

Indications, surgical technique and outcome of the duodenum-preserving resection of the head of the pancreas

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MH SCHOENBERG, M BÜCHLER, R KUNZ, HG BEGER. Indications, surgical technique and outcome of the duodenum-preserving resection of the head of the pancreas. *Can J Gastroenterol* 1993;7(6):493-497. Twenty per cent of patients with chronic pancreatitis develop an inflammatory mass of the head of the pancreas leading to severe pain and/or stenosis of the pancreatic and common bile ducts. Until recently, the standard surgical operation for these patients was partial duodenopancreatectomy. To avoid disadvantages implied by the partial duodenopancreatectomy, the duodenum-preserving resection of the head of the pancreas (DPRHP) was introduced into clinical practice in 1972. The aim of this study was to re-evaluate and update the results, and the early and late postoperative complications of this surgical procedure. From May 1982 to October 1992, 268 patients suffering from chronic pancreatitis and inflammatory mass in the head of the pancreas were treated with DPRHP. The cause of chronic pancreatitis was chronic alcoholism in 82% and biliary diseases in 11% of the patients. The average time between onset of symptoms of pancreatitis and surgical treatment was 3.6 years. The main indication for surgical treatment was intractable pain (94% of the patients), stenosis of the pancreatic duct (60%), obstruction of the common bile duct (50%), and one-third of the patients exhibited a stenosis of the duodenum. Sixteen per cent of the patients suffered from clinically relevant stenosis of the major intestinal vessels. Glucose metabolism was impaired in 48% of the patients as assessed by oral glucose tolerance test. In these patients the inflammatory mass in the pancreatic head was resected preserving the gastric bowel, duodenum, and the extrahepatic biliary tree. The pancreatic secretory flow from the left pancreas into the upper intestine was restored by interposition of the jejunal loop. In 17% of the patients with stenosis of the common bile duct, the subtotal resection of the pancreatic head was combined with decompression of the common bile duct at the peripapillary segment. The early postoperative complications were low (7%). Most frequently, patients developed a leakage of the pancreatic anastomosis. The early postoperative mortality was to 1.07%; two patients suffered from irreversible sepsis after anastomosis insufficiency. Following a median follow-up period of three years of 199 patients, 77% were free from abdominal pain and 12% complained occasionally of abdominal pain attacks. Two-thirds of the patients had complete professional rehabilitation, 20% were in the state of limited or full retirement. The DPRHP had little impact on endocrine function. In 84% of the patients the pre- and postoperative glucose metabolism remained unchanged, in 11% of the patients the glucose metabolism deteriorated

CURRENT EVIDENCE SUGGESTS THAT chronic pancreatitis is a disease which, once it begins, never stops. If the underlying cause of disease, such as chronic ingestion of alcohol, is removed, the process of deterioration may slow down, but usually the progress of the disease continues. Therefore, it is believed that chronic pancreatitis leads inevitably to an ultimate destruction of the gland and recovery of pancreatic function is exceptional. In this setting, surgical treatment may reduce symptoms or deal with specific complications. It will, however, never halt the progression of the inflammation or improve the function. Therefore, the principal indications for operation in chronic pancreatitis are complications which develop from the underlying disease. The most common complications are: intractable pain; large pseudocysts (greater than 5 cm); biliary obstruction; obstruction of the pancreatic duct; duodenal stenosis; and stenosis of the major mesenteric vessels.

As pain is the most common principal indication for surgical treatment, it has been argued that the natural history of the disease leads ultimately to auto-destruction of the pancreas and, as that occurs, to spontaneous relief of pain. Therefore, it has been suggested that patients be encouraged to wait for spontaneous pain relief rather than embarking on a surgical misadventure. Studies of the history of chronic pan-

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and in 5% it improved. Eleven of 210 patients died in the late postoperative phase (late postoperative mortality rate, 5.2%). Compared with partial duodenopancreatectomy, DPRHP is less radical, preserves more pancreatic tissue, leads to low early and late mortality, acceptable postoperative morbidity, and little impairment of endocrine function. Nevertheless, a high percentage of patients experience a long lasting relief from abdominal pain.

