2025

KARNATAKA RADIOLOGY EDUCATION PROGRAM

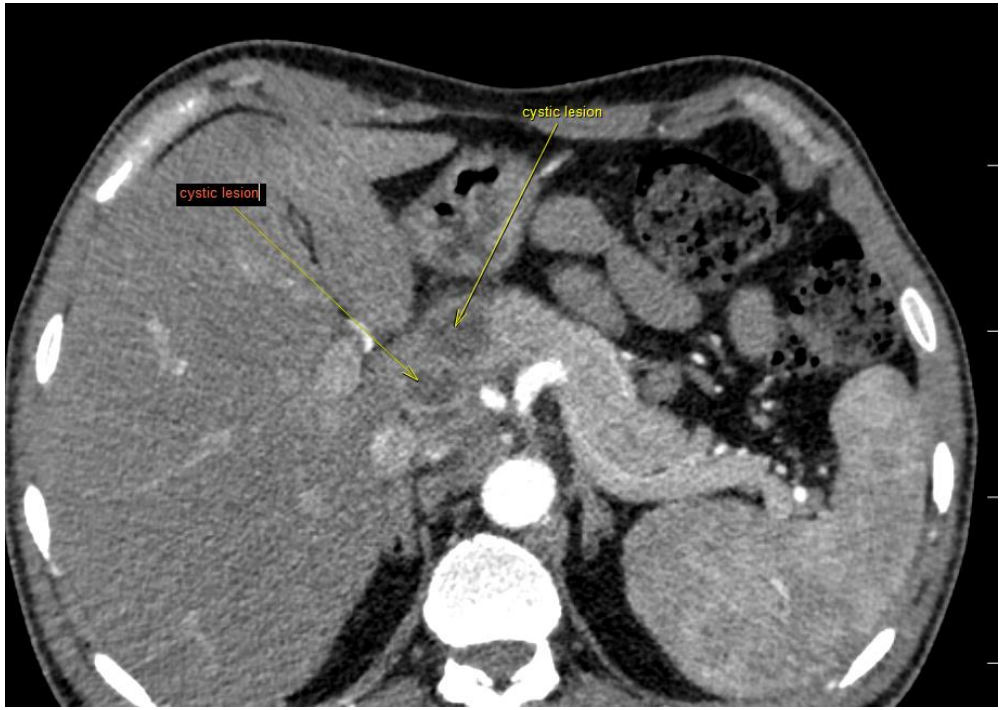
CASE PRESENTATION

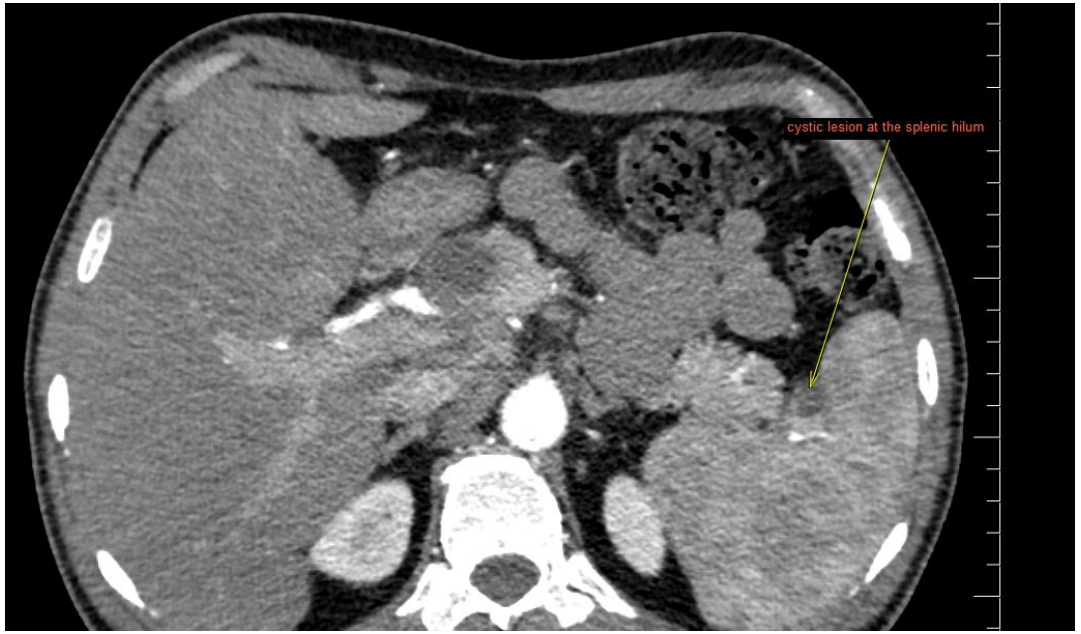
Dr. Muthu Mangala

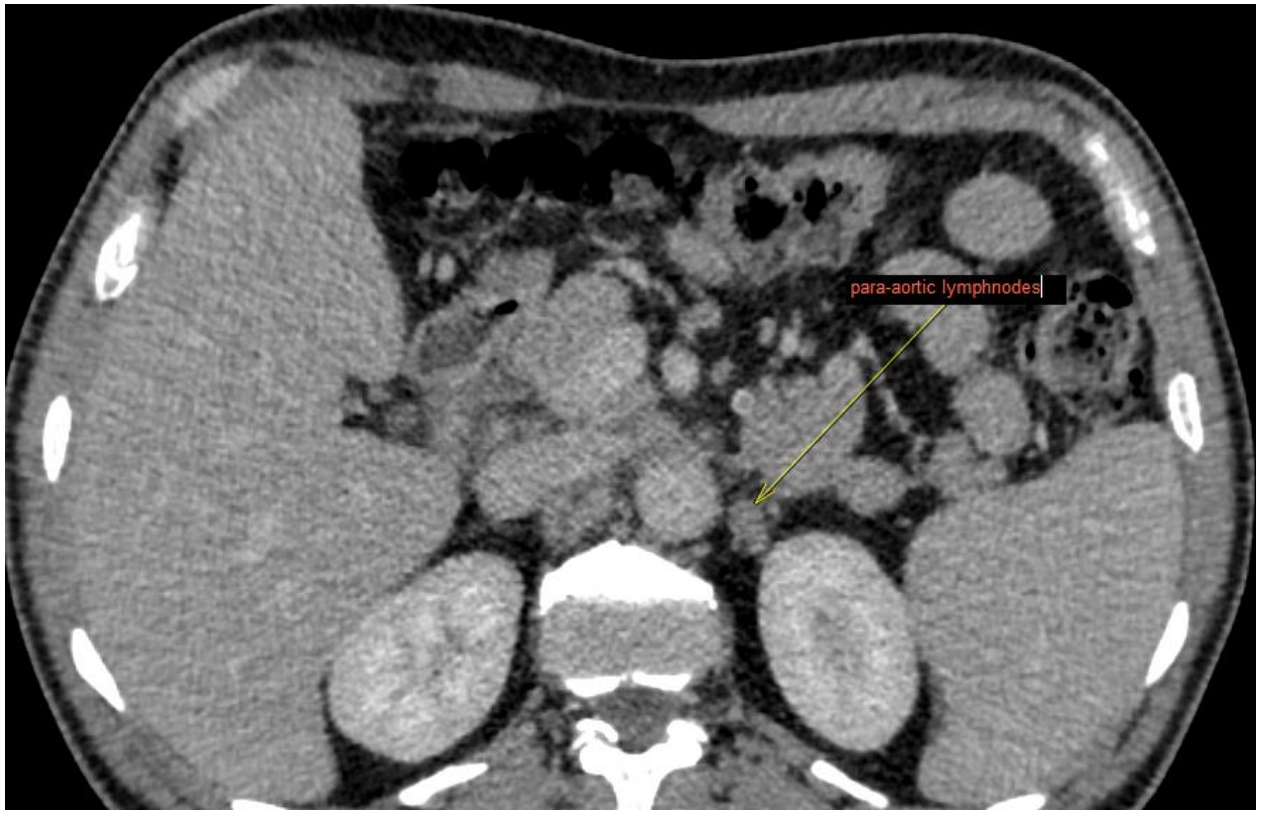
CASE 2:

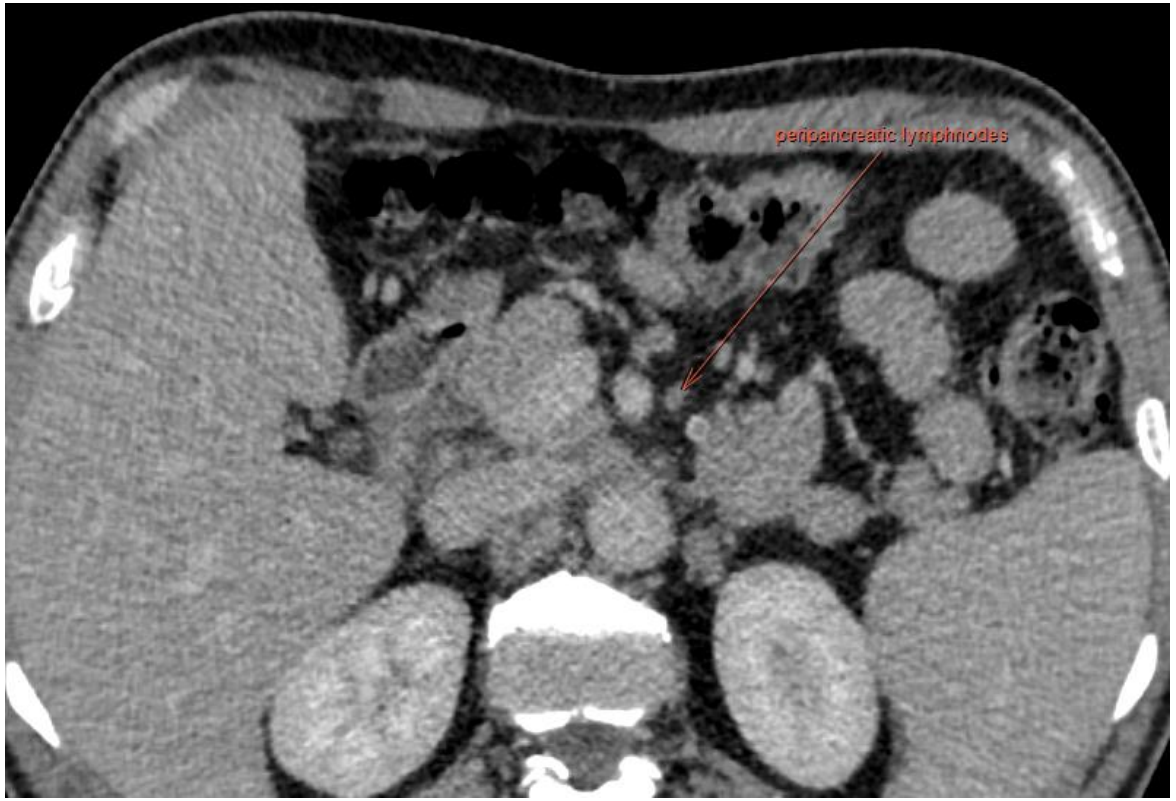
- 52 year old male with
- C/o pain abdomen (epigastric) x 3 months,
- Weight loss (18 kgs in 3 months) and loss of appetite x 3 months.
- H/o high grade fever – 1 episode/ week in last 3 months.
- O/E , afebrile,
- No pallor/ icterus
- P/A - Soft, non tender,
- No palpable organomegaly.
- USG abdomen (outside) - Normal
- CXR – No signs of active infection
- Advised for CECT abdomen

KEY IMAGES:


cystic lesion
cystic lesion


cystic lesion at the splenic hilum


para-aortic lymphnodes


peripancreatic lymphnodes

FINDINGS:

- Well defined hypodense cystic lesions in the head of the pancreas
- Post-contrast study showing mild enhancement of the wall
- Minimal peripancreatic haziness around the head region
- No significant ductal dilatation / calcification is seen
- Similar cystic focus adjacent to the pancreatic tail region at the splenic hilum
- Mildly enhancing peripancreatic and bilateral para-aortic lymph nodes

EUS showed two homogenous cystic lesions in the head of pancreas. Pancreatic parenchyma appears normal. Using 22 G EZ shot aspiration needle, two passes were done into cystic lesion. Pus sent for Gene xpert and culture.

BIOCHEMISTRY

Test	Result	Unit	Biological Reference Interval
Lipase (Two Point Rate - With Colipase)	105	U/L	23.0-300.0

Interpretation Notes

- Lipase is a glycoprotein enzyme. Lipase is useful for investigations of pancreatic disorders, usually pancreatitis, however serum level of lipase is increased in both pancreatic and non-pancreatic causes like acute pancreatitis, pancreatic duct obstruction, chronic pancreatitis, perforated or penetrating peptic ulcer, acute cholecystitis, small bowel obstruction,intestinal infarction as well as in renal failure.

CA-19.9 (Enhanced Chemiluminesence)	16.2	U/mL	<=37.0

Interpretation Notes

- This test is not recommended to screen pancreatic cancer in the general population but aids in the diagnosis and management of pancreatic cancer.
  False negative/positive results are observed in patients receiving mouse monoclonal antibodies for diagnosis or therapy.
  The assay value should be used in conjunction with finding from clinical evaluation and other diagnostic procedures.
  Note: Patient results determined by assay using different manufacturers or methods may not be comparable.

Differential diagnosis

- Walled off necrotic collections
- Serous cystic neoplasm
- Tuberculosis
- Branch duct IPMN
- Neuroendocrine tumor with cystic degeneration
- Ductal carcinoma with cystic features
- Mucinous cystic neoplasm
- Pseudocyst

DEPARTMENT OF LABORATORY MEDICINE

Final Report

Patient Name : **Mr. Ammareshappa Radder** MRN : **10020001699085** Gender/Age : **MALE , 51y (01/01/1972)**

Collected On : **08/12/2023 04:04 PM** Received On : **08/12/2023 05:13 PM** Reported On : **08/12/2023 09:37 PM**

Barcode : **4M2312080024** Specimen : **Fluid, Sputum, Tissues, CSF** Consultant : **Dr. Nandish H K(MEDICAL GASTROENTEROLOGY)**

Sample adequacy : **Satisfactory** Visit No : **DC-001** Patient Mobile No : **9108836205**

MOLECULAR LABORATORY

Test	Result	Unit	Biological Reference Interval
GENE XPERT (XPERTMTB/RIF)			
SPECIMEN	PUS	-	-
Mycobacterium Tuberculosis (Cartridge Based Nucleic Acid Amplification)	DETECTED HIGH	-	-
Rifampicin Resistance (Cartridge Based Nucleic Acid Amplification)	Not Detected	-	Not Detected

Interpretation Notes

- **METHODOLOGY**
  It is a semi-quantitative, nested real-time polymerase chain reaction (PCR) in vitro diagnostic test for the detection of Mycobacterium tuberculosis (MTB) complex and rifampin-resistance associated mutations of the rpoB gene.
  LIMITATIONS:
  A positive test result does not necessarily indicate the presence of viable organisms. It is, however, presumptive for the presence of MTB and Rifampin resistance. This test is intended as an aid in the diagnosis of pulmonary tuberculosis when used in conjunction with clinical and other laboratory findings.
  NOTE: If Gene x pert positive contact your doctor immediately (48hrs)for drug susceptibility testing.

--End of Report-

Neutral Oral Contrast

500 mL water 20 minutes before scanning, 250 mL on scanner table immediately pre-scan

IV Contrast

- Rate: 4 mL/sec (20-gauge or larger IV)
- Non-contrast
- Arterial phase --> 20 seconds after contrast injection
- Pancreatic phase --> at 40-50 seconds
- Venous --> 60 - 70 s after contrast injection

MR protocol

- Axial high resolution T2WI w Fatsat.
- MRCP – 3D navigator guided T2
  – Single shot thick rotating slabs T2
- DWI
- Pre –Post contrast dynamic T1W

MRI Vs CT

- CT will depict most pancreatic lesions, but is sometimes unable to depict the cystic component.
- MR with heavily weighted T2WI and MRCP will better demonstrate the cystic nature and the internal structure of the cyst and has the advantage of demonstrating the relationship of the cyst to the pancreatic duct as is seen in IPMN.

