



# Shaheed Procedure: An Innovative Technique in the Management of Chronic Pancreatitis Calculous

**Md. Shahidur Rahman <sup>a++</sup>, Syeed Mehbub Ul Kadir <sup>b#\*</sup>,  
Md. Saifur Rahman <sup>c†</sup>, Amena Sharmeen <sup>d‡</sup>  
and Zefrin Akter <sup>e‡</sup>**

<sup>a</sup> *Hepatic and Biliary Surgery, Bangabandhu Sheikh Mujib Medical University, Bangladesh.*

<sup>b</sup> *Sheikh Fazilatunnesa Mujib Eye Hospital and Training Institute, Bangladesh.*

<sup>c</sup> *Department of Surgery, 250 Bed District Hospital, Magura, Bangladesh.*

<sup>d</sup> *Northern International Medical College, Dhaka, Bangladesh.*

<sup>e</sup> *Bangabandhu Sheikh Mujib Medical University, Bangladesh.*

## **Authors' contributions**

*This work was carried out in collaboration among all authors. Authors Md. Shahidur Rahman, SMUK and Md. Saifur Rahman designed the research study, procured the samples, performed the experiments, and interpreted the results. Authors Md. Shahidur Rahman, Md. Saifur Rahman, AS and ZA designed and performed the statistical analyses. Author SMUK provided critical input. Authors Md. Shahidur Rahman, Md. Saifur Rahman, AS and ZA wrote the first draft of the manuscript with information from all coauthors. Authors Md. Shahidur Rahman, SMUK and Md. Saifur Rahman contributed to critical appraisal of the manuscript. All authors read and approved the final manuscript.*

## **Article Information**

### **Open Peer Review History:**

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: <https://www.sdiarticle5.com/review-history/109538>

**Original Research Article**

**Received: 24/10/2023**

**Accepted: 29/12/2023**

**Published: 03/01/2024**

<sup>++</sup> *Professor;*

<sup>#</sup> *Assistant Professor*

<sup>†</sup> *Senior Consultant;*

<sup>‡</sup> *Consultant;*

<sup>\*</sup>*Corresponding author: E-mail: mehbubkadir@gmail.com;*

## ABSTRACT

**Aim:** To describe a new technique (Shaheed Procedure, single anastomosis-based side-to-side lateral pancreaticojejunostomy) instead of two anastomoses of Roux-en-Y pancreatic jejunostomy for chronic pancreatitis calculous.

**Methods:** The Prospective longitudinal study was carried out in three tertiary-level hospitals in Bangladesh from 2010 to 2018. All the cases were diagnosed as chronic calculous pancreatitis with a dilated central pancreatic duct. The duct diameter is 6mm and above. The commonest investigation was ultra-sonography, and ERCP was carried out in all cases. The patients were subjected to surgery only when their pain was intractable and not responding to analgesics. A single anastomosis-based Pancreatic-Jejunostomy was made for all cases instead of the two-step anastomoses of Roux-en-Y pancreatic-jejunosomy. Postoperative assessment of their clinical and biochemical features was done every three months.

**Description of Technique:** The transverse colon with mesocolon is lifted upwards after incision. A longitudinal incision was made and exposed the whole length of the Pancreas. The anastomosis was made at the antero-inferior surface of the Pancreas, the most dependent part. The jejunal loop selected for anastomosis is 56 cm away from the DJ flexure, held by two Babcock forceps. No Rouxen Y anastomosis.

**Results:** A total of 146 cases were evaluated in this study, including 76 male and 70 female patients. Age ranges from 15 years to 54 years. Complications like abdominal bleeding and anastomotic leakage did not happen in the postoperative period. Long-time follow-up was six years, and short-time follow-up was only one month. The total operating time is 90 to 120 minutes, with minimal blood loss. No recurrence and postoperative complications were observed in the follow-up time. The pain was relieved in 96% of cases postoperatively. Single anastomosis, shorter operating time, less morbidity with zero mortality rate.

**Conclusion:** The new technique is a new option with better outcomes in pancreatic calculi management's drainage and decompression procedure.

