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A Comparison of Pancreatectomy and Pancreatic Duct Drainage in Chronic Pancreatitis

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ABSTRACT

Surgical therapy was performed in 25 cases of chronic pancreatitis at the Second Department of Surgery, Hiroshima University School of Medicine from January 1973 to October 1984. Thirteen cases were considered related to the excessive intake of alcoholic drinks, 2 cases each to acute pancreatitis and gall stones, and 8 cases to unknown etiology. Complication of pancreatic stone and marked dilatation or partial constriction of the pancreatic duct were observed in 11 of the 25 cases.

Pancreaticoduodenectomy was performed in 7 cases, distal pancreatectomy in 8 cases, longitudinal pancreaticojejunostomy in 6 cases, and pancreaticoplasty in 2 cases, and biliary surgery in 2 cases.

Out of 21 cases with abdominal pains, pain disappeared in 12 cases, improved in 6 cases and remained uncharged in 3 cases, the effect from surgery being almost satisfactory. No difference was observed in the effect between the surgical procedure as described above. Endocrine function tests with 50 g OGTT revealed improvement in 2 cases and aggravation in another two cases. The function remained unchanged before and after operation in the remaining 21 cases.

Pancreatic exocrine function tests with PFD revealed almost no changes before and after operation and no difference between the surgical procedures. Pancreatic exocrine function was found correlated with the advanced conditions of pancreatic fibrosis rather then with the surgical procedures. Cases with less advanced fibrosis maintained the function in a more satisfactory condition both before and after operation.

There occurred no cases of death directory related to operation. Four cases of death, no relating to operation itself, were observed in the pancreatectomy group. Twenty cases are now under rehabilitated conditions.

Results of our surgical treatment for chronic pancreatitis are almost satisfactory in respect to pain-relieving effect but unsatisfactory in respect to improvement of the endocrine and exocrine function.

It may be necessary to consider surgical operation at an early stage before the aggravation of fibrosis, because various types of drainage procedures that aim at preserving the pancreatic tissue and reducing the pancreatic duct pressure are logically capable of improving pancreatic functions.

Alcohol, biliary disease, idiopathy, etc. are given as causes of chronic pancreatitis, but its development mechanism is not always clear. Most of the lesions shows fibrotic changes and decreased number of pancreatic parenchyma cells. They are in most cases progressive and ir-

reversible accompanied by persistent pain, diabetes and pancreatic dysfunction such as dyspepsia. As a result, surgical treatment of the disease is difficult[28,29].

We report on the results of operations in chronic pancreatitis cases we experienced including some discussions such as a comparison of pancreatectomy and pancreatic duct drainage procedures in chronic pancreatitis.

SUBJECTS AND METHODS

The subjects were 25 patients of chronic pancreatitis who underwent operations at the Second Department of Surgery, Hiroshima University in the period from January 1973 to October 1984.

Pancreatic endocrine function was determined by 50 g oral glucose tolerance tests. Venous blood was collected before and 30, 60, 90, 120 and 180 min after glucose loading, respectively. Blood glucose values were measured by Somogyi method and determined in accordance with the criteria recommended by the Japan Diabetes Society.

Pancreatic Function Diagnostant (PFD) was used for the determination of pancreatic exocrine function[26]. Administration of digestive enzyme drugs was stopped two days before the PFD tests. The patients took ham and eggs (about 30 g as protein) for breakfast on the day of the tests and, after urination, took two ampules of PFD test solution together with 200 ml or more of water or tea. The patients' urine specimen were then collected for eight hr at two-hr intervals. Modified Smith method of Bratton-Marsall[21] and p-dimethyl-aminocinnamaldehyde (DACA) method[30] were used to measure p-aminobenzoic acid (PABA) values in the urine samples.

Extent of the progress of pancreatic tissue fibrosis was classified into the following grades on the basis of pathologic findings for the pancreatic tissue sections obtained during operations:

Grade 1: Fibrosis comparatively localized to the surroundings of the pancreatic duct.

Grade 2: Fibrosis seemingly separating the pancreatic lobe from the surroundings of the pancreatic duct.

Grade 3: Presence of cirrhosis-like extensive fibrosis and atrophy of the lobule.

