

T-tube biliary drainage during reconstruction after pancreaticoduodenectomy.

A single-center experience



Ann. Ital. Chir., 2017 88, 4: 330-335
pii: S0003469X17027270

Pasquale Cianci, Gloria Giaracuni, Nicola Tartaglia, Alberto Fersini, Antonio Ambrosi, Vincenzo Neri

Department of Medical and Surgical Sciences, University of Foggia, Foggia, Italy

T-tube biliary drainage during reconstruction after pancreaticoduodenectomy. A single-center experience

AIM: The purpose of this study is to communicate our experience about the results and effectiveness in the use of the T-tube biliary drainage during pancreaticoduodenectomy.

MATERIAL OF STUDY: In accordance with Whipple we perform the gastric antrum resection during pancreaticoduodenectomy. We have treated 42 patients with pancreaticoduodenectomy, 25 males and 17 females with a mean age of 62 years (range: 53-79 years), and in each of them we have placed a biliary T-tube.

RESULTS: Pancreatic fistula was the most common complication and occurred in 10 patients (23.81%), all of these were low-flow fistula (<200 ml) and required only medical treatment.

DISCUSSION: Resection of the pancreas is considered a major operative procedure. Pancreatic fistula is the most common complication after pancreaticoduodenectomy, and it was also the most frequent complication observed by us. In pancreaticoduodenectomy T-tube allows lesser risks of complications due to pancreatic fistula and it makes its faster healing. In all cases the treatment was not invasive.

CONCLUSIONS: T-tube biliary drainage can make a positive contribution concerning all the complications that can occur after pancreaticoduodenectomy, especially against the pancreatic fistula.

KEY WORDS: Pancreaticoduodenectomy, Pancreatic fistula, Pancreas head cancer, Pancreatic Tumors, T-tube drainage

Introduction

Pancreaticoduodenectomy (PD) firstly performed by Whipple¹ is a well-established surgical practice for the

treatment of peri-ampullary and pancreatic head tumors, benign neoplasms and other pathological conditions that have as main symptom jaundice (as well as the chronic pancreatitis)^{2,3}. In the last decade the mortality rate for PD decreased to <4% in most high-volume centers^{4,5}; whereas the morbidity remains high from 30% to 50%^{6,7}. The most common postoperative complications are in the majority of cases secondary to pancreatic anastomosis dehiscence resulting in loss of active pancreatic fluid which can cause erosive complications to neighboring organs and tissues (intestine, biliary duct or vessel walls) and ultimately become infected. Therefore, postoperative pancreatic fistula (POPF) traditionally has been regarded as the most frequent complication and even the

Pervenuto in Redazione Aprile 2017. Accettato per la pubblicazione Giugno 2017

Correspondence to: Pasquale Cianci, Viale Luigi Pinto 1, 71122 Foggia, Italy (e-mail: ciancidoc1@virgilio.it)

potentially more serious, which can prolong hospital stay and increase costs because often associated with other complications such as delayed gastric emptying, bleeding, abscesses and wound infection⁸. The purpose of this study is to evaluate the role that the biliary T-tube may have to reduce complications related to PD.

Material and Method

TECHNIQUE

In accordance with Whipple's procedure we perform the gastric antrum resection during PD. Reconstructive time includes 3 anastomosis to rebuild the digestive tract: end-to-end pancreaticojejunostomy, end-to-side hepaticojejunostomy and then antecolic end-to-side Roux en Y gastrojejunostomy. We drain the hepaticojejunostomy with Kehr's tube (Fig. 1); its small fenestrated horizontal branch is placed between common bile duct and jejunal loop; its long not fenestrated vertical branch passes through a breach of the common bile duct and exits outside the abdominal wall by means of a small skin incision. Two abdominal drains are placed: on the left side (pancreaticojejunostomy) and on the right side (hepaticojejunostomy).

