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Preoperative Predictors of New-Onset Diabetes Mellitus Following Distal Pancreatectomy for Non-functioning Pancreatic Neuroendocrine Tumours

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BACKGROUND

Non-functioning pancreatic neuroendocrine tumours (NF-PanNETs) are typically indolent neoplasms with a rising incidence. Distal pancreatectomy (DP) remains the standard treatment for localized tumours in the pancreatic body/tail. Given the favorable long-term prognosis, accurate assessment of postoperative morbidity, particularly postoperative new-onset diabetes mellitus (PONO-DM), is critical. Aims of the study were to identify preoperative predictors of PONO-DM in patients undergoing DP for NF-PanNETs and to develop a predictive model for individualized risk assessment.

METHODS

All consecutive patients who underwent curative DP for localized NF-PanNETs at San Raffaele Hospital (Milan, Italy) between 2015 and 2022 were included. Exclusion criteria included pre-existing diabetes and follow-up <24 months. Clinical and radiological data, including body composition and pancreatic measurements, were evaluated.

RESULTS

A total of 65 patients were included. After a median follow-up of 58 months, 27/65 patients (41%) developed PONO-DM. PONO-DM was significantly associated with elevated BMI ($p=0.016$), pancreatic atrophy ($p=0.044$), increased total ($p=0.014$) and visceral fat area ($p=0.021$), and a greater percentage of resected distal pancreatic parenchyma (HPP, $p=0.046$). On Cox regression, higher BMI (HR 1.187; $p=0.001$), elevated HbA1c (HR 1.169; $p=0.001$), and greater proportion of distal HPP (HR 1.030; $p=0.018$) were identified as significant risk factors of PONO-DM. A nomogram and online risk calculator (<https://net-distal-pancreatectomy.shinyapps.io/postoperative-diabetes-risk-calculator/>) were developed to predict individual risk at 1, 3, and 5 years after surgery, with good discriminatory performance (AUC 0.766; $p<0.001$).

CONCLUSIONS

PONO-DM occurred in 41% of patients undergoing DP for NF-PanNETs. Elevated BMI, HbA1c and percentage of resected distal HPP emerged as significant risk factors of PONO-DM. The developed nomogram and web-based calculator may support preoperative counseling and guide tailored prehabilitation or parenchyma-sparing strategies in high-risk patients.