

Results of Radical Resection for Periapillary Cancer

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This report concerns 348 pancreatoduodenectomies, including 13 total pancreatectomies. Operative mortality over 30 years was 15%, operative mortality since 1962, 10%. Precise factors influencing operability, mortality, morbidity, and long-term palliation or cure are emphasized. The necessity for making a distinction among tumors arising in the ampulla of Vater, the intrapancreatic portion of the common bile duct, and the duodenum surrounding the papilla of Vater and carcinomas arising in the head of the pancreas is the most important factor in the approach to periapillary malignant tumors. Even with this large experience, the impression of the operating surgeon at the time of resection was incorrect in 10% of the patients in whom a resection was carried out for a tumor assumed to arise in the head of the pancreas. Thus, surgeons who do not resect carcinomas arising in the head of the pancreas and who may have had less experience in this specialized field may be rejecting an even larger per cent of patients with more favorable periapillary malignant tumors. The influence of previous exploration, manipulation, and biopsy on morbidity, mortality, and survival is discussed. The significance of nodal involvement and residual tumor at the neck of the pancreas and the point of division of the common bile duct and the uncinate process is discussed. These data justify continued selective application of pancreatoduodenectomy for periapillary cancer and identify areas where further improvement can be made.

RADICAL RESECTION for periapillary tumors at the Lahey Clinic Foundation has been based on the anatomic principles advocated by Whipple in 1935.²⁸ Over the years, as a result of increasing experience, specific modifications have been adopted, including total pancreatectomy under certain circumstances.^{7,25,26} Although

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this practice has been amply justified by previous reports, some controversy still persists regarding the preferred surgical approach, particularly in the case of adenocarcinoma of the head of the pancreas.^{9,11,18,19,26,27} On the one extreme, more extensive resections, including vascular resection, have been advocated for more advanced tumors.^{1,6,8,9,17,20} However, neither the bypass procedure nor the more radical resection has been justified by results to date.^{1,6,8,9,20}

The resectability rates for malignant jaundice have varied from 8 to 30%.^{2,4,29} Although these resectability rates are relatively low, the magnitude of the surgical problem is best indicated by considering that 348 resections for periapillary cancer have been performed at one institution during the past 30 years. This report is submitted for the purpose of defining further the problems of morbidity and mortality associated with radical resection for periapillary cancer and to present survival figures based on pathologic findings, including site of tumor, type of tumor, the presence and absence of lymph node metastases, and marginal involvement.

Methods and Results

The charts of 355 patients who underwent pancreaticoduodenal resections of periapillary tumors from 1942 to 1971 were reviewed. Operative deaths were defined as those deaths occurring after operation in the hospital and all those who died within 30 days after discharge from the hospital. Relative survival rates were determined after excluding operative deaths and patients with incomplete followup studies. The effect on survival rates was determined for the site of tumor, the presence of lymph node

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TABLE 1. *Patients Treated by Pancreatoduodenectomy or Total Pancreatectomy*

Site	Malignant Tumors	Benign	Total
Pancreas	150	4	154
Ampulla	112	1	113
Common bile duct	47	2	49
Duodenum	39	0	39
Total	348	7	355

metastases in the excised specimen or in the nodes biopsied during operation, and the type of tumor.

No obvious difference was found in the ages of patients when compared to the site of the tumor. The ages varied from that of a 12-year-old girl with cancer of the head of the pancreas to that of a 78-year-old man with cancer of the common bile duct. The mean age for all 348 patients was 56.3 years.

Pathologic examination of 355 surgical specimens resected because of the clinical and operative diagnosis of periampullary cancer demonstrated that 6 resections were for pancreatitis and one was for benign papillary cystadenoma. The remaining 348 resections, which form the basis of this report, were for malignant tumors. The 348 resections included 13 total pancreatectomies, 12 of which were for cancer of the head of the pancreas, and 1 for cancer of the common bile duct (Table 1).

The histologic type of tumor was adenocarcinoma in 331 (95.2%) of the 348 patients with malignant disease. The other 17 included 6 islet cell tumors, 4 carcinoids, 2 cystadenocarcinomas, 2 adenoacanthomas, 1 neurofibrosarcoma, 1 melanoma, and 1 leiomyosarcoma (Table 2).

