

ORIGINAL ARTICLE

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A safe pancreaticojejunostomy anastomosis during the Whipple operation

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A method of dealing with the pancreatic remnant during the Whipple operation by insertion of the remnant into the jejunal end was prospectively studied. From May 1995 to May 1996, 10 patients were enrolled in the study. There were equal numbers of males and females. The age ranged from 30 to 84 years, with a mean of 54 years. The indications for the Whipple operation were ampullary carcinoma in 5 patients and carcinoma of the duodenum, carcinoma of the common bile duct, carcinoma of the gastric antrum, carcinoma of the pancreatic head, and severe trauma to the pancreatic head in the remaining 5 patients. Construction of the pancreaticojejunostomy was performed by inserting the cut end of the pancreatic remnant into the jejunal end after adequate mobilization. The pancreatic remnants appeared normal in 4 patients and appeared hard and fibrotic owing to chronic pancreatitis in the other 6 patients. There was no clinical leakage, no pancreatic fistula, and no mortality. Our study helps confirm the safety of this method for both normal and fibrotic pancreatic remnants.

Index : Whipple operation, pancreaticojejunostomy.

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Pancreaticoduodenectomy or the Whipple operation is the procedure of choice in the treatment of cancer of the periampullary region and the head of the pancreas. Owing to the complex and technically demanding nature of this procedure, the morbidity rate following this operation is still relatively high, approximately 30-40 percent^(1,2,3). Leakage of the pancreaticojejunostomy anastomosis is the most frequent complication and is well known to all surgeons working in this area. Although most pancreatic fistulas will close spontaneously, serious infections or hemorrhage may supervene, resulting in a fatal outcome^(4,5). Several methods of dealing with the pancreatic remnant during the Whipple operation have been described in order to reduce

this complication. Among them, insertion of the pancreatic stump into the jejunal end (telescopic pancreaticojejunostomy) is a popular one⁽⁶⁾. The simplicity of this procedure led us to perform a study to test its applicability in dealing with the pancreatic remnant during the Whipple operation.

Materials and Methods.

From May 1995 to May 1996, 10 consecutive cases of patients who underwent the Whipple operation by the author at Chulalongkorn Hospital, Bangkok were prospectively studied. After the resected specimen had been removed, the pancreaticojejunostomy anastomosis was performed as follows (figure 1):

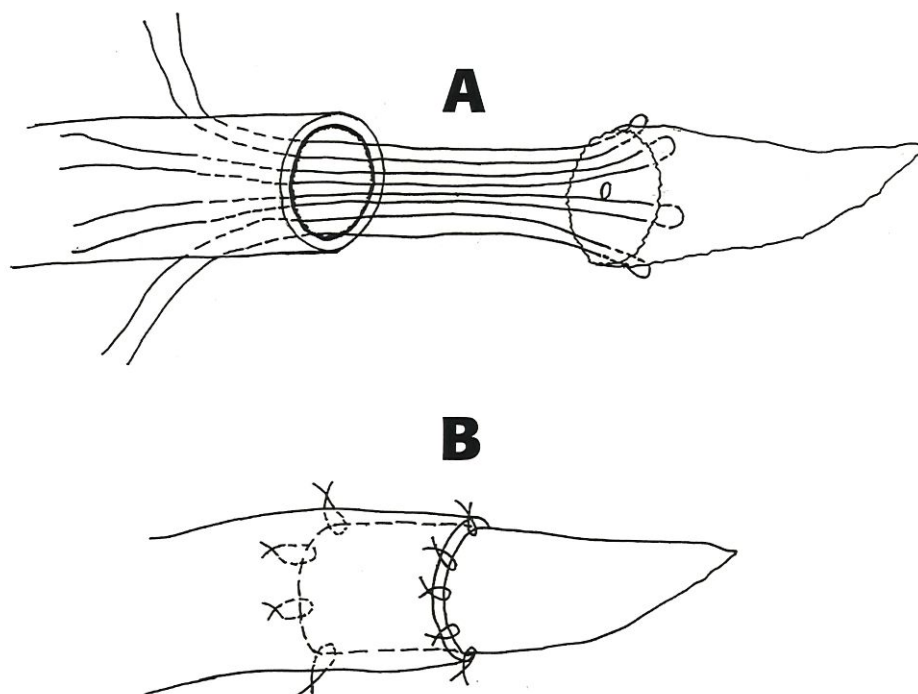


Figure: 1 Technique of inserting the pancreatic stump into the jejunal end during the Whipple operation.

