Pancreatic cystic neoplasms

Clinical manifestations, diagnosis, and management

Surgery Department, Ziayian Hospital, TUMS

Overview

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- TYPES OF PANCREATIC CYSTIC NEOPLASMS
- RISK OF MALIGNANCY
- CLINICAL MANIFESTATIONS
- DIAGNOSTIC APPROACH
- Additional testing
- MANAGEMENT
- FOLLOW-UP AFTER SURGERY

Introduction

- diagnosed with increasing frequency
- the widespread use of cross-sectional imaging
- May incidentally be detected in 40 to 50 percent of patients who undergo abdominal MRI
- The frequency increases with age

TYPES OF PANCREATIC CYSTIC NEOPLASMS(PCNs)

- PCNs account for more than 50 percent of pancreatic cysts, even in patients with a history of pancreatitis

- categorized using the World Health Organization histologic classification:
  - Serous cystic tumors
  - Mucinous cystic neoplasms
  - Intraductal papillary mucinous neoplasms (IPMNs)
  - Solid pseudopapillary neoplasms

Serous Neoplasms

Serous neoplasms
Serous cystadenoma
Microcystic serous cystadenoma
Macrocystic (oligocystic) serous cystadenoma
Solid serous adenoma
Von Hippel-Lindau syndrome-associated serous cystic neoplasm
Mixed serous-neuroendocrine neoplasm
Serous cystadenocarcinoma

Mucinous cystic neoplasm

Mucinous cystic neoplasm
Mucinous cystic neoplasm with low-grade dysplasia
Mucinous cystic neoplasm with high-grade dysplasia
Mucinous cystic neoplasm with associated invasive carcinoma

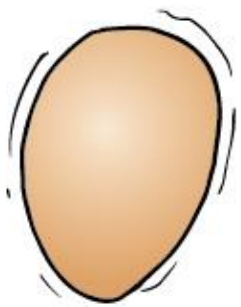
Intraductal papillary mucinous neoplasm

Intraductal papillary mucinous neoplasm
Intraductal papillary mucinous neoplasm with low-grade dysplasia
Intraductal papillary mucinous neoplasm with high-grade dysplasia
Intraductal papillary mucinous neoplasm with associated invasive carcinoma

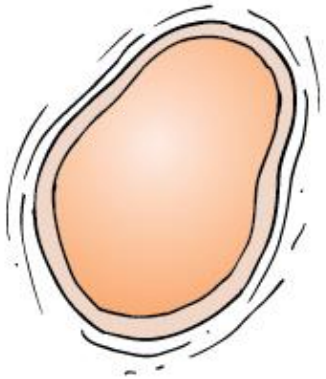
Solid pseudopapillary neoplasm

Solid pseudopapillary neoplasm
Solid pseudopapillary neoplasm
Solid pseudopapillary neoplasm with high-grade carcinoma

