

# Cancer of the Pancreas:

## The Value of Radical and Palliative Surgery

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IN THE UNITED STATES, carcinoma of the pancreas is the fifth commonest fatal carcinoma following lung, breast, large intestine and stomach disease. The incidence of the disease closely parallels the mortality rate and has risen significantly since 1925. The age-adjusted mortality rate has risen from 2.9 to 8.2 per 100,000 from 1920 to 1965.<sup>15</sup>

Since Whipple first reported a successful two-stage operation for removal of carcinoma of the ampulla of Vater,<sup>26</sup> much attention has been given to the use of radical surgery for carcinoma of the pancreas, though relatively few resections are done. Comparatively little has been written about the more common palliative treatment.

This report reviews the outcome of 222 instances of carcinoma of the pancreas treated at the University of Minnesota Hospital from 1955 to 1970. Only cases histologically diagnosed as adenocarcinoma of the pancreas are included. One hundred and fifty-two tumors were confined in the head of the pancreas, and 67 involved both body and *tail*. Complete follow-up records of all patients were obtained.

There is little difference between the average age or age distribution in the two groups; those with carcinoma of the head, and those with lesions of the body and the tail (Table 1). The ratio of male to female is 1.5 to 1 in the head lesions and 1.8 to 1 in the body and tail lesions.

Because of the different clinical features, the two groups are discussed separately.

### Carcinoma of the Head of the Pancreas

Of 152 patients, 136 underwent laparotomy. In 16, diagnoses, although suspected clinically, were confirmed only at postmortem, operation usually being precluded because of the patient's terminal condition. It was in this group that the only symptom of thrombophlebitis occurred. This is consistent with the original description of this association which comes from autopsy examination.<sup>24</sup>

### Clinical Presentation

Of the 132 patients who underwent laparotomy the following features were observed:

Jaundice was recognized by the patient in 102 (75%) instances, and had been present an average of 7 weeks before operation. Abdominal pain occurred in 80 (50%) patients. True biliary colic was rare and occurred in only two patients.

That carcinoma of the pancreas is associated with painless jaundice proved wrong. Fifty-seven (56%) jaundiced patients complained of abdominal pain, a percentage similar to that reported by Glenn and Thorbjarnarson.<sup>12</sup> In patients who underwent resection, however, both symptoms were present in only six of 27 (24%).

Back pain was present in 33 (24%) patients and proved an ominous symptom since only four of these patients had tumors resected. In two the resections were incomplete with survivals of 10 days and 3 months. A third patient had lymph node metastasis and survived

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TABLE 1. Age and Sex Distribution of 222 Patients with Carcinoma of the Pancreas

	Head	Body and Tail	Total
Number	152	70	222
Average Age	64.1	61.8	63.4
Age Range	32-92	33-82	32-92
Male	92(60%)	45(64%)	137(62%)
Female	60(40%)	25(36%)	85(38%)

12 months. Cattell and Warren<sup>3</sup> also found back pain to be unfavorable suggesting that it indicated local extension of the carcinoma.

Weight loss was common, occurring in 97 patients (71%). The average weight loss in 85 patients, when recorded, was 32 lbs. A large weight loss did not reduce the likelihood of resectability since 21 patients having resections lost an average of 42 pounds.

Anorexia occurred in 66 (49%) patients and vomiting in 33 (24%) patients. Pancreatitis and alcoholism were unusual; only four patients had pancreatitis and six had histories of alcoholism.

Gallbladder disease was common in the group. Seventeen (12.5%) patients had had cholecystectomies, six were performed within the previous 12 months without the diagnosis of pancreatic malignancy. Of these six patients, only three had gallstones, two of whom also had normal common duct explorations and the third had a sphincteroplasty. One of the other three operations was performed for right upper quadrant pain and no details of the procedure are available. The other two patients had no gallstones and one patient was reported to have had an inflamed sphincter of Oddi. None of the operative records included any comment on the pancreas.

### Physical Signs

An abdominal mass, thought to be pancreatic, was palpable before operation in 11 patients (8%). In only one was resection possible and this procedure was incomplete. This and similar reports<sup>13,22</sup> suggest that when a mass is palpable before operation there is little chance of resection.

An enlarged liver was discovered in 57 patients (42%), and in 28 (49%), liver metastases were found.