PATIENTS

From September 2006 to September 2016 we treated 129 patients with pancreatic diseases; of these 114 presented proximal pancreatic neoplasms (88.37%), 11 distal pancreatic neoplasms (body-tail) (8.52%) and 4 chronic pancreatitis (3.1%). Surgical procedures performed, at our Department, have been: 71 (55.03%) palliative treatments, 6 (4.65%) distal pancreatic resections, 6 (4.65%) enucleoresections for insulinomas, 4 (3.1%) intervention for chronic pancreatitis and 42 (32.55%)

TABLE I - Preoperative indications

Ampullary neoplasms	7/42
Pancreas head neoplasms	18/42
Pancreas neck neoplasms	4/42
Distal bile duct malignant stenosis	11/42
Cystic dystrophy of duodenal wall	1/42
Autoimmune focal pancreatitis	1/42

TABLE II - Demographic data

SEX	
Male	25 (59.52%)
Female	17 (40.47%)
AGE (years)	
Mean (SD)	68,07 (5,93)
Median	68
Range	58-83
BMI (Kg/m ²)	
Mean (SD)	21.08 (3.71)
Median	20
Range	18-30
ASA Score	
I	10/42 (23.81%)
II	22/42 (52.38%)
III	8/42 (19.04%)
IV	2/42 (4.76%)
V	0/42 (0%)

pancreaticoduodenectomy. We observed the last 42 patients, 25 males (59.52%) and 17 females (40.47%) with a mean age of 62 years (range: 53-79 years), and in each of them undergoing PD we have placed a biliary T-tube. In the preoperative assessment was given special attention to patient history, blood tests were per-

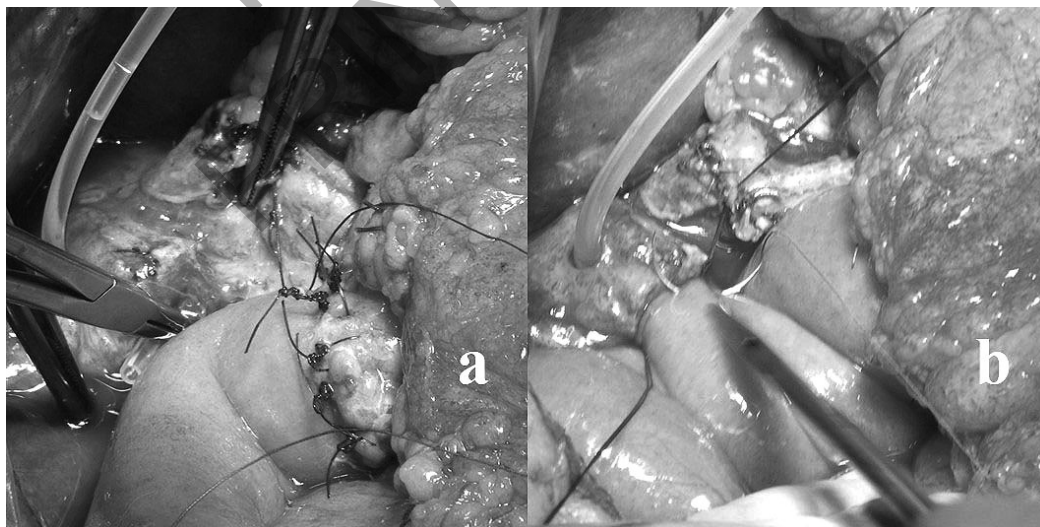


Fig. 1

TABLE III - Intraoperative and postoperative outcomes

OPERATIVE TIME (MIN)	
Mean (SD)	330.74 (83.19)
Median	300
Range	250-550
BLOOD LOSS (ml)	
Mean (SD)	177.38 (56.14)
Median	167.5
Range	105-375
POSTOPERATIVE HOSPITALIZATION (DAYS)	
Mean (SD)	14 (7.13)
Median	10
Range	10-40
POSTOPERATIVE COMPLICATION	
Pancreatic fistulas	15/42 (35.71%)
Perioperative bleeding	10/42 (23.81%)
Pulmonary thromboembolism	2/42 (4.76%)
Atrial fibrillation	1/42 (2.38%)
Severe acute pancreatitis	1/42 (2.38%)
MORTALITY	
	2/42 (4.76%)

