Original Research

A PROSPECTIVE OBSERVATIONAL STUDY SURGICAL MANAGEMENT & OUTCOME OF LATERAL PANCREATICOJEJUNOSTOMY IN CASES OF CHRONIC CALCIFIC PANCREATITIS

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ABSTRACT

Background: Chronic pancreatitis is characterized by progressive pancreatic fibrosis and loss of endocrine and exocrine function. The aetiology of pain in chronic pancreatitis is unclear. It often precedes any loss of endocrine or exocrine function and any radiographically demonstrable changes in the pancreas.

Aim: The primary aim of therapy is the achievement of primary pain relief and an improvement in quality of life. To analyse the efficacy & outcome of the extended drainage procedure. Technical feasibility, safety & effectivity of lateral pancreaticojejunostomy (LPJ) in selected patients

Methods: Patients with chronic pancreatitis including all age groups from our tertiary care institution will be screened and selected to undergo LPJ. After obtaining valid written informed consent they will undergo surgical procedure according to the inclusion and exclusion criteria. Patients will be followed up post operatively for 6 months and the results will be evaluated and analyzed statistically.

Findings: Excellent results can be expected if appropriate choice of procedure with adequate drainage is achieved during the surgical procedure

Conclusion: About seventy one percent patients had significant remission of their pain with improvement in weight gain after LPJ. Among the various approaches, Laparoscopic LPJ is relatively more effective than open procedure in the immediate postoperative period in terms of less pain, early mobilisation and faster return to daily activities.

Keywords: Surgical Management, Lateral Pancreaticojejunostomy, Chronic Calcific Pancreatitis.

INTRODUCTION

Chronic pancreatitis (CP) is characterized by progressive pancreatic fibrosis and a concurrent decline in both endocrine and exocrine physiological Functions. Structurally, the pancreas is a composite gland where eighty percent of the volume comprises serous acinar cells responsible for exocrine activity. In contrast, the endocrine component is much smaller, with the islets of Langerhans constituting only 2% of the structure, while connective tissue and neurovascular structures make up the remainder.

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Although the disease process is benign in itself, the associated complications can be excruciating and unmanageable, causing major distress and negatively impacting the patient's quality of life. Persistent inflammatory pancreatitis is often described as an irreversible pathological alteration that leads to permanent impairment and severe abdominal pain [1]. The global burden is significant, with 2 to 200 cases reported for every 1,000,000 people worldwide. Notably, India records the highest incidence globally, with estimates ranging between 114 and 200 cases per 1,000,000 people.

A specific subtype, calcific pancreatitis, is characterized by the deposition of calcium stones within the ducts and leads to chronic pain and malabsorption [2]. While this condition is relatively rare in the pediatric population, its profound impact on growth necessitates prompt and effective clinical intervention [3]. Consequently, early diagnosis and

management are critical to preserving quality of life in these younger patients [4]. In recent years, diagnostic capabilities have expanded, and endoscopic ultrasound (EUS) has become increasingly common in pediatric practice [5,6)]. EUS is now widely utilized for diagnosing complex pancreatobiliary disorders [7]. Compared to MRCP, EUS has demonstrated superior sensitivity in identifying radiolucent stones and anatomical variations, allowing for earlier assessment of the disease course [8].

Beyond diagnosis, EUS plays a significant therapeutic role in directing transmural drainage operations, such as cyst gastrostomies [9]. This is particularly valuable in children presenting with pancreatic pseudocysts or para-pancreatic fluid collections [10]. Single-center series regarding these interventions have been published, showing promising outcomes and comparatively few complications [11]. Similarly, ERCP is viewed as a crucial diagnostic tool for obtaining precise pancreatograms to evaluate etiology [12]. Pancreatitis remains a common indication for ERCP in children [13]. Tertiary centers have published promising data on the use of adult scopes for young children, achieving high cannulation success rates [14].

