Pancreatitis

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Acute Pancreatitis

Definition and Etiology

An acute inflammation process of the pancreas with associated escape of the pancreatic enzyme into surrounding tissue.

The primary etiologic factors are *biliary tract disease & alcoholism*.

May be a complication of viral or bacterial disease, peptic ulcer, trauma.

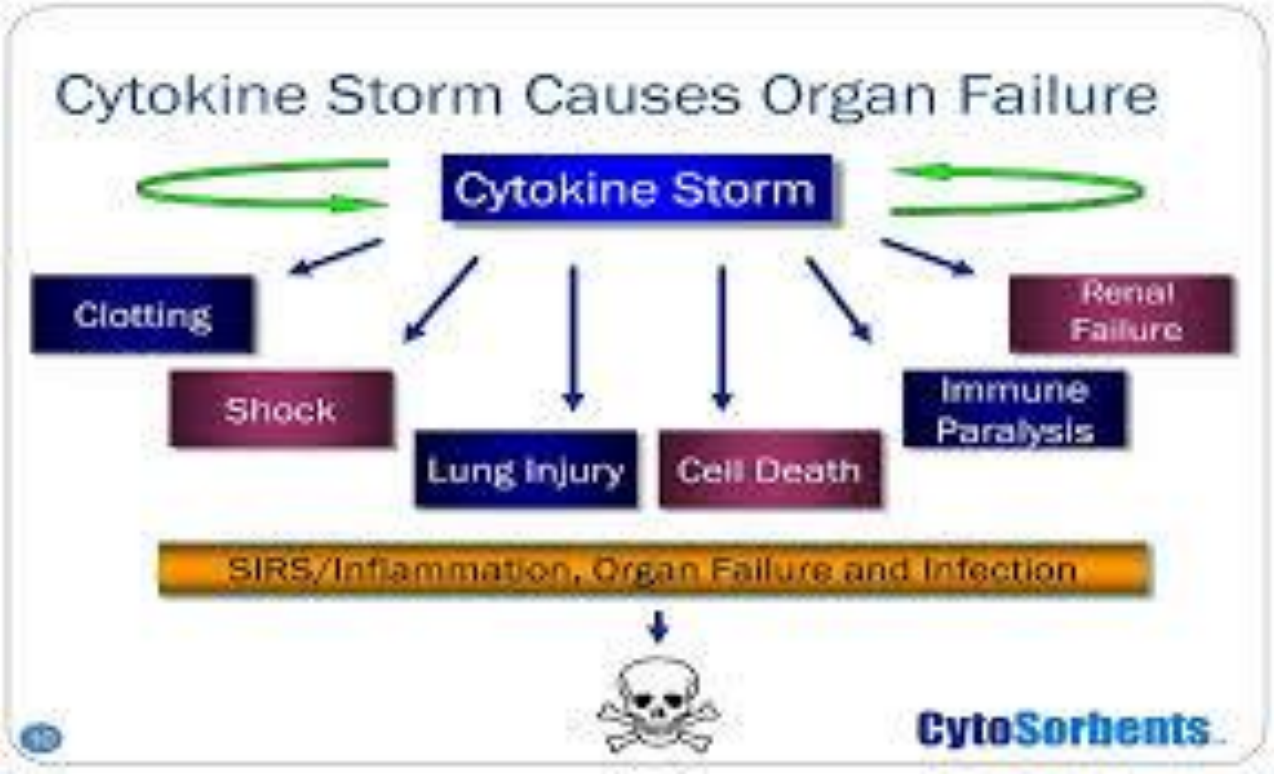
Pathophysiology

Although different etiologies produce distinct inciting events, the final common pathway is premature activation of enzymes within the acinar cell.

Ordinarily, pancreatic proenzymes become activated on release within the duodenum.

Pancreatitis results when activation of pancreatic enzymes occurs early within the acinar cells, producing autodigestion of the pancreas and surrounding tissues.

Exposure of trypsinogen to lysosomal enzymes such as cathepsin B has been shown as a mechanism for early trypsin activation.



IL-1, TNF, IL-6…

«Pancreatitis is not an infection, it is a serious local and systematic inflamation»

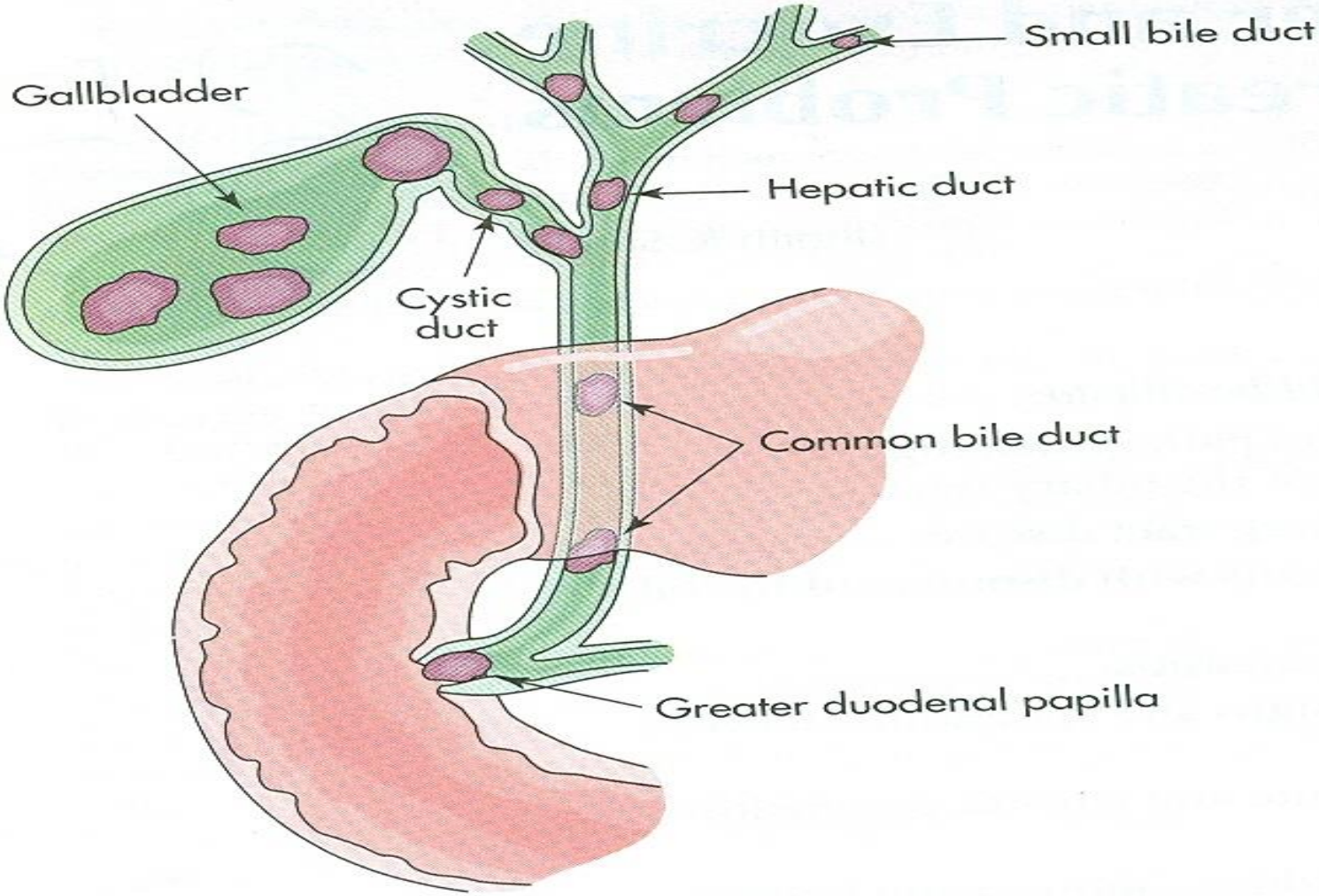
Because of this autodigestion proscess and cytokine storm

Incidence & Risk Factors

Major- Biliary stones, Alcohol use/abuse

Minor- Age: 55 to 65 yrs.
for biliary pancreatitis

45- 55 yrs. For alcohol-related



Common sites of gallstones.

*Female for biliary tract pancreatitis;
Male-for alcohol-related pancreatitis.

*Trauma, Infectious disease, drug toxicities, chronic diseases (inflammatory diseases).

