



A PROSPECTIVE STUDY ON LONGITUDINAL PANCREATICO- GASTROSTOMY AS A DRAINAGE PROCEDURE FOR PAIN RELIEF IN CASE OF CHRONIC PANCREATITIS

Surgery

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ABSTRACT

Chronic Pancreatitis (CP) is an incurable chronic inflammatory condition that is multifactorial in its etiology, highly variable in its presentation, and a challenge to treat successfully.

Surgical intervention in chronic pancreatitis is indicated when there is intractable abdominal pain after unsuccessful medical management, requiring repeated hospitalisation.

30 Patients undergoing Longitudinal Pancreatico- gastrostomy as a part of definitive pain management of chronic pancreatitis in Burdwan Medical College and Hospital from March 2018 to August 2019.

- Longitudinal Pancreatico- gastrostomy (LPG) is a simple and safe procedure for ductal decompression in chronic pancreatitis with dilated duct.
- Postoperative pain relief is adequate (complete or satisfactory) in majority of the patients.
- Duration of operation and length of hospital stay for LPG are shorter than those reported for pancreatico- jejunal anastomosis.
- Postoperative mortality was nil.
- Postoperative complications were minimal, much less than that reported for pancreatico- jejunostomy.

Hence, we might conclude that longitudinal pancreatico- gastrostomy is acceptable for satisfactory pain control in chronic pancreatitis with short operative duration and short length of postoperative hospital stay, with minimal postoperative complications.

KEYWORDS

Longitudinal Pancreatico-Gastrostomy, Drainage Procedure, Chronic Pancreatitis

INTRODUCTION

Chronic Pancreatitis (CP) is an incurable chronic inflammatory condition that is multifactorial in its etiology, highly variable in its presentation, and a challenge to treat successfully. Autopsy studies indicate the evidence of chronic inflammation, such as fibrosis, duct ectasia and acinar atrophy is seen in upto 5% of the population,¹ although these data are difficult to interpret because many of these changes are also present in asymptomatic elderly patients.²

Chronic Pancreatitis is an irreversible procedure. There is recurrent inflammation of the gland followed by exocrine and endocrine pancreatic insufficiency. The patients of chronic pancreatitis usually present with the clinical tetrad of recurrent or persistent abdominal pain, weight loss, diabetes and steatorrhea. The mechanism of pain in chronic pancreatitis is mainly due to increased pancreatic parenchymal and ductal pressure and perineural inflammation. There are some forms of non-operative treatment (medical and endoscopic) for abdominal pain and exocrine and endocrine insufficiency. Surgical management of chronic pancreatitis is directed mainly towards the relief of intractable abdominal pain. Majority of these patients generally have already undergone a long period of unrewarding conservative management and are most likely to be those with worst prognosis.³

The choice of the surgical procedure is based on the main pancreatic duct (MPD) morphology. Ductal drainage is useful in dilated and obstructed ducts while pancreatic resection is suitable for small duct disease.⁴

Though pancreatic resection, especially near total (80- 95%) pancreatectomy, is most effective in relieving pain, it is associated with unacceptably high postoperative morbidity, mortality, exocrine and endocrine insufficiency.

Overall best results are reported with ductal drainage procedures performed on patients with dilated MPD.⁵

There are some definite advantages of an LPG over pancreatico-jejunostomy. Technically the operation is easier to perform and also easily undone if at a later date a reoperation becomes necessary. The stomach being in closed proximity to the pancreas and with a thicker and a more vascular wall, holds sutures well and also enables naso-

gastric aspiration on contact with the anastomosis. It has the theoretical advantage of bathing the pancreatic duct in acidic secretion, thereby having a trypsin neutralizing effect. These factors reduce the chances of anastomotic leak and stenosis and also prevent a flare up of pancreatitis in the immediate postoperative period. Moreover, LPG enables leftover pancreatic stones, if any, to come in direct contact with its solvents namely the gastric acid and orally administered citrate.⁶ Operative time is shorter in LPG and mean duration of hospital stay is also shorter.