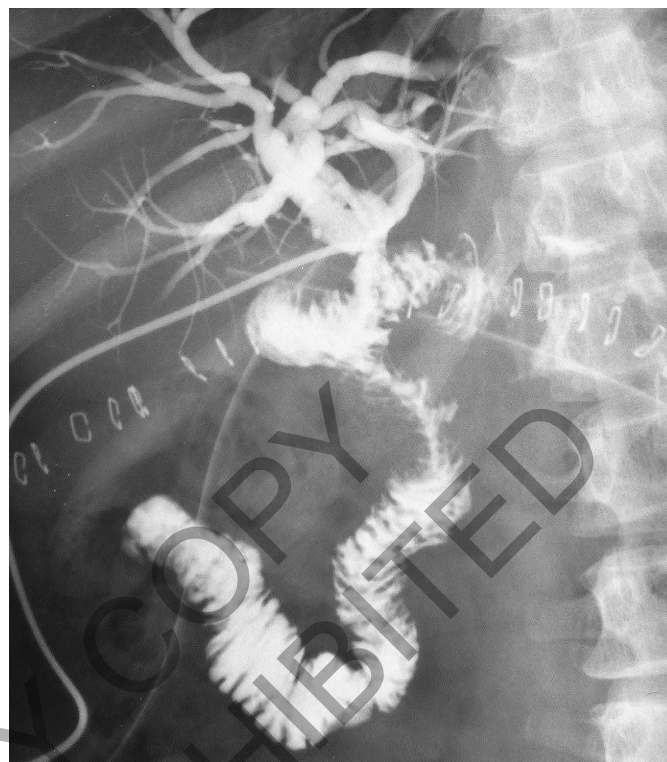


Fig. 2

formed for the detection of tumor markers (TPA, CEA, CA 19-9, CA 50). For the diagnosis the main diagnostic exam was computed tomography (CT), in a few cases was used magnetic resonance imaging (MRI) due to allergy to contrast medium or the presence of metal implants. Endoscopic ultrasonography was required in those cases of uncertain diagnosis (3 insulinomas, 1 IPMN and 1 cystic dystrophy of duodenal wall). Indications to surgery and demographic data, including body mass index (BMI) and ASA score, are shown in Tables I and II. After surgery all patients received the same infusion and antibiotic therapy and began to eat after the resumption of the intestinal peristalsis, usually not earlier than seven days. Routinely we measured levels of amylase and lipase in the peripancreatic abdominal drainage in the third, fifth and seventh day after surgery, consequently negative values drainage has been removed. Even the nasogastric tube, if there are no complications, is removed in the seventh day. The T-tube is removed after four-six weeks, following a trans-kehr control cholangiography (Fig. 2).

Results

A total of 42 PD were followed during the study period. Intraoperative and postoperative outcomes are summarized in Table III. The average operation length was 330.74 min (range: 250-550), the average intraoperative blood loss was 177.38 ml (range 105-375). Mean postoperative hospital stay was 14 days. Postoperative complications occurred in 15 patients. Pancreatic fistula was

the most common complication and occurred in 10 patients, all of these were low-flow fistula (<200 ml) and required only medical treatment. We treated pancreatic fistulas with medical therapy alone which consisted in subcutaneously injection of somatostatine in doses of 100 mcg every 8 hours for at least of 7 days, and replacement parenteral nutrition until the reduction of pancreatic secretion below 40 ml. The perioperative bleeding occurred in 2 cases due to bleeding of the entero-enteric anastomosis, the first was treated by surgery the next day, the other only with medical therapy and blood transfusion. We observed other 3 complications that did not require surgery treatment: severe acute pancreatitis, atrial fibrillation and pulmonary thromboembolism. The mortality rate was 4.76%, postoperatively 2 elderly patients died due to emerging cardiopulmonary complications. Finally, all surgical specimens were analyzed by the same team of pathologists, and the results are reported in Table IV.

