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Open modified puestow procedure in an advanced endoscopic era for chronic pancreatitis with dilated pancreatic duct and stones

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Abstract

Background: Chronic pancreatitis has been defined as a continuing inflammatory disease of the pancreas characterized by irreversible morphological changes. These changes typically cause pain and loss of exocrine and endocrine pancreatic function.

The most common symptom of chronic pancreatitis is pain, which can be severe and intractable in some patients. Although it is itself benign, chronic pancreatitis can significantly affect quality of life and can cause significant distress with its complications^[1].

The initial treatment for pain in most cases is to start of enzyme replacement, control of diabetes with insulin, and administration of oral analgesics.

Surgical intervention is required in patients with intractable pain that is resistant to conventional nonsurgical therapy, in patients with associated or suspected malignancy, and in patients who have developed complications such as biliary or duodenal obstruction, pancreatic fistulae, pancreatic ascites/pleural effusion, pseudocyst, or rare hemosuccus pancreaticus^[2].

The aetiology of pain in chronic pancreatitis is unclear. Some evidence has suggested that perineural inflammation may be the cause of pain. A dilated pancreatic duct, secondary to obstruction, may cause increased intraductal pressures, resulting in pain^[3].

The primary aim of therapy is the achievement of primary pain relief and an improvement in quality of life. This could be achieved by means of endoscopic, open or laparoscopic /robotic lateral pancreaticojejunostomy^[4,13].

Methods: We selected 41 cases of chronic pancreatitis of both genders with moderate to intractable pain hampering routine life. All patients tried conservative treatment for more than 6 months. All selected patients underwent haematological and radiological work up. MRCP of all patients showing dilated pancreatic duct more than 7mm. in size. All of these patients operated for longitudinal pancreaticojejunostomy (Modified Puestow's). Follow up done for one year to ten years

Results: All 41 patients in long term follow up were recovered well from pain and abdominal discomfort. Appetite were improved and weight gain noted in the patients after surgery.

Conclusions: Longitudinal pancreaticojejunostomy is still safe, simple and timely approved procedure for pain associated with chronic pancreatitis.

Keywords: Chronic pancreatitis, pancreatitis pain, partington and Rochelle pancreaticojejunostomy, modified puestow pancreaticojejunostomy

Introduction

Gould successfully removed calculi from the Wirsung duct in 1898^[5].

Moynihan in 1902^[6] and subsequently Mayo-Robson in 1908^[7] reported that timely removal of calculi from the pancreatic duct prevented atrophy of the pancreas and relieved pain.

Coffey first performed distal pancreatectomy with pancreaticoenterostomy in dogs. He suggested that this procedure may be beneficial in various conditions^[8].

Link reported the first pancreatic duct drainage operation for chronic pancreatitis in 1911. In this procedure, a catheter was placed in the pancreatic duct to drain the pancreatic juice through the skin, providing pain relief and restoring the patient's normal weight^[9].

Duval reported on distal pancreatectomy, splenectomy, and pancreaticojejunostomy in 1954^[10]. In this procedure, an end-to-end distal pancreaticojejunostomy was performed, and the pancreatic duct was decompressed in a retrograde manner. The disadvantage of this procedure was that, if the ductal system contained strictures, the entire duct would not be decompressed.

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In 1958, Puestow and Gillesby introduced the lateral (longitudinal) pancreaticojejunostomy (LPJ), which consists of a longitudinal incision of the pancreatic duct and implantation of the tail of the gland into the Roux-en-Y limb of the jejunum following splenectomy and distal pancreatectomy [11]. Although this procedure decompressed a greater length of pancreatic duct and was useful in patients with strictures in the main pancreatic duct, it did not satisfactorily decompress the pancreatic head and the uncinata ducts.

In 1963, Partington and Rochelle modified the Puestow-Gillesby pancreaticojejunostomy by creating an anastomosis between a longitudinally incised anterior surface of the pancreas and duct from the head to the tail with a longitudinally incised Roux-en-Y jejunal loop [12]. This modification did not require distal pancreatectomy, splenectomy, or mobilization of the pancreas from its retroperitoneal attachments.

Open, laparoscopic or robotic lateral pancreaticojejunostomy is one of the answer for relief of pain and better life.

Methods

Forty-one patients from 36 to 70 years of age were selected for surgeries in 10 years of duration from January 2009 to January 2019. Thirty-Five were men and six were women.

Out of 35 men 28 had alcoholic pancreatitis 5 had gall stone biliary pancreatitis remaining 2 had idiopathic aetiology.

One male patient (65 years old) had recurrent formation of pancreatic duct calculi after 18 yrs. of previously inadequately performed Puestow’s surgery.

