Solid and Papillary Neoplasms of the Pancreas

Woo Jung Lee, Yong Tae Park, Jin Sub Choi
Hun Sang Chi, and Byong Ro Kim

Solid and papillary neoplasms of the pancreas, a rare tumor usually found in young female patients, seldom presents with metastasis since it is a tumor with low potential for malignancy. The prognosis for this lesion is much more favorable than that for other pancreatic neoplasms. In an attempt to understand the characteristics and prognosis of this lesion, we reviewed twenty cases treated at the Department of Surgery, Severance Hospital, Yonsei University from 1985 to 1994. The mean age of the patients was 25.6 years (range: 13 to 39 years), and 19 (95%) were women. Chief complaints were palpable mass (50%), pain (45%), and indigestion (5%). In laboratory studies, tumor markers, including CEA, CA125, CA19-9, and aFP were studied in eight patients, and found negative. Other laboratory findings were also nonspecific. These tumors may occur anywhere in the pancreas. In our studies, the tumor was most often located in the tail (45%), and the head (40%) of the pancreas. These were treated by distal pancreatectomy and splenectomy (55%), Whipple’s operation (20%), pylorus preserving pancreateoduodenectomy (10%), enucleation (10%) or excision (5%). Significant morbidity or mortality was not observed during hospitalization, and no recurrence or malignant degeneration occurred during the mean follow-up period of 4 years (range: 1 month to 9 years). In conclusion, this study has suggested that the patients with a solid and papillary neoplasm of the pancreas have a good prognosis for successful treatment, if the disease is diagnosed early and the tumor is completely resected. A higher index of suspicion, and more aggressive diagnostic workups are needed in dealing with this disease entity.

Key Words: Solid and papillary neoplasms of the pancreas

INTRODUCTION

Primary tumors of the exocrine pancreas are numerous, and many different histological types are known (Cubilla and Fitzgerald, 1979). They are often highly malignant. The prognosis of these tumors is usually poor, since they are often diagnosed at a later stage, and when discovered, involvement of the pancreas proper and other adjacent organs is frequent. Solid and papillary neoplasms of the pancreas, a rare tumor usually found in young female patients, seldom presents with metastasis because of its less aggressive nature. The prognosis for this lesion is much more favorable than that for other pancreatic neoplasms. It arises at the tail or the body of the pancreas, usually forming an encapsulated large mass. However, local and distant metastasis is rare, and when radical excision is performed, favorable prognosis can be expected, which distinguishes this tumor from the other more aggressive pancreatic tumors. Since the initial report by Frantz of 3 cases in 1959 (Frantz, 1959), sporadic reports have been available in the literature (Hamoudi et al. 1970; Compagno and Oertel, 1979), and in Korea, a total of 10
cases have been reported by Bae et al. (1984), Jung et al. (1985), Hong et al. (1988), and Ahn et al. (1990). In an attempt to understand the characteristics and prognosis of this lesion, and emphasize the necessity of an early and more aggressive diagnostic workup, we hereby report twenty cases treated at the Department of Surgery, Severance Hospital, Yonsei University from 1985 to 1994, along with a review of the literature.

MATERIALS AND METHODS

20 pathologically confirmed cases of solid and papillary neoplasms of the pancreas treated at the Department of Surgery, Severance Hospital, Yonsei University, from 1985 to 1994 were retrospectively reviewed. The selection and data collection were based on the hospital records, and the follow up status was evaluated, based on recent outpatient clinic records or telephone interviews. The follow up information was available in all 20 cases, and the follow up periods were between 1 month to 9 years postoperatively.

RESULTS

Distribution of age and gender

Among 20 patients, 19 (95%) were women, and the mean age was 25.6 years (range: 13 to 39 years).

Clinical manifestations and physical examination

A palpable abdominal mass was the most commonly encountered clinical manifestation (50%) of this lesion, and other common symptoms were abdominal pain (45%) and indigestion (5%) (Table 1). An abdominal mass was palpable at the left upper quadrant (5 cases), epigastrium (3 cases), right upper quadrant (1 case), and periumbilical area (1 case). Abdominal pain was felt at the left upper quadrant (4 cases), epigastrium (4 cases), and right upper quadrant (1 case). In most patients, the abdominal mass and pain were felt at the left upper quadrant and epigastrium (Table 2 & 3).

Other associated symptoms were postprandial abdominal discomfort, general weakness, nausea, vomiting, weight loss, diarrhea, flank pain, and constipation. Jaundice was not observed in any of the cases.

