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SURGERY OF THE PANCREAS

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I am highly honored and very pleased to be with you today to discuss surgery of the pancreas. I became interested in the problems of the pancreas during my surgical residency and this interest has remained with me ever since. As time goes on and I continue to see a variety of problems which involve the pancreas, my interest in the pancreas has continued to increase. I would like to speak about three major areas of pancreatic surgery which have interested me the most: pancreatitis, islet cell tumors, and carcinoma of the pancreas.

PANCREATITIS

Pancreatitis continues to be a difficult and treacherous disease to manage. One of the major problems is that we don't fully understand the cause of pancreatitis; in fact, it probably has multiple causes. In about 80 percent of patients, pancreatitis appears to be a secondary problem, related to biliary disease, alcoholism, peptic ulcers, trauma, or a metabolic problem. In about 20 percent of patients, no other problem can be identified and it appears to be a primary disease. I think the major cause of pancreatitis, in most patients, is obstruction to the secretion of pancreatic juice, but other factors such as reflux of bile, infection, direct injury, vascular ischemia, emotions, circualting enzymes, an antigenic response, or a direct toxic effect of alcohol or other drugs may also be important or play a role[1].

In 1975, we reported on 177 patients at the Cleveland Clinic on whom we had operated for pancreatitis[2]. We classified these patients according to the Marseilles classification, defined in 1963. (Table 1.) This classification identifies two types of acute and chronic pancreatitis: acute pancreatitis, the first attack, and recurrent acute pancreatitis, subseqeunt acute episodes without permanent pancreatic damage; and recurrent chronic, and chronic pancreatitis, repeated episodes of pancreatitis with evidence of pancreatic fibrosis or calcification. I would like to refer to our findings from this study as I discuss the surgical management of acute and chronic pancreatitis.

Acute Pancreatitis

Acute pancreatitis should initially be treated medically, with relief of pain, adequate fluse replacement, and nasogastric suction. (Table 2.) The use of anticholinergic drugs is controversial,

Table 1. Clinical Classification of 177* Patients Managed Surgically 1962–1973

Acute pancreatitis	33 pts.	18%
Recurrent acute pancreatitis	45 pts.	25%
Recurrent chronic pancreatitis	62 pts.	35%
Chronic pancreatitis	37 pts.	22%
Total	177 pts.	100%

*Marseilles Classification

Table 2. Acute Pancreatitis
Medical Therapy

1) Pain Relief
2) Fluid replacement : saline, albumen, plasma
3) Nasogastric suction
4) Anti-cholinergics
5) Calcium replacement
6) Antibiotics—(surgical drainage)
7) Blood replacement

we use them less than we did previously. The replacement of calcium is important. We start antibiotics for those patients with evidence of infection, a high fever or an elevated white blood cell count. Blood is given as needed. Our experience with antiproteolytic drugs, such as Trasylol (aprotinin) a proteolytic enzyme inhibitor, was disappointing and we no longer use it. In many patients, peritoneal lavage has been instituted, irrigating the peritoneal cavity with saline or Ringer's lactate solution, about 1000 ml every two to four hours, with success[3]. About 95 percent of patients respond adequately to medical management and the acute symptoms subside. About 5 percent of all patients have evidence of severe, progressive disease and may require operation.

The indications for operating on patients with acute pancreatitis include: 1) worsening of the patient's condition on intensive medical therapy, 2) uncertainty about the diagnosis, 3) evidence of abscess, and 4) hemorrhage[4]. (Table 3.) When exploring a patient with acute pancreatitis, all

Table 3. Surgery for Acute Pancreatitis
Avoid operation unless there is—

1) Worsening of the patient's condition on intensive medical therapy.
2) Uncertainty about the diagnosis.
3) Evidence of pancreatic or peripancreatic abscess formation.
4) Evidence of intraperitoneal or gastrointestinal hemorrhage.

areas of necrosis or infection should be gently debrided and drained, the biliary system should be decompressed if it is dilated, and the peritoneal cavity irrigated. The lesser pertioneal cavity must be opened and drained also. (Fig. 1.) A major operative procedure such as cholecytectomy and common bile duct exploration or an operation for concomitant duodenal ulcer should be avoided. Our experience with subtotal pancreatectomy for acute pancreatitis has been poor and we do not recommend it.

Pseudocyst

Pseudocysts of the pancreas may be divided into two types: those that accompany acute pancreatitis and those that develop six weeks or later after an episode of pancreatitis or pancreatic injury, the chronic pseudocyst. Acute pseudocysts usually represent an inflammatory mass or a loculated collection of fluid in association with acute pancreatitis. The diagnosis may be made or confirmed by an ultrasound study. (Fig. 2.) Operation, at this stage of the disease, should be avoided. Most such acute pseudocysts will resolve spontaneously.

Chronic pseudocyts, which develop at some time after acute pancreatitis, represent the end stage of the inflammatory process with pancreatic juice trapped in a fibrous wall. They may be diagnosed by the presence of a tender abdominal mass or by an ultrasound examination or a CT scan, or by distortion of the stomach or duodenum on an upper gastrointestinal X-ray series. (Fig.3.)

At operation, an additional diagnostic procedure which I think is important is an operative cholangiogram. This frequently shows distortion of the common bile duct from a pseudocyst in the head of the pancreas. (Fig. 4.) In addition, a pseudocystogram is taken at operation by needling the cystic mass, aspirating a portion of its fluid, and instilling a water soluble dye into the cyst

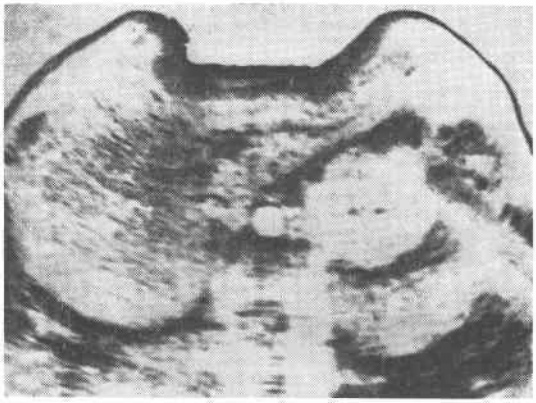


Figure 1. The gastrocolic omentum has been divided, opening the lesser peritoneal cavity and an area of pancreatic necrosis in the distal pancreas debrided and drained. A cholecystostomy tube has been placed in the gallbladder and drains placed in the right subhepatic space.

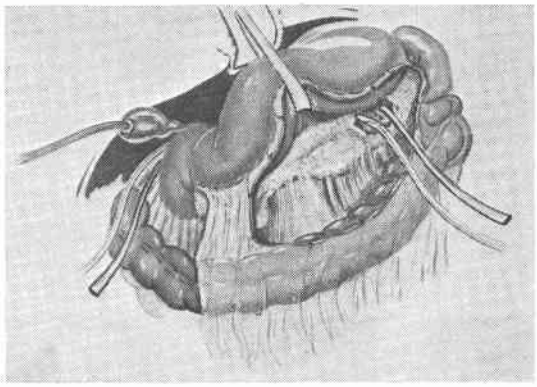


Figure 2. Ultrasound study which shows a pseudocyst of the pancreas.