Out of 6 female 5 had biliary pancreatitis and 1 from Kerala had tropical pancreatitis?

All patients’ detailed history were taken to rule out aetiology, characteristic of pain, abdominal discomfort and weight loss.

In all 41 patients, severe pain with hampered routine activity was a main symptom. Associated symptoms were loss of appetite, belching, gaseous distension and weight loss. Symptoms used to aggravate mainly after meals. Weight loss was significant 10 to 15% of body weight in 3 to 4 months in all patients.

‘Wong-Baker FACES pain rating scale’ system was used for assessment and improvement in pain.

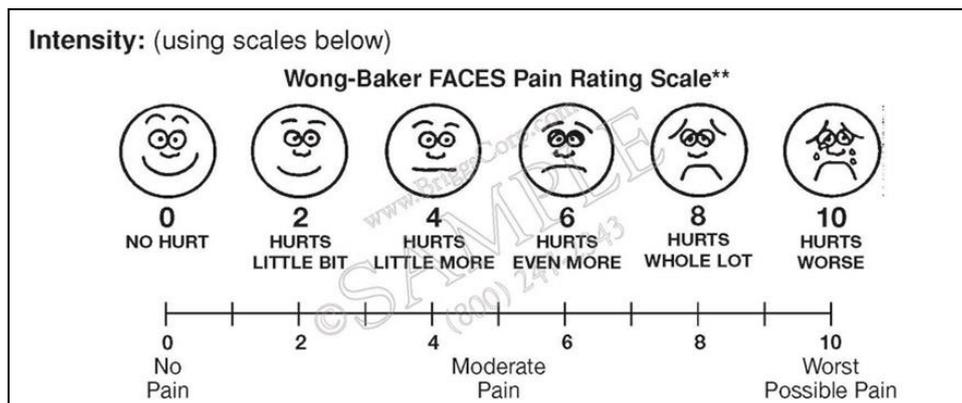


Fig 1: Wong-Baker FACES pain rating scale

Complete haematological check-up was done in all patients. Serum Amylase and Lipase were normal in 30 patients and mildly elevated in 11 patients.

USG abdomen followed by MRI (MRCP) in all patients. All these patients had pancreatic ductal size from 7mm to 15mm. Small to large multiple ductal calculi were present in almost 38 patients.

ERCP pancreatic ductal clearance tried and could not achieved complete clearance in 6 patients.

Out of 10 gall stone (biliary aetiology) patients 4 were required ERCP bile duct clearance before surgery. All patients received conservative management for six months and not responded to it.

