal upstaging (33% vs 14%, $p < 0.05$). There was a higher proportion of nodal upstaging in patients with $Ki67 < 3$ compared to $Ki67 \geq 3$ (55% vs 42%, $p=0.14$) and presence of lymphovascular invasion (92% vs 5%, respectively, $p=0.04$). Mean follow-up time after surgery was 37 months (SD=27). Post-operative disease progression was noted in 44% (n=17) with nodal upstaging and in 20% (n=3) without nodal upstaging ($p=0.09$). DOTATATE-PET to identify multifocal SBNET had a sensitivity of 38% and specificity of 97%.

CONCLUSIONS

Although DOTATATE-PET can identify multifocal SBNET with high specificity, its sensitivity remains poor and it cannot accurately predict lymph node burden. Given that nodal upstaging may be associated with disease progression, a comprehensive preoperative assessment of SBNET patients should integrate multiple modalities and potentially machine-learning for better prognostication.

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