OPEN MODIFIED PUESTOW (PARTINGTON AND ROCHELLE PROCEDURE) FOR CHRONIC LITHIASIC PANCREATITIS IN A MODERN ENDOSCOPIC ERA

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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. Modified Puestow is the best available method to relieve the symptoms associated with chronic pancreatitis, especially pain. As a consultant, I performed my first modified Puestow in February 1993 and found excellent results without any consecutive 27 years. In a later era, I operated only on those patients who were failed in endoscopic management. Materials and Methods: From February 1993 to January 2019, we did multiple procedures as per case demand in chronic pancreatitis. Forty-nine cases of chronic pancreatitis were operated on for modified Puestow. All selected patients had haematological and radiological workup. MRCP of all patients showing dilated pancreatic duct more than 7mm. in size. Follow up after surgery was done from one year to 27 years. Results: All 49 patients in the short term to long term follow up were recovered well from pain and abdominal discomfort. Appetite improved, and weight gain noted in the patients after surgery. Conclusions: Modified Puestow is still a safe, timely and straightforward approved procedure for pain associated with chronic pancreatitis.

KEYWORDS chronic pancreatitis with lithiasis, Partington and Rochelle pancreaticojejunostomy, Modified Puestow’s

Introduction

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 the quality of life and can cause significant distress with its complications. [1]

Surgical intervention is required in patients with intractable pain 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, pseudocysts. [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 to achieve primary pain relief and an improvement in the quality of life. This could be achieved utilizing endoscopic, open or laparoscopic /robotic lateral Pancreatico-jejunosotomy. [4,13]

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 pancreatico-enterostomy in the dog. [8]

Link reported the first pancreatic duct drainage operation for chronic pancreatitis in 1911. [9]
Duval reported on distal pancreatectomy, splenectomy, and pancreaticojejunostomy in 1954. [10]

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 the pancreatic duct and was useful in patients with strictures in the main pancreatic duct, it did not satisfactorily decompress the pancreatic head and the uncinate 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 pancreatico-jejunostomy is one of the answers for relief of pain and better life.

Materials and Methods

Forty-nine patients from 36 to 70 years of age were selected for surgeries in 27 years of duration from February 1993 to January 2019. Forty-three were men, and six were women.

Out of 43 men, 36 had alcoholic pancreatitis, and five had gall stone biliary pancreatitis remaining 2 had idiopathic aetiology. One male patient (65 years old) had the recurrent formation of pancreatic duct calculi after 18 yrs. of previously inadequately performed Puestow’s surgery by another institution.

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

All these patients were evaluated for aetiology, characteristic of pain, abdominal discomfort and weight loss.

In all 49 patients, severe pain with hampered routine activity was the main symptom. Associated symptoms were loss of appetite, belching, gaseous distension and weight loss. Weight loss was significant 10 to 15% of body weight in 3 to 4 months in all patients.

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

A complete haematological check-up was done in all patients. Serum Amylase and Lipase were normal in 38 patients and mildly elevated in 11 patients. MRI (MRCP) was done in all patients, showing pancreatic ductal size from 7mm to 15mm. With multiple pancreatic ductal calculi. ERCP pancreatic ductal clearance tried and could not achieve complete clearance in 10 patients, and they were remained symptomatic. Four patients were needed endoscopic bile duct clearance before surgery. All patients received conservative management for six months and not responded to it.

Surgical technique:

Modified Puestow (Longitudinal Pancreatico-jejunostomy)

Preparation for surgery

Standard preoperative medications are given before longitudinal (lateral) pancreaticojejunostomy (LPJ; Modified Puestow procedure) may include proton pump inhibitors (PPIs).

Figure 1: ERCP showing large dilated pancreatic duct.

Figure 2: Recurrent pancreatic duct calculi at head.

Figure 3: Diagramatic representation of Modified Puestow surgery.

Preoperative administration of a broad-spectrum antibiotic with adequate coverage against gram-negative enteric organisms is recommended. Commonly, prophylaxis takes the form of a third-generation cephalosporin (Injection Ceftiraxone 1 gm.) administered at the time of induction. Another dose was repeated after the surgery. Patients with other risk factors or comorbidities were given a complete five days course of antibiotics.
Incision and exploration

The preferred incisions were bilateral subcostal (chevron) or midline. A chevron incision allows better exposure of the pancreatic tail in patients whose pancreas has a more vertical orientation. A midline incision was preferred in lean and thin individuals with a narrow coastal angle.

After the exploration first step is to confirm the diagnosis of chronic pancreatitis and rule out malignancy.

The pancreas of a patient with chronic pancreatitis had a firm fibrotic feel, which was evident throughout the gland. In addition, in some cases, parenchymal calcification was obvious, or pancreatic calculi are palpable in the dilated duct.

A wide Kocher manoeuvre is mentioned in modified Puestow’s were never needed in our cases.

Exposure of anterior surface of the pancreas

After thorough exploration, the entire anterior surface of the pancreas was completely exposed. With care taken to spare the gastroepiploic vessels, the lesser sac was opened with ligation and division of the gastrocolic omentum. The gastrocolic ligament was divided as far to the left as possible (almost reaching the hilum of the spleen) in order to completely expose the tail of the pancreas. The transverse colon retracted down.