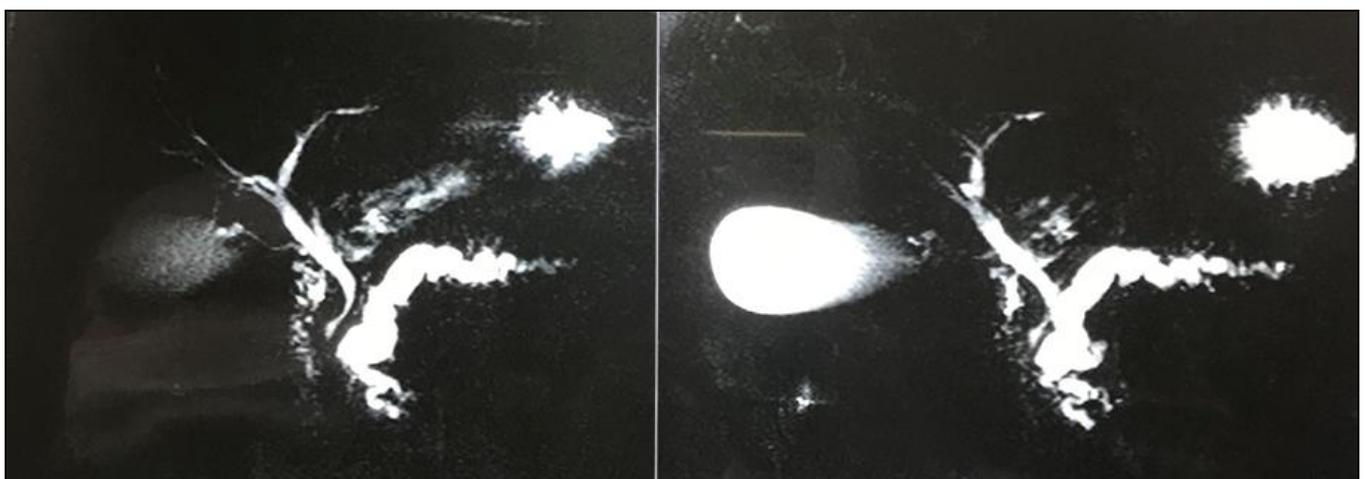


Fig 2: ERCP showing large dilated pancreatic duct

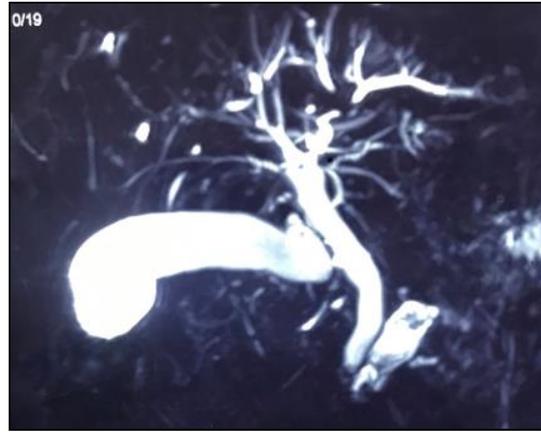


Fig 3: Showing recurrent stones in head and body of pancreatic duct, in previously inadequately performed Puestow's technique Surgical technique:

It is actually modification of original Puestow's surgery (Partington and Rochelle) still goes with Puestow name. The abdomen is opened with an incision from the xiphisternum to the umbilicus.

The pancreas is exposed through lesser sac and the main pancreatic duct is opened from the head to the tail of the pancreas. Identification of ducts were easy in patients with large pancreatic calculi. In some cases, ducts were only dilated without stones, in those cases needle and syringe used to locate duct and incision taken over needle. All ductal stones were removed. Especially all stones were cleared from head of the pancreas.

The opened pancreatic duct is then connected to a Roux-en-Y

loop of small intestine so that the pancreas drains directly into the intestine duct in order to allow its drainage. 4/0 polygalactic acid on round body needle suture material (interrupted or continuous according to pancreatic duct condition) were used. Minimum 8cm. wide anastomosis was done for every patient. Patients who had biliary pancreatitis additional cholecystectomies were performed. Single abdominal 28 number drain kept for all patients.

One advantage of this procedure compared to a Frey's procedure is that pancreatic tissue is preserved, which may be of critical importance in patients with exocrine or endocrine insufficiency from their chronic pancreatitis.

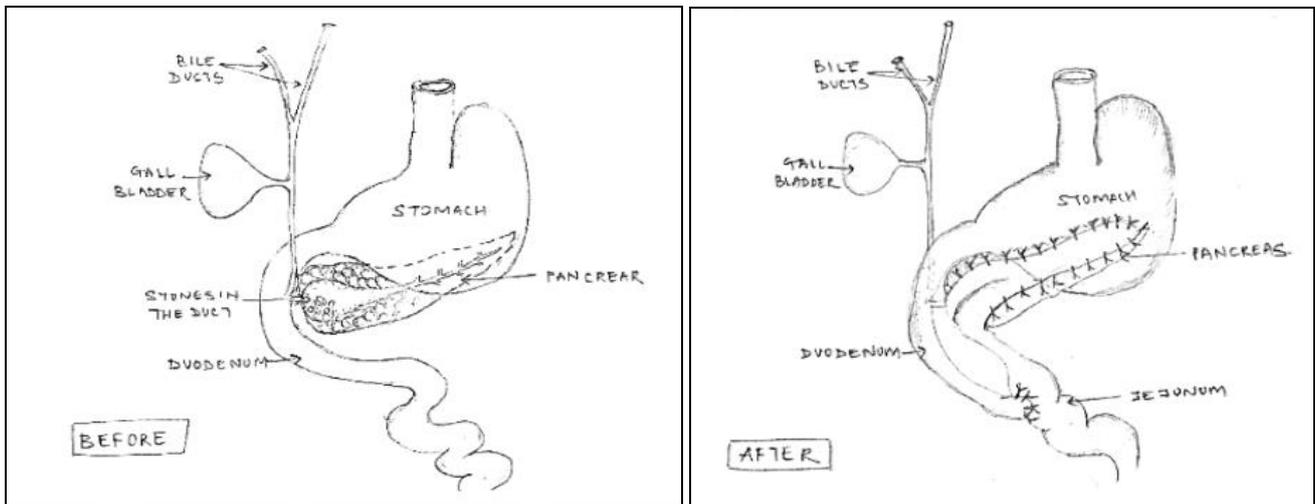
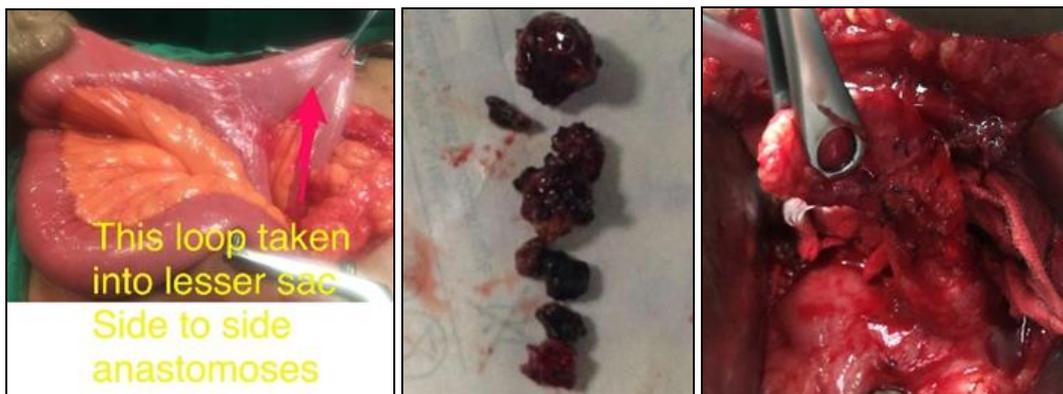