Assessment

Pain:

Steady & severe in nature;

located in the epigastric or umbilical region;

may radiate to the back.

Worsened by lying supine; may be lessened by flexed knee, curved-back position.

Vomiting

Varies in severity, but is usually protracted, worsened by ingestion of food or fluid.

Does not relieve the pain. Usually accompanied by nausea.

Fever:

Rarely exceeds 39 ^{0}C.

Abdominal Finding:

Rigidity, tenderness, guarding, distended, decreased or absent peristalsis and paralytic ileus. Fatty stools- (steatorrhea)

Laboratory Finding:

Elevation of white count- 20,000-50,000.

Elevated serum lipase and amylase(5 to 40 times); glucose, bilirubin, alkaline phosphatase. Urine amylase elevated. Abnormal low serum Ca, Na & Mg.- due to dehydration. Binding of Ca in areas of fat necrosis.

Ranson's Criteria

Admission criteria	Criteria during initial 48 hours
Age: 55 yrs. or older	Hct: decrease or more than 10%
WBC: 16,000/mm^3 or higher	BUN:increase greater than 5 mg/dl.
LDH: 350 IU/L or higher Glucose > 200 mg/dl.	CA: falls to less than 8 mg/dl. PaO2 < 60 mm Hg
AST: 250 U/L or higher	Fluid sequestration; greater than 6 liter

Major complications of AP

Cardiovascular- hypotension/shock from **hypovolemia**.

Hematologic-Anemia from blood loss, DIC, leukocytosis from gen.inflammation or secondary infections.

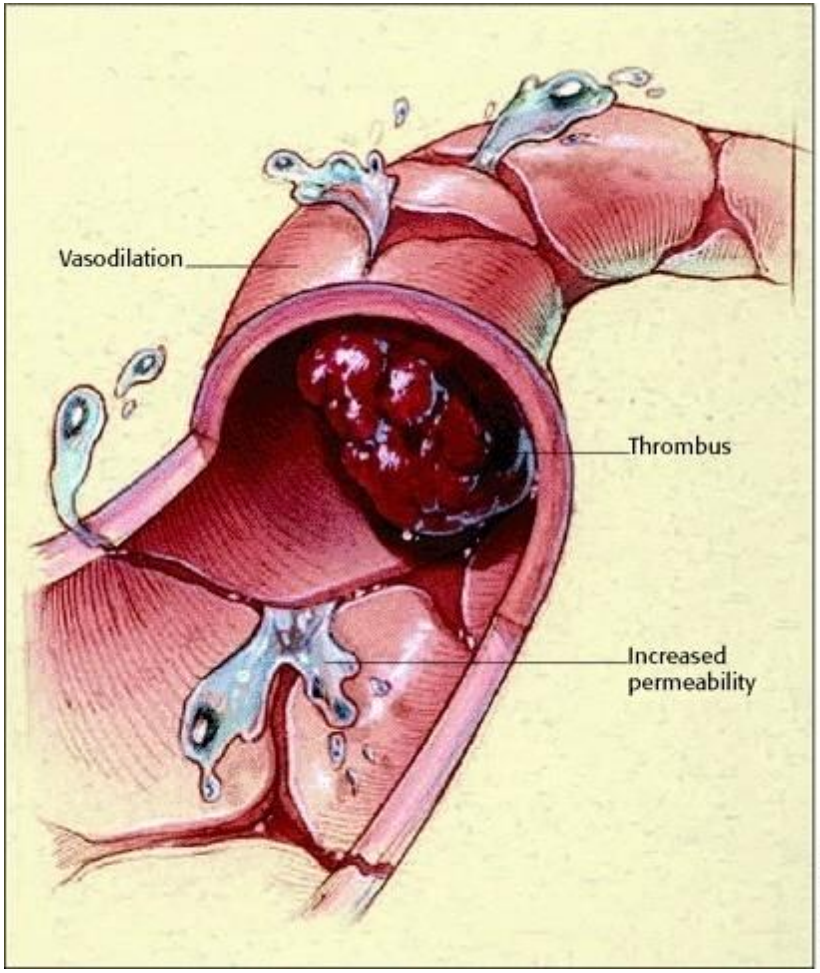
Respiratory-atelectasis, pneumonia, pleural effusion, ARDS

GI- bleeding

Renal- oliguria, acute tubular necrosis

Metabolic-hyperglycemia, **hypocalcemia**.

Cardiovascular and Coagulation Complications



- ↑ Capillary permeability → fluid shifts (3rd spacing) → distributive shock
- Vasodilation d/t inflammatory mediators → distributive shock
- Thrombus formation d/t hypercoaguability

Acute Pancreatitis - Secondary Prevention - Complications

Immunological

↓ motility → movement of bacteria outside GI tract due to pancreatic abscess &/or necrosis → *INFECTION*

Peritonitis

Acute Pancreatitis -
Secondary Prevention -

Complications

Renal

Hypovolemia → ↓ GFR, ↓ renal perfusion →

development of clots in renal circulation →

Acute tubular necrosis & Acute renal failure

Treatment of Acute Pancreatitis

Alleviate pain & anxiety.

Anxiety increases pancreatic secretions.

Analgesics- then morphine.

Reduce pancreatic stimulus-

NPO

If there is ileus findings use NGT to remove gastric secretions.

NaHCO-reverse metabolic acidosis.

Regular insulin to treat hyperglycemia.

Treat infection-antibiotics are not routine!!!

Aggressive respiratory care- monitor ABG.

Reduce body metabolism- bedrest, cool quiet environment.

Avoid alcohol, coffee, heavy meals and spicy food.

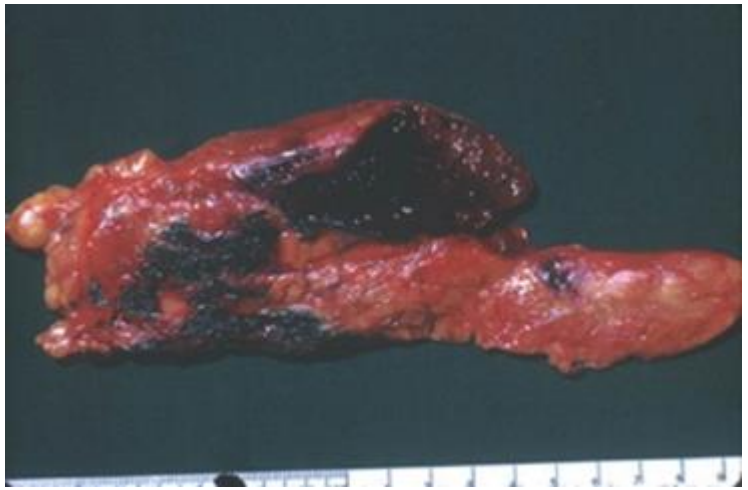
Surgical Management

Surgery

(open/laparoscopic/endoscopic)

