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## Long-term Changes In Pancreatic Volume And Endocrine Function After Pancreaticoduodenectomy For Peri-ampullary Neoplasms Using Pancreas-volumetry

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**Background** : Studies that include long-term follow-up of endocrine function including serial volume of pancreas in patients with pancreaticoduodenectomy for peri-ampullary neoplasm are very rare due to the difficulty of measuring the volume of the pancreas. We aimed to evaluate the long-term pancreatic functional outcomes including pancreas-volumetry of pancreaticoduodenectomy for peri-ampullary neoplasms.

**Methods** : This retrospective study enrolled 353 consecutive patients with at least 12-month follow-up who underwent elective pancreaticoduodenectomy for peri-ampullary neoplasms in a single university hospital between January 2011 and December 2020. Perioperative and postoperative outcomes, long-term endocrine function of pancreas, and pancreatic volume changes at 12 months postoperatively were evaluated.

**Results** : Mean age was 65.4 and sex ratio was 1.38 (Men, n=205, 58.1%). The proportion of pre-diagnosed diabetes mellitus was 31.4% (n=111). The origin of the peri-ampullary neoplasm was in the order of pancreas (n=173, 49.0%), common bile duct (n=96, 27.2%), ampulla of Vater (n=65, 18.4%), and duodenum (n=19, 5.4%). Mean operative time was 561 minutes. Clinically relevant postoperative pancreatic fistula (Grade B and C) rate was 22.4% (n=79). 318 patients (90.1%) were diagnosed in peri-ampullary malignant neoplasm. 220 patients (62.3%) underwent adjuvant chemotherapy after pancreaticoduodenectomy. Chronic pancreatitis was present in 10 patients (2.8%). Postoperative hospital stay was 20.1 days. The postoperative 1-, 3-, 6-, and 12-month proportion of diabetes mellitus diagnosed before surgery plus new-onset diabetes mellitus after surgery were 39.7%, 42.8%, 43.9%, and 49.6%, respectively. The preoperative, postoperative 1-, 3-, 6-, and 12-month mean volume of pancreas were 82.3ml, 38.7ml, 28.1ml, 24.9ml, and 25.5ml, respectively. In multivariate analysis, significant differences were observed in operation time (HR 1.008, p=0.012), male sex (HR 0.187, p=0.015), remnant pancreatic volume 12 months after surgery (HR 0.773, p=0.021), and changes in remnant pancreatic volume 12 months after surgery (HR 1.120, p=0.028) between the 'No DM after PD' and 'New onset DM after PD' groups.

**Conclusions** : Pancreatic endocrine function and pancreatic volume continue to decline for at least 12 months after pancreaticoduodenectomy for peri-ampullary neoplasm. Further studies on the cause of pancreatic endocrine dysfunction and decreased remnant pancreatic volume after pancreaticoduodenectomy are needed.

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