

Original Research

Comparison of Clinical Outcomes and Postoperative Quality of Life between Early and Delayed Surgical Intervention in Chronic Pancreatitis

Dr. Hemant Jain¹, Dr. Vikram Singh Sodha², Dr. Manisha Kala³, Dr. Rekha Shekhawat⁴

¹Assistant Professor, Ananta Institute of Medical Sciences and Research Centre, Rajsamand, Rajasthan, drhemantjain09@gmail.com

²Associate Professor, Dept of Surgical Gastroenterology, NIMS, Jaipur, vikramsinghsodha2014@gmail.com

³Assistant Professor, Dept of Obstetrics & Gynecology, Ananta Institute of Medical Sciences and Research Centre, Rajsamand, Rajasthan, Manishadoc08@gmail.com

⁴Assistant Professor, Department of Community Medicine, SKGMC, Sikar, vikramrekhasingh2014@gmail.com

Corresponding author

Dr. Hemant Jain

Assistant Professor, Ananta Institute of Medical Sciences and Research Centre, Rajsamand, Rajasthan, drhemantjain09@gmail.com

Received Date: 20 November, 2025 Acceptance Date: 5 December, 2025 Published Date: 11 December, 2025

Abstract

Background: Timing of surgery in chronic pancreatitis (CP) may play an important determinant of successful outcomes. Current existing guidelines are contradicting and lack a clear recommendation regarding surgery in CP. In this study, we evaluated impact of surgery within 3 years of pain episode in chronic calcific pancreatitis (CCP) patient on pain relief, pancreatic insufficiency and quality of life.

Methods: This study was a comparative study which including both prospective and retrospective data. 50 diagnosed cases of CP were included in this study and underwent either early or late surgery (≤ 3 or > 3 years from first pain episode) in a single tertiary center from January 2016 to July 2020. Clinical outcomes including pain relief, exocrine & endocrine insufficiency, quality of life and need of opioids etc. were compared in both groups at follow-up. Minimum follow up period was 6 months.

Results: Early surgery group had lower Izbicki pain score (15.48 vs 23.43, $p=0.03$) and better quality of life score (58.69 vs 47.52, $p<0.0001$) compared to delayed surgery group at follow up. Complete or partial pain relief at follow-up was achieved in 20 of 23 patients (87%) in early surgery vs 17 of 23 (74%) in delayed surgery group. ($p=0.26$) The total number of readmission (2 vs 9, $p=0.015$), interventions (1 vs 4, $p=0.15$), complications (4 vs 12, $p=0.01$) and need of opioids (3 vs 8, $p=0.08$) at follow up were lower in the early surgery group. Effect on pancreatic function was not significantly different between both groups.

Conclusions: Results from our study suggest that early surgical intervention of 3 year or less is associated with improved pain control and quality of life. While our data indicate the benefit of early surgery, these findings need to be confirmed in prospective trial with larger sample size and long follow up period.

Abbreviations: CP = chronic pancreatitis, CCP = chronic calcific pancreatitis

Keywords: chronic pancreatitis, pancreatic insufficiency, pain relief, surgery, quality of life

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-Non Commercial-Share Alike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms

Introduction

Chronic pancreatitis (CP) is a chronic, progressive inflammatory disease with debilitating course which causes recurrent episodes of pain, progression to pancreatic insufficiency, and increased risk of pancreatic cancer.^{1,2} It is a disease with an increasing annual incidence which is a reason for negative impact on the quality of life of the patients, with repeated hospitalization and inability to work.^{3,4} In chronic pancreatitis, patient's pain is unpredictable

and symptoms not always directly correlate with the morphological changes.⁵ CP was first described in the medical literature by Sir Thomas Cawley in 1788.⁶ The annual incidence of CP in the United States is around 4 to 12/100,000 persons^{7,8} compared with western countries, the prevalence of CP is higher in India and other Asian countries.^{9,10}

