Feasibility of Mesenteric Vein Reconstruction with PTFE Prosthesis for Non Functioning Endocrine Pancreatic Tumor Surgery

Fratini Geri, Giudici Francesco, Bellucci Francesco, Batignani Giacomo and Tonelli Francesco*

Department of Clinical Physiopathology, University of Florence, AOUC Careggi, Florence, Italy

Abstract

Endocrine pancreatic tumors (EPTs) are rare entities with a low incidence (3-10 per million). A relatively frequent feature (15-53%) among this group of tumors is represented by the non-functioning endocrine pancreatic tumors (NFEPTs) whose peculiarity is due to the absent secretion of mature or active hormones, leaving the patient free from clinically evident hypersecretion syndromes, generally discovered when the mass effect becomes evident, the adjacent pancreatic structures (splenic, superior mesenteric and portal vein, celiac or superior mesenteric arteries, common bile duct, duodenum, etc.) are infiltrated or hepatic metastases are growing. A potentially malignant attitude is high and well related to the dimension of the tumor with inexorably fatal outcome if appropriate surgery is delayed.

The size of the mass and an evident involvement of nearer vascular structures might rise some doubts about the decision to radically remove the tumor. An aggressive surgery should be balanced with the risk/benefit ratio for generally young patients with a reasonable long life expectancy.

We parallel two clinical cases among the patients we observed through the years at our institution and operated on by the same surgeon, who were displaying the same tumoral histology and loco-regional invasiveness of porto-mesenteric axis, but differing one each other for the presence of metastatic disease to the liver the first case. Further aim of the present report is to support the evidence of the feasibility and safeness of extensive surgical demolition with prosthetic reconstruction of the porto-mesenteric axis.

Keywords: PTFE; PET; GEP-NET; Surgery; Mesenteric Reconstruction

Introduction

Endocrine pancreatic tumors (EPTs) are rare entities with a low incidence (3-10 per million) [1], being the 5% of all neoplastic variety of pancreas [2].

A relatively frequent feature (15-53%) among this group of tumors is represented by the non-functioning endocrine pancreatic tumors (NFEPTs) [3,4] with an absent secretion of mature or active hormones, and no clinically evident hypersecretion syndromes. The consequences are represented by indolent clinical courses and late diagnoses so they are generally discovered when the mass effect becomes evident, the adjacent pancreatic structures are infiltrated or hepatic metastases are growing. The size of the mass and an evident involvement of nearer vascular structures might raise some doubts about the decision to radically remove the tumor along with infiltrated major vessels and the subsequent need of their reconstruction.

We considered of some interest to parallel two clinical cases operated on by the same surgeon, who were displaying the same tumoral histology and loco-regional invasiveness of porto-mesenteric axis, but differing one each other for the presence of metastatic disease to the liver in the first case. Further aim is to support the evidence of the feasibility and safeness of extensive surgical demolition with prosthetic reconstruction of the porto-mesenteric axis.

Case No 1

Clinical history and surgery

39 years old man who presented with intermittent mild epigastric pain not related with meals, with salutary emission of unformed stools and a personal and familial negative past medical history. The routine blood tests resulted normal and abdominal US evidenced of a corporo-caudal pancreatic mass. A contrasted abdominal TC scan confirmed the presence of 4 cm. mass confined to the pancreatic body with partial thrombosis of the superior mesenteric vein (SMV), signs of portal hypertension and multiple bilateral liver metastases. Routine serological neoplastic markers were then tested and resulted normal, while NSE and CgA were significantly altered such as somatostatin (SS) and CCK, while PP and Glucagon were only slightly elevated. Basal Gastrin, VIP and Insulin were normal. An invasive NFEPT and an explorative laparotomy were performed. The intraoperative findings were consistent with the pre-operative imaging and in consideration of the young age of the patient, the need of providing symptoms relief and life-expectancy, the decision was taken to radically treat the primary lesion. The liver was left untouched. After gastro-epiploic dissection, lesser sac was opened to identify a hard, white mass within the pancreatic body. Spleno-pancreatic resection up to the pancreatic istmus was undertaken after middle colonic vessels were resected because not detachable by the tumor. Portal vein and superior mesenteric vein were then encircled with a vessel loop and after clamping, thrombectomy of the porto-mesenteric axis was accomplished. Locoregional lymphadenectomy was also carried out. Reconstruction of

