

Surgery in chronic pancreatitis

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Introduction

Before being systematically described in 1946 by Comfort, the term “chronic pancreatitis” has been used for a variety of pancreatic diseases without a generally accepted definition. Since 1983 chronic pancreatitis is defined as an inflammatory disease characterized by irreversible structural changes associated with the progressive conversion of pancreatic parenchyma to fibrous tissue, abdominal pain and permanent loss of function (1).

Alcohol consumption is the leading cause of CP in western countries (70-90%) (2), followed by biliary lithiasis, autoimmune or individual genetic predisposition and anatomic variants such as pancreas divisum. The patients are suffering from intractable pain and impairment in the quality of life; the life expectancy is shortened of 10-20 years (3). The prevalence of chronic pancreatitis is 10-30 per 100,000 population and it affects about 8 new patients per 100,000 population per year in the United States (4). Most commonly the clinical presentation of the disease is in an age of 35 to 55 years (2). The considerable socioeconomic implications of the disease are caused by the persistent pain and frequent hospitalisation, often resulting in an inability to work and an early retirement of the mostly young patients (5).

Therapeutic options

Chronic pancreatitis cannot be cured; therefore the aim of treatment is directed against symptoms (e.g. pain) and complications. Besides conservative therapies consisting of abstinence from alcohol, dietary alterations, analgetics, oral enzyme supplements, and somatostatin analogs, endoscopic, interventional and surgical procedures are used. Despite improvements of the therapeutic options the treatment of CP and its complications remains a major challenge (6,7).

Since the last decades endoscopic treatment is the most important invasive non-surgical treatment in CP to alleviate the outflow obstructions of the pancreatic duct and the common bile duct (8). Different procedures have been used in treatment of chronic pancreatitis including sphincterotomy, endoscopic stone and stenting of the pancreatic duct.

The overall response rate was found to be 55-95% after endoscopic dilatation, transpapillary drainage and stenting (9-11). Early complications occurred in 10-15% and late complications in 10-30% of the patients (8). Extracorporeal shockwave lithotripsy (ESWL) can reduce the obstruction and intraductal pressure by removing pancreatic stones in up to 60% of the patients. Endosonography-guided or percutaneous celiac nerve block with alcohol or steroids and thoracoscopic splanchicectomy have been described. The rate of pain-relief ranges from 20-87%, but data on the results are rare; another disadvantage is that the procedures must be repeated and are associated with severe complications (12).

Since it was shown in two randomized controlled trials that surgery is superior to endoscopic treatment there is no doubt to the need for surgical intervention in patients suffering from CP.

In the first trial an advantage of the surgical group was found in a 5-year follow-up with a rate of complete pain relief of 33.8% compared to 15% after endoscopy (13). In the other trial published by Cahen, the surgically treated patients that underwent pancreatojejunostomy (Partington-Rochelle) had better quality of life and better pain-relief compared to endoscopic drainage procedures (Painscore 53 ± 21 vs. 25 ± 15) (13). Since the inclusion criteria in this trial were obstruction of the pancreatic duct without inflammatory mass (Enlargement <4 cm), these results should be even more true in patients suffering from inflammatory tumour of the pancreatic head with potential organ complications such as stenosis of the common bile duct and duodenal outlet obstruction (7,14,15).

Indications for surgery and armamentarium

Surgery has to be considered in chronic pancreatitis in patients with failure of conservative treatment. The most common indication for surgical treatment is an intractable pain. Furthermore surgery indicated for management of complications related to adjacent organs such as duodenal or common bile duct stenosis, and endoscopically not manageable pancreatic pseudocysts and fistulas (16). Occasionally the indication for surgical treatment of CP is the inability to exclude pancreatic cancer despite broad diagnostic work-up (17).

The surgical armamentarium includes simple drainage procedures, classical pancreatoduodenectomy resection procedures (pancreatoduodenectomy) and duodenum preserving resection of the pancreatic head.

