Original Article

Post-Operative Pancreatitis: A Key Predictor of Pancreatic Fistula after Pancreaticoduodenectomy

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Article History
Received: 30 May, 2025
Accepted: 4 Jun, 2025
Published: 31 Jul, 2025

Funding Sources: None

Conflict of Interest: None

Online Access

DOI: https://doi.org/10.61122/jkistmc347

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Citation: Shrestha A, Tiwari S, Khatri S. Knowledge Regarding Importance of Nutrition among Mothers of Under-Five Children in a Community of Pokhara. J. KIST Med. Col. 7(13):27-33.

Abstract

Introduction: Post-operative pancreatic fistula is a major complication following pancreaticoduodenectomy, contributing significantly to perioperative morbidity and mortality. Post-operative pancreatitis has recently gained interest as a potential predictor of Post-operative pancreatic fistula. However, definitions and diagnostic criteria for it remain inconsistent, and its clinical relevance in pancreaticoduodenectomy outcomes requires further validation.

This study was done to identify the relationship between Post-operative pancreatitis and Post-operative pancreatic fistula and determine the prevalence of Post-operative pancreatitis and Post-operative pancreatic fistula with regard to various perioperative determinants.

Methods: A prospective observational study, including patients undergoing pancreaticoduodenectomy, was conducted at Kathmandu Medical College between June 2021 and November 2022. Patients undergoing concomitant surgery or refusing participation were excluded. Serum amylase (POD 0-1) was used to define CR-POP (Connor's and modified Atlanta criteria). Data on demographics, intraoperative parameters, complications, and outcomes were analyzed using SPSS 26.0. Statistical tests included Student t-test, Chi-square, and multivariate logistic regression. A p-value <0.05 was considered significant.

Results: Out of 40 patients, (mean age: 57.9 ± 14.21 years, 60% male, BMI 19.52 ± 1.71 kg/m^2). CR-POP incidence was 52.5% (Connor) and 20% (modified Atlanta). POPF was observed in 20 patients (50%) with a strong association noted between POP and POPF ($p < 0.001$ for Connors and $p=0.002$ for modified Atlanta). Patients with POP had longer ICU stays (7.4 ± 2.3 days), longer hospital stays (15.8 ± 3.6 days), and increased 30-day readmission rates (29.2% vs. 11.1%). Mortality occurred in 5% of cases but was not significantly associated with CR-POP.

Conclusion: POP is a significant and under-recognized complication following PD, serving as an independent predictor of POPF. Standardized diagnostic criteria and routine POP assessment may enable early identification of high-risk patients, improving outcomes. Future studies should refine diagnostic thresholds and explore targeted therapeutic strategies for mitigating POP-related complications.

Keywords: Post-operative pancreatitis, POPF, pancreaticoduodenectomy, pancreatic fistula, risk factors, Connor's criteria, ISGPS, PPAP

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Introduction

Pancreatoduodenectomy (PD) is a procedure done for the treatment of malignant periampullary tumors, mainly including the tumors of the head of the pancreas, distal common bile duct, second part of the duodenum and the ampulla.[1] It is also performed for certain benign lesions and traumatic injuries to the pancreas, biliary tree and second part of duodenum.[2] Despite advancements in surgical techniques and perioperative care, post-operative pancreatic fistula (POPF) remains one of the most feared complications, significantly contributing to morbidity and mortality.[3] The 2016 international study group for pancreatic surgery (ISGPS) has defined criteria for POPF.[4] According to that definition grade B/C POPF is collectively referred to as clinically relevant POPF (CR-POPF).[5]

The pancreas is a delicate organ, and any surgical manipulation, especially during PD, can lead to post-operative pancreatitis (POP), an underrecognized but increasingly studied complication. The term post-operative pancreatitis (POP) refers to the development of pancreatitis in patients in the post-operative period following pancreatoduodenectomy.[6] The term was first introduced by Saxon Connor in his paper titled "Defining post-operative pancreatitis as a new pancreatic specific complication following pancreatic resection". Clinically relevant POP (CR-POP) was defined as biochemical evidence for pancreatic inflammation (urinary trypsinogen-2 >50 ug/L or serum amylase/lipase > upper limit of normal) between post-operative days 0–2.[7] However, the definition is not in accordance with the modified Atlanta criteria for the diagnosis of acute pancreatitis, according to which it is defined as serum amylase above three times the upper limit of normal with associated morbidity.[8] Some authors have argued whether patients with only biochemical evidence alone adequately reflect the true number of patients of POP cases.[9] Regardless of the underlying cause, pancreatic injury leads to the activation of pancreatic enzymes, triggering the release of inflammatory mediators and in severe cases, this cascade can escalate to systemic inflammatory response syndrome (SIRS), potentially progressing to multiorgan failure.[10]

