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Treatment of the pancreatic stump after DCP

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Abstract. – OBJECTIVE: With improvement in methods, mortality after duodeno-cefalo pancreatectomy (DCP) has decreased to 5% even if complication rate is still high (30-50%). The pancreatic fistula still occurs in 25-50% of cases. Various methods of treating pancreatic stump have been proposed aimed to improve this rate.

PATIENTS AND METHODS: The AA, surgeons of suburban hospital, have performed in five years, 2008-2013, 12 DCP. The pancreatic anastomosis has been in all cases an end-to-end duct-to-mucosa pancreatic-jejunostomy.

RESULTS: The prevalence of fistula has been 33% (4 cases, 3 grade A and 1 grade B according with ISGPF score).

CONCLUSIONS: Soft pancreas and small size of pancreatic duct are recognized as the major factor of risk for pancreatic fistula. In these cases are usually preferred pancreatic-jejunostomy (PJ) and pancreatic-gastro-anastomosis (PG). Both techniques show advantages and disadvantages: some randomized and prospective studies have demonstrated the absence of significative differences respect to the prevalence of pancreatic fistulas. Whipple method has been the most often used reconstructive method: a single loop with bile-pancreatic anastomosis and gastro-pancreatic anastomosis in sequence. A careful evaluation of pancretic tissue and Wirsung size with the aim of choosing the most suitable technique and an accurate execution are the most effective methods to prevent pancreatic fistula,even considering particular setting as elderly patient or HIV infection.

Key Words:
Pancreatic-jejunostomy anastomosis (PJ), Pancreatic-gastro-anastomosis (PG), End-to-end pancreatic-jejunuum anastomosis duc-to-mucosa.

Introduction

One of the most critical points in duodeno-cephalo-pancreatectomy (DCP) for peri-ampullary cancer is the treatment of the pancreatic stump because of its impact on peri-operative morbidity and mortality[1-3]. Nowadays, mortality has decreased to 5%, even though the overall complication rate is still high (30-50%)[4-6].

The most common complications after DCP are:

1) Pancreatic fistula (25-50%), as a consequence of anastomotic leakage. It can be either subclinical, when revealed only after a contrast-enhanced imaging of Wirsung duct, or clinical. Mortality for this complication is about 30%. Risk factors for pancreatic fistula are a soft pancreatic structure and a small and deep Wirsung duct[7-9];
2) Late gastric emptying (10-30%)[10];
3) Haemoperitoneum (5-8%)[11];
4) Hepatic-jejuno-stomy leakage (2-5%) with biliary fistula and localized bile collection[12];
5) Wound infection[10];
6) Intra abdominal abscess[10].

Patients and Methods

Between June 2008 and June 2013, 12 Duodeno cephalo-pancreatectomy have been performed at The Surgery Unit of Basso-Ragusa-Mario Hospital, in Militello in Val di Catania. Indication for surgery was in 7 cases pancreatic head cancer, in 4 ampulloma, and in the last one cholangiocarcinoma of the distal common bile duct; the patients were six males and six females, mean age 72, range 52-83. In all cases, an end-to-end duct-to-mucosa pancreaticojejunostomy was carried on. A stent has been left to protect the anastomosis in all cases.

Results

The most frequent complication was, in 4 cases, a pancreatic fistula grade A (3 cases) or B (1 case) (in the ISGPF score)[13], an haemoperitoneum occurred in case, causing the exitus.

Discussion

Since the introduction of pancreaticoduodenectomy by Whipple, the problem of treatment of pancre-

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atic stump was felt as a primary issue due to the frequency of complications. With the aim of avoiding this complication by a suppression of pancreatic exocrine secretion, Whipple himself in 1935 proposed the duct ligation and the suture of pancreatic stump to induce pancreatic atrophy. Instead of obtaining the intended scope, the method resulted in pancreatic failure with a rising in the rate of pancreatic fistulas and infections, leading early to abandon the procedure. The introduction of sealants able to close the duct without producing a pancreatic atrophy, as neoprene, ethibloc®, tissucol®, had as a result an improvement in mortality rate that was no more different from that of the pancreatic-jejunostomy[14,15].

The main advantages of non-anastomotic treatments are a shortening of surgical times, in particular the performing of anastomoses, and more technical ease, while the frequency of pancreatic fistula is similar to that observed after pancreato-jejunostomy. Disadvantages are the loss of anatomical reconstruction opportunity and altered digestive function[14,15].

Nowadays the non-anastomotic treatment is primarily targeted to a selected group of patients at high risk of anastomotic leakage for soft pancreas and small duct.

