CARCINOMA OF THE PANCREAS

With Special Reference to the Body and Tail

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CARCINOMA of the pancreas does not occur as frequently as do other malignant tumors of the gastrointestinal tract. Lahey[1] estimates the incidence between 1 and 2 per cent of all malignant tumors. Between 1928 and 1930, deaths due to carcinoma of the pancreas represented 4.8 per cent of all cancer deaths in the hospitals of the state of Massachusetts (Bigelow[2]).

The original description of carcinoma of the head of the pancreas by Bard and Pic[3] in 1888 was readily accepted, and the classical "progressive painless jaundice" has been associated ever since with the diagnosis. However, this description does not include all the types of carcinoma of the pancreas; Chauffard[4] in 1908 described the clinical entity, and his description of the pain still applies.

The clinical manifestations of carcinoma of the pancreas, with the exception of a palpable tumor mass, result from changes in the neighboring organs, such as the common duct, duodenum, and stomach. The whole pancreas forms one physiologic entity. Direct symptoms resulting from possible alteration of the physiology of the pancreas (hyperglycemia) are minimal, as has been recognized by most writers.

Ransom[5] in 1935 and Duff[6] in 1939 presented excellent reviews of the subject, considering carcinoma of the body and tail as different clinical entities from carcinoma of the head. Ransom reviewed 16 proved cases of carcinoma of the body and tail of the pancreas, while Duff reported 19 cases in which only the body and tail were involved and 3 cases in which the whole gland was involved. All of these cases were proved at autopsy.

The comparative incidence of carcinoma of the head and of the body is difficult to establish. In the cases reported in the literature and those in which there has been no operation or autopsy, the incidence of carcinoma of the head is higher, whereas the incidence of carcinoma of the body and tail is higher in those cases having had operation or autopsy. The reason for this discrepancy is that in most cases of carcinoma of the head the diagnosis is based on clinical evidence alone, and most of these patients die at home. On the other hand, carcinoma of the body and tail is obscure and difficult to diagnose clinically, and for that reason most patients have had an exploratory laparotomy, or an autopsy has been performed after death to clarify the diagnosis.

Leven[7], in his two series, one from autopsy cases and one from hospital cases, shows this discrepancy: of the hospital cases 22 were diagnosed as carcinoma of the head, 2 of the body or tail, and 6 of the whole pancreas. In his

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autopsy series of 97 cases, 60 were diagnosed as carcinoma of the head, 19 of the body or tail, and 18 of the whole pancreas. As can be seen in the hospital series, the incidence of carcinoma of the body is one-tenth that of carcinoma of the head, and in the autopsy series the incidence is one-third.

In our own series of 31 cases 13 were considered carcinoma of the head, 12 carcinoma of the body and tail, 1 carcinoma of the head and body, 2 carcinoma of the entire organ, and in 3 cases the exact location of the lesion is not mentioned in the records. All of these patients were operated upon or had an autopsy.

Age and Sex. In our series of 12 proved cases of carcinoma of the body and tail the youngest patient was 42 years old and the oldest 78. In our series of carcinoma of the head the youngest patient was 37. Carcinoma of the pancreas is a disease seldom present before the fourth decade of life. Of the patients with carcinoma of the body and tail 7 were male and 5 were female. These figures agree with those reported by other authors (Ransom, Duff, Leven).

Pain. The outstanding clinical symptom in our cases was severe epigastric pain radiating to the back, worse at night, and not relieved by food or alkalies. The pain seemed to bear no relation to meals. In some cases the pain was referred to the back, and in 1 it was the only symptom and so severe in nature that a cordotomy was performed. It was not until postmortem examination a short time later that carcinoma involving the entire pancreas was found. In most of our cases the pain was described as severe in nature but was also described as dull, aching, or boring. There was a previous history of gastrointestinal symptoms in a few cases but in the majority pain was the first and only symptom.

The explanation for the severity of the pain in carcinoma of the body and tail of the pancreas was pointed out by Chauffard in his original communication and verified by Duff. The cancer cells extend along the nerve sheaths of the solar plexus, and when the patient lies on his back the protrusion of the spine and the compression caused by the gland exacerbates the pain. Thus many patients obtain relief from the night pain by sitting up in bed or flexing their thighs over the abdomen.