- (A) Placement of stay sutures between the cut end of the pancreatic remnant and the jejunal wall (sutures at the posterior aspect of the pancreas are not demonstrated).
- (B) Completed anastomosis (sutures at the posterior aspect of the pancreas are not demonstrated).

1) mobilization of the cut end of the pancreatic remnant for at least 2 cm. length

2) invagination of this mobilized segment into the jejunal end, and securing the cut end of the pancreas to the jejunal wall with 6 stitches of polypropylene 3-0 sutures. The sutures should be placed away from the pancreatic duct to avoid inadvertent injury to the pancreatic duct and no stent was inserted into the pancreatic duct.

3) suturing the jejunal end to the pancreatic parenchyma with polypropylene 3-0, ensure an appropriate bite of the needle to the pancreatic parenchyma. Too small a bite may cut through the pancreatic parenchyma and too large bite may injure the pancreatic duct. Approximately 6-8 stitches, depending on size of the pancreatic remnant, are required.

Table 1 Diagnosis, details of operations, and postoperative course

Patient number	Age	Sex	Diagnosis	Operative procedures	Pancreatic remnant	Complications	Rx of complication	Hosp* stay (day)
1	64	F	Ca ampulla	Whipple op.	Chr.pan.**	-	-	18
2	65	F	Ca ampulla	Whipple op.	Chr.pan.**	-	-	16
3	58	M	Ca ampulla	Whipple op.	Chr.pan.**	-	-	30
4	37	M	Ca ampulla	Pylorus preserving Whipple op.	Chr.pan.**	-	-	10
5	46	F	Ca gastric antrum	Rad. subtotal gastrectomy and Whipple op.	normal	Prolonged lymphatic drainage	-	30
6	84	F	Ca ampulla	Pylorus preserving Whipple op.	Chr. pan**	-	-	27
7	44	F	Ca CBD	Whipple op. with portal V. resection	normal	-	-	17
8	30	M	Trauma to head of pancreas	Whipple op.	normal	Intra-abdominal collection	Percutaneous drainage	20
9	45	M	Ca duodenum	Whipple op.	normal	-	-	8
10	63	M	Ca of the pancreatic head	Pylorus Preserving Whipple op.	Chr. pan**	-	-	18

Hosp stay* = days of hospitalization after operation

Chr pan.** = chronic pancreatitis

Postoperative care was undertaken in the same manner as for other major abdominal operations. Oral intake was allowed when gastrointestinal functions returned, usually 5 to 7 days after the operation. The patients were discharged home when no further medical or surgical therapy was needed.

Results

During the 13 month period, 10 patients were entered in the study. Five were males and five were females. The age ranged from 30 to 84 years, with a mean of 54 years. The indications for operation were as follows: ampullary carcinoma in 5 patients; and carcinoma of the common bile duct, carcinoma of the duodenum, carcinoma of the gastric antrum, carcinoma of the pancreatic head, and severe trauma to the pancreatic head in the remaining 5 patients. Regarding the pancreatic remnants, 6 patients had evidence of chronic pancreatitis (rubbery to hard, fibrotic pancreas), and the remaining 4 patients had normal pancreas. Details of the operations, complications, and hospital stays[†] are shown in the table. No clinical leakage of the pancreaticojejunostomy anastomosis was observed and no mortality occurred in this study. (Table 1)

