Imaging in acute pancreatitis

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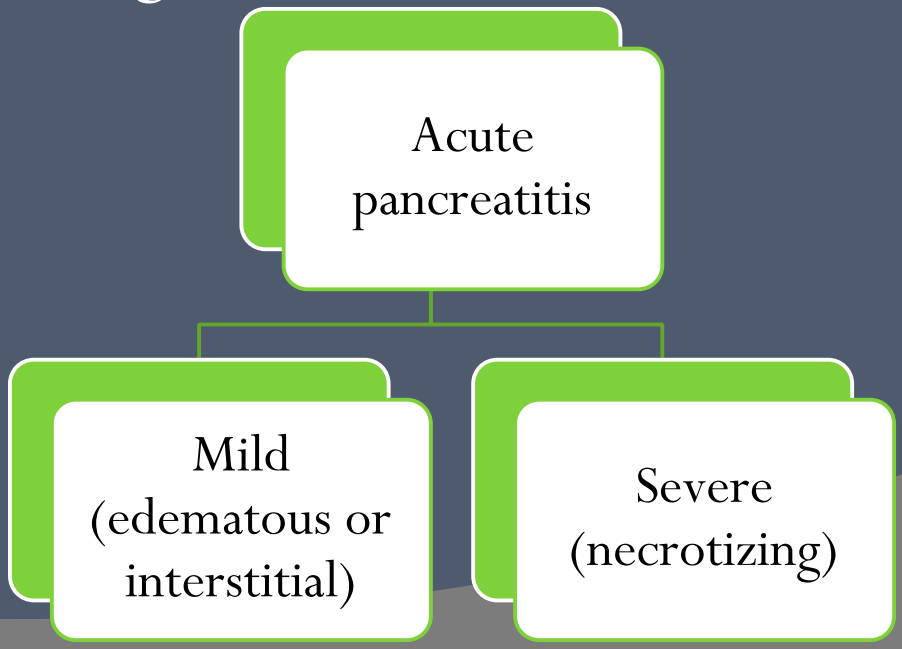
2ND YR PG RADIODIAGNOSIS

INTRODUCTION

- Imaging plays a major role in the management of acute pancreatitis.
- The main role of a radiologist is to grade the severity of the disease and identify any complications if present.
- Image guided inverventional procedures are nowadays being preferred.

CLASSIFICATION OF ACUTE PANCREATITIS

- According to the International Symposium On Acute Pancreatitis, held in 1992.
- Based on presence of Multi-organ failure and appearance of gland on CECT.



COMPLICATIONS

- FLUID COLLECTIONS
- INFECTION OF THE NECROSIS
- PSEUDOCYST
- ABSCESS
- VASCULAR
- G.I. INVOLVEMENT
- SYSTEMIC COMPLICATIONS

METHODS OF INVESTIGATION

- **CONVENTIONAL RADIOGRAPH**
- **BARIUM STUDIES**
- **ULTRASONOGRAPHY**
- **CT (PLAIN & CONTRAST)**
- **MRI**
- **MRCP**
- **EUS**
- **INTERVENTIONAL PROCEDURES**

CONVENTIONAL RADIOGRAPHY

- Conventional radiograph of the chest and abdomen are often abnormal during an episode of acute pancreatitis , but rarely yield a specific diagnosis
- Findings are

a) gas filled duodenal cap & loop

b) sentinel loop sign

c) small bowel ileus

d) colon cut-off sign

e) gas/calcification within pancreas

f) pleural effusions & bibasal atelectasis.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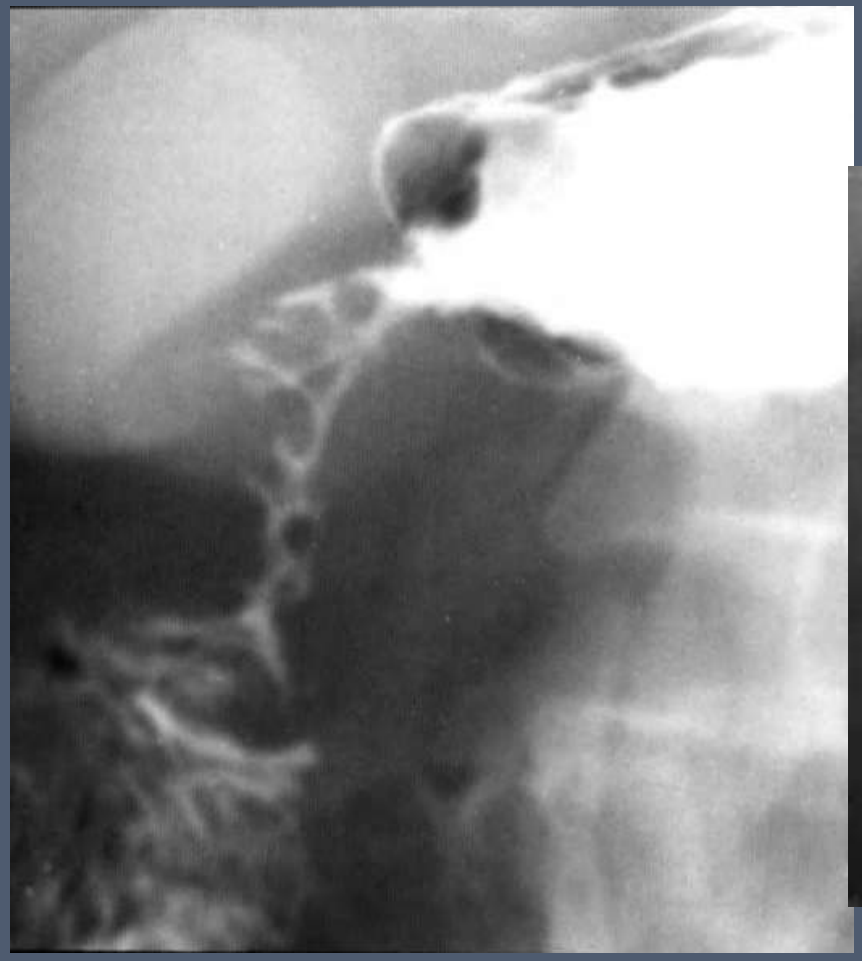
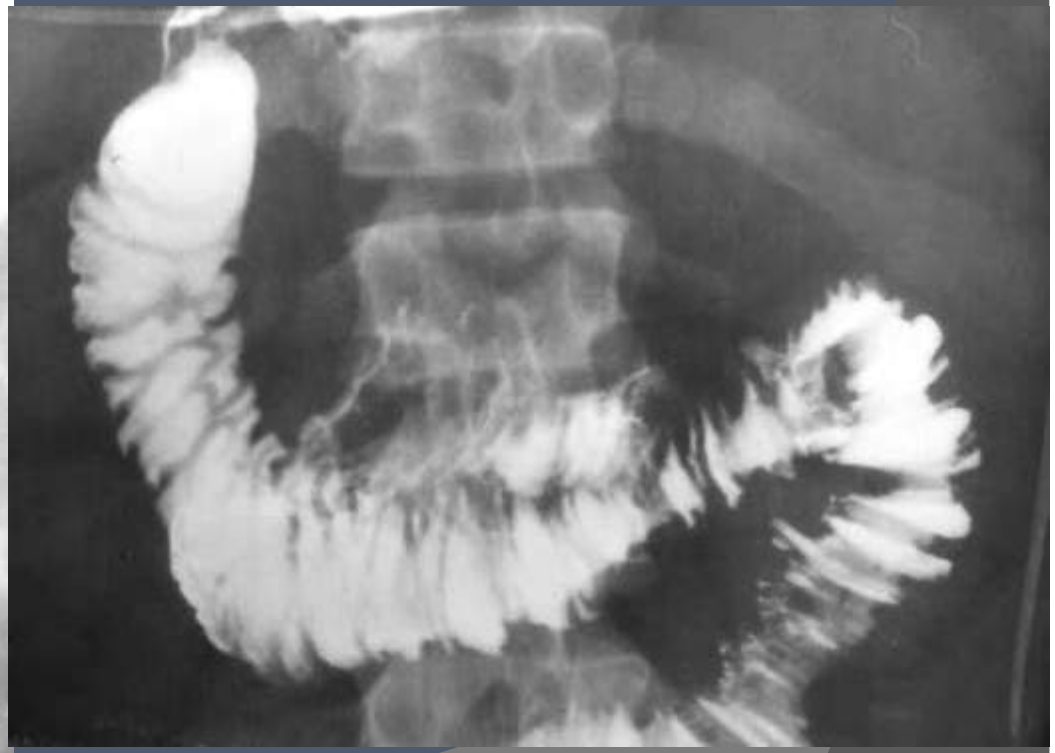
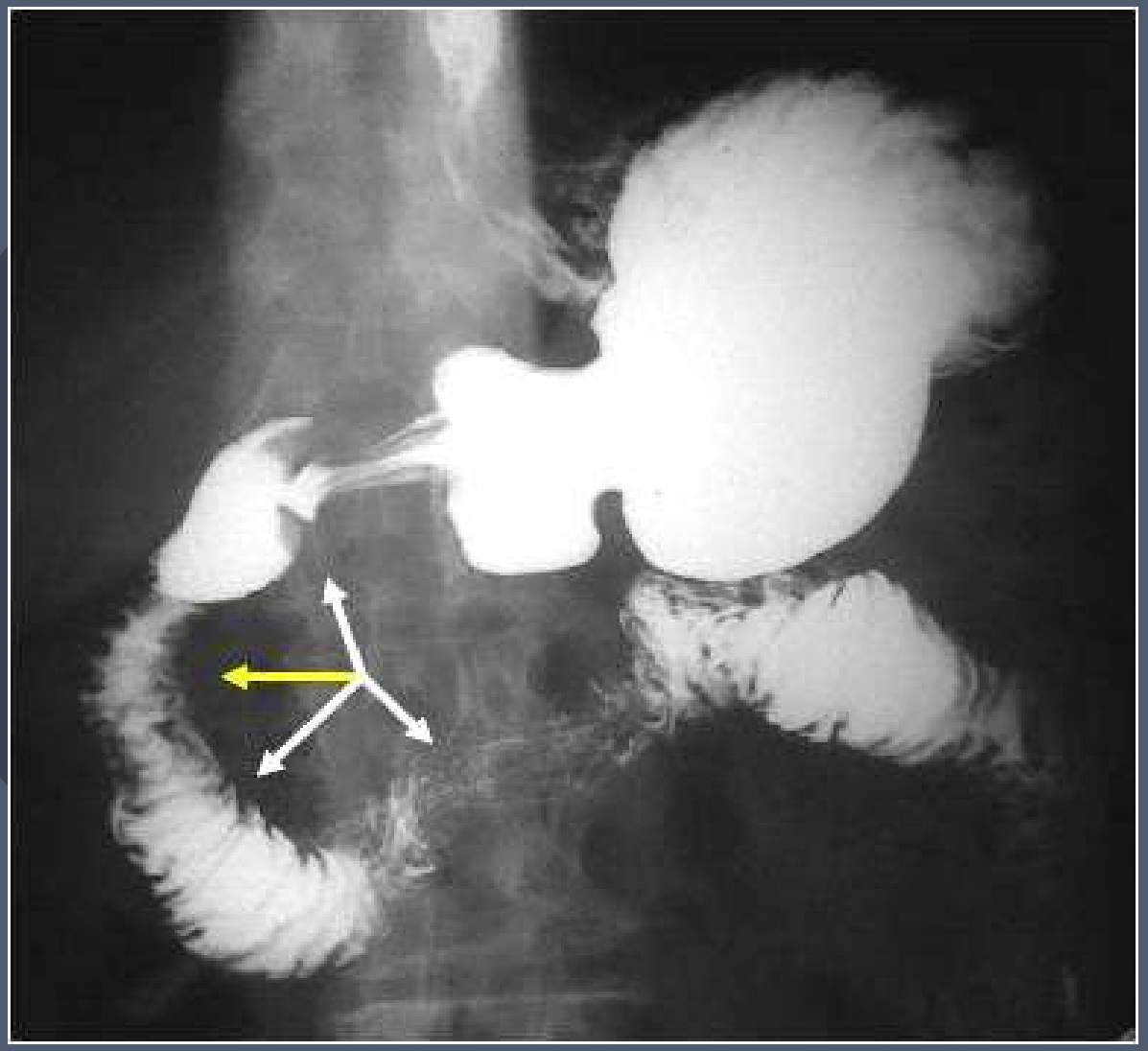
BARIUM STUDIES