An optimal surgical method has to be effective for the treatment of the underlying disease. In chronic pancreatitis the most important criterion for the measurement of success of any treatment, is the improve quality of life and achievement of pain relief or, at least, substantial pain reduction. Additionally an optimal procedure should guarantee a low relapse rate and preserve a maximum of endocrine and exocrine function and should result in a decompression of the main pancreatic duct and resolve the complications concerning adjacent organs. The intervention should be safe to perform and be associated with low mortality and morbidity.

Selection of the surgical procedure

The rationale for simple drainage procedure is the decompression and treatment of the intraductal hypertension. For many years the Partington-Rochelle procedure (longitudinal pancreatocojejunostomy) was the favoured option in surgical treatment of chronic pancreatitis as it is easy to perform and a maximum of pancreatic tissue is preserved. The procedure can be performed with low perioperative morbidity and mortality.

Pain relief is achieved in only 50-60% of the patients. Nowadays the only suitable indication for the Partington-Rochelle procedure is a dilated ductal diameter (>7 mm) or "chain of lakes", without an inflammatory mass in the pancreatic head, and a normal ductal system (18-20).

Due to technical improvements and reduced perioperative morbidity and mortality the pancreatoduodenectomy a historically oncologic procedure became suitable for treatment of the benign chronic pancreatitis. The rationale of this resectional procedure is the removal of the pancreatic head to eliminate the obstructive mass and drain the entire pancreatic duct.

It was found that 30-50% of patients with chronic pancreatitis present with an inflammatory enlargement of the pancreatic head which causes the obstruction of the main pancreatic duct and is known to be the dominant morphologic pathology and pacemaker of the disease (19-23). Additionally it was found that pain is caused by alteration of the parenchyma and nerve fibers in quality and quantity and not only related to hypertension of the duct and parenchyma. Overall, 90-95% of the patients suffering from chronic pancreatitis present with a pathology in the pancreatic head (24). The pancreatoduodenectomy offer an improvement of the quality of life and short and long term pain-relief in up to 90% of the patients.

The rationale of the concepts of duodenum preserving resection of the pancreatic is to combi-

ne the advantages of an extensive resection and a drainage procedure (25-27). Comparable to the drainage procedure, the scarifying of undiseased organs is avoided, the gastro-duodenal and bilioduodenal passage are preserved and the procedure is easy to perform. But the inflammatory mass in the pancreatic head is resected to achieve optimal outflow alleviation of the duct system in the way of pancreatoduodenectomy.

The first type of duodenum-preserving resection of the pancreatic head was introduced by Beger in 1972. Several modifications in regards of the extend of the resection or the combination with drainage aspects have been suggested (28). The original Beger procedure includes a transection of the gland above the portomesenteric axis and subtotal resection of the pancreatic head; the reconstruction is performed with one Roux-en-Y loop with an end-to-end pancreaticojejunostomy and another side-to-side anastomosis between the resection cavity in the pancreatic head and the same jejunal loop (25). Beger reported on a series of 388 patients of whom 91.3% were free of pain with a median follow up of 5.7 years (17,29-34). Other authors found a long term pain relief in 75-95% of the patients (25,29,30). The perioperative mortality rate ranges from 0-3% in experienced centers (20,30,35), while the morbidity rate was found to be 15-32% (30,32,36).

A duodenum preserving resection as a modification of the Partington-Rochelle procedure was suggested by Frey in 1985. It combines a longitudinal pancreaticojejunostomy according to Partington-Rochelle with a local excision of the pancreatic head (25). The pancreatic head is cored out, leaving a small cuff along the duodenal wall; the pancreas is not divided above the superior mesenteric portal vein and the main pancreatic duct is open in the body and tail of the organ. Additionally the extent of the pancreatic head decompression is an essential difference of the Beger and Frey procedures, with the Frey procedure resecting considerable less pancreatic tissue (37,38). The Frey procedure can be performed without mortality (<1%) and low morbidity (9-39%) and the efficacy in terms of pain relief is comparable to Beger (30,34,39).