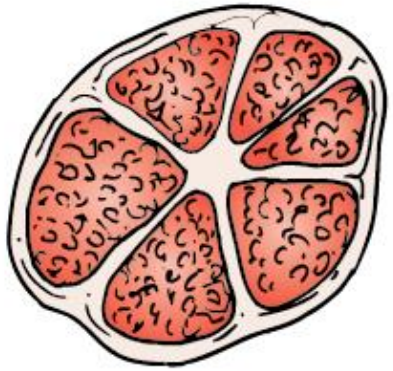
Pancreas – Cystic Lesions



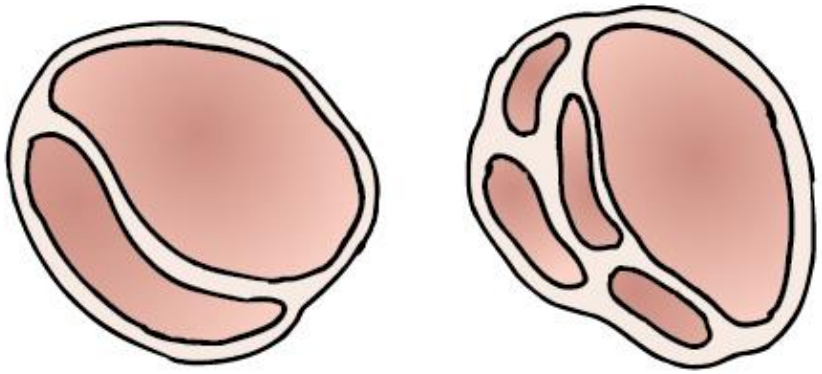
Cyst



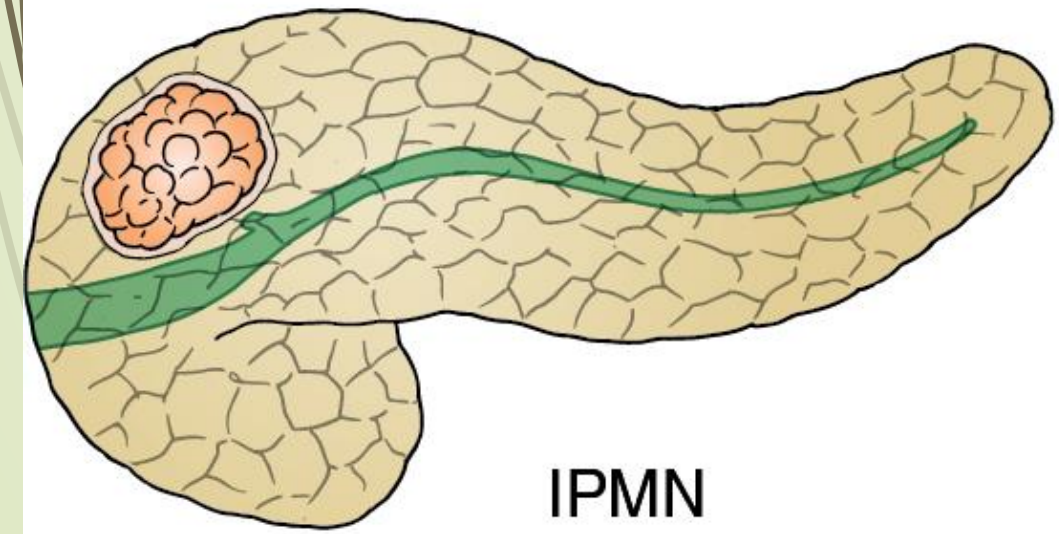
Pseudocyst



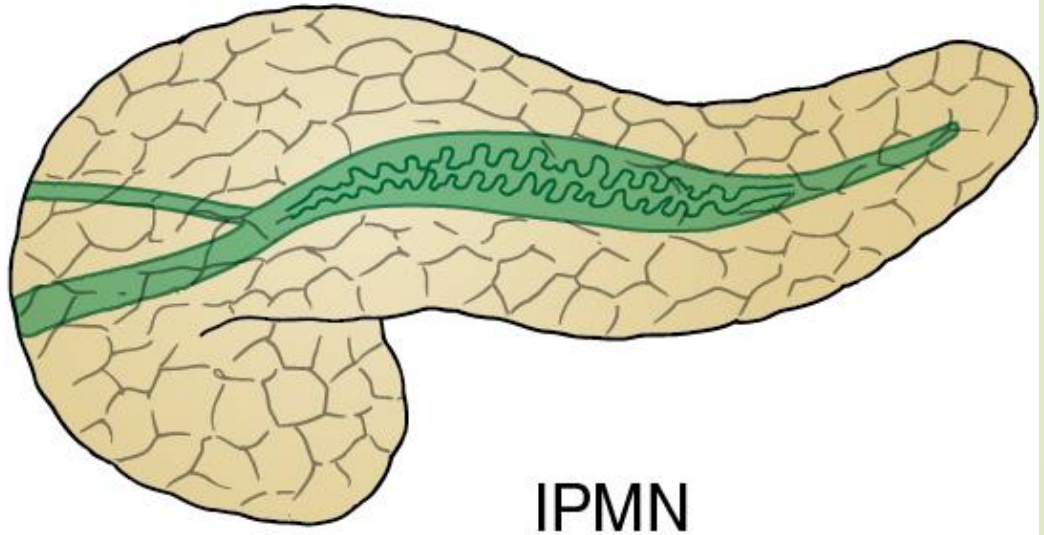
Serous
Cystadenoma



Mucinous cystic
neoplasm



IPMN
Branch duct



IPMN
Main duct

The relative frequencies of the different PCNs

- IPMNs accounted for 38 percent of lesions
- mucinous cystic neoplasms for 23 percent
- serous cystic tumors for 16 percent
- solid pseudopapillary neoplasms for 3 percent.
- P.S.: it only evaluated resected PCNs. Most branch-duct IPMNs and serous cystic tumors do not require resection

