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ORIGINAL ARTICLE

Tailored surgery in chronic pancreatitis after implementation of a multidisciplinary team assessment; a prospective observational study

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Abstract

Introduction: Optimal management of chronic pancreatitis involves several specialties. Selection of patients for surgery may benefit from evaluation by a multidisciplinary team (MDT), similar to cancer care. The aim of this study was to evaluate outcomes in patients selected for surgery after MDT decision.

Methods: A prospective, observational study of consecutive patients operated for pain due to chronic pancreatitis after implementation of a MDT. The main outcome was Quality of life (QoL) assessed by EORTC-QLQ C30 and pain relief in patients followed >3 months. Complications were registered and predictive factors for pain relief analyzed.

Results: Of 269 patients evaluated by the MDT, 60 (22%) underwent surgery. Postoperative surgical complications occurred in five patients (8.3%) and reoperation within 30 days in two. There was no 90-days mortality. Complete or partial pain relief was achieved in 44 of 50 patients followed >3 months (88%). Preoperative duration of pain predicted lower probability of success. Postoperative improvement in QoL was most prominent for pain, appetite and nausea.

Conclusions: After MDT evaluation, one in five patients was selected for surgery. Pain relief was obtained in a majority of patients with improved QoL. A tailored approach through a MDT seems warranted and efficient.

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Introduction

Pain in chronic pancreatitis (CP) can be severe and difficult to treat, ultimately resulting in impaired quality of life (QoL), inability to attend work, and increased health care utilization. Traditionally, patients have been managed by medical or endoscopic therapy,[1] with surgery reserved as last resort indication. However, it is well documented that selected patients may benefit from surgery[2–5] and possibly earlier in the course of disease in order to have an effect. Several studies report promising results regarding pain relief and improved QoL after surgery.[6–9]

Patient selection for invasive procedures and timing of procedures are crucial to the success of treatments.[10] Optimal care of patients with chronic pancreatitis involves several specialties. A dedicated multidisciplinary team (MDT) care in pancreatic surgery is mandatory for most cancer programs, but has until now mainly been implemented in pancreatic cancer and pancreatic cysts.[11,12] In chronic pancreatitis, the complexity of decision-making supports the use of multidisciplinary evaluation and preferably early in the patient journey of an established diagnosis. However, information regarding the use of multidisciplinary assessments is sparse and lacks data from the selected group receiving surgical treatment.[13,14]

Several international guidelines provide recommendations for surgery in chronic pancreatitis.[2,15] However, absolute indications are missing, mainly due to the lack of standardized evidence-based treatment protocols. Thus, selecting patients with

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chronic pancreatitis for surgery is challenging. Knowledge about the various surgical procedures to potentially obtain pain relief is essential and based on the proposed mechanism of pain development. A complex interplay of multiple mechanisms probably contributes to pain in chronic pancreatitis.[16,17] In general, patients might benefit from one of three technical approaches; drainage procedures, resection or a combination of both.[18,19] Hence, regular MDT meetings might offer an advantage in proposing the optimal surgical strategy, including candidates for surgery.

Prior to the study period, surgery for pain due to chronic pancreatitis was seldom performed at Oslo University Hospital. However, in 2016 a structural surgical program for chronic pancreatitis patients, including dedicated chronic pancreatitis MDT-meetings, was established. The aim of the current study was to evaluate the outcome of patients with chronic pancreatitis selected for surgery after the implementation of a multidisciplinary assessment.

Material and methods

Ethics approval and informed consent

The study was approved by the Regional ethical committee (2019/1037) and the institutional Data Protection Officer of Research (2017/2867). All patients signed written, informed consent.

Study design

A prospective, observational single center study of consecutive patients undergoing surgery for chronic pancreatitis at the Department of Hepato Pancreato Biliary (HPB) surgery at Oslo University Hospital (OUH) from February 2016 to October 2021. The study was performed according to the Strengthening Reporting of Observational Studies in Epidemiology (STROBE) guidelines.[20]

The International Study Group for Pancreatic Surgery (ISGPS) standards for reporting surgery in chronic pancreatitis was used as a guide.[21] All patients had chronic pancreatitis according to the M-ANNHEIM criteria,[22] and was evaluated at the CP-MDT-meeting at OUH.