In all other cases, pancreatic anastomosis is mandatory.

The pancreatic stump can be anastomized either to the Jejunum (pancreatic-jejunostomy) or to the stomach (pancreatic-gastrostomy).

Pancreatic-jejunostomy is the most frequently adopted solution because of the good vascularization and large mobility of this tract of bowel.

We distinguish three kind of anastomosis: end-to-end anastomosis (with telescopage and with intussusceptions), end-to-side anastomosis, and duct-to-mucosa end-to-side anastomosis[6,7,16].

In 1991 Bartoli's meta-analysis showed a higher rate of pancreatic fistula with end-to side pancreatico-jejunostomy compared with the end-to-end and duct-to-mucosa ones[17] (Table I)[7].

Even in the Johns Hopkins Hospital (Baltimore, MD, USA) experience, the benefits of end-to-side duct-to-mucosa anastomosis were evident[7,18,19].

Table I. Incidence of pancreatic fistula in Bartoli's meta-analysis[17].

Type of anastomosis	Cases (N)	Pancretic fistulas (N)	%
Duct- to- mucosa	741	85	11.5
End-to-Side	583	96	16.5
End-to End	1037	121	11.7

Peng et al in 2007 reported the results of a prospective trial comparing a group of 111 pancreatico-jejunostomy undergone the conventional anastomosis with 106 cases in which was performed the so-called "binding pancreatico-jejunostomy". This method aimed to obtain a safer anastomosis by "binding" 3 cm of jejunal wall around the intussuscepted pancreatic stump. The results were interesting, showing no fistulas in the group "binding pancreatico-jejunostomy" while with conventional anastomosis 8 patients out of 111 developed pancreatic fistulas[9,20] (7.2%).

A further issue regards the need for an anastomotic stent and the type of stent itself, disposable and according to Walker[15,21].

A prospective, randomized study, set up by Roder et al (1999)[22] showed a decrease of pancreatic fistula from 29% to 7% with stenting while other studies failed to show any advantage[8,18].

There are a lot of proposals of rebuilding of digestive continuity[22]:

1) The classic Whipple technique is still the most diffuse. In this method, pancreatic, biliary and gastric anastomoses are performed on a same jejunal loop. It is considered safe and easy thanks to the minimum number of anastomosis;
2) Pancreatico-jejunostomy on a defunctioning loop; in this case a defunctioning loop is interposed between the biliodigestive anastomosis and the enterogastric anastomosis)[16];
3) Pancreatico-jejunostomy on a defunctioning loop with biliodigestive anastomosis and enterogastric anastomosis onto the same loop)[8];
4) Enterogastric anastomosis on a defunctioning loop (pancreaticjejunostomy and biliodigestive anastomosis onto the loop)[24]. Advantages of this technique are linked to the possibility of creating a "pure pancreatic fistula" after a leakage.

In 1946, Waugh and Clagett[25,26] proposed the pancreatic-gastro (P-G) anastomosis, because of many theoretical advantages: the proximity of the two organs and a tension free anastomosis, the possibility of improving the anastomotic perfusion due to the rich gastric vascularization, distance of biliodigestive anastomosis with lower risk of complications, neutralization of pancreatic enzyme by the acid gastric secretion, insertion of nasogastric tube to control amylase levels instead of radiologic and endoscopic examination.

Prospective and randomized studies of Yeo et al[27] and Bassi et al[28] (compared the different tecniques: they have not found differences in the

risk of pancreatic fistula but they have measured a decrease in bile fistula incidence, abdominal complications and late gastric emptying.

Yin Feng Shen et al[6] published a meta-analysis of a randomized and controlled trials by a literature review: between 1990 and 2011 about 397 studies were collected, and 4 entered metanalysis. These 4 studies compared 276 P-G anastomosis e 277 P-J anastomosis. No statistic differences were found in mortality for pancreatic fistula, bile fistula, intra abdominal complications and late gastric emptying.

Many other factors, different from anatomical patterns, can affect the incidence of pancreatic fistula, among these the age and the presence of comorbidities like HIV infections.

Conclusions

DCP can be considered a difficult technique associated with high risk of complications; in 1979, Moussa defined it as "the Cadillac of abdominal surgery"[29].

Several techniques exist, and few are poor of complications: the surgeon has to decide which is the most suited, considering anatomo-pathological and anatomo-topographical conditions of the organ, the size of Wirsung and also the particular setting of some patient, i.e. HIV-positive and elderly[29-48].

Conflict of Interest

The Authors declare that they have no conflict of interests.

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