Figure 3. Upper gastrointestinal X-ray series with displacement of the stomach forward by a retrogastric pseudocyst.

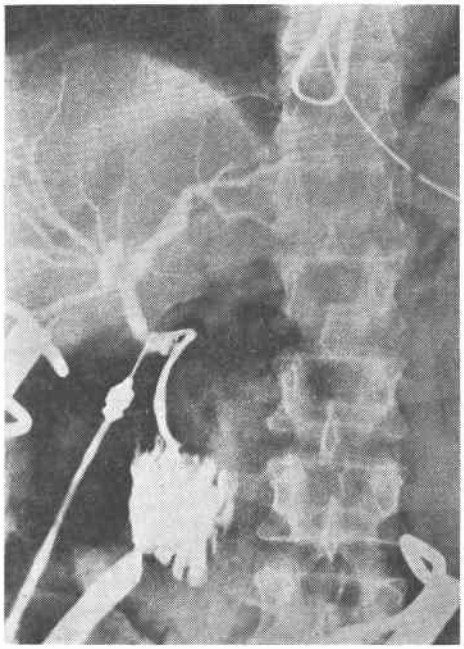


Figure 4. Operative cholangiogram with distortion of the common bile duct from a pseudocyst in the head of the pancreas.

cavity. (Fig. 5.) This outlines the size and location of the cyst and identifies multiloculated cysts when they occur. (Fig.6.)

I prefer to drain most pseudocysts which present behind the stomach and are fused with posterior wall of the stomah by cyst-gastrostomy, draining the pseudocysts into the stomach. (Fig. 7.) A large, 2–3 cm. opening should be made. (Fig. 8.)

Alternate methods of draining a pseudocyst, when it presents below the stomach or below the transverse mesocolon, included cyst-jejunostomy, (Fig. 9.) draining the cyst into a Roux-Y jejunal segment., and cyst-duodenostomy (Fig. 10.) for a cyst in the head of the pancreas, using great

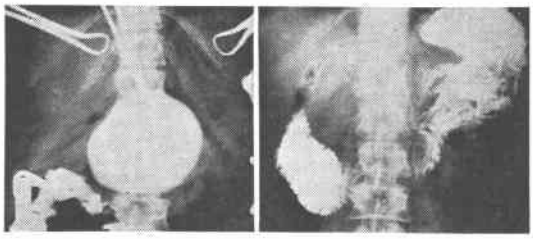


Figure 5. Pseudocystogram which shows a large pseudocyst in the head of the pancreas. On comparison with the G.I. series, the size and location of the pseudocyst can be determined.

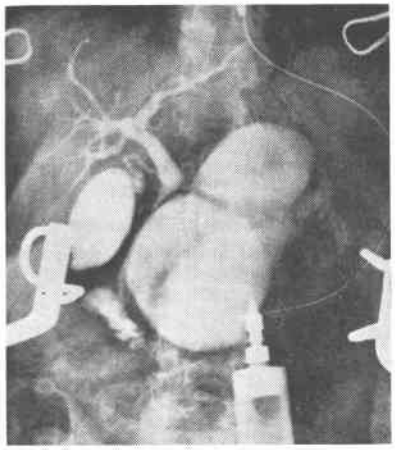


Figure 6. Pseudocystogram of a biloculated pseudocyst in the head and body of the pancreas. An operative cholangiogram has also been obtained and distortion of the distal bile duct is evident.

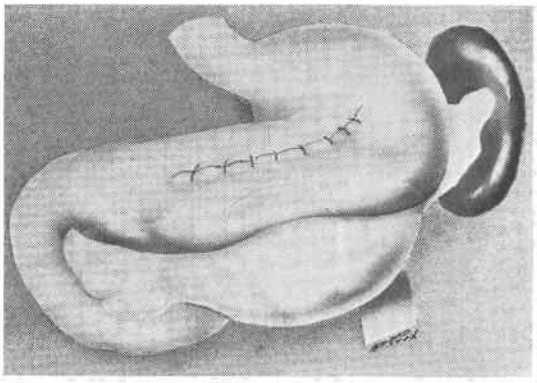


Figure 7. The anterior gastric wall has been opened and a cystgastrostomy created between the fused posterior wall of the stomach and anterior wall of a pseudocyst after a pseudocystogram identifies the location and size of the cyst. The gastrotomy incision in the anterior wall of the stomach is then closed.

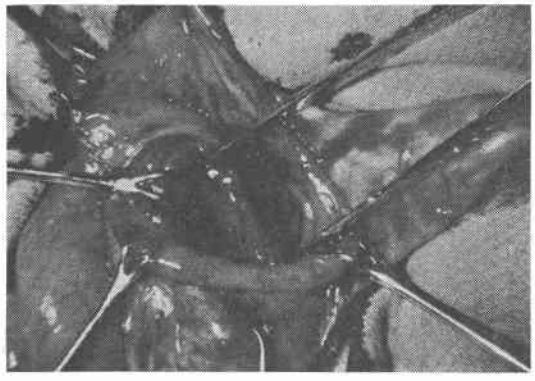


Figure 8. Operative photograph which shows the size of the cystgastrostomy opening between the fused posterior wall of the stomach and anterior wall of the pseudocyst. Interrupted synthetic abso bablesutures are placed around the cystgastrostomy for hemostasis.

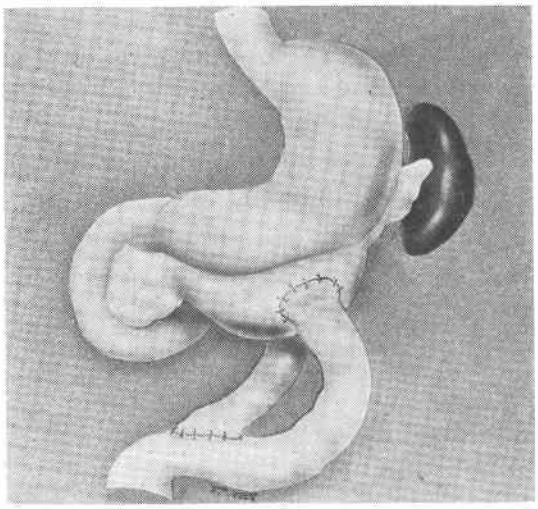


Figure 9. Cyst-jejunostomy, utilizing a Roux-en-Y jejunal segment, for a pseudocyst which presents below the stomach.

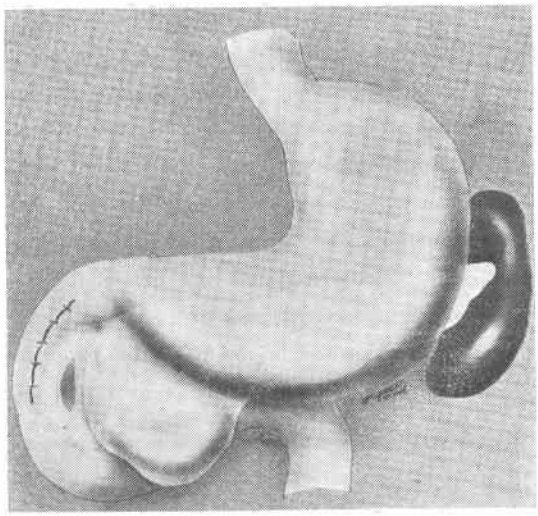


Figure 10. Cyst-duodenostomy for a pseudocyst in the head of the pancreas, adjacent to the descending duodenum.

care not to injure the common bile duct. It is useful to pass a metal probe into the common duct, to identify and protect it. Small pseudcoysts of the tail of the pancreas may be excised by distal pancreatectomy. (Fig. 11.)