Classification

- *Inflammatory --> Pseudocysts*
- Neoplastic

1.Mucinous

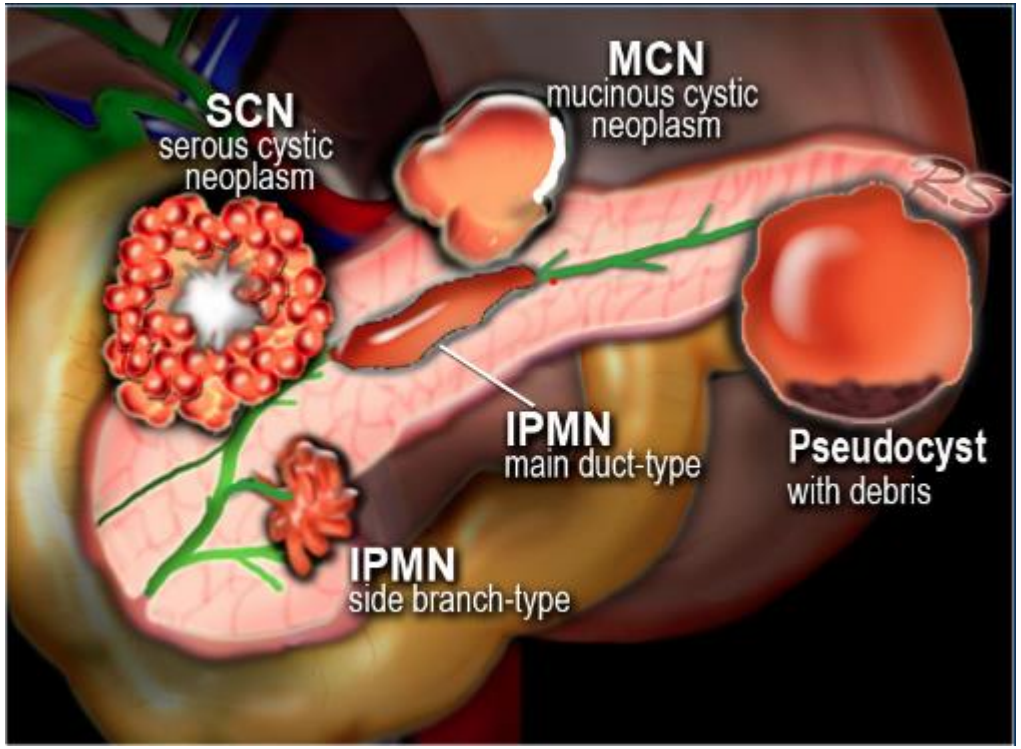
- IPMN - intraductal papillary mucinous neoplasm
- MCN - Mucinous cystic neoplasm

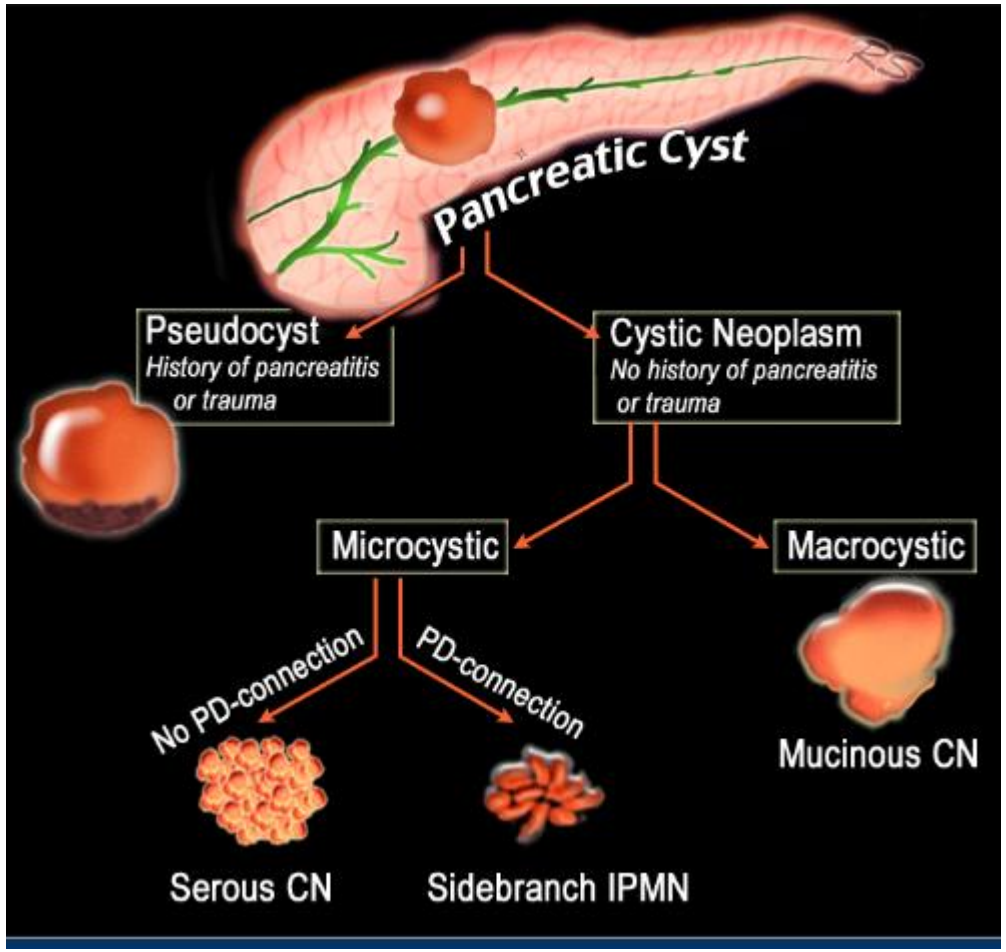
2.Non-mucinous

- SCN - Serous cystic neoplasm
- Solid lesion with cystic degeneration:

  SPEN (solid pseudopapillary epithelial neoplasm)

  Tumors with cystic degeneration: neuroendocrine tumor

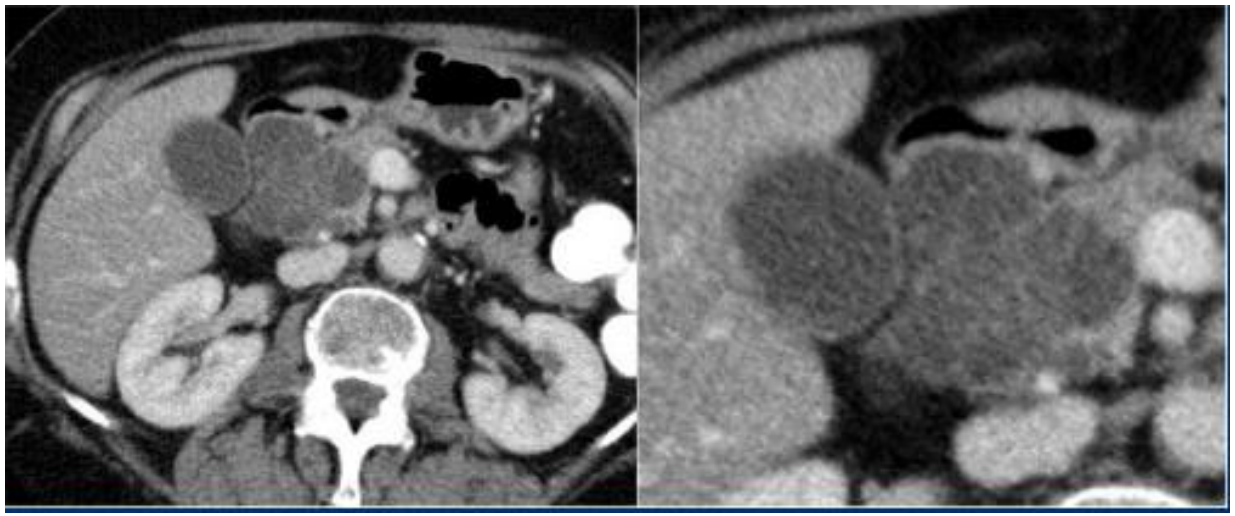



Pancreatic Cyst
Pseudocyst
History of pancreatitis or trauma
Cystic Neoplasm
No history of pancreatitis or trauma
Microcystic
Macrocystic
No PD-connection
PD-connection
Mucinous CN
Serous CN
Sidebranch IPMN