Pathophysiologically, pancreatic fibrosis (PF) is a key factor in the development of chronic pancreatitis and is present in the majority of pancreatic disorders. Recent investigations have explored the correlation between fibrosis grades and serum markers, noting a positive correlation between intralobular fibrosis and blood fibronectin levels [15]. Clinically, nonoperative management typically involves oral analgesics, insulin for diabetes control, and enzyme replacement. However, when medical management fails, lateral pancreaticojejunostomy (LPJ) is often employed to treat severe pain and dilated pancreatic ducts. The most common procedure in pediatric cases is the modified Puestow procedure, a variation of retrograde pancreatic duct drainage [16]. Common indications for this surgery include pancreatic strictures, failed ERCP, and symptom persistence [17]. While surgical decompression aims to slow disease progression, issues such as anastomotic stricture have historically plagued treatment. Therefore, continuous evaluation of pain management outcomes in patients undergoing LPJ is essential [18].

This study was conducted to analyse the efficacy & outcome of the extended drainage procedure i.e. LPJ for treatment of chronic calcific pancreatitis. And to assess technical feasibility, safety & effectivity of LPJ in selected patients. The study also intended to assess Postoperative pain relief by procedure using universal pain assessment tools. The study also assessed the post procedural weight gain & quality of life as well as of Postoperative complications

MATERIALS AND METHODS

This prospective observational study was conducted at the Department of Surgery in a tertiary care hospital in Central India. The study spanned a period of 30 months, from June 2018 to December 2020. Ethical approval was obtained from the institutional ethical committee of GMC Nagpur prior to the commencement of the study. The study population comprised 34 patients diagnosed with chronic pancreatitis who were selected from the Outpatient Department (OPD). All participants provided written informed consent to participate in the study and undergo the surgical procedure. The cohort included patients of all gender and age groups who met the specific eligibility criteria for LPJ.

Patients were enrolled in the study based on a confirmed diagnosis of chronic pancreatitis established through clinical symptoms and morphological changes, such as calcifications or ductal alterations. Eligibility required the presence of pancreatic duct obstruction caused by stenosis, intraductal stones, or a combination of both, resulting in a ductal dilation of at least 7 mm proximal to the obstruction. This diagnosis was substantiated via Magnetic Resonance Cholangiopancreatography (MRCP), abdominal Computed Tomography (CT), or both. Furthermore, candidates must have exhibited severe, recurrent pancreatic pain that was either insufficiently managed by non-narcotic analgesics or required opiate therapy. The study also included patients presenting with anatomical anomalies, specifically annular pancreas or pancreas divisum, as well as those who had experienced failed endoscopic drainage procedures.

Conversely, patients were excluded from the study if they were deemed medically unfit for surgery or presented with specific contraindications. Exclusion criteria encompassed the presence of an inflammatory pancreatic head mass exceeding 4 cm, a history of prior pancreatic surgery or gastrectomy, and confirmed or suspected pancreatic cancer. Additionally, patients were ineligible if they were pregnant, had a life expectancy of less than two years, or suffered from significant comorbidities such as portal hypertension or acute pancreatitis. Any other general contraindications to endoscopic or surgical intervention also served as grounds for exclusion.

All eligible patients underwent LPJ. Pre-operative baseline data regarding demographics, pain scores, and pancreatic function were recorded. Post-operatively, patients were followed up for a duration of 6 months. Key outcome parameters evaluated included mean operative time, length of hospital stay, immediate post-operative pain relief, and post-operative complications. Long-term assessment focused on changes in pancreatic function and disease recurrence.

Data were collected using a structured proforma and entered into a central database. Statistical analysis was performed using standard statistical software (e.g., SPSS). Continuous variables, such as operative time and hospital stay, were expressed as means ± standard deviation (SD), while categorical variables were presented as frequencies and percentages. Pre- and post-operative comparisons were analyzed using appropriate significance tests, with a p-value of <0.05 considered statistically significant.