In CP incapacitating, overwhelming, truly intractable pain develops that markedly alters quality of life of patients and prevents ability to function productively in society.¹¹ Development of pain is seen in 85% of

the patients.¹² Endocrine and exocrine pancreatic insufficiencies, occurring in 50% and 80% of patients respectively within 5 years of disease course.^{13,14} A variety of local complications such as fluid collection, gastric outlet obstruction, bile duct obstruction or portal hypertension also may present in case of chronic pancreatitis which can contribute to morbidity and mortality.^{15,16}

In the final stage the burn-out pancreas with global insufficiency is found usually several years after onset of the disease.¹⁷ In most of the case, patients are eventually incapacitated by intractable pain and become chronic opioid users without any satisfactory result.¹⁸ Achieving satisfactory pain relief in chronic pancreatitis by medication or surgery is still a big challenge.¹⁹

The aim of this study is to use a cohort of patients undergoing operations at a single tertiary centre to evaluate that surgery for pain in CP within 3 years of first pain episode has greater chance or not to achieve significant pain relief than surgery after 3 years of first pain episode. In this study we are also examining the impact of early surgery on pancreatic function, quality of life, morbidity and mortality in comparison of delayed surgery in chronic pancreatitis.

Material and methods

The study was a cross-sectional comparative Study, which was conducted in Department of surgical gastroenterology and liver transplantation, Osmania Medical College and attached hospitals, Hyderabad during the period from January 2016 to July 2020. Patients admitted with a diagnosis as Chronic calcific pancreatitis (25 in each group) were taken in this study. Patients were chosen according to inclusion and exclusion criteria (25 in each group), in order to compare early surgery and delayed surgery in chronic pancreatitis.

Inclusion criteria:

1. Age: 13 years to 60 years
2. Confirmed Case of Chronic Pancreatitis:

Exclusion criteria:

1. Previous pancreatic surgery
2. Stones and strictures exclusively located in the tail of the pancreas
3. Suspected or confirmed pancreatic malignancy
4. Presence of a pseudocyst larger than 6 cm necessitating intervention,
5. Contra-indications for surgery (e.g., American Society of Anaesthesiology class IV, severe comorbid condition, severe portal hypertension)
6. Acute pancreatitis

From the patients fulfilling the inclusion parameters, without any exclusion meriting features, a detailed history consisting of patient particulars, postal and telephonic contact number were noted as per the proforma. The complaints of the patients were taken

down and examination performed. A written informed consent was obtained. For patients below 18 years, consent was given by their parents and separate assent form was filled for them.

Surgery was performed within a period of 3-year from the onset of 1st episode of pain in early surgery group and in delayed surgery group after 3 year from the onset of 1st episode of pain.

Primary outcome was pain relief which was assessed by the Izbicki pain score²⁹ during pre-operative period and on follow up. Secondary outcomes were post-operative morbidity and mortality, effect of endocrine and exocrine function of pancreas and post-surgery quality of life which was assessed by validated short form 36 (SF-36)²⁸. (28,29 reference added)