RESULTS

1. Cases of chronic pancreatitis operation at our department.

Operations were performed in 25 patients of chronic pancreatitis at the Second Department of Surgery, Hiroshima University from January 1973 to October 1983.

Thirteen cases were considered related to alcohol, 2 cases each to acute pancreatitis and gallstones, and 8 cases to unknown etiology. Complications of pancreatic stone and marked dilatation or partial constriction of the pancreatic duct were observed in 11 of the 25 cases (Table 1).

Table 1. Etiology of chronic pancreatitis

	Case	(Pancreaticolithiasis)
Alcohol	13	(7)
Acute pancreatitis	2	(1)
Cholelithiasis	2	(0)
Unknown	8	(3)
Total	25	(11)

Pancreaticoduodenectomy (PD) was performed in 7 cases, distal pancreatectomy in 8 cases, longitudinal pancreaticojejunostomy in 6 cases, pancreaticoplasty in 2 cases, and biliary system operation in 2 cases.

2. Pain-relieving effect.

Table 2. Effect of surgical treatment on pain in chronic pancreatitis

Surgical Procedure	Disappeared	Improved	No change
Pancreaticoduodenectomy	5	2	0
Distal pacreatectomy	3	2	2
Pancreaticojejunostomy	3	2	0
Pancreaticoplasty	1	0	1
Total	12	6	3

Table 2 shows pain-relieving effects by the surgical procedures. The procedures were effective in 18 (85.7%) of 21 cases with pain; disappearance was attained in 12 cases and mitigation in six cases. The results obtained were fairly satis-

factory. Pain-relieving effects have not differed in the types of the surgical procedures.

3. Pacreatic endocrine function. (Fig. 1)

The pancreatic endocrine function before and after operation was evaluated by the results of 50 g OGTT. Abnormal glucose tolerance was observed before operation in 15 (83.3%) of 18 cases. Postoperative improvement of glucose tolerance was noted in a total of two cases (11%)—one case each of the PD group and the longitudinal pancreaticojejunostomy group, whereas postoperative aggravation was noted in a total of two cases (11%)—one case each of the PD group and the distal pancreatectomy group. In the group of pancreatic duct drainage procedures such as pancreaticoplasty and pancreaticojejunostomy aiming at preserving the pancreatic tissue and reducing the pancreatic duct pressure, there was not as much improvement in the function as had been expected, nor cases of aggravation were observed.

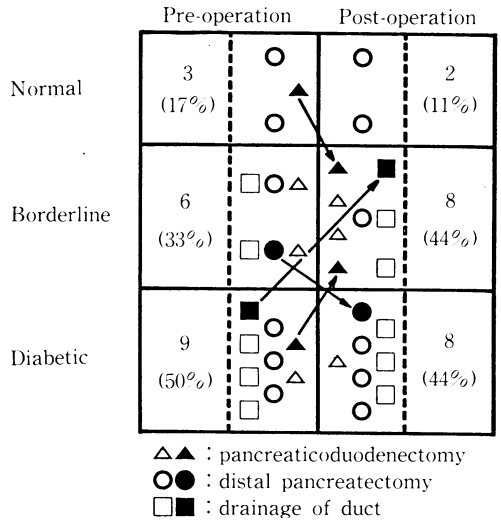

Fig. 1. Change in pancreatic endocrine function (by 50g oral glucose tolerance test) before and after operation of chronic pancreatitis

4. Pancreatic exocrine function.

The cases were classified into a group of pancreatectomy (pancreaticoduodenectomy and distal pancreatectomy) and another group of pancreatic duct drainage (pancreaticojejunostomy and pancreaticoplasty); changes in the pancreatic exocrine function before and after operation in the two groups were examined using 6-hr urinary PABA excretion values.

Table 3. Six-hr excretion of PABA in urine before and after operation of chronic pancreatitis, as devided by the surgical procedure

Group	Six-hr excretion of PABA in urine		
	Before operation	Within 2 months after operation	Over 12 months after operation
Resection of pancreas	42.1±22.1% (n=10)	48.5±20.9% (n=9)	56.4±19.4% (n=5)
Drainage of duct	30.7±14.4% (n=5)	23.06± 7.6% (n=4)	27.3±13.8% (n=4)

(mean±S.D.)

