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Blood Sugar Levels After Lateral Pancreaticojejunostomy and Frey's Procedure in Chronic Calcific Pancreatitis Patients

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Abstract

Aims and Objectives: To assess the blood glucose levels in chronic calcific pancreatitis patients pre and post Frey's procedure and lateral pancreatojejunostomy.

Method: A Prospective observational study conducted in Department of General Surgery to assess the blood glucose levels in chronic calcific pancreatitis patients pre and post Frey's procedure and lateral pancreaticojejunostomy. A total of 22 patients each for Frey's procedure and lateral pancreaticojejunostomy are selected after meticulous history taking, performing haematological investigations, CECT abdomen, MRCP findings and patients with non-diabetic status. HbA1c, FBS, PPBS levels is recorded before surgery and post-operatively at one week, one month and third month

Results: The total number of patients studied in this study were 44. 22 each for LPJ and FREY'S group of which the patients presenting with chronic pancreatitis were maximum in age group of 41-50 years.

In our study, mean postoperative FBS, PPBS and HbA1c scores for all patients were calculated and analysed with preoperative scores.

The trends in FBS and PPBS in the LPJ group showed a small spike in the early postoperative period and improved postoperatively at 3 months. The trends in Hba1C showed no much difference in the initial 3 months postoperatively.

The FBS and PPBS levels in the Frey's procedure group revealed a significant spike in the early postoperative period (p-value <0.5). The levels stayed well above the preoperative values over 3 months of

follow-up. postoperative HbA1c levels at three months revealed an increase.

Conclusion: Lateral pancreaticojejunostomy has got a minimal effect on the blood glucose levels of nondiabetic patients. Blood glucose levels showed slight spike in the early postoperative period and improved over 3 months of follow-up, reaching slightly below the preoperative values .

While Frey's procedure leads to the marginal deterioration of blood glucose levels over the 3 month of follow-up in nondiabetic patients. The blood glucose levels stayed well above the preoperative values over 3 months of follow-up.

Keywords: Chronic Pancreatitis , Frey's Procedure, Lateral, Pancreaticojejunostomy

Introduction

Chronic pancreatitis is defined as chronic inflammation with irreversible fibrosis and atrophy of pancreatic parenchyma and is commonly caused by alcohol consumption. Chronic pancreatitis associated with features of chronic pain, endocrine and exocrine insufficiency which affects between 3 to 10 per lakh persons. Up to 90 % CP patients develop calcifications of the pancreatic duct during long-term follow up. Endocrine insufficiency typically occurs late in the course of disease, often after exocrine insufficiency has appeared, and usually not before about 90% of the pancreatic parenchyma has been replaced by fibrosis.

Treatment option for chronic pancreatitis comprise endoscopic, interventional as well as surgical procedures. In up to 50%, endoscopic or interventional therapy approaches remain unsuccessful, necessitating surgical management in the course of disease

Lateral pancreaticojejunostomy involves creating a longitudinal incision along the pancreas while the main pancreatic duct is filleted open longitudinally from head of the organ to its tail. The duct and pancreas are then attached to a loop of the small intestine (pancreaticojejunostomy) in order to allow better drainage.

In Frey's procedure the anterior surface of pancreatic duct is opened and unroofed completely after all stones are extracted and head coring is done and a standard Roux-en-Y is used to create a lateral pancreaticojejunostomy.

The regulation of the beta-cell mass and the physiological incretin secretion are directly dependent on normal exocrine pancreatic function and fat hydrolysis. Drainage procedures improve the exocrine function and may favor the betterment of diabetic status and insulin use. During Whipple's or pylorus-preserving pancreaticoduodenectomy, the head of the pancreas is removed. Pancreatic tissue provides insulin, which is required for blood sugar control. Head resection removes about 40% of the pancreas. Pancreatic tissue provides insulin, which is required for blood sugar control. when pancreatic tissue is removed, the body release less insulin, and the risk of developing diabetes mellitus is high. Whether this resection leads to diabetes or worsening of diabetes is controversial.

Objectives of The Study

To assess the blood glucose levels in chronic calcific pancreatitis patients pre and post Frey's procedure and lateral pancreaticojejunostomy.