Weight. The other outstanding symptom in our series was marked loss of weight, the average loss being 20 pounds in four or five months. This is comparable with the series reported by Ransom and Duff. There seems to be no difference in the weight loss in the cases of carcinoma of the head and in those of carcinoma of the body and tail. Weight loss was not the chief complaint of our patients, as in Ransom's series, but it is an outstanding symptom. This and pain, we believe, are the cardinal symptoms of carcinoma of the body and tail of the pancreas.

Constipation. Constipation is frequent and becomes more pronounced as the disease progresses. In our experience this was a misleading symptom, and in several cases a preliminary clinical diagnosis of carcinoma of the colon was made.

Jaundice. In general, jaundice in carcinoma of the head of the pancreas follows the classical description of Bard and Pic except that it is not always

painless. Of our 13 patients 12 had jaundice. Of our 12 patients with carcinoma of the body and tail, none had jaundice.

Palpable abdominal mass. Only 3 of our 12 patients with carcinoma of the head had a palpable abdominal mass. Of our 12 cases of carcinoma of the body and tail an abdominal mass was palpated in 5. The size of this mass varied between that of a walnut and that of a grapefruit. The location of the tumor mass was always epigastric, and it was described as hard and not tender. A palpable abdominal mass was present in 1 of the 3 cases in which the exact location of the carcinoma was not established. In 2 cases involving the whole gland, 1 had a palpable abdominal mass.

We can consider that in half of our cases of carcinoma of the body and tail there was a palpable tumor mass. These findings are similar to the series reported by Ransom (8 cases out of 16). In 2 of our cases the mass was described as moving with respiration, and a preliminary diagnosis of carcinoma of the transverse colon was made.

Gastrointestinal bleeding. Only 1 patient with carcinoma of the body and tail had hematemesis; no ulceration was palpated either in the stomach or the duodenum at the time of an exploratory laparotomy. In 2 cases occult blood was present in the stools; in 1 of these cases a gastric crater was suggested at the time of the roentgenologic examination, but at the time of the operation the stomach was considered normal by palpation. There were no roentgenologic or surgical findings to account for the bleeding in the other case.

Roentgenologic Findings

As the pancreas is a radiolucent organ and of the same density as the neighboring structures, it is impossible to obtain any conclusive information from the plain roentgenogram.

In only 1 of our cases was there a calcified cyst-like structure present in the right upper quadrant. This was a heavily vascularized carcinoma of the head of the pancreas. Originally this calcification was interpreted as a renal cyst, and the patient was operated upon under this diagnosis.

Attempts have been made by many investigators to achieve better visualization of the pancreas during roentgenologic examination. Pneumoperitoneum has been advocated but has not been widely popularized because of the difficult technic. We have had no experience with this method.

So far, no contrast medium is available for visualization of the pancreas. In general the radiologic study of the pancreas must be made by indirect means based on the anatomic relationship of this organ to other structures.

Special technics have been described for the diagnosis of pancreatic tumors. Engel and Lysholm[8] advocate the use of a gas-producing mixture which will distend the stomach, thereby causing the pancreas to impress its shadow on the gas-filled organ. Immediately after this a lateral abdominal decubitus film is exposed. Lysholm established the normal size of the pancreas as the width of a vertebral body.

Hershenson[9] has described a technic by which he was able to diagnose a case of carcinoma of the body and tail of the pancreas. During the gastric

examination the patient is placed prone under fluoroscopic control on a tilting table. This is tilted down between 20 and 45 degrees. The tumor mass compressed between the abdominal wall, the stomach, and the spine produces a filling defect along the body of the stomach; this defect appears between the 20 and 45-degree angle.

In our own series no specialized technic was employed; our patients had a gastrointestinal examination and were examined in upright, supine, and prone positions.

There are two signs which have been described as characteristic of pancreatic neoplasms. The first is the fan-like widening of the duodenal loop; this sign is not pathognomonic of carcinoma of the pancreas but can be found in all types of pancreatic tumors. When the duodenum exhibits distorted folds and ragged edges a carcinoma of the pancreas is suggested. A smooth appearance of the duodenum with widening of the long fold but without distortion of the folds is often present in pancreatic cysts.

The second sign is Frostberg's[10] reverse three (Ɛ), which has been described as characteristic of carcinoma of the head of the pancreas and of the ampulla of Vater. We believe this sign to be present more commonly in the latter instance. In none of our series of carcinoma of the head of the pancreas were we able to identify a Frostberg's sign which fitted the description given by the author.

