Noman Shahzad1*, Tabish Umer Chawla2, Saleema Begum3 and Fareed Ahmed Shaikh4

1Consultant General Surgeon, Aga Khan University Hospital Karachi, Pakistan
2Section Head General Surgery, Aga Khan University Hospital Karachi, Pakistan
3Fellow General Surgery, Aga Khan University Hospital Karachi, Pakistan
4Fellow Vascular Surgery, Aga Khan University Hospital Karachi, Pakistan

Received: 22 February, 2018
Accepted: 03 March, 2018
Published: 06 March, 2018

*Corresponding authors: Dr. Noman Shahzad, Consultant General Surgeon, Aga Khan University Hospital Karachi, Office of General Surgery, Link Building, Aga Khan University Hospital Karachi. Postal Code: 74800, Pakistan, Tel: +923008833313
E-mail: dms01@hotmail.com

Keywords: Pancreaticogastrostomy; Pancreaticojejunostomy; Pancreaticoduodenectomy; Pancreatic Fistula

https://www.peertechz.com

Introduction

Pancreaticoduodenectomy (PD) remains the only curative option for resectable pancreatic head, ampullary, duodenal and distal common bile duct tumors. Despite improvements in post-operative care and advancement in surgical techniques, morbidity related to this operation remains very high. According to recent report by St-Germain AT et al. up to 74% of patients suffer from at least one complication related to this complex surgical procedure. Leakage of pancreatic enzymes leading to either formation of abdominal collection or pancreatic fistula is one of the most feared complications. Incidence of post-operative pancreatic fistula (POPF) after PD is reported to be from 11% to 47.7% in various reports [2,3]. This wide variation in occurrence of POPF is partially due to variability in definition of fistula particularly in older studies. Criteria to label pancreatic fistula was standardized by international study group on pancreatic fistula (ISGPF) in 2005 [4].

Furthermore due to high morbidity and cost related to pancreatic fistula [5], multiple interventions have been investigated to prevent this complication [6]. These include pharmacological interventions such as role of peri-operative octreotide administration, adjuncts to surgical anastomosis such as stenting of anastomosis or use of sealants, surgical techniques and site of pancreatico-enteric anastomosis. Of these, comparison of pancreaticogastrostomy with pancreaticojejunostomy is the most studied area. To the best of our knowledge ten randomized controlled trials have been conducted to date to find out better site of performing anastomosis. Three of these trials concluded that pancreaticogastrostomy is superior to pancreaticojejunostomy.
Pancreaticogastrostomy: Conventional pancreaticogastrostomy is performed end to side, double layer, duct to mucosa anastomosis in which inner layer incorporates full thickness jejunal wall to pancreatic duct and outer layer as seromuscular jejunal stitch to pancreatic tissue. Reported leak rate after conventional technique is 6–22% [14]. Invagination of pancreatic tissue with or without duct to mucosa stitches has been studied in promising results. Invagination with duct to mucosa stitches is reported to have rate of CR-POPF as low as 3.3% [15]. Binding pancreaticojunostomy as described by Peng et al incorporates destruction of 3 cm jejunal mucosa by applying 10% carbolic acid followed by rinsing with 75% alcohol and normal saline. After doing pancreaticojunostomy an absorbable ligature is looped around the jejunum, with the invaginated pancreas inside. Randomized controlled trial comparing binding pancreaticojunostomy with conventional technique found significantly lower fistula rate for binding technique. It reported no pancreatic fistula in 106 patients randomized to binding technique group [16]. This technique is not compared to pancreaticojunostomy in any of the randomized controlled trials. Moreover similar results could not be obtained for this technique at other centres. Maggiori et al., in their study reported no decrease in pancreatic fistula, rather risk of haemorrhage was increased [17].

Isolated loop pancreaticojunostomy has also been compared with pancreaticogastrostomy in randomized controlled trial and no significant difference was found in pancreatic fistula rate [18].

Pancreaticogastrostomy: Conventionally pancreaticogastrostomy is performed as invaginated double layer anastomosis to posterior wall of stomach. Fernandez et al., reported doing pancreaticogastrostomy with gastric partition in which pancreatic tissue with or without duct to mucosa stitches has been studied with promising results. Invagination with duct to mucosa stitches is reported to have rate of CR-POPF as low as 3.3% [15]. Binding pancreaticojunostomy as described by Peng et al incorporates destruction of 3 cm jejunal mucosa by applying 10% carbolic acid followed by rinsing with 75% alcohol and normal saline. After doing pancreaticojunostomy an absorbable ligature is looped around the jejunum, with the invaginated pancreas inside. Randomized controlled trial comparing binding pancreaticojunostomy with conventional technique found significantly lower fistula rate for binding technique. It reported no pancreatic fistula in 106 patients randomized to binding technique group [16]. This technique is not compared to pancreaticojunostomy in any of the randomized controlled trials. Moreover similar results could not be obtained for this technique at other centres. Maggiori et al., in their study reported no decrease in pancreatic fistula, rather risk of haemorrhage was increased [17].
It has been proposed that lack of enterokinase and acidic environment in stomach inactivates pancreatic enzymes, which along with good blood supply of stomach may have role to play in reducing risk of anastomotic leak [19]. While potential of anastomotic leak is reduced by pancreaticocystogastrostomy, long term exocrine and endocrine functions are compromised more in these patients as compared to those who underwent pancreaticojejunostomy [20]. Furthermore risk of digestive tract bleeding is also more after pancreaticocystogastrostomy, though management of GI bleed is easy via upper gastrointestinal endoscopy should bleeding occur [21].