Abscesses

Hemorrhagic necrosis



Indications

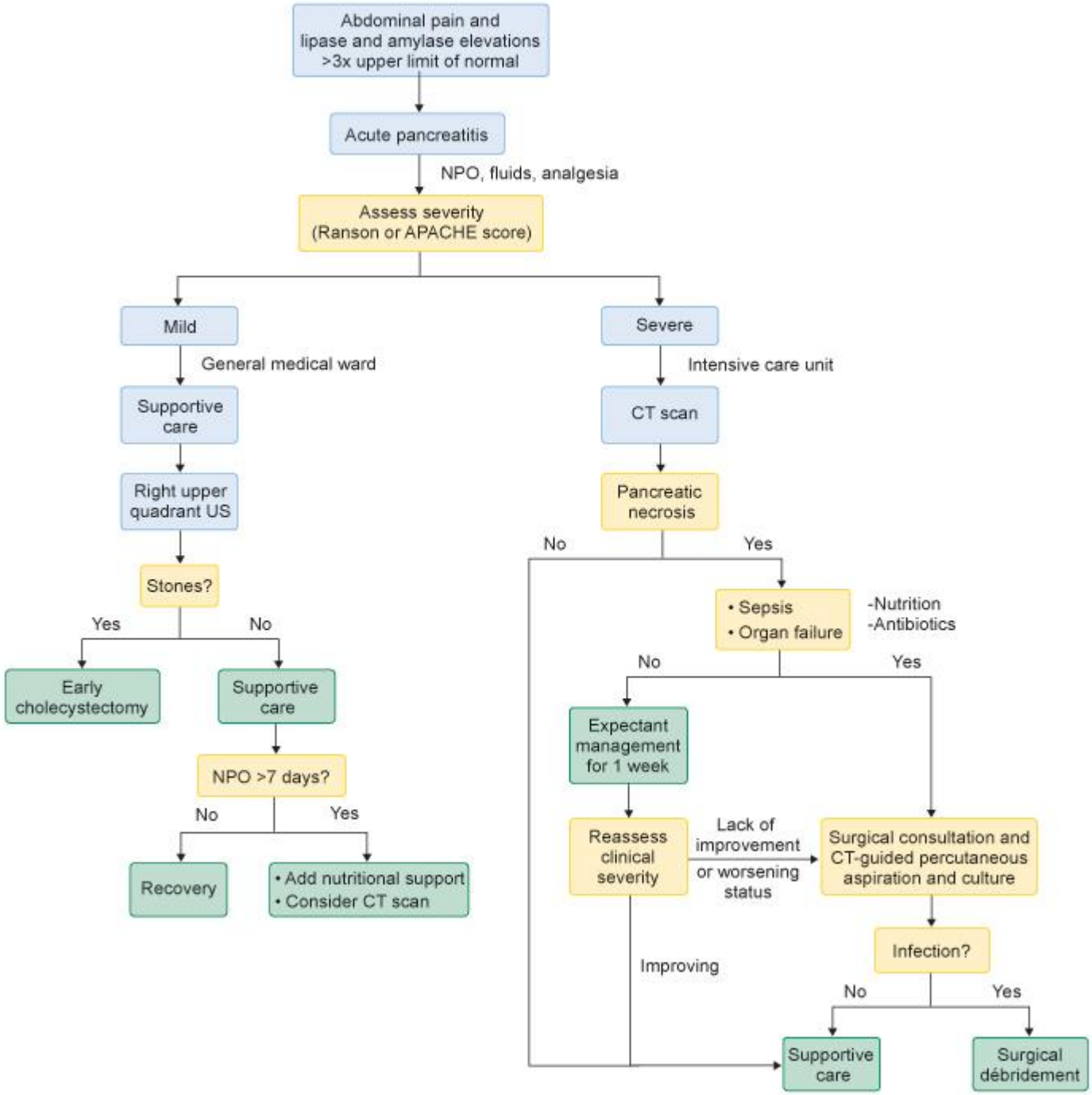
Debride necrosis

Uncertain dx

Relief of pain

Correction of severe biliary obstruction

Progressive clinical deterioration


Abdominal pain and lipase and amylase elevations >3x upper limit of normal
Acute pancreatitis
NPO, fluids, analgesia
Assess severity (Ranson or APACHE score)
Mild
General medical ward
Supportive care
Right upper quadrant US
Stones?
Yes
No
Early cholecystectomy
Supportive care
NPO >7 days?
No
Yes
Recovery
• Add nutritional support
• Consider CT scan
Severe
Intensive care unit
CT scan
Pancreatic necrosis
No
Yes
• Sepsis
• Organ failure
-Nutrition
-Antibiotics
No
Yes
Expectant management for 1 week
Reassess clinical severity
Lack of improvement or worsening status
Surgical consultation and CT-guided percutaneous aspiration and culture
Improving
Infection?
No
Yes
Supportive care
Surgical débridement

CHRONIC PANCREATITIS

Causes of chronic pancreatitis

Alcohol	150 g/day for prolonged periods
Cystic fibrosis	Autosomal recessive. 1 :2000 births amongst Caucasians
Tropical	The young, near the equator. Intraductal calculi. Aetiology unknown
Hereditary	The young, pancreatic calcification. Aetiology unknown
Obstructive	Chronic obstruction, possibly owing to pancreas divisum/acquired obstruction
Idiopathic	Up to 30% cause unknown
Alpha-, antitrypsin deficiency	Usually asymptomatic pancreatic insufficiency
Haemochromatosis	Usually asymptomatic pancreatic insufficiency
Hypertriglyceridaemia	

Definition

Irreversible damage to the pancreas with histologic evidence of inflammation, fibrosis, and destruction of exocrine (acinar) and endocrine (islets of Langerhans) tissue

Etiologic classification – clinically useful

- Histologic – accessibiliy of tissue
- Imaging – late morphologic changes

Prevalence

Autopsy reports – 0.04-5% - overestimates

Retrospective studies – 3-9/100,000

Prospective data

- among alcoholics – 8.2/yr/100,000;
- overall prevalence - 27.4/100,000
- **M:F =3.5:1**

Alcohol abuse – 2/3 of causes

Mortality 3.6x age matched control

Advanced age, alcoholism and smoking are poor prognostic conditions

pathophysiology

Incompletely understood

Why 10% heavy alcoholics develop chronic pancreatitis and the rest not, or limited to asymptomatic pancreatic fibrosis

Alcohol is the most studied

Ductal obstruction hypothesis

Chronic alcohol use

acinar and ductal cell

protein rich pancreatic juice, low in volume and HCO3

formation of protein precipitates – **plug**

calcification of ppt – **ductal stone formation**

ductule obstruction

parenchymal damage

Pancreatic ductal stone are seen in alcoholic, tropical, hereditary, idiopathic

Histologic changes of CP may be seen with out ductal obstruction

Toxic metabolic hypothesis

(alcohol) Direct injurious effect on acinar and ductal cells

Increased membrane lipid peroxidation (oxidative stress), free radical production

Increase acinar cell sensitivity to pathogenic stimuli

Stimulate CCK production (duodenal I cells) – activation of proinflammatory transcription factors

Activation of pancreatic stellate cells (alcohol, cytokines) – produce proteins of extracellular matrix

Necrosis fibrosis hypothesis

Repeated episodes of acute pancreatitis with cellular necrosis or apoptosis, healing replaces necrotic tissue with fibrosis

Evidence from natural history studies - more severe and frequent attacks

More evidence from hereditary pancreatitis and animal models

But some have evidence of chronic pancreatitis at time of first clinical acute attack

Clinical features

- Abdominal pain
  - Acute pancreatic inflammation
  - Increased intrapancreatic pressure
  - Alterations in pancreatic nerves
- Steatorrhea – lipase secretion <10%
- DM

Diagnosis

No single test is adequate

Tests for function

Tests for structure

Both are more accurate in advanced disease

Indicate large reserve functionally, late structural changes

Big duct vs small duct disease

Tests of function – hormone stimulation

Secretin/ secretin CCK test

Fecal elastase

Fecal chymotrypsin

Serum trypsinogen (trypsin)

Fecal fat

Blood glucose

Tests of structure

Endoscopic US

ERCP

MRI/MRCP

CT

Abdominal US

Plain abdominal film

Pancreatic Function Tests[†]

	Sensitivity (percent)	Specificity (percent)
Tubeless tests		
Fecal chymotrypsin	78	94
Trypsin radioimmunoassay	33	65
Serum pancreatic polypeptide	48 to 76	86 to 93
Dual-label Schilling	Not reported	Not reported
Quantitative stool fat	Not reported	Not reported
Duodenal-intubation tests		
Secretin-pancreozymin	75 to 90	80 to 90
Lundh	66 to 94	Not reported

[†]Adapted from Steer, ML, Waxman, I, Freedman, SD, N Engl J Med 1995; 332:1482.

