

# Pancreatic Pseudocysts

## A Follow-up Study

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From 1968 to 1978, 37 men and 14 women, with a median age of 43 years, were operated on for a pancreatic pseudocyst. Alcohol abuse was the dominating cause in 65% of the patients. Internal drainage (medium risk patients) was carried out in 76%, external drainage (high risk patients) in 12%, and pancreatic resection (low risk patients) in 12% of the patients. The hospital mortality rate was 14%. The patients who died were significantly older than those discharged from the hospital alive. At the time of follow-up, (1–11 years, median: 4 years) after operation, a further 13% had died. Thirty per cent of the alcoholic and none of the nonalcoholic patients had severe pain at follow-up examination. Evaluated by their ability to work and pain, the late results were poorer for the alcoholics who continued drinking, better for alcoholics who had stopped drinking and best for nonalcoholics.

PANCREATIC PSEUDOCYSTS ARE A complication of acute or chronic pancreatitis. Approximately 1.5–3% of all patients admitted to the hospital for pancreatitis, develop pseudocysts requiring surgical treatment.<sup>1,2</sup> Since the incidence of hospitalized patients with pancreatitis in Copenhagen is approximately 36 per 100,000 adults per year,<sup>4</sup> the number of pancreatic cysts requiring operation will, therefore, be approximately 0.5–1 per 100,000 adults per year.

Taking these figures into consideration, it is obvious that even large surgical centers<sup>3,7–9</sup> will only operate on a few patients suffering from this condition each year. It is, thus, difficult to obtain materials sufficiently large to permit prospective evaluation of the various types of surgical treatment.

Therefore, it is only possible to carry out retrospective studies of the results obtained following operative procedures. Since the number of patients with pancreatic pseudocysts admitted to the hospital is rapidly increasing,<sup>9</sup> the authors considered it of interest to carry out a follow-up study of 51 patients who underwent operations for pancreatic pseudocysts.

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### Materials and Methods

#### *Patients*

During the 11-year period 1968–1978, 51 patients underwent operations for pancreatic pseudocysts at the Copenhagen Municipal Hospital and Odense University Hospital. The region served by the former is typical of a large city, while that of the latter is typical of a large provincial town with surrounding suburbs and rural district.

The median number of operations per year was four, the fewest was one operation (1969), and the most was 11 operations (1975). Thirty-seven patients were male and 14 were female. Their median age at the time of operation was 43 years (range: 6–77 years). All the patients complained of severe pain, 15 had persistent nausea at times with vomiting, three suffered from excessive loss of weight (more than 5 kg within the last four weeks) and one had massive upper gastrointestinal hemorrhage.

#### *Diagnostic Procedure*

The diagnosis was made during explorative laparotomy in 13 patients with a palpable mass in the epigastrium, and in six patients with no such physical signs. The diagnosis in a further nine patients was mainly based on x-ray examination of the stomach and duodenum, gastroscopy and selective arteriography.

In 23 patients, the diagnosis was based, mainly, on the results of ultrasonographic examination and endoscopic retrograde cholangiopancreatography, both of which were introduced in the middle of the 1970s. One-half of the patients (25) had increased levels of plasma or urine amylase, whereas none of the patients suffered from clinical jaundice.

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Submitted for publication: November 24, 1980.

TABLE 1. *Clinical Data and Observation Time*

	Number of Patients	Age, Years (Median and Range)	Size of the Cyst, cm (Median and Range)	Hospitalization, Days (Median and Range)	Observation Time, Years (Median and Range)
Alcoholics	33	40 (28-64)	7 (3-15)	13 (8-83)	3 (1-7)
Nonalcoholics	18	56 (6-77)	10 (5-30)	22 (10-60)	5 (1-11)
Whole study	51	43 (6-77)	9 (3-30)	14 (8-83)	4 (1-11)

The median size of the cysts (Table 1) at operation was 9 cm (range: 3-30 cm).

