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Duodenopancreatectomy versus Duodenum-Preserving Pancreatic Head Excision for Chronic Pancreatitis

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Key Words

Chronic pancreatitis · Pancreatoduodenectomy · Duodenum-preserving pancreatic head excision · Pain score · Quality of life

Abstract

Background: The aim of this study was to compare two surgical procedures in the treatment for chronic pancreatitis (CP): pancreatoduodenectomy resection (classical Whipple – PD procedure, or pylorus-preserving – PPPD) to duodenum-preserving pancreatic head excision with longitudinal pancreatojejunoanastomosis (DPPHE/PJA), to define the advantages of each procedure with regard to postoperative complications, pain relief, and the quality of life. ***Material and Method:*** 104 consecutive patients were included into this study. Duodenopancreatectomy was chosen when the head pancreatic mass was present or pancreatic cancer could not be ruled out (48 patients); otherwise DPPHE/PJA was performed (56 patients). Quality of life was measured prospectively on two occasions, before the procedure and during follow-up (median 39 months after surgery) using the European Organization for Research and Treatment of Cancer (EORTC) Quality-of-Life Questionnaire (QLQ-C30). The test was re-evaluated for patients suffering from CP. Pain intensity was quantified using a specially designed pain score. Early postoperative morbidity and mortality were assessed and evaluated in both groups of patients. ***Results:*** Total pain score decreased significantly after surgery in both groups of patients. During the follow-up period, the global quality of life improved by 30.4% in the DPPHE/PJA group, and by 23.2% in the PD/PPPD group. Postoperative morbidity and mortality were higher in the resection group, but the differences were not significant. ***Conclusions:*** Both surgical procedures led to significant improvement in the quality of life and pain relief after surgery for CP. The EORTC QLQ-C30 was found to be a valid and readily available test for quality-of-life assessment in patients with CP.

Introduction

The main aims of surgical treatment for chronic pancreatitis (CP) are pain relief, control of complications involving adjacent organs, preservation of exocrine and endocrine pancreatic function, physical, social, and occupational rehabilitation and improvement of quality of life.

Recurrent pain attacks are the characteristic clinical feature of CP and are the most frequent indication for surgical treatment. Selection of the type of the surgical procedure in CP still remains to be a subject of contro-

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Table 1. Clinical characteristics of patients

	DPPHE/PJA group (n = 56)	Resection group (n = 48)
Mean age (range)	45 (23–71)	48 (29–71)
Sex		
Male	55	39
Female	1	9
Etiology		
Alcoholic	44	26
Biliary	0	2
Idiopathic	8	17
Pancreas divisum	3	3
History, years, median (range)	6.0 (0.5–10.0)	5.3 (1.0–9.0)
Pain	56	48
Bile duct stenosis	22	8
Duodenal stenosis	12	4
Pseudocyst	3	0
Huge inflammatory mass or suspicion of pancreatic head tumor	4	31

versy. Radical resection procedures such as duodenopancreatectomy are preferred since, presumably, removal of a large part of parenchyma provides for better outcome in the treatment of intractable abdominal pain [1, 2]. On the other hand, advocates of 'cautious' radicalism claim that the pancreatic head serves as a pacemaker of CP and duodenum-sparing procedures have advantages with regard to pain relief while better preserving, at the same time, exocrine and endocrine pancreatic function [3–6]. Studies of CP have focused predominantly on pain measurement, morbidity and mortality, and quality of life after surgical treatment. The European Organization for Research and Treatment of Cancer (EORTC) Quality of Life Questionnaire (QLQ) was re-evaluated for patients suffering from CP. Pain intensity was quantified using a specially designed pain score [1, 7].

