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Surgical treatment of pain in chronic pancreatitis

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Abstract

Purpose of review—Patients suffering from chronic pancreatitis often require surgical intervention to treat their disease. This review discusses surgical options as well as reviews current trends and research in the operative management of chronic pancreatitis.

Recent findings—Relevant current topics in the field include the appropriate timing of surgery as well as the relative benefits of various procedures, particularly duodenum-preserving pancreatic head resection versus pancreaticoduodenectomy. Multiple studies have found that surgery earlier in the disease course results in improved outcomes. Furthermore, the recent literature reports similar outcomes of duodenum-preserving pancreatic head resection when compared with pancreaticoduodenectomy.

Summary—It is important for treating clinicians to be well versed on the interplay of medical, endoscopic, and surgical strategies to carefully tailor a patient's treatment plan. Each patient warrants careful consideration and an individualized approach in collaboration with multidisciplinary colleagues.

Keywords

chronic pancreatitis; pancreatectomy; surgical decision-making

INTRODUCTION

For 40–75% of chronic pancreatitis patients, the pain and related sequelae of their disease ultimately lands them in the operating room [1,2]. The timing of operative intervention and the surgical procedure of choice are carefully determined by individual patient factors such as underlying cause, duration of disease, and ductal morphology. This article will provide a brief overview of the surgical options for management of pain in chronic pancreatitis as well as discuss the current salient topics in the field.

SURGICAL MANAGEMENT OPTIONS

Traditionally, the arsenal of surgical techniques for treating chronic pancreatitis has included options for both drainage and resection [1,3,4[■]]. A description of the most relevant

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There are no conflicts of interest.

procedures is provided in Table 1. Although each patient case merits an individualized approach, there are some basic guidelines to the appropriate surgical approach for chronic pancreatitis patients. Figure 1 provides a simple guide to surgical decision-making for these patients [5].

MANAGEMENT TRENDS AND NEW LITERATURE

In the past few years, the work in the field has a number of recurring themes. Reflecting the trends of recent publications and debates within the field, the emphasis of the following discussion will be the timing of surgery with particular consideration of the interplay of endoscopic and surgical approaches, the evaluation of duodenum-preserving pancreatic head resection (DPPHR), and the splanchotomy approach to pain management.

TIMING OF SURGERY IN A MINIMALLY INVASIVE ERA

A crucial aspect of surgical success in the treatment of chronic pancreatitis is the careful selection of the appropriate timing of surgical intervention. In 2012, the Dutch Pancreatitis Study Group reported on pain relief after surgery for chronic pancreatitis [6]. They found that 3 years or less of pain ($P = 0.03$), absence of preoperative narcotic use ($P = 0.006$), and five or less endoscopic procedures ($P = 0.05$) were independent predictors of postoperative pain relief. Of note, total pancreatectomy patients were not included. These findings challenged the theory of exhausting medical management prior to operative intervention and suggested early surgical exposure may be advantageous. Following this report, Yang *et al.* published a single institution's experience with the surgical treatment of pain associated with chronic pancreatitis to assess optimal timing of surgery [7]. Their research revealed that duration of chronic pancreatitis prior to operating of 26.5 months was the cutoff threshold (area under the curve 0.66) for their series of 66 patients in having successful pain relief.

Advances in the field of endoscopic management present further challenges in determining the best timing of surgery. Often, endoscopy can relieve pain and associated symptoms for many patients and provide a less invasive treatment option. These capabilities also present an additional challenge in determining the ideal timing to proceed with a surgical approach. As the aforementioned studies reveal, earlier surgical intervention may actually improve rates of postoperative pain relief. Furthermore, multiple studies have revealed that increasing numbers of endoscopic intervention and/or stent placement predict less pain relief postoperatively [6,8]. For example, in a review of 581 total pancreatectomy patients by Chinnakotla *et al.*, multivariate analysis indicated that a previous stent placement [$P = 0.055$, odds ratio (OR) 1.93], greater than two stents ($P = 0.020$, OR 2.73), and prior sphincterotomy ($P = 0.020$, OR 1.76) were associated with narcotic use at 1 year after surgical intervention [8].

