Safer intestinal invagination for a solid pancreatico-jejunal anastomosis in presence of a soft texture pancreatic remnant and non-dilated duct

Francesco Giudici, Benedetta Pesi, Daniela Zambonin, Stefano Scaringi, Paolo Bechi and Giacomo Batignani

Florence, Italy

ABSTRACT: Pancreatico-jejunal anastomosis after pancreatoduodenectomy still represents the Achilles' heel of the procedure: the failure of this anastomosis is relatively common and it is the main cause of post-operative morbidity and mortality. Studies have described different reconstruction strategies for the control of the development of post-operative pancreatic fistula, but the strategy to obtain a safer pancreatico-jejunal anastomosis is still far from satisfaction. We report a novel variation of the invagination technique based on preliminary clinical experience in 8 patients who underwent pancreatico-jejunal anastomosis after pancreatoduodenectomy in our hepatobiliopancreatic center from 2008 to 2014. The variation could obtain a safer intestinal invagination for a solid pancreatico-jejunal anastomosis even in the presence of soft pancreatic remnant.

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KEY WORDS: pancreatico-jejunal anastomosis; anastomosis; pancreatoduodenectomy; invagination; novel variation

Introduction

Because of the severe complications of pancreatoduodenectomy (PD), pancreatico-jejunal anastomosis is still the Achilles' heel of the procedure.[1, 2] The failure of the pancreatico-jejunal anastomosis is a relatively common post-operative complication of PD as it is the main source of morbidity and mortality.

Related to patient characteristics, pancreatic disease and the procedure adopted, many factors influencing the pancreatico-jejunal anastomosis have been described.[3, 4] The factors as the nature and site of the pancreatic disease leading to surgery, the pancreatic duct size and gland texture are surely important, but the surgical technique, blood loss and operative time have to be considered. Taking into account the aspects of the surgical technique, many authors have described different reconstruction strategies for the decrease of the failure of post-operative pancreatico-jejunal anastomosis.[1, 5-7]

At present, the so called "invagination technique" and "duct-to-mucosa" anastomosis are the most widely adopted surgical methods.[8] Furthermore, numerous technical modifications of these methods have been proposed,[9, 10] but the perfect strategy to obtain a safe pancreatico-jejunal anastomosis is not found. Therefore, we proposed a novel variation of the invagination technique based on our preliminary clinical experience.

Surgical technique

We evaluated the results of 8 consecutive patients undergoing PD in our hepatobiliopancreatic center from 2008 to 2014. These patients were operated upon by the same surgeon (BG), using the novel variation of our invagination technique for pancreatico-jejunal anastomosis. Prospectively we collected patients' medical and surgical

Author Affiliations: Unit of Surgery, Department of Surgery and Translational Medicine, University of Florence Medical School, Careggi University Hospital, Florence, Italy (Giudici F, Pesi B, Zambonin D, Scaringi S, Bechi P and Batignani G)

Corresponding Author: Giacomo Batignani, MD, Department of Surgery and Translational Medicine, University of Florence, Largo Brambilla 3, Florence 50139, Italy (Tel: +39-55-7946185; Email: g.batignani@unifi.it)

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records from a computerized database. Surgery was indicated for pancreatic adenocarcinoma, ampullary and advanced colonic cancer. Surgical records included pancreatic texture (firm or soft), pancreatic duct size, post-operative pathological diagnosis, values of pancreatic amylase from drainage during post-operative day 1, 3, 5 and 7, length of hospital stay, and anastomotic failure defined by the International Study Group on Pancreatic Fistula Study Group Consensus.[11]

After the resection phase is finished and the specimen taken, a jejunal loop is brought up, in a trans-mesocolic fashion, to the transected neck of the pancreas, where two hemostatic prolene 3/0 (Ethicon®) sutures have been previously placed cranially and caudally within the pancreatic parenchyma before its transection (hemostatic sutures). A 3/0 double armed prolene with large needles is passed through the pancreas: one needle from the anterior to the posterior surface 1 cm away from the transected margin (Fig. 1), then the needle is used to catch the jejunal seromuscular layer 1.5 cm from the stapled edge and again passes through the pancreas in the same manner, few millimeters from where it enters. This invaginating suture is then suspended with a Kelly clamp. Another invaginating stitch is placed caudally to the duct adopting the same technique. Attention should be paid not to catch or to include the Wirsung duct in the suture, and it is helpful to use a small urethral catheter positioning into the duct. At this moment, the two previously placed hemostatic sutures are passed in the jejunal seromuscular layers cranially and caudally and tied. The stapled jejunal edge is opened, while removing the metallic suture. An internal layer is performed using a 3/0 polydioxanone (Ethicon®) interrupted stitches between the pancreatic capsule and the seromuscular layer of the transected jejunal loop. Once the internal inverting layer has been completed, the 2 suspended invaginating prolene sutures are passed on the anterior jejunal seromuscular layer (about 1.5 cm away from the anastomosis) and tied with a single knot: this will automatically invaginate the jejunum over the pancreas and the shear force will be applied only on the posterior or the anterior wall of the jejunum (Fig. 2). This results in a compression of the pancreas, and for this reason, it is advisable to loose the previously performed single knot, using a metallic hook, after the jejunum is invaginated, tying it again in a more delicate manner thereafter (with multiple knots as usual). It is to underline as in our technique, placing each double-armed suture needle through the

