

among symptomatic SCNs were located at proximal of the pancreas, and 18 cases (85.7%) among asymptomatic SCNs were located at Distal. Among symptomatic 10 cases located at proximal, conventional pancreaticoduodenectomy was done in 5 cases (50%) because of adjacent duodenum or stomach invasion. Among asymptomatic 3 cases located at proximal, 2 cases underwent enucleation, and one case underwent pylorus preserving pancreaticoduodenectomy. Twenty-five SCNs had left-sided pancreatic tumor, 6 SCNs were larger than 5 cm in tumor size, and all cases were performed with open distal pancreatectomy. 19 SCNs were smaller than 5 cm, and among them, 11 SCNs (57.9%) were performed with laparoscopic or robotic distal pancreatectomy.

Conclusions: Before SCN makes symptoms or grow larger than 5 cm, timely appropriate surgical intervention including minimally invasive surgery need to be actively considered.

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Pseudoaneurysmal Bleeding After Pancreatoduodenectomy

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Purpose: A ruptured pseudoaneurysm is the most serious and life-threatening cause of post pancreaticoduodenectomy (PD) hemorrhage. The aim of this study is to evaluate the clinical course and to assess the management of pseudoaneurysms following PD.

Methods: Between March 2003 and Feb 2011, 576 patients underwent PD (whipple's and pylorus-preserving) for periampullary tumors in division of Hepatobiliary & Pancreatic Surgery, Asan Medical Center. We reviewed the clinical course, managements, and outcomes of 26 patients with pseudoaneurysmal bleeding. Pancreatic fistula was evaluated by international study group of pancreatic fistula (ISGPF) definition.

Results: Of the 26 case, 21 patients underwent pylorus-preserving PD. Pancreaticojejunostomy procedures

underwent duct-to-mucosa (n=13) and Dunking method (n=13). Diagnoses were bile duct cancer (n=21), ampullary cancer (n=4), and duodenal cancer (n=1). External drainages of pancreatic duct were performed in 9 patients. Bleeding symptom or sign (bloody drain, hematemesis or melena, etc.) developed at median 21 days (range 8~70) after operation. In particular, 10 patients (38.5%) presented the bleeding after postoperative 4 weeks. Before development of bleeding, 25 patients (96.2%) showed pancreatic fistula (ISGPF grade A,8; B,15; C,1), and 13 patients had intra-abdominal drains with turbid color. When bleeding sign occurred, 17 patients (65.2%) showed a suspicious or definite pseudoaneurysm on CT imaging. All 26 patients were performed with angiography. Fourteen patients (53.8%) experienced bleeding from the gastroduodenal artery stump, 8 patients (30.8%) from common hepatic artery, and 4 patients (15.4%) from proper hepatic artery. Of all angiography, 18 patients were performed with micro-coil embolization, 4 patients with stent insertion, and 2 patients with glue injection. The other 2 patients were failed due to artery dissection during angiography and vascular tortuosity, respectively, and they were managed conservatively. Of 24 patients with angiographic procedure by embolization or stent graft, hemostasis was achieved in 22 patients except two patients required re-laparotomy for hemodynamic instability. Six patients with coil embolization presented liver infarction after angiography, and 5 were improved. One patient experienced two-times pseudoaneurysmal bleeding at postoperative 10 and 70 days. The mortality rate was 19.2% (5 patients, due to sepsis and disseminated intravascular coagulopathy).

Conclusion: A delayed hemorrhage following PD is closely associated with pancreatic fistula and carried a significantly higher mortality. The patients with pancreatic fistula are needed to do careful attention more than 4 weeks after operation. An urgent angiography, instead of CT, is required for diagnosis and management of ongoing hemorrhage. Selective micro-coil embolization or stent graft is recognized as an effective treatment in patients with a pseudoaneurysmal bleeding of the hepatic artery.