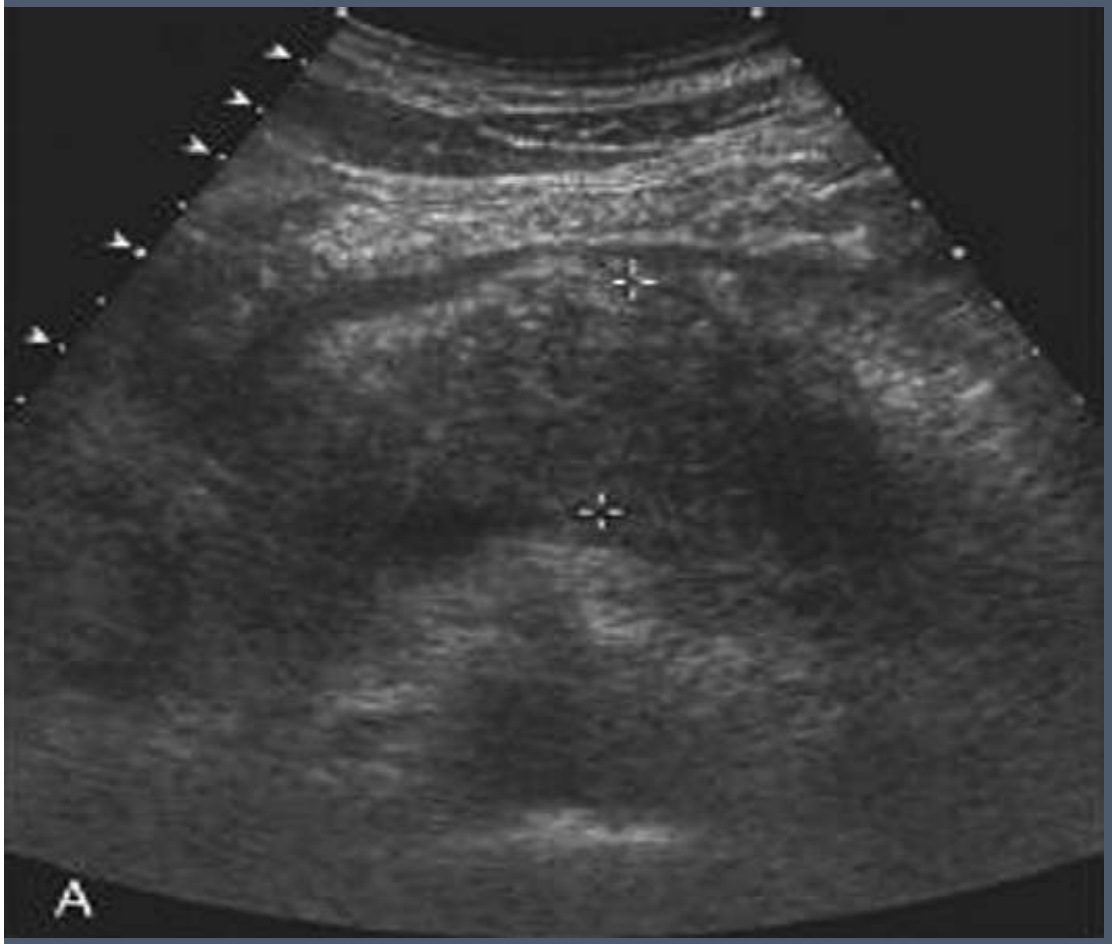




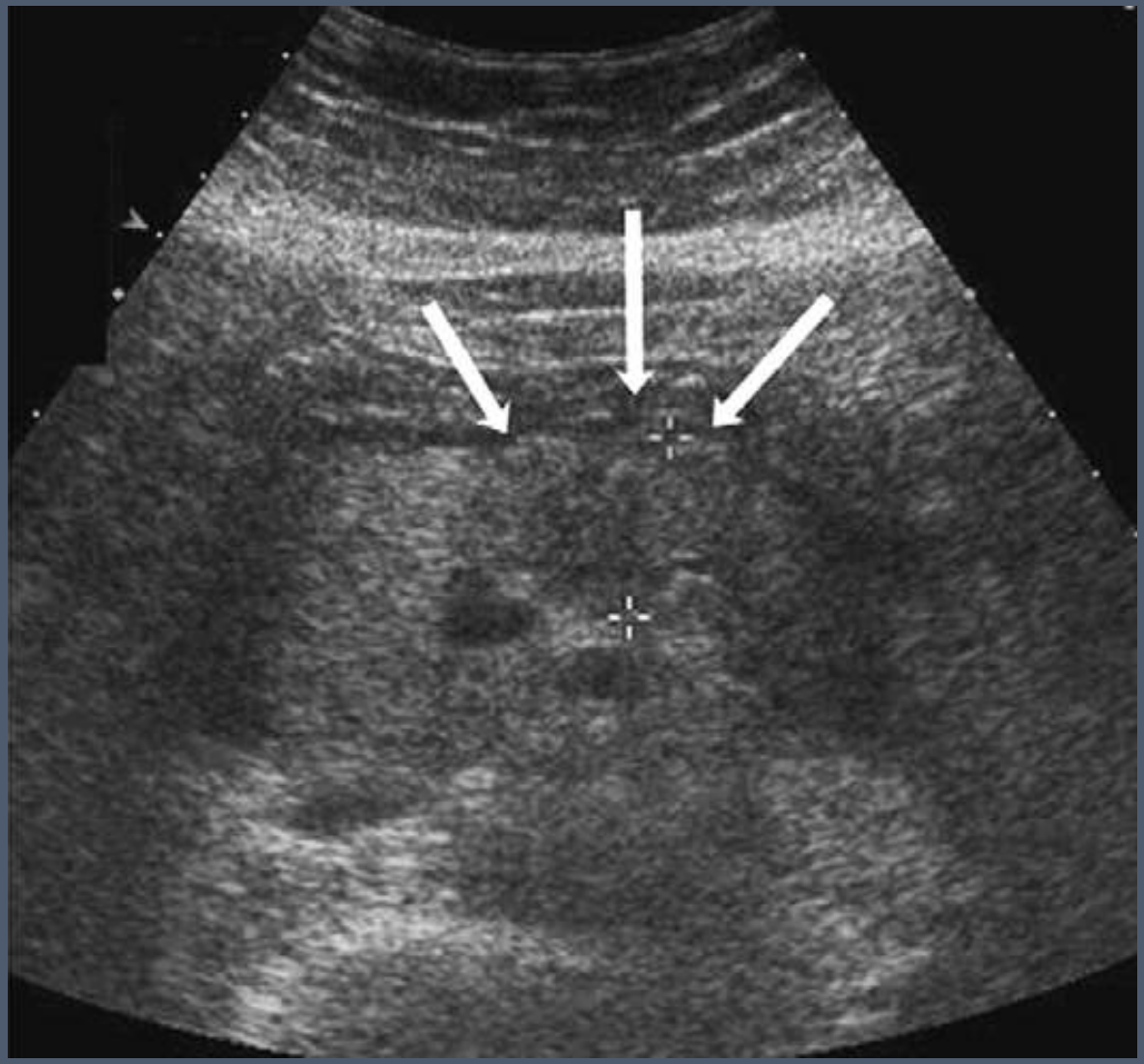


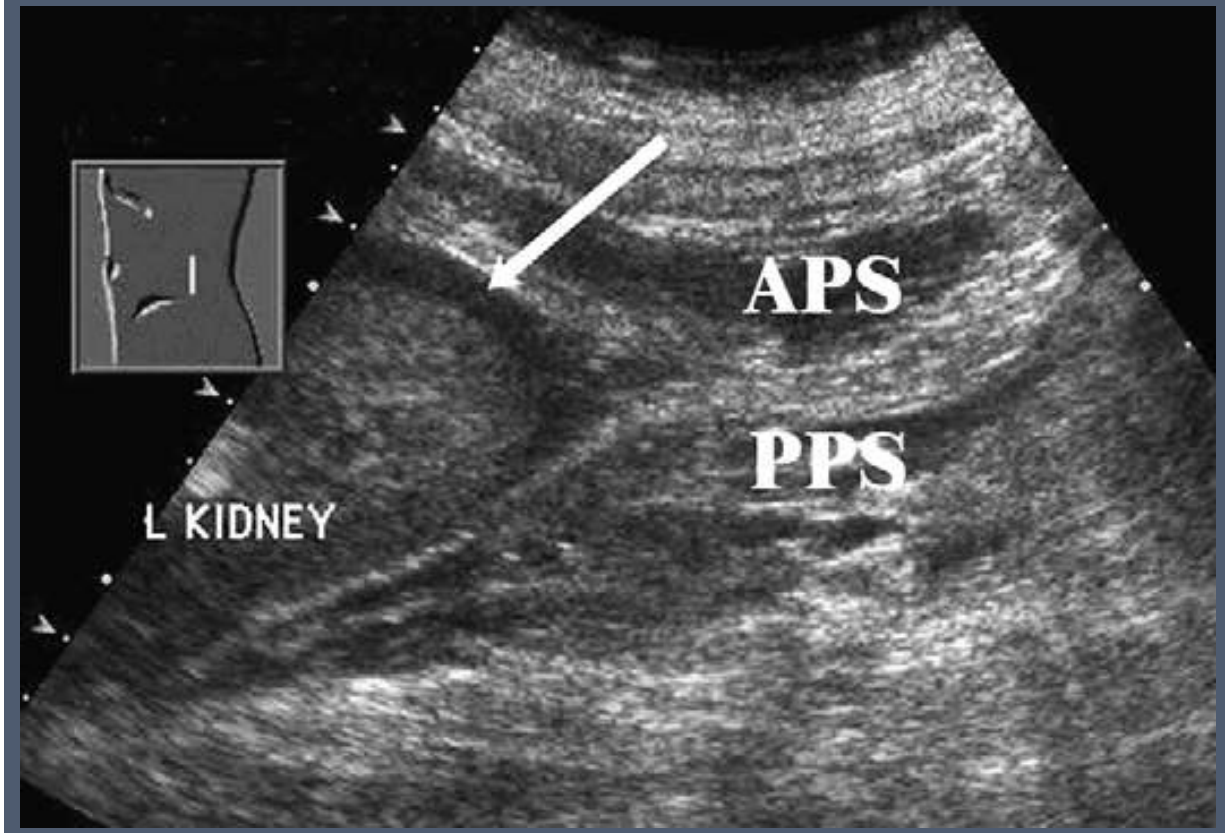
ULTRASONOGRAPHY

- US to detect an underlying treatable cause such as cholelithiasis.
- In mild acute pancreatitis(70–80%), the US appearances may be entirely normal but common findings include generalized (or less commonly, focal) enlargement of the gland with reduced reflectivity.
- Margins may be difficult to define and peripancreatic fluid may be visualized.
- In patients with high alcohol intake hepatic steatosis may be seen.
- Doppler imaging to rule out or identify vascular complications.

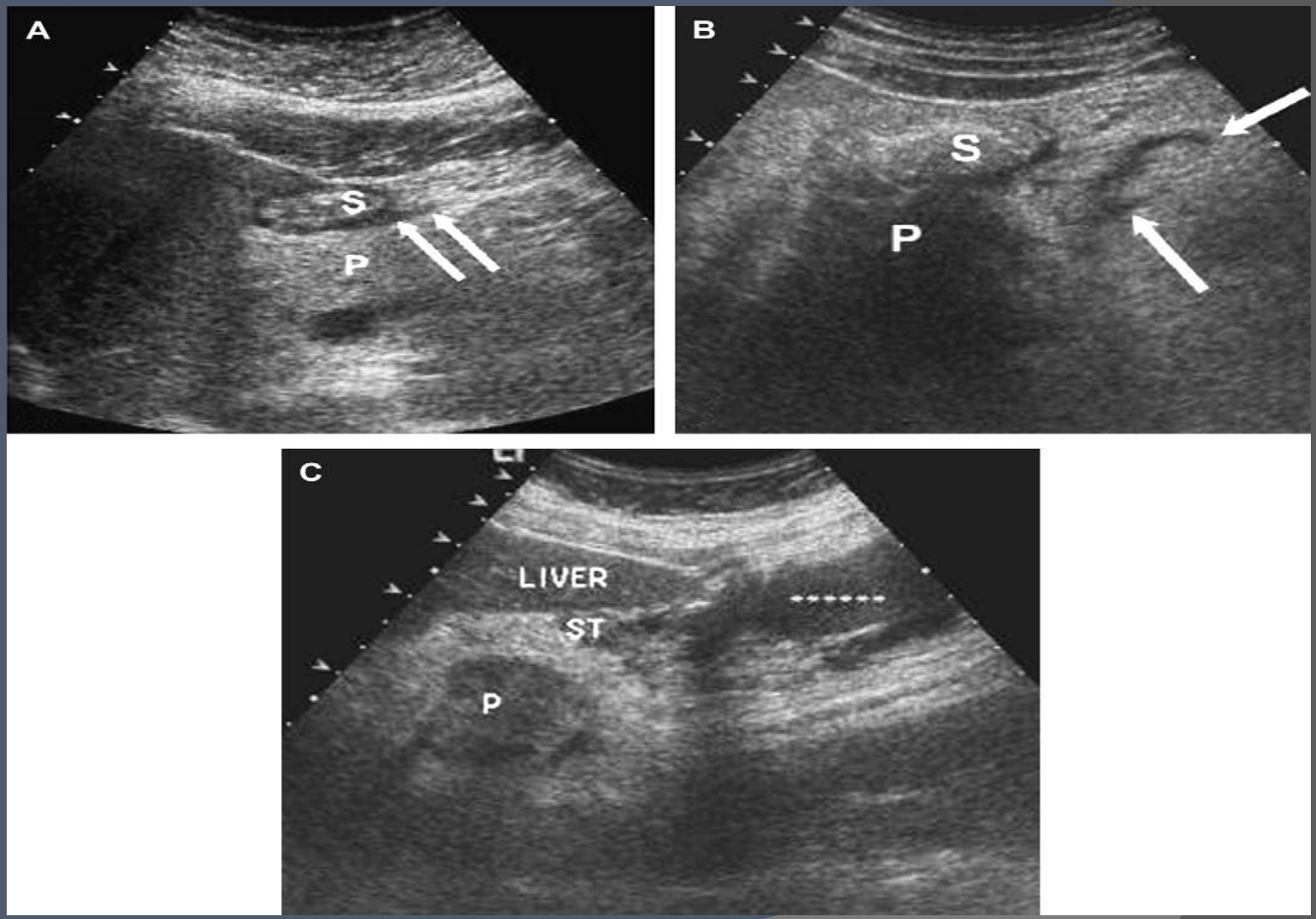


The criterion used for enlargement of the pancreas is >= 23 mm AP dimension at the level of the SMA. This measurement is three standard deviations above the mean.





