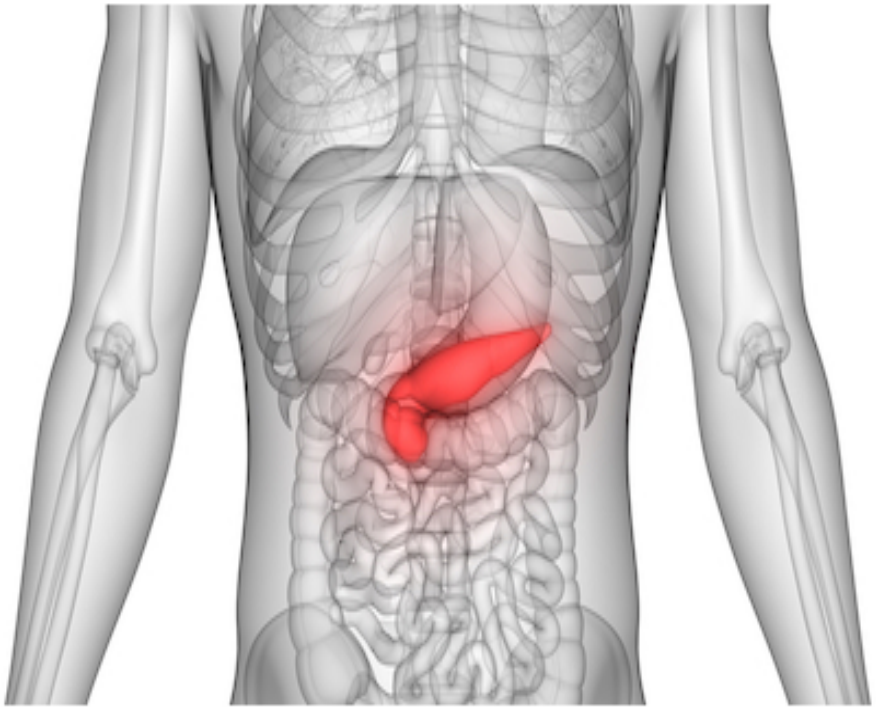

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PSEUDOCYST OF PANCREAS :

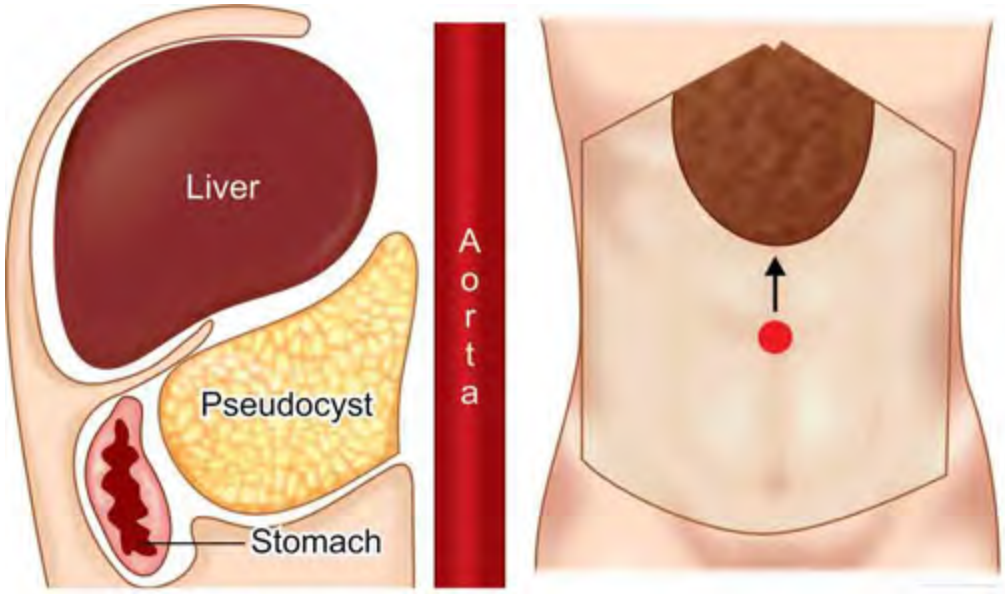
- It is localized collection of sequestered pancreatic fluid, usually 3 weeks after an attack of acute pancreatitis.
- It can occur after trauma and recurrent chronic pancreatitis.
- Collection usually occurs in the lesser sac in relation to stomach, but can occur in relation with duodenum, jejunum, colon, splenic hilum.
- About 50% of acute pancreatitis leads to pseudocyst formation, but among that 20–40% will resolve spontaneously.