RESULTS AND DISCUSSION

The study included a total of 34 patients. The mean age of the study population was 34.73 ± 12.67 years, with the highest proportion of patients (26.47%) falling within the 31–40 age group. The gender distribution was nearly equal, with 52.94% females and 47.06% males. The mean weight of patients at presentation was 50.44 ± 10.98 kg. Regarding etiology and past history, Diabetes Mellitus was present in 44.12% of patients, followed by a history of alcohol intake in 38.24% and tobacco smoking in 35.29%. Pre-operatively, exocrine insufficiency was noted in 64.71% of patients, and 70.59% required pancreatic supplementation. The mean HbA1c was 6.05 ± 0.71%, and the mean Main Pancreatic Duct (MPD) diameter on imaging was 1.32 ± 0.32 cm.

Open procedures were performed in 19 patients (55.88%), while 15 patients (44.12%) underwent laparoscopic procedures. Among the laparoscopic cases, conversion to an open procedure was required in 3 patients (8.82%). Intraoperative complications were observed in a minority of cases, with blood loss and difficulty in locating the main pancreatic duct each occurring in 8.82% of patients. Other findings included atrophied pancreatic parenchyma (8.82%), pancreatic head mass (5.88%), and single incidences of cocooned abdomen, parenchymal calcifications, and middle colic vascular injury.

The overall discharge rate was 97.06%, with one mortality (2.94%) recorded. The mean time for drain removal was 5.97 ± 2.56 days. As shown in **Figure 1**, the highest frequency of drain removal occurred between days 5 and 6 post-operation.

Pain management showed significant improvement throughout the study period. The mean pain score decreased from 6.91 ± 1.24 on admission to 2.44 one week after the operation. This downward trend continued with mean scores of 1.82 at discharge and 1.62 at the end of the follow-up period (**Figure 2**). By the end of the follow-up, only 29.42% of patients required analgesics, while 11.76% used them occasionally.

A comparison between laparoscopic and open procedures revealed no statistically significant differences in key perioperative parameters (**Table 2**). The mean operating time was 190.79 ± 27.70 minutes for the laparoscopic group compared to 199.00 ± 30.37 minutes for the open group (p = 0.4168). Similarly, there were no significant differences regarding major complications (p = 0.2), minor complications (p = 0.475), mean ICU stay (p = 0.4848), or the need for reoperation (p = 0.18).

Post-operative follow-up indicated a significant improvement in nutritional status (**Table 3**). Patients experienced a statistically significant mean weight gain of 0.94 ± 0.77 kg at 1 month and 3.44 ± 1.89 kg at 3 months compared to their baseline pre-operative weight (p < 0.001 for both intervals).

DISCUSSION

At our centre the mean preoperative universal pain assessment score (UPAS) was 6.91 on admission. While after one week postoperatively Mean UPAS was 2.44 & 1.82 at the time of discharge. On follow up at 3 months, the mean UPAS among the patients was 1.52. However, at the follow up & end of follow up mean UPAS remained consistent with a value of 1.52. Thus, there was a significant remission in pain postoperatively in the patients who had undergone LPJ with patients experiencing Complete or partial pain relief was achieved at the end of follow-up in 70.58 % of patients at our centre. In the study of Cahen et al of Endoscopic versus surgical drainage of pancreatic duct in chronic pancreatitis, the mean pain score was 25±15 in the surgery group. After adjustment for baseline scores, the mean difference was 24 (11 to 36; P<0.001).

Moreover, after surgical drainage, pain relief was immediate and was consistent during the follow-up period. Complete or partial pain relief was achieved at the end of follow-up in 75% of patients (P = 0.007). In our experience at our centre, 41.17% patients had the requirement of pancreatic enzyme supplementations & 44.12% patients had requirement of antihyperglycemic drugs at follow up. The observed mean weight gain in Kgs after 1 month in the postoperative phase was 0.94 Kgs & 3.44 Kgs after 3 months after the surgery.