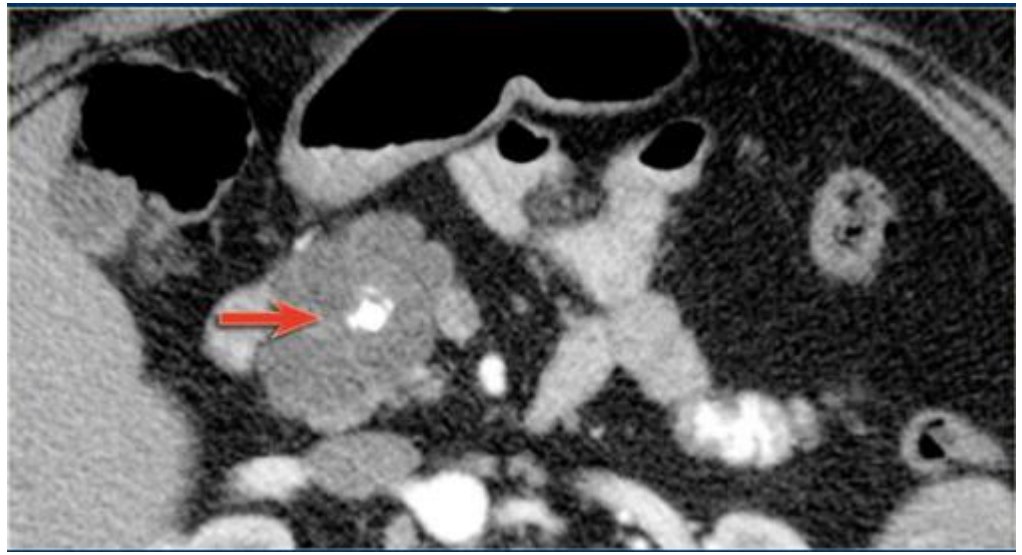
		Age - Gender	Imaging
	**SCN** Benign	75% women 60-70 y **Grandma**	Lobulated microcystic 18% central scar with Ca^{++}
	**MCN** Malignant potential	99% women 40-50 y **Mother**	Macrocystic Usually 1 cyst 25% peripheral Ca^{++} 95% in tail and body
	**Main-duct IPMN** Malignant potential	M=W 60-80 y	Dilated Pancreatic duct Protruding papil of Vater
	**Side-branch IPMN** Malignant potential	M=W 60-80 y	Bunch of grapes connection to PD

Serous cystic neoplasm

- Benign tumor, but large tumors have a tendency to increase in size and cause symptoms.
- SCN may have various appearances like microcystic , macrocystic, mixed microcystic and macrocystic and solid .
- Microcystic or honey-combed cyst with central scar (30%) and calcifications (18%).
- Macrocystic in 10% and difficult to differentiate from pseudocyst and mucinous cystic neoplasm.
- Lobulated surface.
- No communication between cysts and pancreatic duct.
- Tiny enhancing fibrous septae
- Hypervascular enhancement is sometimes seen and can be challenging to differentiate from cystic neuroendocrine tumor.
- A characteristic feature of a serous cystic neoplasm is a central scar, sometimes with calcifications.
  Sometimes the microcystic component of this tumor is difficult to identify on CT.
  MR will better identify the internal architecture.
  MRI is also useful in determining if the cysts communicate with the pancreatic duct or not to differentiate this lesion from a branch-duct IPMN



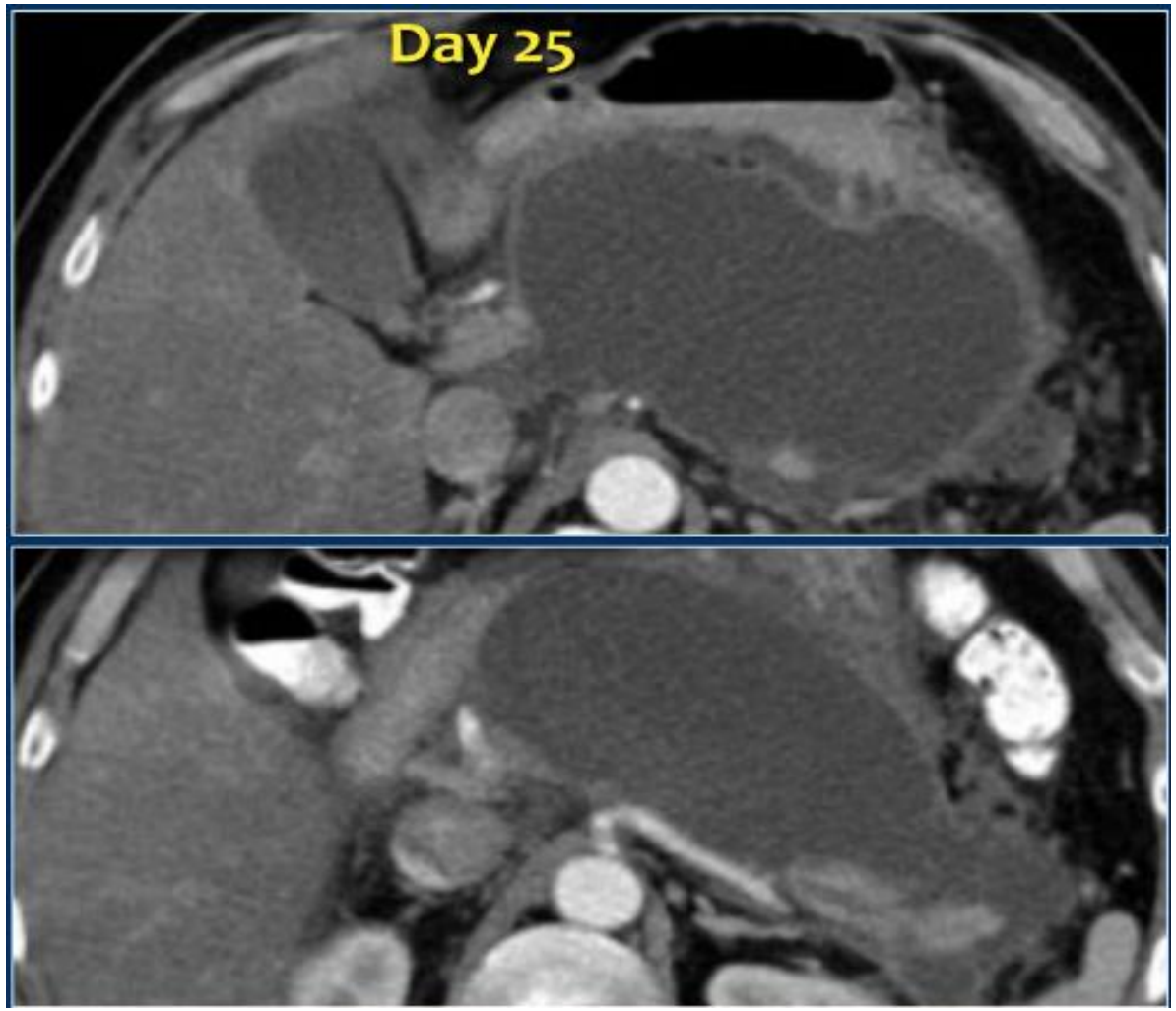
Serous cystic adenomas contain multiple small cysts resulting in a lobulated contour



Hypodense lesion with central calcification in the head of the pancreas with lobulated contour

Walled-off Necrosis - WON

- Based on CT alone it is sometimes impossible to determine whether a collection contains fluid only or a mixture of fluid and necrotic tissue.
- Cystic lesion within or around the pancreas with an area of heterogeneous attenuation non-enhancing (necrotic) tissue, surrounded by a wall



Homogeneous pancreatic and peripancreatic collection, well demarcated with an enhancing wall

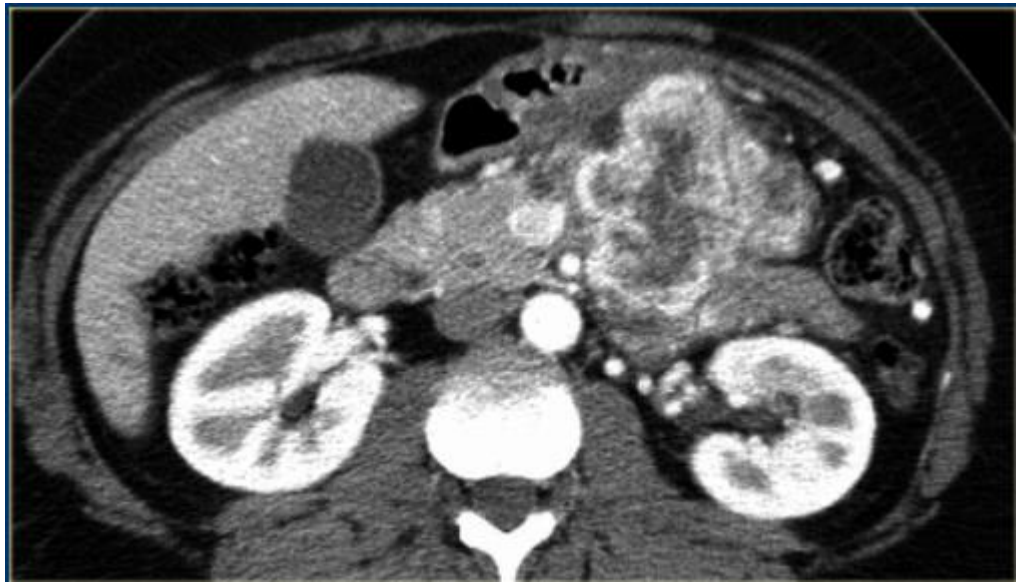
Pseudocyst	Walled-off Necrosis
- > 4 weeks - In interstitial pancreatitis - Homogeneous - fluid density - *Well defined wall* - Adjacent to pancreas - No non-liquid component	- > 4 weeks - In necrotizing pancreatitis - Heterogeneous collection - *Well-defined wall* - Intra- or extrapancreatic