- **Sites of pseudocyst:**

- Lesser sac—commonest, i.e. between colon and stomach

- Can also occur in relation to:

- Duodenum
- Jejunum
- Colon
- Splenic hilum



- Initially cyst wall is thin (unformed), but later it gets fibrosed and thickened (formed and matured).
- It is lined by fibrin layer but no endothelium, hence called as pseudocyst.
- It contains typically brownish fluid with sludge like necrotic material. It can get infected to form *infected pseudocyst or pancreatic abscess.*
- Amylase level in the cyst fluid is very high (>5000 units/ml).

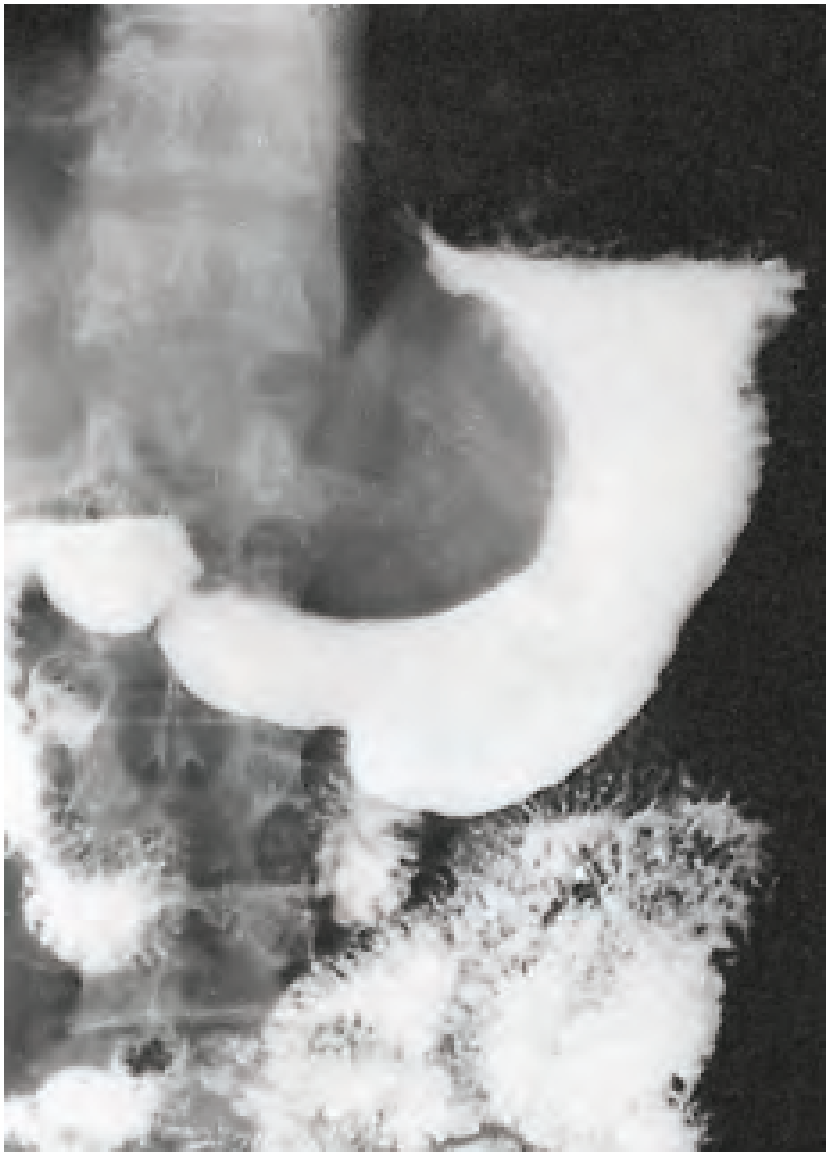
- **Types :**

Depending on whether it communicates with pancreatic duct or not it is classified as:

- *Communicating pseudocyst.*
- *Noncommunicating pseudocyst.*

It can be

- *Acute pseudocyst.*
- *Chronic pseudocyst.*



Barium meal: Pseudocyst displacing the stomach

- **Clinical Features:**

- A swelling in the epigastric region which is hemispherical, smooth, soft, not moving with respiration, not mobile, upper margin is diffuse but lower margin well defined, resonant or impaired resonant on percussion, with transmitted pulsation confirmed by knee-elbow position.

- If it is infected, it will be tender mass and patient will be toxic with fever and chills.

- Because stomach is stretched towards the abdominal wall, Ryle's tube passed will be felt per abdominally ***(Baid test).***

- **Differential Diagnosis:**

- Aortic aneurysm.
- Retroperitoneal cyst or tumour.
- Cystadenocarcinoma of pancreas.
- Cyst of the liver.
- Mesenteric cyst.
- Hydatid cyst.

- **Investigations:**

- ***US abdomen*** *(commonly done procedure), US reveals* the size and thickness of the pseudocyst. Size less than 6 cm indicates that one can wait for spontaneous resolution.
- **Endosonography** (EUS) is very useful.
- ***CT scan*** *is ideal and study of choice. It is two times more* sensitive than US. It demonstrates size, shape, number, wall thickness, contents, pancreatic duct size, and extent of necrosis in pancreas, calcification and atrophy in chronic pancreatitis, regional vessels, pseudoaneurysm, splenic/ portal vein thrombosis.
- **MRCP** delineates the ductal anatomy and its abnormality.
- **ERCP** is done to find out the communication.
- **Barium meal** (lateral view) shows widened vertebrogastric angle with displaced stomach (Not usually done now).
- **LFT, serum amylase, platelete count, PT INR.**
- ***EUS-guided aspiration and analysis of fluid*** *for amylase and* CEA. Amylase will be high with normal CEA in pseudocyst; amylase will be normal/low with high CEA >400 ng/ml in mucinous neoplasm.

CT scan showing typical pseudocyst of pancreas.

- **Treatment:**

- ***Conservative—Observation, follow-up using repeat USG*** at regular intervals. 50% of pseudocysts show spontaneous resolution.

- ***Interventional—Needs ERCP to delineate ductal anatomy,*** pancreatic duct stones, mainly communication into the pseudocyst. It is Guided—Endoscopic/EUS/US-guided drainage.

- ***Surgical drainage– It is either open or laparoscopic*** method.