**Subgroup at high risk of leakage:** In addition to post-operative care and surgical technique, certain patient and disease related factors predispose patients to high risk of POPF development [22]. Soft texture of pancreas is an established risk factor for POPF [23]. There are only a few randomized controlled trials that have been conducted on or have reported separate subgroup analysis for this select subgroup of patients. Bassi et al., reported on difference in fistula rate after pancreaticocystogastrostomy versus pancreaticojejunostomy for patients with soft pancreas [24]. Contrary to that, subgroup of patients with soft pancreas in randomized controlled trial by Topal et al., demonstrated that pancreaticocystogastrostomy was superior to pancreaticocjejunostomy for post-operative pancreatic fistula [9]. There has been no meta-analysis to date to compare pancreaticocystogastrostomy versus pancreaticojejunostomy in patients with intra-operative soft texture of pancreas which needs to be addressed via pooled data analysis.

**Conclusion**

Though a good number of randomized controlled trials have been conducted to compare pancreaticocystogastrostomy versus pancreaticojejunostomy, variations in techniques of performing anastomosis limit external validity. Furthermore this issue of variability in surgical technique across randomized controlled trials should be taken care of before pooling the data for meta-analysis. Moreover subgroup of patients with soft pancreas who are at high risk of pancreatic leak, should be looked at separately for potential benefit of site of anastomosis. In addition to that, other than statistical evidence, to change practice where learning of a new skill is required, many other factors including training, learning curve and required facilities have to be accounted for.

**References**

1. St-Germain AT, Devitt KS, Kagedan DJ, Barnett B, Tung S, et al. (2017) The impact of a clinical pathway on patient postoperative recovery following pancreaticoduodenectomy. HPB. Link: https://doi.org/10.1016/j.hpb.2016.06.001
2. Yeo CJ, Cameron JL, Maher MM, Sauter PK, Zahrakar ML, et al. (1995) A prospective randomized trial of pancreaticogastrostomy versus pancreatic jejunostomy after pancreaticoduodenectomy. Annals of surgery 222: 580. Link: https://doi.org/10.1097/00000658-199509000-00007
3. Aumont O, Dupre A, Abjean A, Pereira B, Veziant J, et al. (2017) Does intraoperative closed-suction drainage influence the rate of pancreatic fistula after pancreaticoduodenectomy?: BMC Surgery 17: 58. Link: https://doi.org/10.1186/s12893-017-0269-8
4. Bassi C, Dervenis C, Butturini G, Fingerhut A, Yeo C, et al. (2005) International Study Group on Pancreatic Fistula Definition. Postoperative pancreatic fistula: an international study group (ISGPF) definition. Surgery 138: 8-13.
5. Williams C, Ansari D, Andersson R, Tingstedt B (2017) Postoperative pancreatic fistula-impact on outcome, hospital cost and effects of centralization. HPB 19: 436-442. Link: https://doi.org/10.1111/1365-2241.13413
6. Lai EC, Lau SH, Lau WY (2009) Measures to prevent pancreatic fistula after pancreateoduodenectomy: a comprehensive review. Archives of Surgery 144: 1074-1080. Link: https://doi.org/10.1001/archsurg.2009.102
7. Fernández-Cruz L, Cosa R, Blanco L, López-Boado MA, Astudillo E (2008) Pancreategastrostomy with gastric partition after pylorus-preserving pancreateoduodenectomy versus conventional pancreaticojejunostomy: a prospective randomized study. Annals of surgery 248: 930-938. Link: https://doi.org/10.1097/01.sla.0000321776.01281.32
8. Figueuras J, Sabater L, Planellas P, Munoz Forner E, Lopez Ben S, et al. (2013) Randomized clinical trial of pancreaticogastrostomy versus pancreatojejunoanostomy on the rate and severity of pancreatic fistula after pancreatectoduodenectomy. British Journal of Surgery 100: 1597-1605. Link: https://doi.org/10.1002/bjs.8908
9. Topal B, Flews S, Aerts R, Weerts J, Feryn T, et al. (2013). Pancreateojejunoanostomy versus pancreaticogastrostomy reconstruction after pancreatecoduodenectomy for pancreatic or periampullary tumours: a multicentre randomised trial. The Lancet Oncology 14: 655-662. Link: https://doi.org/10.1016/S1470-2045(13)70246-8
10. Qin H, Luo L, Zhu Z, Huang J (2016) Pancreategastrostomy has advantages over pancreaticojejunostomy on pancreatic fistula after pancreatecoduodenectomy. A meta-analysis of randomized controlled trials. International Journal of Surgery 36: 18-24. Link: https://doi.org/10.1016/j.ijsu.2016.04.045
11. Crippa S, Cirocchi R, Randolph J, Partelli S, Belfiori G, et al. (2016). Pancreateojejunoanostomy is comparable to pancreaticogastrostomy after pancreatecoduodenectomy: an updated meta-analysis of randomized controlled trials. Langenbecks Archives of Surgery 401: 427-437. Link: https://doi.org/10.1007/s00423-016-1282-0
12. Bassi C, Marchegiani G, Dervenis C, Sarr M, Hilal MA, et al. (2016). The 2016 update of the International Study Group (ISGPS) definition and grading of postoperative pancreatic fistula: 11 Years After. Surgery. Link: https://doi.org/10.1016/j.surg.2016.10.011
13. Gouma DJ, Van Geenen RC, van Gulik TM, de Haan RJ, de Wit LT, et al. (2000). Rates of complications and death after pancreatecoduodenectomy: risk factors and the impact of hospital volume. Annals of surgery 231: 786. Link: https://doi.org/10.1097/00000658-200004000-00038
14. Motoi F, Egawa S, Kihara T, Kayayose Y, Unno M (2012) Randomized clinical trial of external stent drainage of the pancreatic duct to reduce postoperative pancreatic fistula after pancreatecjejunostomy. British Journal of Surgery 99: 524-531. Link: https://doi.org/10.1002/bjs.7459
15. Zhu B, Geng L, Ma YG, Zhang YJ, Wu MC (2011) Combined invagination and duct-to-mucosa techniques with modifications: a new method of pancreaticojejunal anastomosis. Hepatobiliary & Pancreatic Diseases International 10: 422-427. Link: https://doi.org/10.1177/1536669211416271
16. Peng SY, Wang JW, Lau WY, Cai XJ, Mou YP, et al. (2007). Conventional versus binding pancreaticojejunostomy after pancreatojejunostomy: a prospective randomized trial. Annals of surgery 245: 692. Link: https://doi.org/10.1097/01.sla.0000276318.00788.7f
17. Maggioli L, Sauvanet A, Nagarajan G, Dokmok S, Assilhau B, et al. (2010). Binding versus conventional pancreaticojejunostomy after pancreatecoduodenectomy, a case-matched study. Journal of Gastrointestinal Surgery 14: 1395-1400. Link: https://doi.org/10.1007/s11605-009-0990-x
18. El Nakeeb A, Hamdy E, Sultan AM, Salah T, Askar W, et al. (2014). Isolated Roux loop pancreaticojejunostomy versus pancreategastrostomy after pancreatecoduodenectomy: a prospective randomized study. HPB 16: 713-722. Link: https://doi.org/10.1016/j.hpb.2014.08.004