Twenty-one patients had palpable gallbladders, constituting 15% of all patients and 18% of those who had not had previous cholecystectomies. All of these patients were jaundiced and seven had abdominal pain. Five had the lesions resected.

Five patients had clinically detectable ascities and two patients had enlarged supraclavicular nodes.

### Laboratory Investigation

Anemia was found in 60 of 114 determinations (53%). Guaiac positive stools were found in 23 of 26 patients.

Ten patients (7%) were longstanding diabetics and 11 more were discovered to be diabetic or had diabetes of less than 3 months' duration before the onset of symptoms of carcinoma of the pancreas. Thus, the total incidence of diabetes was 15%.

Serum bilirubin was elevated in 85 of the 98 patients (87%) in whom it was determined. The average figure for the total serum bilirubin was 13.6 mg./100 ml. Alkaline phosphatase was elevated in 87 of 104 (84%) determination with an average value of 76 units.

The serum amylase was elevated in only four of 64 (6%).

### X-Ray Evaluation

All patients had preoperative chest X-rays. In four (3%) there was definite evidence of pulmonary metastases, and in four others there were "suspicious" lesions.

Upper GI X-rays were carried out in 89 patients. In 33 (37%) there were findings that were helpful in making a diagnosis. The reversed three sign of Frostberg was present only in one, as was widening of the duodenal loop. These classical signs are not common. The most frequent findings were duodenal compression, indentation by a dilated common bile duct, or antral deformity. Hypotonic duodenography was not used during the period of this report though it is now done frequently.

As expected in jaundiced patients oral cholecystograms were of little value and of 25 attempted, 14 showed no function. Four of these 14 patients also had IV cholangiograms, two failed to function and two were normal. Of the 11 successful cholecystograms, seven were normal, three demonstrated stones in the gallbladder, and one showed a dilated common duct.

Sixteen patients had IV cholangiography. Eleven showed non-function (all having elevated bilirubin levels) and of the remaining five, three were normal (two of these failed to visualize on cholecystography), one was inconclusive, and the other demonstrated a dilated common duct.

Upper GI X-ray series are, therefore, of greater help in most patients than standard biliary X-rays, which are likely to be of value only when the bilirubin level is low. Additional measures such as percutaneous cholangiography, hypotonic duodenography and selective mesenteric angiography and radio isotope scanning<sup>8,28</sup> may be of further assistance in making an accurate diagnosis.

### Operative Treatment

Laparotomy only was performed in 15 instances. These patients were in advanced stages of the disease and no other operation was practical. The operative mor-

TABLE 2. *Resection of Carcinoma of the Head of the Pancreas*

	Number	Operative Mortality†	Average Survival* (Months)
Incomplete Resection	5	2	3.3
Nodes Involved	11	2	12.7
Nodes not Involved	11	0	22.3
Total	27	4	16.1

\* Survival calculated excluding operative mortality.

† Death from any cause within 30 days of operation.

tality rate for this group was 33% and the average postoperative survival time was only 3 months.

### Resection

When possible, pancreatic lesions were resected, but this procedure was omitted only when local spread or dissemination of disease was present. Age, in itself, did not appear to be a contraindication to operation. The oldest patient who underwent resection was 84 and survived 25 months postoperatively.

Of the 136 patients explored, 27 had resections (20%). Twenty-three patients had preoperative findings, which made resection seem unlikely, such as evidence of lung metastasis, enlarged supraclavicular nodes, ascitis, or a palpable mass in the liver or abdomen. If these 23 cases are excluded the resection rate would be 27 of 113 (24%) patients explored with intention of resection.

### Results of Resection

Twenty-six patients had radical pancreatico-duodenectomies and one underwent total pancreatectomy. The operative mortality rate (defined in this report as death from any cause within 30 days of operation) was four (15%). Of these four patients two had incomplete resections and the other two had tumors which had spread to lymph nodes.

The average length of postoperative survival could be correlated with the stage of disease (Table 2). Those

in whom the resection was incomplete survived an average of 3.3 months, those with complete resection but involved lymph nodes survived an average of 12.7 months, and those without extension of the lesion or nodal metastasis survived an average of 22.3 months. Other than the three with incomplete resections only two patients, both with lymph node spread, died within 6 months after operation.