TABLE IV - Pathological findings

Ampullary adenocarcinoma	7/42 (16.67%)
Adenocarcinoma (head/neck of the pancreas)	22/42 (52.38%)
Distal bile duct cholangiocarcinoma	11/42 (26.19%)
Cystic dystrophy of duodenal wall	1/42 (2.38%)
Autoimmune focal pancreatitis	1/42 (2.38%)

Discussion and Comments

Resection of the pancreas is considered a major operative procedure. Operative mortality rates over the last two decades are less than 5%, showing a stable reduction. On the contrary morbidity rates remains high: 30-60%⁹. We can divide the complications related to the intervention of pancreaticoduodenectomy in common and less frequent. In the first group we remember pancreatic fistula-leak (3-30%), hemorrhage (2-16%), delayed gastric emptying (DGE) (8-45%), intra-abdominal abscess (1-14%), wound infection (5-10%) and biliary complications (3-9%)¹⁰⁻¹². Less frequent are gastroduodenal fistula, post-operative acute pancreatitis, anastomotic ulcer. The majority of perioperative complications of pancreatic surgery are not life threatening, with low need of surgical treatment¹³. The most important complication after PD is pancreatic fistulas. However, the rate reported of POPF is highly variable from 2% to over 20%. This significant variability can be attributed to the different evaluations of the complication, also reflected in the different words used: fistula, leakage, anastomotic leakage and failure that should be considered synonymous. Most surgeons currently prefer to use the term fistula. A standardized definition of fistula was first proposed in 2005. The ISGPF consensus document has defined postoperative pancreatic fistula as the a leakage through a place drainage during the operation or successively, of a quantity of any fluid from the 3rd post-operative day included, with an amylase content equal to or greater than 3 times the upper limit of normal serum values⁸. Three clinical grade of POPF are defined: Grade A fistula with no clinical impact; Grade B POPF that requires treatment and a change in the management of specific clinical pathway and leads to a delay in discharge or readmission; and grade C, POPF that requires a major change in clinical management or deviation from the normal clinical route. Serious postoperative complications and mortality may be associated⁸. In our study we observed that the more frequent complication is the fistula in accordance with literature and we can consider the fistulas observed in our patients of grade A and grade B. Risk factors for pancreatic fistula can be divided into three groups: pancreas and disease-related risk factors (pancreatic disease, pancreatic texture, pancreatic duct size, pancreatic juice output), patients-related risk factors (age, gender, jaundice, malnutrition), operative risk factors (operative time, resection type, anastomotic technique, intraoperative blood loss). A pancreatic soft tissue without pre-existing fibrosis is considered a risk factor for the development of fistula, while a pancreatic fibrotic tissue as in patients with chronic pancreatitis facilitates the performing of the anastomosis; a pancreatic duct with a diameter less than 2 mm makes more difficult the anastomosis. Huang et al.¹⁴ described different pancreatic fistula rates based on tissue texture: 0% for hard pancreatic texture, 3% for intermediate pan-