Duration of inflection

A duration of symptoms ranged from 2 days to 2 years (mean 4 months), but most were less than 1 month in 12 cases (60%). Symptoms lasting more than 6 months comprised 5 cases (25%).

Laboratory findings

Peripheral blood smear, urinalysis, and serum electrolytes were normal in all 20 cases.

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<th>Table 1. Chief complaints</th>
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<td>Chief complaints</td>
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<tr>
<td>Palpable mass</td>
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<td>Pain</td>
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<td>Indigestion</td>
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<th>Table 2. Location of palpable mass (N = 10)</th>
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<td>Location</td>
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<tr>
<td>LUQ</td>
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<tr>
<td>Epigastrium</td>
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<td>RUQ</td>
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<td>Periumbilical</td>
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- LUQ: left upper quadrant
- RUQ: right upper quadrant

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<th>Table 3. Location of pain (N = 9)</th>
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<tr>
<td>Location</td>
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<tr>
<td>LUQ</td>
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<td>Epigastrium</td>
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- LUQ: left upper quadrant
- RUQ: right upper quadrant
One patient had elevated liver enzymes which was attributed to the history of chronic hepatitis. All tests were also normal after surgical exploration. Serum amylase was elevated in one case. The level was 596 IU/L (N=60-180 IU/L), and serum lipase was elevated to 340 IU/L (N=0-190 IU/L) in the same case, but among 11 cases evaluated, no other elevations were noted. The elevated amylase and lipase were attributed to concomitant postoperative pancreatitis.

Tumor markers, such as CEA, CA19-9, CA125, aFP were evaluated in 8 patients, without revealing any abnormality. In three patients, all markers were evaluated.

Radiological findings: Abdominal ultrasonography or abdominal computerized tomography were performed in all 20 cases, with 17 patients having both. 2 cases were diagnosed by abdominal ultrasonography, and 1 case was diagnosed by abdominal computerized tomography. In the radiological evaluations, the mass was well demarcated from the surrounding tissues and the margins were smooth and well encapsulated. Internally, cystic and solid components were seen simultaneously (Fig. 1 & 2). In two cases, the surfaces were lobulated. In five cases, calcifications were noted. Local and distant invasions were observed in none of the cases.

Among the 19 cases where preoperative abdominal ultrasonographic evaluations were performed, 11 (58%) were correctly diagnosed with a solid and papillary neoplasm of the pancreas. Other diagnoses were pancreatic pseudocyst, cancer, and pancreatic tumor. All patients exhibited abnormalities on ultrasonography. Among the 18 cases where abdominal computerized tomography (CT) was performed, 17 revealed abnormalities. 11 (61%) were diagnosed with a solid and papillary neoplasm of the pancreas. Other diagnoses included cancer and lymphadenopathy (Table 4).

On endoscopic retrograde cholangiopancreatography (ERCP), displacement or obstruction of the pancreatic duct was noted (Fig. 3). On the upper gastrointestinal series (UGI), performed in 8 cases, there was no invasion of the gastrointestinal tract. However, the stomach, duodenum or other parts of the small in-

<table>
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<th>Study</th>
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<tr>
<td>Ultrasonography</td>
<td>19/19</td>
<td>(100)</td>
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<tr>
<td>CT scan</td>
<td>17/18</td>
<td>(94)</td>
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<td>ERCP</td>
<td>10/11</td>
<td>(91)</td>
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<tr>
<td>NAB</td>
<td>5/5</td>
<td>(100)</td>
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<tr>
<td>UGI</td>
<td>4/8</td>
<td>(50)</td>
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CT: computed tomogram
ERCP: endoscopic retrograde cholangiopancreatography
NAB: needle aspiration biopsy
testine were compressed or displaced according to the various locations of the pancreatic mass.

In 5 cases, needle aspiration was performed. 4 cases were diagnosed with solid and papillary tumor, and 1 case was reported to be a malignant papillary adenocarcinoma, which was confirmed to be a solid and papillary neoplasm on surgical excision.

Other diagnostic tools used were fiberoptic gastroscopy, barium enema, MRI and arterial angiography. All gave nonspecific results.

Surgical exploration and operative findings

The time elapsed from hospital admission to surgery, ranged from 3 to 33 days with a mean of 8.6 days. 16 cases (80%) were explored within 10 days of admission. The most commonly utilized types of skin incision were the right paramedian (4), and the left paramedian (4). The lengths of the skin incision ranged from 10 to 30 cm, with a mean of 18.9 cm.