Routine lab. tests

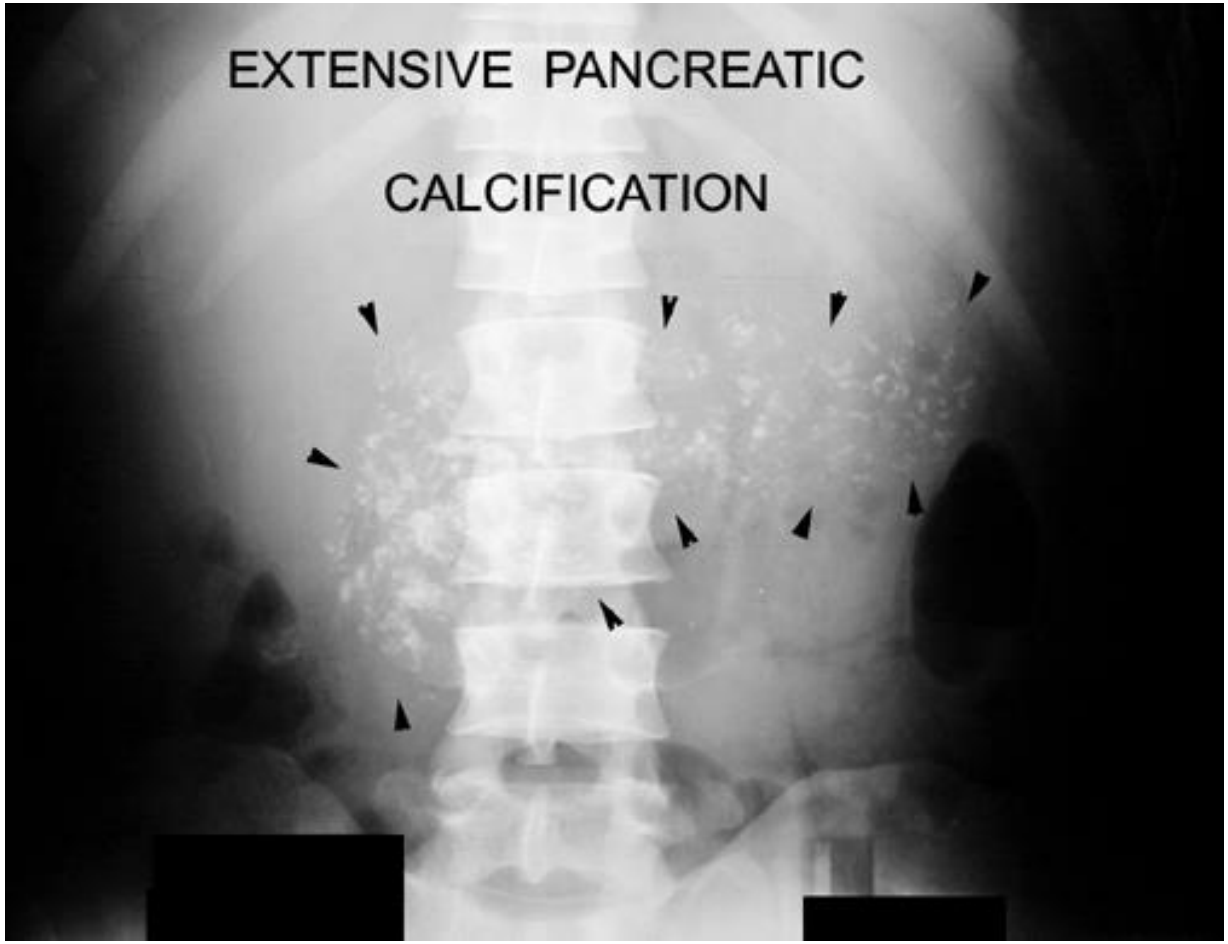
Serum **amylase** and **lipase**

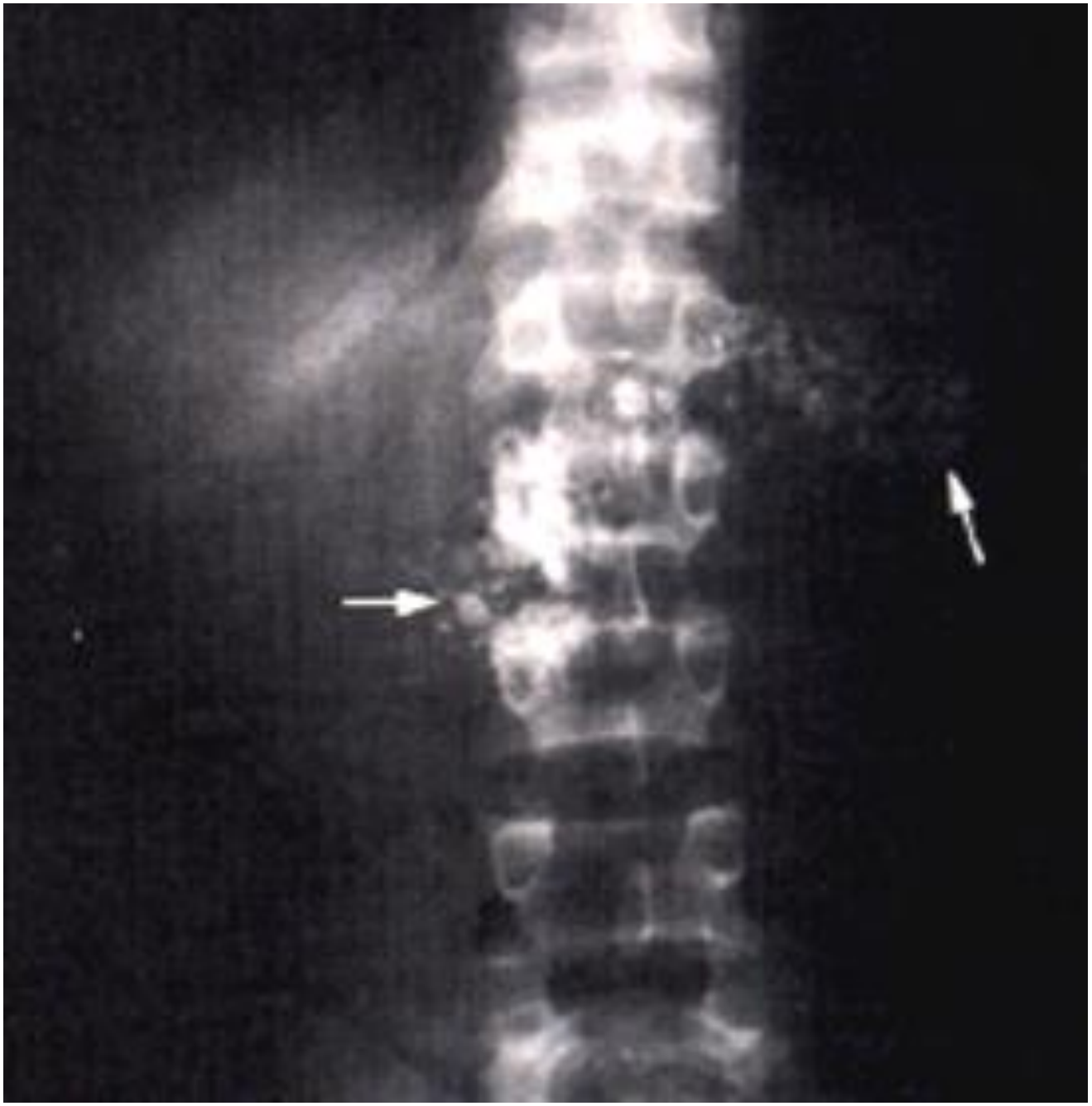
- May be elevated in acute exacerbations
- Also found increased in **pseudocyst**, ductal stricture, internal pancreatic fistula