RISK OF MALIGNANCY

- the risk of malignancy in incidentally detected pancreatic cysts is low.
- risk of malignancy in a pancreatic cyst at the time of diagnosis is at most 0.01 percent (0.21 percent for cysts >2 cm)
- In the subset of cysts that were surgically resected, it was found that the risk of malignancy was 15 percent.(However, there is significant selection bias)
- Factors associated with an increased risk of malignancy included:
  - cyst size >3 cm (43 versus 22 percent if the cyst was <3 cm, odds ratio [OR] 3.0)
  - finding a solid component within the cyst (73 versus 23 percent if there was no solid component, OR 7.7)
  - a trend towards an increased risk of malignancy if the main pancreatic duct was dilated

RISK OF MALIGNANCY

- the malignant potential of a cyst also depends on the cyst type:
  - Serous cystic tumors are at very low risk for developing malignancy
  - moderate to high in:
    - mucinous cystic neoplasms
    - solid pseudopapillary tumors
    - some intraductal papillary mucinous tumors of the pancreas (intraductal papillary mucinous neoplasms (IPMNs); up to 70 percent for main-duct IPMNs)

CLINICAL MANIFESTATIONS

- Many patients are asymptomatic
  - the cysts are discovered incidentally when abdominal imaging is obtained for unrelated indications
- Symptoms are often nonspecific
- **Serous cystic tumors**
  - cause symptoms due to cyst enlargement and resultant space occupation
  - Cysts that are greater than 4 cm in size are more likely to cause symptoms or findings on physical examination
  - abdominal discomfort, a palpable mass, and bile duct and/or gastric outlet obstruction

CLINICAL MANIFESTATIONS

- **Mucinous cystic neoplasms**:
  - abdominal pain, recurrent pancreatitis, gastric outlet obstruction, and/or a palpable mass
  - Jaundice and/or weight loss are more common with malignant lesions.

- **Intraductal papillary mucinous neoplasms (IPMNs):**
  - many patients with IPMNs are asymptomatic
  - longstanding history of recurrent acute pancreatitis or symptoms suggestive of chronic pancreatitis **(**result from intermittent obstruction of the pancreatic duct with mucus plugs**)**
  - Manifestations such as back pain, jaundice, weight loss, anorexia, steatorrhea, and diabetes are harbingers of malignancy.

CLINICAL MANIFESTATIONS

- **Solid pseudopapillary neoplasms (SPNs)** :
  - In the past, approximately 80 percent of patients with SPNs were symptomatic
  - incidental detection of SPNs is becoming more common with widespread use of cross-sectional imaging, and it now accounts for up to 50 percent of cases
  - The most common symptom is abdominal pain, followed by nausea, vomiting, and weight loss
  - symptoms that occur less frequently include gastrointestinal obstruction, anemia, jaundice, and pancreatitis. Patients may also have a palpable mass, which is the most common presentation in children.

DIAGNOSTIC APPROACH

- The major challenge in the evaluation of pancreatic cystic neoplasms is identifying lesions with malignant potential or signs of malignancy while not subjecting patients to unnecessary testing