An evaluation of the roentgenologic findings in carcinoma of the pancreas in our series of cases is as follows:

Of 13 cases of carcinoma of the head 8 had examinations of the stomach and colon. One showed deformity of the duodenal bulb which was interpreted in the original examination as "ulcer deformity without crater." The second case showed a deformed duodenal bulb but due to the smoothness of this deformity had been interpreted as the result of extrinsic pressure. The third showed a compression deformity of the distal antrum, along the lesser curvature, and some extrinsic pressure of the duodenal bulb. This case also had an atypical, wide, fan-like duodenal loop. A fourth case had evidence of extrinsic pressure in the antrum along the lesser curvature.

In a fifth case in which a calcified cyst-like structure was present in the right upper quadrant, the stomach and duodenum were normal, but the examination of the colon revealed a downward displacement of the hepatic flexure. This has been the only case in which we have been able to identify any evidence of displacement of the transverse colon. Also in this case there was a nonfunctioning right kidney, demonstrated by an intravenous urogram. This patient was explored and a large, fungating, heavily vascularized carcinoma of the head of the pancreas invading the right renal region was found.

In 3 cases a normal stomach, duodenum, and colon were found. Gallbladder examination was of no particular interest except that in all the patients who had jaundice there was a nonfunctioning gallbladder.

Of our 13 cases of carcinoma of the body and tail 10 patients had barium studies of the stomach and colon, 1 had a colon examination only, and 1 had a gallbladder examination. Of the 10 patients that were examined completely,

5 failed to show any abnormality either at the time of the original examination or in the review of the roentgenograms. One patient had a typical ulcer crater along the lesser curvature on the posterior wall of the stomach. This ulcer crater was thought to be present in three consecutive roentgenologic examinations but was not demonstrated at gastroscopic study. Occult blood was present in the stools. This patient had severe epigastric pain radiating to the lumbar spine which failed to improve under strict ulcer medical management. An exploratory laparotomy was performed and a white, fixed carcinoma of the body of the pancreas, the size of an orange, was found. The stomach and duodenum were normal to palpation. In another case x-ray examination showed a small tongue-like projection of barium along the lesser curvature of the gastric antrum. This patient had a palpable abdominal mass; there was no evidence of extrinsic pressure in the roentgenograms. An exploratory laparotomy revealed a carcinoma of the body of the pancreas the size of a grapefruit. The stomach and duodenum were normal to palpation. A third patient had roentgenologic evidence of extrinsic pressure along the lesser curvature of the stomach. This patient also had a palpable abdominal mass. In 2 cases pressure deformity suggesting an organic lesion in the third portion of the duodenum was demonstrated on the roentgenograms. In another case a partial obstructing lesion was present just proximal to the ligament of Treitz. Roentgenograms demonstrated gastric retention and considerable dilation of the duodenum proximal to the obstruction. An exploratory laparotomy revealed a carcinoma of the body and tail of the pancreas the size of a grapefruit compressing the third portion of the duodenum.

In 1 case a broadening of the third portion of the duodenum with normal mucosal folds was found. This was interpreted as extrinsic pressure deformity. At the time of surgical exploration a carcinoma of the body and tail of the pancreas compressing the third portion of the duodenum was found.

In none of our cases of carcinoma of the body and tail was evidence of compression or displacement of the colon found.

From this study it is apparent that abnormal roentgenologic findings were present in 10 of the 18 patients with carcinoma of the pancreas in whom x-ray studies of the gastrointestinal tract were made. Pressure deformity of the duodenum or stomach is the most characteristic roentgenologic finding. The deformity may occasionally produce changes suggesting gastric or duodenal ulcer. This latter finding may be misleading and cause delay in performing an exploratory laparotomy. Roentgenologic findings are not pathognomonic for carcinoma of the pancreas, but the secondary signs described are definitely contributory to the diagnosis in a large percentage of the cases.

Conclusions

1. In carcinoma of the body and tail of the pancreas the common and most important symptoms are (1) pain with characteristic radiation to the back and (2) severe loss of weight. Jaundice is a prominent symptom only in carcinoma of the head of the pancreas.

2. The roentgenologic findings have been shown to be contributory in establishing a diagnosis in a large percentage of the cases. The efforts of the roentgenologist should be directed toward detecting any evidence of extrinsic pressure either in the stomach or the duodenum.

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