PANCREATIC CYSTIC NEOPLASMS
Kings County Hospital
February 2009
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CASE PRESENTATION

- 33 y/o female presented with an incidentally found pancreatic mass on CT scan
- Had vague abdominal pain x several months
- Palpable mass on exam
- PMHx: none
- PsurgHx: none
- Meds: OCP
CT Scan

- Large mass with necrotic center arising from the head of the pancreas measuring 10.0 cm x 7.7 cm x 11 cm
- No lymphadenopathy
- No liver masses
- Clear fascial plane between the mass and the superior mesenteric artery
FNA OF THE MASS

- EGD
  - Endoscopic transmural pancreatic biopsy
- Pathology
  - Solid Pseudopapillary tumor
**Operative Intervention**

- Pylorus sparing pancreatico-duodenectomy
- Operative pathology
  - 8x5x5 cm tumor
  - Pseudopapillary tumor of the pancreas

[Image of surgical intervention and anatomy]
CYSTIC NEOPLASMS OF THE PANCREAS
Cystic neoplasms of the pancreas

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Cystic neoplasms - <10% of pancreatic neoplasms

- benign, malignant, and borderline
- neoplasms that either are primarily cystic or result from the cystic degeneration of solid tumors
Cystic Neoplasms

Types of cystic neoplasms include:
- serous cystadenomas (32 to 39%),
- mucinous cystic neoplasms (10 to 45%),
- papillary mucinous neoplasms (21 to 33%),
- Solid pseudopapillary tumors (<3-5%)
PRESENTATION

- Can be asymptomatic
- Recurrent pain, jaundice or pancreatitis
  - Involving or connected to the pancreatic duct
- Advanced
  - Pain, weight loss, jaundice
  - Can present with pseudocysts
    - Pain, and even early satiety if compressing the stomach or small bowel; jaundice secondary to compression of the common bile duct
DIAGNOSIS

- CT
  - initial detection of a lesion
  - visualization of calcifications, septa, mural nodules, pancreatitis

- MRI/MRCP
  - better characterization of the morphologic features of a cyst
  - showing a communication between the cyst and the pancreatic duct.

- Transabdominal ultrasonography
- The use of PET is not firmly established
CYTOLOGICAL INVESTIGATION

- Cytologic examination of cyst fluid
  - analysis the aspirated fluid for a variety of biochemical markers and tumor cells
- cytologic analysis of cyst fluid has identified cells to confirm of malignant disease mucinous cystic lesion in perhaps only half the aspirates obtained
CHARACTERISTICS TO BE EXAMINED

- Signs and symptoms
- Histology
- Location in the pancreas
- Diagnostic features
- Surgical treatment
- Malignant potential
- Prognosis
DIAGNOSIS AND MANAGEMENT OF CYSTIC NEOPLASMS OF THE PANCREAS: AN EVIDENCE-BASED APPROACH

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JOURNAL OF AMERICAN COLLEGE OF SURGEONS
Vol. 207, No. 1, July 2008
SEROUS CYSTADENOMAS

- > 30% of cystic pancreatic neoplasms
- Women in their 7th decade
- Mainly in body and tail but can be anywhere in the pancreas
- Usually asymptomatic and found incidentally
- When symptomatic - epigastric pain, abdominal fullness and weight loss; rarely jaundice – even in the pancreatic head.
HISTOLOGY

- Associated with chromosomal alterations of the gene for von Hippel–Lindau disease located on chromosome 3p25
- 70% serous neoplasms are polycystic (microcystic), multiple tiny cysts vs macrocystic with larger fewer cysts
- The cysts contain serous fluid that are PAS+, glycogen rich cuboidal epithelium
- Solid and oligocystic variants of serous adenomas have also been reported.

A) Microcysts lined by cuboidal epithelium with clear cytoplasm
B) PAS stain demonstrates characteristic intracytoplasmic glycogen granules
OTHER DIAGNOSTIC FEATURES

Radiological

- Lobulated contour, absence of wall enhancement, locale in pancreatic head.
- They may appear solid or show a single dominant cysts.
- The presence of a central/stellate scar visualized with septated honey comb appearance, sunburst calcification.
SEROUS CYSTADENOMAS

- Cyst fluid - 20 percent of serous cystadenomas
  - Low CEA
  - Low CA19-9
  - Low amylase
- Low potential for malignant disease.
  - Observed no significant increase in diameter of the tumor after 69 months
  - Growth of 0.12 cm per year for tumors < 4 cm
  - Larger tumors >1.98 cm per year
SEROUS CYSTADENOMAS

- Treatment –
- “our bias is that that operations are applied too early and too often for patients with this disease.”
  - There is some data that tumors <4 cm can be observed
    - Admittedly the number four is arbitrary.
    - Does not apply for tumors of undetermined pathology
    - Operative procedure depends of the locale in the pancreas –
      - Pancreaticoduodectomy, central or partial pancreatectomy, distal pancreatectomy
SEROUS CYSTADENOMA PROGNOSIS

- In a series by Bassi and colleagues’
  - 50 patients with SCA were treated with definitive surgical resection.
  - At a median followup of 43 months, all patients were alive and free of disease except one, who died of other causes.