The mass was located at the pancreatic tail in 9 cases (45%), tail and body in 2 cases (10%), body in 1 case (5%), and head of the pancreas in 8 cases (40%). In 11 of 12 cases when the tumor was located at the pancreatic tail, tail and body, or body of the pancreas, distal pancreatectomy with splenectomy was employed. One remaining patient received enucleation of the tumor mass. Among 8 cases in which the tumor was located at the head portion of the pancreas, Whipple's operation was performed in 4 cases, and a pylorus preserving pancreaticoduodenectomy was done in 2 cases.

In the other two cases, tumor enucleation alone and enucleation with pancreatic duct anastomosis were done (Table 5 & 6).

Severe adhesion to the adjacent organs was noted in 7 cases on surgical exploration. No infiltration of the tumor mass was grossly found, but in one case a capsular invasion to the spleen was reported on histologic evaluation. No distant metastasis was seen. Lymph node enlargements were suspected on palpation in 8 cases, but pathologic review confirmed all to be benign reactive hyperplasia.

The diameter of the mass ranged from 2 to 13 cm, with the mean diameter of 7.8 cm. The weight of the resected lesion was reported in 7 cases, which ranged from 24 to 750 gm, with the mean of 288 gm.

The duration of hospitalization ranged from 8 to 51 days (mean: 14.6 days). 4 patients who received Whipple's operation stayed considera-
bly longer, which is understandable in light of the wide field of dissection required for this procedure. One of these patients had a wound infection and postoperative leak from choledochojunal anastomosis which was managed conservatively. The remaining 16 patients were discharged within 2 weeks of the operation without complications.

Pathological findings

Gross findings: The mass was usually round or oval and multinodular. The surfaces were smooth and covered with a fibrous capsule. On the cut section, the mass was composed of numerous cysts, within which dark bloody necrotic tissue was found. Solid whitish yellow components were found between the cystic structures (Fig. 4).

Histological findings: Large cystic tumors

![Image of a mass with fibrous capsule and cystic structures]
Fig. 5. Solid area with microcystic spaces containing amorphous eosinophilic material and fibrous septa (H & E, ×100).

Fig. 6. Small uniform oval shaped cells of abundant clear cytoplasm with rounded and relatively clear nuclei. Multiple microcystic area & fibrous septa were noted (H & E, ×200).
were composed of various small sized cystic and solid papillary components. The composit-
ions were variable among the specimens but both components were present in all cases. Multi-
ple septa were found in the solid compo-
partment. Fine fibrovascular stroma divided
the cellular mass into nests. Cells were oval or rectan-
gular with eosinophilic cytoplasm and oval nucleus. The size and shape of individual
cells were rather uniform. No active mitosis
or cellular pleomorphism were noted. Small
cysts were filled with amorphous, eosinophilic
materials (Fig. 5 & 6).

Follow up

Postoperative status after discharge was
evaluated based on recent outpatient clinic re-
cords or telephone interviews. Information
was available in all 20 cases, and follow up
periods were between 1 month to 9 years
postoperatively. 9 cases were followed under 2
years, 4 cases between 2 to 5 years, and 7
cases were followed for more than 5 years.
Among the 7 patients currently visiting outpa-
tient clinics, 3 do not have any signs and
symptoms. 4 patients complain of indigestion
or abdominal pain. Common symptoms during
the immediate postoperative periods were epiga-
gastric discomfort or pain, vomiting, right
upper quadrant pain, wound paresthesia, and
indigestion, which were observed in 10 pa-
tients. However only 4 patients still complain
of similar symptoms but state that there is
less severity.

Radiological monitoring after operations
were ultrasonography, computerized tomog-
raphy (CT), UGI and fiberoptic gastroscopy in 11
cases. Ultrasonography was performed in 8
cases. Common findings on ultrasonography
were abdominal fluid collection (2 cases), atro-
phic changes in the pancreas (1 case), dilated
pancreatic ducts (1 cases), and no abnormality
(4 cases). CT was done in 2 cases, and one pa-
tient had abdominal fluid collection, atrophic
pancreas, and dilated pancreatic ducts. The
other patient had no demonstrable abnormal-
ity on the CT scan (Table 7). On other tests, no
abnormalities were found. Except for one pa-
tient, the above findings were found to be
normal in the follow up serial evaluations.

Two patients were readmitted to our center;
one patient with alkaline reflux gastritis was
admitted one month after excision and was
managed conservatively to health. The other
patient was admitted for a total of 4 times
after surgery. At first, two years after the ini-
tial operation, liver abscess developed and a
pigtail catheter drainage was done. Two
months later, CHD, IHD stones developed, so a
choledocholithotomy, operative cholangiogram,
and T-tube choledochoestomy was done. Upon
the third year, CBD stones developed and a
PTBD was done. One month after the PTBD
catheter insertion, recurrent IHD stones de-
veloped, and the patient was treated conserva-
tively. The patient is being followed on an
OPD basis.