Surgical intervention in chronic pancreatitis is indicated when there is intractable abdominal pain after unsuccessful medical management, requiring repeated hospitalisation. Choice of surgical procedure depends on main pancreatic duct (MPD) morphology. Ductal drainage procedures are indicated when MPD is dilated (diameter more than 7mm.) with or without duct calculi.

MATERIALS AND METHODS

Study Population:

Patients undergoing Longitudinal Pancreatico- gastrostomy as a part of definitive pain management of chronic pancreatitis in Burdwan Medical College and Hospital from March 2018 to August 2019.

Total number of patients admitted with chronic pancreatitis with intractable pain requiring surgery admitted in a span of 1 year and 6 months was 78, among them 46 patients underwent Longitudinal Pancreatico- Gastrostomy. 2 patients did not provide a valid consent for the study, 10 patients were excluded after application of inclusion and exclusion criteria and 4 patients were lost to follow up due to various other reasons. So we included 30 patients as the study population over the study period.

Inclusion Criteria:

1. All clinically diagnosed patients of chronic pancreatitis between the age-group of 20- 60 years of either gender undergoing Longitudinal Pancreatico- gastrostomy in Burdwan Medical College and Hospital during the study period and not having any of the exclusion criteria.

2. Patients in whom pain cannot be controlled by medical means and the main pancreatic duct diameter is ≥ 7 mm. with or without duct calculi.

3. Patients who will give valid and informed consent for the study.

Exclusion Criteria:

1. Main pancreatic duct diameter < 7mm.
2. Gross cardiovascular abnormality.
3. Patients with splenomegaly.
4. H/O myocardial infarction within last 6 months.
5. Pancreatic malignancy or co-existing malignancy of other organs.

STATISTICAL ANALYSIS PLAN

For statistical analysis data were entered into a Microsoft excel spreadsheet and then analysed by SPSS (version 24.0; SPSS Inc., Chicago, IL, USA) and Graph Pad Prism version 5. Data had been summarized as mean and standard deviation for numerical variables and count and percentages for categorical variables.

RESULT ANALYSIS

Longitudinal Pancreatic- gastrostomy was performed in thirty (30) patients within the study period. The followings are the results and analysis of the data that have been tabulated in the master chart.

7 patients (23.33% of the study population) were in the age group up to 30 years, 16 patients (53.33% of the study population) were in the age group from 31 to 40 years, 7 patients (23.33% of the study population) were in the above 40 years age group. The mean age (mean $\pm$ s.d.) of patients was 36.5000 $\pm$ 6.0100 years.

16 patients (53.33% of the study population) were female and 14 patients (46.67% of the study population) were male. Number of female patients was more in the 31-40 years of age group.

Alcohol as the etiological factor of chronic pancreatitis was found in 30% of the study population.

All the patients with history of alcoholism were male. Out of total 14 male patients, 12 were found to be alcoholic. Hence, only 2 out of the 18 non-alcoholic patients were male and the rest were all female.

In the pre-operative imaging studies, gall-stone was found in 18 patients (60% of the study population). 15 of these patients were female and the rest 3 were male.

Corroborating the data found from history and investigations,
 -History of alcoholism without presence of gallstone was found in 10 patients (33.33% of the study population).
 -Presence of gallstone without history of alcoholism was found in 16 patients (53.33% of the study population).
 -There was both history of alcoholism and presence of gallstone in 2 patients (6.67% of the study population).
 -There was no known etiological factor of chronic pancreatitis in other 2 patients (6.67% of the study population).

All the patients had a dilated main pancreatic duct (MPD diameter $\geq$ 7mm) as found on pre-operative imaging (USG, CECT, MRCP).