Key Words: *Chronic pancreatitis, Morbidity and mortality, Surgery*

Indications, technique chirurgicale et issue d'une résection de la tête du pancréas avec conservation du duodénum

RÉSUMÉ: Vingt pour cent des patients atteints de pancréatite chronique développent une masse inflammatoire au niveau de la tête du pancréas, qui provoque une douleur intense et/ou une sténose des canaux biliaires et pancréatiques. Jusqu'à récemment, la technique chirurgicale standard chez ces patients consistait en une duodéno pancréatectomie partielle. Pour éviter les inconvénients de cette intervention une technique de résection avec conservation du duodénum a été introduite en 1972. Le but de cette étude était de faire le bilan des résultats et des complications post-opératoires immédiats et éloignés de cette technique chirurgicale. Entre mai 1982 et octobre 1992, 268 patients atteints de pancréatite chronique et présentant une masse inflammatoire à la tête du pancréas ont été traités par la technique de résection avec conservation du duodénum. La cause de la pancréatite chronique était l'alcoolisme chronique chez 82 % des patients et une maladie biliaire chez 11 %. La période moyenne séparant l'apparition des symptômes de pancréatite et le traitement chirurgical a été de 3,6 ans. La principale indication du traitement chirurgical était une douleur résistant au traitement (94 %), une sténose du canal pancréatique (60 %), une obstruction des voies biliaires (50 %), et le tiers des patients présentaient une sténose du duodénum. Seize pour cent des patients souffraient d'une sténose cliniquement importante des principaux vaisseaux entériques. Le métabolisme du glucose était altéré chez 48 % des patients, selon l'épreuve de tolérance au glucose oral. Chez ces patients, la masse inflammatoire de la tête du pancréas a été réséquée, mais la technique préservait le duodénum et l'arbre biliaire extra-hépatique. Le débit sécrétoire du pancréas gauche vers l'intestin supérieur a été restauré par une interposition de l'anse jéjunale. Chez 17 % des patients atteints de sténose des voies biliaires, la résection sous-totale de la tête du pancréas a été combinée à une décompression des voies biliaires au segment péripapillaire. Les complications post-opératoires précoces ont été rares (7 %). Le plus souvent, les patients présentaient un suintement au niveau de l'anastomose pancréatique. Le taux de mortalité post-opératoire précoce a été de 1,07 %; deux patients ont présenté une infection irréversible après une insuffisance de l'anastomose. Après un suivi moyen sur trois ans de 199 patients, 77 % ne présentaient plus de douleurs abdominales et 12 % se plaignaient d'épisodes de douleurs abdominales occasionnelles. Les deux tiers des patients ont connu une réhabilitation professionnelle complète, 20 % avait atteint l'âge d'une retraite pleine ou partielle. La résection avec préservation du duodénum a exercé un faible impact sur la fonction endocrinienne. Chez 84 % des patients, le métabolisme du glucose avant et après l'intervention est resté inchangé, chez 11 % des patients, le métabolisme du glucose s'est détérioré et chez 5 % il s'est amélioré. Onze patients sur 210 sont décédés durant la période post-opératoire tardive (taux de mortalité post-opératoire tardif, 5,2 %). En comparaison avec la duodéno pancréatectomie partielle, la résection avec conservation du pancréas préserve une plus grande proportion du tissu pancréatique, s'accompagne d'un taux de mortalité précoce et tardif bas, d'un taux de morbidité post-opératoire acceptable, et affecte peu la fonction endocrinienne. Néanmoins, un fort pourcentage de patients éprouvent un soulagement prolongé de leurs douleurs abdominales.

creatitis, however, show that the average time of spontaneous pain relief is longer than five years, ranging up to 18 years. Moreover, only 80% of the pa-

tients followed for that length of time actually become pain-free (1). The second most common indications for operation are biliary or pancreatic duct

TABLE 1
Indication for surgery

	Number of patients	Frequency (%)
Pain	263	94
Stenosis of the:		
pancreatic duct	168	60
common bile duct	140	50
Duodenal stenosis	102	36
Vascular obstruction	45	16
Diabetes		
subclinical	64	23
insulin-dependent	70	25

obstructions in association with pain, occurring in up to one-third of all patients suffering from chronic pancreatitis (2). Duodenal stenoses are rare and often fail to show any clinical relevance. Occlusion of the portal vein is increasingly being recognized as a clinically relevant complication in five to 10% of late chronic pancreatitis (3). Portal vein occlusion, however, creates difficulties with varices around the head of the pancreas and bile duct making surgical procedures much more difficult if not impossible. Nevertheless, patients suffering from intractable pain and obstruction of ducts and vessels should be encouraged to consider surgical treatment instead of waiting until the chronic pancreatitis has 'burned out'.