Study population

Norway has a universal, public health care system covering 5.4 million inhabitants. The country is organized into four regional health authorities (RHA). OUH is the largest HPB center and covers a population of 3.1 million people in South-Eastern Norway, and is a high-volume tertiary referral center for pancreatic diseases. There is no official national referral unit for chronic pancreatitis or complex pancreatic resections. Due to the lack of a structured surgical service in chronic pancreatitis at a national level, selected patients from the other three RHA were also referred to the chronic pancreatitis MDT meeting at OUH. During the study period, beyond a detailed medical history and recently performed computer tomography (CT), there were no consensus guidelines regarding required diagnostic work-up prior to the CP-MDT meeting.

MDT meetings

The CP-MDT meeting was held monthly since 2016. The same team of HPB surgeons, endoscopists, radiologists and a nurse coordinator, attended the meeting. The meeting was led by the surgeon responsible for the chronic pancreatitis surgical program (AW). On occasion, the MDT also included nutritionists, anesthesiologists, social workers, transplant surgeons, endocrinologists, and psychiatrists. These members were rarely included in the primary decision-making process, but they often played an important role in the quality of patient care and were involved pre- or postoperative when needed.

Selection criteria and technical considerations

Indication for surgery was based on patient reported symptoms, medical history, and radiological findings. CT was the reference standard in the radiological work-up supplemented by magnetic resonance imaging (MRI) in selected cases. Major comorbidity, ongoing alcohol abuse or lack of compliance were all contraindications for surgical treatment. In patients with long lasting pain, we were reluctant to recommend surgery, without an absolute cut off regarding duration of pain.

The operative strategy was guided by the anatomical characteristics of the pancreas, focusing on the diameter and appearance of the pancreatic duct, the extent and localization of parenchymal pathology and the size of the pancreatic head. If malignancy could not be ruled out by the preoperative work-up, a formal oncological procedure was mandatory. Patients without pain, but with radiological findings suggestive of chronic pancreatitis, did not receive any interventional treatment. In these cases, follow-up of endocrine and exocrine function was recommended.

Structured evaluation for surgery

The treatment algorithm for surgical approach was standardized during the study period (Fig. 1). A step-up approach for interventional procedures was utilized. Patients with pain and a stricture or obstructive stone in the pancreatic duct accessible for endoscopy were primarily selected to an endoscopic approach. In these cases, the endoscopist was responsible for follow-up and re-referral to the MDT meeting as needed. If initial attempted endoscopic therapy failed, patients were eligible for surgical decompression, preferably longitudinal pancreaticojejunostomy (PJ).[23] This procedure was also discussed as an alternative strategy to cases with repeated endoscopic stent procedures. Surgery was also considered in cases of pain syndrome that persisted following a technically successful endoscopic drainage procedure. In some of these cases, additional CT verified pathology in the pancreatic head tissue was an indication for a duodenum preserving pancreatic

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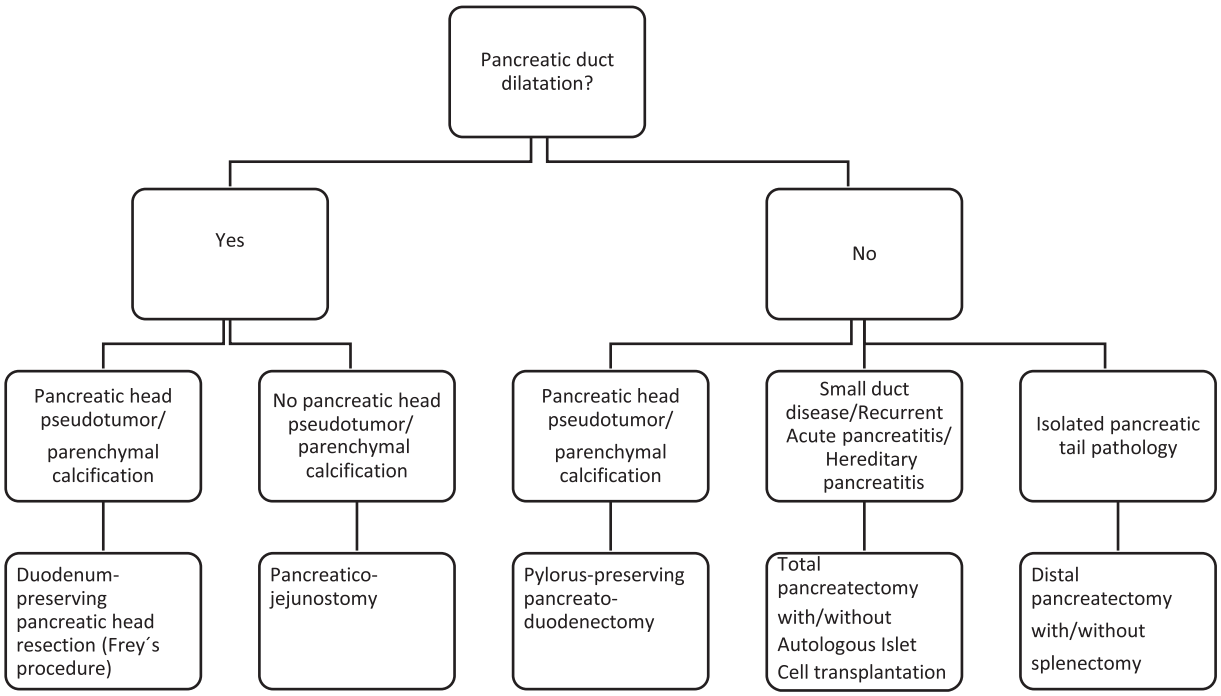

