

PANCREATIC RECONSTRUCTION AFTER PANCREATICODUODENECTOMY; INVAGINATION VERSUS DUCT-TO-MUCOSA PANCREATICOJEJUNOSTOMY.

¹Saleh Khairy Saleh, ²Nasser Mohamed Zaghoul, ³Tohamy Abdallah Tohamy, ⁴Ehab Mohamed Sabry, ⁵Mohammed Mostafa Mohammed.

General surgery department; Faculty of Medicine; Minya University; Egypt

Corresponding Author

Saleh Khairy Saleh

salehkhairy@mu.edu.eg

Abstract

Background: Pancreaticoduodenectomy (PD) is a classic procedure performed for the treatment of pancreatic diseases such as pancreatic cancer, chronic pancreatitis and periampullary cancer. While the mortality and complication rates associated with PD have decreased over the past decades, postoperative pancreatic fistula (POPF) remains an intractable complication of PD. The aim of this work compare duct to mucosa and invagination pancreaticojejunostomy as regard incidence of pancreatic fistula, operative time, postoperative morbidity and mortality and endocrine & exocrine pancreatic function.

Keywords: pancreaticoduodenectomy, postoperative pancreatic fistula (POPF), invagination and duct-to-mucosa pancreaticojejunostomy.

Introduction: Pancreaticoduodenectomy (PD) is a classic procedure performed for the treatment of different pancreatic diseases such as pancreatic cancer, periampullary cancer and chronic pancreatitis. While the mortality and complication rates associated with PD have decreased over the past decades, postoperative pancreatic fistula (POPF) remains an intractable complication of PD [1].

POPF can result in abdominal abscess, hemorrhage, and sepsis, which are associated with higher mortality and longer postoperative hospital stay. Even in high volume centers, the incidence of POPF can be as high as 10%-20% [1-4].

Several factors can influence the possibility and severity of POPF including the surgeon's experience, the texture of the pancreas and the techniques/drugs used. Numerous surgical techniques have been proposed to reduce POPF rates, such as pancreaticogastric reconstruction, pancreatic duct ligation, external drainage of the pancreatic duct, implantation of pancreatic duct stent and prophylactic somatostatin treatment [1, 5-7].

Pancreaticgastrostomy (PG) and pancreaticojejunostomy (PJ) are two main methods for digestive reconstruction after PD. Evidence has shown that PG and PJ are comparable in pancreatic fistula [8].

Currently, pancreaticojejunostomy (PJ) is one of the most popular anastomosis types used after PD, and duct-to-mucosa and invagination are the two major PJ techniques [7].

The postoperative morbidity rate associated with PD remains high, ranging between 20% and 60% [9].

Major complications associated with PD include postoperative pancreatic fistula (POPF), intra-abdominal collection or abscess, and delayed gastric emptying (DGE). Among these, POPF was the most common and problematic complication, with a frequency ranging from

5% to 40%. All these complications can lead to prolonged hospital stays and increased hospital costs [10].

In recent studies there is no superiority of invagination over duct-to-mucosa pancreaticojejunostomy in the risk of POPF. However, in high-risk patients with a soft pancreas, invagination may reduce the risk of clinically relevant POPF compared with duct-to-mucosa [11].

Patients and methods

Patients

Consecutive patients that were treated by PD at Minya university, Egypt, during the period from June 2018 to September 2020 in two groups each group 30 patients.

Informed consent was obtained from all patients to be included in this study, after a careful explanation of the disease and the possible treatment options with its complications. The study was approved by the local ethical committee.

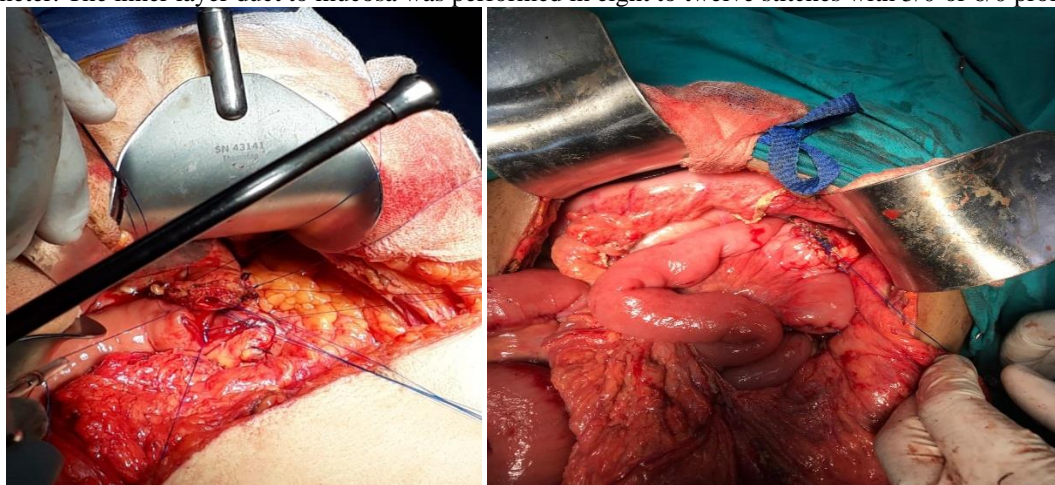
All patients were subjected to careful history taking, clinical examination, routine laboratory investigation and tumor markers as CEA and CA19-9, an abdominal ultrasound, magnetic resonance cholangiopancreatography (MRCP), and an abdominal CT.

