

ORIGINAL ARTICLE

Post-Operative Pancreatic Fistula in Pancreatico-Duodenectomy with Pancreato-Gastrostomy using Barbed Sutures

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ABSTRACT

Objective To demonstrate safety of barbed sutures for pancreatogastrostomy after pancreaticoduodenectomy, analyzing our results with worldwide literature exclusively about post-operative pancreatic fistula, according to the International Study Group for Pancreatic Fistula definition. **Methods** From 1st January 2013 to 30th June 2015, 39 patients underwent pancreaticoduodenectomy with PG reconstruction (but only 36 using barbed sutures). We evaluated demographic details of the patients (age, sex and diagnosis), length of post-operative hospital stay and rate of POPF. **Results** Out of 36 patients, 6 patients had a clinically relevant grade B/C fistula (16.6%). B grade post-operative pancreatic fistula occurred in 4 patients (11.1%), managed with fasting and requiring a delayed discharge. Only 2 patients was diagnosed a C grade post-operative pancreatic fistula (5,55%), one requiring a percutaneous computed tomography drain (discharged at 38th post-operative day) and the other one required a re-operation because of a pancreatogastrostomy dehiscence with delayed discharge at 98th post-operative day. **Conclusions** The use of barbed suture for pancreatogastrostomy reconstruction seems to facilitate the surgical actions and to reduce the rate of post-operative pancreatic fistula after pancreaticoduodenectomy, also in a no high volume center of pancreatic surgery. The results of this observational study should be validated by largest series also inside multicenter randomized trials.

INTRODUCTION

Since its first appearance in 1909, Pancreaticoduodenectomy (PD) passed through many changes and improvements and became soon the treatment of choice for malignant and benign diseases of the pancreatic head and periampullary region. Its technical difficulties, associated with high rates of complications, still represent a hard challenge for surgeons, but during the decades many renovations has been proposed and widely introduced in the surgical practice, with excellent results in terms of reduction of mortality and morbidity. Moreover, the creation of high-volume centers for pancreatic surgery allowed the beginning of clinical trials for new surgical strategies and long-term results.

The pancreaticoenteric reconstruction after PD is one of the topics debated in literature in the last 20 years [1]. The main issue is represented by the incidence of post operative pancreatic fistula (POPF), which is one of the most common complications of the anastomosis between pancreatic stump and digestive tract [2]. Many trials compared two main types of reconstruction, Pancreato-

Jejunostomy (PJ) vs. Pancreato-Gastrostomy (PG), finding similar rates of fistula and other complications [3, 4, 5] but there is poor studies analyzing the introduction of new devices to improve the safety of the procedure [6, 7, 8].

The introduction of new surgical technologies suggested us to start using a barbed suture (V-Loc™ wound closure device. Covidien) for the pancreaticoenteric anastomosis. This new kind of sutures has been introduced in 2011 and tested for plastic surgery, urology, gynecology, orthopedics and general surgery operations (laparoscopic myomectomy and hysterectomy [9], breast reconstructions [10], laparoscopic gastric by-pass [11], radical prostatectomy [12], hip and knee replacement [13]) with excellent results. Many surgeons extended its field of applications and different studies have been published, and so we did, starting to use this suture for PG after PD. The aim of this study is to demonstrate the effective safety of this suture for pancreatic surgery, analyzing our results with worldwide literature exclusively about POPF.

METHODS

From 1st January 2013 to 30th June 2015, 39 patients underwent PD with PG reconstruction in our General Surgery Unit. We evaluated demographic details of the patients (age, sex and diagnosis), length of post-operative hospital stay and rate of POPF. According to the classification done by the ISGPF, fistula was defined as drain output of any measurable volume of fluid on or after postoperative day 3 with amylase content greater than 3 times the upper normal serum value. POPF was classified into three grades: A, B and C. Grade A POPF requires little change in management or deviation from

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Abbreviations ISGPF International Study Group For Pancreatic Fistula; PD pancreaticoduodenectomy; PG pancreatogastrostomy; POPF post-operative pancreatic fistula
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the normal clinical pathway. Grade B POPF needs a change in management or adjustment of the clinical pathway with noninvasive treatment such as parenteral nutrition or antibiotics. Grade C POPF includes a major change in clinical management due to life-threatening complications. These patients required nutritional support, intravenous antibiotics, percutaneous drainage or surgical intervention [14]. In this study we evaluated the safety of using V-Loc for PG and for the anterior gastrotomy, in terms of rate of POPF. Other complications such as biliary leakage or gastro-jejunal leakage, as well oncological follow-up and survival will not be the object of this study.

Surgical Details

The PG reconstruction was first performed by Waugh and Clagett in 1946. In recent years it has gained approvals for many reasons: the excellent blood supply to the stomach wall facilitates the anastomotic healing; the pancreatic enzymes secreted in the stomach are inactivated by gastric acid, and this may prevent the auto-digestion of the anastomosis [15].