Figure 1 Surgical strategy in chronic pancreatitis following MDT evaluation

head resection (DPPHR) combining partial pancreatic head resection with pancreaticojejunostomy (Frey procedure). For patients with localized pathology in the pancreatic head and no pathology in the distal part of the gland, pancreatoduodenectomy was considered, preferably pylorus preserving (PPPD). For oncological resection procedures, total pancreatectomy (TP), distal pancreatectomy (DP) or pancreatoduodenectomy was mandatory if pancreatic ductal adenocarcinoma (PDAC) could not be ruled out from preoperative assessments or intraoperative findings.

In patients with pain, PPPD was also indicated in cases of chronic pancreatitis affecting the duodenum and/or the distal bile duct, resulting in gastric outlet obstruction or jaundice. When strictures in any of these organs occurred without pain or suspicion of malignancy, gastroenterostomy or endoscopic stenting of bile duct was primarily recommended. Pseudocysts giving rise to symptoms were all treated by endoscopic cystgastrostomy. In combined pathology with dilatation of the pancreatic duct and calcification/pseudotumor in the pancreatic head without suspicion of malignancy, Frey procedure was the gold standard.[24] In cases of isolated pathology in the pancreatic tail, distal pancreatectomy (DP) with or without splenectomy was considered. In patients eligible for duodenum-preserving pancreatic head resection (DPPHR) with (Beger procedure) or without (Bern procedure) transection at the neck of the pancreas,[25,26] the chronic pancreatitis pathology was only involving the pancreatic head. Following this, there was no indication for decompression of the whole length of the pancreatic duct. Due to the institutional familiarity with PPPD prior to the recruitment period, candidates for Beger/Bern procedures were preferably given PPPD. Total pancreatectomy (TP) with or without islet cell autotransplantation[27] was considered in symptomatic small duct disease, in recurrent acute pancreatitis and in hereditary pancreatitis. If islet cells were successfully isolated, they were intraoperatively infused into the portal vein.

Pre-operative work-up

All patients considered candidates for surgery were consulted in the out-patient clinic by one HPB-surgeon (AW) to confirm the indication for surgery, inform the patient, and receive written informed consent. Baseline characteristics were recorded and EORTC- QLQ C30 questionnaires completed.

Etiology of chronic pancreatitis was assessed according to established classification systems.[28] Patients were informed of the necessity of smoking cessation and refraining from alcohol consumption. Close collaboration with a dedicated pain anesthesiologist in the CP team was established. Preoperative analgesic consumption was split into non-opioid, weak and strong opioids. Total daily dose of opioids was converted to and registered as oral morphine equivalent dose (OMEQ). Outcome regarding pain-relief was based on self-reported pain assessments or postoperative reduction in opioid consumption. For

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statistical analyses, duration of symptoms was split into four subgroups (≤24 months, 24–48 months, 49–119 months, ≥120 months). Surgical candidates gave written informed consent for prospective follow-up and were registered in the institutional CP database.