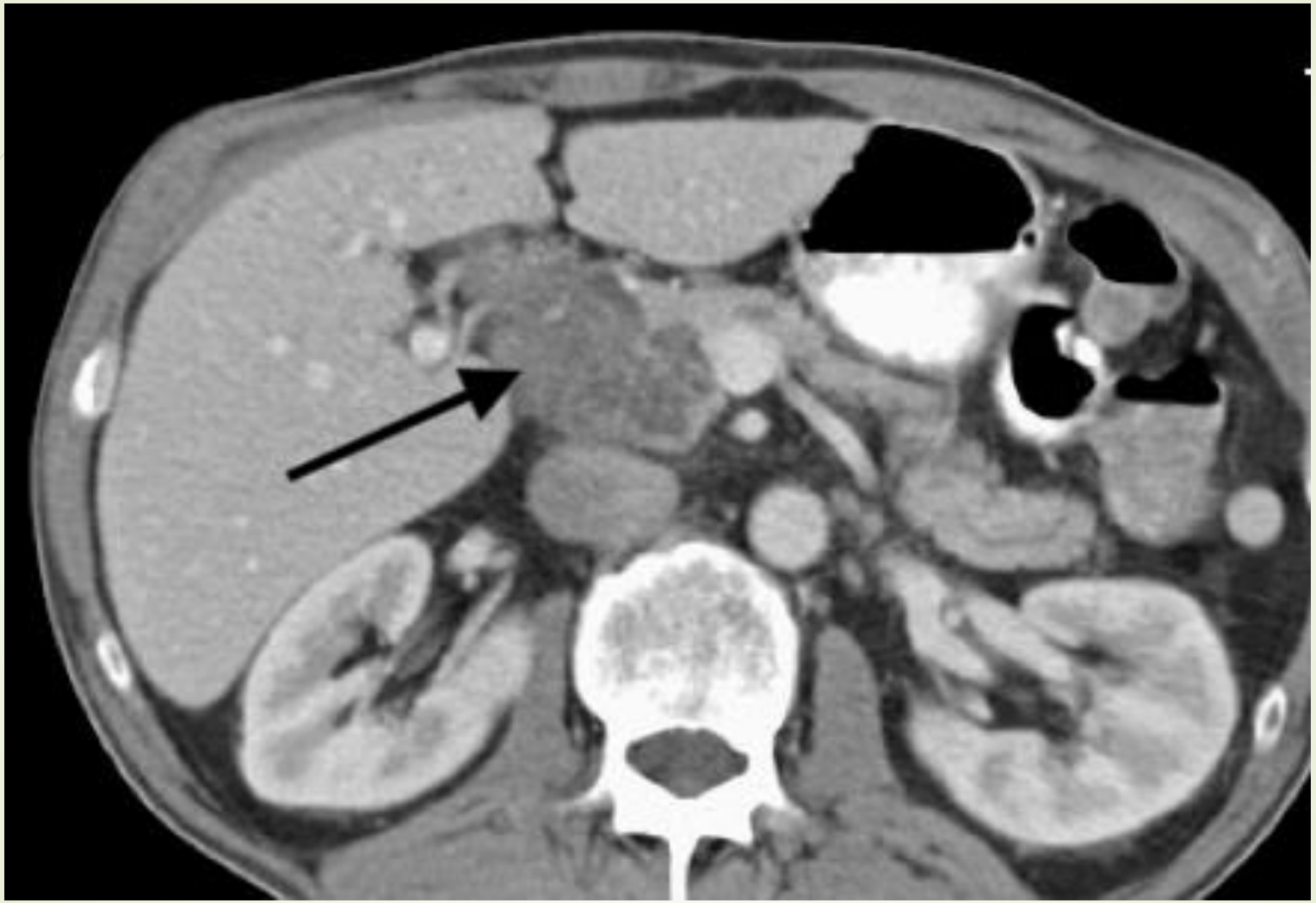
- **Cross-sectional imaging**
- **Endoscopic ultrasound with fine-needle aspiration**
- **EUS-guided through-the-needle biopsy (TTNB)**

Cross-sectional imaging

- The first step in evaluating a cyst is taking MRI with contrast and MRCP
- Alternative to MRI/MRCP is dedicated pancreatic protocol CT scan
- cross-sectional imaging is obtained to identify cyst type and risk of malignancy

Findings on cross-sectional imaging associated with specific cysts include:

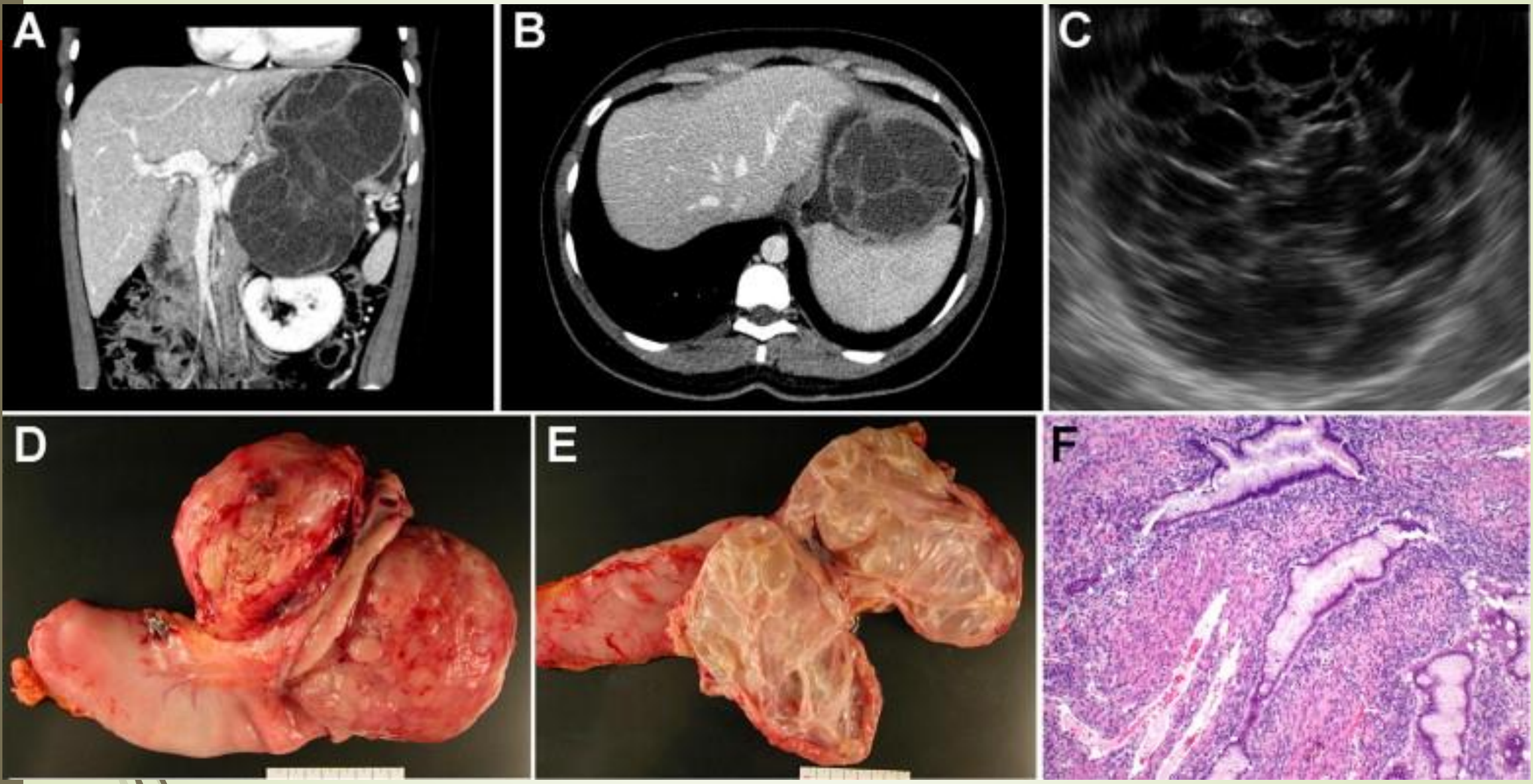
- **Serous cystic tumors:**
  - well-demarcated multicystic lesion
  - A central scar or "sunburst" calcification
  - microcystic variant of SCTs can mimic a solid mass on CT



Cross-sectional imaging

Findings on cross-sectional imaging associated with specific cysts include:

- **Mucinous cystic neoplasms:**
  - septated cystic lesion
  - they can be unilocular
  - mucinous epithelium with variable atypia and may contain eccentric calcifications
  - malignant transformation in MCNs
    - Larger size (5 cm or larger in one series).
    - A thickened or irregular cyst wall.
    - An internal solid component or mass.
    - Calcification of the cyst wall.