Other chemistry and electrolytes depend on associated conditions

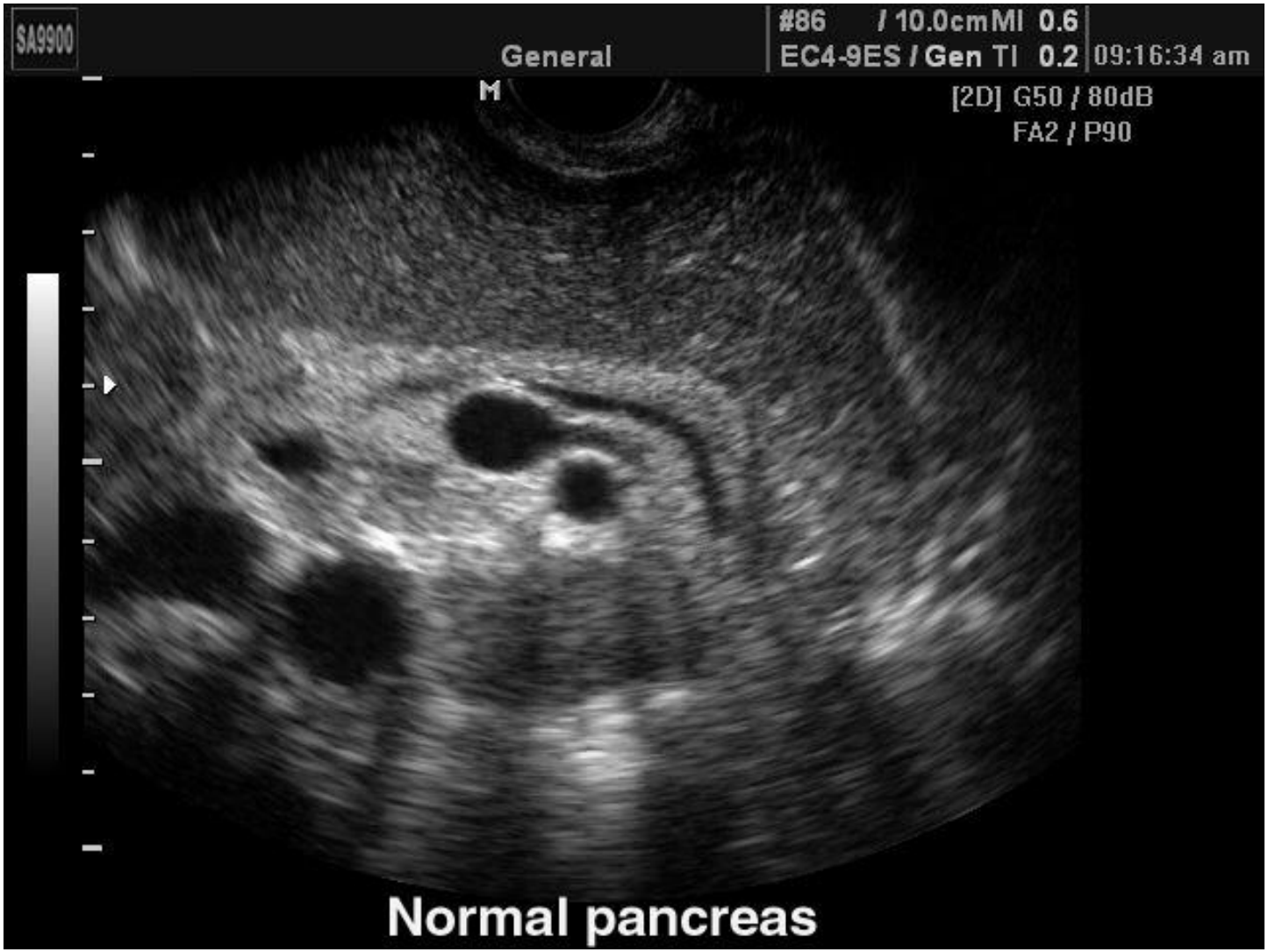
X-Ray Finding

Plain X-ray of abdomen showing calcific pancreatitis





Ultrasound -Normal pancreas



Ultrasound investigation
Chronic pancreatitis

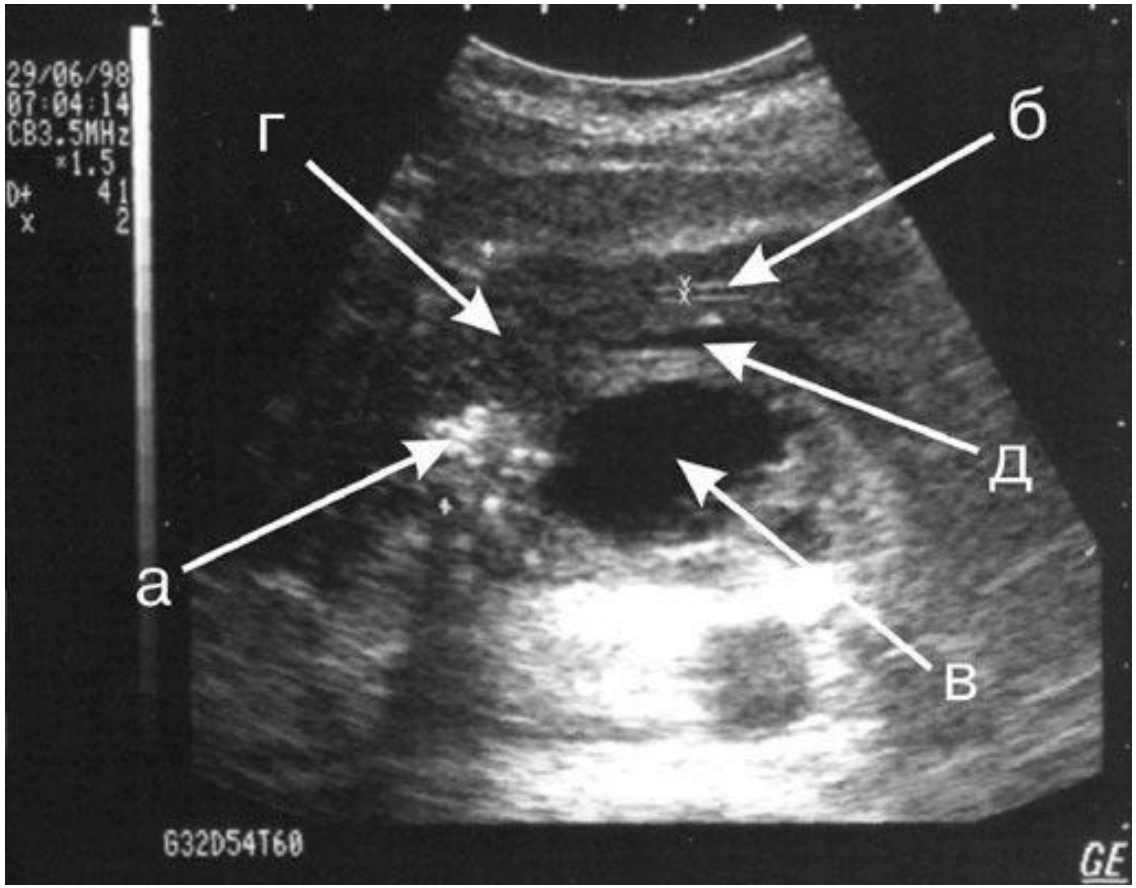
а) calcificates in the head of pancreas;

б) Virsungov’s duct;

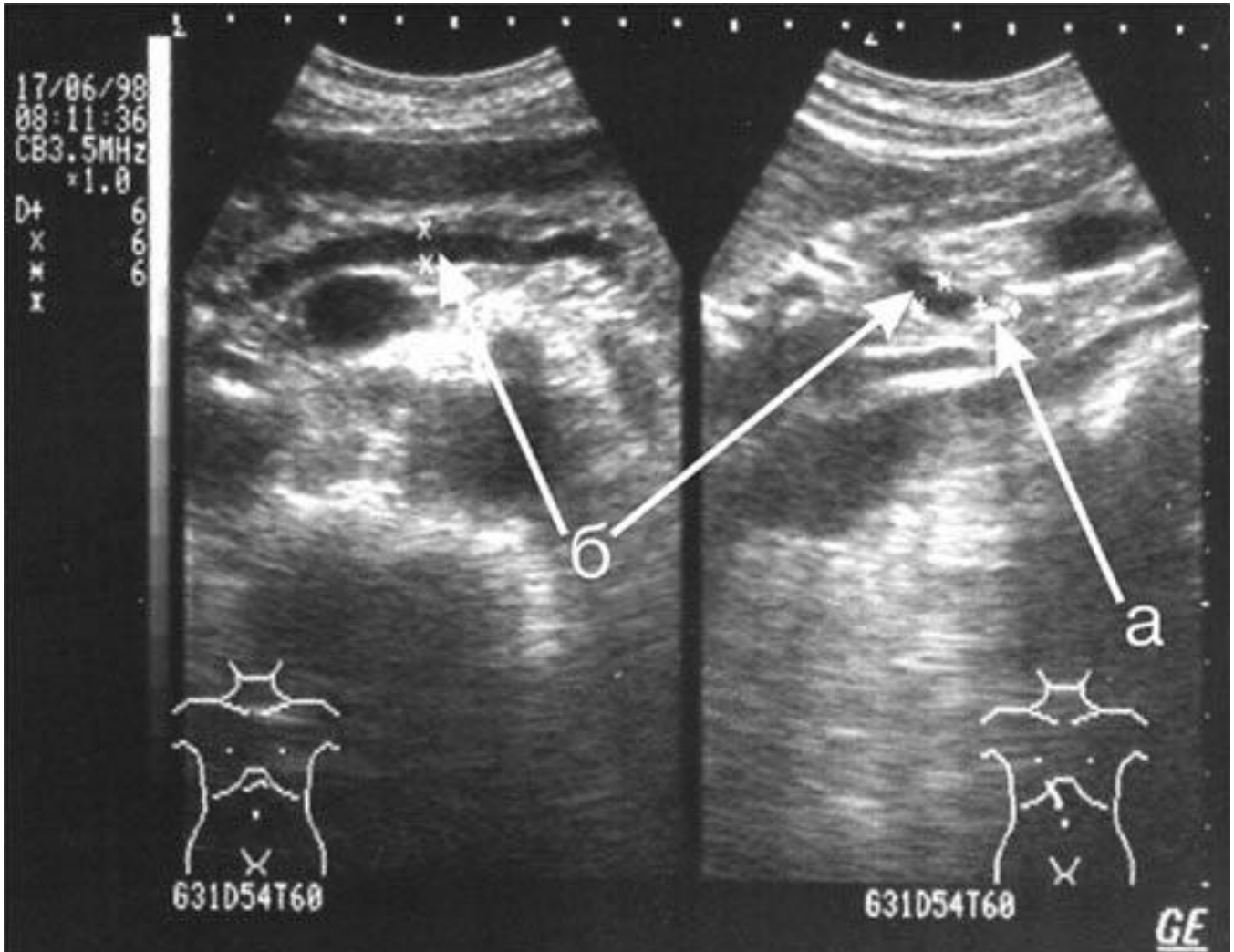
в) pseudocyst of pancreas;