Patients and Methods

Enrolled into this study were 104 consecutive patients indicated for surgical therapy for CP in the period from April 1998 through December 2002 in our former Transplant Surgery Department (IKEM, Prague). Patients were divided into two groups by the type of the surgical procedure. Duodenopancreatectomy, either conventional or pylorus-preserving (Whipple procedure – PD, Traverso-Longmire procedure – PPPD), was undertaken in 48 patients while duodenum-preserving pancreatic head excision with panreaticojejunoanastomosis (Frey procedure – DPPHE/PJA) was performed in 56 patients. Duodenopancreatectomy resection was performed in the presence of a huge inflammatory mass in the pancreatic head involving the duodenum and pylorus or in cases where we were unable to rule out pancreatic head cancer. There were not significant differences in the other characteristics between the two groups of patients with regard to age, sex, history and etiology of CP (table 1).

Preoperative examination included abdominal ultrasonography, helical abdominal computed tomography (CT), endoscopic retrograde cholangiopancreaticography (ERCP), and in some cases, also angiography CT scanning. ERCP could not be performed in 16 patients because of duodenal stenosis.

The most common indication for operation was intractable pain in all patients. Median duration of anamnesis of CP was 5 years (range 0.5–10.0). Among the 104 patients, the etiology of CP was alcohol abuse in 70 (67%). The etiology remained unknown in 25 patients (idiopathic CP); however, the CP in some of these patients was likely to be also of alcohol origin. Surgery was indicated because of failure of conservative treatment in all patients. 16 patients showed intermittent clinical symptoms of duodenal stenosis and 30 patients had stenosis of the common bile duct confirmed by ERCP. Four patients in the DPPHE group had preoperatively a huge inflammatory mass of suspicion of pancreatic cancer. These patients were not resected because preoperatively they had morphologically verified CP. Quality of life and pain score before and after surgery were assessed using the EORTC's QLQ (EORTC QLQ-C30). The EORTC questionnaire comprises items relating to physical status, working ability and emotional, cognitive, and social functioning, as well as a global quality-of-life scale. Pain intensity was estimated by means of a pain scoring system including a visual analog scale, frequency of pain attacks, use of analgesic medication, and the time of inability to work. The total value of pain score was given by the sum of the values divided by 4. The test was recently re-evaluated for patients suffering from CP [1, 7]. This questionnaire was prospectively assessed at two time points during the study: before the surgical procedure and in the follow-up period (median 39 months) after operation. The surgical procedure, classical duodenopancreatectomy and pylorus-preserving duodenopancreatectomy (PD/PPPD), was performed in 48 patients using surgical approaches described elsewhere [1, 8]. The extended drainage procedure (DPPHE/PJA) described by Frey and Amikura [4], Frey and Smith [5] and Izbicki et al. [6] was performed in 56 patients.

Statistics

The end point of the study was to compare quality of life, pain relief, postoperative mortality and morbidity with regard to the type of the surgical procedure. Parametric data are expressed as means with standard deviation, and nonparametric dates as medians. Statistical significance was determined using Student's t test, Wilcoxon rank sum test, the Mann-Whitney test, or Fisher's exact test. The level of significance was set at $p < 0.05$.

Results

Mean hospital stay was 15 days (range 6–50) in the PD/PPPD group and 14 days (range 7–110) in the DPPHE/PJA group (NS). Overall morbidity rates were

48% in the PD group and 39% in the DPPHE/PJA group. Early mortality rates were 4.1% in the PD group and 3.5% in the DPPHE/PJA group (NS). Two patients died in the PD group, 1 died of septic complication on postoperative day 15, and another 1 died on postoperative day 37 after repeat surgical revisions for infectious intra-abdominal complications. In the non-resection group, there were also 2 deaths, both these patients died of cardiopulmonary failure and septic complications on postoperative days 110 and 33. The re-operation rate was around 20% in both groups. The reason for this high re-operation rate was their bad general condition (hypalbuminemia, cachexia, etc.). Lots of patients were indicated for the surgical treatment late. The postoperative course of patients is shown in table 2.