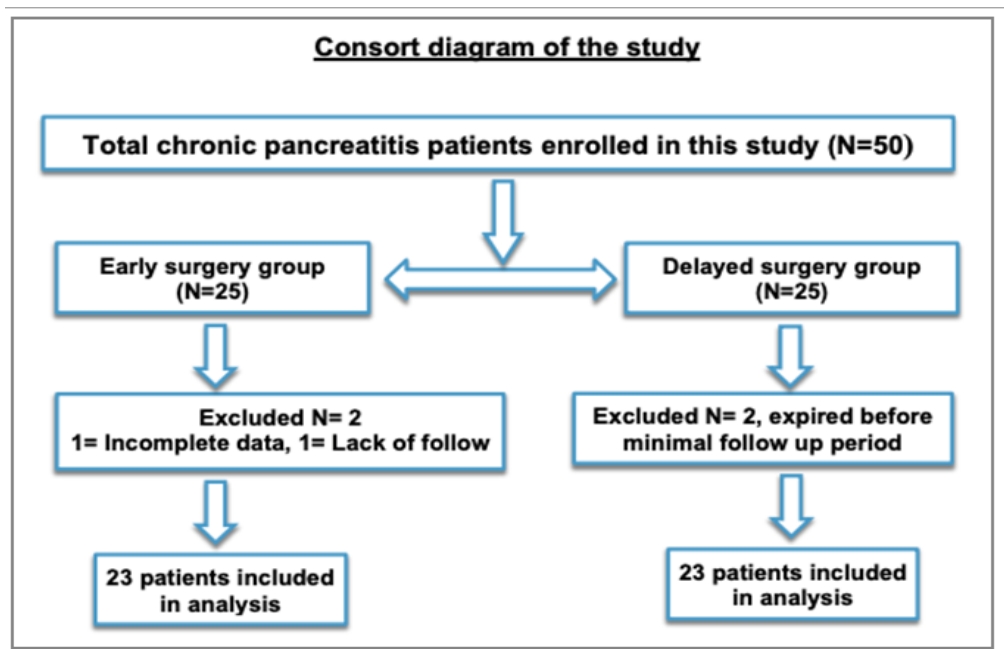
For endocrine Function assessment, fasting blood glucose (>120 mg/dl), post prandial blood glucose (>200 mg/dl and Haemoglobin A1c (HbA1c) level (> 6.5) were used. For exocrine function assessment, spot stool qualitative faecal fat or the need for pancreatic enzyme replacement therapy (>1 year history; overt steatorrhea without treatment) were considered.

For non-enlarge head with dilated pancreatic duct, Modified Peustow's procedure was performed wherever for an enlarged pancreatic head (> 4 cm) with dilated Duct (> 5 mm), Frey's procedure was performed.

Statistical analysis was conducted with the statistical package for the social science system version. Continuous variables were presented as mean \pm SD (or median if the data not evenly distributed). Categorical variables were expressed as frequencies and percentages. The comparison of normally distributed continuous variables between the groups were performed using Student's test. Nominal categorical data between the groups were compared using Chi-squared test or Fisher's exact test as appropriate. For all statistical tests, a p value less than 0.05 was taken to indicate a significant difference at confidence interval of 95%.

Results

During the study period, total of 50 patients were enrolled in the present study. This study included prospective data of 19 patients, for rest 31 patient; retrospective data was retrieved based on medical record. 25 patients were included in each group. In early surgery group, complete data of 23 patients was available for analysis. 2 patients were excluded from study in early surgery group due to lack of follow up and incomplete data. In delayed surgery group also, complete data of 23 patients was available for analysis. 2 patients were excluded from study in delayed surgery group due to death during follow up period. All patient was followed for minimum 6 months. All 23 patients in both groups responded to SF-36 questionnaire related to QOL.



The baseline characteristics of all patients were compared. The two groups had a similar demographic profile with respect to mean age (28.7 years vs 33.78 years), sex distribution (52.17%:47.82% vs 65.21%:34.78%) and BMI.

Table 1: Demographic characteristics of patients of both groups.

	Early surgery	Delayed surgery	P value
Mean age	28.17 +/- 11.55	33.78 +/- 8.74	0.07
Male/ Female	12 (52.17%)/11 (47.82%)	15 (65.21%)/ 08 (34.78%)	0.37
BMI			0.67
Low (<18.5 kg/m ²)	09 (39.13%)	08 (34.78%)	
Normal (18.5 - 24.5kg/m ²)	14 (60.86%)	15(65.21%)	

Pain was presenting complaint in all patients in both groups and it was only indication for surgery in both groups. Jaundice, vomiting, loss of weight, loss of appetite, gastrointestinal bleeding and diabetes were found more in the delayed group but none of these differences was significant. Etiology of chronic pancreatitis was comparable in both groups. In both groups, the main cause of disease was either alcoholism or idiopathic (tropical). 4 patients in the early group and 2 patients in the delayed group had etiology other than idiopathic (tropical) or alcoholism. Patients in the delayed surgery group had significantly higher hospitalization in the preoperative period compared to patients in the early surgery group. In the delayed surgery group, 16 patients had a history of 1 or more (up to 3) hospitalizations due to this disease before they underwent surgery. In the early surgery group, only 6 patients required hospital admission (1-2) during their disease course before surgical procedure. This difference was statistically significant and favored the early surgery group. In both groups, 12 patients were using enzyme replacement therapy (ERT) due to steatorrhea before they underwent surgery for chronic pancreatitis.