г) increase of the head of pancreas;

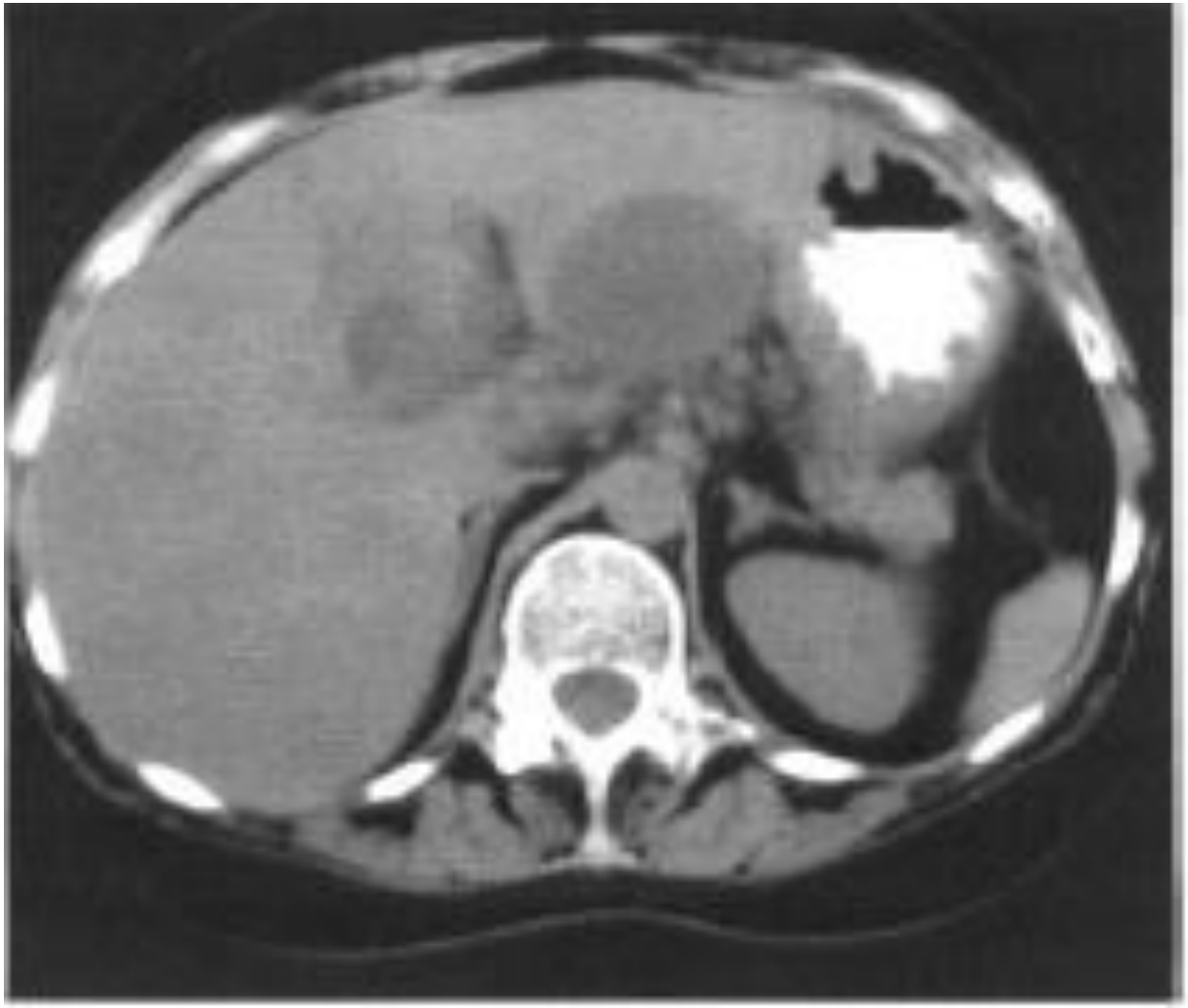
д) spleen vein



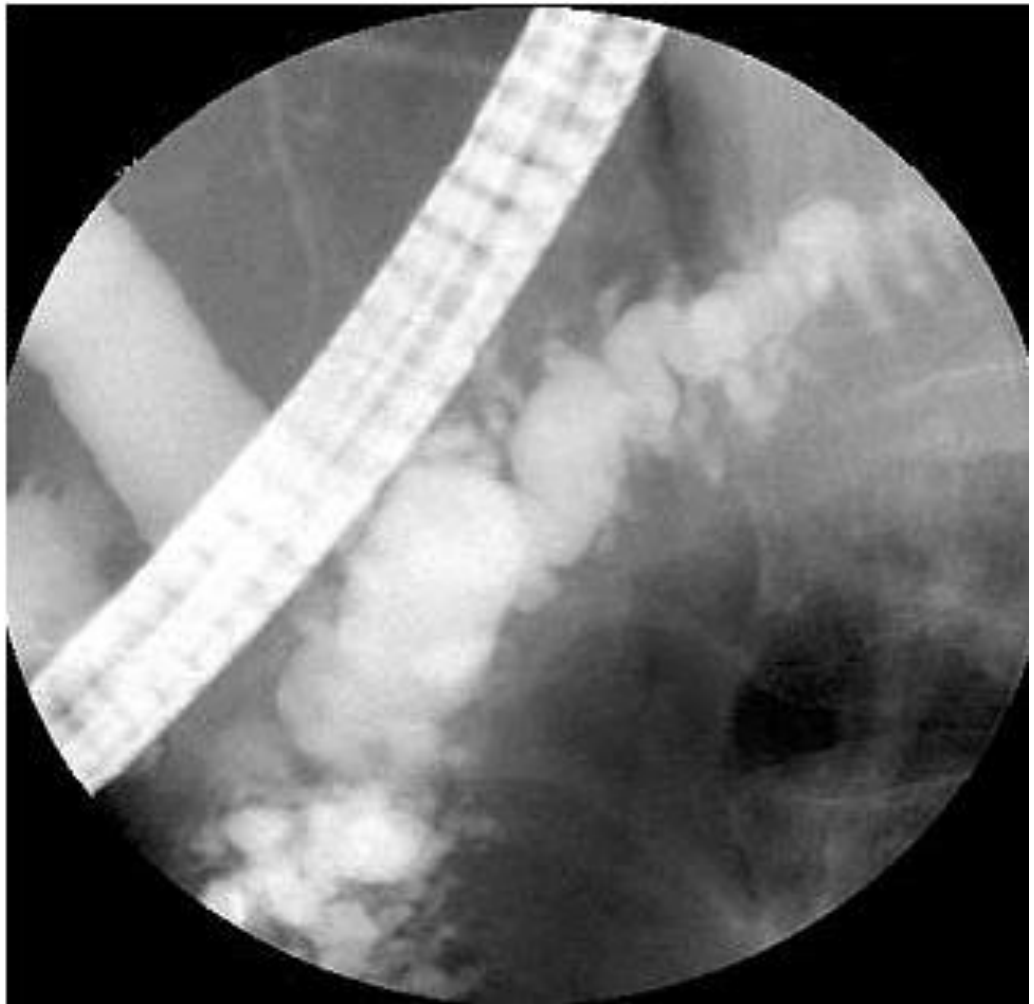
Ultrasound investigation. Chronic calcified pancreatitis a) virsungolithiasis б) dilated Virsungov's duct.