Table 2. Postoperative course

	DPPHE/PJA group (n = 56)	Resection group (n = 48)
Early morbidity	22 (39%)	23 (48%)
Reoperation	11 (19.6%)	10 (20.8%)
Mean hospital stay, days (range)	14 (7–110)	15 (6–50)
Mortality	2 (3.5%)	2 (4.1%)

Before operation and during follow-up, patients were asked to fill up a quality-of-life questionnaire (EORTC QLQ-C30). Complete answers were obtained from 50 patients, 21 (46%) patients in the PD/PPPD group, and from 29 (54%) patients in the DPPHE/PJA group.

The questionnaire was completed at two time points during follow-up in the resection group: (1) before operation and (2) median 43 months (8–61) after operation, and at two time points in the DPPHE/PJA group: (1) before operation and (2) median 36 months (7–61) after operation.

Total pain score decreased significantly after surgery treatment in both groups of patients (tables 3, 4). Both groups showed improvement in pain in terms of the VAS and frequency of pain. There were no significant differences in the need for pain medication and working ability before and after operation. When comparing the two groups, more significant differences and a marked improvement in total pain score were seen in the DPPHE/PJA group.

During follow-up, median global quality of life improved by 30.4% in the DPPHE/PJA group. Improvement was significant in all scales except cognitive function (table 5).

In the PD/PPPD group, global quality of life improved by 23.2%. In the functional scales of physical status, work-

Table 3. Pre- and postoperative pain score in the DPPHE/PJA group (n = 29)

	Preoperative mean (SD)	Median	Postoperative mean (SD)	Median	Significance
VAS	72.81 ± 3.38	74	29.75 ± 21.86	23	$p < 0.001$
Frequency of pain attack	75.96 ± 20.59	75	45.0 ± 19.09	50	$p < 0.001$
Pain medication	16.39 ± 19.97	15	10.85 ± 19.9	1	NS
Inability to work	64.00 ± 38.92	75	71.88 ± 37.1	100	NS
Total	235.97 ± 57.1	239	152.8 ± 73.1	153	$p < 0.01$
Pain score	58.99 ± 14.29	60	38.2 ± 18.28	38	$p < 0.01$

Table 4. Pre- and postoperative pain score in the PD and PPPD groups (n = 21)

	Preoperative mean (SD)	Median	Postoperative mean (SD)	Median	Significance
VAS	67.06 ± 33.82	77	27.39 ± 28.88	25	$p < 0.01$
Frequency of pain attack	82.89 ± 16.78	75	48.68 ± 21.21	50	$p < 0.01$
Pain medication	16.25 ± 23.8	15	6.18 ± 9.21	1	NS
Inability to work	75.5 ± 26.35	75	84.2 ± 22.38	100	NS
Total	249.8 ± 69.5	258	160.6 ± 69.5	141	$p < 0.05$
Pain score	62.44 ± 17.36	65	40.15 ± 15.38	35	$p < 0.05$

Table 5. Results of preoperative and postoperative functioning scale scores in DPPHE/PJA

Functioning scale and/or items[a]	Items[b]	Preoperative score mean (SD)	Follow-up score mean (SD)	Improvement, %	Significance[c]
Physical status	1–5	75.60 (11.57)	81.85 (12.72)	6.25	$p < 0.05$
Working ability	6, 7	64.00 (17.79)	80.35 (20.81)	16.35	$p < 0.001$
Cognitive	20, 25	55.00 (20.41)	57.14 (20.25)	2.14	NS
Emotional	21–24	36.95 (17.26)	49.10 (19.52)	12.15	$p < 0.001$
Social	26, 27	38.00 (27.12)	48.66 (25.76)	10.66	$p < 0.05$
Global quality of life	29, 30	32.44 (19.42)	62.85 (22.87)	30.41	$p < 0.001$

[a] Scores range from 0 to 100, with a higher score representing a higher level of functioning.
[b] Numbers correspond to the numbers of items in the questionnaire.
[c] Wilcoxon rank sum test was used to estimate statistical significance (NS, not significant).