The surgical treatment consists of two procedures: drainage operations and resectional procedures of the pancreatic gland. In patients who developed a dilated pancreatic duct (approximately 40 to 50% of all patients) a side-to-side pancreatojejunostomy usually as a modified Puestow type using a Roux-en-Y-loop of the jejunum is the operation of choice, as it is simple, safe and does not compromise pancreatic function by resection. Similarly, large pseudocysts leading to intractable pain and/or obstruction of the pancreatic or biliary duct as well as the duodenum passage should be drained preferably by a cystojejunostomy if other nonoperative interventional measures do not succeed.

Twenty per cent of patients with chronic pancreatitis develop an inflammatory mass of the head of the pancreas

leading to severe pain and stenosis of the pancreatic and common bile ducts. In some cases, even the duodenum is compressed and the portal vein is obstructed leading to thrombosis with portal hypertension (4). In these patients partial duodenopancreatectomy, the Whipple procedure, is the standard surgical operation even today. The Whipple operation, however, includes not only the resection of the pancreatic head but also removes 50% of the stomach, the entire duodenum and large parts of the common bile duct. Moreover, mortality and morbidity rates following these operations are still relatively high although recently substantial improvement has been reported (5).

To avoid the disadvantages of the Whipple operation the duodenum-preserving resection of the head of the pancreas (DPRHP) was introduced into clinical practice in 1972 (6). This procedure includes the removal of the inflammatory mass in the pancreatic head, thus decompressing the common bile and pancreatic ducts, restoring the pancreaticointestinal secretory flow and preserving the gastroduodenal unit and its passage. The aim of this study was to reevaluate and update the results and the early and late postoperative complications of this surgical procedure and to compare them with those

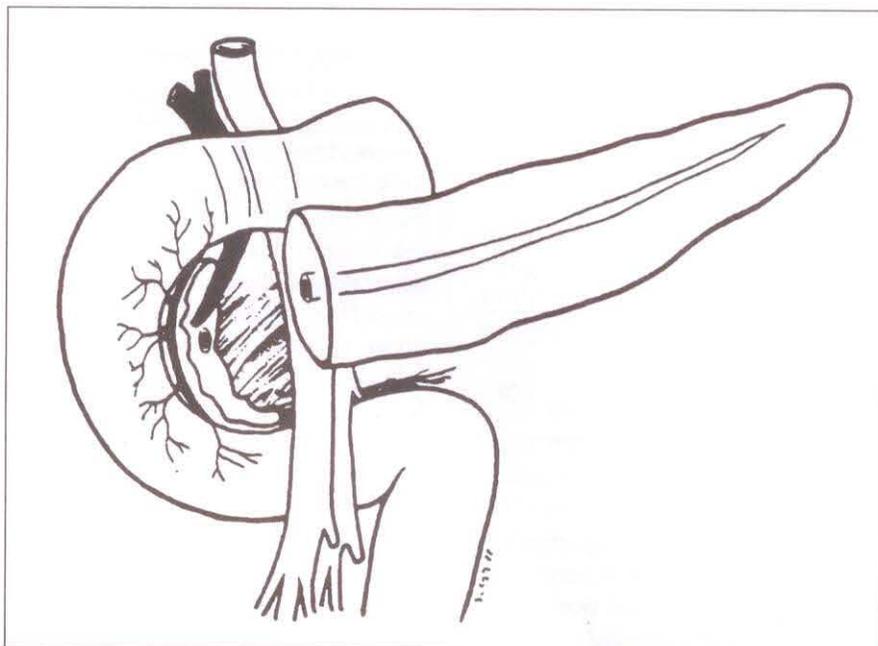


Figure 1) Situation after subtotal resection of the enlarged head of the pancreas. A 5 to 8 mm residue of the pancreatic head remains at the duodenal wall between the choledochal segment and the duodenum ensuring sufficient blood circulation

obtained after partial duodenopancreatectomy (Whipple procedure) for chronic pancreatitis.

PATIENT POPULATION AND PREOPERATIVE MORBIDITY

From May 1982 until October 1992, 370 patients suffering from chronic pancreatitis were treated in the Depart-

ment of General Surgery, University of Ulm in Germany. During this time, 268 patients were treated with DPRHP due to an inflammatory mass in the head of the pancreas. The cause of chronic pancreatitis was chronic alcoholism in 82% of the patients and biliary disease associated chronic pancreatitis in 11%. The time period between the onset of