PANCREATIC TUBERCULOSIS

- Incidence - Rare
- Most commonly presents as a solitary lesion with multiple cystic components
- Typically located in the pancreatic body or head
- Peripancreatic lymphadenopathy can be found
- Cystic components mostly appear hypoechoic (sometimes hypo-isoechoic) on ultrasound, hypodense on CT, and hypointense on T1-weighted MR images, and hyperintense on T2-weighted images
- Associated lymph nodes can have a necrotic center (rim enhancement) and/or form conglomerate masses
- Calcifications or dilatation of the pancreatic duct are uncommon features
- Additional findings of gastrointestinal tuberculosis may be present, such as ascites, ileocecal wall thickening (the ileocecal area is the most common location of gastrointestinal tuberculosis), peritoneal or mesenteric masses, splenic and hepatic lesions

Neuroendocrine tumor with cystic degeneration

- Non-functioning endocrine neoplasm--> present as partially cystic lesions
- Also called islet cell tumor
- Most commonly located in the pancreatic tail
- Hypervascular with ring-enhancement (Vs serous cystic neoplasms that enhance from the center and more solid)



CT-image of a neuroendocrine tumor with central necrosis.
Sometimes this can simulate a cystic component.
Notice the peripheral enhancement.

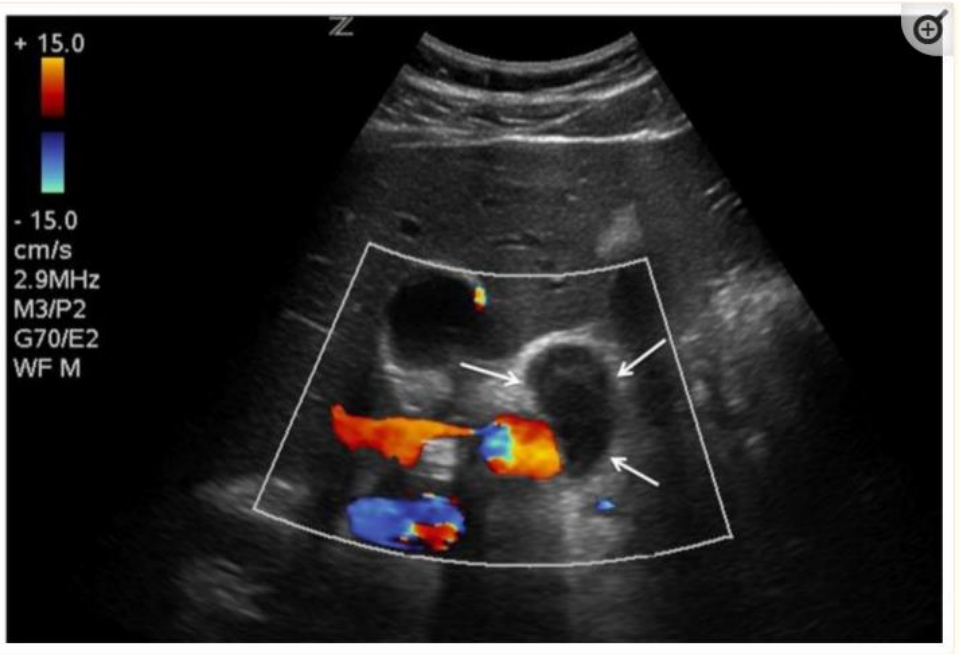
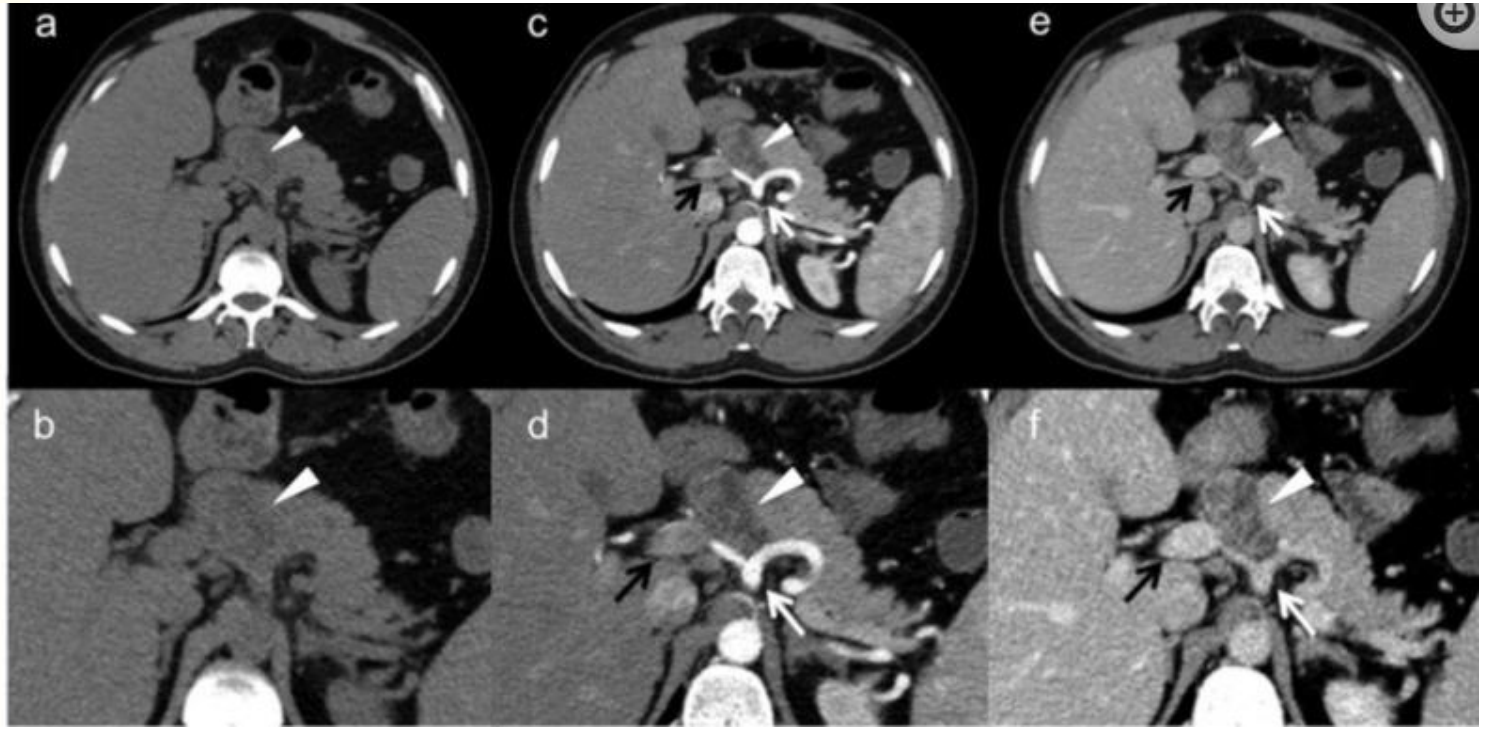


Figure 2

29-year-old male with isolated pancreatic tuberculosis. Ultrasonography was performed using a 3,5MHz conve transducer; color-Doppler image shows no perfusion of a well defined 3,8 × 1,8 cm mass (arrows) with cystic solid components.