Nonetheless, endoscopy plays an important role in the management of chronic pancreatitis. For many patients, endoscopy provides significant pain relief and promising disease management. Jafri *et al.* compiled a meta-analysis of 16 studies investigating the efficacy of endotherapy in relieving chronic pancreatitis pain [9]. Although immediate pain relief was reported as high [88%, 95% confidence interval (CI) 81–94%], this down trended to

67% (95% CI 58–76%) at long-term follow-up (mean of 47 months). The complication rate was 8%. Patients with intraductal stones in the pancreatic head as well as main duct strictures are frequently ideal endoscopic candidates [10]. Endoscopic maneuvers are also often employed in patients with features consistent with both recurrent acute pancreatitis and chronic pancreatitis [11].

Although the literature is admittedly sparse, when compared head to head, surgery currently has the long-term advantage over endoscopy. A Cochrane review of three randomized controlled trials comparing endoscopic and surgical management found that surgical patients had greater and more durable pain relief. At long-term follow-up (5 years), the risk ratio of pain relief was 1.56 (95% CI 1.18–2.05) in the surgical patients with comparable rates of morbidity and mortality [12]. The true challenge is early recognition of patients with disease characteristics not amenable to endoscopic therapy alone, and rigorous clinical trials to provide clearer guidance are needed [13[■]]. In order to reconcile the advantages of endoscopic therapy with the benefit of early surgery, at the authors' institution a multidisciplinary committee comprised clinicians from surgery, gastroenterology, endocrinology, psychology, and pain backgrounds discuss cases weekly to determine the ideal approach.

DUODENUM-PRESERVING PANCREATIC HEAD RESECTION

Not only does determining surgical timing pose challenges for the clinician but also selecting the appropriate surgical procedure can present an additional hurdle in the management of chronic pancreatitis patients [14[■]]. One area of particular interest has been weighing the relative benefits of partial pancreaticoduodenectomy compared with DPPHR. To this end, a number of recent publications have investigated the role of DPPHR [3,15[■], 16,17]. The European ChroPac randomized controlled trial compared quality of life at 2 years postoperatively for patients randomized to pancreaticoduodenectomy and DPPHR groups at 18 hospitals [15[■]]. One hundred and 25 patients were randomized to each group with slightly lower numbers included in final analysis (pancreaticoduodenectomy $n = 111$, DPPHR $n = 115$). There was not a difference in reported quality of life ($P = 0.284$) at the designated time point. Secondly, rates of adverse events were similar between the two groups. The DPPHR group however did have an increased rate of readmissions during the follow-up period (27 versus 11%, $P = 0.002$).

Apart from this report on the ChroPac trial, there was also a recent Cochrane reviewing assessing pancreaticoduodenectomy versus DPPHR [16]. Analysis of five eligible trials revealed no difference in mortality, adverse events, or quality of life; however, all the trials were single institution studies and were noted to have low or very low quality of evidence. The length of hospital stay however was lower in the DPPHR patients by 1–5 days. Further delineating the distinct duodenum-preserving pancreatic head resection strategies, Zhao *et al.* conducted a systematic review and meta-analysis of the DPPHR versus pancreaticoduodenectomy as well as Beger versus pancreaticoduodenectomy, Frey versus pancreaticoduodenectomy, and Beger versus Frey [18]. DPPHR was found to have a lower operative time ($P < 0.00001$), less blood transfusions ($P = 0.02$), and a shorter length of stay ($P = 0.0002$) compared with pancreaticoduodenectomy. They also found short-term

morbidity to be lower in the DPPHR group ($P=0.0007$). Pain relief and quality-of-life outcomes were similar among the groups. Differences in exocrine insufficiency existed more frequently in the pancreaticoduodenectomy group in the studies with shorter follow-up (<60 months); however, this did not persist at greater than 60 months of follow-up. Endocrine outcomes were similar.

Investigating variations within the DPPHR procedure itself, Klaiber *et al.* reported a 10-year followup of a randomized controlled trial comparing the original DPPHR (Beger procedure) to the Berne modification [3]. Sixty-two percent ($n=40$) of the original cohort had follow-up data available. There were no long-term differences in the quality-of-life parameters, and both groups reported improved quality of life. Functional outcomes, including daily pain and reoperation among other parameters, were also comparable. As the original Beger procedure is more technically challenging, these results suggest that the Berne modification presents an equally effective alternative.