*Keywords: Chronic calculous pancreatitis; new technique; single anastomosis; pancreaticojejunostomy; shaheed procedure.*

## 1. INTRODUCTION

In chronic calculous pancreatitis, pain is the predominant symptom. Over time, it becomes intractable. It hampers patients' daily activities, causing them to become unresponsive to drug treatment. The aetiology of pain is multifactorial. Pain in pancreatitis is due to perineural inflammation; [1,2,3] ductal hypertension caused by stones or stricture is the primary cause of pain in chronic pancreatitis [4-9]. Among the different modality treatments, surgical treatment is the last option. Surgical options are resection, decompression and a combination of resection and decompression. Many authors have introduced several procedures. Depending on the benefit of surgery, the surgeon chooses the best option. Extended drainage operations such as Beger [5] and Frey [6] were quickly adopted in Europe and have proven equally effective in morbidity, mortality, and pain relief. Proponents of drainage procedures such as lateral pancreaticojejunostomy (LPJ) and modified Puestow or Partington procedure sufficiently

decompress the affected ductal system. A resection procedure like pancreaticoduodenectomy that removes the affected head of the Pancreas with affected neural tissue is mandatory because the head is the pacemaker in chronic pancreatitis. Stone removal decreases pain; additionally, restitution of pancreatic duct flow improves the physiological function of the Pancreas [10-12]

Roux-en-Y pancreatic-jejunosomy is well-accepted in pancreatic resection and drainage procedures. There are two anastomoses in this procedure: pancreatic jejunostomy and jejuno-jejunosomy.

Here, the author introduced the "Shaheed Procedure" as an alternate procedure. A long segment defunctioning jejunal loop (25 - 30 cm) is used for pancreatic-jejunosomy anastomosis. The straightforward procedure is only one anastomosis, side-to-side lateral pancreaticojejunostomy. It maintains normal anatomical and physiological pathways.

## 2. MATERIALS AND METHODS

This is a prospective Longitudinal study in Bangabandhu Sheikh Mujib Medical University, and Prime Hospital in Savar City in Bangladesh. The study period is from January 2010 to December 2018. All the cases were diagnosed as chronic calculous pancreatitis with a dilated central pancreatic duct. The duct diameter is 6mm and above. The most common investigation was ultrasonography (Fig. 2) in all cases. CT scan, ERCP (Fig. 3) and MRCP are also used in some cases. Non-complicated cases like a pseudo-pancreatic cyst, CBD stricture and stone were included in this study.

Malignant cases are not included. Viral screening like B and C viruses completed all the patient and surgical team safety cases. Cancer markers were done as a routine study. They had pancreatic calcification on the plain abdominal radiograph. Depending on the calculi position, they are graded (Table 1) into I, II, and III. Gr. I-stone in the head, Gr. II-stone at head and body, Gr. III-stone throughout the Pancreas (Fig. 1).

A scoring system was made to grade the pain. Its intensity (I), frequency (F) and consequences (C) were assessed at every visit to determine a "pain score".