Of the 27 patients undergoing resection all but two deaths were due to recurrent tumor. One patient died of coronary thrombosis 25 months after operation without post-mortem evidence of recurrent tumor, and the other was killed in an accident.

### Palliative Operations

Only length of survival and the need for multiple operations are reported. Assessment of palliation for relief of jaundice, pain and vomiting as reported by others<sup>1,2,4,9,19</sup> was not possible. Ninety-four patients had palliative operations. Ninety-one operations initially provided biliary drainage, and three provided gastric drainage alone. Some patients with biliary diversion also had concomitant gastric drainage. When internal gastric drainage was provided, a gastrojejunostomy was used, except for one patient who had a gastroduodenostomy. Two patients had T-tube biliary drainage and gastrostomies.

The group of patients having biliary drainage has been divided into procedures using the gallbladder for drainage (Table 3) and those using the bile duct (Table 4) and are considered separately.

### Gallbladder for Drainage

In this group 14 patients had combined biliary and gastric drainage operations as the primary procedure. Forty-three patients initially had biliary drainage operations alone, and of those 35 patients who survived operation, nine required gastric drainage operations at a later date. The average interval between biliary di-

TABLE 3. *Survival in Patients Having Palliative Operations for Carcinoma of the Head of the Pancreas Using Gallbladder for Drainage*

Operation	Total	Those with Initial Gastric Drainage			Those without Initial Gastric Drainage			Those with Subsequent Gastric Drainage			
		No.	Mort.	Ave. Survival	No.	Mort.	Ave.*	No.	Mort.	Interval	Survival
Cholecystostomy	10	1	0	1.5	9	4	3.0	0/5	0	0	0
Cholecysto-Duodenostomy	21	1	0	7.5	20	2	5.4	5/18	0	5.1	4.5
Cholecysto-Jejunostomy	26	12	2	7.6	14	2	6.2	4/12	1	14.5	2.3
Total	57	14	2	7	43	8	5.2	9/35	1	8.6	3.7
			14%			19%		26%	11%		

\* Survival of those who did not go on to later gastric drainage.

† Average interval from biliary drainage to gastric drainage.

‡ Average survival after gastric drainage.

TABLE 4. *Survival in Patients Having Palliative Operations for Carcinoma of the Head of the Pancreas Using Common Bile Duct for Drainage*

Operation	Total	Those with Initial Gastric Drainage			Those without Initial Gastric Drainage			Those with Subsequent Gastric Drainage			
		No.	Mort.	Ave. Survival	No.	Mort.	Survival*	No.	Mort.	Interval Ave.†	Survival Ave.‡
Choledochostomy	17	3	0	4.6	14	3	7.3	6/11	0	5.6	3.3
Choledocho-Duodenostomy	12	2	1	4.0	10	3	6.1	3/7	1	2.4	4
Choledocho-Jejunostomy	5	2	1	7	3	0	3.5	1/3	0	10	4
Total	34	7	2	4.9	27	6	6.2	10/21	1	5.0	3.5
			29%			22%		48%	10%		

\* Survival of those patients not going onto later gastric drainage.

† Average interval from biliary drainage to gastric drainage.

‡ Average survival after gastric drainage.

version and secondary gastric bypass was 8.6 months, with an additional mean survival of 3.7 months. Cholecystostomy was carried out in ten patients with the operative mortality (40%) and postoperative survival (average 2.8 months) rates being comparable to those in patients having laparotomy alone (33% and 3 months) probably reflecting the advanced stage of the disease rather than the method of drainage used. One cholecystostomy failed to drain bile.

Twenty-one patients had cholecystoduodenostomies. One operation failed to relieve jaundice and in another patient jaundice recurred.

Cholecystojejunostomy was the most common bypass operation used. Of 26 patients having this operation six were Roux-en-Y procedures and in the other 20 a loop was used, one having an entero-enterostomy below the anastomosis. One patient had no relief from jaundice from this method but a subsequent choledochoduodenostomy later produced remission of jaundice until death 7 months afterwards. In another, jaundice recurred at 4 months and was caused by a benign stricture of the Roux-en-Y anastomosis. The patient survived another 10 months after a T-tube was placed in the common duct.

One patient committed suicide 2 days after discharge from the hospital.