POPF remains a significant unresolved challenge in pancreatic surgery. Despite efforts to improve surgical techniques and perioperative management, the occurrence of CR-POPF continues to negatively impact patient recovery, prolong hospital stays, and increase healthcare costs.[11] This entity has recently gained significant interest because, apart from causing systemic responses in patients, it is believed to contribute to the development of POPF, yet it has not traditionally been considered a pancreas-specific post-operative complication.[12,13] Understanding the relationship between POP and the development of CR-POPF could provide a new perspective on reducing this complication.

Although Connor's work introduced POP as a pancreatic complication following PD, its role as a predictor of POPF is still debated.[14] One major concern is the definition of POP, which lacks standardization. Furthermore, in the postoperative setting, clinical findings is often masked or exaggerated due to the effects of the surgery and/or medications. Additionally, performing routine CT scans on all patients is not ethically or financially justifiable, making it challenging to obtain radiological confirmation of POP.

Following Connor's publication in 2016 several other studies also have shown POP as an independent predictor of POPF and ≥IIIB Clavien Dindo classification complication.[12,13]

This study aims to analyze the rate of CR-POP, according to Connor definition and according to the modified Atlanta classification, and the rate of CR-POPF occurring at Kathmandu medical college and see the association of CR-POP with the development of CR-POPF.

Methods

A prospective observational study was conducted between June 1, 2021, and November 30, 2022, after obtaining ethical clearance from the Institutional Review Committee (IRC) of Kathmandu Medical College, Kathmandu, Nepal. The study was carried out in the Department of GI and General Surgery at Kathmandu Medical College. All patients over the age of 18 who underwent pancreaticoduodenectomy (PD) during the study period were included. Patients who underwent additional concomitant surgeries or those who refused to participate were excluded. The objectives of our study were to identify the relationship between POP and POPF, find the prevalence of CR-POP and CR-POPF, and to analyze other variables like pancreatic duct diameter, BMI, sex, and pancreatic texture and correlate them with CR-POP and POPF.

Following IRC approval, relevant data were prospectively collected and analyzed for patients who underwent PD at Kathmandu Medical College Teaching Hospital from August 1, 2021, to July 30, 2022. Data were gathered from all eligible patients after obtaining written informed consent. The diagnosis and surgical procedure were documented, and all pancreatojejunostomies were performed using the Blumgart technique with acceptable variations in operative technique.

The necessary parameters were recorded in a structured proforma. Preoperative data included patient demographics, presenting symptoms, laboratory tests, imaging studies, and any preoperative therapies. Intraoperative parameters included the volume of intravenous fluids administered, operative time, total blood loss, main pancreatic duct diameter, and pancreatic texture as noted by the operating surgeon. Serum amylase levels were recorded 24 hours after pancreatoenteric anastomosis. Postoperative events and clinical outcomes were documented, including therapeutic

and diagnostic procedures, laboratory and imaging studies, gastrointestinal function recovery, and the incidence, type, and severity of complications, including postoperative pancreatic fistula (POPF). ICU admissions and duration, length of hospital stay, and any hospital readmissions or reoperations within 90 days were also recorded. Major complications were defined as those classified as Clavien-Dindo grade IIIb or higher. Mortality was defined as death occurring during the initial hospitalization, within 30 days of hospital discharge, or at any time due to a surgical complication.

Collected data were entered into SPSS version 26.0 for analysis..