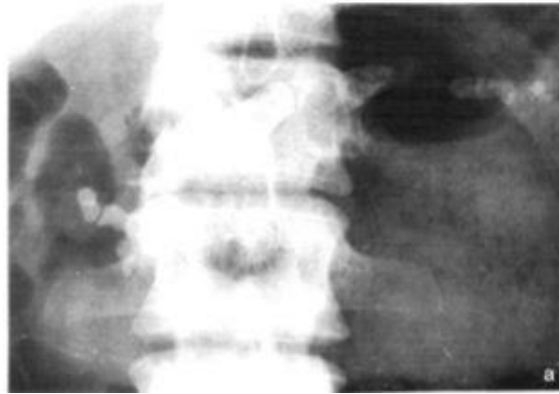


Fig. 1. A plain x-ray of the abdomen shows gr. III calcification

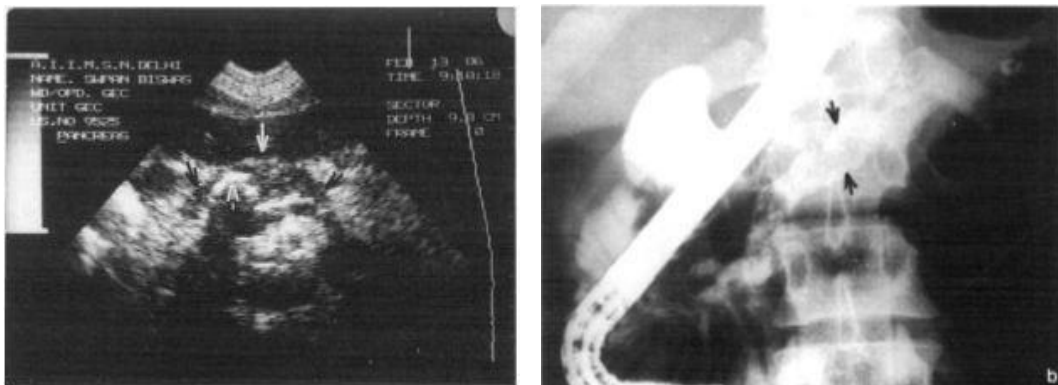


Fig. 2. Ultrasonography and Fig. 3. ERCP shows a dilated central pancreatic duct

Table 1. Grading of Pancreatic Calcification

Pain	Grade No.	Calcification grade (No.)			Duration (yrs)
		Grade I	Grade II	Grade III	
No Pain					
Mild					
Moderate	3	5	4	7-9	
Sever	5	16	29	4-8	

Intensity (I) was given a score of 0 to 8 on the following scale:

- No pain I<sub>0</sub>
- Insignificant pain (only on direct questioning) I<sub>2</sub>
- Mild pain I<sub>4</sub>
- Moderate pain (analgesics regularly required but no drug dependency) I<sub>6</sub>
- Severe pain (Drug dependency present and sleep disturbed regularly) I<sub>8</sub>

Frequency (F) and consequences (C) were also assigned maximum scores of 8 each, but the latter comprised four scores of two different subcategories (Table 2). Thus, the eight F scores comprised four pain episodes/year and 4 of duration/year, as shown below. Similarly, C was assessed by two different parameters, each comprising a maximum score of 4.

The maximum possible score of I, F, and C together was thus 24. Depending on the sum of the three sets of scores (I, F and C) for an individual patient, they were categorized as having mild (scores 1-8), moderate (scores 9-14) or severe (scores 15-24) pain. Every patient had a thorough physical examination, including weight and height measurement, to calculate the body mass index (weight in kg/height in meters. [2,13,14] Investigations included routine blood chemistry, ultrasonography, a plain film of the abdomen, and endoscopic retrograde cholangiopancreatography (ERCP). The patients were subjected to surgery only when their pain was intractable, i.e., not responding to mild analgesics and when it interfered with their daily activities. Postoperative assessment of their clinical and biochemical features was done every three months.

## 2.1 Description of the Technique

Under general anaesthesia by rooftop, the incision abdomen is opened. The transverse colon with its mesocolon is pulled upwards. The Pancreas is palpated at the base of peritoneal

attachments, covering the Pancreas. A longitudinal incision at this peritoneum exposes the whole length of the Pancreas. The Pancreas's normal anatomy is prism-shaped, with three borders and three surfaces. Anastomosis is made at the anteroinferior surface of the Pancreas, the most dependent part. This surface is easily identified. By finger palpation, the central pancreatic duct with its stone is fixed. Using a knife, a longitudinal incision is given at the central pancreatic duct, where a stone will quickly come out, along with stone-thick pancreatic debris being expelled. A metallic dilator is introduced towards the tail first. Over the dilator, scissors are used to extend the incision, then a metallic dilator is introduced towards the head, and the incision is extended towards the head. This incision will reach close to the duodenal wall, about 1 cm from it. The incision will reach near the hilum of the spleen if the duct is dilated. All stone fragments are removed by thorough dissection, and any inflammatory mass, even of small size, is dissected and removed. Any stricture band with calcification is removed. The whole length of the duct becomes a single unobliterated channel. The duct length goes to the right side of the gastroduodenal artery. Any stone in the wiring and Santorini duct were also removed, and both ducts decompressed. The minimum Frey procedure is used for the inflammatory mass at the head.