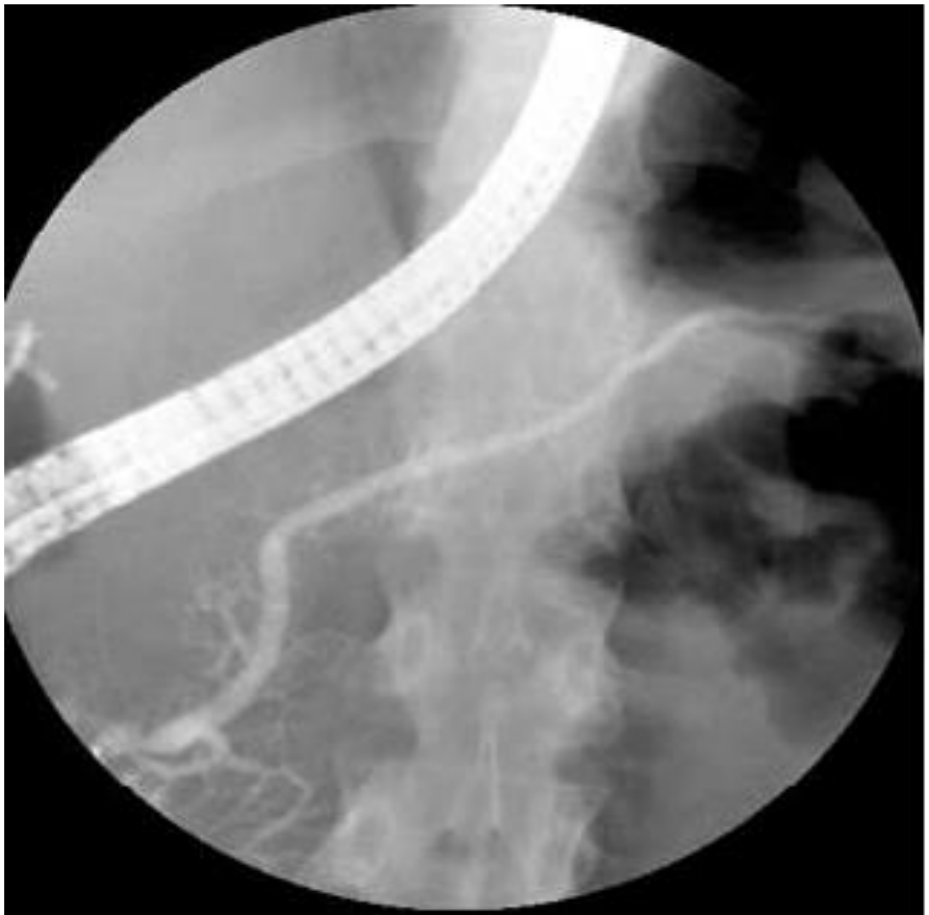
CT scan with central pseudocyst



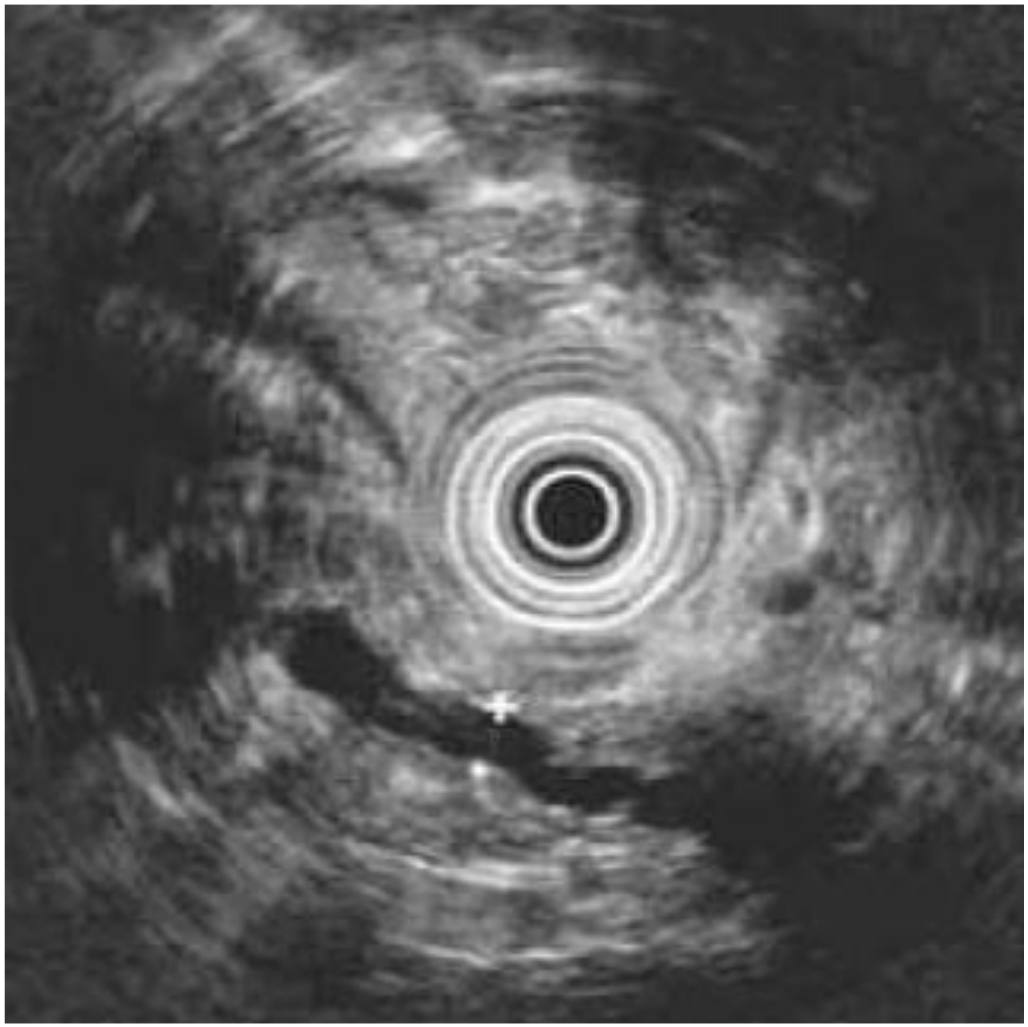
An endoscopic retrograde cholangiopancreatography image demonstrating massive pancreatic duct dilatation in a patient with bigduct chronic pancreatitis.



An endoscopic retrograde cholangiopancreatography (ERCP) image demonstrating minimal pancreatic duct abnormalities in a patient with painful small-duct chronic pancreatitis.



An endoscopic ultrasound image demonstrating a dilated pancreatic duct (markers) in a patient with advanced chronic pancreatitis



Classics of Chronic Pancreatitis

Pancreatic calcification

Steatorrhea

Diabetes mellitus

Found in less than a third of pts with CP

abnormal secretin stimulations test when >60 % affected

Serum trypsinogen < 20ng/ml, fecal elastase < 100mcg/mg stool - severe exocrine insuf.

Complications

Malabsorption

Steatorrhea, A, D, E and K vitamin defficiency

DM – but end organ damages of DM and DKA are rare

Non DM retinopathy (peripheral) due to Vit A and Zn defc.

