Management of the pancreatic remnant during Whipple operation

K. Setzis, N. Barbetakis, A. Theodosiou, N. Chatzigeorgiou

SUMMARY
Pancreaticojejunostomy is the most frequent site of fistula formation in patients undergoing Whipple procedure (pancreaticoduodenectomy). The results of an end-to-side anastomosis of the pancreatic stump to the jejunum are discussed in this retrospective review of 21 patients who underwent Whipple procedure for cancer of the pancreas or periampullary region.

Key words: Whipple procedure, pancreaticojejunostomy, pancreaticojejunal fistula

INTRODUCTION
The role of surgical resection in the treatment of pancreatic cancer was established in 1935 by Whipple and associates with the demonstration that resections of the head of the pancreas could be technically performed. Accumulated clinical experience with pancreatic resection has demonstrated that radical surgical treatment of pancreatic cancer results in significant morbidity and mortality and is applicable only to a small fraction of patients with pancreatic malignancies. International literature suggests that in most patients, pancreatic malignancies are diagnosed at late stages when surgical cure by any type of procedure is not possible.

Pancreatectoduodenectomy generally, is considered to be the standard operation for resection of carcinomas of the pancreas or periampullary region. The Whipple operation comprises an en bloc resection of the duodenum, the distal bile duct and the gastric antrum. Pancreatectoduodenectomy procedure has had many technical variations described, typically dealing with the extent of dissection or with the details of reconstructing the gastrointestinal tract after the resection.

Various series have appeared in the medical literature reporting the overall results of pancreatectoduodenal resections. Most series report operative mortality rates averaging 20% for pancreatectoduodenal resections for carcinoma of the pancreatic parenchyma with 3-year survivals averaging under 15% and 5-year survivals averaging 10% or less. Pancreatecto-duodenectomy series performed for peri-ampullary tumors show an average perioperative mortality of 15%, a 3-year survival of 30% and a 5-year survival approaching the 20% range.

Complication rates are high in patients undergoing the Whipple procedure with complications of some type developing in more than 50% of patients. The most common complication after pancreatectoduodenectomy is fistula formation from the anastomoses at the sites of gastrointestinal tract reconstruction. The pancreaticojejunal anastomosis is technically difficult to perform and is the most frequent site of fistula formation. It is important the pancreaticojejunostomy be a secure anastomosis because the leakage of pancreatic secretions from the anastomosis can have potentially fatal consequences.

Many technical modifications have been proposed such as an end-to-end or an end-to-side anastomosis. Many other authors propose the avoidance of pancreaticojejunostomy (total pancreatectomy, oversewn of pancreatic remnant). In this paper an end-to-side anastomosis of the pancreatic stump to the jejunum is discussed.

PATIENTS AND METHODS
Twenty-one patients (15 men and 6 women [mean age: 56.5 years]) with pancreatic or periampullary cancer, eligible for elective pancreatic resection were enrolled in this study (Table 1).

After pancreatic resection, the reconstruction of the alimentary tract has to be performed. Reconstruction
involves gastro-jejunostomy, choledochojejunostomy and pancreaticojejunostomy. According to the method used in the 1st Surgical-Oncological Department of Theagenion Cancer Hospital, gastrojejunostomy is placed distal to choledochojejunostomy and pancreatico-jejunostomy to allow the gastrojejunostomy to be bathed in alkaline biliary and pancreatic secretions. Exposure of the gastrojejunostomy to alkaline resections minimizes the risk of marginal ulceration caused by the sensitivity of the jejunal mucosa to gastric acid. Pancreatico-jejunostomy is the most proximal anastomosis. For the pancreatico-jejunostomy two steps have to be performed:

1. The traumatic surface of the pancreatic stump is ligated with locking sutures 3-0 silk (1st step).

2. A two-layer end-to-side anastomosis is performed (1st layer: jejunal mucosa-pancreas, 2nd layer: jejunal serosa-pancreas).

For this study protocol, eleven typical complications were defined (Table 2) and each patient was followed for 90 days postoperatively. All patients received octreotide at 3/100 µg/day subcutaneously to achieve the maximal inhibition of pancreatic enzyme secretion.

### RESULTS

The postoperative incidence of pancreatico-jejunal fistula was zero. No perioperative mortality was noticed. Although the complications rate was 48% (patients with one or more complications) most of them were unrelated to the formation of pancreaticojejunal anastomosis (Table 3). The most severe one, was a gastric marginal bleeding on the 9th postoperative day and the patient needed relaparotomy.

### DISCUSSION

The significant mortality and morbidity of pancreatic resection raises questions by surgeon oncologists of...
and postoperative management have made pancreaticojejunostomy safer. Total pancreatectomy removes all exocrine and endocrine pancreatic function, requiring exogenous pancreatic enzyme and insulin administration.

An alternative method to avoid pancreaticojejunalostomy is to ligate the remnant either with intraductal blocking or not and leave it free but well-drained in the abdominal cavity.

Despite the fact that ligation of the remnant causes more fistulas than pancreatico-jejunalostomy, fistula formation after pancreatico-jejunalostomy is more dangerous. Probably there is an activation of pancreatic enzymes caused by the enteric secretions. Activated pancreatic fluid is more corrosive compared to the fluid secreted by the isolated pancreatic remnant.

The modification described in this paper is simple. Excretion of pancreatic fluid inside jejunum is inhibited, in order to avoid mixing of pancreatic and enteric secretions and activation of pancreatic enzymes.

Even though, the number of treated cases was few, the early experience has indicated successful results in pancreaticojejunalostomy formation.

**REFERENCES**


