

## Original Research Article

# Frey's procedure: short term follow up results in terms of pain, endocrine and exocrine status, a tertiary care centre experience

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### ABSTRACT

**Background:** Chronic pancreatitis, a debilitating disease which affects the patient to an extent to render him bedridden sometimes and often make him/her unable to perform daily work, leading to poor quality of life, severe emotional stress and financial burden. Frey's procedure one of the most commonly performed surgery in patient of chronic pancreatitis with stones in pancreatic duct and small inflammatory head mass. This procedure had shown promising results in terms of pain control with unclear outcome with respect to exocrine and endocrine status.

**Methods:** Study was conducted in Government Kilpauk Medical College, Chennai during March 2016 to December 2019. Total 21 patients were followed up for 18 months and Post-operative pain was analysed using pain scoring system used by Bloechle et al. Exocrine status in terms of diarrhea, bloating sensation and Fecal Elastase level (preoperative and postoperative) were analysed. Patient glycaemic status were also analysed and compared. Patient Nutritional status was analysed in terms of weight gain.

**Results:** In this study there was significant improvement in pain after surgery in terms of VAS pain Score (Preop Mean-82.14, Post-op Mean- 9.76,  $p<0.001$ ), frequency of pain (Preop Mean-78.57, Post-op Mean- 14.29,  $p<0.001$ ), analgesia required (Preop Mean-15, Post-op Mean- 3.10,  $p<0.001$ ), and inability to work due to pain (Preop Mean-80.95, Post-op Mean- 11.90,  $p<0.001$ ). Overall total Pain score was significantly improved after surgery (Preop Mean-256.67, Post-op Mean- 39.05,  $p<0.001$ ). There was significant weight gain and significant improvement in Fecal Elastase level in patients following surgery, however there was no significant difference in pancreatic exocrine status on the basis of symptoms.

**Conclusions:** Frey's procedure is very effective in pain control in properly selected patients of chronic calcific pancreatitis, and it also improves nutritional status of patient. Frey's procedure might improve patient exocrine and endocrine status but further multicentre studies are needed to come to a conclusion.

**Keywords:** Chronic pancreatitis, Frey's procedure, Fecal elastase

### INTRODUCTION

Chronic Pancreatitis is an inflammatory process which is progressive and destructive disease and usually ends in total destruction of pancreas resulting in malabsorption, diabetes mellitus and severe debilitating pain.<sup>1</sup>

The course of CP is characterized by recurrent episodes of upper abdominal pain, which represents the most

common indication for endoscopic and surgical intervention.<sup>2</sup>

Patients who undergo surgery as their initial treatment for chronic pancreatitis require less consecutive interventions, a shorter hospital stay, and have a better quality of life compared with any other treatment. Surgery should therefore be considered early for the treatment of chronic pancreatitis, when endoscopic or

conservative treatment fails and patients require further intervention.<sup>3</sup>

Many Surgical techniques have been described and researched, however Frey's procedure is one of the most commonly performed surgery in chronic calcific pancreatitis. Frey's procedure is a modification of Partington-Rochelle procedure, in which resection of most of the pancreatic head done while preserving the duodenum.<sup>4</sup>

Post-operative exocrine and endocrine insufficiency has been reported following pancreatic resection surgeries.

Postoperative pancreatic function is determined by type of resection, the underlying disease and preoperative pancreatic function. Standard treatment following major pancreatic surgery includes the administration of pancreatic enzyme. Most patients also develop diabetes mellitus, which requires insulin substitution.<sup>5</sup>

However, there are reports suggesting a good number of patients do not develop exocrine and endocrine pancreatic function deterioration after Frey's procedure. Patient's overall quality of life increases considerably after Frey's procedure. Relief of symptoms, especially of pain, fatigue, and loss of body weight, accounted for improvement of the physical status, working ability, and emotional and social functioning. Favourable results usually reflected by the fact that occupational rehabilitation achieves in a good number of patients. Many patients with chronic pancreatitis of alcoholic origin discontinue alcohol drinking.<sup>6</sup> This study was conducted to observe the Frey's procedure outcome in form of pain relief and also how it affects exocrine and endocrine insufficiency

## METHODS

This study was designed as prospective study, conducted during March 2016 to December 2019 in patients of Chronic Calcific pancreatitis presented in Government Kilpauk Medical college Hospital who met the inclusion criteria and who consented to take part in the study.

### Inclusion Criteria

- Intractable Pain
- Main duct Disease
- Ductal Dilatation > 7 mm
- Small Inflammatory mass in head of pancreas

### Exclusion Criteria

- Deformed Duodenum
- Suspected Malignancy
- Inflammatory mass involving whole head and uncinated process of pancreas
- Severe changes in entire pancreas

## Standardization

Surgical procedure involved Opening of MPD in entire length, removal of calculi and enucleation of the diseased pancreatic head and uncinata process in contiguity with strictured segment of duct of Wirsung.