Table 2: Preoperative interventions and Treatment

	Early surgery	Delayed surgery	P value
History of Hospitalization	26.08%	69.59%	0.003
History of Interventions	1 (4.34%)	5 (21.73%)	0.07
Use of ERT	47.82%	47.82%	1

Among the 23 patients in the early group with a minimum follow-up of 6 months, 20 (86.97%) patients achieved pain relief. Out of these 20 patients, 6 (26.2%) had complete pain relief and 14 (60.87%) had partial pain relief. 3 (13.04%) patients in this group had no pain relief at all. Compared to the early surgery group, in the delayed surgery group, 17 (73.92%) patients achieved pain relief [Complete pain relief: 2 (8.7%); partial pain relief: 15 (65.22%)]. 6 (26.1%) out of 23 patients in the delayed surgery group had no pain relief after surgery.

A higher proportion of patient in early surgery group had complete pain relief. (26.1% vs 8.7%). The proportion of patient with no pain relief in the early group was smaller (13.04% vs 26.1%). But these favorable results did not have statistical significance probably due to smaller sample size of this study. At pre-operative period, IZBICKI score was comparable in both group (53.85 +/- 8.72 vs 59.05 +/- 9.06, P=0.053). In both group IZBICKI pain score decreased after surgery but it was significantly less in the early surgery group compared to the delayed surgery group (15.48 +/- 8.23 vs 23.43 +/- 14.80, P=0.03) at follow up.

Table 3: Pain relief

Pain relief	Early surgery	Delayed surgery	P value
Complete	6 (26.1%)	2 (8.7%)	0.26 Non-significant
Partial	14(60.87%)	15(65.22%)	
Pain relief (Partial and complete)	20 (86.97%)	17 (73.92%)	
No	3(13.04%)	6 (26.1%)	

Table 4: IZBICKI pain score (Inter Group comparison)

IZBICKI pain score	Early surgery	Delayed surgery
Pre-op	53.85 (+/- 8.72)	59.05 (+/- 9.06)
Follow-up	15.48 (+/- 8.23)	23.43 (+/- 14.80)
P value	P : 0.03(significant)	

Number of patients with endocrine insufficiency before surgery was more in delayed group (52.17% vs 39.13, p=0.374). After early surgery, in 2 (8.69%) patients endocrine insufficiency resolved and in 2 (8.69%) patients, it developed newly during follow up. In delayed group 3 (14.04%) patient developed endocrine insufficiency during follow up and it resolved, only in one (4.34%) patient. All these differences related to type 3c diabetes were non-significant statistically. Number of patients with exocrine insufficiency before surgery was same in both group (52.17% vs 52.17, p=1). After early surgery, exocrine insufficiency resolved in more patients compared to delayed group [5 (21.23%) vs 2 (8.67%)]. But these differences were statistically insignificant. Incidence of newly developed exocrine insufficiency was same in both study groups.