*Corresponding author: Francesco Tonelli, M.D., Department of Clinical Physiopathology, Unit of Surgery, University of Florence, Medical School, Largo Brambilla no. 3, 50100 Florence, Italy, Tel: 00390554277449; Fax: 00390554361770; E-mail: fmed@libero.it

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the defect was made by mean of a PTFE patch. Histology confirmed the islet cell carcinoma with 3 metastatic peripancreatic lymph-nodes.

Outcome and follow-up

The early post-operative outcome was uneventful and the patient discharged on post-operative day 8. The follow-up (24 months) was programmed every three months. No surgical related complications, iatrogenic diabetes and portal vein occlusion were observed along the follow-up period. The patient was submitted to a chronic long-release therapy with somatostatin analogs.

Four months later an urgent open cholecistectomy was required for acute lithiasic cholecistitis. Three chemotherapy courses with streptozocin were then started after 6 months from surgery up to 1 year according to tumoral progression’s status. Nevertheless liver metastatic disease could not be controlled by medical therapy, no loco-regional recurrence was radiologically observed. Serological markers were within the normal range along the whole follow-up period, with the exception of NSE and CA 19-9. A second reoperation was undertaken at 24 months after the first surgery and 6 months after the last course of systemic chemotherapy, with cytoreductive intent over the hepatic lesions which remained stable along the neoadjuvant period. All the 10 metastases were treated with a combination of modalities including metastasectomies (4), cryo-ablation (4) and alcoholization (2). Unfortunately few months later the patient showed recurrent disease confined to the residual liver and he eventually died with liver tumoral progression after eight months.

Case No 2

Clinical history and surgery

30 years old woman complaining the occurrence in the last months of a mild post-prandial epigastric pain with gastric fullness. Her past personal and familial medical histories were negative. EGDS failed to display any abnormality and subsequent abdominal US evidenced a pancreatic mass. An abdominal enhanced-CT scan revealed the presence of 11x5 cm. disomogeneous and hypodense bulky mass of the pancreatic body-tail, bulging the posterior gastric wall without infiltrating it and widely encompassing the celiac trunk (Figure 1). Portal thrombosis with portal hypertesion and colloteral venous circulation could also be evidenced (Figure 2). Blood tests at the admittance were normal also including endocrine biochemical markers with the exception of serum SS which resulted slightly elevated. Even if not fully supported by radiological and biochemical evidences the patient was diagnosed with suspected invasive NFEPT on a clinical/radiological basis and a SS receptor scintigraphy was planned. This latter examination did not contribute to preoperatively clear the diagnosis, but in consideration of the high clinical suspicion, the age of the patient, the ongoing symptomatology and the clear invasive attitude of the mass, the patient was scheduled for an explorative staging laparoscopy and, if permissive, to a laparotomic radical surgery with a curative intent.

