

Surgical Treatment of Chronic Pancreatitis: A Literature Review

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Abstract

Chronic pancreatitis (CP) is a continued inflammatory disorder leading to the irreversible destruction of the pancreas which results in disabling chronic pain and permanent exocrine and endocrine dysfunction. The management of CP is a challenging task for surgeons. New methods are needed for the early diagnosis of CP, and new therapies are needed to determine whether the interventions will delay or prevent the progression of the irreversible damage characterizing end-stage CP. The increasing knowledge about the pathophysiology of CP, introduction of sophisticated diagnostic methods in clinical practice and vast gains in surgical skills have immensely improved the outcome of CP patients. The introduction of new surgical techniques has led to better control of pain and other clinical presentations of CP.

Key words: Pancreatitis, Pathophysiology, and Techniques

INTRODUCTION

The utilization of several advances in molecular and genomic technologies along with the progress in pancreatic imaging techniques has provided remarkable insight into genetic, environmental, immunologic, and pathobiological factors leading to chronic pancreatitis (CP). The heterogeneity of the patient population and symptoms, as well as the poor understanding of the pathophysiology in patients with CP, is the obstacles in the effectiveness of patient treatment. The symptom triad of CP includes exocrine and endocrine pancreatic insufficiency and recurrent episodes of pain, which brings patients to their physicians and causes addiction to analgesics. Profound and intractable pain is the main clinical feature in approximately 90% of patients and has the worst impact on quality of life.¹ Although the conservative management may be successful in some patients, the remission of pancreatic pain is uncommon and not consistently observed.² Usually,

the initial step of managing CP is non-specific conservative medical therapy. After the optimization of symptoms with analgesics and enzyme supplementation, patients with persistent symptoms are candidates for invasive treatments. The vast progress in surgical and interventional techniques has significantly minimized the morbidities and mortality rates.

SURGICAL TREATMENT

Treatment of patients suffering from the complications of CP remains a major challenge. Surgical treatment of CP has seen its ups and downs in recent decades. The risks of pancreatic surgery initially were high in the past. The pathophysiology of the disease was, and partially still is poorly understood. An appropriate surgical procedure has therefore proven difficult to devise. The choice of surgical procedure is rarely straightforward, and other factors like disease location, prior treatment, and suspicion of cancer have an impact on surgeon's decision.

The operative procedures to relieve the pain are decompressive, or resectional surgery. These two approaches differ on the basis of pathophysiological theories of the etiology of the pain. Proponents of drainage procedures such as the lateral pancreaticojejunostomy (LPJ), which

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is also known as the modified Puestow procedure or Partington procedure, insists that decompressing the affected ductal system suffices, whereas proponents of resectional procedures such as pancreaticoduodenectomy argue that removing the portion of pancreas with affected neural tissue, especially the pancreatic head, is mandatory because the pancreatic head is a pacemaker in CP.³ The surgery most often used in the treatment of CP since 1950 was pancreaticoduodenectomy, which has proved to be beneficial in controlling the pain, and complications of CP.^{4,5} Actually this procedure was used for resection of periampullary malignancies, but it has also been introduced for the surgical management of patients with CP. Even though, the Whipple procedure, is successful in achieving the goal of pain relief and managing the complications, but it is associated with poor long-term results regarding the quality of life,^{6,7} while the morbidity rates range between 30% and 50%.⁸ Also, the sacrifice of otherwise healthy organs, i.e., the distal stomach, duodenum, and common bile duct, is the major disadvantage of this procedure. Even with the modification of Longmire and Traverso,⁹ which contributed significantly to the reduction in morbidity and mortality of pancreaticoduodenectomy, glandular function deterioration remained a problem that developed in 50% of the patients.^{10,11} In their study, Müller *et al.*¹² described the three major problems faced by patients who underwent pylorus-preserving pancreaticoduodenectomy (PPPD) for CP: They found the increased incidence of post-operative transient delayed gastric emptying (30-50% of patients), which often led to slower weight gain; the risk of cholangitis; and resulted in long-term irreversible loss of exocrine and endocrine pancreatic function in more than 45% of patients. Sawyer and Frey¹³ emphasized that distal pancreatectomy (DP) as a surgical option in CP should be utilized in patients with diseases restricted to the pancreatic body, tail, or both with pancreatic duct diameter <5 mm. With a mean follow-up of 4 years, they found that adequate pain relief was achieved in 90% of patients with distal disease. On the other hand, good pain relief was recorded, by Rattner *et al.*¹⁴ in only 31% of patients in whom DP was done for distal CP. In two recent studies, spleen preserving DP achieved the pain control in 72-82% of patients with CP.^{15,16} As ductal ectasia is observed in 40-60% of patients with painful CP, decompression of the pancreatic ductal system has become one of the main therapeutic principles. This is based on the assumption that ductal ectasia suggests the intraductal hypertension.^{17,18}