Materials & Methods

Sample size: Minimum 22 samples for frey's procedure and 22 samples for lateral pancreaticojejunostomy.

Duration of study: January 2024 to July 2024

Study design: Observational study

Sample size: Sample size was calculated based on a previous study in which it was found that there was

changes in the blood glucose levels after surgery, in present study considering changes in FBS mean+/-SD of 25+/-40 minimum sample size required for the present study was estimated to be 20 for each group. Considering 20% lost follow up sample size estimated to be 22 for each group.

The patients fulfilling the inclusion criteria were enrolled for the study after obtaining informed consent. Non diabetic Patients aged above 18yrs with chronic calcific pancreatitis are choosen for study. Symptomatic chronic pancreatitis patients with pancreatic ductal obstruction and a dilated main pancreatic duct will be chosen for lateral pancreaticojejunostomy and with "head dominant" disease chosen for Frey's procedure. Hba1c,FBS,PPBS levels is recorded before surgery and post-operatively at one week, one month and third month.

Follow up: All 44 patients were followed up for 3 months postoperatively with at least 2 outpatient follow-ups. long term follows up was obtained by a telephonic interview with the patients. Variables examined were fasting blood sugar(FBS), poatprandial blood sugar(PPBS) and Hba1c.

Inclusion Criteria

1. Patient willing to give informed consent to participate in study (annexure-1).
2. Patients of either gender aged above 18 years.
3. Patients diagnosed with chronic calcific pancreatitis with non-diabetic status.

Exclusion Criteria

1. Patient not willing to give informed consent.
2. Patients unfit for surgery.
3. Suspected malignancy

Statistical Analysis

Data was entered in MS Excel, coded and analyzed in statistical software SPSS 23. Data analysis included both Descriptive and Inferential statistics procedures.

Descriptive statistics were used to summarize quantitative variables with mean and standard deviation,

while frequency and percentages were used to summarize categorical (qualitative) variables.Inferential statistics included tests of significance and P values.

Significance of Mean difference of pre-operative and postoperative blood glucose levels within group were tested by Paired simple t test.

Paired t test was also used for assessing significance of difference in mean FBS,PPBS and Hba1c postoperatively till 3 months.

A P-value < 0.05 was considered statistically significant.

Observations & Results

Between January 2024 to July 2024, total 22 patients each with chronic pancreatitis meeting our inclusion criteria were taken up for Frey's procedure and lateral pancreaticojejunostomy.

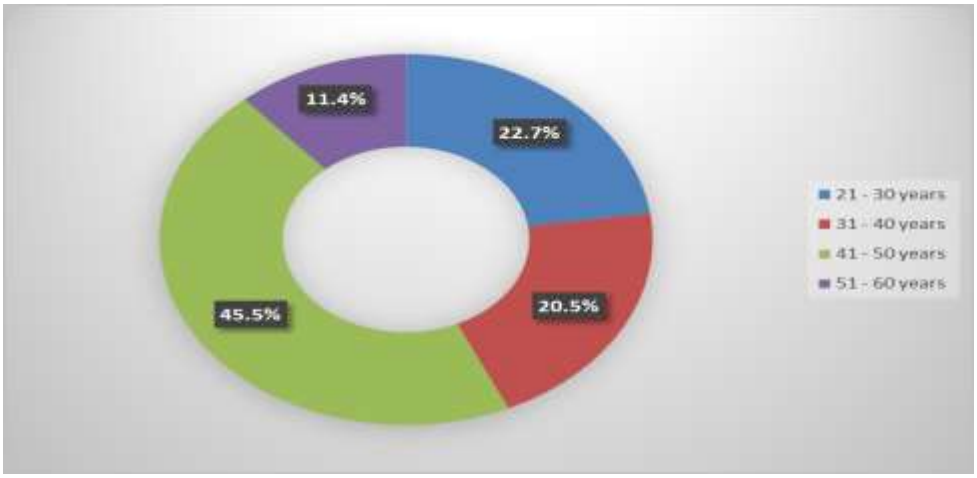
Mean Age & Age distribution

Age wise distribution revealed that most common age group affected were from 41-50 years age group accounting for 45.5% in 2 groups followed by 3rd and 4th decade in each group. Both groups were comparable regarding age, with a p-value of 0.958.