The jejunal loop selected for the anastomosis is 5-6 cm away from the DJ flexure, held by two Babcock forceps. At its anti-mesenteric border, the jejunum is opened by scissors. The length is the same as the length of the MPD. Using 3-0 silk, anastomosis starts from the tail. Two pieces of silk are used, one for the lower leaf and one for the upper leaf. The stitch is continuous with regular intervals of tight knots. Anastomosis is watertight. There is no other anastomosis. Any leakage is checked. Keeping one drain at the anastomotic site, the abdomen is closed in layers. A nasogastric tube is introduced for gastric decompression.

**Table 2. Scoring System**

Scores	0	1	2	3	4
<b>(F) Frequency</b>					
of pain episodes/year	3	4-6	7-9	10-12	12
duration in hours/ episode	<12	12-24	24-48	48-78	72
<b>(C) Consequences</b>					
work loss in months/ year	0	1	2-4	5-8	8
No. of hospitalizations/ year	0	4	5-8	9-12	12

### 3. RESULTS

The entire case is 146. The male is 76, and the female is 70. Age ranges from 15 years to 54 years. No abdominal catastrophes like bleeding and anastomotic leakage happened in the postoperative period. Long-time follow-up is 6 yrs. Short-time follow-up is only one month. The mean ± SD follow-up time was 22.84±17.84 months. Most patients came from the low socio-income group. All are non-alcoholic. All patients are leaving with physical and mental peace. None developed pancreatitis.

The ERCP and ultrasonography are summarized in Table No. 3

Few have diabetes, but none have diarrhoea. After the operation, all patients kept nothing per oral for four days. A drain was kept for seven days to observe any leakage.

The total operating time is 90 minutes to 120 minutes. Blood loss is 20 ml to 40 ml. The length of the hospital stay is from 7 days to 10 days. The total follow-up period is six years.

Transverse ultrasonography shows markedly with gr. III calcification. Dilated central pancreatic duct (arrows show outer border) with echogenic shadow at the head and body of the Pancreas.

### 4. DISCUSSION

Roux-en-Y pancreatic-jejunostomy is the accepted method in surgical operation of the Pancreas, stomach, liver, and biliary tree diseases. It includes two anastomoses. Long-time surgery, a long jejunal loop that may cause

blind loop syndrome, adhesion, twisting, and obstruction.

In my new technique, I choose only the small loop of the jejunum about 5-6 cm away from the DJ flexure. It lies in very close proximity to the tail of the Pancreas. This 5-6 cm long jejunum is optimum for making anastomosis. It causes no tension after anastomosis. In Roux-en-Y anastomosis, usually, a hole is made in the gastro-colic omentum. So, chances of herniation prevailed. But here, there is no chance of herniation. Anastomosis is made at the anteroinferior surface of the Pancreas, most dependent on all body postures—no droplets of food stick at the anastomotic site. The digested food materials are microparticle liquid, coming out in small quantities with isoperistaltic waves; there is abundant space at the jejunal loop at the anastomotic site, so no leakage happens. The results of the Partington procedure are summarized in the Table. No.4 [3,11-20].

Pain is relieved by 66 to 91% in a mean follow-up of 3.5 to 9.1 years. Morbidity and mortality rates are 20% and 2% respectively [11,12,21] In the Partington procedure, pain recurrence is more in 30% of cases because the wiring duct with stone remains undrained [22].

It is important to note that the Partington procedure only applies to inflammatory mass in the Pancreas at its body left to the gastroduodenal artery, not to inflammatory mass at the head [23,24].