Operative techniques

Standard PD was performed in all patients. All patients underwent regional lymphadenectomy.

Duct to mucosa PJ group (Group 1)

The duct to mucosa PJ was performed by a two-layer end to side PJ. The pancreatic capsule and the jejunal serosa were anastomosed by interrupted prolene suture 3/0 to form the outer layer in both the anterior and posterior walls of the anastomosis. Jejunostomy was done matched to the pancreatic duct diameter. The inner layer duct to mucosa was performed in eight to twelve stitches with 5/0 or 6/0 prolene.



Invagination PJ group (Group 2)

The invagination PJ was performed as an end to end. The pancreatic capsule and the jejunal serosa were anastomosed by a continuous prolene 3/0 to form the outer layer in both the anterior and posterior walls of the anastomosis.



The reconstruction was completed by end to side hepaticojejunostomy (retrocolic) manually and gastrojejunostomy (GJ) (antecolic) side to side by linear stapler (endo GIA).

Data collected

Preoperative variables included; age, sex, body mass index, patients' symptoms and signs, preoperative biliary drainage, laboratory tests and tumor markers.

Intraoperative variables included; liver status, tumor size, pancreatic duct diameter, texture of the pancreas, operative time, blood loss and blood transfusion.

Postoperative variables included; postoperative complications, drain amylase, liver function, day to resume oral feeding, post-operative stay, re-exploration, hospital mortality, postoperative pathology, and surgical safety margins.

Assessments

POPF was defined by the International Study Group of Pancreatic Fistula (ISGPF) as any measurable volume of fluid on or after POD 3 with amylase content greater than 3 times the serum amylase activity [22,23]. A pancreatic fistula (PF) was graded according to the ISGPF into Grade A, B and C according to the clinical course [12,13].

The secondary outcomes were operative time, operative time needed for reconstruction, length of postoperative hospital stay, postoperative morbidities including delayed gastric emptying (DGE), pancreatitis and biliary leakage).

Follow up

Follow-up was carried out one week postoperatively, 3 months, 6 months and then after one year.

Statistical analysis in this study was performed using SPSS software, version 20. Descriptive statistics were calculated and described as median (range) for continuous variables. Categorical variables were represented using percentages. Student's t-test for paired samples was used to detect differences in the means of continuous variables and Chi-square test was used for categorical variables. P values <0.05 were significant.

Postoperative data

No significant differences between both groups as regard to the median hospital stay, the median time to resume oral intake and drain removal.

The severity of POPF was noticed more in group 1 with no significant differences. Ultrasound guided tubal drainage was required in 13 patients in group 1 vs. 10 patients in group 2 with intra-abdominal

collection.

There was not statistically significant difference regarding pre- operative and postoperative weight and BMI in both groups. There was not statistically significant difference regarding the incidence of DM preoperatively and one year postoperatively.

Discussion

Several prospective randomized studies reported that a lower POPF in duct to mucosa PJ group than in the invagination PJ group. However, the advantage was not found in patients with soft pancreatic stump [13].

Some retrospective studies showed that the duct to mucosa PJ was associated with a lower rate of POPF in the low risk patients with dilated pancreatic duct or firm pancreas, whereas the invagination PJ technique was safer in the high risk patients with small pancreatic duct or soft pancreas [15]. The meta-analysis studies showed that the rate of POPF was not statistically different between duct to mucosa PJ group and the invagination PJ group [11]. In the current study no significant difference as regards POPF in both groups. The severity of POPF was noticed more in duct to mucosa PJ with no significant differences. No pancreatic reconstruction technique after PD was found to be applicable to all types of pancreatic stumps. Pancreatic reconstruction is difficult in pancreases with small duct and a soft fragile pancreas even in experienced hand [10]. Soft friable pancreatic tissue can be problematic for invagination PJ as the parenchymal laceration and ischemia of the stump can occur because of extensive sutures and compression which lead to POPF [8]. The small pancreatic duct makes duct to mucosa PJ difficult and liable to inaccurate suture placement and obstruction. In duct to mucosa PJ, the jejunal folds and edema formed around the opening of the pancreatic duct make it liable to the obstruction and development of the pancreatitis and anastomotic stenosis [11]. In contrast to, the invagination PJ is easier to perform and all of the pancreatic juice is drained into the jejunum [10].

Soft friable pancreatic tissue can be problematic for the invagination PJ due to parenchymal laceration. Small pancreatic duct makes duct to mucosa PJ difficult and liable to inaccurate suture placement and obstruction[15].

Conclusion

Invagination PJ is easier to perform than duct to mucosa especially in the small pancreatic duct. The soft and friable pancreatic tissue can be problematic for the invagination PJ due to parenchymal laceration. POPF was not statistically different between the duct to mucosa PJ group and the invagination PJ group. The severity of POPF was noticed more in duct to mucosa PJ with no significant differences.

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