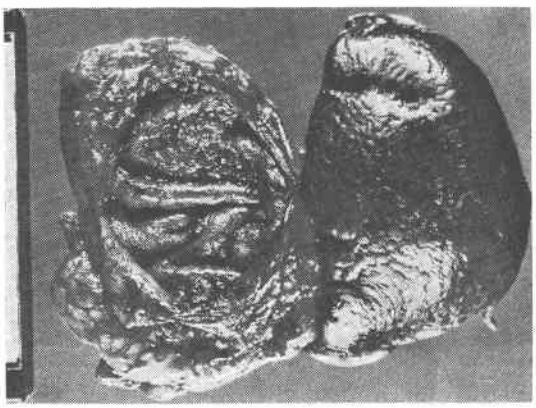


Figure 11. A pseudocyst of the tail of the pancreas has been excised. The spleen is attached.

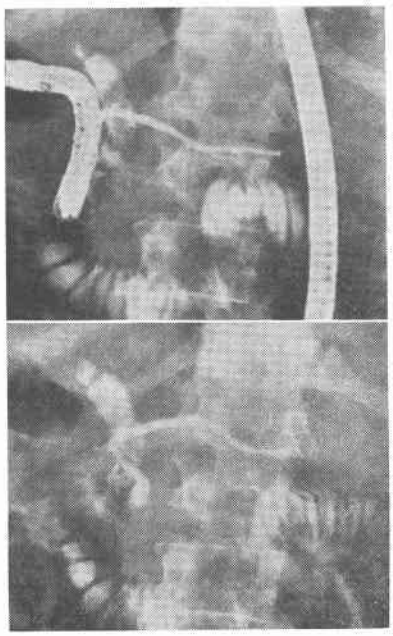
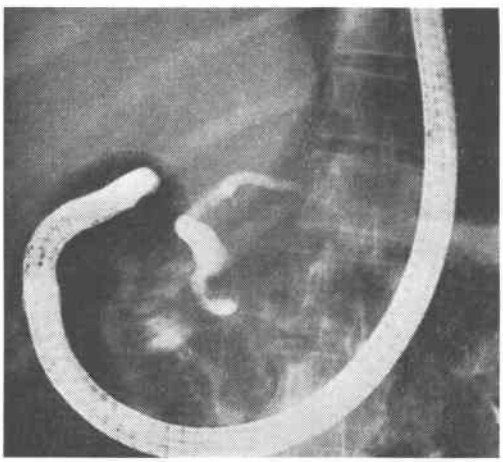


Figure 12. Endoscopic retrograde cholangiopancreatogram which shows stones in the distal common bile duct. The pancreatic duct is slightly dilated.

Recurrent and Chronic Pancreatitis

The key to the treatment of recurrent or chronic pancreatitis is the pancreatogram. With endoscopic retrograde cholangiopancreatography, stones or other pathlogy in the biliary system causing recurrent episodes of pancreatitis (Fig. 12.) or obstruction in the pancreatic duct system can be identified preoperatively. (Fig. 13 and 14.) If a preoperative pancreatogram has not been obtained, an operative pancreatogram should be obtained at surgery. This can be accomplished by three methods: 1) by transduodenal cannulation of the papilla of Vater and retrograde pancreatography, 2) by mid-duct injection of the pancreatic duct system, or 3) by excision of the tail of the pancreas and prograde cannulation of the pancreatic duct. (Fig. 15.) If evidence of pancreatic duct obstruction can be found, if the pancreatic duct is dilated or obstructed, a decompressive or drainage operation should be performed[2].



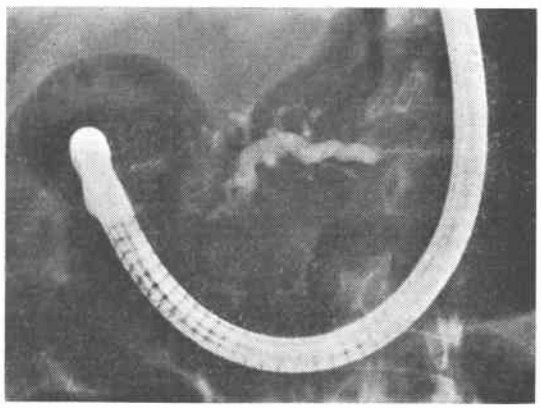


Figure 13–14. Endoscopic retrograde pancreatogram which shows a dilated and partially obstructed pancreatic duct in the head of the pancreas.

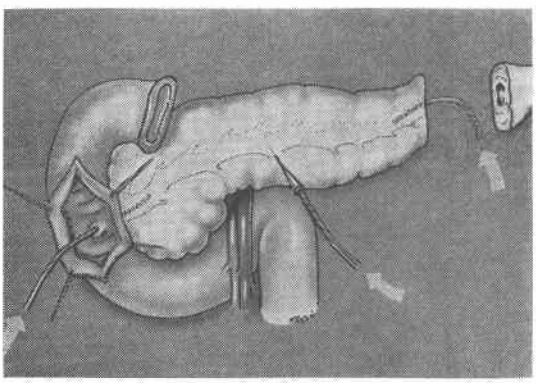


Figure 15. Artist's drawing of three methods of intraoperative pancreatography: 1) transduodenal cannulation, 2) midduct injection, or 3) amputation of the tail of the pancreas and prograde cannulation of the duct.

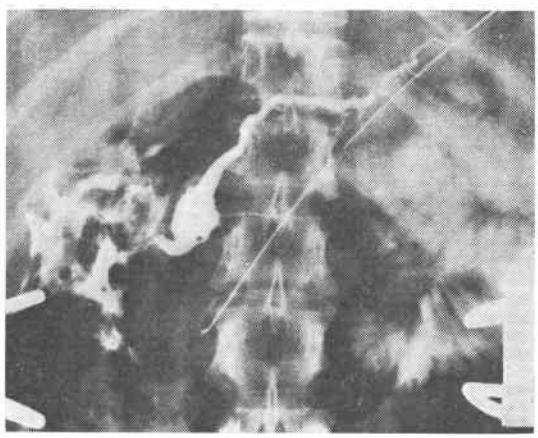


Figure 16. Operative pancreatogram which shows pancreatic duct obstruction from stenosis at the papilla of Vater.

If the pancreatic duct obstruction is due to stenosis at the papilla of Vater, (Fig. 16.) a sphincteroplasty and division of the pancreatic duct sphincter should be performed. (Fig. 17. and 18.) At this time, using fine instruments, curets and fine probes, the pancreatic duct can be irrigated and debribed of small stones and debris. (Fig. 19.)