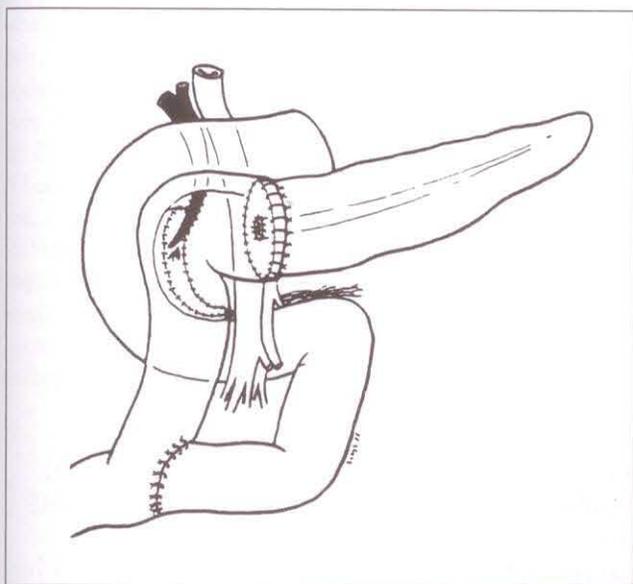


Figure 2) Interposition of the first jejunal loop restoring pancreatic secretory flow from the left pancreas. A Roux-en-Y anastomosis of the jejunum restores the intestinal food passage

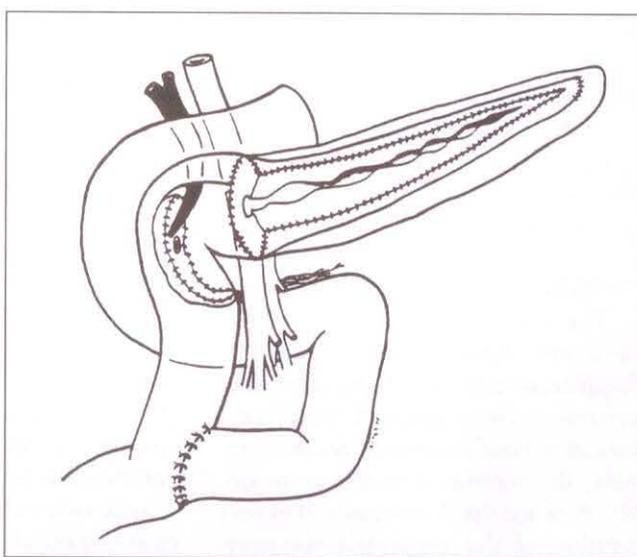


Figure 3) Modification of the duodenum-preserving resection in patients with multiple ductal stenosis of the main pancreatic duct in the left pancreas consisting of a side-to-side anastomosis between the left pancreas and the interposed jejunal loop

TABLE 2
Early postoperative morbidity and mortality

	Number of patients	Frequency (%)
Leakage/fistula	13	5
Pancreatitis	12	4
Abscess	7	2
Bleeding	9	3
Sepsis	3	1
Rate of relaparotomy	13	5
Early postoperative mortality	3	1.07

symptoms of pancreatitis (particularly episodes of abdominal pain) and surgical treatment varied from two months to 15 years (mean 3.6 years). Preoperative morbidity and indication for surgery based on the preoperative diagnostic investigations are shown in Table 1. The main indication for surgical treatment (94% of patients) was an inflammatory mass of the pancreatic head and intractable pain. In 60%, the inflammatory tumour and frequent pain episodes were associated with stenosis of the pancreatic duct. Half of the patients also suffered from obstruction of the common bile duct. One-third of the patients also exhibited a stenosis of the duodenum; however, only 10% were clinically relevant. Sixteen per cent of the patients suffered from clinically relevant stenosis of the major intestinal vessels. Forty-eight per cent were suffering preoperatively from a disturbed glucose metabolism as assessed by oral glucose tolerance test. Insulin-dependent diabetes was present in 25% of patients.

SURGICAL TECHNIQUE

The goal of surgical therapy in patients with chronic pancreatitis and inflammatory mass in the head of the pancreas is the excision of the inflammatory tumour leading to freedom from pain, decompression of the common bile duct and duodenum, as well as restoration of the pancreatic secretory flow from the body and tail of the pancreas. Unlike the Whipple procedure, the gastric bowel, duodenum and extrahepatic biliary tree are preserved. The

TABLE 3
Endocrine function (oral glucose tolerance test)

	Number of patients	Normal	Subclinical diabetes	Insulin-dependent diabetes
Preoperative	280	146 (52%)	64 (23%)	70 (25%)
Late postoperative	199	98 (49%)	44 (22%)	57 (29%)

surgical procedure includes two major steps. First, transection of the pancreas above the portal vein and subtotal resection of the head of the pancreas, leaving a small disk of the head between the common bile duct and the duodenal wall as well as a 5 to 8 mm section of the processus uncinatus in order to maintain the blood supply to the duodenum (Figure 1). The second step restores the pancreatic secretory flow from the left pancreas into the upper intestine by interposition of a jejunal loop thus preserving the gastroduodenal unit and its food passage (Figure 2).