5(16.7%) patients had 7 mm duct diameter, 3(10.0%) patients had 7.5 mm duct diameter, 10(33.3%) patients had 8 mm duct diameter, 2(6.7%) patients had 8.5 mm duct diameter, 6(20.0%) patients had 9 mm duct diameter, 2(6.7%) patients had 9.5 mm duct diameter and 2(6.7%) patients had 10 mm duct diameter.

The mean duct diameter (mean $\pm$ s.d.) of patients was 8.2500 $\pm$.8881 mm.

Duct calculi were seen on imaging studies (X-ray, USG, MRCP, CECT) in 27 patients (90% of the study population)

Pain relief was considered as the chief outcome measure of the operative procedure. Numerical Rating Scale (NRS) and Wong Baker Faces pain rating scale were used to evaluate pain. It was recorded once prior to surgery, then on the 1st (POD 1) and 3rd postoperative days (POD 3) and on the day of discharge; then after 2 weeks, 1 month and 3 months followed by surgery.

All patients participating in the study had one symptom in common, i.e. chronic intractable abdominal pain which was not relieved by medications and required repeated hospitalisation.

15(50.0%) patients had numeric pain rating scale 8 on the day before

surgery, 1(3.3%) patient had numeric pain rating scale 9 on the day before surgery and 14(46.7%) patients had numeric pain rating scale 10 on the day before surgery.

16(53.3%) patients had WB faces pain score of 8 on the day before surgery and 14(46.7%) patients had WB faces pain score of 10 on the day before surgery.

Hence, 100% of the study population had severe pain (NRS score in the range of 7-10 and WB Faces score in the range of 8-10) prior to surgery.

On the first postoperative day, 1 patient (3.33%) had NRS score of 5, 16 patients (53.33%) had NRS score of 4 and 13 patients (43.33%) had NRS score of 2.

On the first postoperative day, 13 patients (43.3%) had WB Faces score of 2 and 17 patients (56.7%) had WB Faces score of 4.

Hence, on the first postoperative day, 17 patients (56.7% of the study population) complained of moderate pain (NRS score in the range of 4-6 and WB Faces score in the range of 4-6), while 13 patients (43.3% of the study population) complained of mild pain.

On the 3rd postoperative day, 1 patient (3.33%) had NRS Score of 5, 8 patients (26.67%) had NRS Score of 4, 12 (40%) patients had NRS score of 2 and 9 patients (30%) had NRS score of 0.

On the 3rd postoperative day according to the WB Faces scale, 9 patients (30%) had a score of 0, 12 patients (40%) had a score of 2 and 9 patients (30%) had a score of 4.

Hence, on the 3rd postoperative day, 9 patients (30% of the study population) of the study population had no pain (both NRS and WB Faces score of 0); 12 patients (40% of the study population) complained of mild pain (NRS score in the range of 1-3 and WB faces score of 2) and 9 patients (30% of the study population) had moderate pain (NRS score in the range of 4-6 and WB Faces score in the range of 4-6).

On the day of discharge, 18 patients (60%) had NRS score of 0, 2 patients (6.67%) had NRS score of 1, 7 patients (23.33%) had NRS score of 2, 1 patient (3.33%) had NRS score of 3 and 2 patients (6.67%) had NRS score of 4.

On the day of discharge, 18 patients (60%) had a score of 0, 10 patients (33.33%) had a score of 2 and 2 patients (6.67%) had a score of 4 according to the WB Faces pain scale.

Hence, on the day of discharge 18 patients (60% of the study population) were completely pain-free (both NRS and WB Faces pain scores of 0), 10 patients (33.33% of the study population) had mild pain (NRS pain score in the range of 1-3 and WB Faces pain score of 2) and 2 patients (6.67% of the study population) still had moderate pain (both NRS and WB Faces pain scores in the range of 4-6).

2 weeks following surgery, 22 patients (73.33%) had a score of 0, 1 patient (3.33%) had a score of 1, 5 patients (16.67%) had a score of 2 and 2 patients (6.67%) had a score of 4 according to the NRS pain rating scale.