Statistical Analysis

The mean ± standard deviation (SD) was used to express quantitative continuous data (age, body mass index, preoperative albumin, intraoperative blood loss, operating time, and serum amylase), and percentages were used to express categorical data (sex, pancreas texture, and all postoperative complications). Patients were divided into two groups based on the development of postoperative acute pancreatitis (POAP), postoperative pancreatic fistula (POPF), and mortality. The difference between two sets of quantitative continuous data was compared using the Student's t-test (parametric test) or the Mann–Whitney U-test (nonparametric test). Categorical data were compared using the χ^2 test (parametric test) or Fisher's exact test (nonparametric test). The predictive value of serum amylase for predicting POPF was assessed using receiver operating characteristic (ROC) curve analysis. Variables with a significant impact on POPF and mortality, as determined by univariate analysis, were analyzed in multivariate logistic regression to examine their relationships. A P-value < 0.05 was considered statistically significant.

Results

A total of 40 patients underwent pancreaticoduodenectomy during the study period, meeting the inclusion criteria. The mean age of the cohort was 57.9 ± 14.21 years, and 60% were male. The mean BMI was 19.52 ± 1.71 kg/m^2. The majority of patients had malignant lesions (87.5%), with adenocarcinoma of the pancreatic head being the most common diagnosis (37.5%). The mean operative time was 309.13 ± 44.72 minutes, with mean intraoperative blood loss of 314.5 ± 122.57mL.

POP (>90 U/L) was observed in 21 patients (52.5%), as defined by Connor's criteria. Using the modified Atlanta criteria, the incidence of POP (>270 U/L) was observed in 8 patients (20%). POPF occurred in 20 patients (50%). Of the 20 patients (50%) who developed postoperative pancreatic fistula (POPF), 6 (15%) were classified as clinically relevant (CR-POPF). Among these, 4 patients (10%) developed Grade B fistula, while 2 patients (5%) progressed to Grade C. Grade B POPF cases were managed conservatively. All four patients had persistent high-output drain fluid (>3 times serum amylase) beyond postoperative day 3, with biochemical features suggestive of pancreatic leak. Drainage was maintained, and patients were kept nil per oral with initiation of total parenteral nutrition (TPN) in two cases and early enteral feeding via nasojejunal tube in the others. Broad-spectrum antibiotics were administered. Two patients required percutaneous image-guided drainage due to localized peripancreatic fluid collections. All four patients eventually recovered, with a mean hospital stay of 17 days (range 13–22 days). Grade C POPF developed in two patients and was associated with a rapidly deteriorating clinical course. Both patients presented with signs of systemic inflammatory response syndrome (SIRS) by postoperative day 5–6, with increasing abdominal pain, rising drain output, leukocytosis, and hemodynamic instability. The first case required urgent re-exploration for suspected intra-abdominal hemorrhage and peritonitis. Intraoperatively, diffuse pancreatic necrosis and hemoperitoneum were noted. The patient developed multi-organ dysfunction and passed away on 9th POD. The second case was managed initially with percutaneous drainage and intensive supportive care including vasopressors and mechanical ventilation. However, despite efforts, the patient developed sepsis-related complications on 11th POD.

Chi-square analysis demonstrated a significant association between post-operative pancreatitis (POP) and the development of post-operative pancreatic fistula (POPF). POP as per Connors showed a strong correlation with POPF ($\chi^2 = 16.94$, $p < 0.001$), with 17 out of 21 patients meeting the POP Connors criteria developing POPF. POP Atlanta also exhibited a statistically significant association with POPF ($\chi^2 = 10.00$, $p = 0.002$), with 8 out of 8 patients classified as POP Atlanta positive developing POPF.

The ROC analysis demonstrated that POP as per Connor had a sensitivity of 85% and specificity of 80% for predicting POPF (AUC 0.825), whereas CR-POP as per Atlanta had a sensitivity of 40% and specificity of 100% (AUC 0.700).

Multivariate logistic regression analysis identified POP as per Connors as an independent predictor of postoperative pancreatic fistula (OR = 12, 95% CI: 2.3 – 63.2, $p = 0.004$). In addition to POP, several patient and disease related factors demonstrated a statistically significant association with CR-POPF on univariate analysis: Female sex ($p = 0.041$), Soft pancreatic texture ($p = 0.027$), Main pancreatic duct (MPD) ≤ 3 mm ($p = 0.014$), and BMI ≥ 30 kg/m^2 ($p = 0.038$) were significantly associated with CR-POPF. Conversely, underlying diagnosis did not demonstrate significant associations with CR-POPF ($p > 0.05$ for all subtypes). Also, there were no statistically significant independent predictors of POP. Sex ($p = 0.979$), pancreatic texture ($p = 0.794$), BMI ≥30 ($p = 0.527$), MPD ≤ 3mm ($p = 0.950$) and diagnosis subtypes ($p > 0.05$ for

all) did not demonstrate a significant association with POP.