Multi-cystic 4,6 × 2,9 cm mass (arrowhead) in the pancreatic head. In figure 3a and 3b the mass appears slightly hypodense. After contrast administration, enhancement in its solid and septated areas can be seen

Ductal carcinoma with cystic features:

- Hypoenhancing with progressive delayed enhancement
- Location:2/3 rd head, rest body and tail
- Associated with ductal obstruction(CBD, PD or both)
- Key features to differentiate from other solid with cystic features are

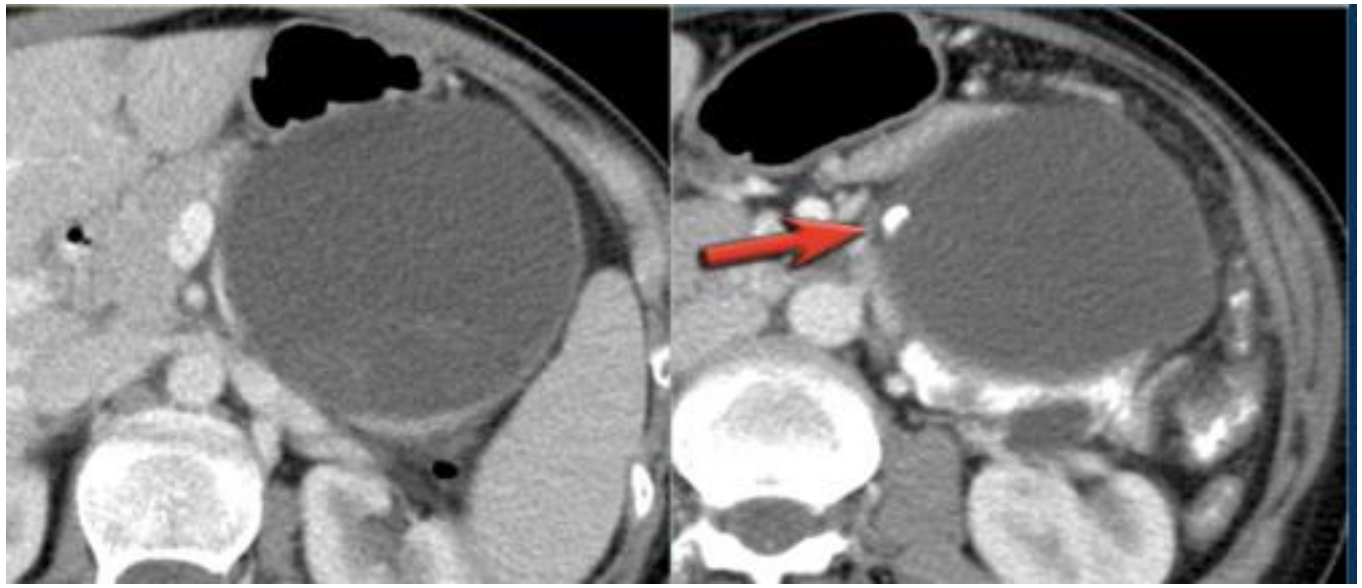
-->Infiltrative pattern

-->Ductal obstruction

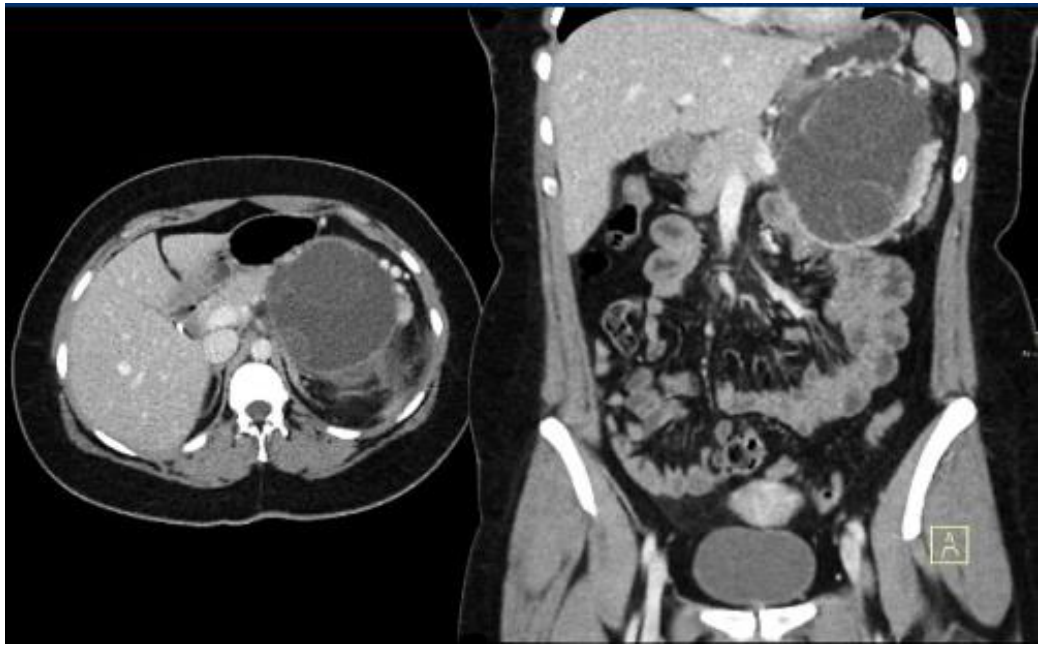
-->Vascular invasion

Mucinous Cystic Neoplasm

- Premalignant tumor - may transform into a mucinous cystadenocarcinoma
- *Exclusively seen in women* - Typically in 'Mother' - median age: 40-50 years
- Macrocystic with thick wall septations.
- Well circumscribed, smoothly margined, delayed enhancing fibrous capsule
- Peripheral calcifications seen in 25%. This finding allows you to make a *specific diagnosis.*
- Location in the tail and body of the pancreas (95%).
- Non-communicating with PD
- Simple fluid signal on T1/T2 , occasionally increased signal on T1
- Most are symptomatic, presenting with nondescript abdominal pain
- ER/PR positive



Large cyst in the pancreatic tail with peripheral calcification.
There is subtle septation as seen on the left image and wall thickening



Non-lobulated cystic lesion in the pancreatic tail with internal enhancing septation without connection to the pancreatic duct

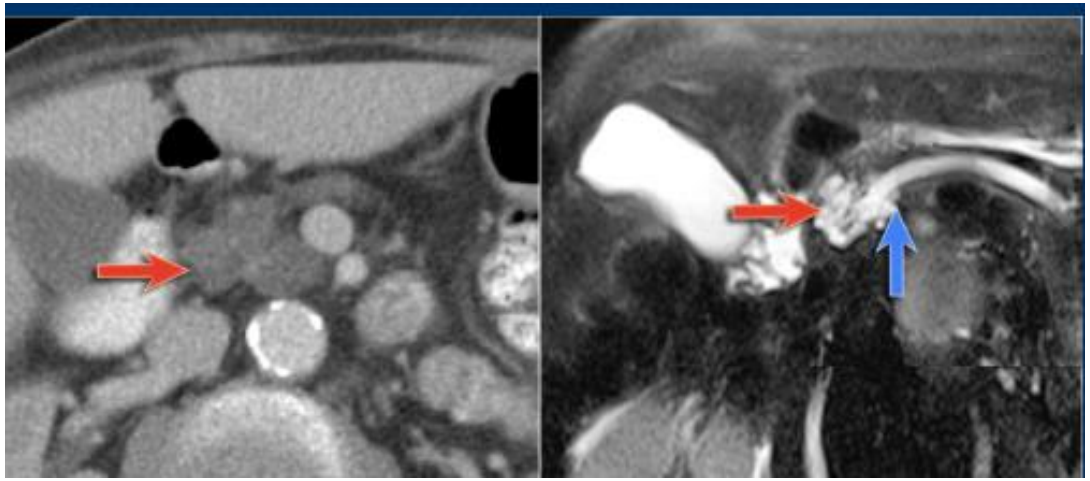
Mucinous	**Vs**	**Serous**
40-50 yrs females		> 60 yrs, females
6 or fewer cysts		Multiple cysts
Each cyst > 2 cm		Each cyst < 2 cm
Mucinous fluid		Glycogen rich cells
Peripheral calcifications		Central stellate scar, can calcify
Malignant potential		No malignant potential
Surgical		Non surgical

Intraductal Papillary Mucinous Neoplasm

- Most common of cystic neoplasms
- Mucin producing tumor in main pancreatic duct or branch-duct.
- Location: Any (pancreatic head >> tail and corpus) .
- Presents as a cluster of micro- and macrocystic lesions with septations
- Must have communication with pancreatic duct. Best seen with MRCP.
- Can be multifocal.
- Branch-duct type can look like other cystic neoplasms
- Cyst +/- solid components

Malignant potential of IPMN:

- Main duct lesion
- Mixed main duct/ branch duct lesion
- Mural nodule
- Dilated MPD > 3 mm
- Dilated CBD > 8 to 10 mm