A bilateral subcostal laparotomy was performed. After colo-epiploic division the lesser sac was entered to expose the pancreatic tumor. In order to completely mobilize the pancreas en bloc with the tumor, ligation and division of the left gastric artery was necessary. At this point cautional dissection of the tumor by the vascular structures and the gastric wall could be safely accomplished after preliminary division of splenic artery and vein at their origin to better mobilize the specimen avoiding any vascular injury. The pancreatic neck was freed and divided and the superior mesenteric-portal vein encircled and clamped for a complete thrombectomy. Loco-regional lymphadenectomy was accomplished along hepatic artery, celiac trunk and...
accumulation. Surgeons approaching EPTs must firstly address calcitonin immunoreactivity, argyrophilia and nuclear p53 protein index >2%, presence of necrosis and/or clear cellular atypia, capsular or perineural microinvasion, tumor size >4 cm., Ki 67 proliferative or metastases or, in their absence, by the following criteria: vascular with high grade malignant behaviour [10]. Malignancy is assessed in 3 categories: benign tumors, well-differentiated carcinomas with metastases and the mortality due to tumoral progression [7-9]. EPTs relatively young (median age is 39 years), this rate is certainly going to the NFPETs tend to increase in time and the affected population is studied because of the rarity of the disease and the absence until a few informations could be derived by the study of their familial genetic counterparts. Differently from the sporadic form, these familial pancreatic adenocarcinoma, when an endocrine carcinoma involves a vascular structure, the prognosis is not affected if a R0 resection is accomplished. Even if there have been few reports of vascular resection and reconstruction after removal of endocrine carcinoma [2,15] this aggressive surgery is well described and derived by the experience on pancreatic adenocarcinoma. Resection and reconstruction of the portal vein can be accomplished by an end to end anastomosis if less than 4 cm. in length are sacrificed. When a vein replacement is necessary, autologous veins, homologous veins or a synthetic prosthesis can be used. Even if an autologous graft is generally preferred for its lower thrombogenic property, polytetrafluoroethylene (PTFE) is largely used for these purposes with good results. NFPETs and such indication is generally reserved to treat hormonal syndromes in case of functioning endocrine tumors [3].

In the 1st case, multiple hepatic metastases had been detected preoperatively, but we resected only the main pancreatic NET to avoid an excessive aggressiveness of the surgical approach. We try not to associate resection of a pancreatic tumor with an extended procedure on the liver, so we delayed major liver resections in case of multiple and bilateral hepatic metastases.

The condition of a major vascular invasion with a neoplastic thrombosis is not a rarity with a 26% of the cases in the experience of Chung et al. [13]. This circumstance can occur either because of direct tumor infiltration or because of neoplastic thrombosis in the splenic vein. In this last case an "en bloc" resection of the left pancreas and the spleen along with the involved tract of mesenteric and portal vein is the treatment of choice. Differently from the case of the pancreatic adenocarcinoma, when an endocrine carcinoma involves a vascular structure, the prognosis is not affected if a R0 resection is accomplished. Even if there have been few reports of vascular resection and reconstruction after removal of endocrine carcinoma [2,15] this aggressive surgery is well described and derived by the experience on pancreatic adenocarcinoma. Resection and reconstruction of the portal vein can be accomplished by an end to end anastomosis if less than 4 cm. in length are sacrificed. When a vein replacement is necessary, autologous veins, homologous veins or a synthetic prosthesis can be used. Even if an autologous graft is generally preferred for its lower thrombogenic property, polytetrafluoroethylene (PTFE) is largely used for these purposes with good results. NFPETs are surgically treatable diseases with curative intent in M0 patients with a resectable primary tumor with no microscopic residual (R0). If major vascular structures, such as splenic vein and porto-mesenteric axis are invaded also with neoplastic thrombosis, resection and reconstruction of the involved vessels is recommended to warrant cure. Aggressive surgery including vascular resection is still debated in case of locally advanced nonfunctioning tumors with metastatic disease to the liver or distant metastases. If all the tumoral deposits cannot be excised R0, the survival doesn’t change when compared to that of untreated patients, while the complications of such aggressive surgery are present.

We recommend that patients be evaluated preoperatively by surgeons in concert with their oncologist to assess preoperative
optimization, timing, and extent of resection. The technique of vascular dissection and decompression, although established, is sometimes extremely difficult. Nearly 80% of patients explored elsewhere were successfully radically operated in experienced Centers familiar with the technique of vascular resection and reconstruction, with improvements in symptoms and survival. An en bloc resection of invasive main pancreatic NET with vascular invasion should be reserved for patients with young age, low comorbidity and potentially long life-expectancy.

References