#### *Type and Cause of Pancreatitis*

Thirty (58%) of the patients suffered from chronic pancreatitis (defined as a reduction in exocrine pancreatic function), 12 (24%) had their first attack of acute pancreatitis and nine (18%) were admitted to the hospital because of recurrent acute pancreatitis. It can be seen from Table 2 that the cause of the pancreatitis in the great majority of patients was alcohol abuse (defined as a daily consumption of more than 50 g of pure alcohol). About two-thirds of the patients admitted to the hospital had an alcohol consumption of such magnitude.

In the group of nonalcoholics, ten patients had pancreatitis, the cause of which could not be found, five patients had stones in the biliary tract, and one patient had a penetrating duodenal ulcer. Traumatic pancreatitis was the cause of the pseudocyst in two boys, six and ten years of age, respectively. Both had had severe blunt abdominal trauma.

#### *Operative Tactics*

A number of factors affected the choice of operation; the age and general condition of the patient, the presence of complicating disease, local complications to the cyst, the appearance of the noncystic part of the pancreas, the size of the cyst, the thickness of its wall and the localization of the cyst in relation to the pancreas and surrounding structures.

An attempt was made in all patients to perform elective surgery following improvement in nutritional status and fluid balance. Due regard was paid to "maturation" of the cyst when selecting the time of operation. The object was to obtain a well-defined cyst with a thick and strong wall, so that a sufficient suture line could be established. This technical problem was weighed against the possible disadvantages in waiting: the risk of infection, hemorrhage, unbearable pain and difficulties in nutrition.

The operations described in Table 3 were performed taking due regard to these tactics. Three-fourths of the patients were subjected to internal drainage, one-eighth

to external drainage, and one-eighth to resection. In cases where gall stones or duodenal ulcers were present, the appropriate operations were performed. Those patients admitting alcohol abuse were advised to abstain from alcohol.

#### *Follow-up*

All the patients were followed during admission, and the majority during outpatient control at intervals between six months and one year, until the time of death or to the end of 1979. Those patients who were not under outpatient control were traced at the time of completing the present investigation.

Those who were alive were subjected to a clinical examination and interviewed with regard to the presence of pain, their alcohol consumption and ability to work. None of the patients were lost to follow-up. The patients who died after discharge were all interviewed as outpatients less than six months before death, and are, therefore, included in the clinical results. The median observation time for the patients discharged from the hospital was four years (range: 1-11 years). Statistical evaluation of the results was performed using the chi square test and the Mann-Whitney rank sum test. A significance level of 5% was employed.

## Results

#### *Immediate Death*

Table 4 shows that seven of the 51 patients (14%) died during the postoperative hospitalization period. Of these, three died 13, 16 and 36 days after operation of an aggravation of the pancreatitis complicated by necrosis, abscess and sepsis. Two patients died 13 and 42 days after operation, after cystogastrostomy, and one patient died 83 days after external drainage, as a result

TABLE 2. *Causes of Pancreatitis*

Alcoholics		33 (65%)
Nonalcoholics		18 (35%)
gall stone	5	
blunt trauma	2	
duodenal ulcer	1	
idiopathic	10	

TABLE 3. Immediate and Late Outcome Related to Type of Operation

Type of Operation	Number	Immediate Outcome		Late Outcome	
		Fatal Complications	Nonfatal Complications	None or Slight Pain	Severe Pain
Internal drainage	39 (76%)				
cystogastrostomy	33	4	5	22	7
cystojejunostomy	6	0	1	5	1
External drainage	6 (12%)				
marsupialization	4	1	0	2	0
sonographic puncture	2	1	0	1	0
Resection	6 (12%)				
left ad modum Puestow	5	1	0	4	1
right ad modum Whipple	1	0	0	0	1

of sepsis in connection with reoperation necessitated by massive hemorrhage from the cystwall. A 70-year-old man who had idiopathic pancreatitis, treated with ultrasound-directed percutaneous puncture of the cyst, died 24 days later of malignant intractable hypertension. In this patient, a recurrent pseudocyst was found at autopsy. The immediate deaths do not differ from the patients discharged from the hospital alive in respect of sex, year of operation, or cause of the pancreatitis. Those patients who died immediately after operation were significantly older than those discharged from the hospital alive.