creatic texture and 25% for soft pancreatic texture. With regard to the therapeutic approaches for pancreatic fistula we can divide them into conservative and surgical treatments. Conservative treatments are drainage, bowel rest, intravenous antibiotics, nasogastric suction, total parenteral nutrition, octreotide¹⁵ (Octreotide is an analogue synthetic of somatostatin that inhibits pancreatic exocrine secretion). With conservative treatment fistula heals in 70-90% of the cases¹⁴. The surgical approach is necessary when there are complications such as hemorrhage, anatomic obstacle (distal pancreatic resection) and pancreatic ductal disruption. In our opinion the T-tube biliary drainage not is a direct protection for the hepaticojejunal anastomosis, usually very reliable, it provides an indirect protection through the external biliary outflow with consequent reduction of the pressure inside the bile duct. Another valuable function of the T-tube is to allow a stable separation between the biliary and pancreatic fluids so as to prevent the activation of this last, especially in case of pancreatic anastomotic leakage or fistula. Ultimately in PD T-tube allows lesser risks of complications due to pancreatic fistula (delayed hemorrhage, superinfections, etc.) and it makes its faster healing. Another frequent complication after PD is the DGE with an incidence of 20-40%. Its etiology is uncertain (decreased motilin levels, removal duodenal pacemaker, disruption gastroduodenal neural connections). To make the diagnosis must consider three parameters: postoperative nasogastric decompression > 10 days, postoperative drug treatment > 10 days (prokinetic drugs) and pyrosis. The treatment of this complication involves bowel rest, gastric decompression, enteral nutrition (nasojunal tube) or total parenteral nutrition, metoclopramide, erythromycin. DGE not increase mortality but results in prolonged hospitalization, impaired quality of life and increased hospital costs. Small doses of erythromycin a hormone produced in the duodenum and proximal jejunum, have been reported to reduce DGE by 75%¹¹. The bleeding complications can occur in perioperative and postoperative time; the first group requires interventional procedures or selective angiographic embolization with an incidence of 2-15% following pancreatic resection, the second group occurs 10-15 days after surgery. Postoperative hemorrhages are caused by erosion of the retroperitoneal vasculature or complications of necrosectomy and require selective angiography or surgical treatment. Postoperative bleeding has been reported in the 5%-16% but this percentage may increase (<60%) in presence of pancreatic leakage [16]. Septic complications and intra-abdominal abscesses are usually the result of anastomotic leakage or fistula. The abscesses usually occur from 3 to 10 days after the PD and their most frequent location is the right subhepatic region and under the left diaphragm. In addition to a targeted antibiotic therapy these collections can be drained under ultrasound and CT guidance. Surgical treatment is considered when in spite of everything is not observed clinical improve-

ment¹⁷. De Oliveira et al.¹⁸ has developed a new classification of complications after PD into five degrees: grade I (no particular action is required), Grade II (need for drug therapy), grade III (need for invasive therapy), grade IV (organ dysfunction with intensive care unit stay) and grade V (death). This classification allows an objective evaluation of the severity of complications allowing an evaluation over time. Our study showed a postoperative morbidity of 38% but only 9.5% of the complications can be classified as grade III of the classification of De Oliveira, in 28% of cases was performed only medical therapy (Grade II). Pancreatic fistula occurred in 12 patients all treated non-invasively and in accordance with the clinical classification proposed by ISGPF we can consider them grade A and grade B.

Conclusions

T-tube biliary drainage can make a positive contribution concerning all the complications that can occur after PD, especially against the pancreatic fistula. Regarding the moderate pancreatic fistulas (about 200 ml daily) the positioning of the T-tube in the common bile duct during PD promotes healing of pancreatic fistula because reduces the mixing of bile and pancreatic fluid and reduces the amount of pancreatic secretion enzymatically activated with all complications potentially resulting. Furthermore we believe that the use of the T-tube contributes to reduce the major complications related to the surgical procedures of PD resulting in a reduction of hospital stay and effective costs.

Riassunto

OBIETTIVO: Lo scopo di questo studio è di comunicare la nostra esperienza sui risultati e sull'efficacia nell'uso del drenaggio biliare a T durante la duodenocefalopancreasectomia.

MATERIALE DI STUDIO: In conformità con Whipple durante l'intervento di duodenocefalopancreasectomia eseguiamo la resezione gastrica dell'antro. Abbiamo trattato 42 pazienti, 25 maschi e 17 femmine con un'età media di 62 anni (range: 53-79 anni), e in ciascun intervento abbiamo posizionato un drenaggio biliare a T.

RISULTATI: La fistola pancreatica è stata la complicanza più comune e si è verificata in 10 pazienti (23,81%), tutti queste erano fistole a basso flusso (<200 ml) e hanno richiesto soltanto un trattamento medico.

DISCUSSIONE: La duodenocefalopancreasectomia è considerata una delle procedure chirurgiche più delicate ed impegnative. La fistola pancreatica è la complicanza più comune dopo questo tipo di chirurgia, ed è stata anche la complicanza più frequentemente osservata da noi. A nostro giudizio durante la duodenocefalopancreasectomia il posizionamento di un drenaggio biliare a T consente

minori rischi di complicanze dovute alla fistola pancreatica e rende più veloce la guarigione. In tutti i nostri casi il trattamento non è stato chirurgico.