Multiple anatomic areas of inflammation are common in acute pancreatitis.
3 retroperitoneal spaces are affected in this patient:(APS), PS (arrow) and (PPS)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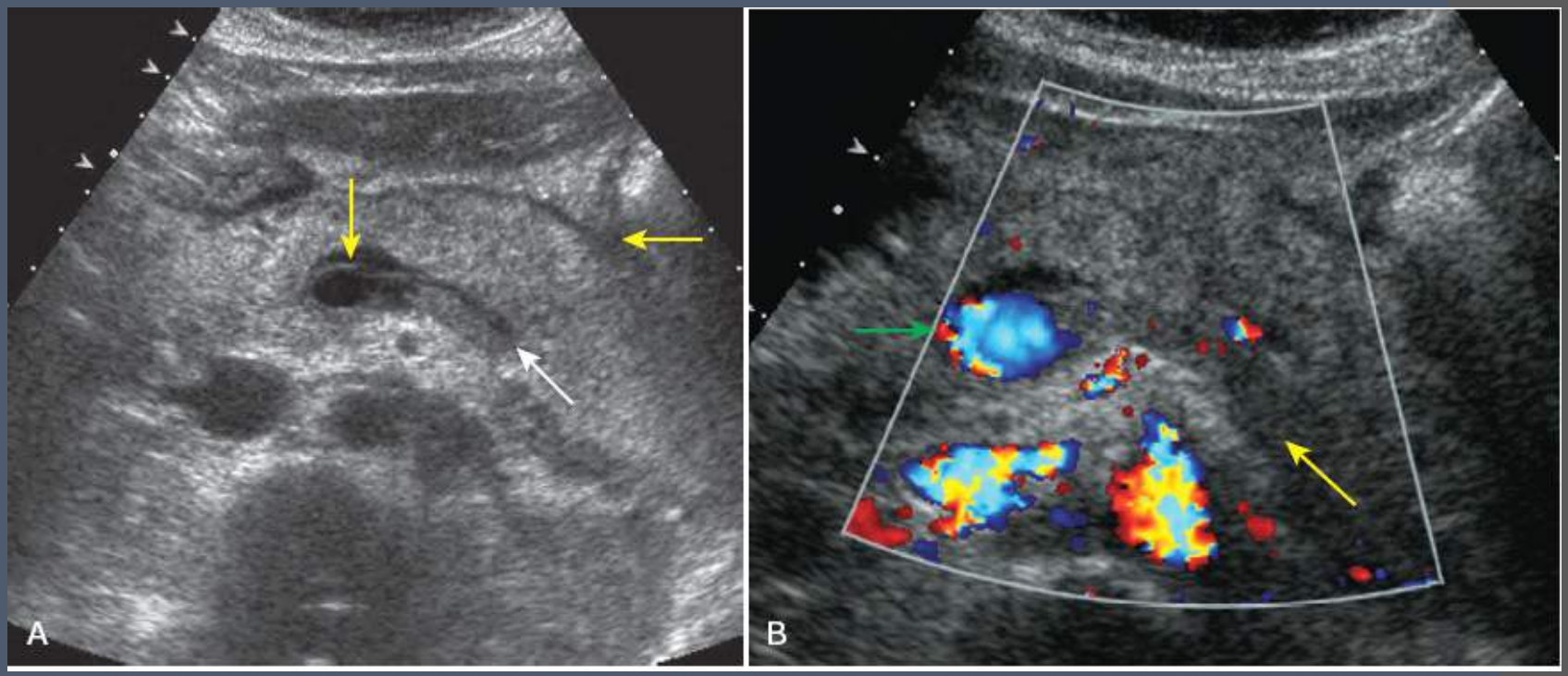
A
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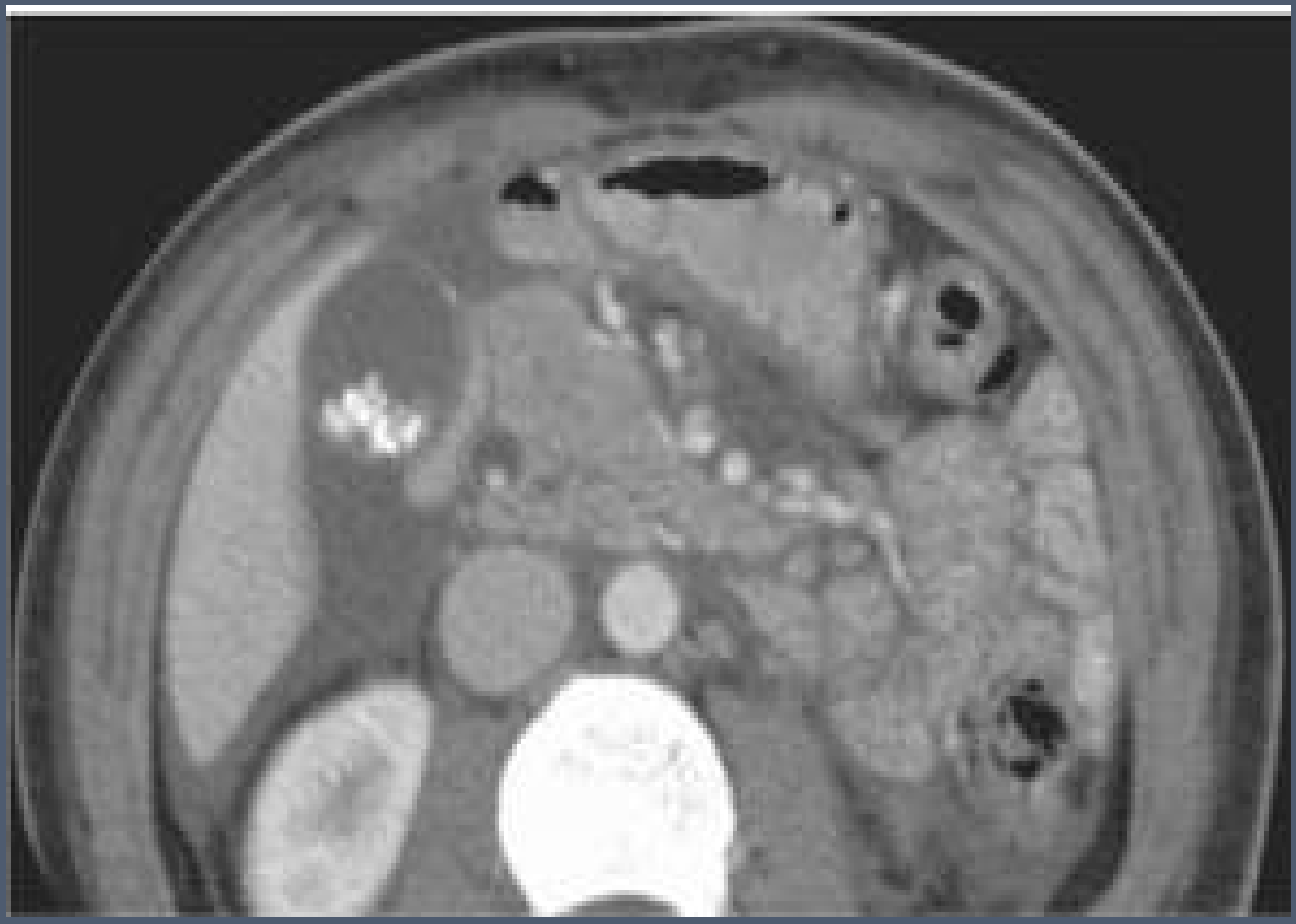
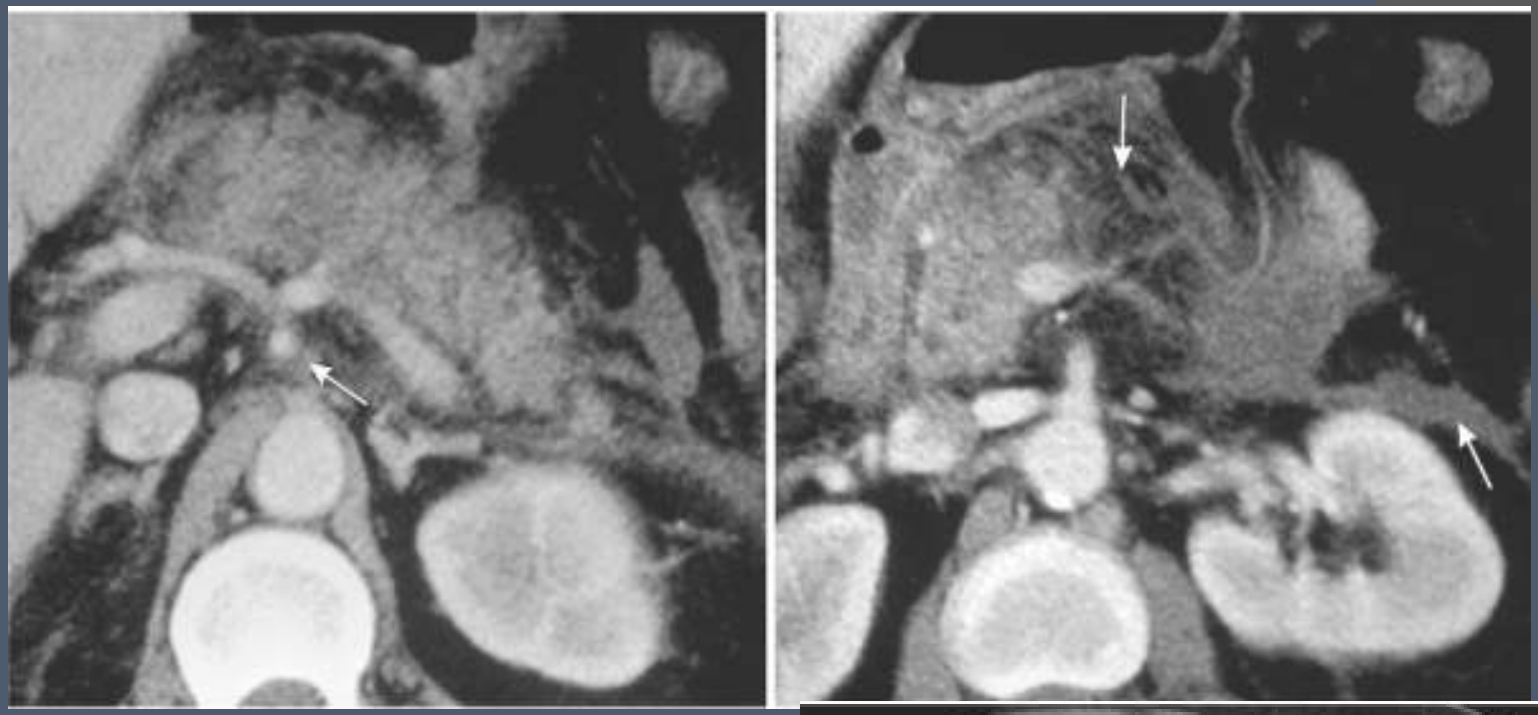
COMPUTED TOMOGRAPHY

- CECT is the most reliable imaging modality for the staging but requires meticulous technique.
- Thin sections during maximum pancreatic enhancement should be obtained.
- Helical technique : administration of oral neutral contrast (water) with an IV iodinated contrast agent volume of 100–150 ml injected at 3 ml s^{-1} with a 30 and 70s data acquisition delay to visualize the pancreas in both the arterial and portal venous phases of enhancement.



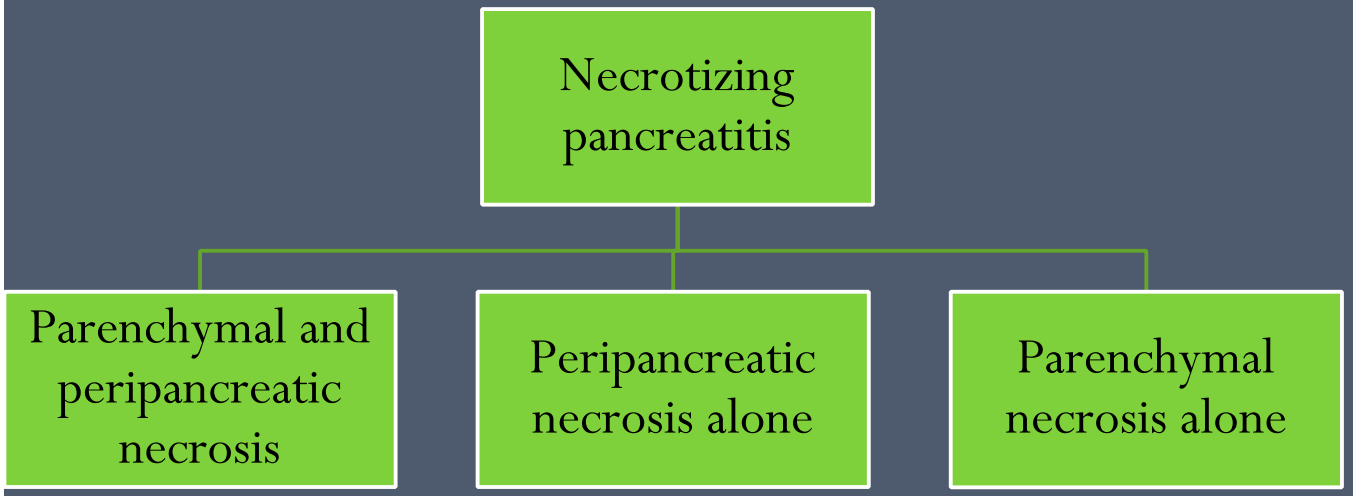
MILD ACUTE PANCREATITIS

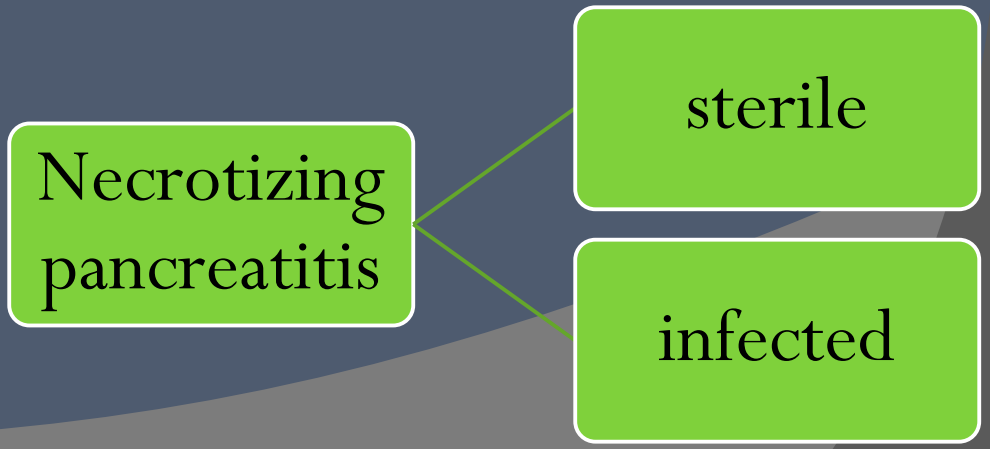
- If the inflammation is very mild the gland may appear normal.
- More commonly →an enlarged gland with patchy high attenuation in the peripancreatic fat is noted.
- Cuffs of fluid may be seen around adjacent vessels.
- Thickening of fascial planes may be noted.
- The gland shows uniform enhancement.