There were six patients with severe, nonfatal complications after these operations (Table 3). Two patients developed massive gastrointestinal hemorrhages following cystogastrostomy, two had pancreatic abscesses and two developed severe postoperative pancreatitis with reversible shock and anuria. The median duration of hospitalization for those patients discharged from the hospital alive is shown in Table 1. Patients with pancreatitis caused by alcohol consumption were hospitalized for a median of 13 days (range: 8–83 days), while those with nonalcoholic pancreatitis were admitted for 22 days (range: 10–60 days). This difference is significant.

#### Late Results

Of the 44 patients who were discharged from the hospital alive, six died during the observation period

(Table 4). Five of these patients were alcoholics. The patient who was not an alcoholic was a 72-year-old woman who died 62 months after operation of an acute myocardial infarction. Of the five alcoholics, four died 18, 21, 38 and 80 months after operation, from thromboembolic complications (a 58-year-old man and a 47-year-old man of cerebral insult, a 41-year-old man after thrombosis of the superior mesenteric artery, and a 38-year-old man from a pulmonary embolism). Finally, a 35-year-old woman probably committed suicide 26 months after operation. Among the 44 patients discharged from the hospital there were no recurrences of pseudocysts, diagnosed or operated, within the time of observation.

At the last interview, 45% of the 44 discharged patients stated that they were free from pain (Table 4), 30% said they had slight or periodic pain, while 25% had severe chronic pain. The last mentioned 11 patients with debilitating symptoms all had pancreatitis caused by the alcohol. None of the patients with nonalcoholic pancreatitis had severe symptoms at the time of follow-up. The results of the operation, with regard to pain at the follow-up examination, were significantly better for the nonalcoholic than for the alcoholics.

If the results for the 30 alcoholics are evaluated, it is found that seven of the nine (78%) who continued to drink after operation had pain at the time of follow-up, while 13 of 21 patients (62%) who had stopped drinking had pain at the follow-up examination. The

TABLE 4. Immediate and Late Outcome Related to Cause of Pancreatitis

	Hospital Deaths	Late Deaths	Status Regarding Pain		
			None	Slight	Severe
Alcoholics	3	5	10	9	11
Nonalcoholics	4	1	10	4	0
Whole study	7 (14%) (of 51 patients)	6 (13%) (of 44 patients)	20 (45%) (per cents of 44 patients)	13 (30%)	11 (25%)

TABLE 5. *Employment Before and After Operation*

	Before Operation	After Operation
Alcoholics	52% (14 of 27)	26% (7 of 27)
Nonalcoholics	100% (9 of 9)	78% (7 of 9)
Whole study	64% (23 of 36)	39% (14 of 36)

somewhat better long-term results for the alcoholics who stopped drinking are not statistically significant.

The ability of the patients to work, within the proper age groups (18–67 years), at the time of operation was evaluated. Insufficient information is available with regard to three of these. Thus, the evaluation of the ability to work is based on 36 patients only (Table 5). Prior to operation, all (9 of 9) of the nonalcoholics were working, but only approximately one-half (14 of 27) of the alcoholics had employment. After operation, three-quarters (seven of nine) of the nonalcoholics were employed, while only one-quarter (seven of 27) of the alcoholics were working. These results are significantly poorer for the alcoholics than for the nonalcoholics. Among the 20 alcoholics who were not employed at the time of follow-up, 15 had chronic pancreatitis at the time of operation and eight were still drinkers at the time of follow-up.

### Discussion

The nonoperative intensive medical treatment of patients with pancreatic pseudocysts results in a significantly higher frequency of immediate complications and death than operative treatment.<sup>1</sup>

The immediate operative mortality rate, in the present material, was 14%. If it is taken into consideration that the true mortality rate based on this lies between six and 26% (confidence limit: 95%), then the present results do not differ from the operative mortality rates stated in other studies (Table 6), which again, with re-

gard to age, sex and cause of pancreatitis do not differ, to any great extent, from the present material.