Following consultation at the out-patient clinic, patients considered for total pancreatectomy with islet cell auto-transplantation (TPIAT) were referred to additional work-up including psychosomatic and endocrine evaluation. The complexity of the TPIAT procedure required involvement of a broader spectrum of specialists confirming the feasibility of the procedure. When all relevant information had been collected, the patients were discussed at a dedicated TPIAT-MDT meeting (transplant surgeon, anesthesiologist, pancreatic surgeon, endocrinologist, coordinating nurse). All other surgical candidates followed a standard preoperative procedure and planning. No routine pre-habilitation was established for CP surgical patients.

Surgical approach

All chronic pancreatitis specific procedures (DPPHR/PJ/TPIAT) were performed by one surgeon (AW). PPPD/DP were performed by several HPB-surgeons. Primary laparotomy through an upper midline or transverse abdominal incision was performed in all patients except DP candidates without prior pancreatic surgery, who were attempted by laparoscopic approach. When intraoperative findings raised suspicion of malignancy, the surgeon proceeded with an oncological resection, even if the MDT meeting had recommended a less comprehensive surgical procedure.

Quality of life assessments

The European organization for research and treatment of cancer quality of life questionnaire (EORTC QLQ-C30) was used to evaluate QoL.[29] Each patient rated his/her QoL at baseline (preoperatively) and once at follow-up during a visit or from questionnaires returned by mail. Scores for global health status and symptomatic and functional scales were recorded.

Follow-up

Patients were followed regularly at 3–6 months intervals at the HPB outpatient clinic. Chronic pancreatitis-related incidents were collected from local hospitals to minimize missing data in the follow-up period. Pain assessments and QoL are based on patients having a minimum postoperative follow-up of 3 months. 30-days complications were reported according to the Clavien-Dindo classification[30] and 90-days mortality registered. Follow-up was completed as of October 31, 2021.

Statistical analyses

All analyses were conducted using IBM SPSS Statistics 27. Continous variables were described with median and range or mean and standard deviation (SD) if normally distributed, categorical variables as counts and percentages. The strength of assocations between selected possible predictive factors and the outcome was analysed using univariate logistic regression. The results are expressed as odds ratios (OR) with 95% confidence intervals (c.i). Possible differences in QoL between baseline measurements and follow-up were assessed using paired sample t-test as all the same patients were measured twice. The results are expressed as the estimated mean differences with 95% c.i. In

Table 1 Descriptive characteristic of patients undergoing operation for painful chronic pancreatitis

	N (%)
Gender m/f 34/26	
Age (y) mean 50 (range 18–71)	
Cause of pancreatitis	
Alcoholic	18 (30.0)
Non-alcoholic	42 (70.0)
Hereditary	5 (8.3)
Idiopathic	20 (33.3)
Other	18 (30.0)
Body mass Index (kg/m2)	
<18,4	7 (11.7)
18,4–24,9	28 (47.7)
>25-30	22 (36.7)
>30	3 (5.0)
S-Albumin (g/L)	
<38	16 (26.7)
Endocrine insufficiency	15 (25.0)
Per oral medication	5 (8.3)
Insulin	10 (16.7)
Pancreatic exocrine insufficiency	33 (55.0)
Analgesics	
Strong opioids	34 (56.7)
Weak opioids	13 (21.7)
Non-opioids	13 (21.7)
Duration of symptoms months, median (range):	42 (3–360)
≤24	20 (33.3)
25-48	14 (23.3)
49-119	12 (20.0)
≥120	14 (23.3)
Prior interventions:	44 (73.3)
Pancreatic surgery	3 (5.0)
Endoscopic attempts:	41 (68.3)
Stenting of pancreatic duct	20
Stenting of Common bile duct	9
ESWL	5
Drainage of pseudocysts	0
Endoscopy unsuccessful	7

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addition, the differences were transformed into effect sizes (ES). The interpretation of ES was as follows: ES < 0.2 small, ES > 0.5 medium and ES > 0.8 is considered large. As the sample size was limited, all c.i were constructed using bootstrapping with 10000 repetitions (the bca method).[31] All analyses were considered exploratory, thus no correction for multiple testing was done and p-values < 0.05 were considered statistically significant.