MILD ACUTE PANCREATITIS

SEVERE ACUTE PANCREATITIS





GLAND NECROSIS

- Hallmark of severe acute pancreatitis.
- Necrotic tissue is seen as areas of non-enhancement within the pancreatic parenchyma
- Gets Infected in 20–70% and is responsible for an estimated 80% of deaths.
- The presence of gas bubbles within an area of necrotic tissue is highly suggestive of infection but can also be caused by a fistula to the GIT.
- Confirmation requires FNA
- If confirmed surgical intervention is indicated

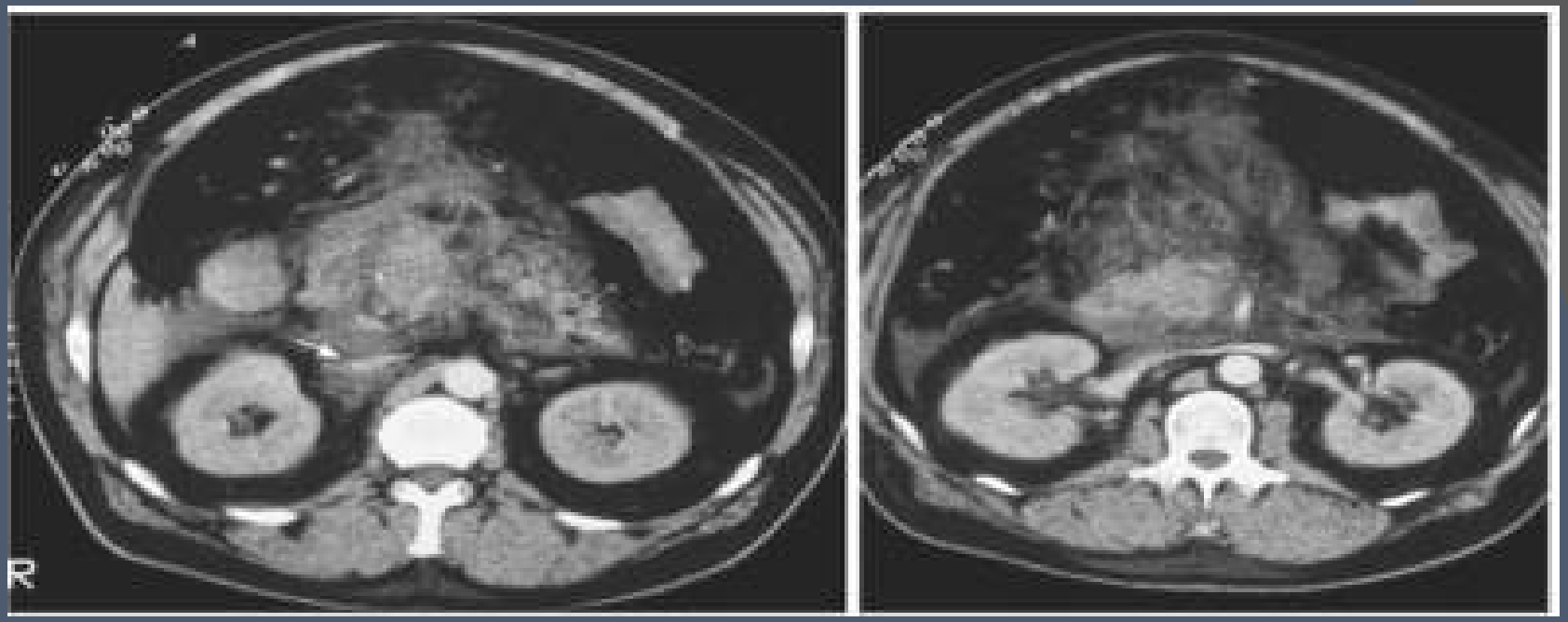
MODIFIED CTSI

CT Grade	SCORE
NORMAL PANCREAS	0
INFLAMMATION – PARENCHYMA/ PERIPANCREATIC FAT	2
PANCREATIC OR PERIPANCREATIC FLUID COLLECTION OR PERIPANCREATIC FAT NECROSIS	4

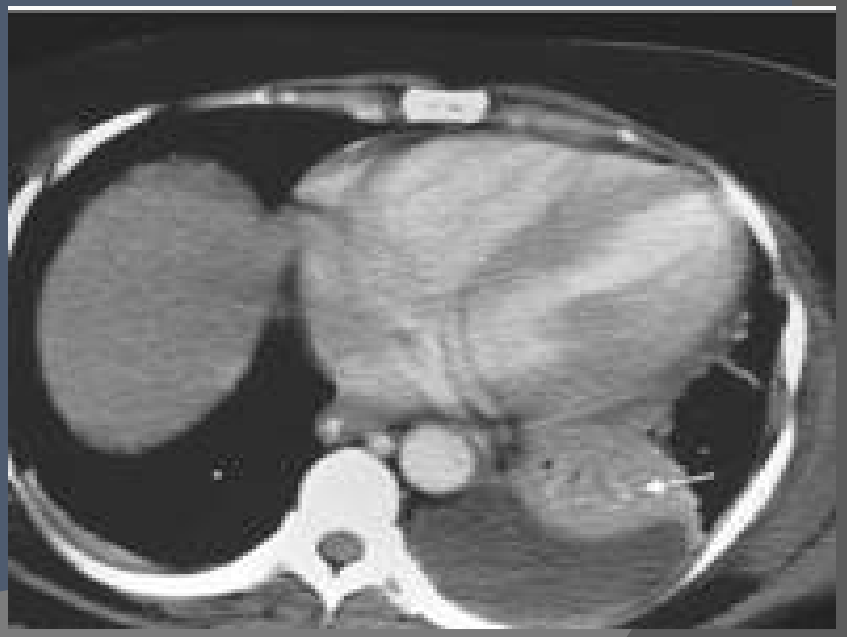
PERCENTAGE NECROSIS	SCORE
0	0
≤ 30%	2
>30%	4

EXTRAPANCREATIC COMPLICATIONS	SCORE
NIL	0
PRESENT	2

TOTAL	SEVERITY
0-2	MILD
3-7	MODERATE
8-10	SEVERE



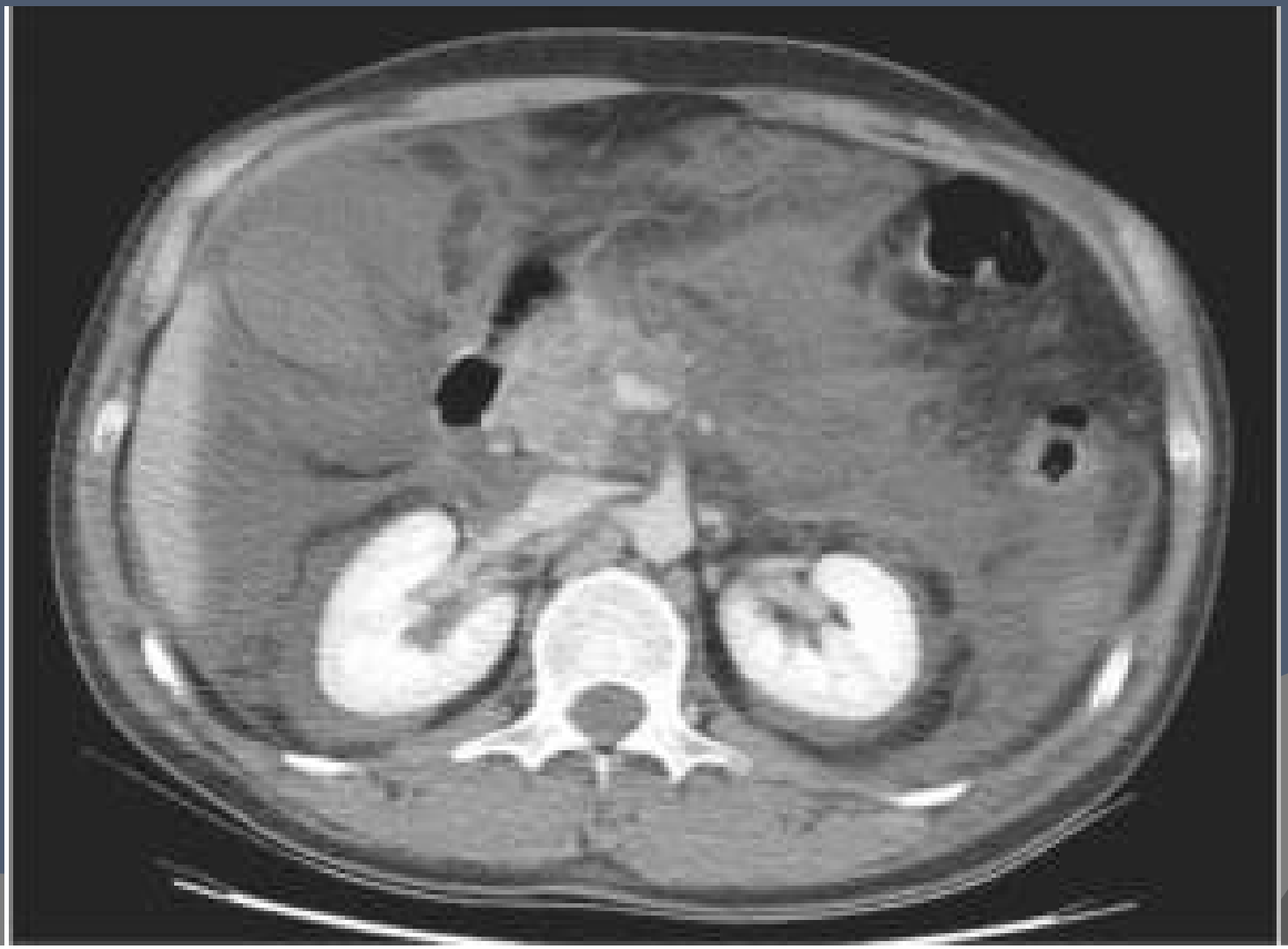
MODERATELY SEVERE ACUTE PANCREATITIS.