Fig 4: Diagrammatic representation showing operative technique of Modified Puestow surgery



This loop taken into lesser sac
Side to side anastomoses

Fig 5: Patient with ERCP of pic 2 Re- pancreaticojejunostomy with same Roux-e-y loop in inadequately performed Puestow s 18 years back with complete pancreatic ductal clearance with difficult cholecystectomy.

Post-operative: all patients kept nil by mouth for three days. Drain removed on fourth day. One patient developed pancreatic ascites in whom drain removed on tenth day.

Results

Table 1: Gender and aetiology

Gender and aetiology	Alcoholic	Biliary	Others	Total
Male	28	5	2	35
Female	0	5	1	06
Total	28	10	3	41

Table 1 clearly shows male predominance 68% with commonest aetiological factor is alcohol 68.29% followed by biliary calculi 24.39% and other causes are 7.32%.

Table 2: Percentage of relief of symptoms post-operatively

Gender and symptomatology	Before pain after no pain		Before weight loss/after weight gain		Gaseous distension and malabsorption Before yes after no		Fluctuation in sugar level before yes after no	
	Before	After	Before	After	Before	After	Before	After
Male	35	35	31	31	28	24	10	10
Female	6	6	5	5	3	2	2	2
Total	41	41	36	36	31	26	12	12

Above table 2 shows symptomatology before and after surgery. Pain was relieved immediately postoperative in all 41(100%). The Wong-Baker FACES pain rating score were above 6 for all patients which improved to 0-4.

Weight loss was in 36 patients, after the surgery all 36 (100%) patients gain weight to normal.

Malabsorption related symptoms were present 31 patients out of which 26(84%) patients had good recovery.

Fluctuation in sugar levels observed in 12 patients in spite of regular adjustment of antidiabetic drug doses, but after the surgery it was easy to control their diabetes mellitus with suitable fix antidiabetic drugs.

Table 3: Size of the pancreatic duct on MRCP

Gender and size	7-9 mm	9-12 mm	12-15 mm	>15mm
male	16	13	5	1
female	2	3	1	0
total	18	16	6	1

18 (44%) patients had 7-9mm duct size.16 (39%) had 9-12mm, 6 (15%) had 12-15mm.and only one (2%) had 17mm size.

Table 4: Complications of surgery

Complications	Number of patients
On table haemorrhages	4 -required blood transfusion
Pancreatic ascites	1
Wound site infection	5
Splenic vein damage	1 splenectomy done

Table 4 shows complications we come across during this surgery. Complication rate was low and complications were manageable.

Discussion

Pain is the predominant symptom in chronic pancreatitis; 80–90% of patients present with pain as the primary symptom either at the first attack of acute pancreatitis or as the main reason for hospital readmissions in the following months and years, as the disease progresses to what could be defined as chronic pancreatitis.

The formations of stones in chronic pancreatitis are caused by

the crystallization and deposition of calcium carbonate as long as alcohol and CP cause hyper saturation of pancreatic juice with calcium.

The diagnosis of chronic pancreatitis is set by clinical means and imaging modalities. On plain X-ray pancreatic calcifications are detected in 30% of CP patients [15]. Abdominal ultrasound has limited value, but computed tomography (CT) scan provides detailed imaging of pancreatic stones. Endoscopic retrograde cholangiopancreatography (ERCP) and magnetic resonance cholangiopancreatography (MRCP) are valuable adjunct to the evaluation of the exact location of the calculi and duct system anatomy. Moreover, ERCP may be therapeutic, if the stones are extracted.