Pleural, peritoneal and pericardial effusions with high amylase

GI bleeding – PUD, gastritis, pseudocyst, varies (SV thrombosis)

Cholestasis, icterus, cholangitis, biliary cirrhosis

Fistula – internal or external

Subcutaneous fat necrosis – tender red nodules on the shins

Pseudocyst,

Obstruction,

Pancreatic carcinoma – **4% life time risk**

Narcotic addiction

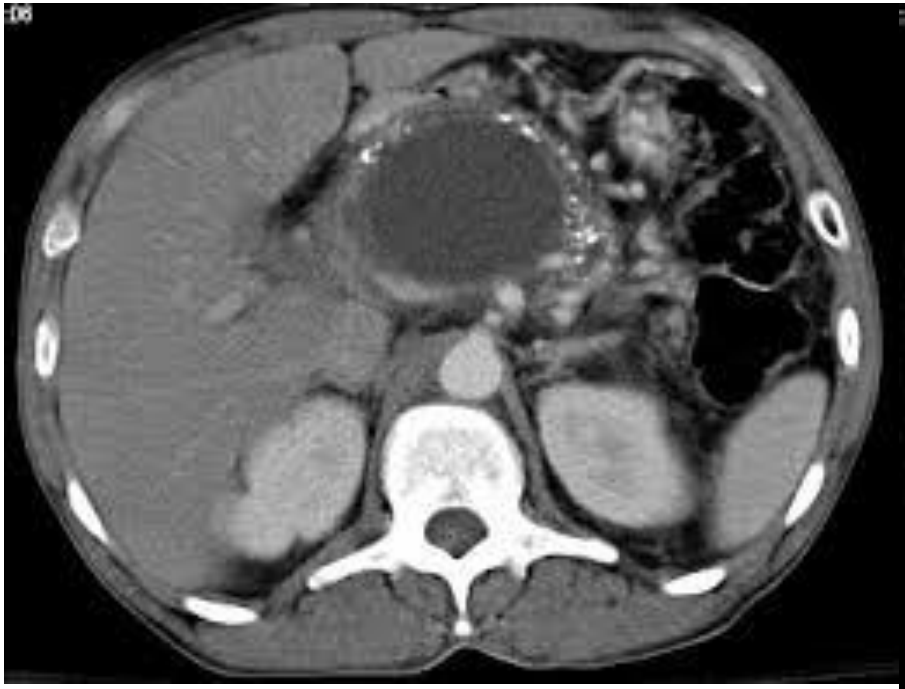
Pseudocyst

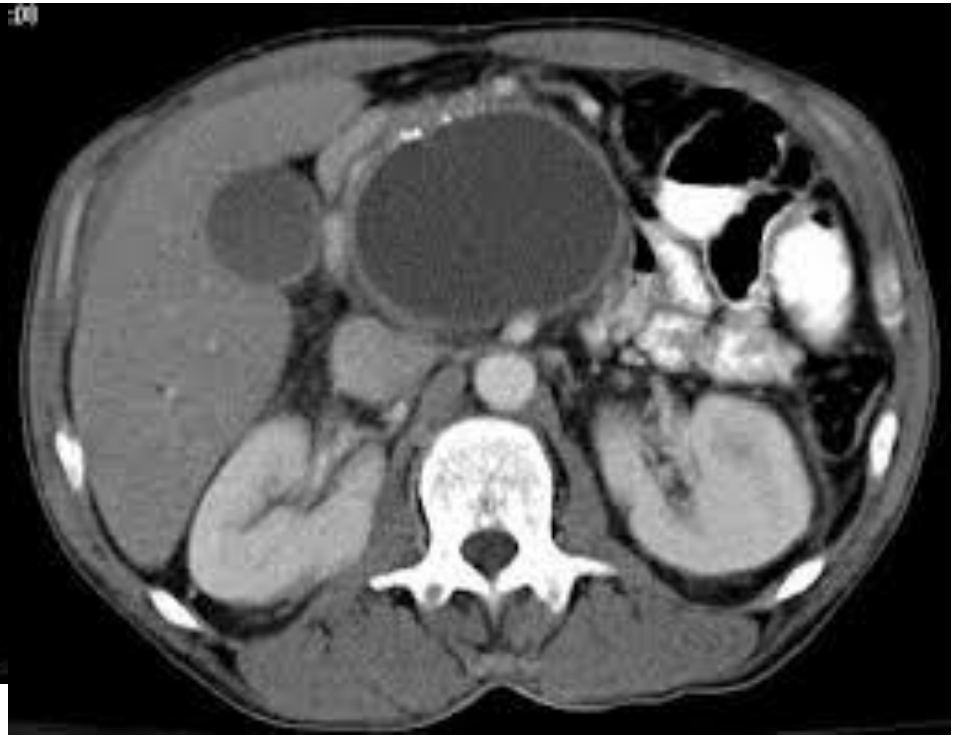
A pancreatic pseudocyst is a circumscribed collection of fluid rich in pancreatic **enzymes, blood, and necrotic tissue**, typically located in the lesser sac of the abdomen.

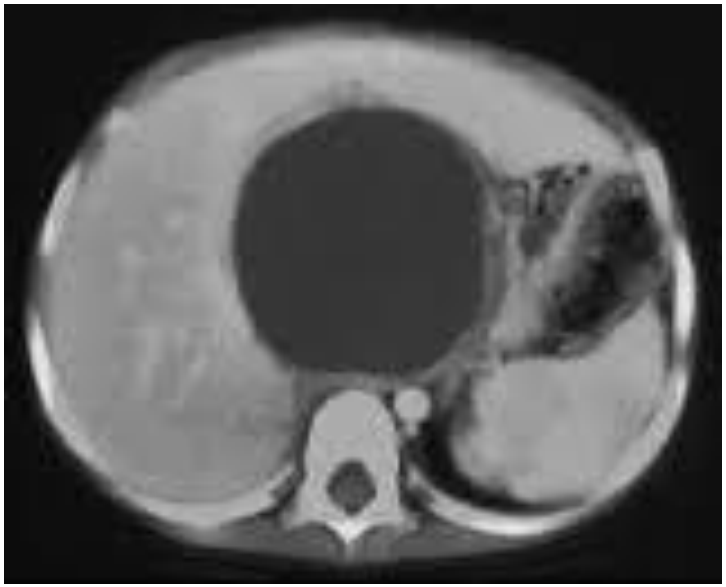
Pancreatic pseudocysts are usually complications of pancreatitis. Pancreatic pseudocysts account for approximately 75% of all pancreatic masses.

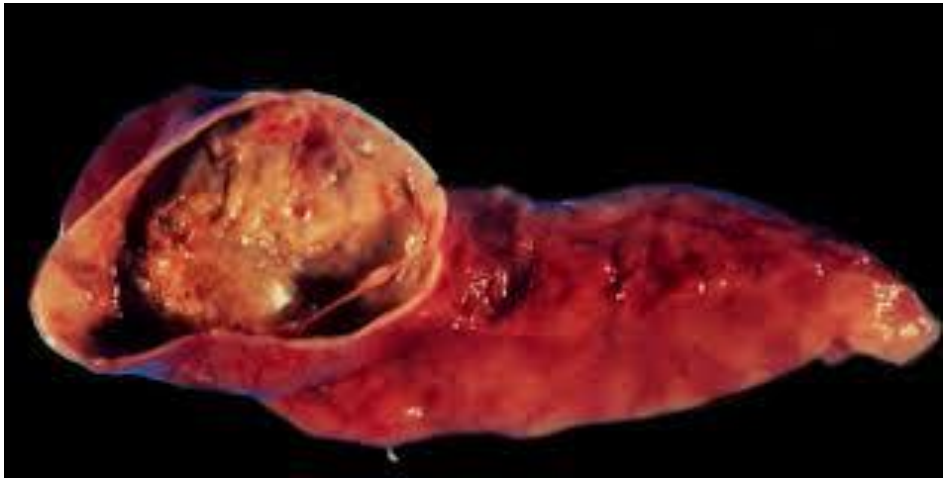
The prefix pseudo- (Greek for "false") distinguishes them from true cysts, which are lined by epithelium; *pseudocysts are lined with **granulation tissue**.*

Treatment—internal (Cystogastrostomi/Cystojejunostomi) or external drainage









Treatment

Aim - Pain control and mx of maldigestion

Pain

- Avoid alcohol
- Low fat meals
- Antipain – narcotics (addiction)
- *Surgical pain control*
  - Resection (local - - - - 95%) – pancreatic insufficiency
  - Splanchinectomy, celiac ganglionectomy, nerve block
- *Endoscopic tx*
  - Sphinctorotomy, dilatation of strictures, caliculi removal, duct stenting
    - Cpx – acute pancreatitis, abscess, ductal damage, death
- Pancreatic enzymes

Tx of maldigestion

Pancreatic enzyme replacement

- 2-3 enteric coated or 8 conventional tablets with meals
- adjuvants with conventional tablets – H2 blockers, PPI, Na bicarbonate,