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National trends in surgical management of T1N0 well-differentiated pancreatic neuroendocrine tumors (PNET) and age-specific survival

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BACKGROUND

Prior studies on the surgical resection of T1N0 pancreatic neuroendocrine tumors (WD-PNET) remain controversial. The present study uses the Surveillance Epidemiology and End Results (SEER) dataset to explore association with surgical management on survival, factors that contribute to allocation of surgery, and subgroup analysis for younger and older cohorts.

METHODS

We performed a retrospective analysis of microscopically confirmed T1N0 WD-PNET with known surgical history diagnosed from 2010–2021 and divided them into surgical (SG) and non-surgical (NSG) groups. The 12-year period was divided into 3-year blocks (P1–P4). Surgical methods include local excision (LE), partial pancreatectomy +/- gastrectomy/duodenectomy (PP), total pancreatectomy +/- subtotal gastrectomy/duodenectomy (TP), and extended pancreatoduodenectomy (EP). We assessed trends in surgical management with descriptive statistics and one-way anova, factors associated with surgical allocation using multivariable logistic regression, association of surgery with overall survival (OS) using multivariable cox-regression analysis.

RESULTS

N=1,766 patients diagnosed between 2010–2021 met criteria for T1N0 WD-PNET (SG:N=565 vs NSG:N=1,201). The median age was 60.0 years in SG vs 66.0 years in NSG. PP (52.5%) was the most common resection method followed by LE (9.5%), TP (4.5%), and EP (0.4%). The number of cases increased over time (P1: 96, P2:409, P3: 548, P4: 713). Surgical resection rates decreased significantly over time ($p < 0.001$) from 91.3% in 2010 to 49.2% in 2021.

Tumor size $>1\text{cm}$ (OR 1.57[1.22–2.03], $p < 0.001$) and body/tail location (OR 1.37[1.04–1.79], $p=0.03$) increased likelihood of proceeding to the operating room, but advanced age decreased likelihood (50–75 years: OR 0.63[0.47–0.84], $p<0.01$; >75 years: OR 0.21[0.14–0.32], $p<0.001$).

Lower OS was seen with advanced age (50–75 years: 3.59[1.74–7.44], $p<0.001$; 75+ years: 9.50[4.32–20.91], $p<0.001$). SG had higher OS (HR 0.48[0.34–0.70], $p < 0.001$) compared to NSG. Subgroup analysis showed that SG had higher OS in 50–75 year olds (HR 0.40 [0.26–0.63], $p < 0.001$), but not in extremes of age (<50 years: HR 2.01 [0.21–18.85], $p = 0.41$; > 75 years: HR 0.53 [0.24–1.16], $p = 0.11$). Even so, the 5– year absolute difference in survival was marginal (4%) in the 50–75 year old cohorts.

CONCLUSIONS

Since 2010, the number of patients diagnosed with T1N0 WD-PNET increased and surgical resection rates significantly decreased. Surgery shows marginal 5- year absolute survival over no-surgery in cohorts 50-75 years with no significant difference in OS in extremes of age. Results suggest patients 75+ may defer surgery to be spared post-operative morbidity while younger patients (<50 years) may opt for active surveillance in select cases.

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