No mortality or recurrence was observed.

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<th>Table 7. Follow-up radiologic study</th>
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(PD: pancreatic duct, DP: distal pancreatectomy, SP: splenectomy)
after operation in all cases.

DISCUSSION

Solid and papillary neoplasm of the pancreas is a rare entity, both clinically and pathologically. Although the mass is usually huge at diagnosis, it is surprisingly benign clinically and rarely metastasizes. The origin of this tumor is controversial, but seems most likely derived from tubular structures, based on the morphologic studies of intercellular space, desmosome and the cellular configurations (Hamoudi et al., 1970; Boor and Swanson, 1979; Compagno and Oertel, 1979; Alm et al., 1981). However the presence of the granules containing neurotransmitters or endocrine substances and annulate lamellae also suggests paratubular origin (Bombi et al., 1984). Some suggest that both theories are only different expressions of the same hypothesis (Bae et al., 1984; Jung et al., 1985), since pancreatic paratubular or endocrine components all originate from tubules (Bockman, 1981). Kloppel et al. demonstrated intracellular alpha-1-antitrypsin from the tumor cell, thus supporting the paratubular origin, and since the tumor is prevalent among young females, the genetic or endocrine predispositions are suspected in the development of the tumor. There are many terms describing this entity, mostly based on histologic characteristics. For example, papillary cystic neoplasm (Boor and Swanson, 1979; Bombi et al., 1984), solid and cystic acinar cell tumor (Kloppel et al., 1981), papillary epithelial neoplasm (Hamoudi et al., 1970), and papillary cystic epithelial neoplasm (Bombi et al., 1984) are some of the terminologies used. It is very likely that this tumor has been classified or diagnosed under other types of pancreatic tumor (Compagno and Oertel, 1979; Sanfey et al., 1983). Porter has used the term "low grade papillary neoplasm", reflecting its benign clinical nature.

Compagno et al. have reported the mean age of 24 years, which was similar to our findings of 25.6 years. The most common presenting symptoms were a large abdominal palpable mass with or without tenderness (Compagno and Oertel, 1979; Friedman et al., 1985). Among the 20 patients, 10 (50%) who presented with a palpable abdominal mass, most were at the left upper quadrant (5 cases). Tenderness was noted in 9 (45%) cases, at the left upper quadrant and epigastrium (4 cases each) (Table 1.2 and 3). Sometimes patients were asymptomatic and the tumors were found during other abdominal operations, but rarely, they were found due to hemoperitoneum from the rupture of the tumor (Kloppel et al., 1981; Bombi et al., 1984). Generalized symptoms such as jaundice or multiple joint pain are also among the encountered complaints (Mullin et al., 1968; Ahn et al., 1990), and occasionally skin induration similar to erythema nodosum is also noted (Mullin et al., 1968; Friedman et al., 1985). The joint pain is explained by the elevated level of serum lipase, as in pancreatitis, pancreatic ductal carcinoma, and acinar cell tumor, which cause fat necrosis at subcutaneous tissues around joints (Mullin et al., 1968; Ahn et al., 1990). In our series, no jaundice, multiple joint pain, or skin nodules were observed. Indigestion, nausea, vomiting, weight loss, flank pain, and constipation were other commonly encountered symptoms.

Peripheral blood smear, urinalysis, serum electrolytes, and serologic liver profiles are usually normal (Kuo et al., 1984; Ahn et al., 1990). In our series, one patient had an elevated level of liver enzymes which was later attributed to chronic hepatitis B.

Tumor markers such as CEA are usually nonspecific, which was confirmed in our patients. Eosinophilia has been reported (Kuo et al., 1984; Friedman et al., 1985) but we did not observe this.

On simple abdominal radiological evaluations, secondary defects or calcifications caused by the tumor could be seen (Bombi et al., 1984; Friedman et al., 1985). On the upper gastrointestinal series, surrounding organs compressed or displaced by the huge tumor mass could be observed, and on ERCP, deformed pancreatic ductal configurations, usually ductal structures within the tumor mass, could not be seen, and no communic-
tion with the pancreatic duct was noted. The obstruction of the main pancreatic duct is reported to be rare (Sanfey et al., 1983), but we have observed such obstruction in two patients. ERCP is a useful diagnostic modality in differentiating pseudocyst, pancreatic ductal carcinoma, and solid and papillary neoplasm of the pancreas (Samuel et al., 1994).