When the pancreatic duct obstruction is at a more distal level in the pancreas, (Fig. 20.) or

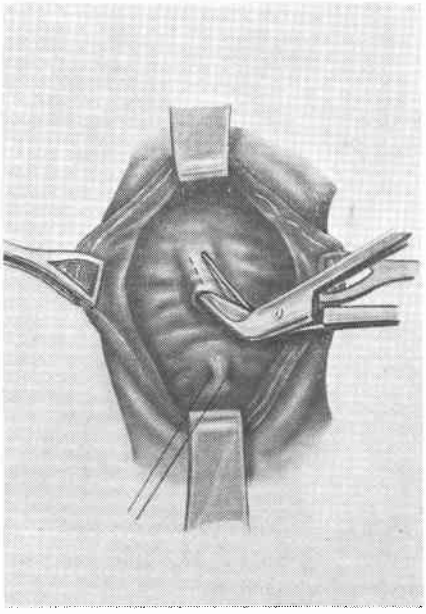


Figure 17. The duodenum has been opened by longitudinal duodenotomy. Using an angled vascular scissors, the choledochal sphincter is cut at eleven o'clock for a distance of approximately 2.5 cm.

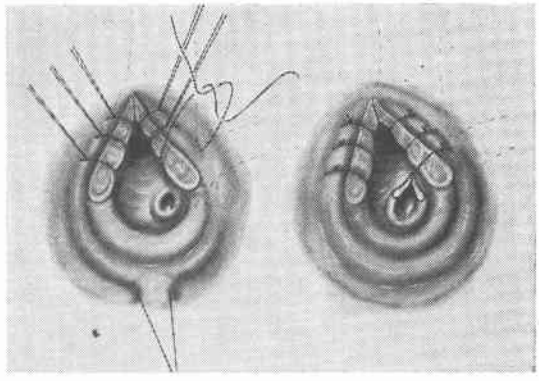


Figure 18. After sphincterotomy, the mucosa of the distal bile duct is sawn to the mucosa of the duodenum with interrupted fine chromic catgut sutures. The sphincteroplasty is completed by dividing the pancreatic sphincter, incising into the septum between the distal bile duct and pancreatic duct.

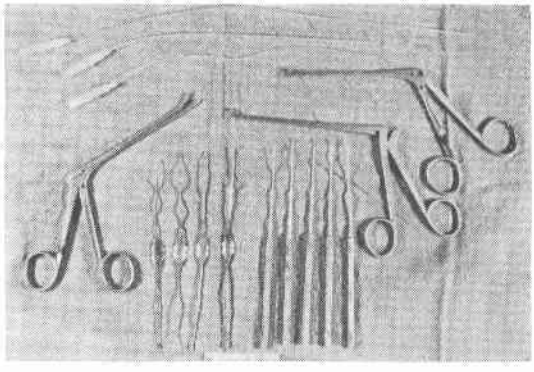


Figure 19. Small plastic catheters for irrigation, small loops and curets, and fine crushing forceps for debridemetn and retrieval of small stones or debris in the pancreatic duct system.

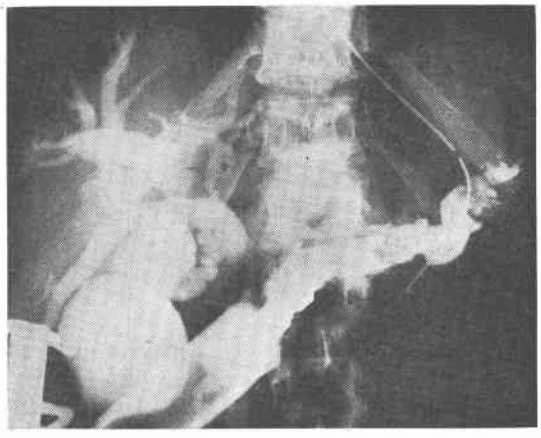


Figure 20. Operative pancreatogram shows massive pancreatic duct obstruction and obstruction of the biliary system from fibrosis in the head of the pancreas.

is multiple the typical "chain of lakes" deformity with multiple areas of stenosis and dilatation, (Fig. 21 and 22.) our preferred method of treatment is by longitudinal pancreatojejunostomy using a Roux-Y jejunal segment. (Fig. 23.) The pancreatic duct is opened widely from the head to the tail and a Roux-Y jejunal segment is brought up for drainage. At the time the pancreatic duct is opened and explored, an effeort should be made to clean any stones or debris from the secondary and tertiary pancreatic ducts as well as the main duct.

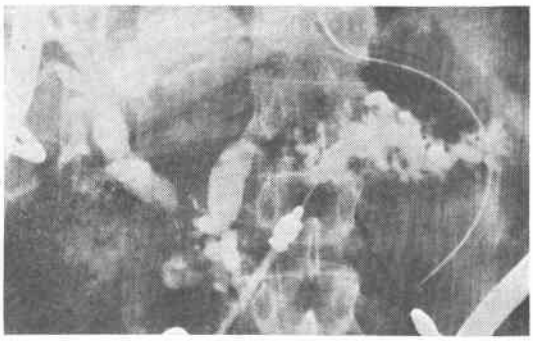


Figure 21. Multiple areas of stenosis and dilatation are seen on an operative pancreatogram.

Figure 22. A "chain of lakes" deformity is seen on operative pancreatography.

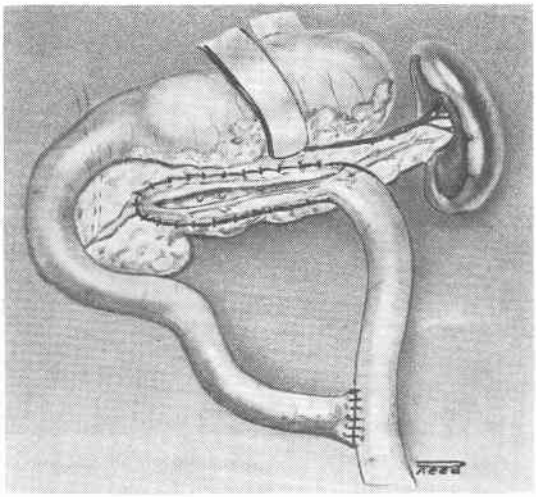


Figure 23. Longitudinal pancreatojejunostomy using a Roux-en-Y jejunal segment.

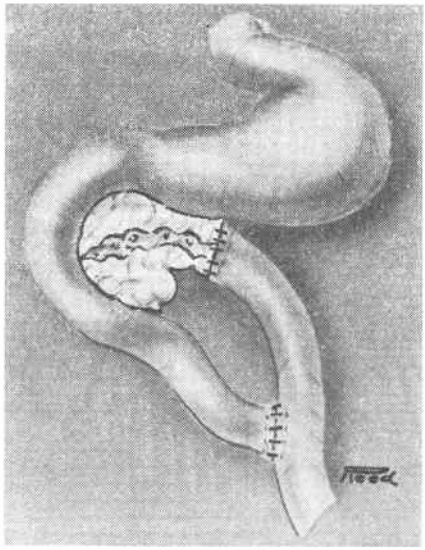


Figure 24. Subtotal distal pancreatectomy with Roux-en-Y pancreatojejunostomy to the remaining pancreas.