In older randomized trials is demonstrated that surgical therapy turns to have more durable results and results in pain relief for longer intervals [16]. Today, due to further development of endoscopic techniques, endoscopic therapy is usually the first preferred option because of less invasiveness. Positive response to endoscopic treatment is a predictor of good surgical results when operative approach is administered in the course of the disease [17]. Endoscopic stone removal is attempted when upstream pancreatic duct dilatation is present. However, pancreatic stones are harder and speculated in comparison to bile duct stones and these features explain why pancreatic stones imply difficulties for extraction. Endoscopic stone removal is successful in 50% of cases with standard techniques [18].

The decision for surgical therapy depends on many factors: pancreatic duct diameter, duct strictures, pain severity indexes, malignancy concerns, associated biliary duct obstruction and operative risk. Resection, drainage and decompression and combination procedures have been described. Regarding surgical treatment, lateral pancreaticojejunostomy or modified Puestow procedure is the most common and well-studied surgical technique for such cases [19]. It is successful in chronic pancreatitis without an inflammatory mass in the head of the pancreas for pain relief in 90% of patients and is suited for pancreatic ducts >8mm [20]. Pancreatic leak is low (0.03-5%) in appropriately selected patients with a fibrotic gland [19]. Postoperative mortality rate and disease incidence of patients who underwent the Partington-Rochelle procedure were lower than among those who had the original Puestow procedure, at approximately 3% and 20%, respectively [21,22].

Surgical treatment of the pain of chronic pancreatitis

Many operations have been described. They can be divided into decompression and drainage procedures and resection procedures. The primary indication for surgical intervention in

chronic pancreatitis is severe, unremitting pain that is resistant to other measures. Examples of the commonly used surgical procedures in the management of chronic pancreatitis are shown in Table 5.

Table 5: Surgical procedures performed in chronic pancreatitis

Decompression/drainage operations procedures	Resection
Longitudinal pancreaticojejunostomy (modified Puestow procedure)	pancreaticoduodenectomy (Whipple procedure)
Lateral pancreaticojejunostomy	Beger procedure (duodenum-preserving pancreatic head resection)
Lateral pancreaticoduodenectomy	Frey procedure (resection of the pancreatic head with longitudinal pancreaticojejunostomy)
Pancreatic pseudocyst drainage	Total pancreatectomy and islet cell autotransplant Distal pancreatectomy

Drainage procedures are performed when there is a widely dilated main pancreatic duct (>6-7mm) and the most commonly performed operation is longitudinal pancreaticojejunostomy (the modified Puestow procedure). Short-term pain relief is achieved in up to 80% of patients with pain relief persisting for more than 2 years in 60% of patients^[14].

In our study all patients had pancreatic duct size of more than 7mm. we got result of instant relief in 100% patients, weight gain in 100% patients and relief from abdominal discomfort symptoms in 88% cases. In diabetic patient, sugar was controlled well with steady doses of antidiabetic drugs after surgery. Follow up from last one year to ten years patients are without any pain and enjoying comfortable life style. Three elderly patients of age more than 65 died later due to cirrhosis of liver. We found complication rates are very low with this surgery.

Conclusion

Chronic pancreatitis, and the pain associated with it, is a complex clinical syndrome that has a devastating effect on those who suffer from it. It can be described as a group of disorders, with diverse aetiologies and multiple pathological processes, leading to the anatomical and physiological destruction of normal pancreatic function. Despite the numerous causes and multiple theories of pathogenesis, the common feature throughout a diverse group of patients is pain; pain that some describe as unbearable, relentless and all consuming. It is a pain that dominates every aspect of the life of a patient with chronic pancreatitis. It is a disease process that commonly leads to multiple hospital admissions, associated complications (diabetes, malnutrition, and pseudocyst).

There is a wide range of treatments available to ameliorate the symptoms of chronic pancreatitis. Primary-care physicians, gastroenterologists, anaesthesiologists, pancreatic surgeons, pain specialists all have important roles to play in its management. A multi-disciplinary approach is fundamental to improving treatment and outcome in this field.

But when patient does not respond to any conservative management some kind of drainage procedure could definitely help the patient. In our series we found that Modified Puestow longitudinal pancreaticojejunostomy gives excellent results from all symptomatology with improvement in life style. More patients with large pancreatic duct, who failed endoscopic approach should get benefited with this surgery.

Declarations

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Conflict of interest: Nil

Ethical approval: Not required

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