Table 6. Results of pre- and postoperative functioning scale scores in the resection group

Functioning scale and/or items[a]	Items[b]	Preoperative score mean (SD)	Follow-up score mean (SD)	Improvement, %	Significance[c]
Physical status	1–5	76.00 ± 14.51	86.00 ± 11.42	10.00	$p < 0.05$
Working ability	6, 7	70.00 ± 20.38	82.50 ± 14.28	12.50	$p < 0.05$
Cognitive	20, 25	61.84 ± 21.03	64.47 ± 12.68	2.63	NS
Emotional	21–24	43.40 ± 19.35	57.23 ± 13.86	13.83	$p < 0.05$
Social	26, 27	42.36 ± 24.68	55.92 ± 20.14	13.56	NS
Global quality of life	29, 30	35.00 ± 19.38	58.21 ± 19.42	23.21	$p < 0.001$

[a] Scores range from 0 to 100, with a higher score representing a higher level of functioning.
[b] Numbers correspond to the numbers of items in the questionnaire.
[c] Wilcoxon rank sum test was used to estimate statistical significance (NS, not significant).

ing ability and emotional functioning, there were significant differences between the pre- and postoperative scale scores. No significant differences were seen in cognitive and social functioning (table 6). There were no marked differences between both groups with regard to quality of life in the follow-up period after operation.

Discussion

Despite new data regarding the etiology and pathogenesis of CP, its management is not causative and current conservative and surgical methods only modulate the complications occurring in the course of the chronic disease (particularly exocrine and endocrine dysfunction, involvement of adjacent organs, and pain). The most common indications for surgical treatment were recurrent attacks of pain experienced by CP patients in whom conservative and endoscopic therapy has failed. In a proportion of patients, pain is associated with obstruction of the duodenum, bile ducts, a pseudocyst, or suspected malignancy. While retaining low morbidity, the surgical procedure should eliminate pain in the long term, have the least possible effect on exocrine and endocrine pancreatic function, eliminate complications of adjacent organs, and rule out the presence of pancreatic tumor. The objective of surgical treatment is not only to eliminate pain and complications of CP but, more importantly, to improve the patients' global quality of life, physical status as well as to provide for their social and occupational rehabilitation. The current surgical procedures performed electively in CP patients can be divided into two main groups, the resection and drainage procedures [1, 8, 11]. A transition between both approaches are duodenum-preserving

resection and pancreatic head excision [5, 6]. In an effort to identify the optimal surgical approach, a number of randomized studies have been conducted comparing individual surgical techniques in terms of morbidity, mortality, modulation of exocrine and endocrine function, and pain relief [12–14]. Another objective criterion in addition to the above basic parameters of a specific surgical method is currently global improvement of the quality of life. The objective outcome assessment of surgical treatment has made by the EORTC QLQ, used for patients with CP [3, 7, 9, 10].

Our study was designed to prospectively evaluate two main procedures performed in patients with CP (resection PD/PPPD and DPPHE/PJA) with respect to pain relief and improvement of the global quality of life after surgery. Given the type of surgery, patients were not randomized and the choice of the surgical technique was dependent on the pathomorphological finding before and during surgery (head pancreatic mass, biliary and duodenal obstruction, suspected tumor). Because of the statistically small number of patients in individual groups, and as the results of published comparative studies have demonstrated a non-significant difference between both types of resection in terms of modulating exocrine and endocrine pancreatic function and the quality of life after surgery, the resection group included patients undergoing conventional PD/PPPD) [13–15]. When assessing early morbidity, the PD/PPPD group showed a higher complication rate (48%) compared with the DPPHE/PJA group (39%). Although most of these postoperative complications were non-surgical and had no effect on the patient's overall status or marked prolongation of hospital stay, the incidence is higher than that reported for other international patient series, primarily in duodenum-preserving resection of the head of the pancreas. Bloechle et al. [3] reported an 8% early morbidity rate. Büchler et al. [11] reported morbidity rates of 15 and 20% for the DPPHE and PPPD group, respectively. In our view, the reason for the high morbidity in our group of patients was the advanced stage of the disease, and the overall status of patients undergoing surgery. Patients had been treated conservatively or by repeat endoscopic interventions for a number of years, and were not scheduled for surgery until they reached an advanced stage of the disease, showing signs of malnutrition and other symptoms of exocrine and endocrine dysfunction. Early morbidity rates were 4 and 3.5% in the PD/PPPD and DPPHE/PJA groups; still, it did not exceed 5% and was not markedly higher compared with data reported by other authors (0–3.2%) [9, 16]. These mortality rates are acceptable.