If there is no evidence of pancreatic duct obstruction, fibrosing pancreatitis without evidence of pseudocysts or calcification, a subtotal distal pancreatectomy is performed, removing from 60 to 80 percent of the distal pancreas and the spleen. The remaining pancreatic duct in the head of the pancreas is opened and debrided and a Roux-Y jejunal segment is brought up for retrograde drainage of this remaining pancreas. (Fig. 24.) We have rarely peformed an 80 to 90 percent pancreatectomy, as advocated by Child and associates and would reserve this operation for only the most severe patients[5]. (Fig. 25.)

I believe it is important to drain all pancreatic anastomoses and prefer to use either a Penrose drain or a sump suction drain placed near the anastomosis.

In our series of 177 patients, operated upon for acute and chronic pancreatitis (on whom we performed 207 operations), the overall operative mortality was 6 percent. (Table 4.) Our highest operative mortality was in those patients with acute necrotizing pancreatitis. Approximately 82 percent were considered good or fair results; 18 percent of patients had poor results, they either continued to have recurrent symptoms or required another operative procedure. (Table 5.)

Table 4. Pancreatitis
Operative Mortality

Overall Mortality	12/177	6%
Acute or Recurrent		
Acute Episode	5/27	19%
Interval	2/51	4%
Necrotizing Pancreatitis	7/17	41%
Pseudocyst	2/38	5%
Recurrent Chronic or Chronic	5/99	5%

Table 5. Pancreatitis
177 Patients—207 Operations
Present Status

	No. Patients
Follow-up Results Known:	
Good—Fair	131
Poor	16
Postoperative deaths	12
Excluded from follow-up:	
Lost to follow-up	14
Cancer	4
Total	177

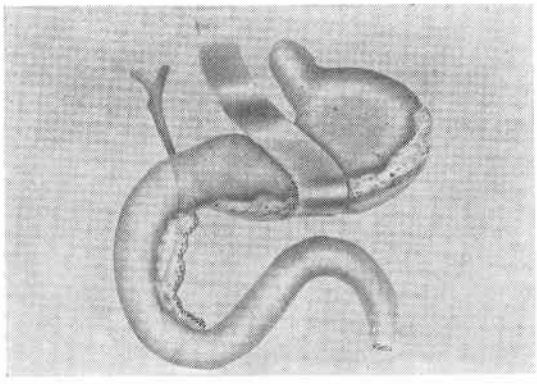


Figure 25. Radical subtotal distal pancreatectomy with resection of 90 percent of the pancreas, preserving only a small portion of the gland to protect the blood supply to the duodenum and common bile duct.

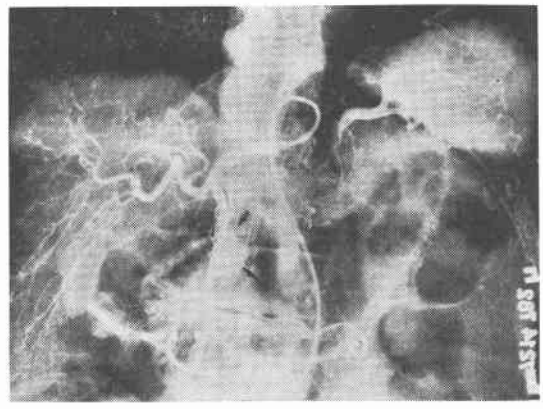


Figure 26. A selective celiac arteriogram visualizes an insulinoma immediately adjacent to the gastroduodenal artery in the head of the pancreas.

ISLET CELL TUMORS

Of the various hormone secreting islet cell tumors of the pancreas, the two most common are the insulinoma and the gastrinoma.

Insulinoma

In patients who have:1) weakness, sweating, or bizzare behavior brought on by activity and associated with, 2) a blood sugar of 45 mg% or less, 3) relieved by eating or by the infusion of glucose, the diagnosis of insulinoma should be strongly suspected. The best diagnostic test for insulinoma, in my opinion, is still a prolonged 48-hour fast, measuring blood glucose levels during this period of time. We rarely use provocative test, such as the tolbutamide test, since they are rarely necessary to make the diagnosis and are occasionally dangerous. Plasma insulin levels are now available and are an aid in making the diagnosis. A selective celiac and superior mesenteric arteriogram will visualize the insulinoma in from 60–80 percent of patients.[6] (Fig. 26.)

Surgical removal of the insulinoma is curative. If the tumor is in the distal pancreas, a partial pancreatectomy is performed (Fig. 27.); if the tumor is in the proximal pancreas, it can be removed by enucleation. (Fig. 28. and 29.) Ninety percent of insulinomas are solitary and benign[7].

Gastrinomas (Zollinger-Ellison Syndrome)

As opposed to insulinomas, most gastrinomas are malignant an metastases are present in approximately 80 percent. Over 800 cases of Zollinger-Ellison syndrome have now been reported[8]. This syndrome consists of atypical peptic ulceration which is often complicated or bizzare in location, gastric hypersecretion, and diarrhea. Serum gastrin levels can now be measured; gastrinomas have serum levels at least twice normal (50–150 pg/ml). An infusion of secretin in a patient with a gastrinoma will further elevate serum gastrin levels, whereas they will usually be unchanged in patient without gastrinoma. Calcium infusion also causes hypersecretion and elevation of serum gastrin, but is less useful.

The operative management of patients with a gastrinoma remains total gastrectomy; removal

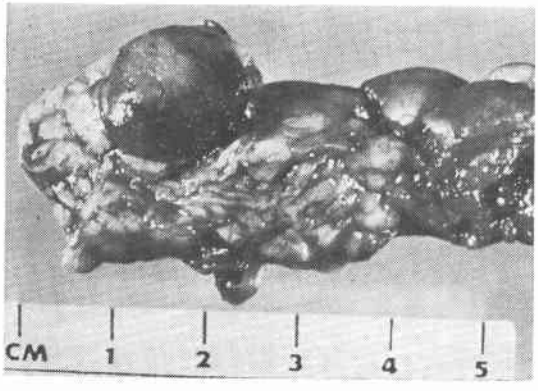


Figure 27. Operative specimen of distal pancreas with insulinoma.

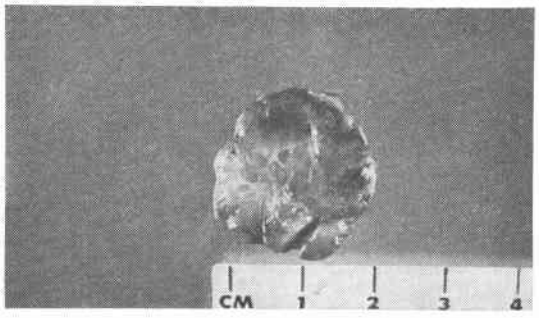


Figure 28. Operative specimen of an insulinoma removed by enucleation from the head of the pancreas.

of the pancreatic tumor alone is not effective treatment. In those rare situations, less than 10 percent of patients, where the gastrinoma is located in the duodenum or jejunum and when there are no evidence of metastases, resection of the tumor alone might be employed along with vagotomy and subtotal gastrectomy. In all patients in whom the gastrinoma is in the pancrease, however, because of a greater than 80 percent incidence of malignancy and metastases ,a total gastrectomy should be performed[9].