Patients with POP had longer ICU stays (7.4 ± 2.3 days vs. 4.1 ± 1.1 days; $p < 0.02$), longer hospital stays (15.8 ± 3.6 days vs. 11.2 ± 2.1 days; $p < 0.01$), and increased 30-day readmission rates (29.2% vs. 11.1%; $p = 0.03$).

Mortality occurred in two patients (5%), with no significant association observed between POP and mortality.

Table 1: Comparison of Continuous Variables between POPF and Non-POPF Groups

Variable	Non POPF (n = 20)	POPF (n = 20)	CR-POPF (n = 6)
Age of the patient (years)	56.20 ± 13.70	59.65 ± 14.86	61.17 ± 13.92
Body Mass Index (kg/m²)	20.05 ± 1.79	29.00 ± 1.50	30.40 ± 0.89
Serum Amylase on POD1 (U/L)	60.29 ± 41.29	271.80 ± 163.41	328.67 ± 118.11
Drain Amylase on POD3 (U/L)	77.65 ± 72.10	2119.75 ± 2216.66	3120.50 ± 1488.42
Duration of Operation (minutes)	315.00 ± 40.07	303.25 ± 49.27	295.50 ± 45.13
Total Blood Loss (mL)	311.50 ± 94.38	317.50 ± 148.04	332.50 ± 165.23
Main Pancreatic Duct Diameter (mm)	5.35 ± 1.90	3.60 ± 1.23	3.05 ± 1.10
Serum Albumin (g/dL)	3.40 ± 0.39	3.40 ± 0.40	3.30 ± 0.41

Note. POPF = Postoperative Pancreatic Fistula; CR-POPF = Clinically Relevant Postoperative Pancreatic Fistula; POPF = Postoperative Pancreatic Fistula

Table 2: Comparison of Categorical Variables between CR-POPF, POPF and Non-POPF Groups

Variable	Category	POPF Absent (n=20)	POPF Present (n=20)	CR-POPF (n = 6)	p-value (CR-POPF)
POP (Connors)	Absent	16	3	1	0.002
	Present	4	17	5	
POP (Atlanta)	Absent	20	12	2	0.009
	Present	0	8	4	
Sex	Male	14	10	1	0.041
	Female	6	10	5	
Diagnosis	Pancreatic head Ca	9	6	2	0.186
	Ampullary Ca	5	7	3	
	Distal cholangiocarcinoma	4	5	1	
	IPMN	2	1	0	
	Chronic pancreatitis	0	1	0	
Pancreas Texture	Soft	12	11	5	0.027
	Hard	8	9	1	
MPD ≤ 3 mm	No	11	5	1	0.014
	Yes	9	15	5	
BMI ≥ 30	No	15	11	2	0.038
	Yes	5	9	4	

Note: CR-POPF = Clinically Relevant Postoperative Pancreatic Fistula; POPF = Postoperative Pancreatic Fistula; MPD = Main Pancreatic Duct; BMI = Body Mass Index. Bolded p-values indicate statistical significance.

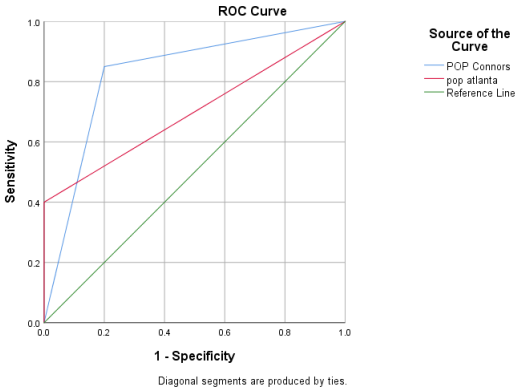


Figure 1: Receiver Operating Characteristic (ROC) curves evaluating the predictive accuracy of postoperative pancreatitis for the development of postoperative pancreatic fistula (POPF) after Pancreaticoduodenectomy with an AUC of 0.825 (Connors) and 0.7 (Atlanta)

Discussion

This study demonstrates a significant association between post-operative pancreatitis (POP) and the development of post-operative pancreatic fistula (POPF) following pancreaticoduodenectomy (PD). POP, as defined by Connor's criteria, was found to be an independent predictor of POPF with an odds ratio of 12 (95% CI: 2.3–63.2, p = 0.004). POPF developed in 50% of patients, and 15% were classified as clinically relevant (CR-POPF). The incidence of POP varied with diagnostic definitions - 52.5% with Connor's and 20% with the modified Atlanta criteria, highlighting variability in detection based on differing thresholds.