The surgeon's conclusions regarding the site of origin of all periampullary cancers at operation were compared with the pathologist's findings. This demonstrated that 20 of the 198 cancers of the ampulla, common bile duct, and duodenum were mistaken for cancer of the pancreas. This 10% consisted of 9 cancers of the ampulla, 8 cancers of the common bile duct, and 3 cancers of the duodenum.

TABLE 3. *Operative Mortality (1962-1971)*

Site	Number of Cases	Operative Deaths	Per Cent
Pancreas	58	6	10.3
Ampulla	39	3	7.6
Common bile duct	23	4	17.4
Duodenum	19	2	10.5
Total	139	15	10.7

Determination of the 30-year operative mortality according to the site of origin of the tumor showed that there was a mortality of 21% for cancer of the common bile duct; the next highest mortality was 18% for cancer of the duodenum. The lowest mortality was 11% for cancer of the ampulla, whereas there was a 15% mortality for cancer of the pancreas. During the last 10 years, resections for common bile duct cancers continued to have a relatively high mortality of 17.4%, while the mortality for ampullary cancer resection was 7.6%. Mortality for resection of the duodenum and pancreas was reduced to 10.5 and 10.3% respectively (Table 3).

Operative mortality for the 348 resections was 52 deaths (14.9%). Hemorrhage, sepsis, cardiopulmonary problems, renal failure, and necrotizing pancreatitis were the major life-threatening complications causing 44 of the 52 deaths. Sepsis caused 9 deaths, and cardiopulmonary complications caused 7 deaths. The mortality rate for the 10 patients with renal failure was 60%, and 3 of the 4 patients with necrotizing pancreatitis died. There were 28 pancreatic leaks resulting in two deaths. Of the 23 biliary leaks one was considered a cause of death. There were four gastric leaks, none of which caused death. Other complications included hepatic failure which caused two deaths, shock of unknown cause which caused two deaths, and a fatal cerebrovascular accident (Table 4).

Since 1962 the operative mortality for 139 resections was 10.7%. Hemorrhage was again the most serious complication occurring in 13.7% with a mortality of 36.8%. Pancreatic leak occurred in 5 patients and caused one death. No

TABLE 2. *Histologic Type of Tumor*

Type of Tumor	Pancreas	Ampulla	Common Bile Duct	Duodenum	Total
Adenocarcinoma	138	109	47	37	331
Islet cell tumors	6	0	0	0	6
Carcinoid	1	2	0	1	4
Cystadenocarcinoma	2	0	0	0	2
Adenoacanthoma	1	1	0	0	2
Neurofibrosarcoma	1	0	0	0	1
Melanoma	1	0	0	0	1
Leiomyosarcoma	0	0	0	1	1
Total	150	112	47	39	348

TABLE 4. Operative Morbidity and Mortality:
348 Resections (1942-1971)

Major Complications	Number of Cases	Cause and Number of Deaths
Hemorrhage	41	19
Pancreatic leak	28	2
Cardiopulmonary	25	7
Biliary leak	23	1
Sepsis	23	9
Renal failure	10	6
Intestinal obstruction	6	0
Necrotizing pancreatitis	4	3
Gastric leak	4	0
Hepatic failure	4	2
Hyperglycemia	4	0
Thrombophlebitis	3	0
Cerebrovascular accident	3	1
Shock	2	2
Acute parotitis	2	0
Total	182	52 (14.9%)

deaths were attributed to any of the 16 biliary leaks. Sepsis and cardiopulmonary complications continued to be frequent and serious (Table 5).

Survival rates according to the site of tumor demonstrate that less than half (46%) of patients with pancreatic carcinoma survived one year, which is in marked contrast to the fate of patients with tumors at the other periampullary sites. A steep decline in survival occurred in patients with ampullary, common bile duct, and duodenal tumors during the second and third years although 5-year survivals of 41% and 32% were obtained respectively for duodenal and ampullary tumors, while the survival rate for common bile duct cancers was 25%. At 5 years the survival rate for cancer of the pancreas had fallen to 12.5%. Long-term survival results, up to 15 years, demonstrate a steady decline for tumors at all periampullary sites except in the case of the common bile duct, which does not show such a decline and for which a 38.4% 15-year survival rate was obtained (Table 6).

