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Contemporary approaches to choosing surgical treatment for patients with complicated forms of chronic pancreatitis

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Abstract
Surgical treatment was applied to 144 patients with chronic pancreatitis (CP). In 54 (37.5%) patients, CP was complicated by dysfunction of adjacent organs. Particularly, these were biliary hypertension (BH) in 36 (25%) patients and chronic duodenal obstruction (CDO) in 8 (5.5%) patients. In 5 (3.5%) patients, BH was combined with CDO, and another 5 (3.5%) patients had a combination of BH, CDO and venous hypertension (VH) of the portomesenteric area. Indications for surgical treatment were as follows: persistent pain syndrome and inefficiency of pharmaceutical treatment; manifest duct hypertension due to fibrotic CP with dilatation of pancreatic ducts and pancreatic juice hypertension in hem or calculous CP with manifest intrapancreatic hypertension – 48 (33.3 %) patients; fibrocystic CP with formation of retention cysts, pseudocysts and external fistula of the pancreas - 27 (18.7 %) patients; fibrous-degenerative CP with involvement of adjacent organs and their dysfunction (BH, CDO, VH, and their combination) - 54 (37.5%) patients; pancreatic pseudotumor and assumption of a pancreas tumor – 10 (6.9%) patients. Resection surgeries were performed in (43.4 %) patient (pancreaticoduodenal resection (PDR) – 5 (3.5 %), Frey's procedure – 44 (30.5 %), Berne modification - 2 (1.4 %), distal pancreas resection – 10 (7 %). Draining operations were performed in 74 (51.4%) patients, palliative surgeries - in 9 (6.2 %) patients. In 16 patients with CP accompanied by signs of BH, intraoperative monitoring of biliary pressure was performed, which allowed determining the appropriateness of the surgery for the elimination of BH. The results of surgical treatment were traced in 43 (29.8 %) patients in the period from 6 to 36 months and appeared to be good and satisfactory. Life quality indicators were better in patients who underwent resection surgeries on the pancreas.

Keywords: chronic pancreatitis, biliary hypertension, duodenal obstruction, ductal hypertension, duodenum-preserving resection.

Introduction
CP is a progressing inflammatory process in the pancreas that results in complete destruction of gland tissue, derangement of digestion, development of diabetes mellitus, and manifest pain syndrome [1]. Over the last thirty years, we have witnessed a more than double increase in the number of CP patients [2]. Early complications of CP develop in 30% of cases while late ones – in 70-85%; 6.3% of patients die within 5 years, 30% - within 10 years, and around 50% - within 20 years [3]. CP mortality among the patients with alcoholic pancreatitis that are suffering for more than 20 years fluctuates between 28.8% and 35.0% while in cases of non-alcoholic pancreatitis lasting for more than 10 years the mortality rate reaches 10% [4].
Surgical treatment of CP is a topical, complicated and not yet completely resolved problem of gastroenterology. From 4 to 9 % of patients with CP require surgical intervention [5]. Strategies of CP treatment available at the moment stipulate that surgery is the last moment of treatment after the conservative treatment, change of lifestyle, and endoscopic methods failed [6].
Presently, indications for surgical treatment of CP are not always specific. Surgical intervention is justified in case there are clinical signs of CP and morphological changes in the pancreas when conservative therapy is inefficient and there is a threat of CP complications or the complications have already occurred [5].
A number of authors determine the following indications for surgical treatment of CP: pain that is not treatable conservatively, different complications of the fibrous-degenerative process in the pancreas and parapancreatic fibrosis (stenosis of the major pancreatic duct (MPD), intrapancreatic part of the common bile duct (CBD), stenosis of the duodenum, compression or thrombosis of the portal and splenic veins, colon obstruction), complications of pseudocysts (long-existing or symptomatic cyst, purulent pseudocyst or hemorrhage into its cavity, pancreatic ascites and pleural effusion, pancreatic fistula), assumption of pancreas carcinoma [7, 8].

Aim of the paper: basing on the analysis of our own results, to determine optimum methods of surgical treatment of CP.

Materials and Methods

We analyzed the results of surgical treatment of 144 patients with complicated forms of CP who underwent surgical treatment at the department of surgery of the Ivano-Frankivsk Regional Clinical Hospital, among them 133 (92.3%) men and 11 (7.7%) women aged 21 to 72. Fifty-four (37.5%) patients had the symptoms of adjacent organ dysfunction, in particular: CDO –8 (5.5%) patients, BH –36 (25%) patients. Another 5 (5.5%) patients had a combination of BH and CDO, and the other 5 (5.5%) had a combination of BH+CDO and local VH of vessels of the pancreaticobiliary area.

To diagnose CP and its complications we used: laboratory tests (the level of alpha-amylase, total and direct bilirubin, alkaline phosphatase), ultrasonography (USG), ERCP, computed tomography (CT), MRCP, intraoperative measurement of bile pressure (IOM BP).