Rim of pancreatic head close to duodenum was spared along with posterior parenchyma, with or without excising both duct of Wirsung and Santorini.

Lateral pancreaticojejunostomy done using Vicryl 2-0.

## Outcome parameters

### Pain score

Pain score model (Table 1) which was mentioned in the study performed by Bloechle et al was used with few modifications.<sup>7</sup>

**Table 1: Pain score model.**

Frequency of pain	Points
Daily	100
Several times a week	75
Several times a month	50
Several times a year	25
None	0
Analgesics Medication	Points
Morphine	100
Buprenorphine	80
Pethidine	20
Tramadol	15
Paracetamol	5
Disease related inability to work	Points
Permanent	100
<1 year	75
<1 months	50
<1 week	25
No inability in last year	0

### Weight gain

### Endocrine insufficiency

- Newly diagnosed DM after the procedure
- Glucose Metabolism improved or deteriorated (Known DM) after surgery

### Exocrine insufficiency

- Diarrhoea (Table 2)
- Bloating Sensation (Table 2)
- Pre-operative elastase
- Post-operative elastase

**Table 2: Scoring system for diarrhoea and bloating sensation.**

Frequency	Points
Daily	100
Several times a week	75
Several times a month	50
Several times a year	25
None	0

**Statistical analysis**

All cases were followed up for 18 months and results were expressed as mean and standard deviation for continuous data and frequency as number and percentage. Paired t test was used to compare mean levels between Preoperative and post-operative scores. Pearson correlation test to check two continuous normally distributed variables exhibit linear correlation. Categorical data was analysed by Chi square test. Confidence interval of 95 % and p value of 0.05 or less was considered for statistical significance.

**RESULTS****Pain**

In this study there was significant improvement in pain after surgery in terms of VAS pain Score, frequency of pain, analgesia required, and inability to work due to pain (Table 3).

**Table 3: Comparison of preoperative and postoperative VAS pain score, frequency of pain, analgesia required, and inability to work.**

	Pre-operative (Mean)	Post-operative (Mean)	p value
VAS	82.14	9.76	<0.001
Frequency of pain	78.57	14.29	<0.001
Analgesia requirement	15	3.10	<0.001
Inability to work	80.95	11.90	<0.001
Overall Pain score	256.67	39.05	<0.001

**Table 4: Comparison of preoperative and postoperative weight (in kgs).**

Weight	Mean	Std. deviation	p value
Pre-operative	49.90	7.307	0.041
Post-operative	51.76	6.220	

**Weight gain**

Most of the patient showed good nutritional improvement and significant weight gain (Table 4) following surgery.

**Diarrhoea**

Five patients had increase frequency of passing stool in preoperative period, out of which two patients showed improvement in post-operative period but four new patients developed increase frequency of bowel movement in post-operative period. There was slight increase in diarrhoea symptoms score in post-operative patients. However there was no statistically significant difference (Table 5).

**Table 5: Comparison of preoperative and postoperative diarrhoea.**

Diarrhea	Mean	Std. deviation	p value
Pre-operative	8.33	16.457	0.771
Post-operative	9.52	14.740	

**Bloating**

Six patients had increase bloating sensation in preoperative period, out of which one patient showed improvement in post-operative period but three new patients developed bloating symptoms in post-operative period.

There was slight increase in bloating symptom score in post-operative patients, however there was no statistically significant difference (Table 6).

**Table 6 : Comparison of preoperative and postoperative bloating sensation.**

Bloating	Mean	Std. deviation	p value
Pre-operative	9.52	3.650	0.540
Post-operative	11.90	3.708	

**Fecal elastase level**

Most of the patients were suffering from exocrine sufficiency. Mean Preoperative fecal elastase level was 161.85 mcg/gm and Postoperative fecal elastase level was 174.33 and the difference was statistically significant (Table 7).

Change in Fecal elastase level (Mean = -12.47) was more significant when duration of disease (Mean= 5.76) was more, which was significant according to Pearson Correlation test (Table 8).

**Table 7: Comparison of preoperative and postoperative fecal elastase level.**

Fecal elastase	Mean	Std. deviation	p value
Pre-operative	161.85	50.768	<0.001
Post-operative	174.33	39.74	

**Table 8 : Relation of change in fecal elastase level with duration of disease.**

Correlations			
		Duration	Change
Duration	Pearson Correlation	1	-0.792**
	Sig. (2-tailed)		0.000
Change	Pearson Correlation	-0.792**	1
	Sig. (2-tailed)	0.000	

\*\* . Correlation is significant at the 0.01 level (2-tailed).