2 weeks following surgery, 22 patients (73.33%) had a score of 0, 6 patients (20%) had a score of 2 and 2 patients (6.67%) had a score of 4 according to the WB Faces pain rating scale.

Hence, 2 weeks after surgery, 22 patients (73.33% of the study population) had no pain at all (both NRS and WB Faces pain rating scores being 0), 6 patients (20% of the study population) had only mild pain (NRS pain score in the range of 1-3 and WB faces pain score of 2) and 2 patients (6.67% of the study population) still had moderate pain (both NRS and WB Faces pain rating scores being 0).

1 month after the surgery, 18 patients (60%) had a score of 0, 1 patient (3.33%) had a score of 1, 5 patients (16.67%) had a score of 2, 1 patient (3.33%) had a score of 3, 4 patients (13.33%) had a score of 4 and 1 patient (3.33%) had a score of 6 according to the NRS scale.

1 month after the surgery, 18 patients (60%) had a score of 0, 7

patients(23.33%) had a score of 2, 4 patients (13.33%) had a score of 4 and 1 patient (3.33%) had a score of 6 according to the WB Faces pain rating scale.

Hence, 18 patients (60% of the study population) had no pain (both NRS and WB Faces pain scores being 0), 7 patients (23.33% of the study population) had mild pain (NRS pain score in the range of 1-3 and WB Faces score of 2) and 5 patients (16.67% of the study population) had moderate pain (both NRS and WB faces pain rating scores in the range of 4-6).

3 months after the surgery, 16 patients (53.33%) had a score of 0, 2 patients(6.67%) had a score of 1, 7 patients (23.33%) had a score of 2, 4 patients(13.33%) had a score of 4 and 1 patient (3.33%) had a score of 6.

3 months after the surgery, 16 patients (53.33%) had a score of 0, 9 patients(30%) had a score of 2, 4 patients (13.33%) had a score of 4 and 1 patient(3.33%) had a score of 6.

Hence, 16 patients (53.33% of the study population) had no pain 3 months after the surgery (both NRS and WB faces pain scores being 0), 9 patients (30% of the study population) had mild pain (NRS score in the range of 1-3 and WB faces score of 2) and 5 patients (16.67% of the study population) had moderate pain persistent even after 3 months (both NRS and WB faces pain scores in the range of 4-6).

-The mean NRS score on the day before surgery (mean±s.d.) was 8.9667±.9994.

-The mean NRS score on postoperative day 1 (mean±s.d.) was 3.1667± 1.0532.

-The mean NRS score on postoperative day 3 (mean±s.d.) was 2.0000 ± 1.5974.

-The mean NRS score on discharge (mean±s.d.) was . 9667± 1.2726.

-The mean NRS score after 2 weeks (mean±s.d.) was . 6333 ± 1.1885.

-The mean NRS score after 1month (mean±s.d.) was 1.2000± 1.7301.

-The mean NRS score after 3months (mean±s.d.) was 1.2667± 1.6802.

-The mean WB faces pain score on the day before surgery (mean±s.d.) was 8.9333±1.0148.

-The mean WB faces pain score on postoperative day1 (mean±s.d.) was 3.1333±1.0080.

-The mean WB faces pain score on postoperative day3 (mean±s.d.) was 2.0000±1.5757.

-The mean WB faces pain score on discharge (mean±s.d.) was .9333±1.2576.

-The mean WB faces pain score after 2 weeks (mean±s.d.) was 6667± 1.2130.

-The mean WB faces pain score after 1month (mean±s.d.) was 1.2000± 1.7100.

-The mean WB faces pain score after 3 months (mean±s.d.) was 1.3333±1.6884.

-The mean operative time (mean±s.d.) of patients was 90.7000± 5.7244mins.

-The mean hospital stay (post op days) (mean±s.d.) of patients was 6.4667±1.569 days.