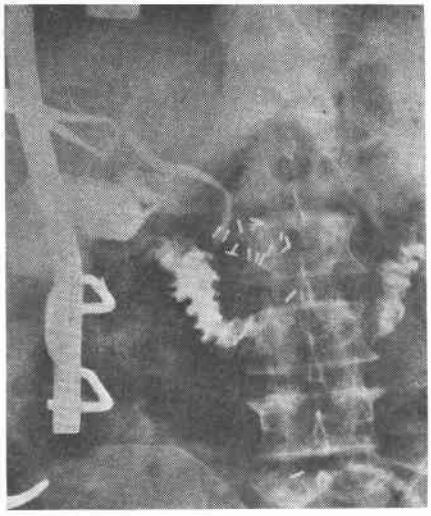


Figure 29. An operative cholangiogram taken immediately after enucleation of an insulinoma (region of small silver clips applied for hemostasis), to be certain that there has been no injury to the bile duct during the operative procedure.

Figure 30. A polypoid tumor mass is seen in the duodenum, region of the papilla of Vater, on duodenoscopy. Biopsy of this tumor showed it to be a carcinoma.

CARCINOMA OF THE PANCREAS

The results of surgery for carcinoma of the pancreas are discouraging. The world-wide experience wtih carcinoma of the head of the pancreas indicates that less than 15 percent of all patients operated upon have resectable tumors and the 5-year survival results in those patients in whom a resection can be performed is only about 4 percent. (Table 6.) The mortality rate of pancreatoduodenal resection remains high, in the range of 10 to 20 percent in many reported series[10].

Preoperative studies of any patient with obstructve jaundice, suspected to have carcinoma of the head of the pancreas, should include an ultrasound study to identify dilated bile ducts and to rule out gallstones. Gastroduodenoscopy is of valuc to look at the duodenum and papila of Vater, to identify and biopsy any tumor seen preoparetively. (Fig. 30.) On endoscopic retrograde cholaniogpancreatography it is often possible to identify pancreatic duct obstruction caused by carcinoma of the pancreas. (Fig. 31.) Fianlly, percutaneous transhepatic cholangiogram performed preoperatively will identify the obstructed biliary system and show the level and type of obstruction. (Fig. 32.)

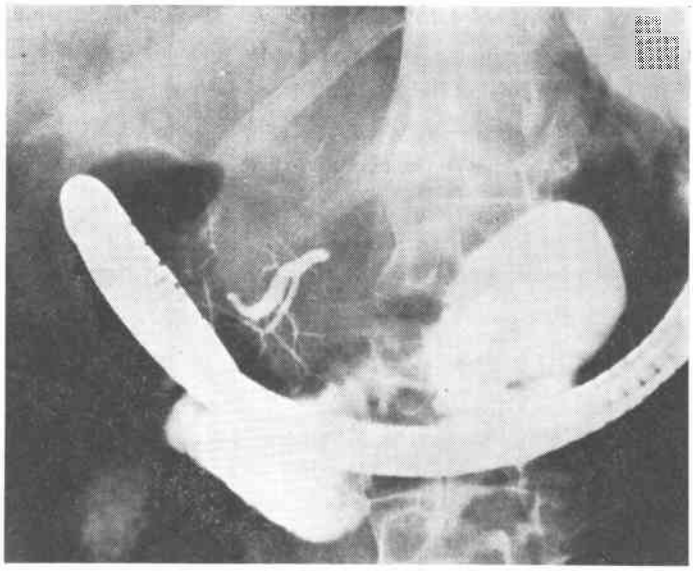


Figure 31. Endoscopic retrograde pancreatogram shows obstruction of the pancreatic duct by a carcinoma.

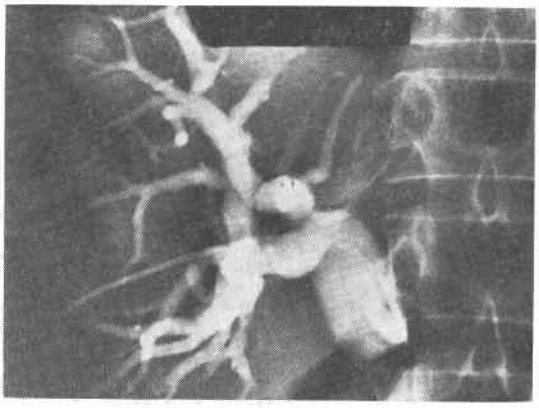


Figure 32. A percutaneous transhepatic cholangiogram shows obstruction of the common bile duct bya carcinoma of the pancreas. The transhepatic catheter was left in place, in this patient, for preoperative decompression of the obstructed biliary system.

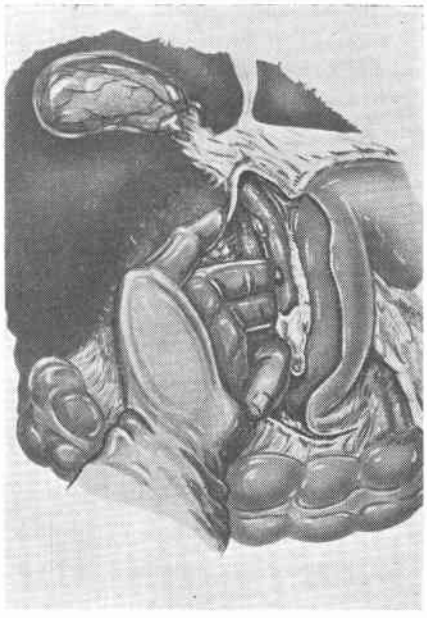


Figure 33. A Kocher maneuver is performed to mobilize the head of the pancreas and duodenum for assessment of the size and extent of the tumor mass.

Table 6. Results of Pancreatoduodenal Resection for Carcinoma of Pancreas

	Patients Resected	Resect-ability	Mortality	5 Year Survivors
Monge (Mayo)	119	10%	25%	8
Porter (Columbia)	17	9%	11%	0
Morris (Mass. General)	26	21%	34%	2
Glenn (Cornell)	25	9%	24%	1
Jordan (Baylor)	36	—	22%	1
Salom (Minnesota)	38	18%	33%	1
Lansing (Ochsner)	22	—	27%	3
Park (Pennsylvania)	51	27%	31%	0
Richard (New Orleans)	43	26%	—	2
Leadbetter (Vermont)	6	21%	0	2
Fish (Texas)	16	—	31%	0
Hoffman (Missouri)	13	—	24%	0
Warren (Lahey)	138	—	15%	10
Longmire (California)	39	26%	10%	1
Crile (Cleveland)	28	4%	10%	0
Smith (London)	44	—	20%	2
Hertzberg (Norway)	12	6%	8%	0
Nakase (Japan)	332	18%	25%	6
Total	1005	15%	20%	39(4%)

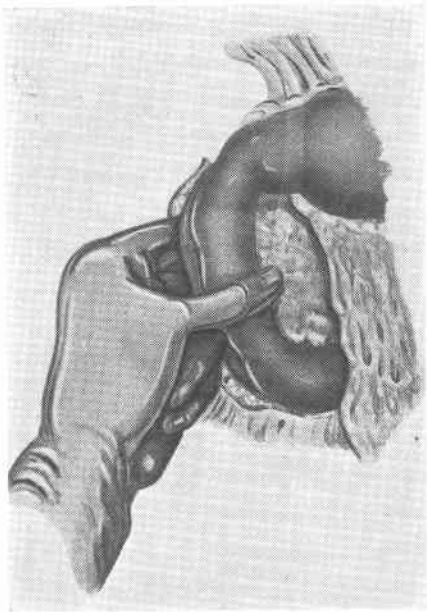


Figure 34. After a Kocher maneuver has been performed, the size of the tumor in the head of the pancreas can be palpated between the thumb and fingers of the surgeon's left hand.