- In an earlier series Pyke and colleagues
  - reported a 5-year survival of approximately 81% in 36 patients who underwent resection.
**SEROUS CYSTADENOCARCINOMA**

- Aggressive behavior
  - Lymphovascular invasion
  - Microscopic infiltration
  - Synchronous or metachronous extrapancreatic metastasis
MUCINOUS CYSTIC NEOPLASM (MCN)

- Mucin producing cystic neoplasm
  - Includes intraductal mucinous neoplasms
    - IPMN
    - MCN
  - Pre-malignant
    - Can progress to invasive cancer
  - Can be determined from cyst aspirate
MUCINOUS CYSTIC NEOPLASM (MCN)

- 45% of all resected pancreatic neoplasms
- Almost all are female
- Middle aged
- >90% located in the body and tail
- Symptoms can include discomfort, nausea, dyspepsia
- Jaundice is uncommon
Mucinous Cystic Neoplasm (MCN)

- Typically round, thick walled and septated.
- No communication with the pancreatic ductal system.
- Histopathological features of mucinous cystic neoplasms:
  - include a dense mesenchymal ovarian-like stroma,
  - requisite feature of mucinous cystic neoplasms.
MUCINOUS CYSTIC NEOPLASM (MCN)

- CT – thick cyst wall. Macrocystic lesion that can be multiloculated.
- Peripheral eggshell calcification on CT
  - uncommon
  - specific to a mucinous cystic neoplasm
  - highly predictive of cancer
- The use of PET is not firmly established
Mucinous Cystic Neoplasm (MCN)

- **EUS**
  - Evaluate the viscosity of the fluid on aspiration
    - “string sign”
  - Tumor markers can be used to evaluate the cyst fluid
    - CEA > 800 ng/ml is 98% specific although 48% sensitive
    - CEA > 6000 is strongly suggestive of mucinous adenocarcinoma
    - CA 19-9 is less accurate.

- **FNA**
  - High rates of sampling error
  - Also cannot take into account malignant transformation
Mucinous Cystic Neoplasm (MCN) Prognosis

- Survival after surgical resection correlates with the presence or absence of invasive disease.
- Surgical resection is curative for non invasive disease where as there have been cases of recurrence with invasive disease.
**Mucinous Cystic Neoplasm (MCN)**

- In a series of 56 patients who underwent surgical resection of MCN, neither tumor recurrence or tumor-related death was observed in 34 patients with adenomas or borderline MCN during a median follow-up period of 42 months and 69 months, respectively.

- Six patients with noninvasive carcinoma (carcinoma in situ) were also all alive without recurrence at a median followup of 76 months.

- In contrast, 8 (50%) of 16 patients with invasive MCN died within 45 months.

- Reddy and colleagues found that none of the 52 patients with noninvasive MCN had recurrence of disease after resection.

- Goh and colleagues identified only 4 (2%) recurrences among 189 resected patients with noninvasive MCN in a pooled analysis of 344 previously reported patients.
INTRADUCTAL PAPILLARY MUCINOUS NEOPLASM (IPMN)

- 25% of pancreatic cystic neoplasms
- 20% of pancreatic resections for malignancy
- Disease of the elderly
- Higher prevalence of invasive adenocarcinoma with advanced age
- Equal distribution amongst the genders
- Salient feature – connection to pancreatic duct
- Clinical symptoms are generally non specific
  - Can also include: pancreatitis
  - Diabetes, weight loss or jaundice is generally correlated with invasive disease
ADDITIONAL FEATURES OF IPMN

- Histologically –
  - Cystic pancreatic duct dilation with associated papillary projections and mucin production

Characteristic microscopic features of intraductal papillary mucinous neoplasm with well-formed, finger-like papillae, and an absence of ovarian-type stroma
CT – polycystic mass associated with dilation of the main pancreatic duct or its side branches.
- Involvement of the main duct is associated with a higher degree of invasiveness
- Head of pancreas - >50% of patients
- Can be found anywhere and even throughout the entire pancreas

MRI may be better able to demonstrate the communication with the ducts

A) Large, cystic mass (arrow) consistent with main duct intraductal papillary mucinous neoplasm (IPMN), identified on CT scan in a 65-year-old man who presented with abdominal pain and jaundice. Pancreaticoduodenectomy revealed IPMN without dysplasia or invasive adenocarcinoma. (B) Incidentally identified 2.5-cm cyst in the uncinate process
IPMN

- ERCP may show mucin production from an enlarged papilla
- IPMN can be associated with a focus of ductal carcinoma elsewhere in the pancreas
- Current recommendations
  - Resection should be offered to all pts with main duct IPMNs
  - Tumors with side branch involvement that are symptomatic or greater than 3 cm in size should be resected
  - < 3cm can be observed
IPMN Prognosis

- Postoperative survival of patients is related primarily to the presence of invasive adenocarcinoma.
- Five-year postoperative survival of patients with noninvasive disease is between 77% and 100%.
- In contrast, the prognosis for patients with invasive IPMN is similar to that of patients with invasive ductal adenocarcinoma, with the most optimistic 5-year survival rates no better than approximately 36%.
- Noninvasive IPMN carries a recurrence rate after resection of 10%.
SOLID PSEUDOPAPILLARY TUMOR

- Rare
- Predominates in women
- Median age around 30 years
- Can occur anywhere in the pancreas
- Symptoms are usually vague and associated with size of the tumor
Typically large encapsulated lesions with solid and cystic components.