CONCLUSIONI: Il drenaggio biliare a T può contribuire positivamente al decorso della maggior parte delle complicazioni che possono verificarsi dopo la duodenocefalopancreasectomia, in particolar modo nei confronti della fistola pancreatica.

References

- Whipple AO: *Pancreaticoduodenectomy for Islet carcinoma. A five year follow-up.* Ann Surg, 1945; 121:847-52.
- Shrikhande SV, Qureshi SS, Rajneesh N, et al: *Pancreatic anastomoses after pancreaticoduodenectomy: Do we need further studies?* World J Surg, 2005; 29(12):1642-649.
- van der Gaag NA, Rauws EA, van Eijck CH, et al.: *Preoperative biliary drainage for cancer of the head of the pancreas.* N Engl J Med, 2010; 362(2):129-37.
- Brunschwig A: *One stage pancreaticoduodenectomy.* Surg Gynecol Obstet, 1943; 77:581-84.
- Shapiro TM: *Adenocarcinoma of the pancreas: A statistical analysis of biliary bypass vs Whipple resection in good risk patients.* Ann Surg, 1975; 182(6):715-21.
- Crist DW, Sitzmann JV, Cameron JL: *Improved hospital morbidity, mortality, and survival after the Whipple procedure.* Ann Surg, 1987; 206(3):358-65.
- Schmidt CM, Powell ES, Yiannoutsos CT, et al.: *Pancreaticoduodenectomy: A 20-year experience in 516 patients.* Arch Surg, 2004; 139(7):718-25.
- Bassi C, Dervenis C, Butturini G, et al.: *International study group on pancreatic fistula definition. Postoperative pancreatic fistula: An international study group (ISGPF) definition.* Surgery, 2005; 138(1):8-13.
- Baker TA, Aaron JM, Borge M, et al.: *Role of interventional radiology in the management of complications after pancreaticoduodenectomy.* Am J Surg, 2008; 195(3):386-90.
- Poon RT, Fan ST, Lo CM, et al.: *External drainage of pancreatic duct with a stent to reduce leakage rate of pancreaticojejunostomy after pancreaticoduodenectomy: A prospective randomized trial.* Ann Surg, 2007; 246(3):425-23.
- Bassi C, Butturini G, Molinari E, et al.: *Pancreatic fistula rate after pancreatic resection. The importance of definitions.* Dig Surg, 2004; 21(1):54-9.
- Büchler MW, Friess H, Wagner M, et al.: *Pancreatic fistula after pancreatic head resection.* Br J Surg, 2000; 87(7):883-89.
- Ho CK, Kleeff J, Friess H, et al.: *Complications of pancreatic surgery.* HPB (Oxford), 2005; 7(2):99-108.
- Huang JJ, Yeo CJ, Sohn TA, et al.: *Quality of life and outcomes after pancreaticoduodenectomy.* Ann Surg, 2000; 231(6):890-98.
- Yeo CJ, Cameron JL, Lillemoe KD, et al.: *Does prophylactic octreotide decrease the rates of pancreatic fistula and other complica-*

tions after pancreaticoduodenectomy? Results of a prospective randomized placebo-controlled trial. *Ann Surg*, 2000; 232(3):419-29.

16. Rumstadt B, Schwab M, Korth P, et al.: Hemorrhage after pancreaticoduodenectomy. *Ann Surg*, 1998; 227(2):236-41.

17. Ashley SW, Perez A, Pierce EA, et al.: Necrotizing pancreatitis: contemporary analysis of 99 consecutive cases. *Ann Surg*, 2001; 234(4):572-79.

18. DeOliveira ML, Winter JM, Schafer M, et. al.: Assessment of complications after pancreatic surgery: A novel grading system applied to 633 patients undergoing pancreaticoduodenectomy. *Ann Surg*, 2006; 244(6):931-37.

READ-ONLY COPY
PRINTING PROHIBITED