A
B
C
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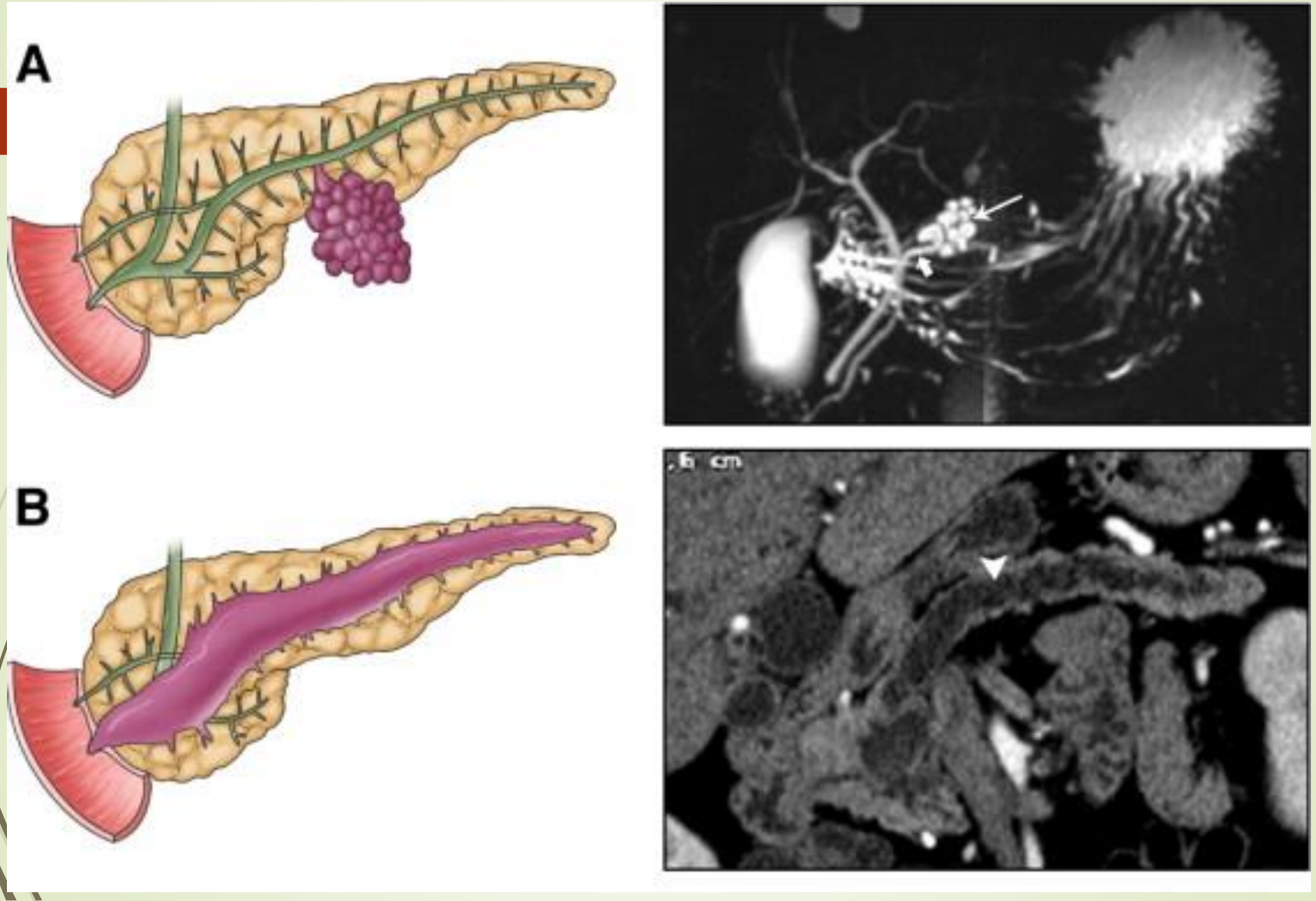
Cross-sectional imaging

Findings on cross-sectional imaging associated with specific cysts include:

- **Intraductal papillary mucinous neoplasms:**
  - IPMNs may involve the main pancreatic duct, the branch ducts, or both
  - Main duct involvement is characterized by a diffusely or partially dilated main pancreatic duct filled with mucin
  - Branch-duct (BD) IPMN is characterized by dilation of side branches of the pancreatic duct.
  - MRCP appears to be superior to CT scan for determining whether side-branch lesions communicate with the main pancreatic duct
  - MRCP is inferior to ERCP in demonstrating peripheral ductal abnormalities


