

Comparison of BLUMGART vs. Dunking Pancreatico-Jejunostomy AnastomosisAlam J¹, Ullah M^{2*}, Hussain M³, Roghani M⁴ and Mahmood F⁵¹Associate Professor, Surgical "A" ward, Hayatabad Medical Complex, Peshawar Pakistan²Specialist Registrar, Surgical "A" ward, Hayatabad Medical Complex, Peshawar Pakistan³Assistant Professor, Surgical "A" ward, Hayatabad Medical Complex, Peshawar Pakistan⁴Trainee Medical Officer, Surgical "A" ward, Hayatabad Medical Complex, Peshawar Pakistan⁵Junior Registrar, Surgical "A" ward, Hayatabad Medical Complex, Peshawar, Pakistan***Corresponding author:**

Muhib Ullah,
Specialist Registrar, Surgical "A" ward, Hayatabad
Medical Complex, Peshawar, H#331, Street#2,
Sector F-8, Phase 6 Hayatabad, Peshawar, Pakistan,
E-mail: dr.muhib17@gmail.com

Received: 03 Sep 2022

Accepted: 09 Sep 2022

Published: 14 Sep 2022

J Short Name: AJSCCR

Copyright:

©2022 Ullah M, This is an open access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and build upon your work non-commercially.

Citation:

Ullah M. Comparison of BLUMGART vs. Dunking Pancreatico-Jejunostomy Anastomosis. *Ame J Surg Clin Case Rep.* 2022; 5(7): 1-4

Keywords:

Whipple procedure, Blumgart anastomosis, Dunking anastomosis

1. Abstract

1.1. Background: Dunking anastomosis is the most commonly performed method for pancreatojejunostomy (PJ) in the Whipple procedure. However, the postoperative pancreatic fistula (POPF) rate was high in this procedure. Blumgart and his colleagues introduced a method for PJ to reduce POPF.

1.2. Objective: Keeping this in view, the current study compared the two methods in terms of procedure time, Intensive care (ICU) stay, hospital stay, mortality, POPF, postoperative hemorrhage (POH), Biliary leakage, and intra-abdominal abscess.

1.3. Method: A total of 43 patients who underwent PJ at the department of surgery, Hayatabad Medical Complex, Peshawar, and were willing to participate were included in the current study. The patients were prospectively observed for the outcomes between August 2017 and July 2022. The patients were divided into two groups: the blumgart group (BG, n= 17) and the dunk group (DK, n= 26). The data was collected using a pre-defined Microsoft Excel sheet, and then data was exported into a statistical package for social sciences for statistical analysis.

1.4. Result: The mean patient's age in the DK group was high compared to the BG group (DK: 48±10 vs. BG: 39±9). Most of the patients in both groups presented with abdominal pain. Hypertension and diabetes were the most common comorbidities in both groups. The patient with BG procedure stayed less in the ICU and hospital than in the DK group. The mortality rate was high in the DK group. The patients with the DK procedure reported POPF from moderate to severe.

1.5. Conclusion: The present research found that BG outperformed DK regarding ICU, and hospital stays. However, there was no significant difference between the two groups in terms of serious complications such as POPF, POH, biliary leakage, and intra-abdominal abscess.

2. Introduction

Pancreaticoduodenectomy (PD) was first time described by Whipple and colleagues in 1935 and has been considered the standard surgical technique for patients with benign or malignant cancer of the pancreatic head and periampullary area [1, 2]. This surgical procedure was considered one of the most challenging and intricate abdominal procedures. Mortality related to PD was reduced to less than 5% in high-volume centers with advancements in surgical procedures and perioperative treatment. However, the risk of postoperative complications remained as high as 50%, particularly postoperative pancreatic fistulas (POPF) and delayed stomach emptying (DGE) [3].

In reconstruction following PD, dunking anastomosis is widely practiced. However, the frequency of POPF remained high. Patient-derived risk factors for POPF include soft pancreatic texture, a narrow pancreatic duct, inadequate blood flow, and a high patient body mass index [4, 5]. In contrast, several pancreato-enteric anastomoses have been developed to lower the occurrence of POPF [6, 7]. Shear stresses exerted on the weak pancreatic parenchyma by sutures applied tangentially through the capsule are a significant cause of pancreatic obliterative fibrosis. Blumgart and colleagues created a new method of PJ with trans pancreatic U-sutures in

2000 to avert this challenge [8]. Numerous studies have shown the safety and efficacy of this technique and its modification in lowering POPF [9].