Thus, of 57 patients in whom the gallbladder was used for drainage, in three patients biliary diversion was not achieved and in two more the diversion failed within 4 months. However, of 47 patients who were well enough to undergo cholecystoenterostomy, only two failures of biliary diversion occurred (4.2%).

#### *Common Duct for Drainage*

The common duct was used for drainage in 34 instances. In seven, gastric drainage was done concomitantly. Of 27 remaining patients 10 of 21 who survived the initial biliary operation required gastric drainage at an average interval of 5 months and survived another 3.5 months.

T-tube choledochostomy was done in 17 patients. One T-tube failed to drain bile and after a month the patient had a choledochojejunostomy at a higher level in the bile duct but failed to survive for more than 2 weeks. Twelve patients underwent choledochoduodenostomies and five had choledochojejunostomies, three with loops and two with Roux-en-Y procedures. No failures were observed in choledochoenterostomy.

Of 91 biliary drainage procedures, four did not function immediately after construction and two failed within a few months.

#### *Gastric Decompression*

Only three patients underwent gastric decompression without biliary bypass. There were no operative deaths and the average survival was 2.3 months. One patient subsequently required cholecystostomy for jaundice.

Biliary bypass alone was done in 70 patients, apparently without anticipation of duodenal obstruction (Table 5).

However, of the 56 patients who withstood the initial procedure, 19 (34%) required operation for duodenal obstruction after an average of 7.1 months. Two operative deaths occurred, the remaining patients survived on an average of an additional 3.6 months.

#### *Postoperative Gastrointestinal Hemorrhage*

Seven patients of 118 (6%) bled from the gastrointestinal tract after operation, five instances occurred in the early postoperative period.

Of the five patients with early bleeding, one bled immediately after operation probably from the suture line of a gastrojejunostomy. Another bled from a previously known duodenal ulcer 6 days after cholecystojejunostomy (Roux-en-Y), requiring vagotomy and gastrojejunostomy.

The other three patients bled on an average of 7 days after operation, probably from stress ulcers and received an average of 17 pints of blood. Two had

TABLE 5. *Survival of Patients Having Palliative Biliary Operations for Carcinoma of the Head of the Pancreas*

Operation	Total	Those with Initial Gastric Drainage			Those without Initial Gastric Drainage			Those Going on to Gastric Drainage			
		No.	Mort.	Ave.	No.	Mort.	Ave.*	Op.	Ave.†	Ave.‡	
Biliary Drainage	91	21	4 19%	6.5	70	14 20%	5.5	19/56 34%	2 11%	7.1	3.6

\* Average survival of those patients not going on to gastric drainage.

† Average interval from biliary drainage to gastric drainage.

‡ Average survival after gastric drainage.

undergone gastric drainage procedures as well as biliary diversion. Only one of these patients survived.

Of the two patients with late bleeding, one died from upper gastrointestinal bleeding from an unknown site 6 months after cholecystoduodenostomy and gastrojejunostomy. The other patient bled from an unknown site 2 years after total pancreatectomy and responded to transfusion.

### Carcinoma of the Body of the Pancreas

Seventy patients are in this group, including three described as "diffuse." Fifty of the 70 patients underwent laparotomy, the other 20 diagnoses were made postmortem in patients initially seen with advanced disease. They survived an average of 6.3 months after the onset of symptoms.

#### Clinical Features

Patients who underwent laparotomy showed the following features:

Abdominal pain which was the most common symptom was present in 43 (86%) patients.

Back pain was also a common and unfavorable symptom occurring in 28 (56%) patients, none of whom had resectable lesions.

Weight loss was also frequent, occurring in 30 (60%). The average weight loss was 32.5 lbs.

Anorexia occurred in 22 (44%) patients and there was vomiting in eight (16%). Only one patient had a history of pancreatitis and only one had a history of alcoholism.

Six patients had undergone previous cholecystectomy but not within 12 months of their present illness.

Only two (4%) noted jaundice, one had multiple liver metastases and the other had cholestatic jaundice unrelated to the tumor in the tail of the pancreas.

Thirteen (26%) patients had palpable pancreatic masses, which is three times the incidence in patients with head lesions, probably indicating a less symptomatic course in patients with body and tail lesions seen at a more advanced stage.