In this new innovative procedure, we have taken advantage of removing the inflammatory mass

**Table 3. ERCP and ultrasonography of the study group**

Abnormality	Ultrasound (146)		ERCP (78)		MRCP (146)	
	No.	%	No.	%	No.	%
Ductal Dilatation	146	100	78	100	146	100
Detection of calculi	146	100	78	100	146	100
MPD dilatation on US: block by ERCP	146	19.35	78	64.28	146	
US & ERCP both show blockage of MPD	46	12.90		57.14		

**Table 4. Results of parting ton procedure for chronic pancreatitis**

Refer ence	year	No. of Pts	operative Mortality %	Mean Follow up	Pain relief%
Shahid et al.	2010-2018	146	0	6 yrs	96%

**Table 5. Result of our series**

References	year	No. of Pts	Operative mortality %	Mean follow-up years	Pain relief%
Nealon et al.	2001	124	0	6.5	86
Delcore et al.	1994	28	-	3.5	86
Greenlee et al.	1990	50	4.2	7.9	82
Bradley	1987	48	0	5.8	66
Sato et al.	1986	43	0	9.1	91
Holmberg et al.	1985	51	0	8.2	72
Warsaw	1985	36	3.0	3.6	83
Sarles et al.	1982	69	4.2	5	85

and stone at the head, body, and tail. The success rate is very high. That's why pain recurrence is significantly less in my series (Table 5) [24-30].

#### 4.1 Advantages of the new technique:

- A. Single anastomosis
- B. Shorter operating time
- C. Bleeding is very minimal.
- D. Morbidity and mortality are zero.
- E. No internal herniation.
- F. No attack of pancreatitis
- G. Pain recurrence is 3-4%
- H. Exocrine and endocrine functions are preserved.
- I. Splenectomy and removal of the tail of the Pancreas are not done.
- J. There is no need to mobilize the pancreatic posterior surface.

This procedure is better than any previous procedure, compared to the result of the Partington procedure in Table 4.

## 5. CONCLUSION

It is a new option in the drainage and decompression procedure of pancreatic calculi management without Roux. It gives the best result in pain management. There was no significant complication development in the study period. It is an extensive study and a short time follow-up.

Further, long-time follow-up and multicenter studies can be appreciated for future direction. Hepatobiliary and pancreatic surgeons worldwide can accept this as an alternate procedure.

## CONSENT

As per international standards or university standards, patient(s) written consent

has been collected and preserved by the author(s).

## ETHICAL APPROVAL

As per international standards or university standards written ethical approval has been collected and preserved by the author(s).

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

## REFERENCES

1. Bockman DE, Biichler M, Malfertheiner P, Beger HG. Analysis of nerves in chronic pancreatitis. *Gastroenterology*.1988;94:1459-69.
2. Bradley EL. Pancreatic duct pressure in chronic pancreatitis. *Am J Surg*.1982;144:313-6.
3. Steer ML, Waxman I, Freedman S, Chronic pancreatitis. *N Engl J Med*. 1995;332:1482-1490.
4. Ohara H, Hoshino M, Hayakawa T et al. Single-application extracorporeal shock wave lithotripsy is the first choice for patients with pancreatic duct stones. *Am J Gastroenterol*. 1996;91: 1388-1394.
5. Ebbehøj N, Borly L, Bulow J, Rasmussen SG, Madsen P. Evaluation of pancreatic tissue fluid pressure and pain in chronic pancreatitis: a longitudinal study. *Scand J Gastroenterol*. 1990;25:462-466.
6. Karanjia ND, Reber HA. The cause and management of the pain of chronic pancreatitis. *Gastroenterol Clin North Am*. 1990; 19:895-904
7. Kloppel G. Pathology of chronic pancreatitis and pancreatic pain. *Acta Chir Scand*.1990; 156:261-265