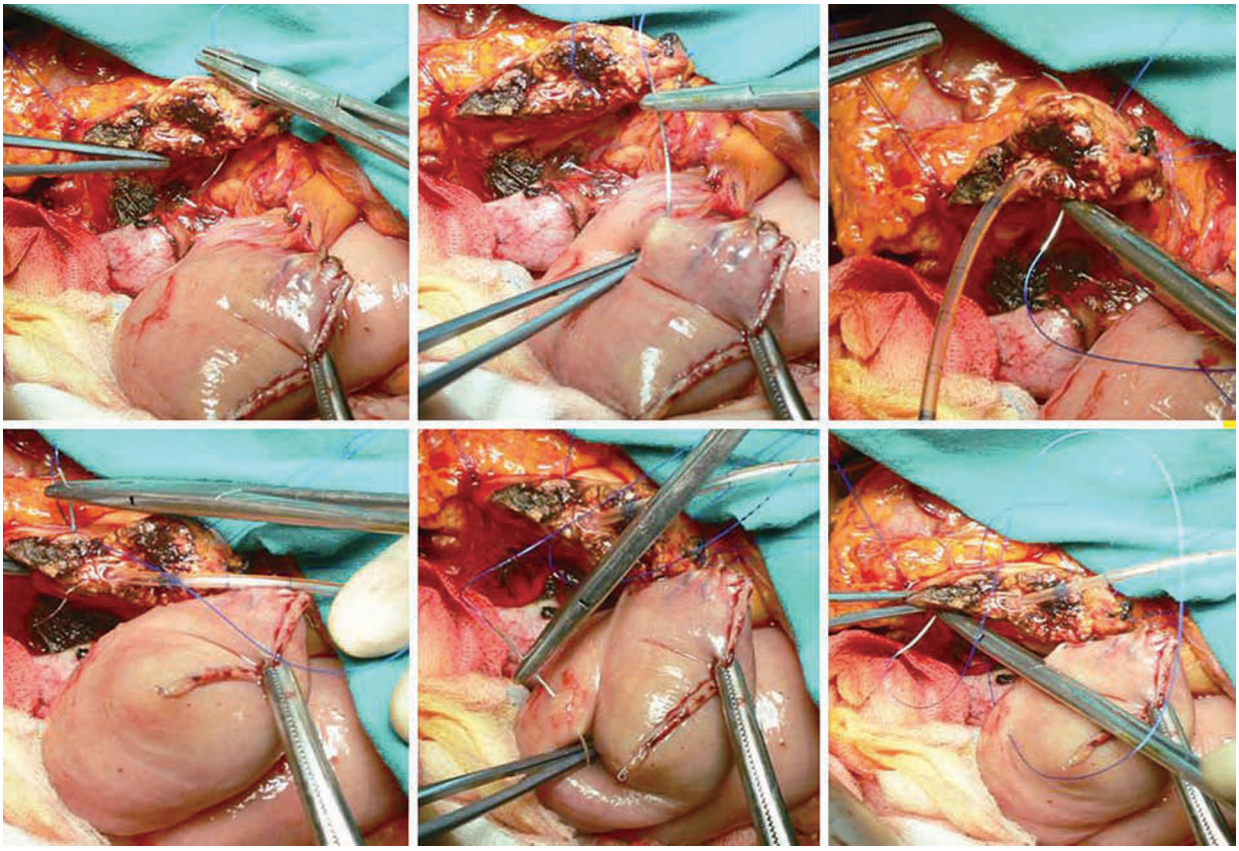

Fig. 1. Intra-operative pictures of the initial steps of our anastomotic technique. A 3/0 prolene suture is passed through the pancreas from the anterior to the posterior surface 1 cm away from the transected margin, then the needle is used to catch the jejunal seromuscular layer and again passed through the pancreas in the same manner.