TABLE 5. Operative Morbidity and Mortality:
139 Resections (1962-1971)

Major Complications	Number of Cases	Number of Deaths
Hemorrhage	19	7
Biliary leaks	16	0
Cardiopulmonary	15	3
Sepsis	10	3
Pancreatic leaks	5	1
Renal failure	4	0
Necrotizing pancreatitis	2	1
Cerebrovascular accident	2	0
Gastric leaks	1	0
Hepatic failure	1	0
Acute parotitis	1	0
Total	76	15 (10.7%)

There were 87 (25%) patients with metastases to one or more lymph nodes. There was an incidence of 28% regional lymph node metastases associated with cancer of the pancreas and 28% in the case of ampullary and duodenal cancers. Lymph node metastases were found in 13% of cancers of the common bile duct.

Of the 348 resections, 261 (75%) patients had no evidence of regional lymph node metastases (Table 7A). There is only a 41.1% one-year survival rate for cancer of the head of the pancreas, whereas the one-year survivals for patients with tumors at the other sites range from 75.7 to 90.4%. Again, there is a steep decline in survival rates between the first and third years in the case of ampullary, common bile duct, and duodenal tumors. In the case of long-term survivals, a steady decline continues for both ampullary and duodenal cancers, while there is an actual improvement in survival rates for common bile cancers as already seen for all cases according to site of the tumor (Table 6). Survival rates shown in Table 7B demonstrates a marked drop after one year for ampullary, common bile duct, and duodenal cancers, resulting in only 4 patients surviving in 5 years. The results for cancer of the head of the pancreas, however, show a remarkable 60% one-year survival rate, but only 2 of 27 patients survived 5 years.

Marginal involvement was found in 18 (13%) of the 150 resected tumors of the pancreas and in 6 (12.5%) of the 47 resected tumors of the common bile duct. No marginal involvement was found in the case of duodenal or ampullary tumors. There was only one 3-year survival among those with marginal involvement, and that patient had carcinoma of the head of the pancreas.

Of the 150 patients with cancer of the head of the pancreas, 12 had tumors other than adenocarcinoma and 6 of these had islet cell cancers (Table 2). Survival rates for the 10 patients eligible for followup demonstrate relatively satisfactory results with a 5-year survival of 40% (Table 8).

Discussion

The problem of avoiding unnecessary resection for chronic pancreatitis can be a challenge to the surgeon operating on patients with obstructive jaundice. The less than 2% incidence of such resections in this series was achieved by careful evaluation of the history, physical findings, and results of investigations before operation. During exploration, particular attention was given to changes in the distal pancreas. The duct of Wirsung is dilated in 80% of the resectable tumors, and the body and tail of the pancreas are enlarged, pale, and firm.²⁷ Examination of the common bile duct and the gallbladder, which are obstructed owing to carcinoma of the head of the pancreas, will reveal a thin-walled gallbladder and bile duct with a bluish color. In the majority of cases, a diagnosis was made without biopsy of lymph nodes or of the primary lesion. In the cases where doubt still existed regarding the nature of the lesion, the next step was peripancreatic and common

TABLE 6. *Relative Survival Rates According to Site of Tumor*

Site	1-Yr Survivals	3-Yr Survivals	5-Yr Survivals	10-Yr Survivals	15-Yr Survivals
	1942-1971	1942-1969	1942-1967	1942-1962	1942-1957
Pancreas	46.6% (56/120)*	15.7% (18/114)	12.5% (13/104)	8.6% (7/81)	3.5% (2/56)
Ampulla	83.2% (79/ 95)	44.4% (40/ 90)	32.0% (26/ 81)	35.3% (18/51)	23.6% (9/38)
Common					
bile duct	76.3% (29/ 38)	32.3% (11/ 34)	25.0% (8/ 32)	28.5% (6/21)	38.4% (5/13)
Duodenum	93.5% (29/ 31)	45.1% (14/ 31)	41.3% (12/ 29)	25.0% (4/16)	18.1% (2/11)

*Numbers in parentheses indicate survivors and patients eligible for followup.

bile duct node biopsy. If diagnosis was still in doubt, choledochostomy and, if indicated, duodenotomy were carried out to obtain tissue from the distal common bile duct and ampulla.²⁵ When indicated biopsy of the head of the pancreas was undertaken by making a rectangular-shaped incision over the tumor and then gently scooping out tissue with a bone curet. This method of biopsy has been found satisfactory and is associated with no complications.

