Pancreatic Cystic Neoplasms

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KEYWORDS

- Pancreatic cystic neoplasms • Serous cystadenoma
- Mucinous cystic neoplasms
- Intraductal papillary mucinous neoplasm

Cystic neoplasms of the pancreas have been recognized for almost two centuries. In 1830, Becourt's first description noted a tumor "the size of a child's head and composed of very strong fibrous walls."[1] Soon after, Gross published the first report of a cystic neoplasm in the United States. It took 50 years for Bozeman to understand in 1872 that aspiration alone would not cure this type of tumor, and he accomplished the first successful resection of a tumor with survival of the patient. In 1900, Reginald Fitz acknowledged the malignant potential of such tumors. Much progress in terms of the understanding of etiology, diagnosis, treatment, and prognosis has been accomplished since then. In 1978, Compagno and Oertel[2] divided cystic tumors into 2 types: benign serous neoplasms and mucinous cystic tumors that harbored a malignancy. In 1982, Ohashi described what one would now call an intraductal papillary mucinous neoplasm (IPMN), which he initially described as a "mucin-producing cancer."[3]

Over 70% of cystic neoplasms are found in asymptomatic patients, usually as an incidental finding on scans obtained for another reason. In an autopsy study published in 1995, the investigators found that almost half of the 300 deceased patients studied had small cystic lesions.[4] Older age was directly related to the probability of finding a lesion. Most published studies agree that the ratio of benign to malignant lesions is approximately 2:1. Cystic neoplasms are found in females at a ratio of 2:1 to 3:1 compared with males. Ferrone and colleagues[5] looked at 401 patients with pancreatic cystic lesions and found that 61% were women with a median age of 62 years.

Given the malignant potential of cystic neoplasms, it is important that this entity be differentiated from pancreatic pseudocysts. Postinflammatory cystic collections, especially pseudocysts, represent the vast majority of cystic lesions (as much as 90%). Pancreatic pseudocysts lack an epithelial lining and will, many times, follow an illness, particularly a bout of pancreatitis. Radiologic imaging plays a large role in

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diagnosis. Evidence of chronic pancreatitis make a pseudocyst more likely. On the other hand, calcification in the wall of the cyst, septations, or solid components can point one more in the direction of a cystic neoplasm.[6] Communication with the pancreatic duct can be seen in both pseudocysts and some forms of mucinous cystic lesions, so this does not confirm a diagnosis. Abdominal and endoscopic ultrasound has proven very helpful in differentiation between these 2 entities. The type of cyst wall seen, presence of a multilocular versus unilocular cyst, appearance of septations or solid components, and simultaneous lymphadenopathy can all help make an accurate diagnosis.[7,8] A recent study showed that presence of internal dependent debris was a highly specific magnetic resonance imaging (MRI) finding indicating the diagnosis of pseudocyst.[9] In cases that remain difficult to diagnose despite radiologic studies, cyst fluid analysis can help. Analysis includes cyst epithelial cell staining, stains for mucin, amylase levels, and tumor markers carcinoembryonic antigen (CEA) and carbohydrate antigen 19-9 (CA19-9).[6] The positive predictive value of such tests is very high, but negative results are unreliable and cannot be used to rule out malignancy. In a minority of cases, differentiating between a pseudocyst and pancreatic cystic neoplasm proves impossible before going to the operating room. However, in general a combination of the patient's history, radiologic studies, and laboratory tests will allow the physician to feel confident in choosing the differential diagnosis.

WORLD HEALTH ORGANIZATION CLASSIFICATION OF CYSTIC NEOPLASMS

The World Health Organization (WHO) first published a classification system for cystic neoplasms in 1996, and a revision in 2000. This classification system divided pancreatic cystic neoplasms into 3 categories: malignant tumors (in situ or invasive), borderline (uncertain malignant potential), and benign (adenomas).[10,11] Microcystic, glycogen-rich, serous tumors are almost universally benign, and macrocystic, mucinous tumors accepted as either malignant or premalignant.

Malignant tumors include serous cystadenocarcinomas, mucinous cystadenocarcinomas, intraductal papillary mucinous carcinomas, invasive papillary mucinous carcinomas, and acinar cell cystadenocarcinomas. Borderline tumors consist of mucinous cystic tumors with moderate dysplasia, IPMN with moderate dysplasia, and solid pseudopapillary tumors. Benign or adenomatous tumors are serous cystadenomas, mucinous cystadenomas, and certain IPMNs.

SEROUS TUMORS: SEROUS CYSTADENOMA AND SEROUS CYSTADENOCARCINOMAS

Serous tumors represent approximately 1% to 2% of pancreatic neoplasms and almost 25% of all cystic tumors.[12] Serous neoplasms are distributed evenly throughout the pancreas. These tumors are almost universally found incidentally when a computed tomography (CT) scan is obtained for another reason. The tumors cause symptoms only if they are very large (>15 cm), usually compressive symptoms from a mass effect. Although extremely rare, the most common symptoms would be either jaundice or gastric outlet obstruction, caused by extrinsic pressure on adjacent structures. Serous tumors tend to be found more often in older women (average age 61 years). A mean diameter of 5 to 8 cm is most common.

Serous neoplasms will stain negative for mucin. It is generally believed that they carry no risk of invasive cancer; however, there are several case reports in the literature describing serous cystadenomas that presented with metastases, now more correctly termed a serous cystadenocarcinoma.[13–16] Serous neoplasms have glycogen-rich clear cytoplasm that stains positive with a PAS test (periodic acid-Schiff