Coffey¹⁹ and Link²⁰ first described the concept of opening the main pancreatic duct with bypass of the obstruction. Duval²¹ and Zollinger *et al.*²² were the first to apply this principle in clinical applications, independently. The decompression of the main pancreatic duct was achieved by the resection of the pancreatic tail, and retrograde drainage

of the pancreatic duct via end to end, or end to LPJ. However, this procedure was effective in patients with a single dominant obstruction between the pancreatic tail and the ampulla of Vater. However, single dominant strictures, or obstruction is rarely found in patients with alcohol abuse, which is the major cause of CP in the most of the patients in the western hemisphere. But relapses of severe pain are frequently observed, even with patent drainage of the duct system. In 1956, Puestow and Gillesby²³ presented another drainage procedure: In which the decompression of the main pancreatic duct was achieved by a longitudinal side to side pancreaticojejunostomy after resection of the pancreatic tail and splenectomy. In 1960, Partington and Rochelle²⁴ proposed a modification in which the jejunum is directly anastomosed to the anterior surface of the pancreas. This simplification not only allows the preservation of the spleen but also reduces the amount of pancreatic mobilization that is required, thereby decreasing the operation time and blood loss. They also suggested that the whole length of the ductal from the tail of the pancreas to the pancreatic head should be laid open for anastomosis with jejunum; this extended decompression benefits as the removal of pancreatic duct calculi is greatly facilitated. A review of numerous series with this procedure reports that LPJ relieves the chronic abdominal pain in 65-93% of patients²⁵⁻²⁷ Morbidity and mortality rates are low, averaging 20% and 2%, respectively.²⁵⁻²⁹ Nealon and Matin³⁰ reported the largest series, in which they reviewed the surgical treatment of 124 patients with CP who had undergone a modified LPJ. They found that 106 of 124 patients, at a mean follow-up of 6.5 years, had completed the resolution of pain as defined by an absence of narcotic use. Successful operation seems to be related to both technique and patient selection. Bradley²⁵ has emphasized that the ductal decompression of <6 cm is associated with inadequate relief of pain compared with >6 cm of decompression. Furthermore, duct size >7 mm also correlated with success. With advances in minimal access the technical feasibility of laparoscopic LPJ has been finally described by Tania *et al.*³¹ and Kurian and Gagner.³² Even with these encouraging outcome, long-term follow-up of patients after LPJ reveals 10-35% patients fail to obtain any pain resolution and symptoms recurrent develop in up to 50% of patients.^{29,33} The reasons for the greater usage of drainage procedures in CP in comparison to resectional procedures, i.e., partial pancreaticoduodenectomy (classical Whipple procedure) or more recently PPPD (Longmire–Traverso procedure) is significantly decreased morbidity and mortality as postulated and at least actually recorded in older series. Pain relief is obtained in 60-80% of cases who have dilated duct, i.e., ductal diameter >7 mm, by doing a traditional drainage procedure, i.e., Partington–Rochelle’s longitudinal pancreaticojejunostomy.^{34,35} Lower mortality and morbidity rates and the preservation of