8. Beger HG, Krautzberger W, Bittner R, Buchler M, Limmer J, Duodenum – Preserving resection of the head of the Pancreas in patients with severe chronic pancreatitis. *Surgery*. 1985; 97:467-73.
9. Frey CF, Smith GJ. Description and rationale of a new operation for chronic pancreatitis *Pancreas*. 1987;2:701-7.
10. Nealon WH, Townsend CM, Jr, Thompson JC. Operative drainage of the pancreatic duct delays functional impairment in patients with chronic pancreatitis: a prospective analysis. *Ann Surg*. 1988; 208:321-329
11. Greenlee HB, Prinz RA, Aranha GV. Long-term results of side-to-side pancreatojejunostomy. *World J Surg*. 1990;14:70-76.
12. Adler DG, Lichtenstein D, Baron TH, et al. The role of endoscopy in patients with chronic pancreatitis. *Gastrointestinal Endosc*. 2006;63:933-937.
13. Sherman S, Lehman GA, Hawes RH et al. Pancreatic ductal stones: frequency of successful endoscopic removal and improvement in symptoms. *Gastrointestinal Endosc*. 1991;37:511-517.
14. Adamek HE, Jacobs R, Buttmann A, Adamek MU, Schneider AR, Riemann JF, et al., Long-term clinical outcome after endoscopic pancreatic ductal drainage for patients with painful chronic pancreatitis. *Clin Gastroenterol Hepatol*. 2004; 2:1096-1106.
15. Rao KN, Van Thiel DH, Pancreatic stone protein: what is it and what does it do? *Dig Dis Sci*. 1991; 36:1505-1508.
16. Tanaka T, Miura Y, Ichiba Y, Jtoh H, Dohi K. Experimental pancreatolithiasis: Association with chronic alcoholic pancreatitis. *Am J Gastroenterol*. 1992; 87:1061.
17. Midha S, Khajuria R, Shastri S, Kabra M, Garg PK. Idiopathic chronic pancreatitis in India: phenotypic characterization and solid genetic susceptibility due to SPINK1 and CFTR gene mutations. *Gut* 2010;59: 800-807.
18. O'Neil SJ, Aranha GV. Lateral pancreatojejunostomy for chronic pancreatitis. *World J Surg*. 2003; 27:1196–202.
19. Duffy JP, Reber HA. Surgical treatment of chronic pancreatitis. *J Hepatobiliary Pancreat Surg*. 2002;9:659–68.
20. Gourgiotis S, Germanos S, Ridolfi MP. Surgical management of chronic pancreatitis. *Hepatobiliary Pancreat Dis Int*. 2007; 6:121–33.
21. Nealon WH, Matin S. Analysis of surgical success in preventing recurrent acute exacerbations in chronic pancreatitis. *Ann Surg* 2001;233:793–800.
22. Delcore R, Rodriguez FJ, Thomas JH, Foster J, Hermreck AS. The role of pancreatojejunostomy. *Am J Surg*. 1994; 168:598–602.
23. Greenlee HB, Prinz RA, Aranha GV. Long-term results of side-to-side pancreatojejunostomy. *World J Surg*. 1990;14:70–6.
24. Bradley EL. Long-term results of pancreatojejunostomy in patients with chronic pancreatitis. *Am J Surg*. 1987;153:207–13.
25. Sato T, Miyashita E, Yamauchi H, Matsuno S. The role of surgical treatment for chronic pancreatitis. *Ann Surg*. 1986; 203:266–71.
26. Holmberg JT, Isaksson G, Ihse I. Longterm results of pancreatojejunostomy in chronic pancreatitis. *Surg Gynecol Obstet*. 1985;160:339–46.
27. Warshaw AL. Conservation of pancreatic tissue by combined gastric, biliary, and pancreatic duct drainage for pain from chronic pancreatitis. *Am J Surg*. 1985; 149:563–9.
28. Sarles JC, Nacchiero M, Garani F, Salasc B. Surgical treatment of chronic pancreatitis. Report of 134 cases treated by resection or drainage. *Am J Surg*. 1982;144:317–21.
29. Frey CF, Suzuki M, Isaji S. The Treatment of chronic pancreatitis complicated by obstruction of the common bile duct or duodenum. *World J Surg*. 1990;14:59–69.
30. Ceppa EP, Pappas TN. Modified Puestow lateral pancreatojejunostomy. *J Gastrointestinal Surg*. 2009;13:1004–8.

© 2024 Rahman et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

*Peer-review history:*

*The peer review history for this paper can be accessed here:*  
<https://www.sdiarticle5.com/review-history/109538>