It is important to bear in mind that cancers other than adenocarcinoma can occur in the periampullary area and that resection for such cancers results in relatively satisfactory survival rates (Table 7). Twelve such tumors occurred among the 150 cases of cancer of the head of the pancreas in this series (Table 2).

The difficulty in determining the exact site of the tumor during surgery is demonstrated by the pathologic reports of the resected specimens. The reports revealed that, at the time of operation, 10% of periampullary tumors arising in the ampulla, common bile duct, and duodenum was mistaken for tumors of the head of the pancreas. The importance of this figure is obvious in circumstances when only bypass procedures are carried out for cancers of the head of the pancreas, and it is especially important when one considers the overall national figures involving thousands of patients annually.^{5,12} These findings demonstrate the difficulty of interpreting the results of the bypass operation for resectable tumors which were considered cancers of the head of the pancreas during exploration.⁹ Furthermore, this figure of 10% for these tumors with a relatively favorable prognosis occurred at a center specializing in this type of disease.

The operative mortality in this series, particularly during

the 10 years from 1962 to 1971, corresponds fairly well to that found by other authors.^{2,10,15,16,21-24} Measures to reduce operative morbidity and mortality include careful preoperative evaluation with particular attention to blood volume, hypoproteinemia, prothrombin determinations, and electrolyte balance. The correction of hypovolemia has been shown to be a major factor in reducing operative mortality.²⁹ As operative experience has been gained over the years, there has been a substantial reduction in the number of anastomotic leaks (Tables 3 and 4). In this study, there were 5 pancreaticojejunostomy leaks after 1972 as opposed to 23 before 1962. Furthermore, the mortality associated with pancreatic leaks can be reduced by proper use of sump drains. The lower mortality rate during the past decade was mainly the result of absence of death from renal failure (Tables 3 and 4). Hemorrhage, sepsis, and cardiopulmonary complications are still the principal causes of morbidity and mortality. A further significant reduction in the morbidity and mortality rates associated with this operation will be achieved only by the prevention of these problems and improved methods of management.^{15,16,22} As a result of experience at this clinic, it is suggested that management of postoperative hemorrhage during the initial phases, whether intraperitoneal or gastrointestinal, should be based on conservative principles. Reexploration should only be considered in patients whose condition continues to deteriorate despite vigorous treatment, which may involve transfusion of 10 to 12 liters of blood.

Since 6 deaths were directly related to the residual pancreas (4 were due to acute necrotizing pancreatitis and 2 were due to pancreaticojejunostomy leak) total pancreatectomy should be considered in those patients in

TABLE 7 A. *Relative Survival Rates According to Site of Tumor without Lymph Node Metastasis*

Site	1-Yr Survivals	3-Yr Survivals	5-Yr Survivals	10-Yr Survivals	15-Yr Survivals
	1942-1971	1942-1969	1942-1967	1942-1962	1942-1957
Pancreas	41.0% (35/85)*	21.6% (18/83)	16.8% (13/77)	10.9% (7/64)	4.3% (2/46)
Ampulla	88.0% (59/67)	49.2% (32/65)	40.0% (24/60)	35.3% (18/51)	23.6% (9/38)
Common					
bile duct	75.7% (25/33)	35.4% (11/31)	27.5% (8/29)	33.3% (6/18)	41.6% (5/12)
Duodenum	90.4% (19/21)	52.3% (11/21)	50.0% (10/20)	33.3% (4/12)	18.1% (2/11)

*Numbers in parentheses indicate survivors and patients eligible for followup.

TABLE 7 B. Relative Survival Rates According to Site of Tumor with Lymph Node Metastasis

Site	1-Yr Survivals	3-Yr Survivals	5-Yr Survivals	10-Yr Survivals	15-Yr Survivals
	1942-1971	1969-1972	1942-1967	1942-1962	1942-1957
Pancreas	60.0% (21/35)	6.4% (2/31)	7.4% (2/27)	5.8% (1/17)	
Ampulla	71.4% (20/28)	28.6% (8/28)	9.5% (2/21)		
Common bile duct	80.0% (4/ 5)				
Duodenum	100.0% (10/10)	30.0% (3/10)	22.2% (2/ 9)		

*Numbers in parentheses indicate survivors and patients eligible for followup.

whom there is difficulty in making the pancreaticojejunostomy anastomosis.