FLUID COLLECTIONS AND PSEUDOCYSTS

- **Fluid collections arise within or adjacent to the pancreas in approximately 40%**
- **In more than half resolve spontaneously without clinical sequelae.**
- **Appear as ascitic collections within the peritoneal or retroperitoneal spaces.**
- **In other cases they persist and over several weeks develop into pseudocysts, which classically have a fibrous capsule.**

FLUID COLLECTIONS



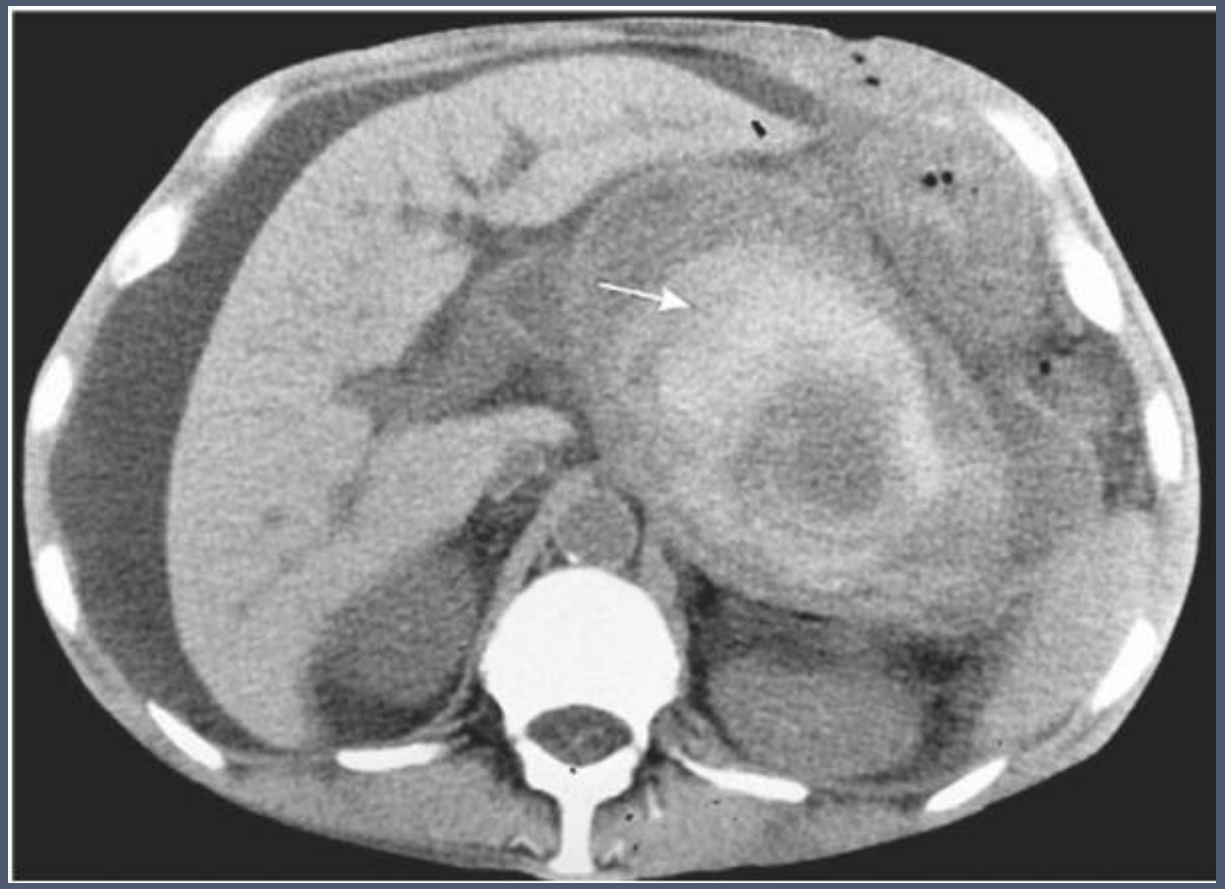
PANCREATIC PSEUDOCYST

- **Irrespective of the wall of the collection, pseudocyst is defined as any fluid collection persisting for more than 4 weeks**
- **More than 50% of pseudocysts resolve spontaneously.**
- **Pseudocyst appears as a well defined fluid attenuation lesion on CT, and if sterile no enhancement of the wall is noted.**
- **Complications include rupture, infection , haemorrhage, pain, biliary or pancreatic duct obstruction , or gastrointestinal tract involvement**
- **Effective treatment may be provided by percutaneous catheter drainage following full pre-drainage evaluation**

