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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

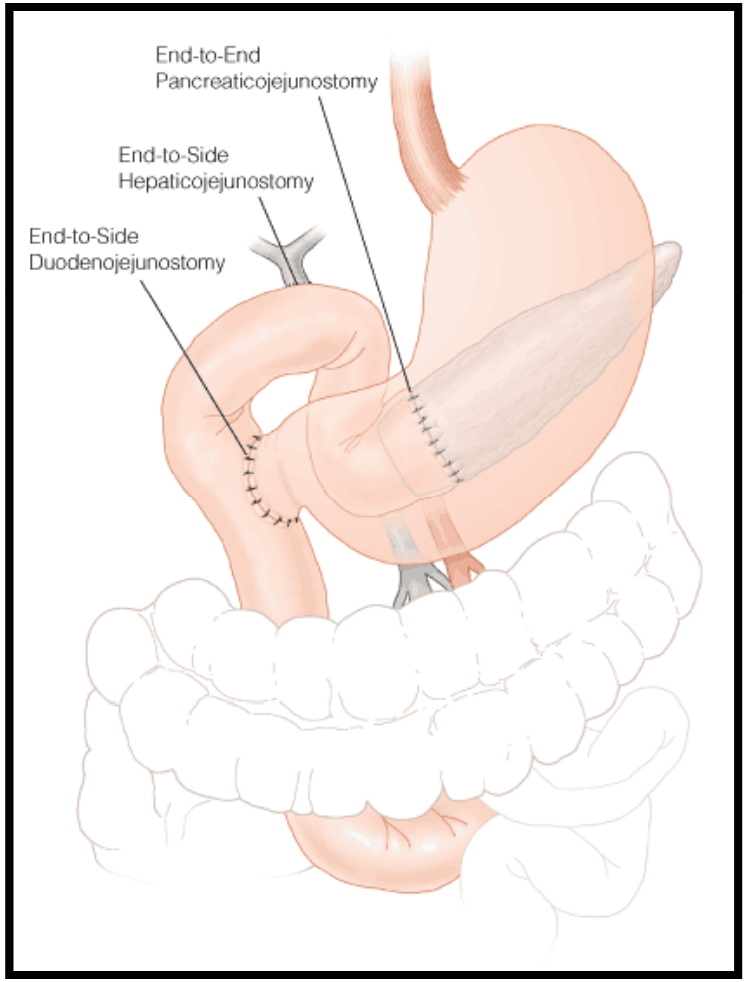
- Large mass with necrotic center arising from the head of the pancreas measuring 10.0 cm x 7.7 cm x 11 cm
- no lymphadenopathy
- No liver masses
- Clear fascial plane between the mass and the superior mesenteric artery