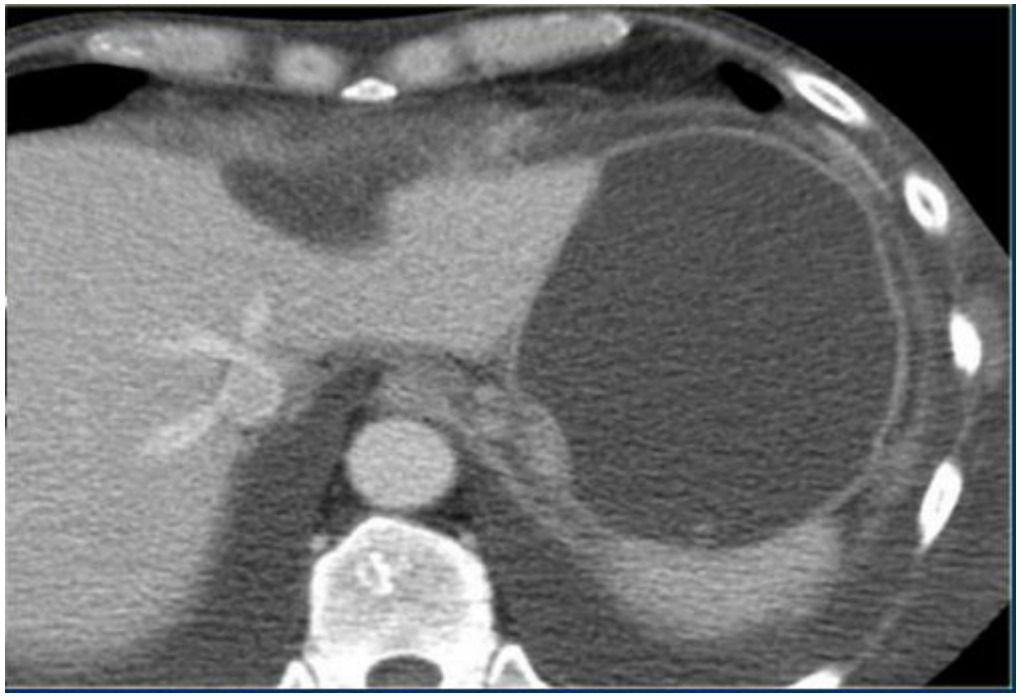


CT-image shows a hypodense lesion in the pancreatic head.

On MRCP the cystic nature is better appreciated and there is a connection to a widened duct (blue arrow).

PSEUDOCYST:

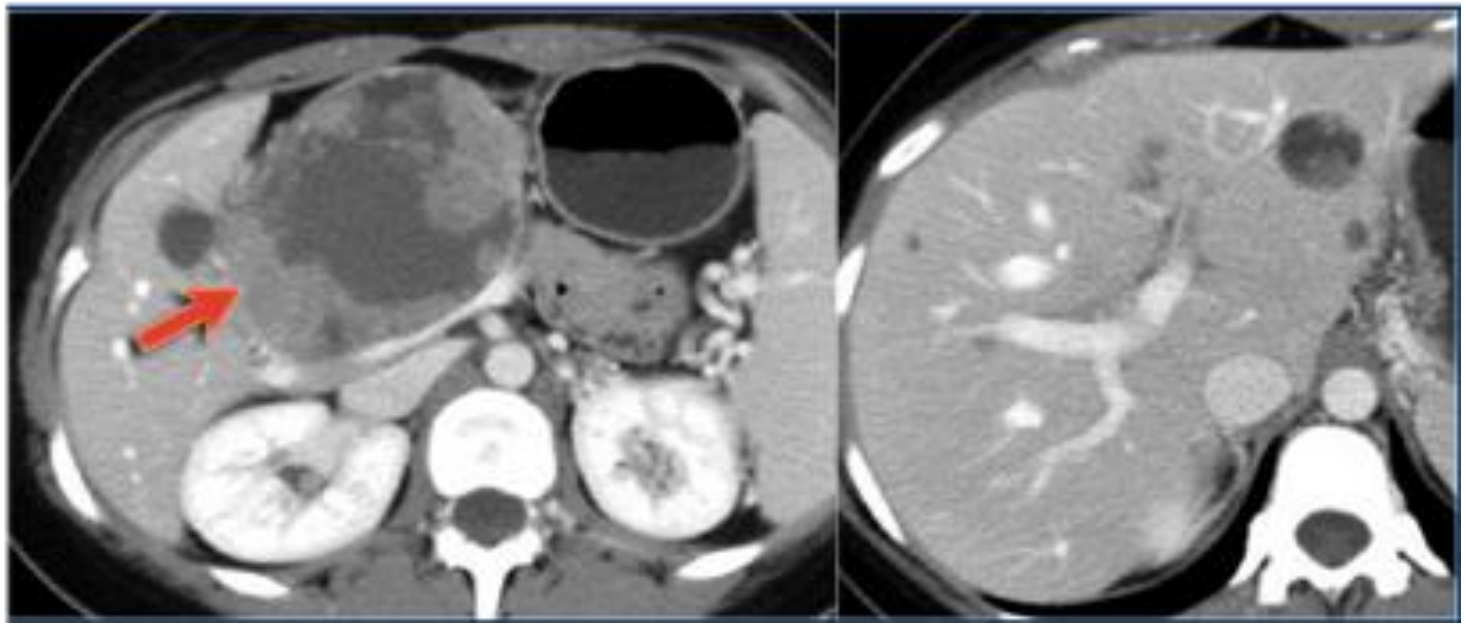
- Unilocular cyst without solid components, central scar or wall calcification.
- Collection of pancreatic enzymes, blood and necrotic tissue.
- Debris within a cystic lesion is a specific MR finding.
- History of pancreatitis or abdominal trauma.
- Cysts develop in 4-6 weeks - usually decrease in size over time - sometimes enlarge or become infected.
- Found in any part of the pancreas or anywhere within the abdomen and sometimes even in the chest.
- Pancreatic calcifications, irregular pancreatic duct dilatation and inflammatory changes in the peripancreatic fat should be looked.



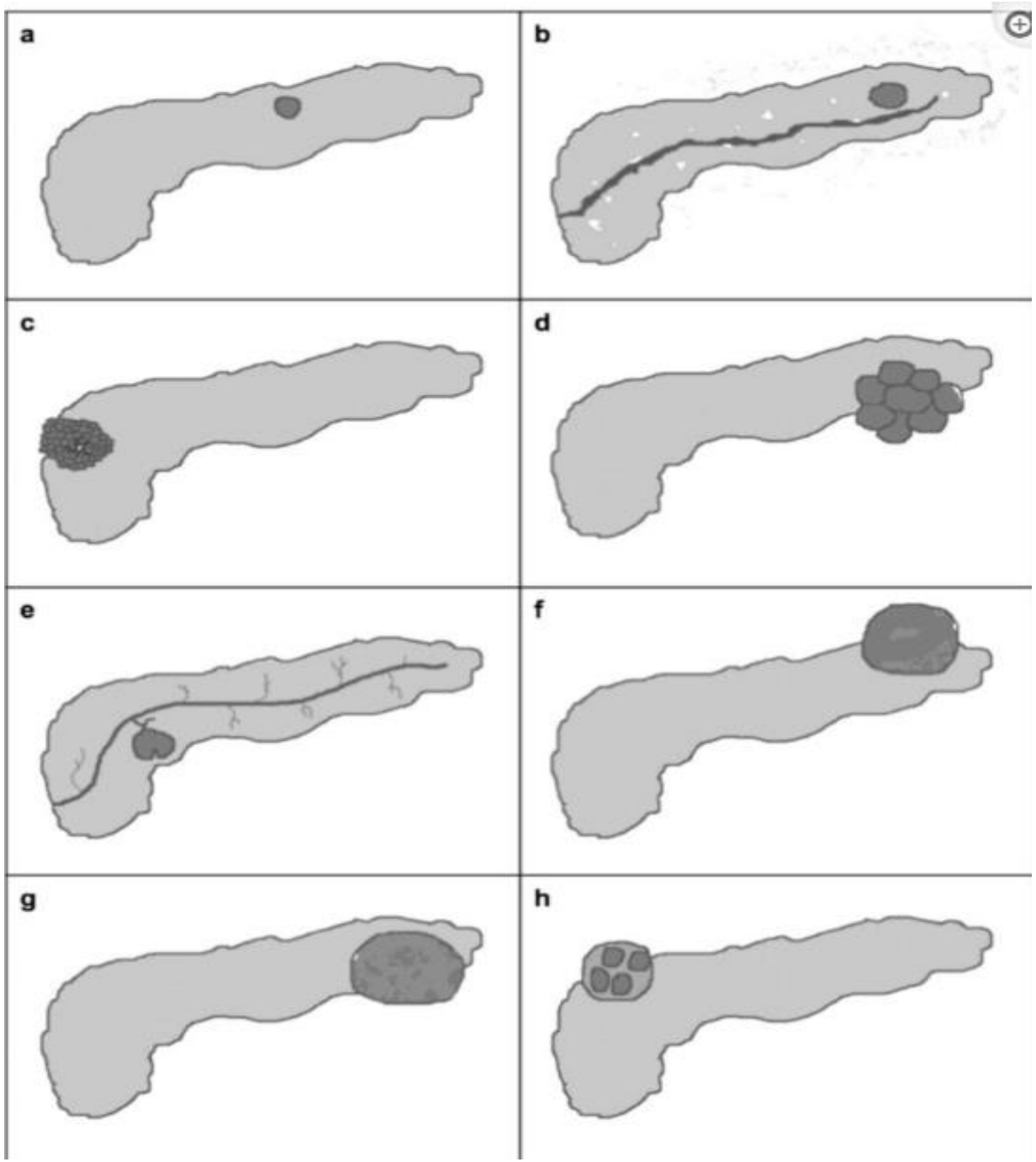
CT demonstrates a large cyst in the upper abdomen in a patient who had an acute pancreatitis (Fig).
Notice that there is also some ascites and pleural fluid.
There is wall enhancement.

