A Prospective Analysis of the Factors Influencing Pancreaticojejunostomy Performed Using a Single Method, in 100 Consecutive Pancreatocoduodenectomies

SATORU MATSUSE1, HIROSHI TAKEDA1, YOSHINORI NAKAMURA1, SATORU NISHIMURA1, and SHUNZO KOIZUMI2

1 Department of Abdominal Surgery, Tenri Hospital, 200 Mishima, Tenri city, Nara 632, Japan
2 Department of General Medicine, Saga Medical School, 5-1-1 Nabeshima, Saga city, Saga 849, Japan

Abstract: The factors influencing the healing process of pancreaticojejunostomy (P-J) following pancreatocoduodenectomy (PD) are still ill defined, allowing the recommendation of various anastomotic methods. We conducted a prospective study to determine the risk factors influencing the protracted healing of P-J, examining 100 consecutive patients who underwent PD followed by P-J, performed as an end-to-side “mucosa-to-mucosa” anastomosis using vertical mattress sutures (VMS method). Protracted healing of P-J was classified as either peri-pancreatic sepsis (PPS), defined as prolonged suppurative discharge of less than 50 ml a day from the drain beneath the P-J for more than 1 week; or a pancreatic fistula (PF), defined as prolonged discharge of more than 50 ml a day with a high amylase content (>1000 IU) for more than 1 week. There were 80 patients with a malignant neoplasm, and 20 with benign disease. The overall incidence of healing problems following P-J was 9%, which included 6 patients (6%) with PPS and 3 (3%) with PF. Apart from an advanced age of more than 70 years, none of the patients’ characteristics or postoperative complications influenced the healing of P-J. The type of reconstruction, an anastomotic stent, duct size, and a “soft” pancreas were not risk factors. In conclusion, no factors, apart from the age or any special problem of an individual patient, influenced the dehiscence of P-J when the VMS method was used after PD.

Key Words: pancreaticoduodenectomy, pancreaticojejunostomy, vertical mattress sutures, pancreatic fistula, anastomotic leak

Introduction

Recent advances in pancreatic surgery have rendered pancreatocoduodenectomy (PD) a safe operation with a very low mortality rate, but complications arising from pancreaticojejunostomy (P-J) following PD remain a major source of morbidity. According to recent reports, the incidence of leakage of the pancreatic Anastomosis after PD is high at between 6.3% and 19.2%, compared with the incidence of any other anastomosis in the abdominal surgical field. A number of methods of performing the pancreatodigestive anastomotic procedure following PD have been proposed since this operation was first successfully carried out and popularized about 50 years ago. Various authors have also suggested that an anastomotic leak after PD is related to a small pancreatic duct and a “soft” or normal pancreas, large operative blood loss, age, and jaundice. Some authors have recommended alternating anastomotic methods according to the caliber of the pancreatic duct or the condition of the pancreatic parenchyma, whether it is “soft” or “hard.” However, there have been no reports evaluating the risk factors associated with anastomotic healing in consecutive patients undergoing P-J with one single method.

The importance of the submucosal layer in promoting healing of the anastomoses of the digestive tract has been emphasized by Gambee and others. Embracing this fundamental concept, in 1972 we designed a method of “mucosa-to-mucosa” anastomosis using vertical mattress stitches in the P-J, which ensured contact fusion of the submucosal layer of the jejunal and the pancreatic duct. We subsequently demonstrated clinically that end-to-side “mucosa-to-mucosa,” P-J using this vertical mattress suture (VMS) method, resulted in a lower frequency of anastomotic leakage than other conventional procedures. Studying the healing process of the VMS method in dogs, we observed that fusion of the epithelia of the jejunal mucosa and the pancreatic duct took only a couple of weeks, whereas another method took more time.

Since 1981, we have prospectively studied 100 consecutive cases to determine the risk factors associated
with the healing process of P-J using a single method, namely the VMS method, following PD.

Materials and Methods

Patients
Between July 1981 and May 1996, 100 consecutive patients underwent PD at Tenri Hospital, Nara, Japan. P-J was performed following pancreaticoduodenal resection using one single method employing vertical mattress sutures (the VMS method) in all patients. The operations were performed by 12 expert abdominal surgeons who had specialized in gastrointestinal surgery for more than 4 years. All surgeons were allowed to choose the type of reconstruction and use an internal or external stent tube through the anastomosis.

Most of the patients were postoperatively nourished with peripheral parenteral nutrition (PPN) including a fat emulsion, then allowed oral intake within less than 2 weeks. If the fasting period was prolonged for more than 2 weeks due to any complication, they were commenced on total parenteral nutrition (TPN).

We prospectively recorded the following data in each patient.

Preoperative Data
This included the characteristics of the patients, laboratory data including the serum albumin and total bilirubin levels, and whether or not any preoperative biliary decompression, such as endoscopic biliary drainage, percutaneous transhepatic biliary drainage, or T-tube drainage had been performed.

Operative Data
This included the operation time, estimated blood loss, transfusion details, combined resection of other organs, consistency of the pancreas, caliber of the pancreatic duct at the anastomotic site, type of reconstruction, whether an anastomotic stent had been used, and intraoperative irradiation employed after 1992.

Postoperative Data
This included the incidence of complications, outcome, and the length of hospital stay.

We focused particular attention on the protracted healing of P-J in all patients. The protracted healing of P-J was divided into peripancreatic sepsis (PPS) and pancreatic fistula (PF). PPS and PF were clinically defined as prolonged suppurative discharge less than 50 ml a day with a low amylase level of less than 1000 IU, from a drain beneath the P-J site, for more than 1 week; and as prolonged discharge of more than 50 ml a day with a high amylase level of more than 1000 IU, for more than 1 week, respectively.

Procedure of Pancreaticojejunostomy

The pancreaticojejunal anastomosis used in this procedure is of the end-to-side type. Following en bloc resection of the head of the pancreas, duodenum, choledochus, and gallbladder with or without the distal stomach, for standard or pylorus-preserving PD, respectively, the anastomosis is begun. Prior to performing the anastomosis, bleeding from the cut end of the pancreas must be completely controlled. The posterior cut border of the pancreas is sutured to the posterior wall of the jejunum with interrupted stitches of 4-0 atraumatic fine silk.

A small opening is made in the jejunum opposite to the pancreas to fit the pancreatic duct in size. The first mattress suture is then placed along the posterior row of the anastomosis: at the center of the posterior row of the jejunal orifice, an atraumatic needle equipped with 5-0 fine silk suture is passed from inside the lumen through the full thickness of the jejunal wall and brought out from the jejunal serosa (Fig. 1). The needle is then thrust at a point 5 mm away from the edge of the pancreatic duct, passed through the pancreatic parenchyma, and brought out of the lumen of the duct. Finally, the needle is passed through the ductal cut edge