The most marked differences in the materials quoted (Table 6) is to be found in the distribution of the operative procedures. The frequency of internal drainage is 37–82%, external drainage 9–59%, and resections 0–34%. Such variations reflect the difficulties in determining which operative procedure provides the best results as a selection has taken place following the choice by the surgeon. Thus, in most reports, the patients in the poorest condition have been subjected to an operation considered to be least detrimental to the patient.<sup>10</sup> In the present study, where the operative tactics were individualized in the same manner, no difference was observed in the immediate results of different types of operations. The operative mortality rate was influenced by the age of the patient. Those patients discharged from the hospital alive were significantly younger than those who died immediately after operation. Thus, the age of the patient appears to determine, to a considerable extent, the immediate postoperative results. This seems to be emphasized by the fact that nonalcoholics were retained considerably longer in hospital after operation than alcoholics although these were significantly younger.

A large study,<sup>6</sup> in which only external or internal drainage was employed and where the patients were selected in such a manner that high risk patients were subjected to external drainage, showed that there is a higher immediate mortality rate in such patients than those who undergo internal drainage. However, if external drainage is used in uncomplicated cases, the immediate results are good.<sup>2</sup> However, the preferred method, in all other reports from the last decade, is internal drainage (Table 6).

The use of the latest diagnostic procedures (sonography with aspiration and measurement of cyst wall thickness, endoscopic retrograde pancreatography, computerized tomography and refined selective angiography) will improve the preoperative planning and

TABLE 6. *Clinical Data, Immediate and Late Outcome in Reported Series of Operations for Pancreatic Pseudocysts*

Authors	Cases Operated on (Number)	Period	Alcoholics/ nonalcoholics (Ratio in Per Cent)	Operative Mortality (Per Cent)	Follow-up Time (Mean or Median Years)	Lost at Follow-up (Per Cent)	Late Deaths (Per Cent)	Late Outcome, Excellent or Fair (Per Cent)
Frey <sup>3</sup>	120	1959–1976	66:34	8	3¼	14	17	—
Pollak et al. <sup>7</sup>	32	1966–1976	—	15	3 (?)	—	0	55
Shatney and Lillehei <sup>9</sup>	114	1945–1976	48:52	13	1	—	0	44
Ravelo and Aldrete <sup>8</sup>	45	1967–1977	78:22	7	1	10	7	90
Elechi et al. <sup>2</sup>	22	1970–1977	72:28	5	4½	—	14	0
Martin et al. <sup>6</sup>	100	25 years	41:59	9	—	0	0	—
Present study	51	1968–1978	65:35	14	4	0	13	75

determination of the best time for operation. It should be emphasized, in this connection, that the size of the cysts in the present study was smaller in the alcoholics than in the group of nonalcoholics. This could suggest that alcoholics have more pain and a poorer general condition, which may cause a higher diagnostic activity.

The information provided by the literature on long-term prognosis concerning clinical status (Table 6) is, perhaps, somewhat misleading, due to the fact that many are based on a short observation time, from hospital records and rehospitalization of patients from a limited region. Only one report gives a figure on the ability to work after operation—40%. In the same thorough follow-up report,<sup>3</sup> no difference was demonstrated in the long-term results, as related to the type of operation. This is confirmed by the present study.

The causes of death during the late phase are thromboembolic diseases and suicide. This pattern of death is characteristic for patients with alcoholic pancreatitis.<sup>5</sup> The late results, in respect to pain, were considerably better for the nonalcoholics than for alcoholics, and better for those alcoholics who stopped drinking than those who did not. Similarly, there were more alcoholics who were unemployed after the operation than nonalcoholics, despite the fact that the

alcoholics were considerably younger than the other patients. The long-term prognosis is, thus, dependent to a great extent on whether the cause of the pancreatitis can be successfully treated and whether alcoholics stop drinking.

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