Results

During the study period 60 (22.3%) of 269 patients referred to the CP-MDT-meeting underwent surgery. Baseline characteristics are presented in Table 1. The mean age was 50 years, 34 were male. Etiology was alcohol in less than one third of the patients. Mutations (SPINK1, PRSS1, or CFTR) were revealed in five patients, all of them candidates for TPIAT. At time of surgery, 25 (46%) patients were active smokers.

Forty-seven patients (78%) had severe pain requiring daily opioids. The median time from onset of symptoms to surgery was 42 months (range 3–360). Prior chronic pancreatitis-related invasive procedures had been performed in 44 patients (73%). Two patients had undergone an open PPPD and one patient a laparoscopic cystogastrostomy several years before inclusion in the current study. In 41 patients (68%), endoscopic therapy had been attempted prior to surgery of whom endoscopic decompression of the pancreatic duct technically was successful in 20 (48%). However, due to recurrent pain episodes, surgery was indicated.

Surgical procedures

Surgical procedures are presented in Table 2. During the study period, there were 61 procedures in 60 patients. In one patient, a PPPD was performed two years after a DPPHR due to recurrent pain. Eight of 11 DP were attempted by laparoscopy, of which one was converted to laparotomy due to technical difficulties. All other procedures were performed by laparotomy. In two patients, malignancy was suspected from preoperative work-up and confirmed by histopathology of the resection specimen in one. In another patient, a planned Frey procedure was intraoperatively converted to a PPPD due to suspicion of malignancy which was confirmed by histopathology. In twelve patients, TPIAT were performed. In the remaining four patients receiving a total pancreatectomy, islet cell autotransplantation was not performed because of either extensive calcification with insufficient isolation of islet cells (n = 1), lack of islet cell function (n = 2), and chronic pancreatitis in the native pancreas in a patient who earlier had undergone a single organ pancreatic transplantation (n = 1).

Table 2 Surgical procedures in chronic pancreatitis

	No
Longitudinal pancreaticojejunostomy, Partington-Rochelle (PJ)	7
Partial pancreatic head resection without transection of the pancreatic neck, Bern procedure	1[a]
Longitudinal pancreaticojejunostomy with partial pancreatic head resection, Frey procedure	14
Pylorus preserving pancreatoduodenectomy (PPPD)	11
Distal pancreatectomy with splenectomy (DP)	11
Total pancreatectomy ± islet cell autotransplantation (TP ± IAT)	16
Pancreaticogastrostomy (PG)	1

[a] One DPPHR (Bern procedure) later converted to PPPD.

Surgical outcomes

Postoperative surgical outcomes are presented in Table 3. There was no 90-day mortality. Clavien-Dindo complications grade ≥ 3a developed in five patients (8%), of whom 2 underwent a reoperation within 30 days. The cause of reoperation was intraabdominal hemorrhage after a Frey procedure in one patient and small bowel perforation after PPPD in another patient. Medical morbidity occurred in three patients (pulmonary embolization n = 2, malignant tachyarrhythmia n = 1). There were no cases of postoperative pancreatic fistulas. Median operation time varied from 185 min (range 125–355 min) in laparoscopic distal pancreatectomy to 369 (range 248–355 min) in PPPD. Eighteen patients (30%) were managed postoperatively in the intensive care unit (ICU) for a total of 69 ICU days. Three patients (5%) (TPIAT; n = 2, PPPD; n = 1) were readmitted within 30 days because of recurrent pain.

Outcome on pain syndrome

At the date of last follow-up, four patients were alive, but lost to follow-up, giving a follow-up rate of 93%. Two patients were diagnosed with pancreatic ductal adenocarcinoma (PDAC) and

Table 3 Postoperative complications after surgery in chronic pancreatitis (n = 60)

	No (%)
Mortality (90 days)	0 (0)
Morbidity[a] and adverse events (30 days)	5 (8.3)
Pancreatic fistula	0
Bile leakage	0
Postoperative bleeding	2
Intraabdominal abscess	1
Bowel perforation	1
Chyle leakage	1
Reoperation	2 (3.3)
Blood transfusion	2 (3.3)
Readmission	3 (5.0)

[a] Clavien –Dindo ≥ 3.

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were excluded from long term follow-up analysis because adjuvant chemotherapy might have been be a confounder in self-reported pain relief and QoL. In the remaining 54 patients, 50 had a follow-up of >3 months and were analyzed. The mean follow-up time was 20 months (range 3–62).

