

Carcinoma of the Pancreas and Periampullary Region:

A 41 Year Experience

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A retrospective review of 329 cases of adenocarcinoma of the pancreas and 31 adenocarcinomas of the ampulla and common bile duct seen between the years 1929 and 1973 was carried out. The most common complaints for carcinoma of the pancreas were pain, weight loss, and jaundice in that order of frequency; while jaundice was the most common complaint with periampullary lesions. The most common procedure carried out was a gastric and/or biliary bypass. Thirty-five patients underwent pancreatoduodenectomy. The survival of this latter group was longer and better than those undergoing bypass and in 40% of patients with ampullary carcinoma a cure was effected. Patients undergoing bypass did not live longer than patients undergoing simple exploratory laparotomy. Duration of symptoms and location of tumor within the pancreas (excluding ampullary tumors) did not appear significantly to alter the prognosis. In view of our experience it is felt that pancreatoduodenectomy should be undertaken whenever the tumor is deemed resectable as this provides the only chance for cure and the best palliation.

IN THE TREATMENT OF the patient with carcinoma of the pancreas and periampullary region one of the three following surgical procedures can be employed: pancreatoduodenectomy, partial pancreatectomy, biliary and/or duodenal bypass. Of these only pancreatoduodenectomy (and in few selected cases, distal partial resection) is a curative and the other procedures are used solely for palliation.

In general, the results with pancreatoduodenectomy for carcinoma of the pancreas have been disappointing. This procedure can only be performed in a small percentage of patients, has a high mortality rate and the five year survival has been uniformly low. Accordingly, this procedure has been utilized less often and many surgeons currently resort to palliative operations with the belief that the end results are not dissimilar. Regarding carcinoma of the periampullary region the results

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have been much better and pancreatoduodenectomy in this instance is rewarded with a 30–40% five year survival.

These controversies led us to review our own experience with these diseases in an attempt to find a solution to the dilemma of deciding which procedure is best suited to the patient's condition.

Materials and Methods

The records of 360 patients with adenocarcinoma of the pancreas, distal ampulla and common bile duct seen at the R. V. H. in Montreal, between 1929 and 1973, were reviewed. Follow-up data was available for 99% of our patients through the Tumor Registry. Prior to 1950 only 26 cases were recorded but this figure may be too low as the Tumor Registry was not established until 1950 (Table 1).

Results

Adenocarcinoma of Pancreas (329 Patients)

There were 208 males and 131 females in this series. Eighty per cent of the patients were between the ages of 50 and 80. The duration of symptoms prior to hospitalization varied from less than a month to over two years. Eighty-two per cent of the patients had complaints for less than six months and 50% were asymptomatic for less than three months.

The most common complaints (Table 2) were pain (62%) weight loss (49%) and jaundice (38%). Of the 329 patients studied 271 were operated on (an operability rate of 82%). In the remaining 58 patients the diagnosis was confirmed either by an extra-abdominal biopsy or at autopsy.

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TABLE 1. Number of cases and year of diagnosis

Year of Diagnosis Year	Number of Cases		
	Ca Pancreas	Ampulla	CBD
1929–1949	23	1	2
1950–1954	62	4	2
1955–1959	56	2	3
1960–1964	60	3	3
1965–1969	66	1	5
1970–1973	62	3	2
Total	329	14	15

TABLE 2. Symptomatology in Patients with Carcinoma of Pancreas, Ampulla and CBD

Symptoms	% Ca Pancreas	Ampulla	CBD
Pain	62	43	40
Weight loss	49	50	40
Jaundice	38	79	94
Anorexia, fatigue	25	—	—
Nausea and vomiting	16.5	7	—
Constipation	10	—	—
Diabetes mellitus	8	—	—
Miscellaneous	6	—	—
Thrombophlebitis	0.6	—	—

The different procedures performed, the operative mortality and average survival time are given in Table 3. An analysis of the type of procedure performed and operating room mortality by decade is given in Table 4. As can be seen the mortality remained essentially unchanged for exploratory laparotomy but has improved for bypass procedures and pancreatoduodenectomy.

The site of origin of the tumor, as determined at operation or autopsy is given in Table 5. As can be seen the majority of tumors were located in the head of the organ.