PANCREATIC PSEUDOCYST

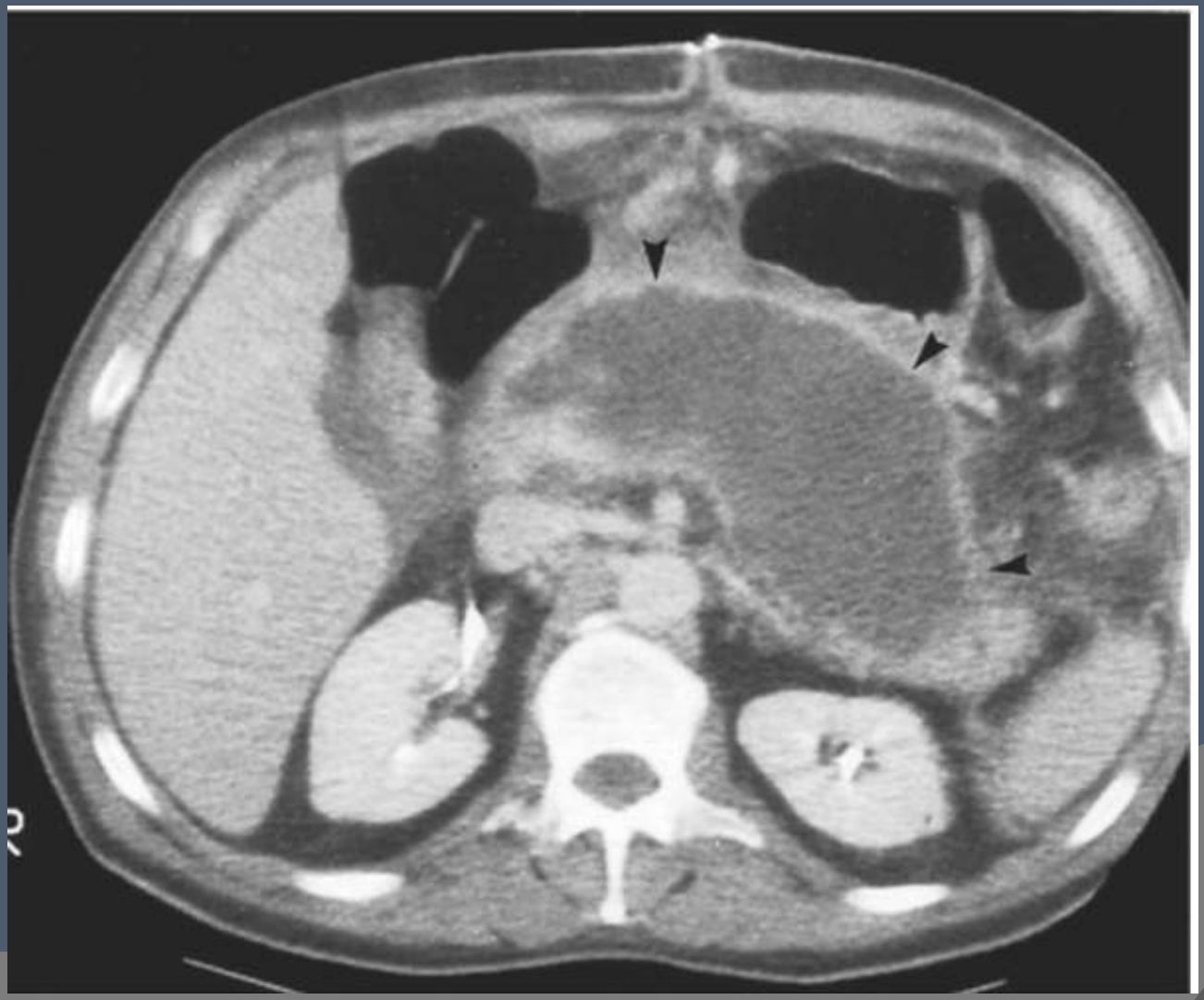
INFECTED PSEUDOCYST

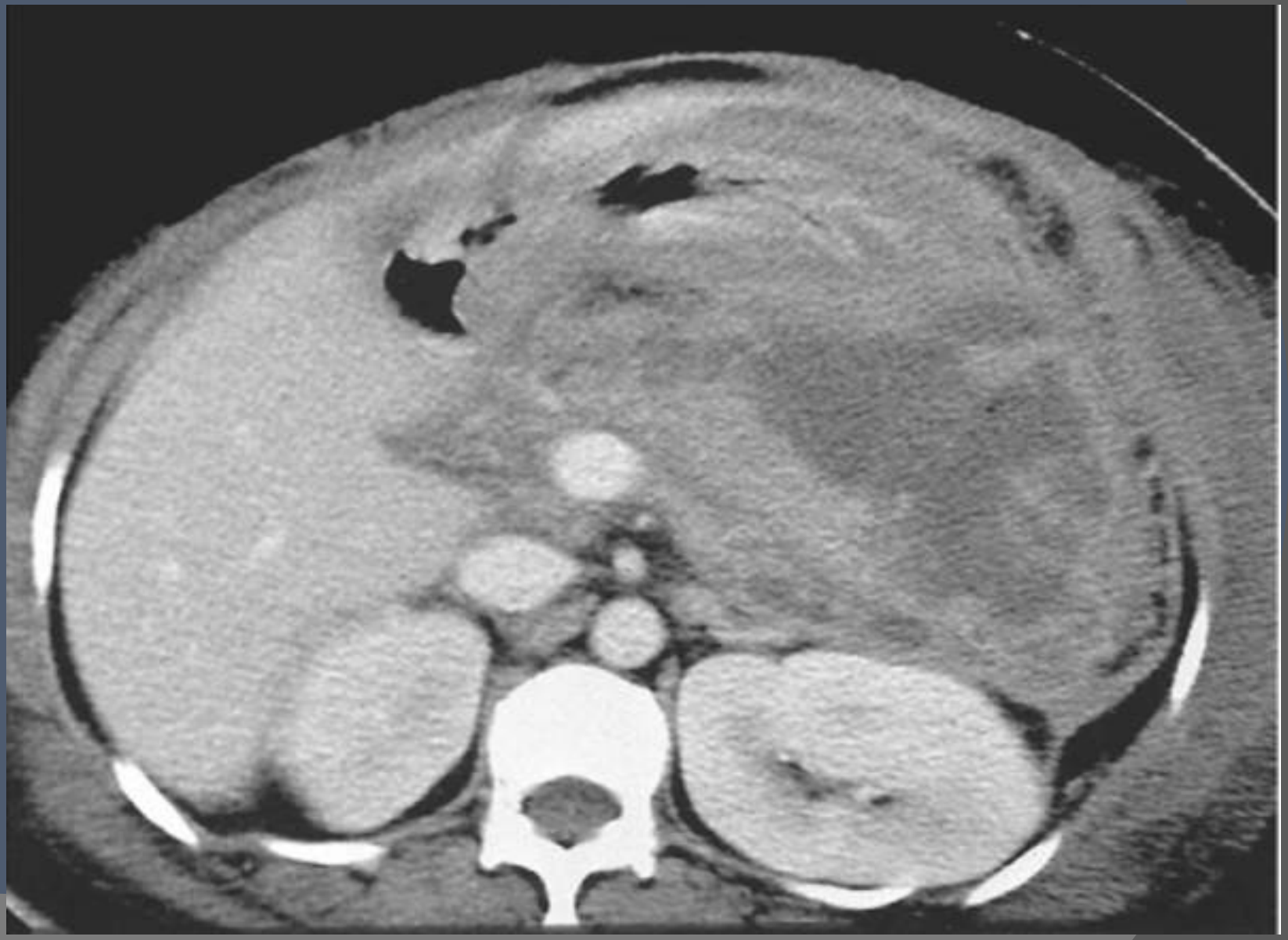
HEMORRHAGE INTO A PSEUDOCYST



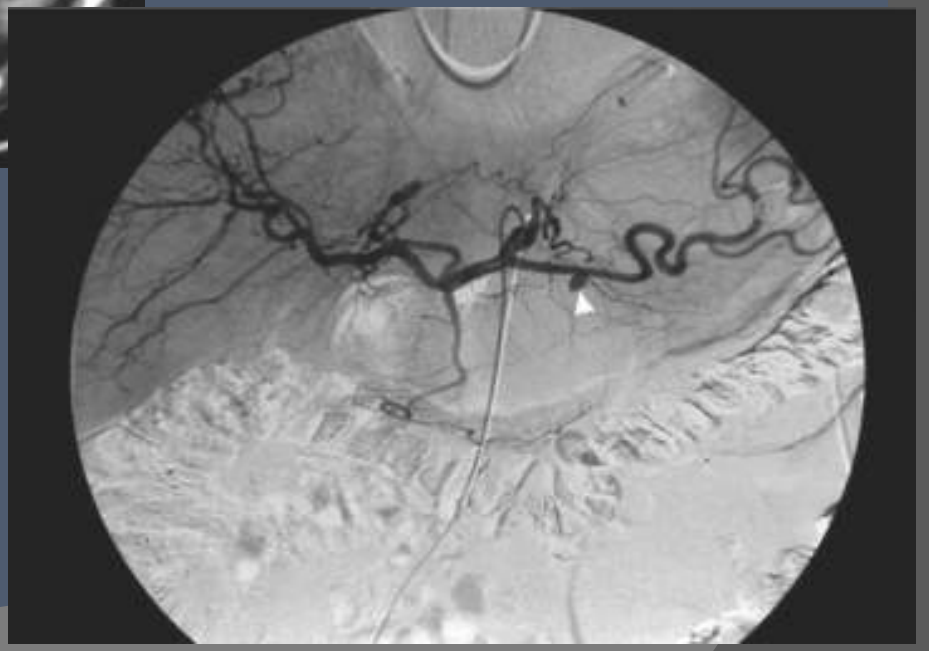
INFECTED NECROSIS

PANCREATIC ABSCESS





VASCULAR COMPLICATIONS



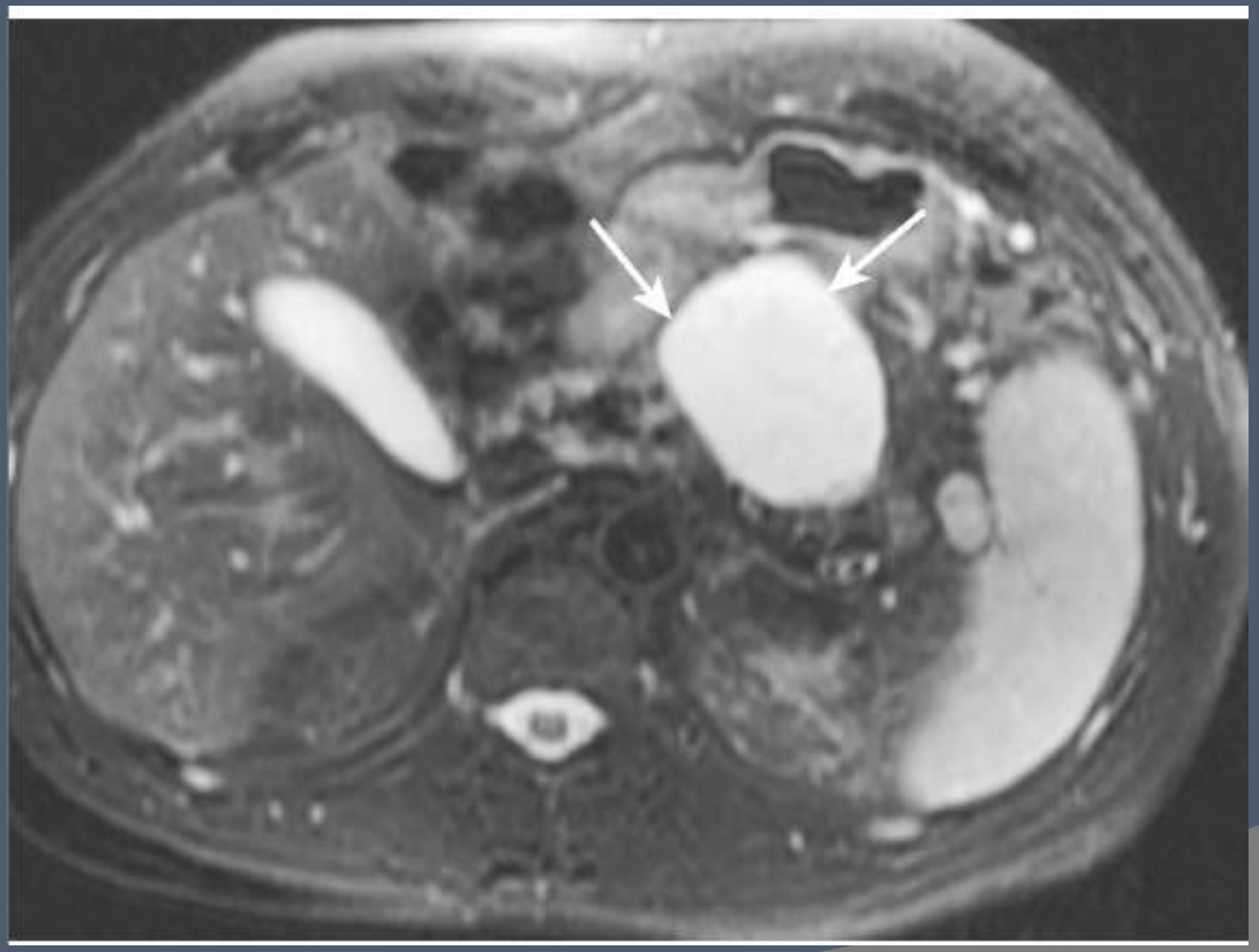
ROLE OF MRI

MRI is superior to CT in differentiating between fluid and solid debris