In one patient a mass had been present for 20 years but symptoms were apparent only 4 months. At opera-

tion a cystadenocarcinoma was found, perhaps stemming from malignant degeneration of a cystadenoma. This was the only patient with a palpable mass in whom resection was feasible.

An enlarged liver was palpable in 13 (26%) patients and 12 had liver metastases at operation. Thus, with body lesions, liver enlargement is far more likely to be due to metastases than in head lesions, where hepatic enlargement may be due to distention, as in 51% of the cases in this series.

Four (8%) patients had ascites, all due to malignancy with no portal vein obstruction being found in this series.

Supraclavicular node enlargement was found in three (6%) patients.

#### Laboratory Investigation

Anemia was present in 23 of 44 (52%) patients. Four patients were diabetic (8%).

Only the two patients with clinical jaundice had elevated serum bilirubin levels. Alkaline phosphatase was elevated in 15 of 34 determinations, the average value being 40. Nine of these 15 patients had hepatic metastases. Only one of 15 determinations of serum amylase was elevated.

Three patients (6%) had pulmonary metastases. Upper GI X-rays were performed in 38 patients; 24 were normal, one was inconclusive, and in 13 (34%) the findings were consistent with a pancreatic lesion. Of 12 patients with a palpable pancreatic mass who had upper GI X-rays, seven had positive findings.

Seventeen patients had cholecystograms. Twelve were normal, three showed gallstones and two were non-functioning.

#### Operative Treatment

Fifty patients underwent laparotomy (Table 6). Thirteen were regarded as incurable before operation, due to pulmonary metastases, ascites, supraclavicular node enlargement or a palpable liver.

Only four patients underwent resection. In two patients the pancreatic lesions were discovered during laparotomy for other upper abdominal lesions (cholestatic jaundice and hiatus hernia repair). Thus, of 48 patients operated

TABLE 6. *Operations for Carcinoma of the Body and Tail of the Pancreas*

	No.	Operative Mortality	Survival (months)
Resection	4	1	13.6
Palliative	3	0	6.3
Laparotomy only	43	5	5.7

upon for carcinoma of the pancreas, two (4%) had resections. Of those not believed to be incurable before laparotomy, two of 28 (7%) had resections. One patient died after operation and the average postoperative survival was 13.6 months. Three patients had palliative operations; two were gastrojejunostomies and the third procedure was a cholecystojejunostomy Roux-en-Y. The average postoperative survival was 6.3 months.

In the remaining 43 patients, five (12%) died after operation, and the survival of the rest averaged 5.7 months.

#### Comments

Patients with carcinoma of the head and those with tail and body lesions have similar incidences of weight loss, anorexia, vomiting and history of gallbladder disease. Jaundice is more common in head lesions, and abdominal pain is prominent in both groups. Back pain is twice as common in body lesions as in head lesions and is a highly unfavorable symptom.

The presence of a palpable mass is three times more common in body and tail lesions and makes the chance of resection remote. An enlarged liver with body and tail lesions is believed to be due to malignancy; head lesions in jaundiced patients are as likely to be due to distention (51%).

Standard laboratory and radiologic investigations were not of great early diagnostic value.

#### Resection

Some authorities<sup>7</sup> question the advantage of resection in any patient with carcinoma of the head of the pancreas while others<sup>6</sup> feel that it can be performed on carefully selected patients. Objections to the operation concern operative mortality and long-term survival. In this series the operative mortality for resection of head lesions was 15%. Resection has been advocated as a palliative procedure but from the poor survival rate of those who, in this group, had incomplete resection, it would appear that a palliative bypass operation would be preferable.

There were no 5-year survivals in this series. The longest survivor (51 months) had undergone total pancreatectomy. This operation has been advocated by others<sup>5,13,20,21</sup> as a curative procedure.

The operative mortality of those patients who underwent laparotomy only (33%) and of those who had a palliative operation (20%) was higher than with resection but probably reflects a more advanced stage of the disease.

#### Biliary Bypass Procedures

The greatest number of patients with pancreatic carcinoma are treated with palliative surgery but this group has received relatively little attention. Consideration should be given to which type of biliary bypass is preferable and whether a concomitant gastrojejunostomy is appropriate.