In summary, the recent literature still indicates mixed results in regards to the optimal surgical intervention, and additional surgical trials are warranted [14]. The recent studies do suggest that for surgical candidates with disease of the pancreatic head, procedures such as DPPHR and Frey result in similar outcomes to pancreaticoduodenectomy and thus may be preferable in order to salvage the duodenum and its key structural and enteroendocrine functions [3,15,16,19,20]. Furthermore, there is a large body of evidence to support the role of total pancreatectomy with islet autotransplantation (TPIAT) in chronic pancreatitis patients with small duct or minimal change disease and intractable pain, and the experience is also growing in patients with recurrent acute and hereditary pancreatitis, including in the pediatric population [8,21-25,26,27]. As surgeons who treat chronic pancreatitis are well aware, each patient warrants careful consideration and an individualized approach in collaboration with multidisciplinary colleagues.

SPLANCHNOTOMY

Seeking surgical relief from pancreatic pain has not been isolated to intra-abdominal procedures. A few recent reports detail experience with splanchnotomy, or splanchnicectomy, from a thoracic approach [28,29,30]. Although individual techniques vary, this procedure entails bilateral transection of the greater thoracic splanchnic nerve that contains both sympathetic and visceral afferent fibers. A retrospective review of 123 patients within a single system found that although narcotic pain medication use and hospitalizations decreased in both pancreatic cancer and chronic pancreatitis patients after thoracoscopic splanchnotomy; the effect was more profound in cancer patients [28]. Two other small case series reported successful pancreatic pain relief and minimal complications using this minimally invasive approach to pain control [29,30]. The durability of this procedure and comparison with alternate modalities is yet to be clearly elucidated. What this procedure does represent however is that a definite solution for treating the pain of chronic pancreatitis remains elusive, and the field continues to evolve to produce optimal outcomes for patients.

CONCLUSION

Chronic pancreatitis is a challenging disease that produces great suffering for the patient and perplexing management decisions for the clinician. It is important for treating clinicians to be well versed on the interplay of medical, endoscopic, and surgical strategies to carefully tailor a patient's treatment plan. Although the timing and technique of surgical intervention must be carefully weighed, there is mounting evidence that pursuing surgery in the first few years of disease for the appropriate candidates provides durable pain relief and improved quality of life in chronic pancreatitis patients.

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■ of special interest

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KEY POINTS

- Pursuing operative intervention early in the disease process results in improved outcomes.
- In recent studies, duodenum-preserving pancreatic head resection has been performed as well as pancreaticoduodenectomy in regards to patient outcomes.
- Each patient with chronic pancreatitis warrants careful consideration and an individualized approach in collaboration with multidisciplinary colleagues.