POP patients exhibited more complex postoperative courses, with longer ICU stays (7.4 vs. 4.1 days), prolonged hospitalization (15.8 vs. 11.2 days), and higher readmission rates (29.2% vs. 11.1%). These findings suggest that early pancreatic inflammation not only predicts POPF but may directly influence its pathogenesis by impairing anastomotic healing through local and systemic inflammatory effects. The strong association of POP (especially using Atlanta criteria, where all 8 patients with POP developed POPF) supports the hypothesis that POP is more than a biochemical anomaly, it may be a causative driver of POPF. However, the strict Atlanta criteria captured fewer cases, possibly underestimating risk in patients with less severe enzyme elevation.

The incidence of POP and POPF varies based on the definitions employed. For instance, a study involving 520 PD patients reported postoperative hyperamylasemia (POH) in 23% of cases, while postoperative acute pancreatitis (POAP) occurred in 12.1%. This study also found that POAP was associated with higher rates of severe complications (76.1% vs. 25.8%), delayed gastric emptying (42.9% vs. 24.9%), and POPF (90.5% vs. 40.8%) compared to patients without POAP.[15]

Furthermore, POP's systemic effects, including inflammatory cascades, may exacerbate local tissue damage, complicating the healing of pancreatic anastomoses. This systemic inflammatory response syndrome (SIRS) could explain the increased rates of ICU admissions and prolonged hospital stays observed in POP patients. According to a study by Räty Sari et al. POPF are also more likely to develop non-fistula postoperative complications including prolonged duration of hospital stay, wound infection, acute cardiac events, bile leak, and mortality.[16]

Bannone et al. (2020) conducted a comprehensive systematic review involving 9,220 patients and highlighted the lack of consensus in defining POH and POP, particularly in terms of serum amylase thresholds, timing, and diagnostic criteria. They proposed that POH may represent the biochemical expression of subclinical or overt parenchymal injury: a localized pancreatitis like process at the pancreatic stump which predisposes patients to downstream complications, especially POPF. In our study, POP (as defined by elevated serum amylase in the early postoperative period) was significantly associated with the development of POPF. These findings support that POP may not be a coincidental biochemical abnormality but a central pathophysiological event that initiates or exacerbates POPF formation. This is consistent with Bannone et al.'s conclusions that a soft pancreas and narrow main pancreatic duct were predisposing factors for the occurrence of POP which was correlated with development of postoperative pancreatic fistula.[17]

To reduce pancreatic exocrine secretion and potentially reduce fistula risk, we routinely administered octreotide prophylactically in all patients undergoing pancreaticoduodenectomy. While the efficacy of somatostatin analogs in preventing POPF remains debated in literature, our institutional practice is guided by the rationale that reducing pancreatic enzyme output in the immediate postoperative period may attenuate the severity of subclinical leaks or enzymatic injury contributing to POP and POPF. A randomized clinical trial compared effect of hydrocortisone vs pasireotide on pancreatic surgery complications in patients with high risk of pancreatic fistula concluded that hydrocortisone was not non inferior compared with pasireotide in patients undergoing partial pancreatectomy.[18]

The findings underscore the need for routine early monitoring of POP markers (e.g., serum amylase) after PD. Incorporating these into postoperative management protocols may allow early identification of high-risk patients, targeted interventions, and timely escalation of care.

The International Study Group for Pancreatic Surgery (ISGPS) recently published a formal definition and grading system for Postpancreatectomy Acute Pancreatitis (PPAP). According

to ISGPS, PPAP is diagnosed when three criteria are met within the first 3 postoperative days: 1) Sustained serum hyperamylasemia for ≥48 hours above the institutional upper limit of normal, 2) Clinically relevant features (e.g., fever, leukocytosis, abdominal pain, or organ dysfunction, and 3) Radiological evidence of inflammatory changes in the remnant pancreas. Three grades of PPAP were proposed: Grade A: Biochemical changes only (formerly termed POH), Grade B: Associated with mild to moderate complications and Grade C: Associated with severe, life-threatening complications.[19] However, since our study was initiated prior to the validation and publication of the ISGPS criteria, we adopted the widely used Connor's criteria for defining POP, which combines early postoperative biochemical (serum amylase) markers for pancreatic inflammation. Our findings nonetheless parallel those of the ISGPS framework, reinforcing the clinical relevance of early inflammatory changes in predicting fistula.