In this study, marginal involvement was found in 13% of the common bile duct and pancreatic tumors and may well represent an advanced stage of tumor growth. As a result of finding marginal involvement in 4 of their 10 patients, Hicks and Brooks¹¹ have advocated total pancreatectomy for cancer of the head of the pancreas. However, Smith²³ has noted that recurrence in the residual pancreas is not one of the major problems following resection for this disease. The Whipple type of operation continues to be the procedure of choice at the Lahey Clinic for cancer of the head of the pancreas.

Analysis of survival rates in this series confirms the relatively favorable prognosis for duodenal, ampullary, and common bile duct cancer, particularly when there is no associated lymph node metastases. Although no resections were performed when lymph node metastases were found beyond the area of excision, the presence of node involvement in the pathologic specimens was associated with a bad prognosis. Node metastases within confines of possible block excision probably should not be regarded as an absolute contraindication to radical surgery, but such a finding would obviously have to be weighed carefully in light of the site of the tumor and the condition of the patient.

Despite the findings that 75% of periampullary cancers in this series had no evidence of lymphatic or blood-borne spread at the time of resection, the majority of patients were dead within 5 years. Previous studies³ have clearly demonstrated the importance of blood-borne metastases particularly in the case of carcinoma of the pancreas. Because of the tendency of early widespread dissemination of cancer of the pancreas resulting in low resectability rates, emphasis has been placed on developing methods of early diagnosis including fiberoptic endoscopy, biochemical tests, angiography, and scanning techniques.¹¹

TABLE 8. Comparison of Survivals: Adenocarcinoma versus Other Malignant Tumors of the Head of the Pancreas

Type	Number of Cases	Survival Rates				
		1 Yr	3 Yrs	5 Yrs	10 Yrs	15 Yrs
Adenocarcinoma	110	44.2%	10.2%	9.0%	3.8%	1.8%
Other tumors	10	70.0%	60.0%	40.0%	40.0%	10.0%

Although a 5-year survival rate of 18% has been reported, the results of radical surgery for carcinoma of the head of the pancreas have been poor.^{10,13-15} However, radical surgery still offers the only chance of cure to the patient, and, furthermore, up to 10% of other periampullary cancers with a relatively favorable prognosis may be mistaken for cancer of the pancreas. The incidence of cancer of the pancreas is increasing, and it is now the fourth leading cause of cancer deaths in the United States.^{5,12} Although there is little possibility of further advances in surgical technique, improvement in diagnostic and other methods of treatment are needed to combat periampullary cancer more effectively.

References

- Asada, S., Itaya, H., Nakamura, K., et al.: Radical Pancreatoduodenectomy and Portal Vein Resection. *Arch. Surg.*, 87:609, 1963.
- Beall, M.S., Dyer, G.A., and Stephenson, H.E., Jr.: Disappointments in the Management of Patients with Malignancy of Pancreas, Duodenum, and Common Bile Duct. *Arch. Surg.*, 101:461, 1970.
- Bell, E.T.: Carcinoma of the Pancreas. I. A Clinical and Pathologic Study of 609 Necropsied Cases. II. The Relation of Carcinoma of the Pancreas to Diabetes Mellitus. *Am. J. Pathol.*, 33:499, 1957.
- Bowden, L. and Pack, G.T.: Cancer of the Head of the Pancreas: A Collective Review of the Experiences of the Gastric Service of the Memorial Cancer Center 1926-1958. *GEN*, 23:339, 1969.
- '73 Cancer Facts and Figures. American Cancer Society, New York, New York, 1973.
- Cassebaum, W.H.: Resection of Superior Mesenteric Vessels in Pancreatectomy. *New York State J. Med.*, 71:366, 1971.
- Cattell, R. B. and Pyrttek, L. J.: An Appraisal of Pancreatoduodenal Resection; Follow-up Study of 61 Cases. *Ann. Surg.*, 129:840, 1949.
- Child, C.G., III, Holswade, G.R., McClure, R.D., Jr., et al.: Pancreatoduodenectomy with Resection of Portal Vein in Macaca Mulatta Monkey and in Man. *Surg. Gynecol. Obstet.*, 94:31, 1952.
- Crile, G., Jr.: The Advantages of Bypass Operations Over Radical Pancreatoduodenectomy in the Treatment of Pancreatic Carcinoma. *Surg. Gynecol. Obstet.*, 130:1049, 1970.
- Fortner, J.G.: Regional Resection of Cancer of the Pancreas. A New Surgical Approach. *Surgery*, 73:307, 1973.
- Hicks, R.E. and Books, J.R.: Total Pancreatectomy for Ductal Carcinoma. *Surg. Gynecol. Obstet.*, 133:16, 1971.
- Kalbere, R. and John, T., Jr.: Cancer of the Pancreas. *J. Surg. Oncol.*, 2:1, 1974.
- Lansing, P.B., Blalock, J.B. and Ochsner, J.L.: Pancreatoduodenectomy: a Retrospective Review 1949 and 1969. *Am. J. Surg.*, 38:79, 1972.
- Loggan, P.B. and Kleinsasser, L.J.: Collective Review: Surgery of