Table 5: Endocrine insufficiency

Endocrine insufficiency	Early surgery	Delayed surgery	P value
Present in pre operative period	9 (39.13%)	12 (52.17%)	0.374
Normal (pre-op period)	14 (60.86%)	11 (47.82%)	
Newly developed	2 (8.69%)	3 (14.04%)	0.527
Normal	12 (52.17%)	8 (34.78%)	
Resolved	2 (8.69%)	1 (4.34%)	
Persisted	7 (30.43%)	11 (47.82%)	

Table 6: Exocrine insufficiency

Exocrine insufficiency	Early surgery	Delayed surgery	P value
Present in pre-operative period	12 (52.17%)	12 (52.17%)	1
Normal (pre-op period)	11 (47.82%)	11 (47.82%)	
Newly developed	3 (13.04%)	3 (13.04%)	0.611
Normal	8 (34.78%)	8 (34.78%)	
Resolved	5 (21.73%)	2 (8.67%)	
Persisted	7 (30.43%)	10 (43.47%)	

In early surgery group, major complications (Clavein-dindo grade III and IV) were observed in one case (4.34%) following grade B POPF. That patient required percutaneous drainage of intra-abdominal collection in post-operative period before discharge. In delayed surgery group, major complication (Clavein-dindo grade III and IV) was observed in 3 cases (13.04%). One patient had post operative significant bleeding with hypovolemic shock which required ICU care, multiple blood transfusions and inotrope support. 2 patients required percutaneous drainage for intra-abdominal collection in postoperative period before discharge. The early surgery group had low rate of overall complications [4 (17.39%) vs 12 (52.17%) p=0.0132].

Length of hospital stay was 7.7 +/- 2.22 days in early surgery group and 8 +/- 2.37 days in delayed surgery group, which was comparable without statistical significance. In early surgery group, one patient underwent celiac plexus block for persistent pain. That patient had no pain relief after surgery. In delayed surgery group, 1 patient underwent re-surgery (LPJ) for no pain relief. Celiac plexus block was done for two patients who had no

pain relief after surgery. Endoscopic stenting was done in one patient during follow up period for persistent pain.

Table 7: Complication and Post surgery interventions

Complication	Early surgery	Delayed surgery	P value
CD III & IV	1 (4.34%)	3 (13.04%)	0.0132
Hemorrhage	0 (0%)	1 (4.34%)	
Pancreatic fistula (B/C)	1 (4.34%)	3 (13.04%)	
Wound complication	3 (13.04%)	7 (30.43%)	
Post-op infection	0 (0%)	1 (4.34%)	
Total complications	4 (17.39%)	12 (52.17%)	
Interventions	1 (6.08%)	4 (17.39%)	

There was no difference in follow-up time between both groups [23 +/- 14.38 months (6-48) vs 21.08 +/-12.70 (6-44) p=0.566]. The delayed surgery group had more re-admission rate (8.69% vs 39.13%, p=0.015) and associated with more need for analgesic (13.04% vs 34.78, p= 0.08) in follow up period. Early surgery was superior with less no of re-admission in follow up period. (p=0.015). We observed 2 case of disseminated malignancy after delayed surgery in this study.

In early surgery group, QOL was significantly improved in all eight domains after surgery. Physical health scale, mental health scale and global quality of life were improved significantly after surgery in follow up period. In delayed surgery group, QOL was improved in all domains except emotional role functioning after surgery in follow up period. Physical health scale; mental health scale and global quality of life were improved significantly after surgery in follow up period.

In follow up period, QOL scores of four domains in early surgery group were better than delayed surgery group with statistically significance (Physical functioning, role limitation due to physical health, general health and social functioning). Physical health scale and global quality of life were also significantly better in early surgery group during follow up period.

Table 9. QOL scores: Inter group comparison

Parameter	P value (Pre-op period) (Early vs. delayed)	P value (Follow up Period) (Early vs. delayed)
Physical functioning	0.736	0.026
Role limitation due to physical health	0.287	0.041
Bodily pain	0.342	0.090
General health	0.147	0.046
Role limitation due to emotional problem	0.061	0.383
Vitality (energy/ fatigue)	0.534	0.493
Emotional well being	0.960	0.491
Social functioning	0.337	0.043
Physical health scale	0.740	<0.0001
Mental health scale	0.100	0.057

Global quality of life	0.377	<0.0001
------------------------	-------	---------

Discussion

This is a hospital based cross sectional study has both prospective and retrospective data components, conducted at department of surgical gastroenterology, Osmania general hospital (OGH), Hyderabad, India. In our study we used two types of surgical procedure. Out of 46 patient, LPJ and Frey's procedures were done in 35 and 11 patients respectively. In literature, proper definitions of early surgery and delayed surgery are not clear. We took 3 year as a cut off from symptoms on the basis of previous studies. Most of the study²⁰⁻²² also took 3 year as a cut off point for early and delayed surgery except one study²³ in that cut off point was 26.5 months.