Table 4. Six-hr excretion of PABA in urine before and after operation of chronic pancreatitis, as devided by the pancreatic fibrosis

Pancreatic fibrosis	Six-hr excretion of PABA in urine		
	Before operation	Within 2 months after operation	Over 12 months after operation
Grade 1	51.8± 9.8% (n=4)	64.4± 8.6% (n=5)	56.4%±19.4% (n=3)
Grade 2	38.5±16.8% (n=6)	36.1± 7.5% (n=4)	37.3± 8.4% (n=3)
Grade 3	16.9±11.8% (n=5)	19.3± 2.3% (n=4)	18.4± 6.3% (n=3)

Significant difference: * $p<0.05$ (mean±S.D.)
** $p<0.01$

The results were slightly better in the pancreatectomy group, with a trend of improvement observed 12 months after operation. However, no statistically significant difference, in terms of time sequence, was observed between the two groups and also between the values obtained at the time of different measurements within each group (Table 3).

The cases were classified into Grade 1 to 3 by the extent of fibrosis in the biopsied pancreatic tissue sections obtained during the operation, and changes in 6-hr urine PABA excretion values before and after operation were determined. As Table 4 shows, the results were satisfactory in the Grade 1 group that had the least fibrosis before and after operation, poor in the Grade 2 group, and much poorer in the Grade 3 group.

A trend of improvement in the pancreatic exocrine function was observed two months after operation in the Grade 1 group. Statistically speaking, however, no significant postoperative improvement in the function was observed in any of the three groups.

5. Prognosis of chronic pancreatitis operation cases.

Although there was no case of death immediately following operation, late death occurred in four cases in the pancreatectomy group: one case of death from retrograde cholangitis and sepsis four months after operation, one from diabetic coma one year after operation, one from breast cancer two years and four months after operation, and one from meningitis seven years and four months after operation.

Table 5. The body weight change after surgery of chronic pancreatitis

Surgical Procedure	Increase (+5%)	No change	Decrease (−5%)
Pancreaticoduodenectomy	0	1	6
Distal pacreatectomy	1	4	3
Pancreaticojejunostomy	0	5	1
Pancreatico plasty	0	2	0
Biliary surgery	0	2	0
Total	1	14	10

Postoperative weight loss, as shown in Table 5, was observed in relatively many cases of the PD group and the distal pancreatectomy group. No remarkable postoperative changes in weight were observed in the other groups.

Twentyone patients surviving at present are almost completely rehabilitated or in conditions promising rehabilitation except for one who is receiving treatment in hospital.

DISCUSSION

Medical treatment dominated the therapy for chronic pancreatitis and surgical treatment was not required in most of chronic pancreatitis cases before. However, with the recent increase in alcoholic chronic relapsing pancreatitis cases, references to surgeons have been increasing for stubborn pain, pancreatic cyst and stone, etc.

Alcohol, acute pancreatitis, biliary disease, endocrine abnormality, autoimmune disease, etc. are given as causes of chronic pancreatitis[10]. As the pancreatic fibrosis and endocrine and exocrine function impairment greatly vary in extent depending on cases, operative indications, operative procedures and timely operation are very difficult to determine.

In accordance with the operative indications adovocated by Smith[22] and the Ministry of Health and Welfare Specific Disease and Chronic Pancreatitis Research Group[18], we considered the following as the indications: 1. cases with repetitive perisistent pain. 2. cases with complications of pancreatic tumor, pancreatic cyst, pancreatic abscess and pancreatic fistula. 3. cases with evident dilatation or constriction of the pancreatic duct or pancreatic stone. 4. cases with complication of biliary disease. 5. cases with suspected complication of pancreatic cancer.

Surgical procedures for chronic pancreatitis, though many have tried so far, can be roughly classified into two types—pancreatectomy[5-8] for the resection of lesions in the pancreas and pancreatic duct drainage such as pancreaticojejunostomy[3,14,25] and pancreaticoplasty[1,13].

Pancreatectomy is indicated for cases with localized pancreatic lesion and with no dilatation of the pancreatic duct[7]. Usually, pancreaticoduodenectomy is performed when the lesion is at the head of the pancreas, and distal pancreatectomy is performed when the lesion is at the tail of the pancreas. Total pancreatecto-

my is also performed depending on cases[6].