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



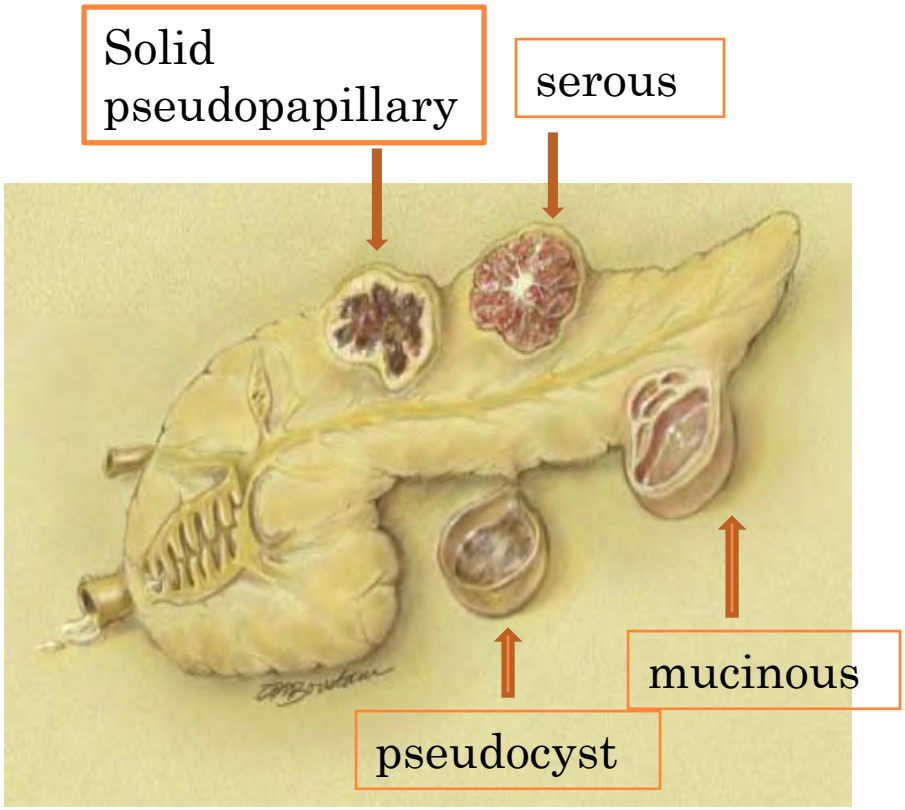
Cystic neoplasms of the pancreas

Cystic Neoplasms of the Pancreas

William R. Brugge, M.D., Gregory Y. Lauwers, M.D., Dushyant Sahani, M.D.,
Carlos Fernandez-del Castillo, M.D., and Andrew L. Warshaw, M.D.
n engl j med 351;12 www.nejm.org September 16, 2004

- 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

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Diagnosis and Management of Cystic Neoplasms of the Pancreas: An Evidence-Based Approach

Matthew H G Katz, MD, Melinda M Mortenson, MD, HuaminWang, MD, PhD, Rosa Hwang, MD,Eric P Tamm, MD, Gregg Staerkel, MD, Jeffrey H Lee, MD, Douglas B Evans, MD, FACS, Jason B Fleming, MD, FACS

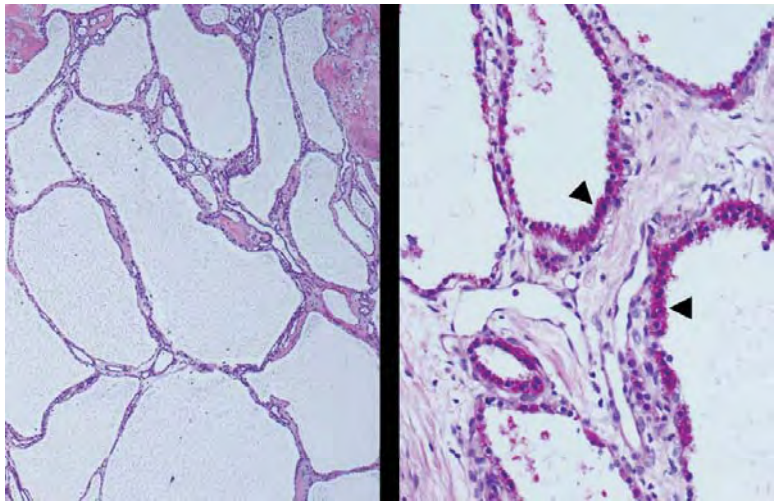
Journal of American College of Surgeons
Vol. 207, No. 1, July 2008

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.

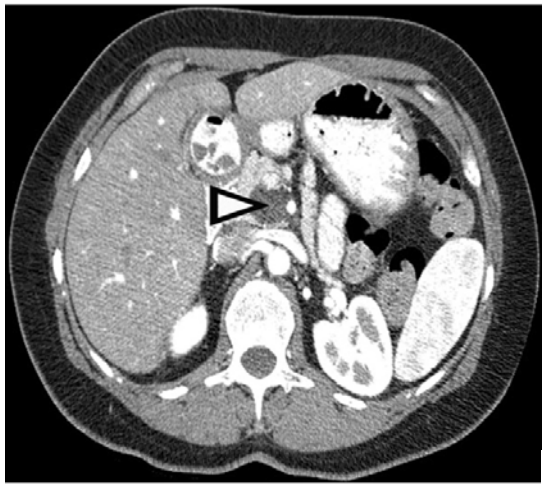


A)Microcysts lined by cuboidal epithelium with clear cytoplasm
B) PAS stain demonstrates characteristic intracytoplasmic glycogen granules

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.