In the postoperative period, 24 patients (80% of the study population) did not develop any complication, whereas 6 patients (20% of the study population) developed complications in the early postoperative period (within 2 weeks of surgery). None of the patients had any late complication.

Out of the 6 patients who developed postoperative complications, 1 patient (3.33% of the study population) had melaena (gastric hemorrhage), 2 patients (6.67% of the study population) had wound infection and 3 patients (10% of the study population) had prolonged ileus in the early postoperative period. There was no incidence of pancreatic fistula, intestinal fistula or any other complication.

DISCUSSION

Chronic Pancreatitis is an irreversible procedure which leads to progressive structural changes with replacement of functional exocrine and endocrine parenchyma by a fibrotic and inflammatory tissue.⁷ There are some forms of non-operative treatment (medical and

endoscopic) for abdominal pain, and exocrine and endocrine insufficiency. Surgical interventions are primarily indicated in cases of intractable abdominal pain not relieved by medication and requiring repeated hospital admission.

Ductal drainage or decompression procedures are indicated in patients of chronic pancreatitis with ductal dilatation due to obstruction of the duct. Traditional form of decompression is construction of a longitudinal pancreatico- jejunal anastomosis (LPJ). Another alternative method is longitudinal pancreatico-gastrostomy (LPG).

Literature shows that there are certain advantages of LPG over the traditional anastomosis with the jejunum.^{8,9,10} The stomach lies in close proximity to the pancreas, is thick walled and more vascular and hence ensures better anastomosis. In LPG the presence of a long jejunal blind tube is eliminated. LPJ involves the creation of two anastomoses hence takes more time, has a higher chance of leakage and results in longer duration of hospital stay postoperatively. If stone remains in the main pancreatic duct after operation, it gets dissolved with the direct contact of gastric juice and orally administered citrate solution. From the physiological point of view, the lack of enterokinase in the gastric mucosa prevents protease activation.¹¹

This study was undertaken to evaluate the effectiveness of longitudinal pancreatico- gastrostomy in achieving pain control in patients of chronic pancreatitis, to measure the operative time duration and length of postoperative hospital stay, and to assess postoperative complications.

This study was conducted over a period of 1 year and 6 months on a total number of 30 patients who after qualifying the inclusion criteria and receiving detailed information regarding the operative procedure, agreed to the study protocol. All the patients were in the age group of 20- 60 years and clinically diagnosed cases of chronic pancreatitis with a dilated pancreatic duct (duct diameter ≥ 7 mm.) with or without duct calculi as shown on the imaging studies. All of them had chronic intractable abdominal pain not relieved by medication and required repeated hospitalization. We excluded the patients with cardiovascular comorbidities and pancreatic or any other malignancies.

History of alcoholism without any history of gallstone disease was present in 33.33% patients. Whereas, history of gallstone disease alone was present in 53.33% patients and both these factors were present in 6.67% of patients. The other 6.67% patients did not have a known etiological factor of chronic pancreatitis.

Hence in our study, majority of the patients had gallstone disease as etiology as opposed to other studies which showed chronic alcohol consumption as the main etiological factor.¹² This might be related to the gender of the patient as most of the male patients (12 out of total 14 male patients) were found to be alcoholic whereas none of the female patients had any history of alcohol consumption and overall, number of female patients participating in the study were female (53.33%).

Hypoalbuminaemia was present in many of the patients but hyperamylasemia and raised alkaline phosphatase were not very commonly seen.

All the patients (100%) had a dilated main pancreatic duct visible in the pre-operative imaging studies. 86.66% of the patients had gross parenchymal disease along with marginally dilated main pancreatic duct (>7mm and ≤9mm). The rest 13.34% patients had a grossly dilated main pancreatic duct (>9mm). In 90% of these patients duct calculi were present along with dilatation of the pancreatic ductal system. Most of these patients with gross parenchymal disease, had atrophic pancreas as seen in CECT. None of the patients had pseudocyst or any other cystic neoplasm of pancreas.