No correlation was noted between survival and duration of symptoms (Table 6). There was also no relationship between the location of the tumor and average survival (Table 7).

Carcinoma of Common Bile Duct (17 Cases)

The male to female distribution in this group was approximately 1:1 and the majority of patients (67%) presented with a short history of less than three months. The most common presenting complaint was jaundice (94%) followed equally by pain and weight loss (40%). Fifteen out of 17 patients underwent an operation with operative mortality rates as shown in Table 3. The average survival in this group of patients was 8.6 months and one five year survivor was present; this patient had undergone a local resection. Pancreatoduodenectomies (Whipple procedure) were done in four instances with a 50% operative mortality rate and two survivors; one for 39 months and one for six months.

Carcinoma of Ampulla (14 Cases)

The male to female distribution was 1:1 and the duration of symptoms prior to operation was similar as for carcinomas of the pancreas. The most common complaint was jaundice (79%) followed by weight loss (50%). Eleven out of 14 cases underwent an operation and the operative mortality rate was zero (Table 3). In this group, eight pancreatoduodenectomies were performed with no mortality and there are four patients apparently cured and living eight to 20 years without disease, giving an overall five year survival rate of 36%.

Discussion

There is a continuing controversy in the literature as to which procedure is best for the management of the patient with resectable pancreatic cancer. The proponents against pancreatoduodenectomy^{3,4} argue that the high mortality rate and poor five year survival results should deter inexperienced surgeons from carrying out this procedure and insist that bypass operations result in equally good survival with a much lower mortality.⁴ There is no doubt that the overall mortality rate for pancreatoduodenectomy reported by most centers is high, usually between 20% to 40%.^{1,3,5,7} However, it has been shown that it is possible to keep the mortality rate low by having such radical operations performed by experienced teams.^{2,6,8,10,14} Regarding five year survival, most series show this to be disappointingly

TABLE 3. Procedure Used, 30 Day Mortality Rate and Survival

Procedure	Ca Pancreas			Ampulla			CBD		
	Pts.	OR mort. %	Survival mo	Pts.	OR mort. %	Survival mo	Pts.	OR mort %	Survival mo
Expl. lap.	119	34	5.83	—	—	—	4	50	4
Bypass	125	12	7.37	1	100	0	5	20	4
Pancreatoduodenectomy	23	12	15.0	8	0	78	4	50	21
Distal pancreatectomy	4	50	15.0	—	—	—	—	—	—
Local resection	—	—	—	1	0	24	1	0	84

TABLE 4. Carcinoma of Pancreas

Years	Total Patients	Laparotomy	Bypass	Whipple
1929-1939	4	4 (25)		
1940-1949	18	7 (14)	6 (16.0)	5 (20.0)
1950-1959	87	40 (41)	43 (15.0)	4 (25.0)
1960-1969	98	44 (23)	49 (15)	(0)
1970-1973	62	24 (46.0)	27 (0)	9 (11)
Total	269	119 (34)	125 (12)	23 (12.0)

Type of operation and mortality analysed by decades. Numbers in parentheses represent percentage operating room mortality.

low,^{1,3,4,7,12} but better results obtained by other investigators must not be overlooked.^{6,9,10,14}

Irrespective of what procedure one advocates, everyone seems to agree that pancreatoduodenectomy is the only procedure that can effect a cure, and even if this is not attained, some investigators believe that it is worthwhile as it offers the best palliation. Although bypass procedures appear to offer some measure of palliation, and some patients appear to live for a considerable length of time, it still is not as good as the survival time for all patients undergoing pancreatoduodenectomy.^{3,5,12,13} Exploratory laparotomy only serves as a diagnostic procedure.

In our series the highest operative mortality rate (death within 30 days of the operation) was associated with exploratory laparotomy (34%) and the lowest with pancreatoduodenectomy (12%) while the mortality with bypass procedures was 12%. The results are similar to those already reported in the literature.^{10,13,14} As already pointed out in the results, the mortality for both pancreatectomy and bypass procedures has steadily decreased while that of laparotomy has remained essentially unchanged. This may be explained by assuming that patients undergoing laparotomy have widely spread disease, are severely malnourished, and in these patients any trauma will be accompanied by a high mortality. Patients undergoing bypass or pancreatoduodenectomy have generally more localized disease, are less malnourished, and in these patients improved post-operative care has decreased the operative mortality.