Despite many reports to the effect that pancreaticoduodenectomy is effective in about 70% of cases, it sometimes cases deaths from operation and is apt to cause slightly more deaths from other causes than the other procedures[8,19]. We performed PD in 7 cases and obtained results of no direct death and 3 cases of late death. We exercise utmost caution in deciding on PD indications, but in not a few cases we are compelled to decide on PD performance since chronic pancreatitis with a tumor in the pancreas head is not always easy to distinguish from pancreatic cancer.

Distal pancreatectomy is reported to be slightly lower than PD in the direct and late death rate and also to be effective in about 60% of the cases[5]. A problem here is the extent of resection. Distal pancreatectomy of 80% or up causes diabetes complication with a high frequency[5]. We have been performing 40—80% distal pancreatectomy, which exerted almost satisfactory pain-relieving effect. Postoperative progress into diabetes were rarely observed in the cases.

Total pancreatectomy[6] is rarely performed in Japan because of the surgical invasion to a high degree and difficulties in the control of postoperative diabetes. Further studies may be necessary on this procedure and its performance in combination with autotransplantation of the pancreas or islet cell[12,24].

Pancreatic duct drainage procedures have been practiced in expectation of relieving pain and improving pancreatic functions by draining pancreatic juice and by reducing pancreatic duct pressure while preserving the pancreatic tissue[2]. The effect of papillopancreaticoplasty[1,13] one of these procedures, is transitory and lacks reliability as multiple constriction often occurs in the main pancreatic duct[29]. We performed pancreaticoplasty in two cases and satisfactory results were obtained in one case only.

Other pancreatic duct drainage procedures are distal pancreaticojejunostomy[3] and longitudinal pancreaticojejunostomy[16]. The latter, that builds a sufficiently large anastomotic opening between the pancreas and the jejunum by cutting open the the pancreatic duct long and wide, is superior to the former both logically and practically[11,28]. This procedure is capable of showing the reliable effect of pancreatic duct decompression in chronic pancreatitis with pancreatic duct dilatation. In the experiences at our department, longitudinal pancreaticojejunostomy was found satisfactory both in pain-relieving effect and in prognosis. In the cases of pancreatic stone complication, however, the stones in the head of the pancreas are often difficult to remove however well the pancreatic duct at the pancreas body is cut open. There arises the risk of allowing inflammation and fibrosis at the pancreas head to advance[9]. In these cases, Rumpf et al[17] have been performing longitudinal pancreaticojejunostomy plus pancreaticoplasty (Rumpf method) that removes pancreatic stones from the pancreatic head as well by cutting wide open the orifice of the main pancreatic duct via the duodenum. From our following study on his method, we have come to have the impression that it is an excellent method allowing the opening of almost the whole length of the pancreatic duct and the prevention of bile duct constriction[23].

Improvement in pancreatic functions is expectable with pancreatic duct drainage that preserves pancreatic tissue and performs sufficient drainage of pancreatic juice. Reports vary on its effect, some describing postoperative improvement[20], others pointing out that pancreatic fibrosis was not suppressed by the operation but was rather aggravated[27].

In regard to pancreatic endocrine and exocrine function, the results obtained in our cases show no significant difference between the pancreatectomy group and the pancreatic duct drainage group, and hardly any improvement in the function was attained after operation. On the contrary, a significant correlation was observed between the less extent of pancreatic fibrosis at the time of operation and the improvement in the function.

All these findings lead to the conclusion that pancreatectomy of the part where the tumor sit will be indicated for tumor-type chronic pancreatitis without pancreatic duct dilatation, and that pancreatic duct drainage procedures such as longitudinal pancreaticojejunostomy and Rumpf method will be indicated for chronic pancreatitis with pancreatic stones and pancreatic duct dilatation.

As for the timing of the surgical operations,

satisfactory maintenance and recovery of pancreatic functions can never be expected from operations in terminal cases with progressing pancreatic fibrosis. In view of the present availability of safe and reliable operations in chronic pancreatitis and the remarkable progress in the diagnostic techniques, we are of the opinion that operative indications should be considered before the fibrosis reach the final stage.

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