A



B

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 can not 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)

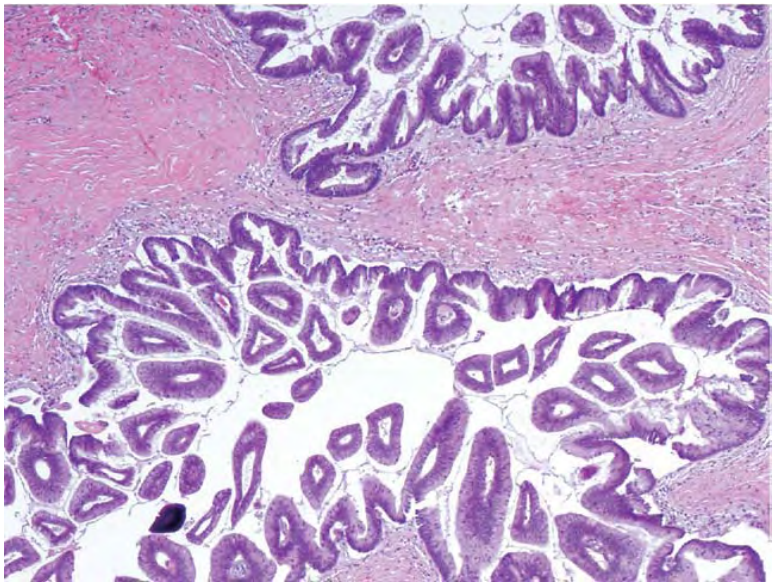
- In a series of 56 patients who underwent surgical resection of MCN, neither tumor recurrence or tumor-related death was observed in 34 patients with adenomas or borderline MCN during a median follow-up period of 42 months and 69 months, respectively.
- Six patients with noninvasive carcinoma (carcinoma in situ) were also all alive without recurrence at a median followup of 76 months.
- In contrast, 8 (50%) of16 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

B

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 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

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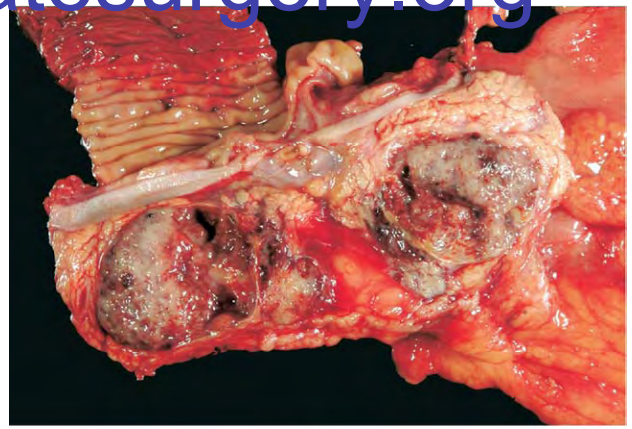
- Typically large encapsulated lesions with solid and cystic components.
- Have pseudopapillary patterns on histology

CT

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



A

B

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
- Usu 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.