Complete or partial pain relief was achieved in 44 patients (88%). Six (12%) patients had no improvement of pain. Forty-three of 50 (86%) patients received opioids prior to surgery with a median daily OMEQ dose of 42 mg (range 2.5–420). Thirty (70%) of these patients reported no use of opioids postoperatively. In patients having partial pain relief, median OMEQ was reduced from 85 mg to 31 mg.

Possible predictive factors of postoperative pain relief involved gender, smoking status, age at operation, preoperative OMEQ and length of symptoms and were tested in univariate analyses. Length of symptoms was the only variable associated with postoperative pain relief, but it did not reach the level of statistical significance when modelled as a continous variable. However, when length of symptoms was categorised (< or ≥10 years), patients with symptoms lasting ≥10 years had significantly lower odds for pain relief after operation compared to those with shorter symptom lengths (OR = 0.41, 95% CI [0.18 to 0.91], p = 0.029).

Quality of life

Forty-one of 50 patients (82%) fulfilled the QoL questionnaire pre- and postoperatively once during follow-up. The median time after surgery for returning the questionnaire was 19.5 months (3–43).

Compared to baseline assessments, global health was significantly increased postoperatively. For symptomatic and functional scores, improvement was obtained in all but three domains (financial difficulties, diarrhoea, dyspnoe). Of all the analysed domains it was pain, nausea and appetite that revealed the largest improvements in scores between assessments (Fig. 2). Moreover, we also consider the changes clinically relevant as all the significant changes reached effect size >0.5, indicating moderate to large improvement. The effect size expressing the change for global health score was 0.62, indicating a large and clinically relevant change.

Discussion

In this study, we found that a formal, systematic CP-MDT evaluation led to an operative approach in one in every five patients during the study period. Several surgical techniques were used, with a preference for total pancreatectomy or