A
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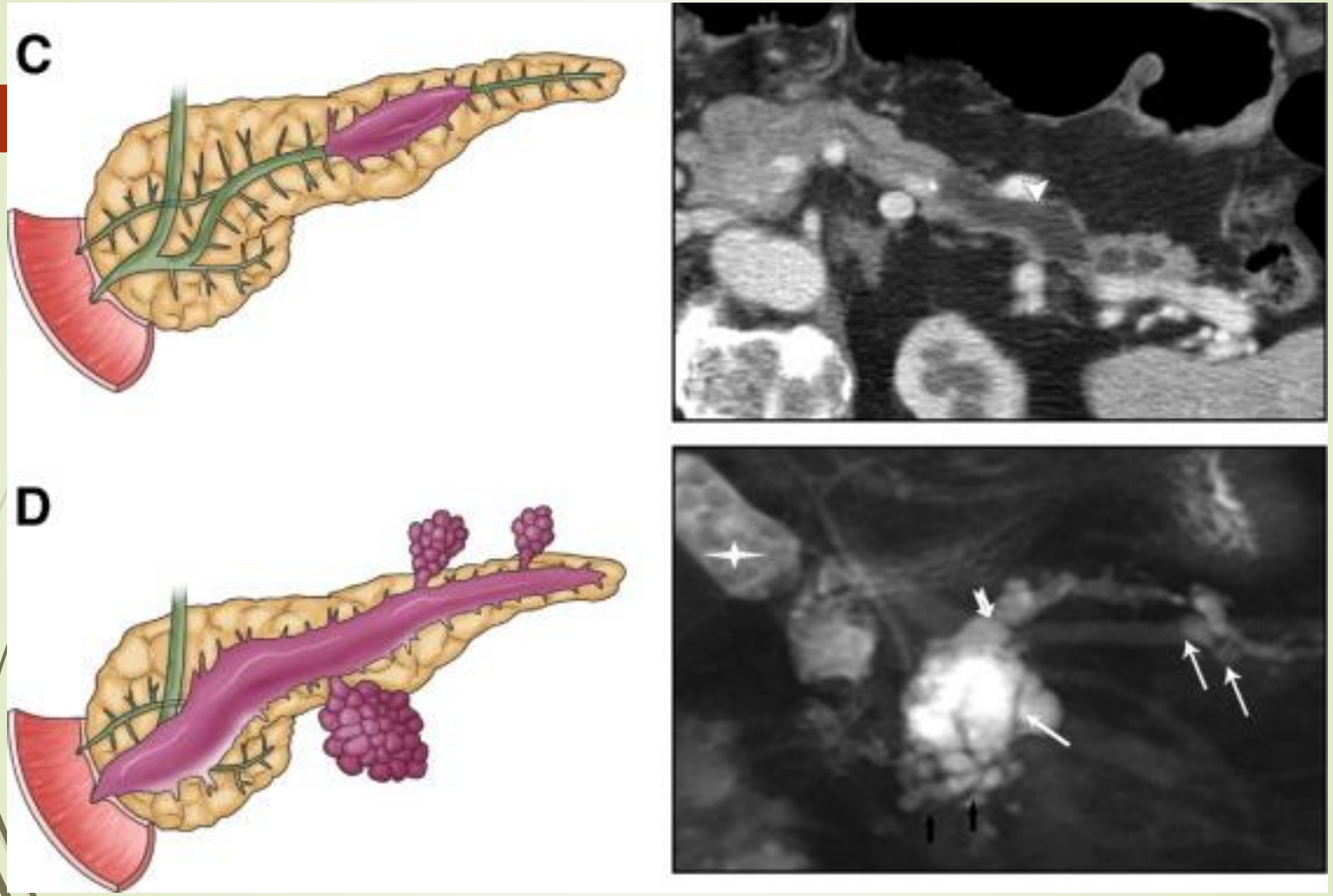
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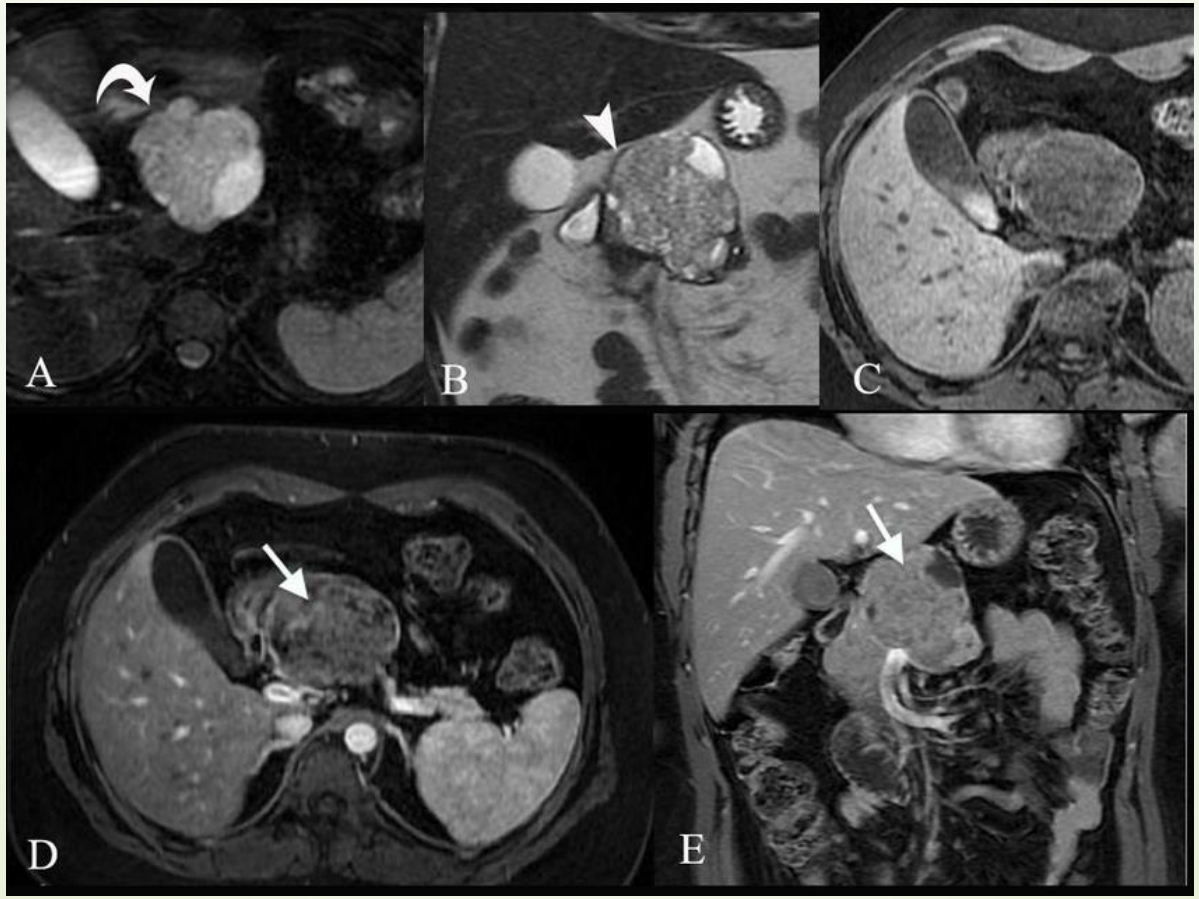
D