Both LPJ and LPG demonstrated effective pain relief in pediatric calcific pancreatitis, with comparable postoperative VAS scores (LPJ: 1.5±0.6 vs LPG: 1.4±0.5, p=0.682). LPG showed fewer complications (15.4% vs 30.8%, p=0.042), particularly reduced wound infections (7.7% vs 23.1%). Both LPJ and LPG effectively relieve pain in pediatric calcific pancreatitis with similar recurrence rates. However, LPG offers advantages with fewer complications, particularly wound infections, and comparable operative times and hospital stays. LPG may be preferred due to its superior safety profile [19].

The majority of the 17 patients were in the 20–35 age range, with an average age of 33.4 (±9.6) years. There were more male patients than female patients (67% vs. 33%). Significant clinical manifestations include fever (40%), steatorrhea (40%), diarrhea

(33.3%), shortness of breath (26.7%), upper abdominal pain (100%), nausea/vomiting (73.3%), history of weight loss (60%), and exhaustion (5.3%). Results were good for 73.3% of patients and poor for 26.7% of patients. Of all, 26.7% had a higher VAS score at discharge but dropped to a VAS score of 0 or 2 at 1 month (6.7%) and 3 months (6.7%) follow-up, while 40% had a VAS score of 0 at discharge but increased at 1 month (53.3%) and 3 months (73.3%) follow-up. Prior to and following the LPJ procedure, the mean pain score was 8.26±1.27 and 1.7±1.66, respectively, with statistical significance ($p<0.001$). Following LPJ, 73% of patients experienced good pain outcomes. Following LPJ, there was a noticeable decrease in pain symptoms. It is advised that more extensive research be done to confirm these results [20].

There were 19 retrospective studies in total. Following minimally invasive LPJ, the morbidity rate ranged from 0% to 57%, while following open LPJ, it ranged from 4% to 68% (median: 25, i.q.r.: 23). The length of hospital stay varied from 6 to 16 days following open LPJ and from 5 to 7 days following minimally invasive LPJ. Following open LPJ, the rate of pain relief was 62% to 91% (median: 78.5, i.q.r.: 23), and following minimally invasive LPJ, it was 71% to 100% (median: 82.5, i.q.r.: 12.5). After open LPJ, new-onset endocrine insufficiency ranged from 19% to 26%, while in minimally invasive LPJ, it ranged from 21% to 22%. Compared to 8% to 26% following open LPJ, 11% to 27% of patients with minimally invasive LPJ had new-onset exocrine insufficiency. Following minimally invasive LPJ, weight gain ranged from 60% to 100% (median: 97, i.q.r.: 23) [21].

CONCLUSION

This study establishes lateral pancreaticojejunostomy (LPJ) as a safe and highly effective intervention for chronic calcific pancreatitis, offering significant long-term pain relief and marked improvement in nutritional status. Our findings demonstrate that surgical decompression leads to substantial weight gain and a drastic reduction in analgesic dependence, with the majority of patients experiencing pain remission. While the laparoscopic approach demands a higher technical skill set, it demonstrates safety and long-term efficacy comparable to the open procedure, with no statistically significant difference in operative time or complication rates. Consequently, early surgical intervention should be the recommended standard of care for eligible patients to arrest disease progression, restore quality of life, and minimize the morbidity associated with chronic pain.

Conflict of interest: Authors declare that they have no conflict of interest.