Have pseudopapillary patterns on histology CT.

Well – encapsulated solid masses with thickened capsules and variable amount of internal hemorrhage, cystic degeneration and calcification.

A) specimen demonstrating focal hemorrhage and cystic degeneration consistent (B) A 4.5-cm solid and cystic lesion with coarse internal calcification, (arrow), found incidentally on a CT scan performed for workup of nephrolithiasis.
SOLID PSEUDOPAPILLARY TUMOR

- Operation is offered for this low grade tumor
  - Prevent local tumor growth and mets
  - Palliate symptoms
  - Can lead to favorable survival even with local tumor extension or mets
  - Usually requires distal pancreatectomy or a pancreaticoduodenectomy because of its large size
SOLID PSEUDOPAPILLARY TUMOR
PROGNOSIS

- A single center report by Tipton and colleagues
  - described 14 patients with a median tumor diameter of 7 cm.
  - 13 of the patients in whom curative resection was performed
  - 12 were alive after longterm followup.
- In a similar series by Martin and colleagues
  - 18 patients who underwent resection for localized SPPT
  - 100% recurrence-free survival
  - Of these, four patients presented with synchronous liver metastasis underwent combined pancreatectomy and metastasectomy
  - led to survival of 6 years and 11 years in 2 of the 4 patients.
  - Overall, aggressive surgical resection is associated with a 5-year survival of 95%.
LYMPHOEPITHELIAL CYSTS

- The rarest: <70 pts in the literature
- More common in men
- 5th to 7th decade
- Usually asymptomatic and discovered incidentally
- Usually distributed throughout the pancreas
- Histology
  - Lined by a layer of stratified squamous epithelium surrounded by a characteristic layer of lymphoid tissue.
  - Cysts are filled with a dense material, composed mainly of debris, keratin, and cholesterol crystals.
LYMPHOEPITHELIAL CYSTS

- There are no pathognomonic features on cross-sectional imaging, but several radiographic features are highly suggestive of this diagnosis.
- CT can demonstrate either a multi- or a unilocular cyst, which is well-encapsulated by an enhancing thin wall protruding from the body of the gland.
- A cystic component of low attenuation is typical, but a solid component of variable magnitude can also exist.
- MRI can be useful;
  - the high-keratin content of cyst fluid often produces a hyperintense signal on T1- and a hypointense signal on T2-weighted images
LYMPHOEPITHELIAL CYSTS

- Few reports exist of FNA biopsy and analysis of cyst fluid for cytology and biochemical analysis.
- Cytologic evidence of squamous cells, keratin debris, lymphocytes, and cholesterol crystals can help confirm the diagnosis.
- Lymphoepithelial cysts are benign
  - Observation is appropriate for the asymptomatic patient if you have definitive diagnosis has been secured.
  - Surgical therapy should be reserved for symptomatic patients or for those in whom the diagnosis is equivocal.
ALGORITHM FOR PANCREATIC CYSTIC TUMORS/NEOPLASMS

- Pancreatic Cyst
  - H & P
  - Rule out pseudocyst and other non-neoplastic cysts

- Pancreas Protocol CT
  - SCA
    - > 4cm or symptomatic
      - Consider resection
    - < 4cm and asymptomatic
      - Close followup Serial CT
  - Indeterminant
    - EUS FNA Fluid markers
      - < 3 cm branch duct and asymptomatic
        - Consider resection
      - > 3 cm branch duct and symptomatic
        - Close followup Serial CT
  - Mucinous
  - IPMN
  - MCN
    - Main duct or branch duct > 3 cm or symptomatic
      - Consider resection
QUESTIONS

1. Which of the following is an important distinguishing characteristic of an IPMN
   a) Elevated CEA
   b) Loculated cysts
   c) Connection with the pancreatic ducts
   d) Ring enhancement on MRI
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3. What are the histological characteristics of serous adenomas
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   b) Characteristic microscopic features of intraductal papillary mucinous neoplasm with well-formed, finger-like papillae, and an absence of ovarian-type stroma.
   c) pseudopapillary patterns.
   d) Microcysts lined by cuboidal epithelium with clear cytoplasm and PAS stain demonstrates characteristic intracytoplasmic glycogen granules.
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4. Serous cystadenomas are associated with which of the following genetic disorders
   a) Von Hippel Landau’s disease
   b) BRCa-1
   c) Lynch Syndrome
   d) MEN 2
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