TABLE 5. Location of Tumor as Determined at Operation or Autopsy

Location	No. of Patients
Head	173
Body	27
Tail	18
Diffuse (3 parts)	12
2 parts involved	29
Not stated	66
Ampulla	14
Distal common bile duct	17

TABLE 6. Survival of Patients with Carcinoma of Pancreas as a Function of Preoperative Duration of Symptoms

No. of Patients	Duration of Symptoms	Average Survival (months)
112	0-3 months	7.71 ± 1.06
30	3-6 months	6.06 ± 1.07
43	>6 months	7.36 ± 1.42

It may be interesting to study the effect of prior hyperalimentation on mortality in these severely malnourished patients.

Patients that underwent pancreatoduodenectomy for carcinoma of the pancreas lived longer and apparently better than the rest of the patients (average survival time is 15.0 ± 4.4 months). Although we cannot report a single five year survivor, one patient died 4.7 years post-operatively without any evidence of tumor at autopsy.

Patients undergoing bypass procedures lived on the average 7.37 ± 0.65 months which was not significantly longer than the 5.83 ± 0.84 months survival of patients undergoing exploratory laparotomy alone.

The argument can be raised that patients undergoing resection had more favorable lesions as determined at the time of laparotomy by means of size of tumor, absence of metastasis *etc.* Using these criteria for comparison a review of our records show that the few bypassed patients with comparable lesions did not do so well. This observation seems to be in agreement with those of other observers.¹¹ One however, has to bear in mind that such comparison is not strictly correct as a specimen removed surgically often is compared with one left *in situ*. To settle this argument one would have to devise a double blind prospective randomised study between pancreatoduodenectomy and bypass procedures, and to our knowledge this has not been done yet.

A disappointing observation in this series was the fact that the majority of patients had a very short history of nonspecific complaints prior to admission (82% less than six months, 50% less than three months). Even if the patient had sought medical attention right at the beginning of his symptoms, this earlier detection would probably have minimal effect on survival rate as it can be seen from Table 6. This is probably because we are dealing with a tumor which by virtue of its location manifests itself late in its development.

TABLE 7. Survival as a Function of Location of Tumor

Location of Tumor	Average Survival (months)
Head	7.6 ± 0.85
Body	4.87 ± 1.21
Tail	6.25 ± 2.91
Ampulla	78.0
CBD	8.6

Barring, at the moment, a method of detection of the tumor prior to the time it becomes symptomatic we feel, in view of our experience that the patient with adenocarcinoma of the pancreas should be managed as follows:

1. If there is evidence of distant or widespread metastasis without evidence of obstruction the patient should be left alone. Operating on these patients is accompanied by a prohibitive mortality rate. This mortality rate has remained unchanged in the last 40 years (Table 4).
2. If the patient is deemed operable then at the time of laparotomy one of two procedures can be carried out depending on the operative findings.
 - a) If the tumor appears unresectable with metastases to liver and/or lymph nodes and it is either obstructive or appears impending then one should perform biliary and duodenal bypass procedures.
 - b) If the surgeon knows that he is dealing with carcinoma of the pancreas (as a result of positive biopsy) and the tumor appears confined to the organ, then irrespective of its size one should proceed with pancreatoduodenectomy.

Our results with carcinoma of the common bile duct were very disappointing. In spite of the fact that this tumor manifests itself earlier in its development we were able to salvage only one patient. However, these patients included all patients with carcinoma of CBD not only the ones in the periampullary region.

On the other hand by doing a pancreatoduodenectomy in patients with ampullary carcinoma, we were able to cure four out of ten patients and these results are in agreement with those reported in the literature. When dealing with tumors of the distal common bile duct and ampulla, we feel that if the surgeon employs the criteria set out for carcinoma of the pancreas he

will be able to salvage a considerable proportion of these patients.

If this plan of action is accepted it is possible that a greater number of pancreatic tumors will be resected and a better survival rate obtained. Even if this is not accomplished then at least better palliation will be offered to these patients.

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