- the Pancreas: Results of Pancreaticoduodenal Resections Reported in Literature. *Internat. Abstract Surg.*, 93:521, 1951.
15. Longmire, W.P., Jr. and Aston, S.J.: Pancreaticoduodenal Resection: Twenty Year's Experience. *Arch. Surg.*, 106:813, 1973.
 16. Longmire, W.P., Jr. and Shatey, O.A.: Certain Factors Influencing Survival After Pancreaticoduodenal Resection for Carcinoma. *Am. J. Surg.* 111:8, 1966.
 17. McDermott, W. V., Jr.: One-stage Pancreatoduodenectomy with Resection of Portal Vein for Carcinoma of Pancreas. *Ann. Surg.*, 136:1012, 1952.
 18. Rhoads, J.E.: The Surgical Management of Pancreatic Tumors. *West. J. Surg.*, 64:62, 1956.
 19. Ross, D.E.: Cancer of Pancreas: Plea for Total Pancreatectomy. *Am. J. Surg.*, 87:20, 1954.
 20. Sigel, B., Bassett, J.G., Cooper, D.R., et al.: Resection of the Superior Mesenteric Vein and Replacement with a Venous Autograft During Pancreatoduodenectomy. *Ann. Surg.*, 162:941, 1965.
 21. Smith, R.: Longtime Survival After Pancreatectomy for Cancer. *Br. J. Surg.*, 44:29, 1956.
 22. Smith, R.: Pancreatectomy for Cancer of the Pancreas. The Results. *Bull. Soc. Intern. Chir.*, 24:329, 1965.
 23. Smith, R.: Progress in the Surgical Treatment of Pancreatic Disease. *Am. J. Surg.*, 125:143, 1973.
 24. Statistical Research Service: Career Mortality Statistic (1970). American Cancer Society, New York, New York.
 25. Warren, K.W., Braasch, J. and Thum, C.W.: Diagnosis and Surgical Treatment of Carcinoma of the Pancreas. *Curr. Probl. Surg.*, 108:3, 1968.
 26. Warren, K.W., Veidenheimer, M.C. and Pratt, H.S.: Pancreatoduodenectomy for Periampullary Cancer. *Surg. Clin. North Am.*, 47:639, 1967.
 27. Warren, K.W., Cattell, R.B., Blackburn, J.P., et al.: A Long Term Appraisal of Pancreaticoduodenal Resection for Periampullary Carcinoma. *Ann. Surg.*, 155:652, 1962.
 28. Whipple, A.D., Parsons, W.B. and Mullins, C.R.: Treatment of Carcinoma of the Ampulla of Vater. *Ann. Surg.*, 102:763, 1935.
 29. Williams, R.D., Elliott, D.W., and Zollinger, R.M.: Surgery for Malignant Jaundice. *Arch. Surg.* 80:992, 1960.

DISCUSSION

DR. GEORGE L. JORDAN, JR. (Houston): Dr. Warren has been a strong proponent of an aggressive attack upon disease in this area, and I rise to support this contention.

Our experience with this disease is somewhat smaller than his, but our experience with 95 consecutive operations of this type for periampullary malignancies parallels his own series. Some of our patients were operated upon by some of our residents, and therefore our overall mortality rate is somewhat higher than his. But if we look at the patients operated upon by members of our faculty, the mortality rates are almost identical, because throughout our entire experience the mortality rate among that group has been 13.5%. Also, our survival rates are very similar.