Pain relief and improvement of the quality of life after surgery for CP in our group of patients were assessed using the EORTC QLQ-C-30. The questionnaire was employed in our earlier study in a group of patients undergoing DPPHE/PJA to assess their quality of life and pain score, showing significant improvement ($p < 0.05$) at 6 months postoperatively [17]. Our previous study demonstrated the validity and usefulness of the EORTC QLQ-C-30 in CP as other authors [3, 7, 9, 10, 18]. The present study comparing resection and non-resection methods in the surgical treatment of CP in terms of pain relief and quality of life is an extension to the above study of ours and follow-up of our patients.

The completed QLQ before and after the surgical procedure were evaluated in 50 patients. Other patients were not included into the study because of incomplete QLQ data, lack of cooperation, or because follow-up was performed in other centers and data of patients were not available. It was also for these reasons that the questionnaires were completed at different time intervals during follow-up. The median of follow-up was 43 (8–61) months in the PD/PPPD group, and 36 (7–61) months in the DPPHE/PJA group. When assessing pre- and postoperative total pain scores, significant pain relief was noted in both groups. The difference in total pain score was more significant in the DPPHE/PJA group compared with the PD/PPPD group ($p < 0.01$ vs. $p < 0.005$). The difference was even more significant in subjective patient assessment (VAS, frequency of pain attacks) ($p < 0.001$ vs. $p < 0.01$). By contrast, no significant difference between pre- and postoperative status was seen in objective parameters (ability to work, need for pain medication), apparently as a result of persisting analgesic abuse and social aspects with long-term inability to work in these patients. Izbicky et al. [9] reported similar postoperative pain relief for resection and non-resection procedures ($p < 0.001$ vs. $p < 0.001$); however, partial occupational rehabilitation occurred in 68 and 43% of patients undergoing DPPHE/PJA and PPPD. When assessing global quality of life after surgery for CP, appreciable improvement was seen in both our patient groups ($p < 0.001$). Compared with the PD/PPPD group, the DPPHE/PJA group showed more significant improvement in ability to work ($p < 0.001$ vs. $p < 0.05$) and emotional status ($p < 0.001$ vs. $p < 0.05$); improvement in social status was likewise more marked in the DPPHE/PJA group. No difference in cognitive function was observed between the two groups (NS). Similar results have been reported by other authors [9, 14, 18].

Conclusion

The following conclusions can be made on the basis of results of our study: The higher postoperative morbidity in both groups was affected by late referral and scheduling of patients for surgery in advanced CP associated with complications and marked comorbidity. Increased morbidity and mortality rates were seen in the group of patients undergoing resection; however, the difference with the rates in the DPPHE/PJA was not significant. Significant postoperative improvement of the quality of life and pain relief was noted with both surgical methods (PD/PPPD and DPPHE/PJA). The improvement was more significant in the DPPHE/PJA group. We can conclude that the EORTC QLQ-C-30 is a suitable and reliable tool for assessing global quality of life in patients with CP. We recommend to prefer DPPHE, because in our opinion it is superior to the PPPD procedure in patients with CP.

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