The quality of patients' life in the remote postoperative periods was considered the criterion of surgical treatment efficiency. Assessment of the remote results of surgical treatment was done by examining the patients, USG, and filling out the «Short Form Medical Outcomes Study» (SF-36) questionnaire, which allows assessing physical and psychoemotional conditions of the surveyed separately.

Results and Discussion

Surgical intervention was aimed at elimination of the persistent pain syndrome, restoration of pancreatic juice passage, elimination of complications that cannot be corrected by conservative methods, and the creation of conditions for maximum preservation of exocrine and endocrine functions of the pancreas.

The analysis of our own experience of surgical treatment of 144 patients with complicated forms of CP over the period of 2009-2016 determined the following indications for surgical treatment:

1. Persistent pain syndrome and inefficiency of pharmaceutical treatment.
2. Fibrotic CP with dilatation of pancreatic ducts and hypertension of pancreatic juice in them.
3. Fibrous-degenerative CP:

a) calculous CP with calcifications in ducts and parenchyma of the pancreas, manifest intraductal hypertension and acinal tissue atrophy;

b) pancreatic pseudotumor;

c) fibrocystic – with the formation of retention cysts, pseudocysts, and external fistula of the pancreas;

d) fibrous-degenerative – with the involvement of adjacent organs and their dysfunction (biliary hypertension, chronic duodenal obstruction, venous hypertension in the mesoportal system and their combination).

4. The assumption of pancreas tumor.

Stable clinical picture and manifest pathomorphological changes in the pancreas and adjacent organs, verified by instrumental methods of examination, were an essential condition for determining indications for surgery.

Main clinical manifestations of CP included persisting pain syndrome of various intensity that occurred in 137 (95.1%) patients, symptoms of exocrine deficiency (132 (91.6%) patients) and signs of endocrine deficiency (19 (13.2%) patients). Fibrous-degenerative changes in the head of the pancreas with the involvement of the neurological apparatus and duct system of the gland with the development of ductal hypertension were the causes of pain syndrome in cases of CP with BH.

Symptoms of adjacent organ damage and their dysfunction were the indications for surgical treatment in 54 (37.5%) patients. In 5 (3.5%) patients, fibrous-degenerative changes in the pancreas head or pancreatic pseudotumor that stimulated tumorous process in the head of the pancreas was the indication for surgery. Contemporary laboratory and instrumental methods of examination at the preoperative stage do not always allow excluding the malignant process completely.

In 27 (18.7%) patients, fibrocystic CP with the formation of retention cysts, pseudocysts or external fistula of the pancreas became the indications for operation. Except complications on the part of the pseudocyst itself (hemorrhages, purulence, perforation), a pseudocyst of the head of the pancreas may be the cause of adjacent organ dysfunction (duodenum with the development of CDO, mesoportal venous confluence with the development of portal hypertension). Therefore, these complications required surgical correction.

Manifest ductal hypertension clinically diagnosed using instrumental methods (with Wirsung's duct lithiasis or without it) was an indication for surgical treatment in 48 (33.3%) patients. They underwent mostly draining surgeries (longitudinal pancreaticojejunostomy (LPEA) – 36 patients, endoscopic stenting of the MPD – 14 patients).

The general principle of surgical treatment of patients with complicated forms of CP was the elimination of pathological process in pancreatic tissue and adjacent organs, which causes clinical signs of the prior disease. The scope and nature of surgical intervention in patients with complicated forms of CP depended on the seriousness and character of pathological changes in the pancreas and adjacent organs.

Methods of surgical treatment of CP included draining, resection and indirect (palliative) surgeries.

Description of all surgeries is provided in table 1.

Table 1: Surgeries in patients with complicated forms of CP

Surgery	Number	%
Resection surgeries:	**61**	**42.4**
Frey's procedure	44	30.5
Pancreaticoduodenal resection according to Whipple	5	3.5
Berne modification of Beger procedure	2	1.4
Distal resection of the pancreas	10	7
Draining surgeries	**74**	**51.4**
Longitudinal pancreaticojejunostomy	33	22.9
Cystenterostomy	17	11.8
Endoscopic cystoduodenostomy	5	3.5
Endoscopic stenting of the MPD	14	9.7
External draining of the pancreatic cyst	5	3.5
Palliative surgeries	**9**	**6.2**
Palliative hepaticojejunostomy	5	3.5
ERCP with endobiliary stenting	4	2.7
Total	**144**	**100**

Resection surgeries were performed in 61 (43.4%) patient. A manifest chronic inflammatory process was considered to be an indication for resection surgeries in the area of pancreas head (PDR, Beger procedure, Frey's procedure, Berne modification) or tail of the pancreas (distal resection). In the case of grounded assumption of a malignant process in the area of the head of the pancreas, the standard PDR was applied – 5 (3.5%) patients. In cases of isolated fibrous-degenerative

process of the tail of the pancreas, or in the case of assumption of a tumorous process, distal resection was applied to 10 (7%) patients. The choice of the method of surgical intervention was conditioned by the fact that resection surgeries, as well as their contemporary modifications, allow eliminating a number of complications of CP, namely: pancreatic ductal hypertension, in some cases – BH and compression of porto-splenic-mesenteric confluence with recovery of portal circulation (this is less true for Frey's procedure), chronic abdominal pain.