According to international consensus guideline for chronic pancreatitis, in patients with CP and an enlarged head, a hybrid procedure such as Frey, Berne etc may be the treatment of choice with less postoperative complications and comparable results in pain-relief to resection procedure like pancreaticoduodenectomy (PD) or pyloruspreserving pancreaticoduodenectomy (PPPD). In patients with dilated main duct (5 mm or more) and normal size pancreatic head lateral pancreatico-jejunostomy and Frey procedure seems to provide equivalent pain control.²⁴

Ahmed Ali²⁵ et al showed that 5 or more endoscopic procedure before surgery is related to poor result in term of pain relief after surgery. A multi-center trial in 2020 showed that more interventions were required for endoscopy first group. (3 vs 1; P < .001).²⁶

In this study, pain relief was achieved more after early surgery group compared to delayed surgery group. Pain relief was 86.97% in early surgery group with complete pain relief 26.1%, partial pain relief 60.87% and no pain relief 13.04% while in delayed surgery group, pain relief was 73.92% with complete pain relief 8.7%, partial pain relief 65.22% and no pain

relief 26.1%. But this difference was not significant (p=0.26) probably due to less sample size of the study.

Ahmed Ali et al conducted multi-centre prospective observational studies and results from this study showed that surgery within 3 years of symptoms was associated with more pain relief (OR, 1.8; 95% CI, 1.0-3.4; P=.03).²⁵ A Meta-analysis of previous study was published in 2014 to evaluate the effect of early surgery on postoperative pain. This study showed that early surgery was associated with an increased likelihood of complete postoperative pain relief (RR=1.67, 95 % CI 1.09–2.56, p=0.02).⁶

Beger et al reported removal of an inflammatory process and/or pancreatic duct stenosis may cause improvement of function in the remaining pancreas.⁷ One retrospective study²¹ from China suggests that early surgery results in better preservation of pancreatic function both exocrine and endocrine. Early surgery had reduced incidence of exocrine insufficiency (60.2% vs 80.39%, P = .005) and endocrine insufficiency (35.7% vs 52.7%, P = .033) according to this study. In early surgery group, higher rate of resolution of both exocrine and endocrine insufficiency was noted. Early surgery group patients had significantly lower incidence of exocrine insufficiency prior to surgery.

Major limitation of this study was low sample size. Some parameters were superior in early surgery group but could not reached to statistical significance level due to this reason only. Other limitation was nature of this study which was non-randomized comparison which included retrospective data with short follow up period. While our data indicate the benefits of early surgery these findings need to be confirmed in prospective trials.

Table 10. Comparison of results of other studies with our study

Study	Design	Definition	Pain relief	Endocrine pancreatic function	Exocrine pancreatic function	Complication	QOL
Ali et al (2012) ²⁵	Prospective observational	ES: At or before 3 years	ES: 66%; DS: 47% P value: 0.03	Less after ES	-	-	-
Yang et al (2015) ²³	Retrospective	ES at or before 26.5 months	ES: 58.1%; DS: 22.9% P value: <0.01	-	-	More opioid use and Re-interventions after DS	-
Ke et al (2018) ²¹	Retrospective	Early surgery: At or before 3 years	ES: 91.8%; DS: 84% P value: 0.01	Significant result (0.033)	Significant result (0.005)	Less hospital stay after early surgery	Better after early surgery
Issa et al (2020) ²⁶	Multicenter RCT		Izbiki pain score: 37/49 (<0.02) VAS at follow up: 28/38 (0.03)	Non significant result (0.12)	Non significant result (0.611)	No difference	No difference
M A Kempeneers et al (2020) ²⁴	International consensus guidelines		ES results optimal long term relief	No recommendations	Risk is less after ES		QOL improve after ES
Our Study	Comparative study	Early surgery: At or before 3 years	Izbiki pain score: 15.48/23.43 (0.03)	Non significant result (0.52)	Non significant result (0.611)	More opioid use, re admission and Re-interventions after DS	Better after ES