Meanwhile, a Japanese surgeon created another shear force-reducing technique, the Kakita anastomosis with interrupted trans pancreatic suture, which was also generally accepted in Japan [10]. Comparing Blumgart and Dunking anastomosis, several studies have recently shown contradictory outcomes. Therefore, the current study was conducted to compare blumgart anastomosis with Dunking anastomosis in terms of procedure time, Intensive care (ICU) stay, hospital stay, mortality, POPF, postoperative hemorrhage (POH), Biliary leakage, and intra-abdominal abscess.

3. Method and Patients

3.1. Patients

A total of 43 patients who underwent Whipple procedure at the Department of Surgery, Hayatabad Medical Complex, Peshawar, and were willing to participate were included in the current study. The patients were prospectively observed for the outcomes between August 2017 and July 2022. The patients were divided into two groups, namely, the blumgart group (BG, n= 17) and the dunk group (DK, n= 26). The informed consent was obtained from each participants and patients were treated as per Declaration of Helsinki.

3.2. Anastomosis type

3.2.1. Dunking anastomosis: In Dunking anastomosis, six to eight nonabsorbable interrupted sutures were inserted between the posterior side of the pancreas and the seromuscular layer of the jejunum. After making a small incision in the jejunum, four to six absorbable interrupted sutures were placed between the pancreatic duct and the jejunum mucosa in an end-to-side manner. The anterior layer of the pancreas and the jejunum were then approximated in the same manner as previously described.

3.2.2. Blumgart anastomosis: This procedure involves the implantation of four to six nonabsorbable trans pancreatic sutures and jejunal seromuscular sutures to approximate the pancreas and the jejunum. From front to back, a suture was inserted across the whole pancreatic parenchyma. As the posterior outer layer, a seromuscular bite with a vertical mattress was taken across the jejunum, and the same suture was retraced back to front through the whole pancreas to complete the U-suture. After building duct-to-mucosa anastomosis, these trans pancreatic U-sutures were finished by inserting the needle into the anterior seromuscular wall of the jejunum to generate an anterior outer layer. The remaining pancreas

was then entirely covered by jejunal serosa.

3.3. Outcome variables

The outcome variables for the current study were procedure time, ICU, and hospital stay. In addition, POPF, POH, biliary leakage, and intraabdominal abscess were considered major postoperative complications. The POPF was assessed based on the grading of the International Study Group on Pancreatic Fistulas (ISGPF). The grading ranges from A (least severe) to C (most severe). POPF grading was based on clinical state, therapy employed, imaging study findings, prolonged drainage, reoperation, mortality, infection symptoms, and re-admission. The International Study Group on Pancreatic Surgery (ISGPS) defined and rated POH. POH was classified into three classes, including A (mild), B (moderate), and C (severe), based on the procedure timing, location of bleeding, severity, and clinical consequence. Postoperative computed tomography (CT) scans were used for an intra-abdominal abscess or fluid accumulation.

3.4. Data collection and statistical analysis

A pre-defined Microsoft Excel sheet was generated for data collection. The data included in this sheet were patient characteristics, procedural time, ICU and hospital stay, and postoperative complications. The postoperative complications include POPF, POH, biliary leakage, and intraabdominal abscess. The collected data was exported into the statistical package for social science (SPSS v25). The categorical data were tabulated in the form of frequency and percentages, while the continuous data were presented as a mean and standard deviation. Based on the normality test, parametric tests, including the Chi-square test, fisher exact test (where applicable), were used for categorical variables, whereas the scale variables were assessed using an independent t-test and One-way ANOVA. The p-value was considered significant at 0.05 level.

4. Results

A total of 43 patients were recruited for the current study. Among these, 17 and 26 patients underwent blumgart and Dunking anastomosis, respectively. The mean patient's age in the DK group was high compared to the BG group (DK: 48±10 vs. BG: 39±9). Most of the patients in both groups presented with abdominal pain. Hypertension and diabetes were the most common comorbidities in both groups. The detail can be seen in Table 1.

The outcome of the study is given in Table 2. The patient with BG procedure stayed less in the ICU and hospital as compared to the DK group. The mortality rate was high in the DK group. The patients with the DK procedure reported POPF from moderate to severe.