Among all of our patients who have been operated upon more than three years ago, the three-year survival rate is 25%. This includes patients who died postoperatively, as well as the long-term survivors. Thus, there is a high salvage rate in this group, much higher than is generally appreciated.

Some of those patients who survived three years died before reaching the five-year period, but without disease. But we also have a significant number of five-year survivals.

I agree completely with his insistence upon categorization of the lesion. The best results we have obtained, as has he, are in patients with carcinoma of the ampulla of Vater, where our five-year survival rate is 37%.

Lastly, I would like to make a plea that I have made before to follow these patients carefully, and to attack vigorously any evidence of apparent recurrent disease, because it is too easy to presume that when the patient develops new abdominal symptoms, he now has recurrent carcinoma, and there's nothing else that one can do.

There have been a number of patients in our series who have been reoperated upon with symptoms of recurrent disease who were found to have benign disease which could be treated and salvage accomplished. There have been other patients who have developed a second, entirely separate, independent carcinoma which could be treated. One of our patients with carcinoma of the pancreas, for example, was not only a five-year survival following treatment of his carcinoma of the pancreas, but also a five-year survival following treatment subsequently of a carcinoma of the colon. Therefore, things are not always what they seem, and it behooves us to treat all of our patients aggressively, and to continue our treatment until we know that they have totally incurable disease.

DR. WILLIAM M. REMINE (Rochester, Minnesota): I rise in strong support of Dr. Warren and his philosophy regarding carcinoma of the pancreas, duodenum, and ampulla, because, as he indicated there, the mortality in the untreated cases is very high. We have summarized our experience with pancreaticoduodenectomy in 1963 with 239 cases, and at that time we had an 18% five-year survival of head lesions. One of these

was a malignant lesion of the islet of Langerhans, and we felt that it was worthwhile to pursue the problem further even though the survival was low and there was lots of room for improvement.

We, therefore, began to look at the possibility of total pancreatectomy, because of the inability to detect the outer limits of the lesion as it expands into the head of the pancreas, and also because of the possibility of multicentric lesions.

In 1970 we summarized our experience with total pancreatectomy, and at that time we had 36 cases. Since then, we have summarized our experience again recently with 28 more cases for a total of 64 patients treated with total pancreatectomy.

I'd like to give you just a few of our findings in that series. Initially we had a 27% five-year survival with total pancreatectomy. The series was small, and so we don't know that it is highly indicative, except that it's encouraging.

In the more recent series we have reduced our operative mortality, which was originally 16% through 1968. From '68 to '70 it was reduced to 11%, and since 1970 it's been 7.4%. We feel this is a marked improvement and a better selection of patients. Prior to 1968 we were operating on patients with very large lesions that required total pancreatectomy for their removal.

In the total series, the longest survivor in the group, with adenocarcinoma of the pancreas, lived six years and eight months. There is a patient still alive who had rhabdomyosarcoma who has remained alive for 14 years after removal, and, since then, he's had another operation subsequently for a stricture of the hepaticojejunostomy. I think this man would have been written off as a recurrence if we had not operated on him with the hope of being able to do something for him.

Of the nine patients with ampullary carcinoma, the longest survivor remains alive 6½ years after total pancreatectomy. Two patients survived three or more years, and four patients remained alive for one or more years. There were four patients with cystadenocarcinoma; the longest survivor lived about five years, or four years and nine months.

I would like to ask Dr. Warren if they have checked their specimens for evidence of multicentricity. When we went over ours we found that nine of the patients with total pancreatectomy with malignancies had multicentric lesions. We feel this is very important if you are going to eradicate all of the malignant problem. If so, what percentage did they have?

I think the high degree of pessimism in certain quarters with regard to this problem is totally unwarranted. I feel we need to strive more diligently in this direction if we are going to get people well. I think earlier diagnosis, of course, is the key to the whole problem.

DR. GEORGE CRILE, JR. (Cleveland): I think it's generally recognized that there is a striking difference in prognosis between gastrointestinal tract tumors that are polypoid and those that are invasive and ulcerating. This has certainly been true in our experience in the ampullary lesions. We have only one long-term survivor of an infiltrating, as opposed to a polypoid tumor.