**Citation:** Shahzad N, Chawla TU, Begum S, Shaikh FA (2018) Pancreatecjejunostomy versus pancreaticogastrostomy after pancreatecoduodenectomy to prevent post-operative pancreatic fistula, a dissonance between evidence and practice. Arch Clin Gastroenterol 4(1): 008-011. DOI: http://doi.org/10.17352/2455-2283.000048
19. Oneil Machado N (2012) Pancreatic fistula after pancreatectomy: definitions, risk factors, preventive measures, and management—review. International journal of surgical oncology. Link: https://goo.gl/ji3QiH

20. Roeyen G, Jansen M, Ruyssinck L, Chapelle T, Vanlander A, et al. (2016). Pancreatic exocrine insufficiency after pancreaticoduodenectomy is more prevalent with pancreaticogastrostomy than with pancreaticojunostomy. A retrospective multicentre observational cohort study. HPB 18: 1017-1022. Link: https://goo.gl/YxEuRq

21. Clerveus M, Morandeira-Rivas A, Picazo-Yeste J, Moreno-Sanz C (2014) Pancreaticogastrostomy versus pancreaticojunostomy after pancreaticoduodenectomy: a systematic review and meta-analysis of randomized controlled trials. Journal of Gastrointestinal Surgery 18: 1693-1704. Link: https://goo.gl/uSS2ee

22. Soreide K, Labori KJ (2016) Risk factors and preventive strategies for post-operative pancreatic fistula after pancreatic surgery: a comprehensive review. Scandinavian journal of gastroenterology 51: 1147-1154. Link: https://goo.gl/txbCfT

23. Yang MW, Deng Y, Huang T, Zhang LD (2017) Clinical study on the relationship between pancreatic fistula and the degree of pancreatic fibrosis after pancreatic and duodenal resection. Zhonghua wai ke za zhi [Chinese journal of surgery]. 55: 373. Link: https://goo.gl/PGnB6b

24. Bassi C, Falconi M, Molinari E, Salvia R, Butturini G, et al. (2005). Reconstruction by pancreaticojunostomy versus pancreaticogastrostomy following pancreatectomy: results of a comparative study. Annals of surgery 242: 767-773. Link: https://goo.gl/hBda7J