Table 1: Distribution of subjects according to age-group (years).

			Surgeries			
			Frey's(1)	LPJ(2)	Total	P-Value
Age Group	21-30 Years	Count	5	5	10	0.958
		%	22.7%	22.7%	22.7%	
	31-40 Years	Count	5	4	9	
		%	22.7%	18.2%	20.5%	
	41-50 Years	Count	10	10	20	
		%	45.5%	45.5%	45.5%	
	51-60 Years	Count	2	3	5	
		%	9.1%	13.6%	11.4%	
Total		Count	22	22	44	
		%	100.0%	100.0%	100.0%	

Figure 1: Age wise distribution.



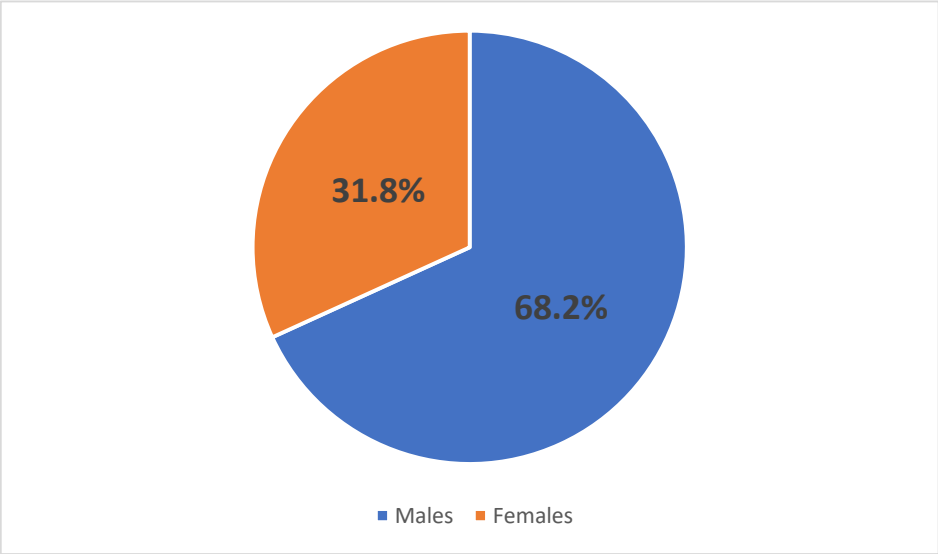
Gender distribution

Among the 22 LPJ patients, 15 were males and 7 were females. Frey's group comprised 15 males and 7 females. Both groups were comparable regarding sex, with a p-value of 1.

Table 2: Gender distribution.

			Frey's(1)	LPJ(2)	TOTAL	p-value
Sex	Males(1)	Count	15	15	30	1.0
		%	68.2%	68.2%	68.2%	
	Females(2)	Count	7	7	14	
		%	31.8%	31.8%	31.8%	
Total			Surgeries			
		%	100.0%	100.0%	100.0%	

Figure 2: Gender wise distribution.



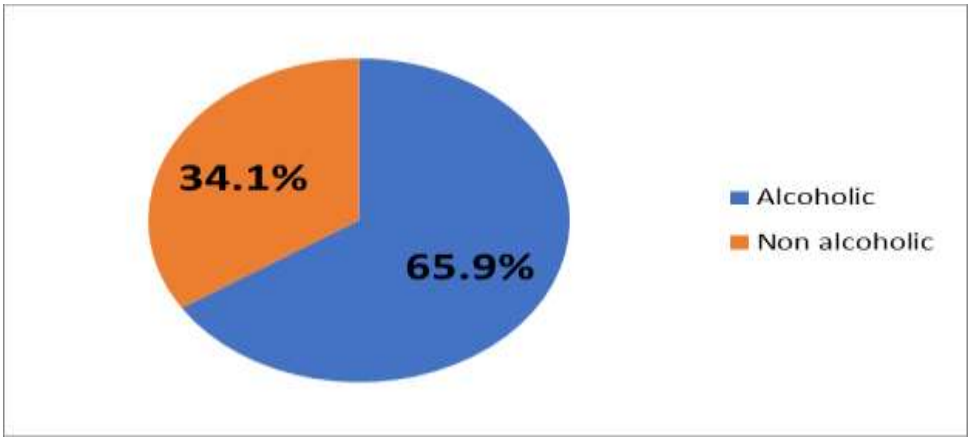
Distribution of subjects according to habit of alcohol intake