Larger, multicenter studies applying the ISGPS PPAP criteria are needed to validate POP as a risk factor and refine management protocols. Development of a composite risk scoring system, integrating biochemical markers, pancreatic texture, duct diameter, and intraoperative findings, could further improve risk stratification and guide early therapeutic decisions.

Conclusion

Our study highlights that post-operative pancreatitis (POP) is not just a biochemical finding but a meaningful clinical event that strongly predicts the development of post-operative pancreatic fistula (POPF) after pancreaticoduodenectomy. Using Connor's criteria, we found a clear and significant association between early POP and subsequent POPF, while the more stringent Atlanta criteria, though highly specific, may overlook patients at risk.

Patients who developed POP faced more challenging recoveries with longer ICU and hospital stays and higher chances of readmission pointing to the broader impact of early pancreatic inflammation on outcomes. We also observed that factors like soft pancreatic texture, narrow pancreatic duct, higher BMI, and female sex increased the risk of clinically relevant fistulas, consistent with previous findings.

The study emphasizes the importance of identifying inflammation early, which allows for timely interventions. However, larger studies using standardized criteria like PPAP will be key to refining how we detect and manage these complications. Preventive strategies whether pharmacologic, procedural, or supportive should focus on high-risk patients identified early through clinical and biochemical markers which may be able to improve outcomes and reduce the burden of POPF in patients undergoing pancreaticoduodenectomy.

Limitations

Single-center design: The study's findings may not be generalizable to other institutions with different patient populations and surgical practices. Sample size: While sufficient for preliminary analysis, a larger sample size would increase statistical power and validate the findings. Diagnostic criteria variability: The reliance on Connor's and modified Atlanta criteria highlights the lack of a universally accepted standard for diagnosing POP, potentially affecting the reproducibility of results. Short follow-up period: Long-term outcomes, including late-onset complications, were not assessed.

References

1. D'Cruz JR, Misra S, Menon G, Shamsudeen S. Pancreaticoduodenectomy (Whipple Procedure). In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 [cited 2025 Mar 22]. Available from: http://www.ncbi.nlm.nih.gov/books/NBK560747

2. Lupascu C, Trofin A, Zabara M, Vornicu A, Cadar R, Vlad N, et al. Emergency Backwards Whipple for Bleeding: Formidable and Definitive Surgery. Gastroenterology Research and Practice. 2017;2017(1):2036951. DOI: 10.1155/2017/2036951
PMID: 28757865 PMCID: PMC5512028

3. Chui JN, Sahni S, Samra JS, Mittal A. Postoperative pancreatitis and pancreatic fistulae: a review of current evidence. HPB. 2023 Sep 1;25(9):1011-21. DOI: 10.1016/j.hpb.2023.05.007
PMID: 37301633

4. Bassi C, Marchegiani G, Dervenis C, Sarr M, Abu Hilal M, Adham M, et al. The 2016 update of the International Study Group (ISGPS) definition and grading of postoperative pancreatic fistula: 11 Years After. Surgery. 2017 Mar;161(3):584-91. DOI: 10.1016/j.surg.2016.11.014
PMID: 28040257

5. Enderes J, Pillny C, Matthaei H, Manekeller S, Kalff JC, Glowka TR. Clinically Relevant Pancreatic Fistula after Pancreaticoduodenectomy: How We Do It. Biology (Basel). 2023 Jan 22;12(2):178. DOI: 10.3390/biology12020178
PMID: 36829457 PMCID: PMC9952935

6. Todorov RS, Zhivkov EE, Arabadjieva E, Bulanov DI, Yonkov AS, Todorov RS, et al. Postoperative Pancreatitis [Internet]. IntechOpen; 2025 [cited 2025 Mar 25]. DOI: 10.5772/intechopen.1008690