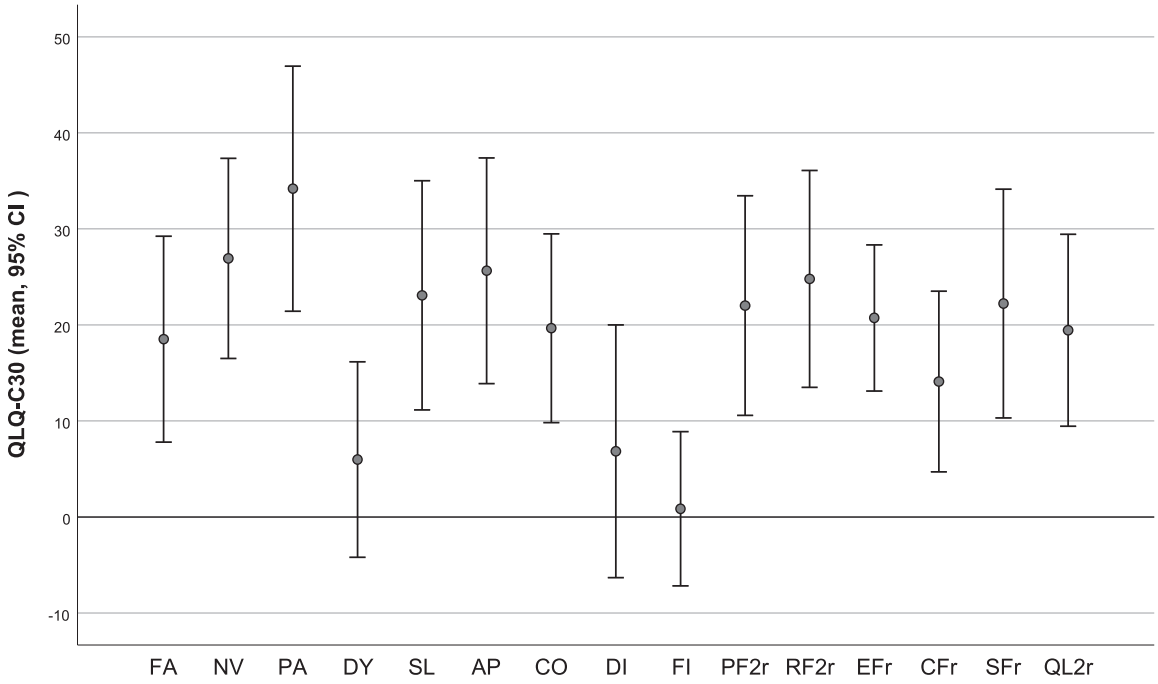

Figure 2 Difference in QoL between baseline measurements and follow up. The differences between pre-and post operative assessment are depicted as the estimated mean with 95% c.i. All changes not crossing the "0" horisontal line are statistically significant. Symptom scales: FA = Fatigue, NV = Nausea and vomiting, PA = Pain, DY = Dyspnoe, SL = Insomnia, AP = Appetite loss, CO = Constipation, DI = Diarrhoea, FI = Financial difficulties. Functional scales: PF2r=Physical, RF2r = Role, EFr = Emotional, CFr=Cognitive, SFr=Social, QL2r = Global healthe status

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resection procedures. Surgery was performed with low morbidity and no mortality. A majority of patients experienced a positive effect on pain relief and improved quality of life scores. The formal MDT evaluation seems warranted and is associated with favorable outcomes in selected patients.

Duration of pain prior to surgery was the only significant predictor for pain relief. This is in accordance with previous studies where timing of intervention has been found to be an important determinant of long-term-outcome of surgery in chronic pancreatitis.[10,32,33] Traditional theories explaining the development of pain focus on a mechanical cause, local pathology in the pancreatic tissue or pain pattern.[34] However, pathophysiological studies conclude that when pancreatic pain persists for a prolonged period, peripheral and central nerve sensitization may occur. This "Wiring" problem can lead to neuropathic pain, which cannot be solved by surgery.[16,17] In the present study, the interval from the first pain episode to surgery was median nearly 4 years, and nine patients had a pain history for more than 10 years. This might be explained by doctors' delay in referral of patients for MDT evaluation and a lack of surgical interest for chronic pancreatitis until recently. Accordingly, reluctance to refer patients for surgery might have occurred since physicians outside the institution did not have any specific address for referral. A structured surgical program which includes regular CP-MDT meetings might lower the threshold to refer patients for multidisciplinary treatment options, thus having the potential of offering surgery at an earlier stage. And in spite of controversies regarding treatment of pain, there is a consensus that all patients requiring opioid analgesia in chronic pancreatitis should be discussed multidisciplinary to determine whether they should be referred for interventional endoscopy or surgery.[3]

Even if radiological findings reveal a surgical solution, anatomical and morphological changes in the pancreatic gland are just one of several variables in selecting patients for surgery. Following this, potential surgical candidates in the current study were all evaluated at the outpatient clinic by the same HPB surgeon to confirm the information from the referring doctor and evaluate suitability for surgery before a definitive indication for surgery was set.

Surgical options for chronic pancreatitis are multiple and an individual tailoring is mandatory. Recent publications from European high volume centers show that a consistent surgical approach is still lacking, even within the same institution over time.[35] One institution reports a trend towards pancreatoduodenectomy in chronic pancreatitis[36] and DPPHR procedures have not yet gained widespread popularity outside Europe.[37]

In a Swedish retrospective study of surgically treated patients, DPPHR was seldom performed.[36] However, the indication for surgery was suspicion of malignancy in the majority of the patients (62%) requiring an oncological resection. In our cohort, the indication of surgery was malignancy in only two patients (3%).

In the present study, both DPPHR and PPPD were performed in almost an equal number of patients, but based on different anatomical findings. In a systematic review and meta-analysis including 4 randomized controlled trials, DPPHR and PPPD were found to be equally effective in terms of postoperative pain relief, overall morbidity, and incidence of postoperative endocrine insufficiency.[19] As our study is too small to conclude on the specific surgical techniques per se, the outcomes should preferably be viewed based on the multidisciplinary program rather than the surgical details. Obviously, surgical skills and knowledge of the various indications and limitations are crucial to the team in order to arrive at the optimal care for each patient.