In the last years two other modifications combing the advantages of Beger and Frey procedure have been suggested. The Hamburg procedure consists of a deep duodenum-preserving resection of the pancreatic head of according to Beger procedure, and an additional longitudinal V-shape excision of the ventral aspect of the body and tail of the pancreas very much in the way of Partington-Rochelle and Frey. The transection of the gland over the superior mesenteric portal vein is avoided as well (24). The mortality and morbidity of the Hamburg procedure were 0% and 19.6%, respectively; 89% of the patients were free of pain (26,40). The Berne procedure includes a subtotal resection of the pancreatic head comparable to the Beger procedure as well, but the hazardous transection above the portal vein is avoided and therefore only one pancreatic anastomosis is necessary (35). In a recently published trial the mortality was found to be 0% and the morbidity 20% (20,32,41-45).

Up to now six randomized controlled trials comparing different surgical procedures in treatment of chronic pancreatitis have been published. Two trials compare different DPPHR modifications while four trials compare DPPHR and pancreatoduodenectomy (30,43). Comparing Beger and Frey procedure, a significantly lower perioperative morbidity rate was detected after Frey procedure (9%) compared to Beger (15%), while no significant differences concerning Quality of Life and pain score were found in the short-term follow-up and in the 8 year follow-up (30,43).

The comparison of Beger and Berne procedure revealed no significant differences regarding the quality of life using the EORTC QLQ 30, while applying the EORTC QLQ-PAN 26 significantly better results after Berne procedure were detected. Additionally the operating time and duration of hospital stay were shorter after the Berne modification; no pain score was evaluated in this trial (35).

Concerning the comparison of duodenum preserving resections of the pancreatic head and PPPD recently a meta-analysis including all four randomized controlled trials was published (46).

The first RCT comparing Beger and PPPD no significant differences were found in terms of morbidity and mortality, but a significant higher rate of pain-free patients (75% versus 40%) and better gain of body weight after 24 months was reported after Beger procedure (44). In the 14-year long-term follow-up no significant differences in regards of pain could be detected but favourable results concerning loss of appetite are still present (44). In an other trial a significant advantage of Beger procedure concerning the postoperative hormonal status and in terms of convalescence compared to PPPD was detected (42). Comparing Frey procedure and PPPD a lower perioperative morbidity rate was found after Frey procedure (19% versus 53%). In the 24 months follow-up the Qua-

lity of Life was significantly higher (85.7 vs. 75.1) and the pain score better (6.1 vs. 18.1) after Frey procedure while no significant differences were found in the 7-year follow-up (32,45).

When comparing a modification of the duodenum preserving resection to PPPD the morbidity (0% vs. 30%) and increase of body weight (7.8 ± 0.9 vs. 3.2 ± 0.3 kg) were significant better after DPPHR, while the rates of pain free patients (86% vs. 83%) were comparable (41).

Taken together in the meta-analysis no significant difference concerning the postoperative pain relief was detected, but concerning the quality of life the duodenum preserving resections of the pancreatic head were found to be superior to PPPD. Additionally the gain of weight and occupational rehabilitation were better after organ preserving resection (46).

Conclusion

Chronic pancreatitis is a common disease usually characterized by an inflammatory mass located in the pancreatic head with enormous social and personal impact. Pain relief and quality of life are the major aims in treatment of chronic pancreatitis, irrespective of whether surgery, endotherapy or other modalities are applied. Pancreatic surgery is technically demanding and is associated with potential life-threatening complications. Therefore it should be left to experts in high volume hospitals in order to minimize mortality and morbidity. Duodenum-preserving resections of the pancreas seem to be the ideal operation for most patients as they are associated with a low perioperative mortality and morbidity as well as best short-term outcome regarding the quality of life and therefore combines high safety with high efficacy.

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