7. Connor S. Defining post-operative pancreatitis as a new pancreatic specific complication following pancreatic resection. HPB (Oxford). 2016 Aug;18(8):642-51. DOI: 10.1016/j.hpb.2016.05.006
PMID: 27485058 PMCID: PMC4972444

8. Walkowska J, Zielinska N, Tubbs RS, Podgórski M, Dłubek-Ruxer J, Olewnik Ł. Diagnosis and Treatment of Acute Pancreatitis. Diagnostics (Basel). 2022 Aug 15;12(8):1974. DOI: 10.3390/diagnostics12081974 PMID: 36010324 PMCID: PMC9406704

9. Mederos MA, Reber HA, Girgis MD. Acute Pancreatitis: A Review. JAMA. 2021 Jan 26;325(4):382-90. DOI: 10.1001/jama.2020.20317 PMID: 33496779

10. Watts GF, Rosenson RS, Hegele RA, Goldberg IJ, Gallo A, Mertens A, et al. Plozasiran for Managing Persistent Chylomicronemia and Pancreatitis Risk. N Engl J Med. 2025 Jan 9;392(2):127-37. DOI: 10.1056/NEJMoa2409368 PMID: 39225259

11. Williamsson C, Ansari D, Andersson R, Tingstedt B. Postoperative pancreatic fistula-impact on outcome, hospital cost and effects of centralization. HPB (Oxford). 2017 May;19(5):436-42. DOI: 10.1016/j.hpb.2017.01.004 PMID: 28161218

12. Chui JN, Sahni S, Samra JS, Mittal A. Postoperative pancreatitis and pancreatic fistulae: a review of current evidence. HPB (Oxford). 2023 Sep;25(9):1011-21. DOI: 10.1016/j.hpb.2023.05.007 PMID: 37301633

13. Nahm CB, Connor SJ, Samra JS, Mittal A. Postoperative pancreatic fistula: a review of traditional and emerging concepts. Clin Exp Gastroenterol. 2018;11:105-18. DOI: 10.2147/CEG.S120217 PMID: 29588609 PMCID: PMC5858541

14. Søreide K, Labori KJ. Risk factors and preventive strategies for post-operative pancreatic fistula after pancreatic surgery: a comprehensive review. Scand J Gastroenterol. 2016 Oct 2;51(10):1147-54. DOI: 10.3109/00365521.2016.1169317 PMID: 27216233 PMCID: PMC4975078

15. Quero G, Massimiani G, Lucinato C, Fiorillo C, Menghi R, Laterza V, et al. Acute pancreatitis after pancreatoduodenectomy: clinical outcomes and predictive factors analysis according to the International Study Group of Pancreatic Surgery definition. HPB. 2023 Mar 1;25(3):363-73. DOI: 10.1016/j.hpb.2023.01.002 PMID: 36764909

16. Räty S, Sand J, Lantto E, Nordback I. Postoperative acute pancreatitis as a major determinant of postoperative delayed gastric emptying after pancreaticoduodenectomy. J Gastrointest Surg. 2006;10(8):1131-9. DOI: 10.1016/j.gassur.2006.05.012 PMID: 16966032

17. Bannone E, Andrianello S, Marchegiani G, Malleo G, Paiella S, Salvia R, et al. Postoperative hyperamylasemia (POH) and acute pancreatitis after pancreatoduodenectomy (POAP): State of the art and systematic review. Surgery. 2021 Feb;169(2):377-87. DOI: 10.1016/j.surg.2020.04.062 PMID: 32641279

18. Tarvainen T, Sirén J, Kokkola A, Sallinen V. Effect of Hydrocortisone vs Pasireotide on Pancreatic Surgery Complications in Patients With High Risk of Pancreatic Fistula: A Randomized Clinical Trial. JAMA Surg. 2020 Apr 1;155(4):291-8. DOI: 10.1001/jamasurg.2019.6019 PMID: 32022887 PMCID: PMC7042940

19. Marchegiani G, Barreto SG, Bannone E, Sarr M, Vollmer CM, Connor S, et al. Postpancreatectomy Acute Pancreatitis (PPAP): Definition and Grading From the International Study Group for Pancreatic Surgery (ISGPS). Annals of Surgery. 2022 Apr;275(4):663. DOI: 10.1097/SLA.0000000000005226 PMID: 34596077