In this series of palliative procedures (Tables 3 & 4), the gallbladder was used for bypass in 62% of the patients and in 38%, bypass was through the common bile duct. In the latter group of patients 12 of 34 had previous cholecystectomies and five had cholecystectomies either for gallbladder disease or as part of exploration at the time of operation. Therefore, in half of this group there was no choice as to the type of bypass. There appears to be little difference as to the results of using the gallbladder or bile duct<sup>1,2,10</sup> for drainage but use of the gallbladder is technically easier. In some cases, reviewed by us, jaundice recurred because of obstruction rather than of hepatic metastases. Careful evaluation of the biliary tract is advisable at initial operation and perhaps this should include an operative cholangiogram. This procedure would demonstrate those instances in which the cystic duct runs parallel to the common bile duct for some distance. If there appears to be little likelihood of late cystic duct or low common duct involvement, an anastomosis to the gallbladder is the easier procedure. In addition, the observation that emptying the gallbladder *decompresses* the common duct is helpful. There does not appear to be any definite evidence<sup>14</sup> whether a loop, with or without enteroanastomosis, is preferable to a Roux-en-Y type of anastomosis. The risk of ascending biliary tract infection using a loop anastomosis may have only theoretical importance in patients who have such a short period of time to live.

#### Gastric Decompression

An important question during palliative surgery is the necessity of concomitant gastrojejunostomy. The first suggestion to incorporate this as a routine operation came from Glassman and Johnson<sup>11</sup> who based their decision on three of 20 patients returning with late duodenal obstruction. Pipes and Pareira<sup>18</sup> found that five of 18 patients required gastrojejunostomy for duodenal obstruction as a second procedure, although none of these patients had evidence of duodenal obstruction at initial operation. Glantz and Ozeron<sup>10</sup> found that duodenal obstruction alone occurred as a presenting symp-

tom in 5% of their patients, but that in 22 who survived biliary decompression without gastric decompression, 11 developed duodenal obstruction. Five underwent laparotomy for this condition. Some believe that the need for gastrojejunostomy can usually be ascertained at the time of the original exploration but this is contrary to the opinion of the other authors mentioned.

In this series (Table 5) of 91 patients, 21 underwent biliary decompression and combined gastric bypass at initial operation. The operative mortality rate was 19%. Seventy patients originally had only biliary decompression with an operative mortality rate of 20% so that the additional operation of gastrojejunostomy does not appear to affect the operative mortality rate. Fifty-six patients survived the procedure of biliary decompression and 19 (34%) developed late gastric obstruction requiring operation. The obstruction appeared on an average of 7.1 months after the first operation. After a second operation the mean survival rate was 3.6 months.

This evidence strongly suggests that in patients undergoing palliative operation for carcinoma of the head of the pancreas, a considerable number will be saved from the necessity of a second palliative operation for relief of gastric obstruction if a gastrojejunostomy is carried out as a routine procedure at the first operation.

### Summary

The records of 222 patients with carcinoma of the pancreas are reviewed. There were 152 patients with carcinoma of the head and 70 patients with carcinoma of the body and tail. One hundred and thirty-six patients with carcinoma of the head of the pancreas underwent laparotomy. Twenty-seven patients (20%) underwent resection with an operative mortality of 15% and an average postoperative survival of 16.1 months. Ninety-one patients had palliative biliary bypasses, 20 of whom underwent gastrojejunostomy at the same time. Of the 56 patients who survived biliary bypass alone, 19 (34%) underwent gastrojejunostomy at an average of 7.1 months after initial operation and lived an additional 3.6 months. Patients undergoing resection had the longest survival, and although there were no 5-year survivors, resection appears to offer good palliation. Bypass procedures are recommended for relief of biliary and gastric obstruction.

The routine use of gastrojejunostomy as well as biliary bypass is advocated during the initial palliative operation.

### References

1. Bufkin, W. J., Smith, P. E. and Kremenz, E. T.: Evaluation of Palliative Operations for Carcinoma of the Pancreas. *Arch. Surg.*, **94**:240, 1967.