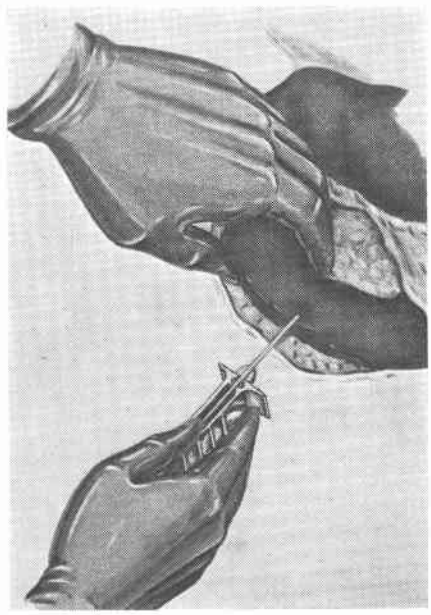


Figure 35. A needle biopsy of the head of the pancreas is performed transduodenally using a Trucut biopsy needle.

At operation, a wide Kocker maneuver is performed to mobilize the head of the pancreas and duodenum from its retroperitoneal location. (Fig. 33.) By palpation of the head of the pancreas, the size of the tumor and its potential resectability is determined. (Fig. 34.) A careful search for distant metastases, outside of the field of resection, is essential in assessing resctability. I believe that histologic proof of the diagnosis of carcinoma is preferable, but not essetnhial, to performing a pancreatoduodenal resection. The clinical history of painless jaundice, the radiologic findings preoperatively, and the evidence of a localized mass at operation in the absence of stones in the biliary system all provide sufficient clinical evidence of the presence of a carcinoma. Needle biopsies of the head of the pancreas, performed transduodenally using a Trucut biopsy needle, will usually provide the diagnosis. (Fig. 35.) However, pancreatic biopsy is not completely accurate, false-negative biopsies will occur in up to 15 percent of patients, (Table 7.) with the highest incidence occurring in those patients with the smallest, most potentially curable tumors[11]. Therefore, to insist on biopsy proof fo the diagnosis in all patients would be to deny some patients with potentially curable lesions the chance for resection and cure. We, therefore, biopsy the pancreas through the duodenum at least twice and often obtain needle aspiration cytology smears as well. At operation, the size of the lesion, its fixation to other structures, especially the portal vein, and the presence or absence of

Table 7. Accuracy and Complications of Pancreatic Biopsy

Collected Series*	Error in Diagnosis	Complication
2416 patients	4%—50% Average: 15%	0%—20% Average: 5%

*Bowden, Coté, Forsgren, Fraser, George, Gambill, Isaacson, Kline, Lightwood, Lung, Schultz, Spjut, Willbanks, Williams.

Table 8. Cancer of the Pancreas and Peri-Ampullary Reg : on

Resectability Depends on:
- Size of the lesion
- Fixation to other structures especially portal vein
- Absence of distant metastases
- Type of tumor*

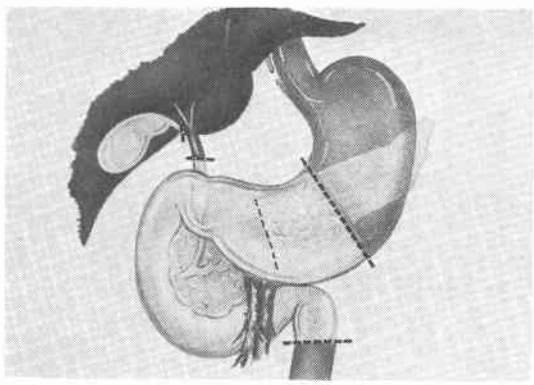


Figure 36. Artist's drawing which shows the extent of pancreatoduodenal resection (Whipple operation).

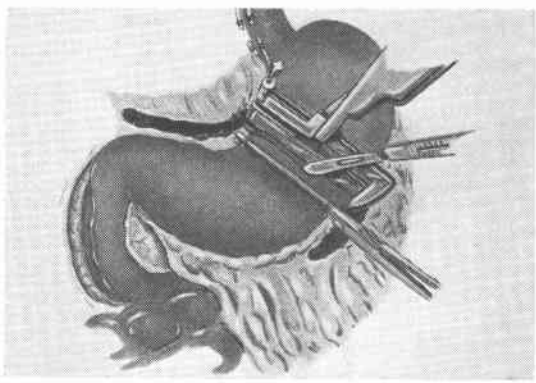


Figure 37. After vagotomy is performed, the stomach is divided proximal to the antrum.

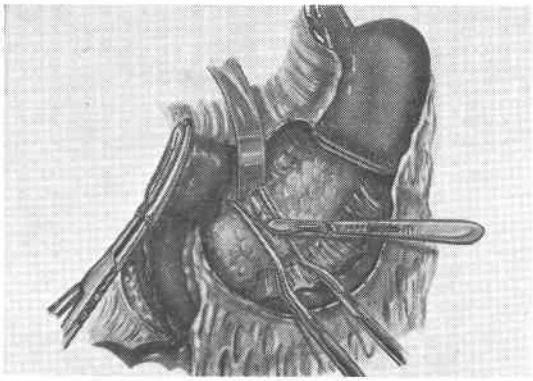


Figure 38. The antrum of the stomach is reflected to the right, the neck of the pancreas is elevated from the portal and superior mesenteric veins, and divided between non-crushing clamps.

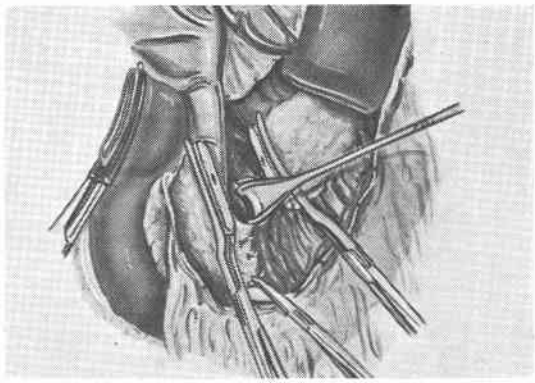


Figure 39. The pancreas is carefully dissected from the superior mesenteric and portal veins, individually clamping and ligating veins and arteries.