pancreatic function are the main advantages of these drainage procedures. However, 20-40% of patients will not be helped from these drainage operation.^{18,34,35} In order to improve the long-term outcome in patients with CP and to limit the resection of pancreatic tissue to a minimum, the duodenum-preserving pancreatic head resection (DPPHR) was introduced by Beger *et al.*³⁶ in the 1970. This procedure is indicated in intractable abdominal pain, small duct CP, and head dominant disease. While it is contraindicated in conditions where pancreatic cancer cannot be excluded.³⁷ Surgical technique involves subtotal head resection with ventral transection of the pancreatic neck. The reconstruction is with Roux-en-Y loop of jejunum anastomosed to the distal pancreatic remnant, and the rim of pancreatic tissue along the inner surface of the duodenum.³⁸ The main concern of this technique is to deal with the enlarged pancreatic head, where the disease is usually present, and to spare the duodenum, which has a great role in the regulation of digestion and glucose metabolism. Beger *et al.*³⁷ presented their 26 years experience with this procedure in 504 patients with CP and pancreatic head inflammatory mass. With a median follow-up of 5.7 years, they concluded that 91.3% of patients got relief from pain following the Beger's procedure, and that the hospital mortality was 0.8%, and the late death rate was 8.9-12.6%, compared to 20.8-35% for the patients without surgery.

In a randomized trial, 20 patients underwent Beger's technique and Whipple's procedure each. It was observed that the patients undergoing Beger's technique had significantly better results with less pain, increased post-operative weight gain, and better glucose tolerance at a 6 months follow-up.³⁹ In 1987,⁴⁰ a modified Beger's technique was innovated by Frey. In this procedure, LPJ was done after subtotal DPPHR. This modified approach avoids more technically difficult aspects which are the division of the pancreatic neck, and the need for two separate pancreatic anastomoses in Beger's technique.⁴¹ The coring in the head of the pancreas allows the debulking of head tissue with opening of the main pancreatic duct as it courses posteriorly toward the duodenum and thus provides more effective drainage.⁴¹ So it is indicated in patients who have "head-predominant" disease with the belief that the pancreatic head, with fibrotic and obstructed ducts, is not properly taken care of with simply decompression of the main pancreatic duct with the Puestow procedure.⁴¹ It is also has advantage for small duct CP, and for patients with mild dilation and stricture of the proximal pancreatic duct.^{40,41} The suspicion of malignancy in head of pancreas is a contraindication to Frey's surgery.⁴¹ This modified technique innovated by Frey combines a longitudinal pancreaticojejunostomy as described by Partington and Rochelle with a local excision of the pancreatic head and

duodenum preserving excision. In this "extended drainage" procedure (Frey's) pancreatic transection above the portal vein is avoided. A longitudinal pancreaticojejunostomy is attached to the excised cavity of the head, body, and tail of the pancreas, draining almost whole of main duct. This alternative procedure with varying extent of resection, leads to substantial pain relief in 80-90% of patients.^{42,43} As reported in the literature and various recent prospective randomized trials, the results of the "extended drainage" operation (Frey) in terms of pain resolution and tackling of pancreatitis - associated complications of adjacent organs match those of the resection procedures, such as the partial pancreateoduodenectomy according to Whipple, the PPPD according to Longmire and Traverso and Beger. The intermediate and long-term achievements in terms of preservation of pancreatic function, and social and occupational rehabilitation were also reported to be comparable after Frey and Beger.^{42,43} However, Frey's procedure is technically easier, has significantly lower morbidity. The argument of an increased mortality associated with the resectional procedures such as Whipple^{9,44} Longmire, and Traverso^{45,46} or Beger^{45,46} cannot be used any further in favor of drainage operations, as the mortality of has come down to nearly nil in experienced centers. However, the extended draining procedures are still favored for significantly lower peri- and post-operative morbidity associated with them. Moreover, with the "extended drainage" technique and Beger procedure,^{45,46} there is a definitive advantage in terms of development of endocrine and exocrine pancreatic dysfunction as compared to Whipple^{9,44} or Longmire-Traverso.^{45,46}

CONCLUSIONS

It has been observed that the surgical treatment provides better long-term resolution of pain, a good post-operative quality of life with the preservation of endocrine and exocrine pancreatic function. Surgical procedures are associated with low early and late mortality and morbidity when curtailed as per patient requirement. It is obvious that new studies are needed to judge which procedure is the most beneficial for the management of the particular patients with CP.

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