2. Buckwalter, J. A., Lawton, R. L. and Tidrick, R. T.: Bypass Operations for Neoplastic Biliary Tract Obstruction. *Am. J. Surg.*, **109**:100, 1965.
3. Cattell, R. B. and Warren, K. W.: *Surgery of the Pancreas*. W. B. Saunders Co. Philadelphia, 1953.
4. Coller, F. A. and Winfield, J. M.: Evaluation of Palliative Operations for Cancer of the Pancreas. *Am. J. Surg.*, **25**:64, 1934.
5. Collins, J. J., Craighead, J. E. and Brooks, J. R.: Rationale for Total Pancreatectomy for Carcinoma of the Pancreatic Head. *N. Engl. J. Med.*, **274**:599, 1966.
6. Co-operative Study. A ten year experience with Carcinoma of the Pancreas. *Arch. Surg.*, **94**:322, 1967.
7. Crile, G.: The Advantages of Bypass Operations Over Radical Pancreatic Duodenectomy in the Treatment of Pancreatic Carcinoma. *Surg. Gynecol. Obstet.*, **130**:1048, 1970.
8. Eaton, S. B., Fleischli, D. J., Pollard, J. J., Nebesar, R. A. and Potsaid, M. S.: Comparison of Current Radiologic Approaches to the Diagnosis of Pancreatic Disease. *N. Engl. J. Med.*, **279**:389, 1968.
9. Feduska, N. S., Dent, T. L. and Lindenauer, S. M.: Results of Palliative Operations for Carcinoma of the Pancreas. *Arch. Surg.*, **103**:334, 1971.
10. Glantz, G. and Ozeran, R. S.: Role of Gastroenterostomy in Malignant Pancreatic Carcinoma: Risk of Duodenal Obstruction after Biliary Bypass. *Am. Surg.*, **32**:670, 1966.
11. Glassman, W. S. and Johnson, P. W.: Palliative Surgery in Carcinoma of the Pancreas. *Geriatrics*, **10**:456, 1955.
12. Glenn, F. and Thorbjarnarson, B.: Carcinoma of the Pancreas. *Ann. Surg.*, **159**:945, 1964.
13. Hicks, R. E. and Brooks, J. R.: Total Pancreatectomy for Duodenal Carcinoma. *Surg. Gynecol. Obstet.*, **133**:16, 1971.
14. Howard, J. M.: Pancreato-duodenectomy: Forty-one Consecutive Whipple Resections without an Operative Mortality. *Ann. Surg.*, **168**:629, 1968.
15. Krain, L. S.: The Rising Incidence of Carcinoma of the Pancreas. *Am. J. Gastroenterol.*, **54**:500, 1970.
16. Monge, J. J., Comment on Feduska, N. J., Dent, T. L. and Lindenauer, S. M.: Results of Palliative Operations for Carcinoma of the Pancreas. *Arch. Surg.*, **103**:334, 1971.
17. Monge, J. J., Judd, E. S. and Gage, R. P.: Radical Pancreatico-duodenectomy. A 22 year Experience with the Complications, Mortality Rate, and Survival Rate. *Ann. Surg.*, **160**:711, 1964.
18. Pipes, K. E., and Pareira, M. D.: Duodenal Distention Appearing after Palliative Biliary Diversion for Pancreatic Carcinoma. *Surgery*, **44**:636, 1958.
19. Pope, N. A. and Fish, J. C.: Palliative Surgery for Carcinoma of the Pancreas. *Am. J. Surg.*, **121**:271, 1971.
20. Remine, W. H., Priestcey, J. T., Judd, E. S. and King, J. S.: Total Pancreatectomy. *Ann. Surg.*, **172**:595, 1970.
21. Ross, D. E.: Cancer of the Pancreas: A Plea for Total Pancreatectomy. *Am. J. Surg.*, **87**:20, 1954.
22. Sato, T., Saitoh, Y., Koyama, K. and Wanatabe, K.: Preoperative Determination of Operability in Carcinoma of the Pancreas and Periampullary Region. *Ann. Surg.*, **168**:876, 1968.
23. Spanos, P. K.: Personal Communication.
24. Sproul, E. S.: Carcinoma and Venous Thrombosis. *Am. J. of Cancer*, **34**:566, 1938.
25. Walker, R. J.: The Diagnosis of Carcinoma of the Pancreas. *J. R. Coll. Surg. Edinb.* **15**:185, 1970.
26. Whipple, A. O., Parsons, W. B., Mullins, C. R.: Treatment of Carcinoma of the Ampulla of Vater. *Ann. Surg.*, **102**:763, 1935.