Complete separation of the pancreas from the stomach was achieved so that the stomach can be retracted up completely for placement of the sutures during the longitudinal pancreatico-jejunostomy.

Special attention was paid to identifying the superior mesenteric vein (SMV) within the fibrosed adhesions and avoiding avulsion of the branches of this vessel. The pancreatic head was palpated for stone. Identification and opening of the pancreatic duct

By palpation and aspiration with a 20-gauge needle yielding clear pancreatic juice. We took an incision over the needle to enter into the pancreatic duct.

In cases where stones were palpable, the pancreatic parenchyma is cut on the duct in the area of the stone to gain access to the duct. The stones are then retrieved from the open duct. Pancreatic calculi being retrieved from the dilated pancreatic duct.

Complete pancreatic duct clearance was the main aim after ductotomy.

Final Anastomosis:

Roux-y wide and adequately long (minimal of 8cm. onwards) pancreatico-jejunostomy was done with 4/0 polyglactin acid material with interrupted or continuous sutures depending upon pancreatic tissue friability.

For 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 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.

Postoperative care

Nasogastric decompression was continued postoperatively until bowel function resumes. Oral intake was resumed as after 3 days.

Results

Table 1 clearly shows male predominance 83.67% with commonest aetiological factor is alcohol 73.46%, followed by biliary calculi 20.40%, and other causes are 6.12%.

Table 2 shows symptomatology before and after surgery. The pain was relieved immediately postoperative in all 49(100%). The Wong-Baker FACES pain rating score was above 6 for all patients who improved to 0-2.

Weight loss was in 45 patients; after the surgery, 37 (82%) patients gain weight to normal.

Malabsorption related symptoms were present in 31 patients, out of which 26(84%) patients had a good recovery. Fluctuation in sugar levels observed in 12 patients despite regular adjustment of antidiabetic drug doses. However, after the surgery, it was easy to control their diabetes mellitus with suitable fix antidiabetic drugs.

22 (44.89%) patients had 7-9mm.,18 (36.73%) had 9-12mm., 8 (16.32%) had 12-15mm and only one (2%) had 17mm pancreatic duct size. The complications rate was very low and were never life-threatening.

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 adjuncts to evaluating the exact location of the calculi and duct system anatomy. Moreover, ERCP may be therapeutic if the stones are extracted.
**Table 1** Gender and aetiology

| Gender and aetiology | alcoholic | biliary | others | total |
|----------------------|-----------|---------|--------|-------|
| male                 | 36        | 5       | 2      | 41    |
| female               | 0         | 5       | 1      | 06    |
| total                | 36        | 10      | 3      | 49    |

**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                      | 43     | 43    | 40     | 32    | 28     | 24    | 10     | 10    |
| female                    | 6      | 6     | 5      | 5     | 3      | 2     | 2      | 2     |
| total                     | 49     | 49    | 45     | 37    | 31     | 26    | 12     | 12    |

**Table 3** Size of the pancreatic duct on MRCP.

| Gender and size | 7-9 mm | 9-12 mm | 12-15 mm | >15mm |
|-----------------|--------|---------|-----------|-------|
| male            | 20     | 15      | 7         | 1     |
| female          | 2      | 3       | 1         | 0     |
| total           | 22     | 18      | 8         | 1     |

**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 5** Surgical procedures performed in chronic pancreatitis

| Decompression/drainage operations | Resection procedures |
|-----------------------------------|----------------------|
| Longitudinal pancreaticojejunostomy (modified Puestow procedure) | pancreaticoduodenectomy (Whipple procedure) |
| Lateral pancreaticojejunostomy    | beger procedure (duodenum-preserving pancreatic head resection) |
| Lateral pancreaticoduodenostomy   | Frey procedure (resection of the pancreatic head with longitudinal pancreaticojejunostomy) |
| Pancreatic pseudocyst drainage    | Total pancreatectomy and islet cell autotransplant Distal pancreatectomy |
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 resistant to other measures. Examples of the commonly used surgical procedures in the management of chronic pancreatitis are shown in Table 5.

Drainage procedures are performed when there is a widely dilated main pancreatic duct (>6–7 mm), 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 two years in 60% of patients. In our study, all patients had a pancreatic duct size of more than 7 mm. We got instant relief in 100% of patients, weight gain in 82% of patients and relief from abdominal discomfort symptoms in 84% of cases. In a diabetic patient, sugar was controlled well with steady doses of antidiabetic drugs after surgery. Follow up from last one year to twenty-seven years without any pain and enjoying a comfortable lifestyle. Five elderly patients of age more than 65 died later due to cirrhosis of the liver and Five due to other reasons, but they never experienced pain due to chronic pancreatitis. We found that complication rates are very low and easily manageable.

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

However, when a patient does not respond to any conservative management, some kind of drainage procedure could help the patient. In our series, we found that Modified Pustow’s longitudinal pancreatico-jejunostomy gives excellent results from all symptomatology with improvement in lifestyle. Patients with the large pancreatic duct that failed the endoscopic approach should undergo Modified Puestow’s surgery.

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Conflict of interest

There are no conflicts of interest to declare by any of the authors of this study.

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