In case of manifest fibrous-degenerative changes in the head of the pancreas accompanied by pain syndrome, BH, CDO or VH, the method selected was duodenum-preserving resections of the pancreas (Frey's procedures, Berne modification) – 46 (31.9 %) patients.

Draining surgeries were used in 74 (51.4%) cases. Particularly, in cases of isolated Wirsung's duct lithiasis, dilatation of MPD without stenosis and occlusion of passages and without significant fibrous degeneration of the head of the pancreas, in case of CP with atrophy of the head of the pancreas and Wirsung's duct ectasia, the method selected for surgical treatment was LPEA – 33 (22.9 %) patients. Fourteen (9.7 %) patients underwent endoscopic stenting of the MPD, 5 of them had simultaneously lithoextraction from the MPD. However, three patients, who underwent this procedure, later needed resection interventions on the head of the pancreas due to progressing fibrous-degenerative changes in the head of the pancreas. The following surgeries were applied in cases of pancreatic cysts: open cystenterostomy – 17 (11.8 %) patients, endoscopic cystoduodenostomy – 5 (3.5 %) patients, external drainage of cysts – 5 (3.5 %) patients.

In 9 (6.2 %) patients with serious comorbidity, *symptomatic operations* were applied: application of biliodigestive bypasses (in cases of biliary hypertension and jaundice) – 5 patients, ERCP with endobiliary stenting (in the case of obstructive jaundice) – 4 patients.

Patients with CP complicated by BH constituted a separate group.

Table 2: Surgical interventions in patients with chronic pancreatitis accompanied by signs of biliary hypertension

Surgery	Number	%
Frey's procedure	**18**	**39.1**
standard	6	13
with hepaticoenteroanastomosis (HEA) according to Roux	10	121.6
with excision of pancreas lingula	1	2.1
with application of biliopancreatic anastomosis	1	2.1
Pancreaticoduodenal resection(PDR) according to Whipple	5	10.8
Berne modification of Beger procedure	2	4.3
Longitudinal pancreaticojejunostomy	8	17.4
with HEA according to Roux	8	17.3
Cystenterostomy	3	6.5
Endoscopic cystoduodenostomy	2	4.3
Palliative hepaticojejunostomy	2	4.3
External draining of pancreatic cyst	1	2.1
ERCP with endobiliary stenting	5	10.8
Total	46	100.0

IOM BP (useful model patent No. 101713, bul No. 18 of 25.09.2015) [9] was applied to 16 patients during duodenum-preserving resections of the pancreas; in seven patients, measurement of BP was done using a digital manometer connected to a computer.

IOM BP was determinant in the selection of surgical tactics. If BH remained after removal of fibrous tissues of the head of the pancreas and release of the intrapancreatic part of the CBD, the surgery was supplemented by interventions on bile duct (bilipancreatic anastomosis, hepaticoenteroanastomosis (HEA) on a loop according to Roux). If BH was eliminated by a surgery on the head of the pancreas, intervention on bile passages was not applied.

In cases of CP with BH, Frey's procedure was applied in 18 (39.1%) patients. In six (10.8%) of them, BH was eliminated by standard Frey's procedure. In 12 (21.6 %) patents, Frey's procedure was supplemented by interventions on bile ducts (HEAs were applied in 10 patients, pancreas lingula was excised in one patient, biliopancreatic anastomosis was applied in one case).

The results of surgical treatment were traced in 42 (29.8%) patients in the period of 6 to 36 months. The results of questionnaire survey showed that all patients estimated their physical and psychoemotional condition as good or satisfactory. Life quality indicators appeared to be better in patients who underwent resection surgeries on the pancreas. Physical examinations and laboratory and USG data indicated to the absence of signs of adjacent organ dysfunction in the remote postoperative periods.

Conclusions

1. Main indications for surgery in patients with CP include persistent pain syndrome which occurs in 98.5% of patients and is caused by fibrous-degenerative changes in the gland tissue or pancreatic hypertension, dysfunction of adjacent organs – 37.5% of patients, complications of gland cysts (purulence, hemorrhages) – 18.7% of patients, impossibility to exclude malignant process in the gland – 6.9%.
2. The surgeries selected to treat patients with CP with signs of biliary hypertension are duodenum-preserving resections (Frey's procedure, Beger procedure, Berne modification), which in some cases require additional intervention on bile passages (application of biliodigestive anastomoses or biliopancreatic anastomoses in the area of pancreas head resection).

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