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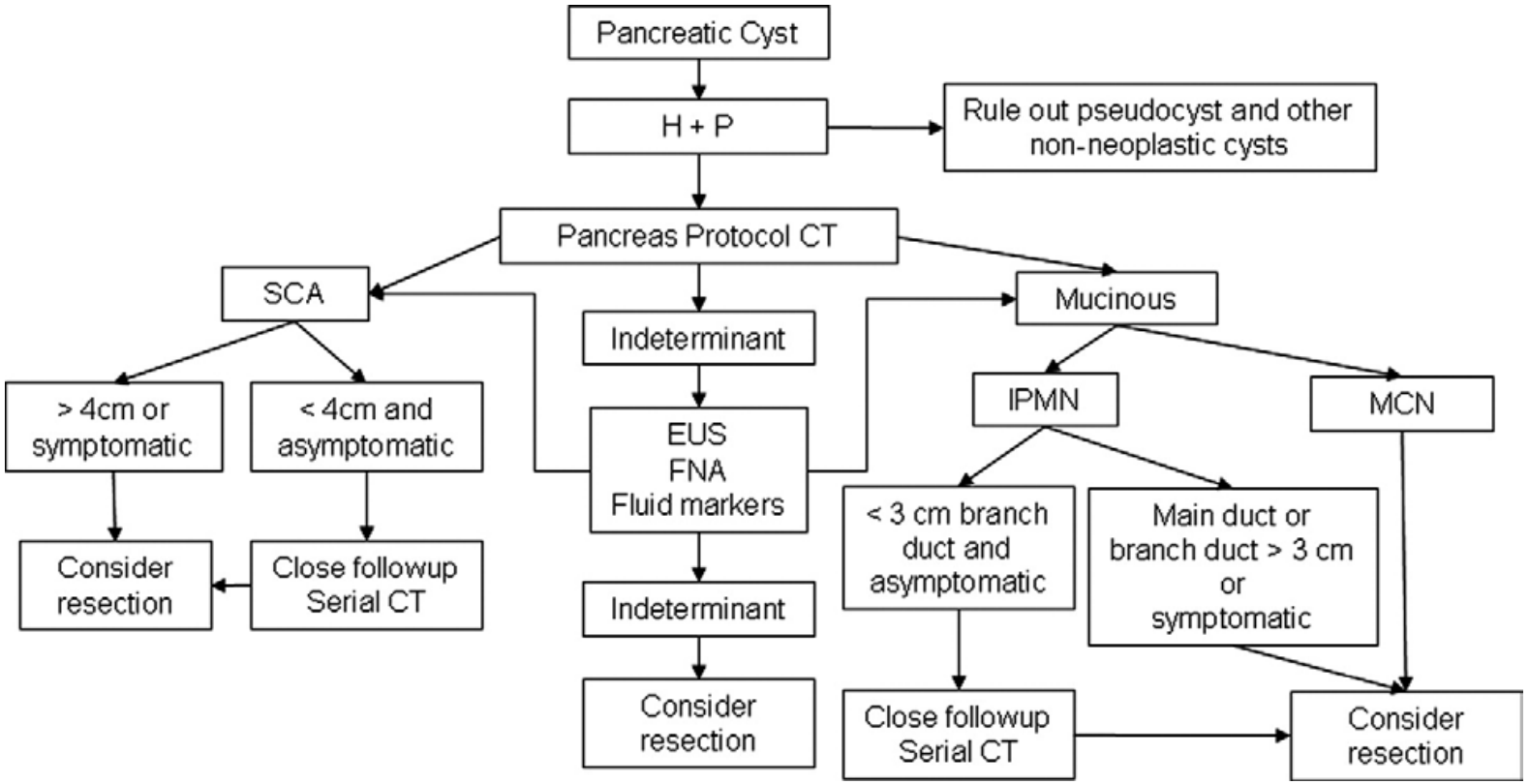
ALGORITHM FOR PANCREATIC CYSTIC TUMORS/NEOPLASMS



QUESTIONS

- 1. Which of the following is a important distinguising characteristic of an IPMN
  a) Elevated CEA
  b) Loculated cysts
  c) Connection with the pancreatic ducts
  d) Ring enhancment on MRI

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- 2. Which of the following are considered mucin producing tumors
  a) IPMN
  b) SPPT
  c) Lymphoepithelial
  d) Serous cystoadenoma

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- 3.What are the histological characteristics of serous adenomas
  a) lined by a layer of stratified squamous epithelium surrounded by a characteristic layer of lymphoid tissue.
  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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- 5. With which of the following can the GI guys see a “string sign”
  a) IPMN
  b) Serous cystadenoma
  c) SPPT
  d) MCN

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