Table 3: Distribution of subjects according to habit of alcohol intake

			Surgeries			
			Frey's(1)	LPJ(2)	Total	P-Value
Alcohol Intake	Yes(1)	Count	15	14	29	0.750
		%	68.2%	63.6%	65.9%	
	No(2)	Count	7	8	15	
		%	31.8%	36.4%	34.1%	
Total		Count	22	22	44	
		%	100.0%	100.0%	100.0%	

Alcohol addiction was among 63.6% and 68.2% of patients in the LPJ group and Frey's group respectively. both groups were comparable as there was no statically difference in alcohol addiction (p-value 0.750)

Figure 3: Distribution of subjects according habit of alcohol intake.



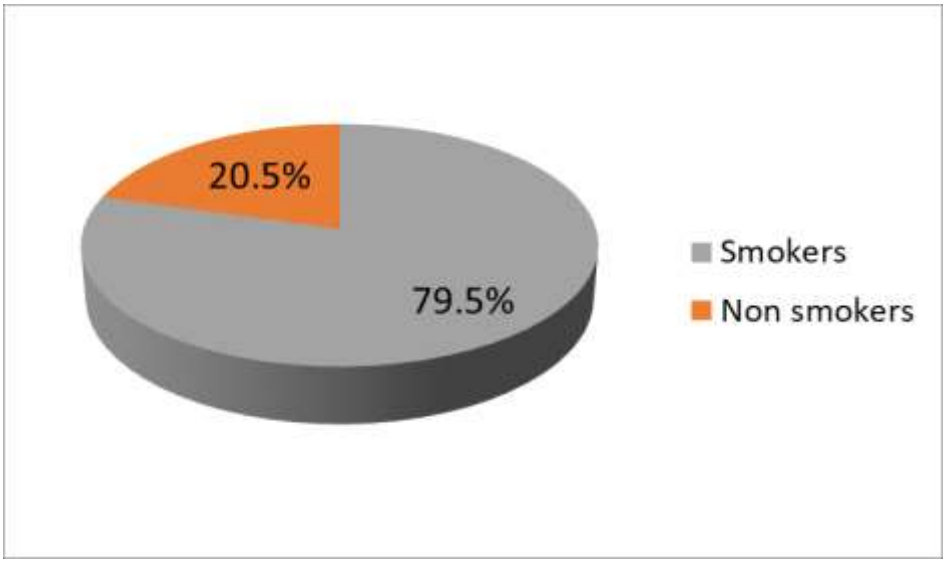
Distribution of subjects according to habit of tobacco smoking

Table 4: Distribution of subjects according to habit of tobacco smoking

			Surgeries			
			Frey's(1)	LPJ(2)	Total	P-Value
Smoking	Yes(1)	Count	17	18	35	0.709
		%	77.3%	81.8%	79.5%	
	No(2)	Count	5	4	9	
		%	22.7%	18.2%	20.5%	
Total		Count	22	22	44	
		%	100.0%	100.0%	100.0%	

Tobbacco smoking was among 81.8% and 77.3% of patients in the LPJ group and Frey's group respectively. both groups were comparable as there was no stastical difference in tobacco smoking (p-value 0.709)

Figure 4: Distribution of subjects according to habit of tobacco smoking



Discussion

This study was focused to assess blood glucose levels following lateral pancreaticojejunostomy and frey's procedure in chronic calcific pancreatitis patients.

Both procedure is similar but differ in amount of pancreatic tissue removed and indication.

Lateral pancreaticojejunostomy commonly used for disease characterized by a diffusely dilated main pancreatic duct with no significant biliary obstruction and no mass in the pancreatic head.

Frey's procedure is considered for the patients with pancreatic duct obstruction at the pancreatic head and pancreatic tail as well as small inflammatory masses at the pancreatic head.

Frey's procedure removes a variable amount of pancreatic tissue amounting to almost 20-25 %, while LPJ focuses on ductal decompression through ductal deroofing. We included 22 chronic calcific pancreatitis patients with nondiabetic status per Frey's group and LPJ group. FBS, PPBS and HbA1c assessed postoperatively and compared with preoperative levels.