Operative findings were overall corroborative with the imaging findings:

-Dilated pancreatic duct was found in 100% patients.

-Pancreatic stones/ calcifications were seen in 90% patients.

-Cholelithiasis was present in 60% of patients.

-Atrophic pancreas was seen in majority of the patients.

There was no intraoperative complication and no intraoperative blood transfusion was needed.

The ideal operation for chronic pancreatitis should relieve pain and

preserve endocrine and exocrine functions.^{13,14}

Pain relief occurs in 65-90% with chronic pancreatitis treated with ductal drainage, as shown in different studies.^{15,16,17}

Ductal drainage procedures in dilated and obstructed ducts provide the best results.^{18,19}

In one controlled series LPG was compared to celiac plexus block and was found to be superior in achieving pain relief after 6 months of operation in patients with chronic pancreatitis.²⁰

Recently uncontrolled studies show LPG is better as drainage procedure in chronic alcoholic pancreatitis though the technique of operation is not always identical.²¹

Results of pancreatico-gastrostomy are excellent, as shown in studies conducted in southern India. Data comparing LPJ and LPG is not available for chronic pancreatitis. The available studies comparing the two procedures frequently include patients of carcinoma pancreas.²²

It is documented that drainage procedures in cases of duct diameter ≥ 7 mm with a stoma diameter of 6 mm provide effective pain relief.²³

Regarding assessment of pain we could divide the patients into three categories: complete pain relief (no pain), satisfactory (mild pain) and unsatisfactory pain (moderate to severe pain). According to the results as seen on both NRS and WB Faces scales, at the end of 3 month, 53.33% patients had complete pain relief and 30 % patients had satisfactory results, whereas only 16.67% patients had unsatisfactory results.

Technically LPG is easier than LPJ as an operative procedure. LPJ involves creation of two anastomoses, hence takes more time, has a higher probability of leakage and results in longer duration of hospital stay postoperatively.

We could see that the minimum length of postoperative hospital stay was 5 days and the maximum was 11 days. Hence, the mean length of hospital stay was 6.46 days with a standard deviation of 1.56.

Though some studies reported a postoperative mortality of 0-4%, in our study we found that the postoperative mortality was nil. 80% of the patients did not develop any complication in the postoperative period, whereas 20% patients developed some complication in the early postoperative period. Of this 20% of the study population, 1 patient had haemorrhage from the anastomotic site, manifested as gastric haemorrhage (melaena). 2 patients had incidence of operative wound infection and 3 patients had prolonged ileus in the early postoperative period.

There was no incidence of pancreatic fistula or intestinal fistula. There was no late complication noted.

CONCLUSION

According to the data found from the prospective study conducted at Burdwan Medical College over a period of 1 year and 6 months, our conclusions are:

- Longitudinal Pancreatico- gastrostomy (LPG) is a simple and safe procedure for ductal decompression in chronic pancreatitis with dilated duct.
- Postoperative pain relief is adequate (complete or satisfactory) in majority of the patients.
- Duration of operation and length of hospital stay for LPG are shorter than those reported for pancreatico- jejunal anastomosis.
- Postoperative mortality was nil.
- Postoperative complications were minimal, much less than that reported for pancreatico- jejunostomy.

Hence, we might conclude that longitudinal pancreatico- gastrostomy is acceptable for satisfactory pain control in chronic pancreatitis with short operative duration and short length of postoperative hospital stay, with minimal postoperative complications.

Table: Types Of Postoperative Complications

Complications	Frequency	Percent
Gastric haemorrhage / Melaena	1	3.33%
Wound infection	2	6.67%

Prolonged ileus	3	10%
Pancreatic fistula	0	0%
Intestinal fistula	0	0%
Others	0	0%
No complication	24	80%
Total	30	100%

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