Table 1: Patient characteristics

Patient characteristics		BG		DK	
		Frequency	Percentage	Frequency	Percentage
Age in years (mean±SD)		39±9		48±10	
Gender	Male	10	41.70%	14	58.30%
	Female	7	36.80%	12	63.20%
Symptoms	Jaundice	4	40.00%	6	60.00%
	Abdominal pain	9	39.10%	14	60.90%
	others	4	40.00%	6	60.00%
Underline disease	hypertension	4	40.00%	6	60.00%
	Diabetes	4	40.00%	6	60.00%
	hyperlipidemia	1	16.70%	5	83.30%
	Cardiologic diseases	2	40.00%	3	60.00%
	Cerebrovascular disease	1	33.30%	2	66.70%
	Pulmonary disease	3	60.00%	2	40.00%
	Others	2	50.00%	2	50.00%
BMI (mean±SD)		23±3		25±2	
ASA score (mean±SD)		2±1		2±1	

BG – Blumgart anastomosis, DK – Dunking anastomosis

Table 2: Comparison of the outcome variable

		BG		DK		P-value
		Frequency	Percentage	Frequency	Percentage	
Procedure time in min (mean±SD)		447±83		354±100		0.002
ICU stay in days (mean±SD)		2±1		3±1		0.051
hospital stay days (mean±SD)		8±3		10±3		0.038
Mortality	Yes	1	16.70%	4	15.40%	0.217
	No	16	43.20%	22	84.60%	
POPF	A	11	44.00%	14	56.00%	0.78
	B	5	33.30%	10	66.70%	
	C	1	33.30%	2	66.70%	
POH	A	14	51.90%	13	48.10%	0.099
	B	2	20.00%	8	80.00%	
	C	1	16.70%	5	83.30%	
Biliary leakage	Yes	2	40.00%	3	60.00%	0.982
	No	15	39.50%	23	60.50%	
Intraabdominal abscess	Yes	4	44.40%	5	55.60%	0.735
	No	13	38.20%	21	61.80%	

BG – Blumgart anastomosis, DK – Dunking anastomosis

5. Discussion

The current study highlighted the superiority of BG over DK in terms of ICU, and hospital stay. However, there was no significant difference between the two groups in terms of major complications including POPF, POH, biliary leakage, and intra-abdominal abscess.

In recent decades, the morbidity and mortality toll associated with PJ have fallen dramatically. In high-volume centers, the centralization of pancreatic cancers, uniformity of surgical methods, and enhancement of perioperative care have led to a considerable reduction in postoperative mortality to less than 3–5% [11, 12]. However, pancreatic anastomosis is still the surgical procedure’s Achilles’ heel, with POPF rates ranging from 10% to 30% [13-15]. In the current study, the POPF ranged from mild to moderate in the DK group; however, the frequency of the mild POPF was also observed in the BG group, which is consistent with our study.

Several pancreato-enteric anastomoses have been employed to decrease the incidence of POPF after PD. The duct-to-mucosa PJ as described by Cattell and Warren, named as Cattell-Warren anastomosis (CWA), with two distinct anterior and posterior layers implanted in addition to the duct-to-mucosa anastomosis, seems to be the most prevalent approach. Nonetheless, other pancreatic anastomoses have been suggested. The Blumgart pancreato-enter-

ic anastomosis (BA) is a two-layer method that consists of outer full-thickness mattress sutures across the pancreas and jejunum and an inner duct-to-mucosal anastomosis [15]. Other pancreatic anastomosis variants include the dunking PJ and the pancreaticogastrostomy (PG). In the present study, the Blumgart procedure was slightly superior to the dunk in terms of safety and postoperative complications.

Trainees from two US centers reported the outcomes of the Blumgart, as described by Leslie H. Blumgart in a 2010 publication [8]. They evaluated 187 unselected, consecutive patients undergoing Blumgart following PD with diverse pancreatic textures and ductal diameters. Overall mortality was 1.6%; 13.4% of patients had a biochemical leak, and 6.7% had a clinically significant POPF. Patients in their series did not have hemorrhage, reoperation, or death due to pancreatic anastomotic failure. This study suggest that Blumgart was preventing disturbance of the pancreatic gland, particularly in instances with a soft pancreas, by using a single full-thickness mattress-type suture as opposed to separate anterior and posterior layers. In addition, the modest compression created by sandwiching the pancreas between the jejunum through sutures may reduce leakage from accessory pancreatic ducts. Therefore, they concluded that Blumgart applies to all patients in whom the pancreatic duct can be identified and is linked with meager rates of

substantial postoperative morbidity and death, which supports its regular use for PJ reconstruction.