Patients were comparable with respect to age, sex, alcohol addiction and tobacco smoking in the two groups. preoperative mean FBS, PPBS and HbA1c were also comparable in both groups.

The trends in FBS and PPBS in the LPJ group showed a small spike in the early postoperative period and improved postoperatively at 3 months. This may be attributed to the improved drainage, reduction in ductal Hypertension and possible incretin play postoperatively in LPJ. The trends in Hba1C showed no much difference in the initial 3 months postoperatively in LPJ group. The FBS and PPBS levels in the Frey's procedure group revealed a significant spike in the early postoperative period (p-value <0.5). The levels stayed well above the preoperative values over 3 months of follow-up. A trend of regaining the endocrine function was found but not going below the preoperative levels over 3 months and needed a longer duration of follow-up, which was beyond the scope of this study.

postoperative HbA1c levels at three months revealed an increase, which can be attributed to the minor but significant loss of pancreatic tissue from the head.

Classically, it was proved that the drainage procedures do not alter the diabetic status either in the early postoperative or late follow-up stages . Distal pancreatectomy will compromise the endocrine function without affecting the exocrine functions at an earlier stage, and proximal pancreatectomy precipitates exocrine but not endocrine insufficiency . The difference is attributable in part to the relative preponderance of islet cells in the body and tail of the pancreas.

Among the 14 LPJ patients, nine were males and five were females. The Frey's group comprised eight males and five females. Both groups were comparable regarding sex, with a p-value of 0.883. . The mean preoperative FBS in the Frey's procedure group was 122.46 mg/dl, with seven out of 13 being known as diabetic.

The trends in FBS values in the LPJ group showed a small spike in the early postoperative period (two weeks) with a p-value of >0.05, and later on, it improved over 18 months of follow-up, reaching below the preoperative values (mean 109.38)

On the contrary, the FBS levels in the Frey's procedure group revealed a significant spike in the early postoperative period (two weeks), with a mean sugar value of 148 mg/dl and a p-value of 0.01. The levels stayed well above the preoperative values over 18 months of follow-up. The trends in HbA1c showed marginal improvement in the LPJ group over a six-month follow-up period (p-value 0.008) from the preoperative levels. In Frey's procedure group, postoperative HbA1c levels at three months revealed an increase.

The impact of pancreatic head resection on blood glucose homeostasis in patients with chronic pancreatitis. included 43 patients for pancreatic head resection surgery. 6 patients in the normoglycaemia group were preoperatively characterized by a normal median fasting glucose of f 5.25 mmol/L and a median HbA1c of 5.2%. Three and 12 months after surgery, neither fasting glucose levels ($p = 0.36$) nor HbA1c ($p = 0.64$) changed significantly compared to preoperative levels. Out of the six patients in this group, two subjects developed IGT and one subject developed DM 12 months after surgery.

Reflecting on earlier experiences, the exocrine function remains unchanged by drainage procedures (LPJ), with

there being neither deterioration nor significant improvement . Contrary to the earlier belief that procedures in the head of the pancreas do not affect the endocrine function , patients in the Frey's procedure group showed a statistically significant worsening of FBS and PPBS in the early postoperative period and continued to be worse over 3 months of follow-up. Their HbA1c levels also corresponded to the observation. This may be attributed to the worsened exocrine function post-Frey's procedure influencing the glycemic control of the patient.

Conclusion

Lateral pancreaticojejunostomy has got a minimal effect on the blood glucose levels of nondiabetic patients. Blood glucose levels showed slight spike in the early postoperative period and improved over 3 months of follow-up, reaching slightly below the preoperative values. It may be attributed to the reduction in ductal hypertension and the role of incretin. Leading to improvement in exocrine function which in turn increases endocrine function of pancreas.

While Frey's procedure leads to the marginal deterioration of blood glucose levels over the 3 month of follow-up in nondiabetic patients. The blood glucose levels stayed well above the preoperative values over 3 months of follow-up. A trend of regaining the endocrine function was found but not going below the preoperative levels over 3 months of follow up. which can be attributed to the minor but significant loss of pancreatic tissue from the head

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