The primary goal of surgery in chronic pancreatitis is not only to completely relieve, or at last reduce the disabling pain but also to increase the QoL. Thus, QoL assessments are important tools to evaluate the effect of surgery. Morbidity and mortality are subject to scientifically objective criteria, but patients' subjective perceptions are more seldom recorded. The best tool for this is to use standardized and validated questionnaires. SF-36, SF-12 and QLQ PAN26 are patient-reported outcome, validated QoL-instruments in chronic pancreatitis specific clinical trials.[38] The EORTC-QLQ C30 questionnaire is primarily designed and intended for cancer patients, but is also specifically validated for use in benign conditions such as chronic pancreatitis.[29] In two Nordic studies, patients with chronic pancreatitis had significantly lower scores of global health status and reduced scores for all functional scales using the EORTC-C30 questionnaire as compared to the reference population.[39,40] In other studies, QoL after surgery was impaired compared to a normal population, suggesting QoL being determined by a number of patient and disease characteristics including, but not limited to, measures of pain.[41,42] However, there are few prospective studies investigating QoL after surgery in chronic pancreatitis compared to baseline, since most reports have a retrospective design.[43] Although there might be multiple risk factors for impaired QoL in chronic pancreatitis which cannot be solved by surgery, we found a statistically significant and clinically relevant increase both in global health and all but three of the functional and symptomatic scores postoperatively, which is in accordance with results reported in other studies.[7,10,44]

The majority of patients had prior endoscopic attempts during the course of chronic pancreatitis. However, this step-up approach is controversial. In a long-term study including 266 surgically treated patients, more than five preoperative endoscopic procedures predicted less favorable outcome regarding pain relief.[10] Thus, the success of endoscopy should be determined after a limited number of endoscopic procedures to optimize outcome of potential future surgery. In addition, randomized controlled trials suggest a superiority of surgery compared to conservative and endoscopic measures in patients primary suitable for endoscopy.[42,45]

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Surgical complication was registered in 8.3% of the patients, and there was no 90-days mortality. These results are in contrast to complication rates reported in pancreatic surgery for other indications than chronic pancreatitis, both international[46] and from OUH.[47,48] In 34 of the patients a pancreaticojejunostomy was performed, either as part of a decompression procedure, a resection procedure or a combination of both. No pancreatic fistulas were registered. Structural changes in a fibrotic gland following chronic inflammation favors a safe anastomosis and this is one of several variables predicting low fistula risk score.[49] However, reports from other centers have found a higher complication rate for surgery in chronic pancreatitis.[9,42,50] A successive development of surgical competence in the HPB-team, and limiting the number of surgeons involved in the chronic pancreatitis specific procedures during the implementation period, may partly explain the favorable short-time surgical outcome in the current study.

Strengths and limitations

This study has some limitations. We are lacking information regarding surgery in chronic pancreatitis patients prior to 2016, when an organized multidisciplinary approach was established. Historical controls from own institution could have constituted a control group. However, despite a high pancreatic surgical volume, surgical treatment in chronic pancreatitis was very seldom performed at OUH until that time.

Further, the study design did not include a non-surgical control group. The idea of a comparison group of patients not selected for surgery during the inclusion period was entertained, yet they were deemed poor candidates for surgery and hence outcome comparison may not have been warranted. This largely reflects the heterogeneity in this complex study population.

The study is rather small, but selected outcomes of 269 patients were evaluated during the period. Hence, we believe this to reflect the size of the problem and the challenge as seen in many other regions that are comparable. However, the small population makes multivariable testing unreliable and was not further pursued.

Of note, the EORTC-QOL C30 score is not designed specifically for chronic pancreatitis, and a more specific score for pain assessment such as Visual Analog Scale (VAS) or Izbicki pain score would have been beneficial. However, the domain assessing subjective pain in the EORT-QLQ C30 questionnaire turned out to have the highest improvement size. In addition, registration of baseline characteristics including both QoL scores and consumption of analgesics converted to OMEQ makes comparison of outcome regarding pain reliable.

Standardized intervals from surgery to assessments would further strengthen our conclusions. However excluding patients with shorter follow-up time than three months avoids potential confounders from temporary postoperative discomfort.

The strength of our study is the prospective design, a high follow-up rate and the uniform team throughout the period. The experience at OUS regarding surgical solutions in chronic pancreatitis was scarce prior to the implementation period. Since the CP-surgical program was developed by a dedicated CP responsible HPB surgeon, standardization of the technique was achieved, further strengthening the results by avoiding different surgeons having different technical skills and opinions.

. Our results support that a CP MDT-meeting and a structured surgical program is a suitable setting for selecting candidates for surgery in this complex group of patients. Organizing dedicated CP MDT-meetings might contribute to improved treatment outcome. Hopefully it will increase surgical attention to a large group of patients suffering from disabling pain and decreased quality of life.

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Declaration of competing interest

None declared.

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