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Impact of Hospital Type and Location on Survival Outcomes for Patients with Well-Differentiated G1/G2 Pancreatic Neuroendocrine Tumors

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BACKGROUND

Well-differentiated nonfunctional pancreatic neuroendocrine tumors (PanNETs) require multimodal and multidisciplinary management; therefore, treatment facility type and location may impact patient outcomes. This study examines how facility type and geographic factors are associated with survival for patients with well-differentiated PanNETs.

METHODS

A retrospective cohort study utilizing the National Cancer Database from 2004-2021 to identify patients with well-differentiated G1/G2 nonfunctional PanNETs was performed. Variables included demographic characteristics, insurance status, distance traveled, pathological stage, and treatment modalities (surgery, chemotherapy, radiotherapy, hormonal therapy). The primary outcome was overall survival (OS) and association between survival and treatment facility type and location. Multivariable Cox proportional hazards models were used to identify factors independently associated with mortality.

RESULTS

Of 21,473 patients included in the analysis, 23.2% were treated at community hospitals, 17% at integrated hospitals, and 51.8% at academic hospitals. Patients at community hospitals had lower 15-year survival rates (40% vs. 47% at integrated; 49% at academic hospitals, $p<0.001$). Survival rates varied significantly by hospital distance, with traveling >250 miles showing the highest 15-year survival (59% vs. 47% within 12.5 miles; 49% 12.5-250 miles, $p<0.001$). Kaplan-Meier curves indicated inferior outcomes for patients treated at community hospitals <250 miles of their residence, with nearly 4 years less median survival time. Univariable Cox analysis revealed that receiving treatment at a community hospital <250 miles was associated with >50% risk of mortality (HR=1.52, 95%CI 1.42-1.62, $p<0.001$). Mortality risk was elevated for patients treated at low-volume hospitals and those with higher tumor stages, as well as higher tumor grade with G2-tumors associated with nearly 40% higher risk of mortality compared to G1-tumors (HR=1.39, 95% CI 1.31-1.49, $p<0.001$). Primary tumor resection and private insurance were associated with a significant reduction in mortality risk. On MVA, the main protective and risk factors remained significant. Treatment at a community hospital was associated with a 9% increase in mortality (HR=1.09, 95%CI 1.01-1.17, $p=0.018$). Primary tumor resection was associated

with a 67% reduction in mortality (HR=0.33, 95%CI 0.31-0.35, p<0.001). Other significant factors included age >65yrs, male sex, higher stage and grade, low-volume hospitals, and insurance status.

CONCLUSIONS

Traveling longer distances to specialized, high-volume centers and primary tumor resection are associated with improved OS for patients with well-differentiated PanNETs. These findings underscore the value of access to centralized care at high-volume, specialized hospitals, especially for advanced-stage PanNETs. Future studies examining the utility of interdisciplinary care for patients without access to academic or integrated centers may be of benefit.

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