After classical en-bloc pancreaticoduodenectomy, the pancreatic stump is mobilized from the retroperitoneum. Two traction sutures are applied on both edges of the pancreas. Through an anterior and a posterior gastrotomy (3 cm each one), we pull over the pancreatic remnant and perform the PG with two single-layer running sutures (anterior and posterior) between the pancreatic body and the gastric wall (full thickness). The pancreatic stump needs to protrude in the stomach at least two-three cm. Once the anastomosis is fixed, the anterior gastrotomy is closed with a double-layer running suture too. The suture selected for the PG has always been PDS 3/0, but since the introduction of the V-Loc we started using it for this type of pancreatic anastomosis. V-loc has been also used for the closure of the anterior gastrotomy. In this study we used V-Loc 3/0 suture for 36 patients; the others 3 patients received PDS 3/0 suture, and will be excluded from the current dissertation.

RESULTS

The mean age of the patients at the day of the operations was 70 years (min 46 years, max 83). 17 patients were diagnosed with adenocarcinoma of the pancreatic head, 5 with ampullary adenocarcinoma, 2 with distal bile duct adenocarcinoma, 1 with neuroendocrine adenocarcinoma, 3 with Intraductal Papillary Mucinous Neoplasia (IPMN), 4 with cistoadenoma, 3 with ampulloma and 1 with bile duct adenoma. The mean hospital stay was 28, 80 days (max 98 days, min 11).

In terms of post-operative complications, among 36 patients, 6 had a clinical POPF (16.6%). B grade POPF occurred in 4 patients (11.1%), managed with fasting and requiring a delayed discharge. Only 2 patients were diagnosed a C grade POPF (5.55%), one requiring a CT drain (discharged at 38th post-operative day) and the other one required a re-operation because of a PG dehiscence with delayed discharge at 98th post-operative day. 1

patient required a reoperation for a gastrotomy bleeding complicated by wound infection, frequent positioning of laparostomy system, then a multiorgane failure occurred and the patient died after 53 days of hospitalization (diagnosis: pancreatic head carcinoma).

DISCUSSION

Pancreaticoenteric anastomosis is still a challenge for surgeons because of the risk of the anastomotic failure. The risk is due to the differences between the pancreas, a solid retroperitoneal organ, and the intestine, peritoneal organ working via peristalsis that can disrupt a stable anastomosis site. Moreover, the pancreatic juice is secreted not only from the main duct, but also from several minor ducts that can weaken the anastomosis and contribute to develop a POPF.

According to literature, two main types of anastomosis can be performed after a pancreatoduodenectomy: PJ and PG. In terms of post-operative outcome, many surgeons have reported a similar rate of complications between the two methods, but none of them seems to be safer than the other.

Recently, Kech *et al.* [16] published their results of the RECO-PANC multicenter randomized controlled trial, showing an overall rate of POPF of 20% in PG anastomosis and 22% in the PJ one. Analyzing the data and excluding high volume centers for pancreatic surgery (>80 major pancreatic resections per-year), the rate of POPF is higher after PJ reconstruction (46%) than the PG reconstruction (27%). In their reviews, Harnoss *et al.* [17] reported a rate of POPF between 22% and 26%, considering both types of anastomosis. Analyzing the data of the last 2 years and half, in our center the rate of POPF is 16.6% (6/36 patients), which seems to be lower than the mean rate reported in literature (24%). The only case of death was not consequent to a POPF, but to a gastrotomy bleeding (complication more frequent in PG reconstruction than in PJ [16]), than followed by positioning of laparostomy system and a multi-organ failure.

Although if barbed sutures were produced for few kind of surgery (gastric by-pass, inguinal herniorrhaphy, Nissen fundoplication, dermal closure), their use has been extended in several operations such as tendon repair, urethro-urethral anastomosis after prostatectomy [18], bronchoplasty after sleeve lobectomy [19], robotic mitral valvuloplasty [20], with acceptable outcomes according to literature comparisons. In our study, the rate of complications using this new type of suture is absolutely similar to other type of sutures used for the same anastomosis, as demonstrated by comparison with Matsuda *et al.* [8], using Vicryl in laparoscopic PD, and Lee *et al.* [7], using a combination of Prolene and TFE Polymer Pledget: their POPF rates were respectively 20% (1/5 patients) and 28.6% (18/63 patients). Moreover, the experience we developed in bariatric surgery reinforced the certainty that barbed sutures allow us to obtain good results in terms of surgical facility and safety.

CONCLUSIONS

The use of barbed suture for PG reconstruction seems to facilitate the surgical actions and to reduce the rate of POPF after PD, also in a no high volume center of pancreatic surgery. The results of this observational study should be validated by largest series also inside multicenter randomized trials.

Conflict of interest

The authors declare that there are no conflicts of interest.

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