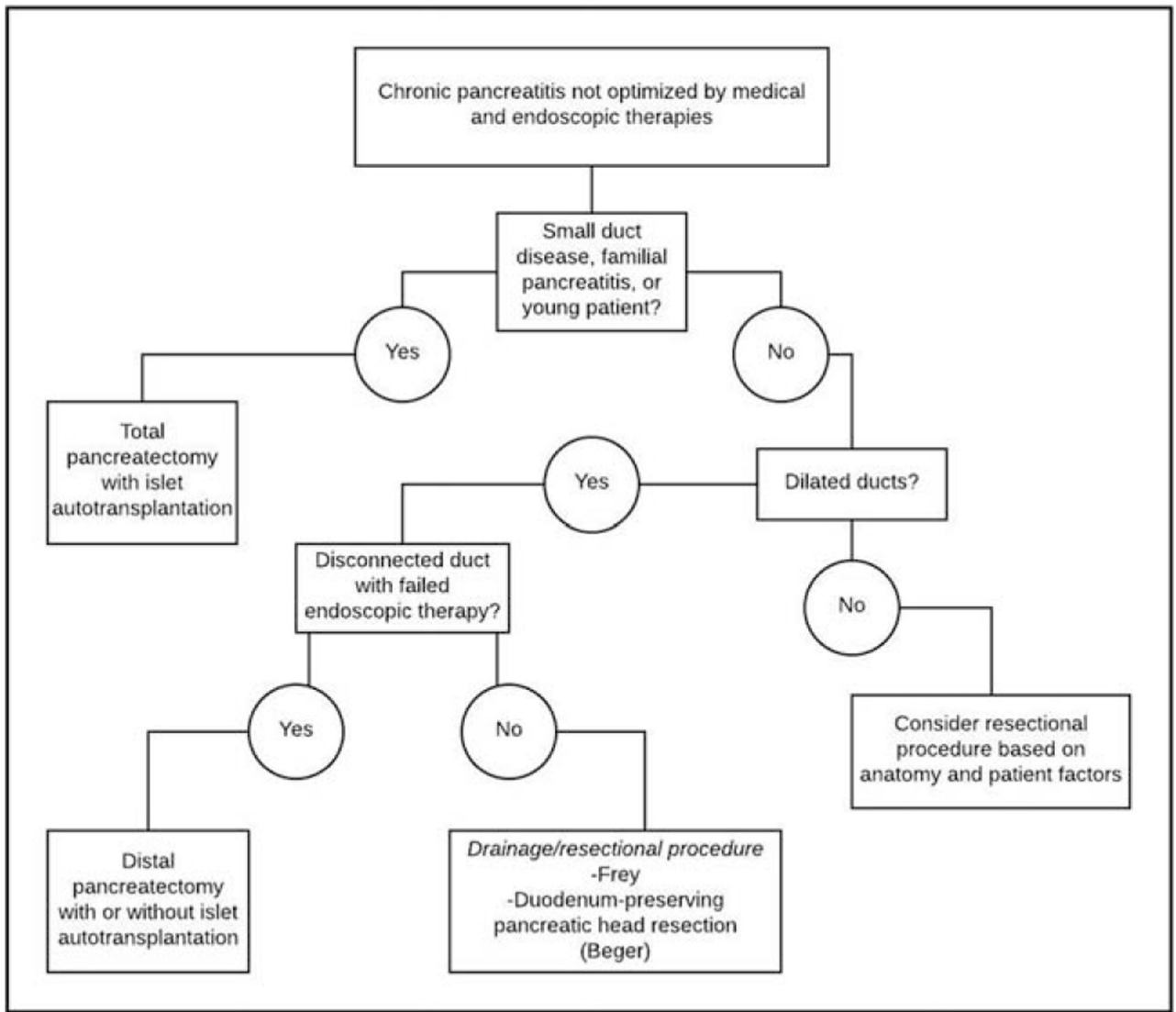


FIGURE 1. Guide to surgical decision-making for the management of chronic pancreatitis. These are general guidelines only. Every patient warrants a tailored approach to care with multidisciplinary input.

Operative approaches to chronic pancreatitis

Table 1.

Procedure	Category	Disease feature (s) of ideal candidate	Technique	Notes
Longitudinal pancreatico-jejunostomy	Drainage	Dilation of the main pancreatic duct	Pancreatic duct is opened along the length of the anterior surface of the pancreas Roux limb of jejunum is anastomosed to the open duct	Modification of the original Puestow procedure that had the additional features of distal pancreatectomy and splenectomy
Duodenum-preserving pancreatic head resection (Beger)	Drainage Resection	Disease localized in the pancreatic head, duodenum, and/or common bile duct	Pancreatic neck is transected, and the diseased pancreatic head is resected leaving a cuff of pancreatic disease along the duodenum Roux limb of jejunum is then anastomosed as bridge between the pancreatic remnant on the duodenal wall and the distal pancreas	Beger modification to this procedure involves coring out the diseased pancreatic head and draining the main pancreatic duct without pancreatic transection
Frey	Drainage Resection	Main pancreatic duct dilation and disease of the head of the pancreas	Resection of the pancreatic head while leaving residual pancreas on the duodenum Main pancreatic duct is opened and a lateral pancreaticojejunostomy is performed	In contrast to the DPPHR the pancreatic neck is not transected Modifications exist involving varied degrees of pancreatic head resection
Partial Pancreatectomy	Resection	Intraductal papillary mucinous neoplasm, suspected malignancy	Pancreatico-duodenectomy Distal pancreatectomy	Pancreaticoduodenectomy may be performed with or without pylorus preservation
Total Pancreatectomy	Resection	Intractable disease, hereditary pancreatitis, small duct or minimal change pancreatitis		May be performed with or without islet autotransplantation ^a

Sources: Data from [1,3,4].

^aSee article on Total Pancreatectomy with Islet Auto Transplant in this issue.