Discussion

Since Allen O. Whipple first introduced the technique of pancreaticoduodenectomy for treatment of carcinoma of the ampulla of Vater in 1935 (7), several modifications have been made resulting in an almost totally different procedure from the original one. A number of techniques have been described to deal with the pancreatic remnants to decrease the occurrence of pancreatic leakage and fistulation. Leakage of the pancreaticojejunostomy anastomosis has long been recognised by surgeons working in this area. It is not too emphatic to state that the postoperative course of patients who undergo this extensive operation is largely determined by the procedures undertaken on the pancreatic remnants and its outcome. Even uncomplicated pancreatic

fistulas result in unnecessary and prolonged hospital stays. Complicated pancreatic fistulas may lead to intraabdominal sepsis and catastrophic hemorrhage, which may eventually result in mortality.

Different methods of management of the pancreatic remnant has been proposed by several investigators^(8,9). These include the non-anastomotic options, i.e. pancreatic duct ligation or total pancreatectomy; the anastomotic options, i.e. duct to mucosa pancreaticojejunostomy, pancreaticogastrostomy, and insertion of the pancreatic remnant into the jejunum by a variety of techniques. When anastomosis was performed between the pancreatic remnant and the jejunum or the stomach, fistula formation was most likely to occur in patients with a normal pancreas but it is rare in patients with a large pancreatic duct and a hard, fibrotic pancreatic remnant resulting from chronic inflammation.

Non-anastomotic options may be performed by either duct ligation or total pancreatectomy. High rates of fistula formation have been reported when ligation of the main pancreatic duct is employed, making the procedure less favourable^(4,10). A total pancreatectomy results in severe pancreatic exocrine and endocrine insufficiency, therefore it is reserved for those who may benefit from the procedure such as in carcinoma of the pancreas and in chronic pancreatitis unresponsive to previous partial pancreatectomy⁽¹¹⁾.

The duct to mucosa pancreaticojejunostomy is one of the more popular methods of dealing with the pancreatic remnant during the Whipple operation^(12,13). This procedure is convenient and appropriate when the pancreatic duct is large and the pancreatic remnant is hard and fibrotic from chronic inflammation. For a normal pancreas, a duct to mucosa pancreaticojejunostomy is cumbersome owing to the difficulty of performing the anastomosis between the small pancreatic duct and the jejunal mucosa.

In the pancreaticogastrostomy, the procedure is performed by either implanting or invaginating the pancreatic stump into the posterior wall of the stomach. The first clinical report of success in this procedure was published in 1946 by Waugh and Clagett⁽¹⁴⁾. In the early days, the procedure did not gain widespread popularity despite the numerous technical and theoretical benefits⁽¹⁵⁾. But during the past decade, several reports of excellent results from pancreaticogastrostomy anastomosis during the Whipple operation has been published^(16,17,18,19). At present, there is an increasing trend towards the use of pancreaticogastrostomy, however, its safety over other more conventional techniques has yet to be proven⁽²⁰⁾.

Invagination of the pancreatic remnant into the jejunal end has long been described in the literature. The end-to-end anastomosis between the pancreatic stump and the jejunal end can be performed by either the "dunking" technique⁽⁹⁾ or the insertion technique as described in this study^(8,21).

The insertion technique seem to be technically easier than the dunking technique. The most important step in the insertion technique is adequate mobilization of the cut end of the pancreatic remnant (at least 2 cm.) for a safe invagination. The procedure can be conveniently performed for both normal and fibrotic pancreas regardless of the size of the pancreatic duct. There was no occurrence of pancreatic fistula in our study which included both normal and hard fibrotic pancreatic remnants. This helps to confirm the safety of this method in dealing with the pancreatic remnant during the Whipple operation

In conclusion, a safe method of constructing the pancreaticojejunostomy anastomosis during the Whipple operation has been described. Insertion of the pancreatic remnant into the jejunal end is performed after at least 2 cm. of cut end of the pancreatic remnant has been mobilized. The procedure has been shown to be suitable for both normal and fibrotic pancreas.

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