Conclusion

This study underscores the potential advantage of early surgical intervention in chronic pancreatitis. Early surgery was associated with markedly better pain control, superior quality-of-life outcomes, and lower postoperative morbidity compared with delayed surgery, without compromising pancreatic exocrine or endocrine function. Although differences in re-intervention rates and opioid use did not reach statistical significance, the overall clinical trajectory consistently favored early intervention. These findings reinforce the emerging paradigm that timely surgery may alter the disease course in CP rather than serve as a last-resort option. Well-designed multicenter studies with larger cohorts and longer follow-up are essential to validate these results and refine guidelines on optimal surgical timing in chronic pancreatitis.

References

1. Van der Gaag NA, van Gulik TM, Busch OR, Sprangers MA, Bruno MJ et al. Functional and medical outcomes after tailored surgery for pain due to chronic pancreatitis. *Ann Surg* 2012;255(4):763-70.
2. Issa Y, van Santvoort HC, van Goor H, Cahen DL, Bruno MJ, Boermeester MA. Surgical and endoscopic treatment of pain in chronic pancreatitis: a multidisciplinary update. *Dig Surg* 2013; 30(1):35-50.
3. Miyake H, Harada H, Kunichika K, Ochi K, Kimura I. Clinical course and prognosis of chronic pancreatitis. *Pancreas*. 1987;2(4):378-385.
4. Gardner TB, Kennedy AT, Gelrud A et al. Chronic pancreatitis and its effect on employment and health care experience: results of a prospective American multi-center study. *Pancreas*. 2010;39(4):498-501
5. Lankisch PG, Breuer N, Bruns A, Weber-Dany B, Lowenfels AB, Maisonneuve P. Natural history of acute pancreatitis: a long-term population-based study. *Am J Gastroenterol*. 5 2009 Nov;104(11):2797-805.
6. Steer ML, Waxman I, Freedman S. Chronic pancreatitis. *N Engl J Med*. 1995; 332:1482-90.
7. Yadav D, Lowenfels AL. The epidemiology of pancreatitis and pancreatic cancer. *Gastroenterology*. 2013;144:1252-1261.
8. Yadav D, Timmons L, Benson J T, et al. Incidence, prevalence, and survival of chronic pancreatitis: a population-based study. *Am Gastroenterol*. 2011; 106:2192-2199.
9. Tandon RK, Sato N, Garg PK. Chronic pancreatitis: Asia-Pacific consensus report. *J Gastroenterol Hepatol*. 2002;1.
10. Garg PK. Chronic pancreatitis in India and Asia. *Curr Gastroenterol Rep*. 2012; 14:118-24.
11. Michael G. Sarr, MD, George H. Sakorafas, MD Rochester, Minnesota Incapacitating pain of chronic pancreatitis: a surgical perspective of what is known and what needs to be known *gastrointestinal endoscopy* volume 49, no 3, part 2 1999.
12. Bradley EL. Long-term results of pancreatojejunostomy in patients with chronic pancreatitis. *Am J Surg* 1987; 153:207-13.
13. Bouwense SA, Olesen SS, Drewes AM, et al. Effects of pregabalin on central sensitization in patients with chronic pancreatitis in a randomized, controlled trial. *PLoS One*. 2012; 7.
14. Lieb JG 2nd, Forsmark CE. Review article: pain and chronic pancreatitis. *Aliment Pharmacol Ther*. 2009; 29:706-19.