On abdominal ultrasonography and CT, solid and papillary tumor is seen as a huge encapsulated, well demarcated, tumor with both solid and cystic components. Differentiating it from the mucoid cystic tumors is difficult when the cystic component predominates (Friedman et al., 1985), but the measured Hounsfield units (HU) were around + 40 HU - + 50 HU which suggests that hemorrhagic necrosis is a key in differentiation (Alm et al., 1981; Choi et al., 1988). Calcification within or around the tumor is an infrequent finding, and should be differentiated from the other tumors with calcification, such as microcystic adenoma, mucinous cystic tumors, or non-functioning islet cell tumors. However, the presence of calcification alone does not significantly aid in differentiating between these tumors (Friedman et al., 1985; Choi et al., 1988; Hong et al., 1988). In our series, calcific infiltration of subcapsular portion was seen in 5 patients (Fig. 2).

Arterial angiography revealed hypovascular tumor with displacement of surrounding vessels. On a contrast enhanced CT scan, the tumor could be differentiated, because acinar carcinoma shows total or partial increase in density, but only peripheral enhancement is seen in solid and papillary tumor (Alm et al., 1981; Balthazar et al., 1984; Hong et al., 1988).

Fine needle aspiration of the tumor is indicated when the mass should be differentiated from mucoid cystic tumor, pseudocyst, or pancreatic carcinoma (Tatsuta et al., 1986; Jones et al., 1987; Katoh et al., 1989; Samuel et al., 1994). CEA, CA19-9, pancreatic enzymes, presence of mucus, and cytological evaluation should be performed with the aspirate. We have performed 5 cytologic examinations, and in 4 cases, the information was helpful in preoperative diagnosis.

According to the location of tumor, distal pancreatectomy with splenectomy, pylorus preserving pancreatectoduodenectomy, Whipple's operation or enucleation can be chosen. Surgery should be performed even if local infiltration is present (Kim et al., 1985), and in selected cases when complete excision is not possible, excision combined with postoperative radiotherapy on residual mass is feasible (Dales et al., 1983). In our series, 8 head portion tumors and 12 tail or body tumors were treated. In 11 of 12 cases, when the tumor was located at the pancreatic tail, tail and body, or body of pancreas, distal pancreatectomy with splenectomy was employed. One remaining patient received enucleation of the tumor mass. In 8 cases, where the tumor was located at the head portion of pancreas, Whipple's operation was performed in 4 of them, and pylorus preserving pancreatectoduodenectomy in 2 of them. In the other two cases, tumor enucleation alone and enucleation with pancreatic duct anastomosis were done. On surgical exploration, no local or regional infiltration of tumor mass was found grossly, and no case of distant metastasis was seen. The average resected weight of the tumor was 288 gm and many of them were quite massive.

On microscopic analysis of solid and papillary neoplasms of the pancreas, central capillaries surrounded by papillary epithelial cells, small cysts of various sizes and intervening plated patterns of solid components are seen. It should be differentiated from acinar cell tumor, mucoid cystic carcinoma, carcinoid tumor, and tubular carcinoma. Mucoid tumor can easily be diagnosed by the presence of mucoid content within the tumor. Tubular tumor can be differentiated grossly without difficulty on the basis of capsule formation and low incidence of local infiltration.

Compagno and Oertel reported one death attributable to recurrence among 52 patients who were operated on due to solid and papillary neoplasm of the pancreas, with the mean follow up of 7.1 years. In the remaining 51 patients, no recurrence was observed. Sporadic cases of metastasis to the liver, abdominal cavity, or lymph nodes (Compagno and Oertel, 1979; Choi et al., 1988) and recurrence after several years are found in the literature.
(Cubilla and Fitzgerald, 1979), but even in the face of recurrence or metastasis, the pathologic type of tumor is the same as the primary tumor, so when resected, good prognosis can be expected. On this study, the follow up periods ranged from 1 month to 9 years and no recurrence was found. 10 patients complained of epigastric discomfort or pain, vomiting, right upper quadrant pain, wound paresthesia, or indigestion. However only 4 patients still complain of similar symptoms and do so with less severity. In five patients, abdominal fluid collection, atrophic pancreas, and dilated pancreatic ducts were found on CT scan and ultrasonography. Among these patients, 3 had received pancreateoduodenectomy, and the findings on imaging studies were attributed to benign postoperative changes. Except for one patient, above findings were later found to be within physiological limits, and the remaining one patient is still in the process of being evaluated.

This tumor is rare, but if it is diagnosed and treated early, the prognosis is good. So a higher index of suspicion and more aggressive diagnostic efforts are recommended for this pancreatic disease.

REFERENCES


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