There are two modifications of this operative procedure. In 17% of the patients with stenosis of the common bile duct, subtotal resection of the head does not result in sufficient decompression of the common bile duct (6). In those patients, the peripapillary segment of the common bile duct is opened and included into the jejunal anastomosis. Another modification of the surgical technique of DPRHP is mandatory in patients in whom the entire pancreatic duct of the pancreas demonstrates dilations and stenoses of the main duct ('chain of lakes' phenomenon). In these cases the pancreatic head resection is combined with a side-to-side anastomosis between the longitudinally opened pancreatic main duct and the interposed jejunal loop (Figure 3).

EARLY POSTOPERATIVE COMPLICATIONS

The postoperative morbidity of DPRHP is low. The most frequent postoperative complication, in 5% of the patients, was leakage of the pancreatic anastomosis with fistulization. In most cases this could be treated by conservative measures. Twelve patients suffered from an episode of pancreatitis postoperatively, and nine exhibited an intestinal hemorrhage on the cut surface of

the pancreas. The overall rate of relaparotomy was 5% (Table 2). Hospital mortality was also low, three patients died in the early postoperative phase, and one patient suffered a fulminant pulmonary embolization on the ninth postoperative day. Two patients died from irreversible sepsis after anastomosis insufficiency. The total early postoperative mortality was to 1.07% (Table 2).

LATE RESULTS

Following a mean follow-up period of three years (range six months to 19 years) of 199 patients, 77% were free from abdominal pain and 12% complained occasionally of abdominal pain attacks. Eleven per cent of the patients treated with DPRHP still suffered frequently from abdominal pain. Similarly, it was shown earlier that two-thirds of the patients had complete professional rehabilitation, 20% were in the state of limited or full retirement, and 13% were unemployed (7). Concomitant to the good clinical results, DPRHP had little impact on endocrine function as assessed by oral glucose tolerance test. In 84% of the patients the pre- and postoperative glucose metabolism remained unchanged. In 11% glucose metabolism deteriorated and in 5% it showed improvement (Table 3). Eleven of 210 patients died in the late postoperative phase after a median follow-up of three years. Twenty-two patients were lost to follow-up and three patients died within the early postoperative phase. The late postoperative mortality rate was 5.2%.

COMPARISON BETWEEN THE WHIPPLE PROCEDURE AND DPRHP

The hospital mortality of the Whipple operation is about 3 to 5% in patients operated for chronic pancreatitis (7,9). The high late mortality of ap-

proximately 20% following Whipple operation is probably related to the increasing insufficiency of glucose metabolism, resulting from a major reduction of endocrine pancreatic function (10). Moreover, the late morbidity following Whipple operation often includes the development of an anastomotic ulceration in the first years after surgery (11), gastrointestinal tract bleeding and cholangitis in 6 to 8% of the patients. Twenty-five per cent of the patients are malnourished and 30% develop an insulin-dependent diabetes mellitus (12,13). In contrast, DPRHP does not involve significant impairment of endocrine function, the late mortality in this series was only 5% (Table 4). As a consequence of the underlying disease of the chronic pancreatitis the frequency of diabetes mellitus in the late postoperative period is

slightly increased. The favourable metabolic functions in the late years after DPRHP can be explained by the fact that resection results only in a moderate reduction of the pancreatic parenchyma of approximately 20 to 30%. The surgical technique is based on preserving the food passage through the duodenum, therefore maintaining the physiological regulation of the insulin and glucagon secretion.

SUMMARY

The main advantage of DPRHP in patients with chronic pancreatitis is the limitation of surgical resection whereby only the inflammatory tumour is removed. Subtotal resection of the pancreas head consequently does not result postoperatively in a deteriorated glucose metabolism. This less radical, organ-preserving surgical procedure is

TABLE 4
Comparison between Whipple procedure and duodenum-preserving resection of the head of the pancreas (DPRHP)

	Whipple*	DPRHP
Hospital mortality	5%	1%
Diabetes induced by operation	30%	2%
Late mortality	20%	5%

*See reference 14

characterized by a low early and late mortality, acceptable postoperative morbidity, and little or no impairment of the endocrine function. Yet, a surprisingly high percentage of patients experience a long lasting relief from abdominal pain which enables them full recovery and, in two-thirds of cases, complete professional rehabilitation.

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