15. Ammann RW, Akovbiantz A, Largiader F, Schueler G. Course and outcome of chronic pancreatitis: longitudinal study of a mixed medical-surgical series of 245 patients. *Gastroenterology*. 1984;86(5, pt 1):820-828.
16. Witt H, Apte MV, Keim V, Wilson JS. Chronic pancreatitis: challenges and advances in pathogenesis, genetics, diagnosis, and therapy. *Gastroenterology*. 2007; 132(4):1557-1573.
17. Lankisch PG, Happe-Loehr A, Otto J, et al. Natural course in chronic pancreatitis. Pain, exocrine and endocrine pancreatic insufficiency and prognosis of the disease. *Digestion* 1993; 54:148-55.
18. Andersen DK, Frey CF. The evolution of the surgical treatment of chronic pancreatitis. *Ann Surg* 2010; 251(1):18-32.
19. Hartel M, Tempia-Caliera AA, Wente MN, Z'graggen K, Friess H, Buchler MW. Evidence-based surgery in chronic pancreatitis. *Langenbecks Arch Surg* 2003; 388(2):132-9.
20. Ahmed Ali U, Nieuwenhuijs VB, van Eijck CH, Gooszen HG, van Dam RM, Busch OR, et al.; Dutch Pancreatitis Study Group. Clinical outcome in relation to timing of surgery in chronic pancreatitis: a nomogram to predict pain relief. *Arch Surg*. 2012 Oct; 147(10):925-32.
21. Ke N., Jia D., Huang W., Nunes Q. M., Windsor J. A., Liu X., & Sutton R. (2018). Earlier surgery improves outcomes from painful chronic pancreatitis. *Medicine*, 97(19).
22. Riediger H, Adam U, Fischer E, Keck T, Pfeffer F, Hopt UT, Makowiec F. Long-term outcome after resection for chronic pancreatitis in 224 patients. *J Gastrointest Surg* 2007;11(8):949-5.
23. Yang CJ, Bliss LA, Freedman SD, Sheth S, Vollmer CM, Ng SC, et al. Surgery for chronic pancreatitis: the role of early surgery in pain management. *Pancreas* 2015 Jul; 44:819-23.
24. M.A. Kempeneers, Y. Issa, U. Ahmed Ali, R.D. Baron, M.G. Besselink, M. Büchler, M. Erkan, C. Fernandez-Del Castillo, S. Isaji, J. Izbicki, J. Kleeff, J. Laukkarinen, et al Consensus Guidelines for Chronic Pancreatitis International consensus guidelines for surgery and the timing of intervention in chronic pancreatitis 2019 Dec 17.
25. Ahmed Ali U, Nieuwenhuijs VB, van Eijck CH, Gooszen HG, van Dam RM, Busch OR, et al.; Dutch Pancreatitis Study Group. Clinical outcome in relation to timing of surgery in chronic pancreatitis: a nomogram to predict pain relief. *Arch Surg*. 2012 Oct; 147(10):925-3.
26. Y Issa, MA Kempeneers, P Fockens, U Ahmed Ali, MG Besselink, TL Bollen, CH Dejong, P van Duijvendijk, HM van JE van Hooft, Y Keulemans, VB Nieuwenhuijs, AC Poen et al, Early surgery versus current step-up practice for chronic pancreatitis: a multicenter randomized controlled trial: Academic Medical Center, Amsterdam *JAMA*, 2020, 323(3), 237-24.
27. Beger HG, Schlosser W, Friess HM, Buchler MW. Duodenum-preserving head resection in chronic pancreatitis changes the natural course of the disease:

DOI: 10.69605/ijlbr_14.12.2025.69

- a single- center 26-year experience. *Ann Surg* 1999;23.
28. Brazier JE, Harper R, Jones NM, et al. Validating the SF-36 health survey questionnaire: new outcome measure for primary care. *BMJ*. 1992;305 (6846):160-164.
29. Cahen DL, Gouma DJ, Laramée P, et al. Long-term outcomes of endoscopic vs surgical drainage of the pancreatic duct in patients with chronic pancreatitis. *Gastroenterology* 2011; 141:1690–5.