Pancreaticojejunostomy using duct-to-mucosa anastomosis without a stenting tube

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Abstract

Background. There is a high risk of anastomotic leakage after pancreaticojejunostomy following pancreatocoduodenectomy in patients with a normal soft pancreas because of the high degree of exocrine function. Therefore, pancreaticojejunalostomy is generally performed using a stenting tube (stented method). However, pancreaticojejunalostomy with a certain duct-to-mucosa anastomosis does not always require a stenting tube, even in patients with a normal soft pancreas. Recently, we have performed pancreaticojejunalostomy with duct-to-mucosa anastomosis without a stenting tube (nonstented method) and obtained good results.

Methods. The point of this technique is to maintain adequate patency of the anastomosis using a fine atraumatic needle and monofilament thread. The results of end-to-side pancreaticojejunalostomy of the normal soft pancreas using the nonstented method (n = 123) were compared with those using the stented method (n = 45).

Results. There were no differences in background characteristics between the groups, including age, gender, and disease. The mean times to complete pancreaticojejunalostomy were around 30 min in the two groups and the rates of morbidity and leakage of pancreaticojejunalostomy were 26.8% and 5.7% in the nonstented group and 22.2% and 6.7% in the stented group, respectively. These differences were not statistically significant. One patient in the stented group died of sepsis following leakage of pancreaticojejunalostomy. There were also no significant differences in the mean time to initiation of solid food intake or postoperative hospital stay.

Conclusions. In conclusion, complete pancreaticojejunalostomy using duct-to-mucosa anastomosis for a normal soft pancreas does not require a stenting tube. This nonstented method can be considered one of the basic procedures for pancreaticojejunalostomy because of its safety and certainty.

Key words Duct-to-mucosa pancreaticojejunalostomy · Nonstented pancreaticojejunalostomy · Pancreatocoduodenectomy · Reconstruction of the normal soft pancreas

Introduction

Pancreatocoduodenectomy was introduced by Kausch in 1912 and by Whipple et al. in 1935. In recent years, marked progress in imaging modalities has lead to early diagnosis of many pancreatobiliary diseases and pancreatocoduodenectomy, including pylorus-preserving pancreatocoduodenectomy (PPPD), has been performed increasingly as a standard operation for patients with periampullary lesions. The operative techniques have also become safer, and postoperative morbidity and mortality have been reduced markedly in many large specialized centers. However, the postoperative complication rates in patients with a normal soft pancreas are still high because a soft normal pancreas has a nondilated pancreatic duct and a high degree of exocrine function. In particular, anastomotic leakage of the pancreaticojejunalostomy, which is the most serious early complication after pancreatocoduodenectomy, induces severe complications, such as intra-abdominal abscess or subsequent hemorrhage from the pseudoaneurysm of the artery. Therefore, pancreaticojejunalostomy is generally carried out using a stenting tube for the normal soft pancreas. However, no consensus has been obtained on which pancreaticojejunalostomy procedure is the safest, and there are some problems with stenting tubes such as twisting, bending, and occlusion of the tube. We have seen several complications associated with the stenting tube: acute pancreatitis resulting from subsequent occlusion or bending of the stenting tube or late anastomotic stenosis following iatrogenic injury sustained when withdrawing the external stenting tube.
Pancreaticojejunostomy by duct-to-mucosa anastomosis without a stenting tube using thin monofilament stitches even in patients with a normal soft pancreas. The aim of this study was to evaluate the usefulness of nonstented duct-to-mucosa anastomosis in pancreaticojejunostomy for a normal soft pancreas with a nondilated pancreatic duct compared with stented duct-to-mucosa anastomosis.

**Patients and methods**

A consecutive series of 168 patients who underwent pancreateoduodenectomy and pancreaticojejunostomy with duct-to-mucosa anastomosis for a normal soft pancreas with a nondilated pancreatic duct between September 1992 and March 2003 at Tokyo Women’s Medical University Hospital was included in the study. Of these, 123 patients underwent pancreaticojejunostomy without stenting tube [nonstented group: pancreatic head cancer, 44; cancer of the papilla of Vater, 22; bile duct cancer, 16; intraductal papillary-mucinous neoplasm (IPMN), 11; endocrine tumor, 5; gastric cancer, 4; duodenal cancer, 4; serous cystadenoma, 3; others, 14] and the remaining 45 patients underwent pancreaticojejunostomy with an internal or external stenting tube (stented group: pancreatic head cancer, 12; cancer of the papilla of Vater, 7; bile duct cancer, 11; IPMN, 1; endocrine tumor, 1; gastric cancer, 5; duodenal cancer, 0; serous cystadenoma, 0; others, 8). Among the 123 patients in the nonstented group, 106 patients underwent PPPD and 17 patients underwent pancreateoduodenectomy with distal gastrectomy (PD). Among the 45 patients in the stented group, 31 patients underwent PPPD and 14 patients underwent PD. The choice of anastomosis with or without a stenting tube was the surgeon’s decision. The only difference between the two groups was whether a stenting tube was used, and pancreaticojejunostomy by duct-to-mucosa and end-to-side anastomosis was performed using the same methods described below in both groups.

The normal soft pancreas with a nondilated pancreatic duct was defined as follows: the results of the preoperative pancreatic function test was within normal limits, intraoperative assessment showed a soft pancreatic parenchyma without fibrosis, and the diameter of the main pancreatic duct measured after pancreatic resection was less than 3 mm. The operative results including operating time, time to complete pancreaticojejunostomy, intraoperative blood loss, morbidity rate, mortality rate, time to initiation of solid food intake, and postoperative hospital stay were compared between the two groups. Statistical evaluation between the two groups was carried out using Student’s \( t \) test and the \( \chi^2 \) test. Significance was defined as a \( P \) value of less than or equal to 0.05. Numeric data are expressed as the means ± SD.

**Operative techniques**

The operative techniques of the nonstented method are illustrated in Figs. 1–6. The pancreas, including the pancreatic duct, is sharply transected with a scalpel. Leaving only the pancreatic duct should be avoided at this time. Any arterial bleeding points on the pancreatic cut end are repaired with 4-0 or 5-0 nonabsorbable sutures and any oozing points are coagulated by electrocautery. No other treatment of the stump such as mattress or fish-mouth suturing is performed. A small hole compatible with the caliber of the pancreatic duct is made in the jejunal wall using electrocautery. No other treatment such as excision or scarification of the jejunal wall is

**Fig. 1a,b.** Transection of the pancreas and treatment of the pancreatic cut end. **a** The pancreas is sharply transected with a scalpel. **b** Any arterial bleeding points on the pancreatic cut end are repaired with 4-0 or 5-0 nonabsorbable sutures and any oozing points are coagulated by electrocautery. No other treatment of the stump such as mattress or fish-mouth suturing is performed.