Solid Pseudopapillary Neoplasm

- Very uncommon neoplasm seen in women 20-30 years (daughter).
- Solid and cystic neoplasm with capsule and with early 'hemangioma-like' enhancement.
- Peripheral calcifications are present in approximately one third of cases - similar to mucinous cystadenomas.
- Thick, well-defined capsule and may show areas of hemorrhage, which can result in a heterogeneous appearance in which fluid-debris might be seen .
- Therefore, its pattern of contrast enhancement is described as highly characteristic and can contribute to the diagnosis: peripheral rim enhancement in their thick fibrous capsule and progressive heterogeneous fill-in on dynamic enhanced images



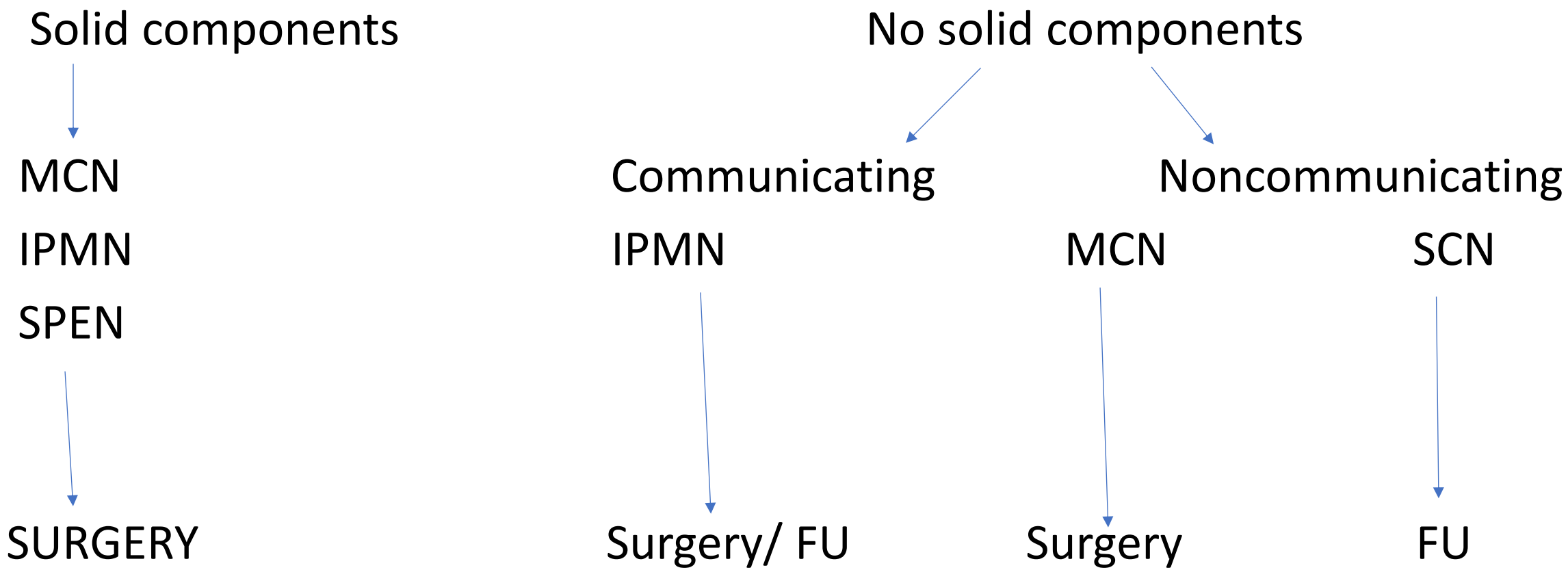
large mass in the pancreatic head
and metastases in the liver.
In the center there is lack of
enhancement due to cystic or necrotic
degeneration



(a) epithelial cyst; (b) pseudocyst typically results from pancreatitis, which can also lead to calcifications of the pancreas (white), to irregular pancreatic duct dilatation and to inflammatory changes in the peripancreatic fat; (c)* serous cystadenoma consists of microcystic lesions with a star-like scar (black) with calcifications (white) in the center; (d)* mucinous cystadenoma presents with macrocystic lesions with peripheral calcification (white); (e)* intraductal papillary mucinous neoplasm of the side-branch, which leads to pancreatic duct dilatation because of its communication with the pancreatic duct; (f and g) a solid pseudopapillary tumor and a nonfunctioning islet cell tumor are extremely difficult to differentiate in images, because both tend to hemorrhage (grey filling), can show calcifications (white) and can have a varying amount of cystic components (dark grey); (h) pancreatic tuberculosis, a solid mass with multiple cystic components.

Diagnosis	US	CT	MRI	Contrast enhancement
Epithelial cyst	anechoic	hypodense	T1: hypointense, T2: hyperintense	might have mild enhancement of the thin epithelial wall
Pseudocyst	anechoic or hypoechoic, pancreatic calcifications might be seen	hypodense, pancreatic calcifications and inflammatory changes in the peripancreatic fat might be seen	T1: hypointense, T2: hyperintense, Debris or hemorrhage can change the intensity	might have mild enhancement of the thin fibrous capsule, no inner enhancement
Serous cystadenoma	inhomogeneous, hypoechoic or anechoic mass	hypodense, central calcified scar (20–30%), honeycomb pattern due to multiple microcysts, microcysts can mimic solid mass	T1: hypointense, T2: hyperintense, honeycomb pattern due to multiple microcysts	in the fibrous scar (late enhancement), wall and septa
Mucinous cystadenoma	hypoechoic, macrocystic (>2cm)	hypodense, uni- or multilocular, peripheral calcification (10–25%)	T1: hypointense (fluid-like content) but may vary if cysts content gets thicker, T2: hyperintense, uni- or multilocular	in septa and cyst wall
IPMN	hypoechoic, pancreatic duct dilatation	hypodense, pancreatic duct dilatation	T1: hypointense, T2: hyperintense, pancreatic duct dilatation, communication of cystic mass with the pancreatic duct best seen on MRCP	usually absent, may occur in septa
Solid pseudopapillary tumor	heterogeneous mass with anechoic or hypoechoic (cystic areas) and hyperechoic (solid areas) components	heterogeneous hypodense thick-walled mass, varying amount of cystic components, peripheral calcification (30%)	heterogeneous, due to varying amount of solid, cystic and hemorrhagic components	in the solid parts, peripheral rim enhancement in thick fibrous capsule, progressive heterogeneous fill-in on dynamic enhanced images
Non-functioning islet cell tumor	heterogeneous mass with anechoic (cystic areas) and hyperechoic (solid areas) components	heterogeneous, varying amount of cystic and necrotic components, calcifications	heterogeneous, due to varying amount of solid, cystic and hemorrhagic components	strong arterial enhancement in solid periphery
Isolated tuberculosis	mass with multiple hypoechoic (sometimes hypo-isoechoic) cystic components	mass with multiple hypodense cystic components	mass with cystic components which presents T1: hypointense T2: hyperintense	in septa, rim enhancement of lymph nodes

Cystic lesions of pancreas



Congenital cytomegalovirus infection

- NECT showing intracranial calcifications, predominantly peri-ventricular.