Cross-sectional imaging

Findings on cross-sectional imaging associated with specific cysts include:

- **Solid pseudopapillary neoplasms:**
  - may appear as a mixed solid and cystic pancreatic lesion on cross-sectional imaging
  - On MRI, the lesions may appear as well-demarcated solid tumors



Endoscopic ultrasound with fine-needle aspiration

- EUS-FNA provides high-quality imaging of the pancreas and the opportunity to sample pancreatic lesions, which increases diagnostic accuracy
- not part of the routine evaluation of pancreatic cysts.
- The cyst fluid obtained via EUS-FNA can be analyzed for cytology, tumor markers, and molecular markers:
  - Cytology
  - CEA level
  - diagnostic molecular markers (*KRAS*, *GNAS*, *VHL*, *CTNNB1*)
  - prognostic molecular markers (*TP53*, *PIK3CA*, *PTEN*)

EUS-guided through-the-needle biopsy (TTNB)

- We currently reserve EUS-TTNB for select larger cysts (that have failed previous diagnostic FNA) where a definitive histologic diagnosis would significantly alter management.
- larger indeterminate cysts are more frequently targeted.
- TTNB has a higher diagnostic yield as compared with FNA cytology and CEA analysis, particularly for mucinous cysts
- The pooled sensitivity and specificity of TTNB for mucinous cysts was 90 and 94 percent, respectively.

MANAGEMENT

- Many pancreatic cysts can be followed with surveillance imaging
- In general, surgery is indicated for:
  - cysts with cytology revealing advanced neoplasia or malignancy;
  - cysts causing complications (eg, pancreatitis);
  - cysts with features concerning for malignancy;
  - cysts with significant malignant potential, including mucinous cystic neoplasms (MCNs), main-duct intraductal papillary mucinous neoplasms (IPMNs), and solid pseudopapillary neoplasms (SPNs).
  - the decision to recommend surgery should take into account factors such as the patient's age and general health, the malignant risk of the specific lesion, and the suspicion for malignancy

MANAGEMENT

- If surgery is performed, lesions in the body or tail of the pancreas require a distal pancreatectomy, whereas those in the head of the gland are resected by pancreaticoduodenectomy.

- Alternative treatments are also being studied, including endoscopic cyst ablation methods in which the cyst is injected with ethanol or chemotherapeutic agents during endoscopic ultrasound (EUS)

MANAGEMENT

- in some cases a diagnosis may not be clear despite a diagnostic evaluation that includes EUS-guided fine-needle aspiration (FNA)
- surgery is suggested for patients who are good candidates if any of the following features are present:
  - Cytology/histology that is suspicious or positive for a malignant neoplasm
  - A mucinous cyst ≥3 cm associated with main duct dilation and/or a definitive mural nodule
  - *KRAS* and/or *GNAS* mutations with *TP53* and *PIK3CA* or *PTEN* mutations by molecular testing
- We perform surveillance in patients who do not meet these criteria

FOLLOW-UP AFTER SURGERY

- For patients who undergo cyst resection, follow-up depends on the pathologic findings.
- If there is evidence of invasive cancer or high-grade dysplasia, magnetic resonance imaging surveillance of the remaining pancreas should be performed every two years
- If there is no high-grade dysplasia or malignancy, surveillance is not needed for patients who do not have papillary mucinous neoplasms (IPMN) or a strong family history of pancreatic cancer.

THANK YOU FOR YOUR ATTENTION