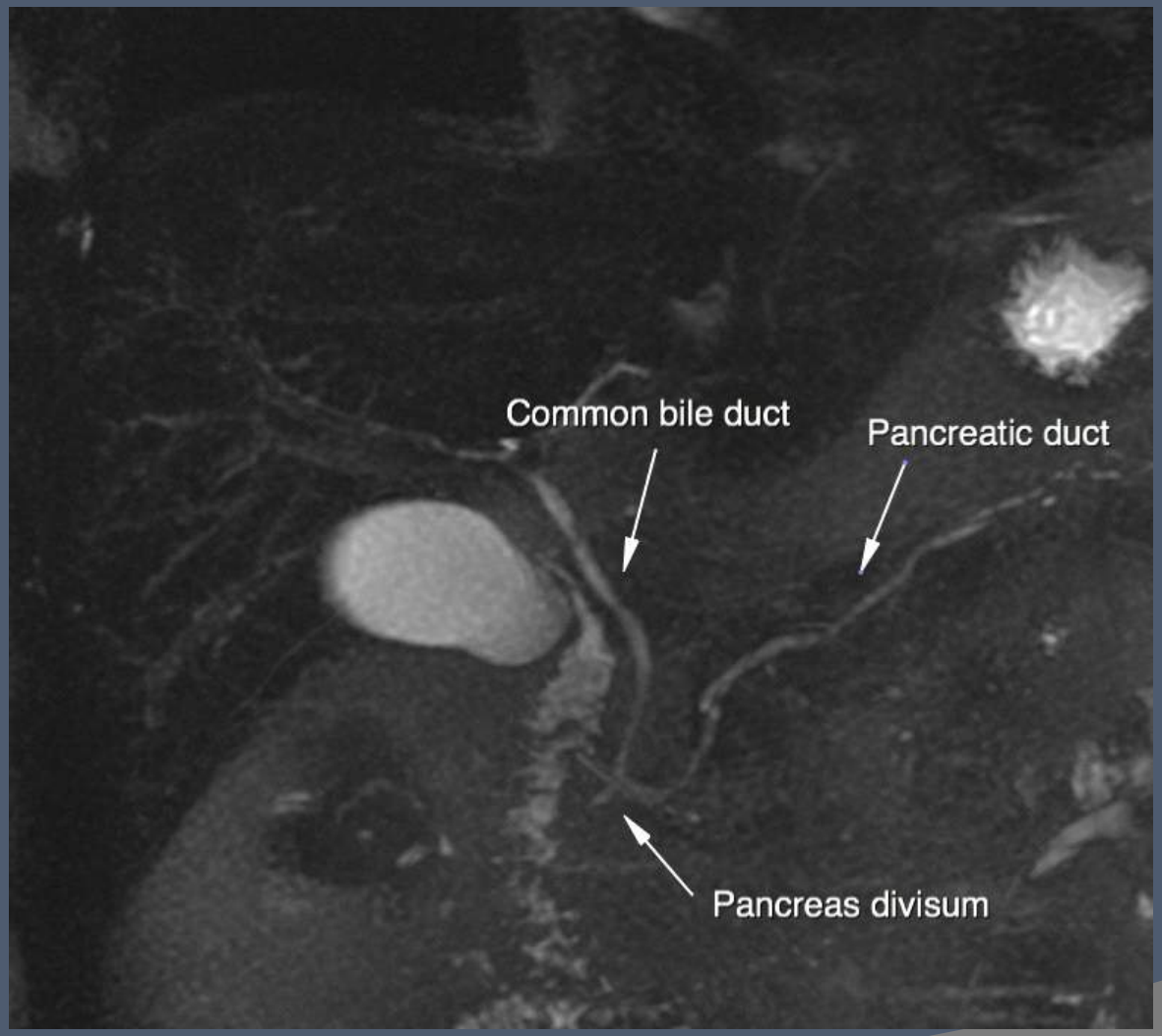
Limitations of imaging in peripancreatic collections

- CT can not differentiate between fluid and debris.
- MRI is superior to CT in differentiating between fluid and solid debris
- Imaging can ***not*** differentiate between sterile and infected collections.
- Air is only present in 20% of infected collections!