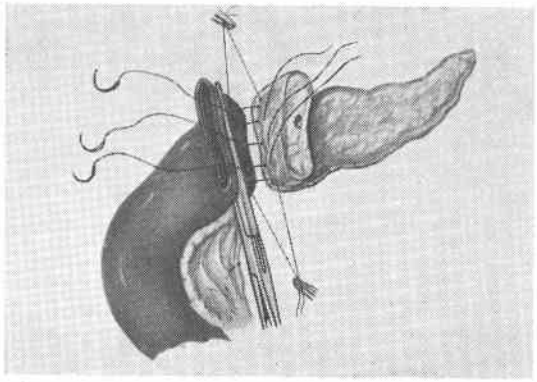


Figure 40. An end-to-end pancreatojejunostomy is performed in two layers with interrupted 3-0 silk sutures to the outer row, interrupted synthetic absorbable sutures to the inner layer.

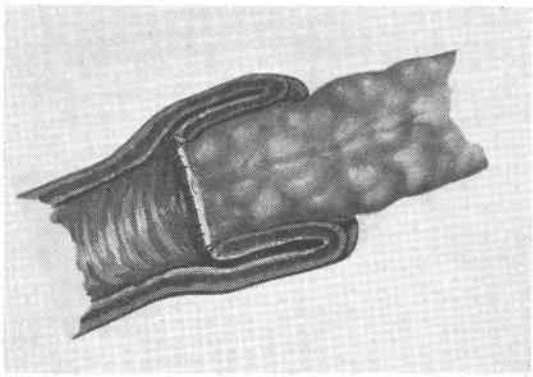


Figure 41. The end of the pancreas is stuffed into the end of the jejunum by this two-layer anastomosis. Occasionally, a small plastic catheter is sutured in the pancreatic duct to splint this opening.

distant metastases are all carefully evaluated. (Table 8.) The type of the tumor is of questinaoble importance in the decision for resection. We proceed with resection based on the these findings and on clinical judgment.

We continue to prefer pancreatoduodenal resection (Fig. 36.) for patients with cancer of the head of the pancreas considered resectable[12]. A vagotomy is performed as an adjunct to all Whipple resections. The stomach is divided (Fig. 37.) and the neck of the pancrease is carefully elevated from the supreior mesenteric vein and divided using Glassman clamps. (Fig. 38.) The gastroduodenal artery is ligated and divided, the common bile duct is divided at the midduct, and the head of the pancreas is carefully dissected from the superior mesenteric and portal veins. (Fig. 39.) The duodenojejunal junction is mobilized at the ligament of Treitz and divided, removing the specimen.

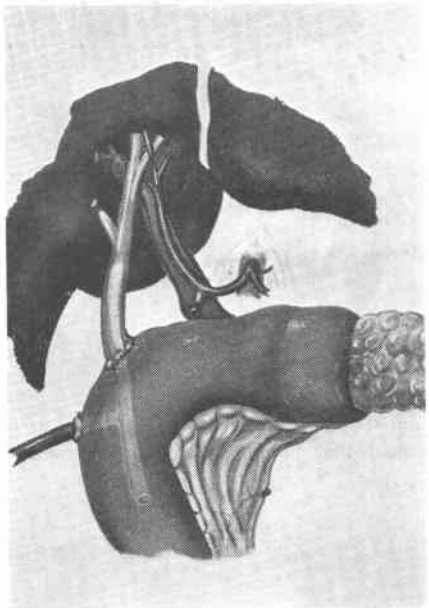


Figure 42. An end-to-side choledochojejunostomy has been performed and a large T-tube splints the anastomosis. The T-tube exit site is protected by a 2-0 chromic catgut pursestring suture. This T-tube not only splints the choledochojejunostomy but decompresses the jejunal segment.

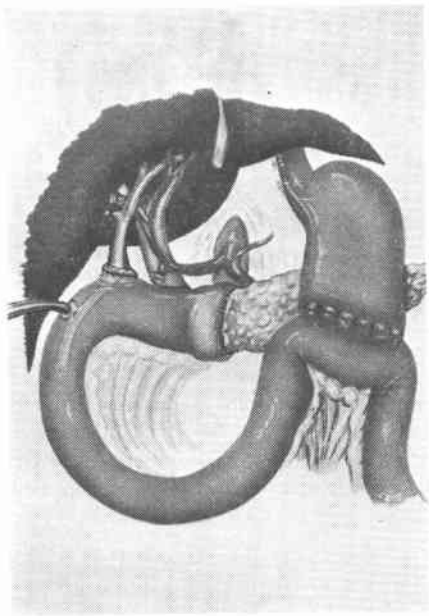


Figure 43. The complete reconstruction after a Whipple resection. A gastrojejunostomy is the most distal anastomosis.

Table 9. Pancreatoduodenal Cancer
5-year Survivals Collected Series

Ampulla of Vater	30—40%
Duodenum	35—40%
Common Bile Duct (Distal)	15—25%
Islet Cell	25—40%
Average	26%
Pancreas	0— 7%
Average	4%

Reconstruction is by means of an end-to-end pancreatojejunostomy, using a two-layer anastomosis, (Fig. 40.) stuffing the end of the pancreas into the jejunum. (Fig. 41.) Occasionally, a small plastic catheter is used to splint the pancreatic duct. An end-to-side choledochojejunostomy is then performed, frequently using a large T-tube placed in the jejunum both to splint this anastomosis and to drain the jejunal segment. (Fig. 42.) A gastrojejunostomy distal to these anastomoses completes the reconstruction. (Fig. 43.) The abdomen is always drained with multiple Penrose drains or Sump suction tubes.

The operative mortality for pancreatoduodenal resection should be less than 10 percent. Although cure is hoped for, palliation is all that may be obtained; it should be good palliation. Long-term survival can be expected in from 30 to 40 percent of patients with carcinoma of the ampulla of Vater and of the duodenum, and in 15 to 25 percent of patients with carcinoma of the distal common bile duct. (Table 9.) With improved methods of diagnosis and earlier diagnosis of patients with small tumors, perhaps the log-term survial rate of patients with cancer of the head of the pancreas will also be improved.

Recently, some surgeons have become enthusiastic about total pancreatectomy for carcinoma of the head of the pancreas[13)14)]. Their early results indicate little improvement in either resectability or long-term survival. The morbidity of total pancreatectomy, especially that of brittle diabetes, is a serious drawback to this operation.

For those patients in whom a resection cannot be performed, we bypass the biliary system, to decompress the obstructive jaundice, by means of a cholecytojejunostomy or choledochoduodenostomy. A gastrojejunostomy is only used when impending obstruction of the duodenum is evident. We are investigating newer methods of radiation therapy to the pancreas and are impress with some of the favorable reports from Japan and other countries. Our experience with the use of chemotherapy has been disappointing.

Finally, in patients with unresectable cancer of the pancreas in whom back pain is a severe problem, a bilateral splanchnicectomy for palliation should be considered. Our neurosurgeons perform this procedure through a posterior approach and have been successful in relieving pain in about 70 percent of patients.

It has been a great pleaure to speak with you on surgery of the pancreas, and to bring you my views on the surgical management of pancreatitis, of islet cell tumos, and of carcinoma of the pancreas.

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