Kleespies et al. in Germany corroborated the positive findings from the American group [4]. In 2003, they implemented BA into their practice and compared the results of CWA, which they had previously used, to those of the revolutionary approach. There were 182 patients, including 90 with CWA and 92 with BA. The latter demonstrated a reduction in operation time, POPF (13% vs. 4%; $P=0.032$), postoperative hemorrhage, overall surgical problems, and intensive care unit stay duration. However, one of the major drawbacks of their research is that they included patients operated on during eight years, with Whipple conducted during the first six years included in the CWA group and those performed during the final two years included in the BA group. Although they claim that surgical standards unrelated to the kind of anastomosis have remained mostly similar over the last eight years, advancements in perioperative treatment may have influenced their results.

6. Conclusion

The present research found that BG outperformed DK in terms of ICU, and hospital stay. However, there was no significant difference between the two groups regarding serious complications such as POPF, POH, biliary leakage, and intra-abdominal abscess.

7. Limitation

The current study is subjected to various limitations. The current study is single centered which comprised the external validity. In addition, the sample cohort of the current study is small where the result may be different in larger population.

References

- Whipple AO, Parsons WB, Mullins CR. Treatment of Carcinoma of the Ampulla of Vater. *Ann Surg.* 1935; 102(4): 763-79.
- Li Z, et al. Blumgart anastomosis reduces the incidence of pancreatic fistula after pancreaticoduodenectomy: a systematic review and meta-analysis. *Sci Rep.* 2020; 10(1): 17896.
- Kawai M, Yamaue H. Analysis of clinical trials evaluating complications after pancreaticoduodenectomy: a new era of pancreatic surgery. *Surg Today.* 2010; 40(11): 1011-7.
- Kleespies A, et al. Blumgart anastomosis for pancreaticojejunostomy minimizes severe complications after pancreatic head resection. *Journal of British Surgery.* 2009; 96(7): 741-750.
- Wang SE, et al. Comparison of Modified Blumgart pancreaticojejunostomy and pancreaticogastrostomy after pancreaticoduodenectomy. *HPB.* 2016; 18(3): 229-235.
- Chen Y, et al. End-to-side penetrating-suture pancreaticojejunostomy: a novel anastomosis technique. *Journal of the American College of Surgeons.* 2015; 221(5): e81-e86.
- Wang M, et al. A Modified Technique of End-to-End Pancreaticojejunostomy With Transpancreatic Interlocking Mattress Sutures. *Journal of Surgical Oncology.* 2013; 107(7): 783-788.
- Grobmyer, S.R., et al. Novel pancreaticojejunostomy with a low rate of anastomotic failure-related complications. *Journal of the American College of Surgeons.* 2010; 210(1): 54-59.
- Cao F, et al. Meta-analysis of modified Blumgart anastomosis and interrupted transpancreatic suture in pancreaticojejunostomy after pancreaticoduodenectomy. *Asian Journal of Surgery.* 2020; 43(11): 1056-1061.
- Kakita A, et al. A simpler and more reliable technique of pancreaticojejunal anastomosis. *Surgery today.* 1996; 26(7): 532-535.
- Kimura W, et al. A pancreaticoduodenectomy risk model derived from 8575 cases from a national single-race population (Japanese) using a web-based data entry system: the 30-day and in-hospital mortality rates for pancreaticoduodenectomy. *Annals of surgery.* 2014; 259(4): 773-780.
- van Rijssen LB, et al. Variation in hospital mortality after pancreaticoduodenectomy is related to failure to rescue rather than major complications: a nationwide audit. *Hpb.* 2018; 20(8): 759-767.
- Pedrazzoli S. Pancreatoduodenectomy (PD) and postoperative pancreatic fistula (POPF): a systematic review and analysis of the POPF-related mortality rate in 60,739 patients retrieved from the English literature published between 1990 and 2015. *Medicine.* 2017; 96(19).
- Ecker BL, et al. Characterization and optimal management of high-risk pancreatic anastomoses during pancreaticoduodenectomy. *Annals of surgery.* 2018; 267(4): 608-616.
- Mungroop TH, et al. Alternative fistula risk score for pancreaticoduodenectomy (a-FRS): design and international external validation. *Annals of surgery.* 2019; 269(5): 937-943.