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Table 1: General Characteristics of Study Subjects

Characteristics		**Findings (N=34)**
Age group N (%)	</=10	1 (2.94)
	11-20	4 (11.76)
	21-30	8 (23.53)
	31-40	9 (26.47)
	41-50	8 (23.53)
	>/=50	4 (11.76)
Age (mean ± S.D.)		34.73 ± 12.67
Gender (N (%)	Male	16 (47.06)
	female	18 (52.94)
Pancreatic supplementation before surgery	Required	24 (70.59)
	Not required	10 (29.41)
Weight (Kg) Mean S.D.		50.44 ± 10.98
Pain score		6.91 ± 1.24

Serum amylase (IU/L)		73.26 (32.68)
Serum Lipase (IU/L)		164.29 87.89
MPD diameter on CECT/MRCP (cm)		1.32 ± 0.32
HbA1c (%)		6.05 ± 0.71
Exocrine insufficiency		22 (64.71)
Past history	Diabetes Mellitus	15 (44.12)
	Alcohol intake	13 (38.24)
	Tobacco smoking	12 (35.29)
	Jaundice	4 (11.76)
Surgical approach used	Coeliac plexus block F/B open procedure	2 (5.88)
	Laparoscopic converted to open procedure	3 (8.82)
	Open procedure	14 (41.18)
	Sutured laparoscopic procedure	15 (44.12
Type of surgical Procedure	Open procedure	19 (55.88)
	Laparoscopic procedure	15 (44.12)
Intraoperative complications	Atrophied pancreatic parenchyma	2 (8.82)
	Blood Loss	3 (8.82)
	Cocooned abdomen	1 (2.94)
	Difficulty in locating main pancreatic	2 (8.82)
	Pancreatic head mass	2 (5.88)
	Middle colic vascular injury	1 (2.94)
	Parenchymal calcifications	1 (2.94)
Need to convert to open procedure		3 (8.82)
Drain removal frequency		5.97 ± 2.56
Requirement of pancreatic enzymes		22 (64.71)
Requirement of analgesic at the end of follow up	Yes	10 (29.42
	Occasional	4 (11.76)
Outcome	Death	1 (2.94)
	Discharge	33 (97.06)

Table 2: Comparison of Key Parameters between Subjects who Underwent Laparoscopic and Open Procedure

	Laparoscopic (N=15)	**Open Procedure (N=19)**	**T/X^2**	**P Value**
Operating time	190.79 ± 27.70	199.00 ± 30.37	0.8226	0.4168
Major complications	8 (23.53)	6 (17.65)	1.6	0.2
Minor complication	9 (26.47)	5 (14.70)	3.927	0.0.475
ICU stay	0.47 ±0.74	0.68 ± 1.0	0.7009	0.4848
Reoperation needed	3 (20)	1 (5.26)	1.75	0.18

Table 3: Comparison of Mean Weight Gain at 1 Month and at 3 Months to that Pre-Op Weight

	At 1 Month*	**At 3 Months***	**P Value#**
Mean weight gain	0.94 ± 0.77	3.44 ± 1.89	<0.001
p value*	<0.001	<0.001	
t	7.12	10.61	

* Compared to baseline, #Comparison between 1 month and 3 months.