### Glycaemic status

Nine patients (45%) patients were on Insulin in preoperative status and out of which one (11%) patient showed improvement in glycaemic status and was off insulin. However out of remaining twelve patients two (18%) new patients developed DM during follow up. The difference was statistically significant (Table 9), but the sample size is low to come to a conclusion.

**Table 9: Comparison of preoperative and postoperative glycaemic status.**

		Post op DM		Total
		N	Y	
Pre op DM	N	10	2	12
	Y	1	8	9
Total		11	10	21
p value (Chi square)		0.001		

## DISCUSSION

Chronic pancreatitis is a pathologic fibro-inflammatory syndrome of the pancreas in individuals with genetic, environmental and other risk factors who develop persistent pathologic responses to parenchymal injury or stress. In addition, Common features of established and advanced CP include pancreatic atrophy, fibrosis, pain syndromes, duct distortion and strictures, calcifications, pancreatic exocrine dysfunction, pancreatic endocrine dysfunction and dysplasia. This definition recognizes the complex nature of CP, separates risk factors from disease activity markers and disease endpoints, and allows for a rational approach to early diagnosis, classification and prognosis.<sup>8</sup>

Pain, symptoms related to exocrine pancreatic sufficiency, i.e., intestinal bloating, steatorrhea, diarrhoea, and weight loss, and complications due to endocrine pancreatic insufficiency are the characteristic features of chronic pancreatitis.<sup>9</sup>

In spite of intensive research there is still no specific therapy for CP. Medical pharmacologic treatment is the basis of therapy in CP and aims at pain relief and treatment of exocrine and endocrine insufficiency. However, many patients require additional therapy for effective pain relief or treatment of local complications. Whereas a lot of these patients undergo repetitive endoscopic interventions, surgical drainage results in better long-term outcome. In patients with an inflammatory mass of the pancreatic head, surgical resection procedures provide good short and long-term results, especially in terms of pain relief. The vast majority of patients present with a ductal obstruction located in the pancreatic head, frequently associated with an inflammatory mass. In these patients pancreatic head resection is the procedure of choice. The duodenum-preserving pancreatic head resections and its variants (Beger-procedure, Frey-procedure, and Bern-procedure) represent less invasive, organ-sparing techniques with good long term results. Frey et al. developed a modification of DPPHR which represents a hybrid technique between the Beger- and Partington-Rochelle procedures. Compared to the Beger-procedure the resection in the pancreatic head in the Frey-modification is smaller and combined with a laterolateral pancreaticojejunostomy to drain the entire pancreatic duct towards the tail. In contrast to the Beger-procedure reconstruction can be performed with one single anastomosis. This procedure is not suitable in patients with a large inflammatory mass in the pancreas without stenosis of the left sided pancreatic duct, as often observed in the European series. However, it appears advantageous in patients with less severe inflammation in the head combined with an obstruction in the left sided pancreatic duct.<sup>10</sup>

Nutrition, exocrine and endocrine functions are important elements in judging the success of an operation to relieve the pain or treat the complications of chronic pancreatitis. In a meta-analysis, Frey's procedure results in weight gain in 60.5% patients and also noted that Insulin requirement decreased or no insulin required after surgery in some patients. The stool elastase level test showed that the exocrine function of their patients slightly improved one year after Frey procedure.<sup>11</sup> However a study reports 17.3% and 30.7% patients developed new onset diabetes and new onset exocrine insufficiency respectively after surgery, which are the natural consequences of chronic pancreatitis. There is evidence that neither medical nor surgical therapy can change the decline in pancreatic exocrine and endocrine function in patients with chronic pancreatitis in the long run.<sup>12</sup>

The present study assessed the Pain status, pancreatic exocrine status and endocrine status in patients who underwent Frey's procedure. As consistent with other studies pain score significantly improves in patients after surgery and many patient didn't had any recurrent symptom or needed analgesia during follow up. However, one patient's symptoms worsened after the surgery for which Coeliac plexus block was done to relieve pain. Two patients developed new onset Diabetes mellitus probably because of natural course of disease process. However as reported in some studies, there was statistically significant change in glycaemic status of patients who were on insulin preoperatively. There were no significant changes in pancreatic exocrine status on the basis of symptoms but Mean Fecal Elastase level improved after the surgery, especially those who had long duration of disease. This finding was contrary to common belief among surgeons that exocrine status will improve if drainage procedure is performed in early course of disease. However further studies with larger sample size is needed to evaluate the role of Frey's procedure in exocrine pancreatic status

It is wise to say, in carefully selected patients Frey's procedure provide good pain control and weight gain, however its role in pancreatic endocrine status and exocrine status is still not very well established and warrants further study considering various demographics, region and aetiologies.

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