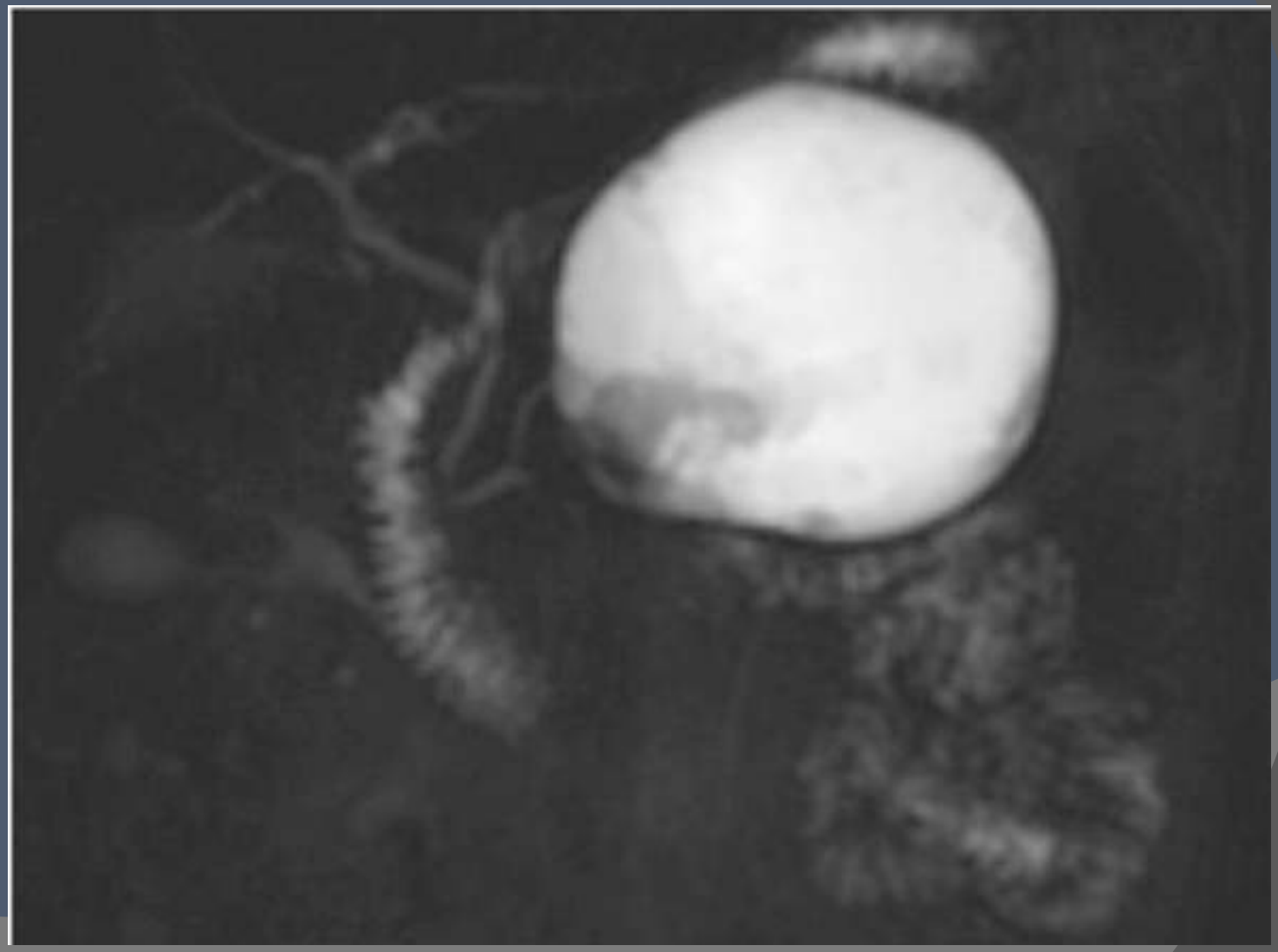
PSEUDOCYST



MRCP



PSEUDOCYST ON MRCP

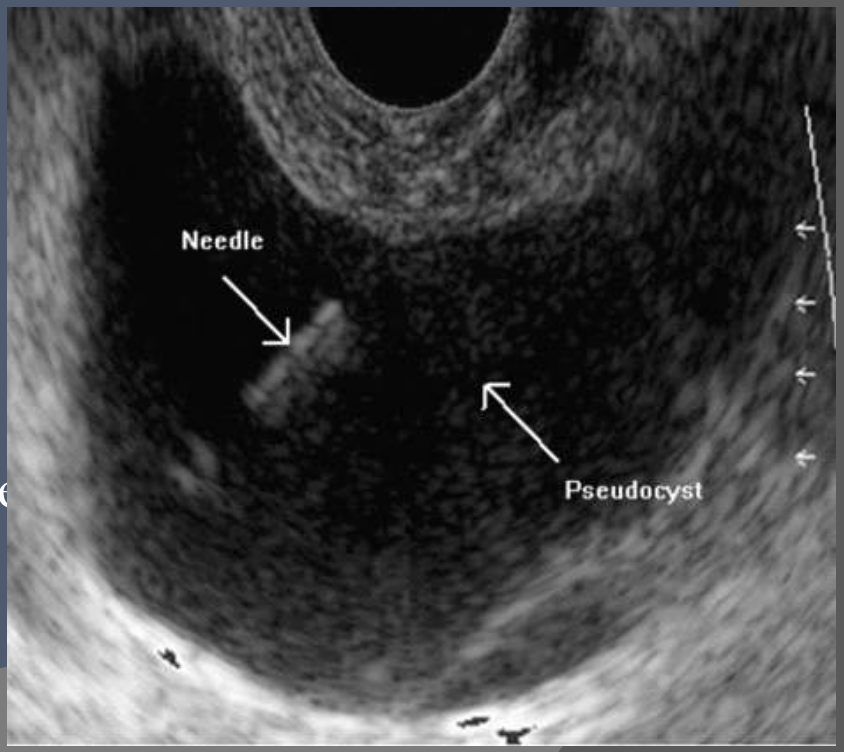


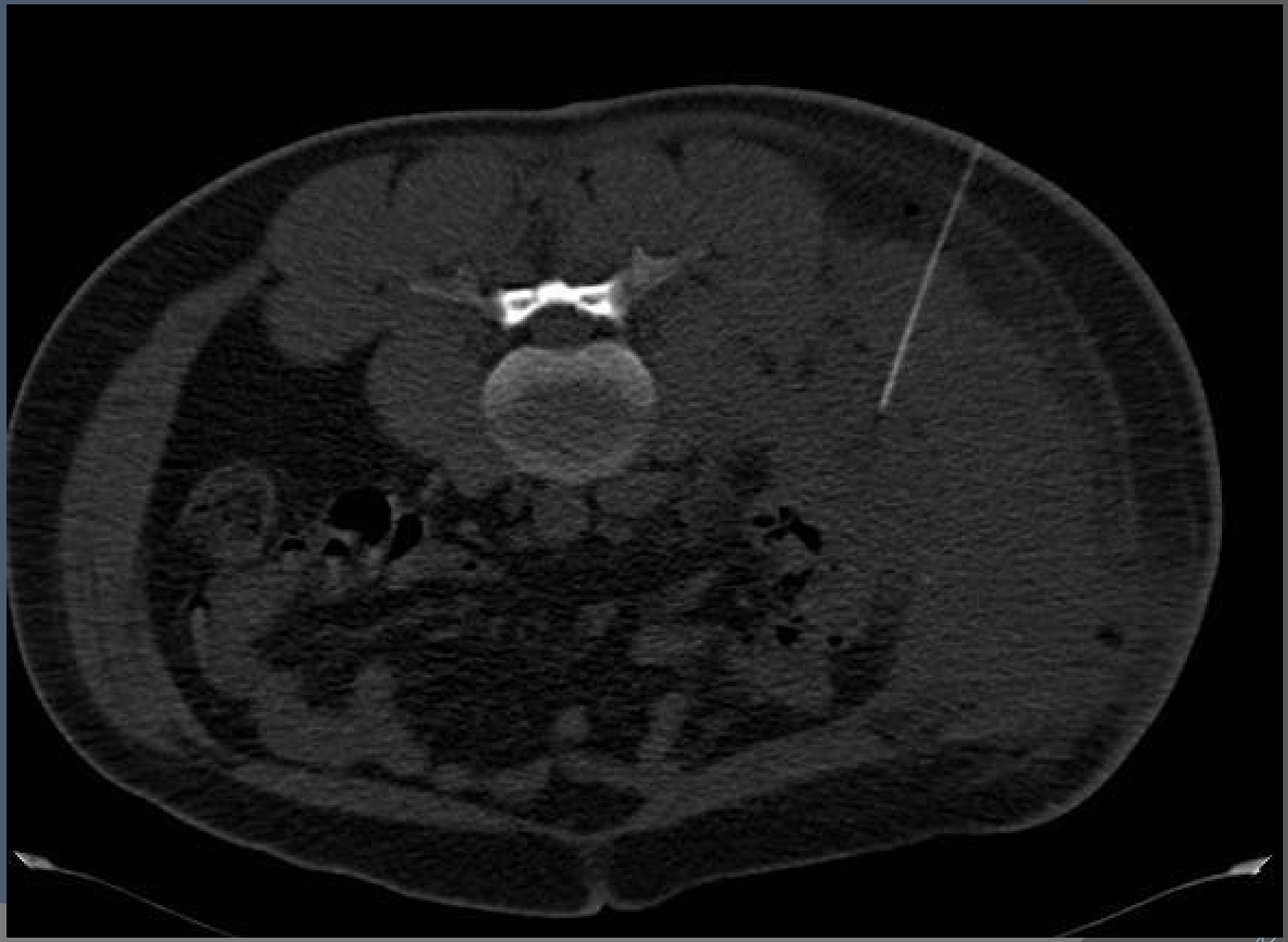
INTERVENTIONAL RADIOLOGY

- Percutaneous drainage using either needles or pig tail catheters, of pancreatic abscess or pseudocyst or fluid collections using either ultrasound or CT guidance.
- Coiling of pseudoaneurysms
- Treatment of upper GI bleeds

Due to erosion of the vessels by

- embolization using PVA particle
- coils





TAKE HOME MESSAGE

- Imaging plays a major role in the management of acute pancreatitis.
- **Ultrasonography** is the **initial** investigation, however may not be able to diagnose or confirm the diagnosis on all occasions.
- **THE INVESTIGATION OF CHOICE IS CECT**
- Grading of the severity of the disease done according to the MODIFIED CT SEVERITY INDEX.
- Identification of complications early in the disease process can help in better treatment of the patient.
- ***Vascular or non-vascular complications can be treated with minimal invasion by image guided interventions.***

REFERENCES

- GRAINGER & ALLISON'S DIAGNOSTIC RADIOLOGY – 5TH EDN.
- CT & MRI OF WHOLE BODY, VOL 2, 5TH EDN, JOHN R.HAAGA
- DIAGNOSTIC ULTRASOUND, VOL 1, 4TH EDN, CAROL M. RUMACK
- *Mortele KJ, Wiesner W, Intriere L, et al:* ***A Modified CT Severity Index for evaluating acute pancreatitis: Improved correlation with patient outcome****. AJR Am J Roentgenol 183:1261-1265, 2004.*


Thank You