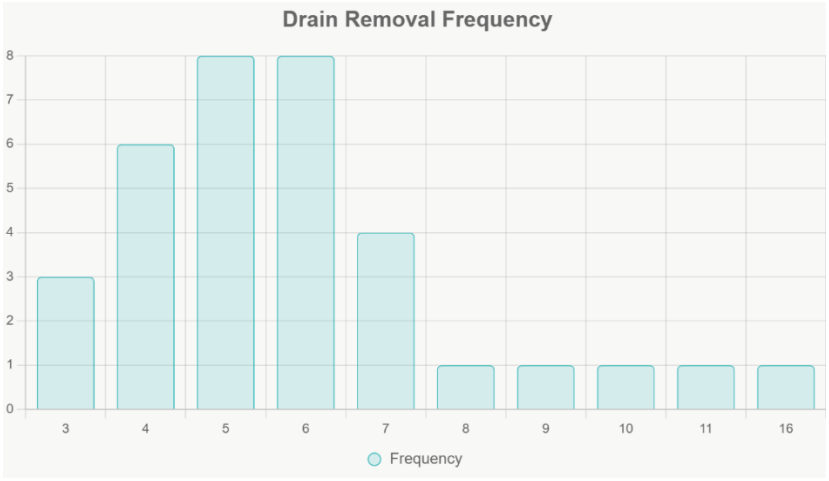

Fig 1: Drain Removal Frequency in Study Subjects

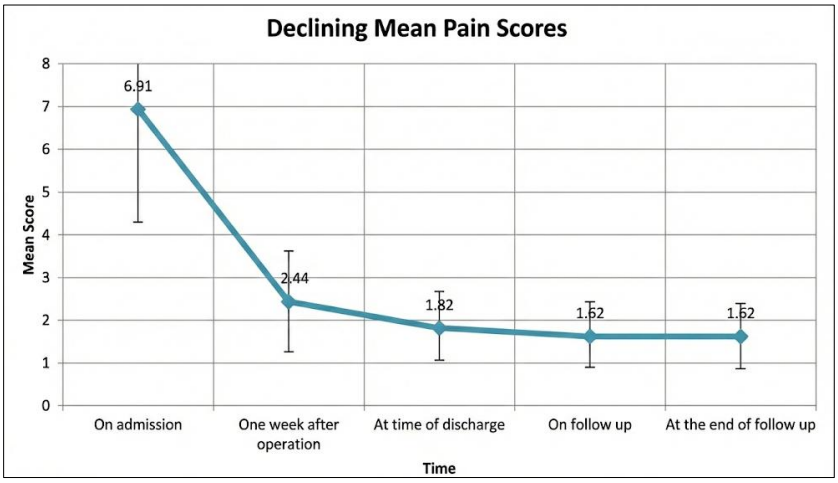

Fig 2: Decline in Mean Pain Score in Study Subjects

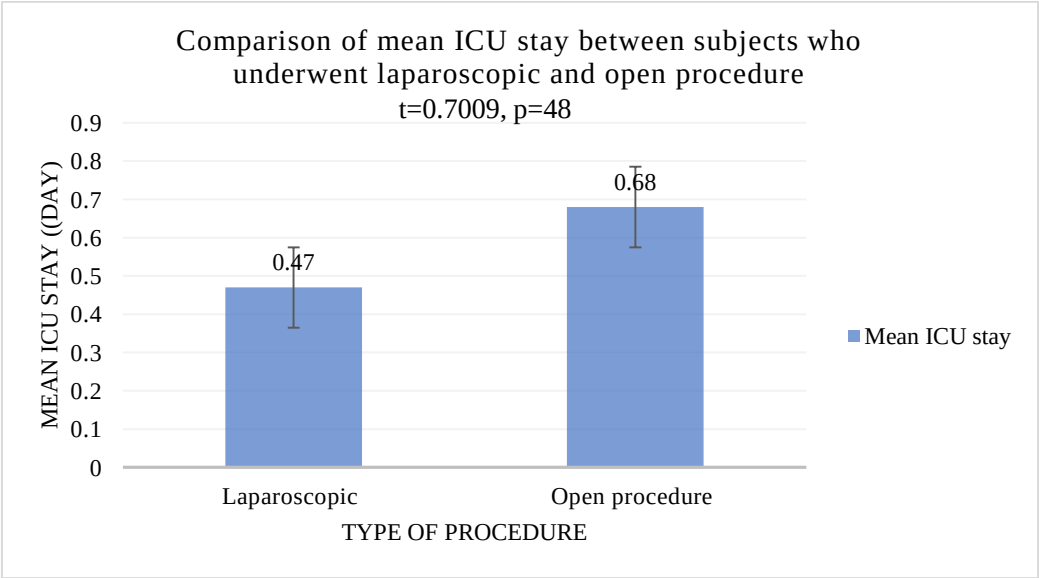

Fig 3: Comparison of Mean ICU Stay between Groups