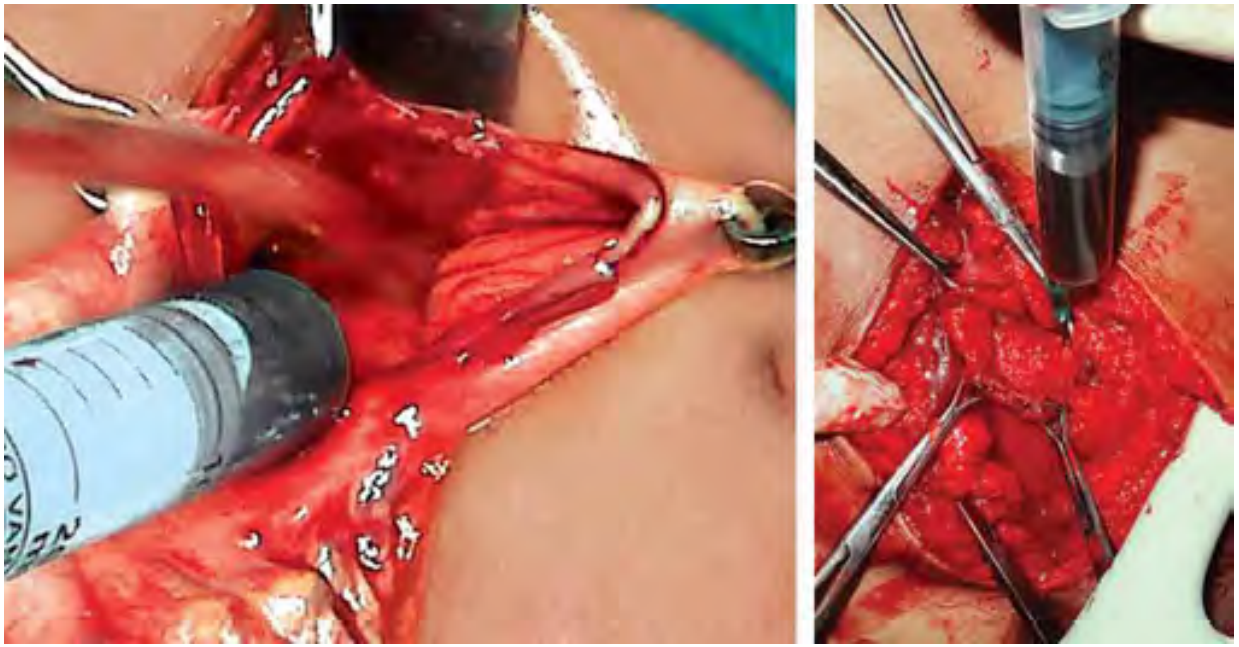
- **Indications for surgery/intervention:**

- Size more than 6 cm
- Formed pseudocyst
- Infected pseudocyst
- Cyst persisting after 6 weeks/progressive cyst
- Multiple cysts/cyst due to trauma
- Communicating cysts/cyst with severe pain
- Thick-walled pseudocyst

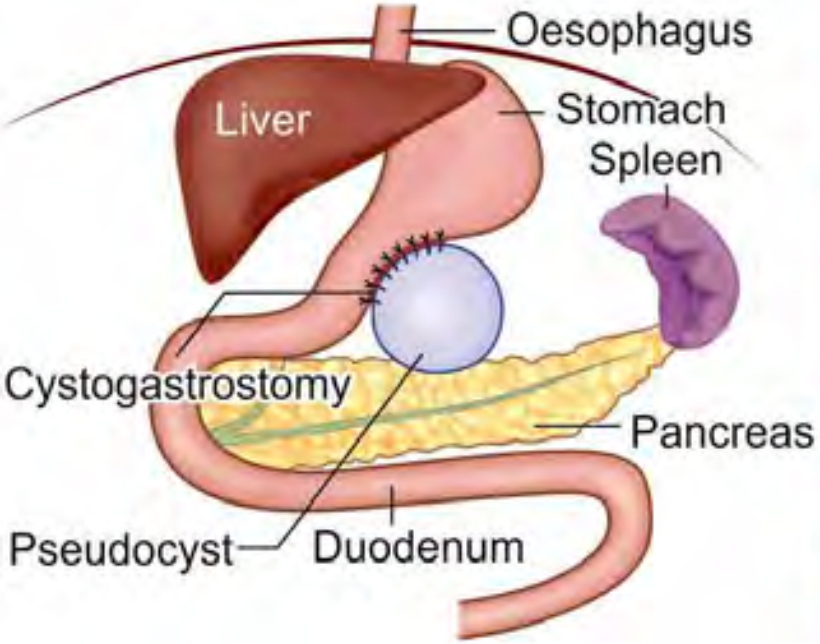
- **Surgery:**

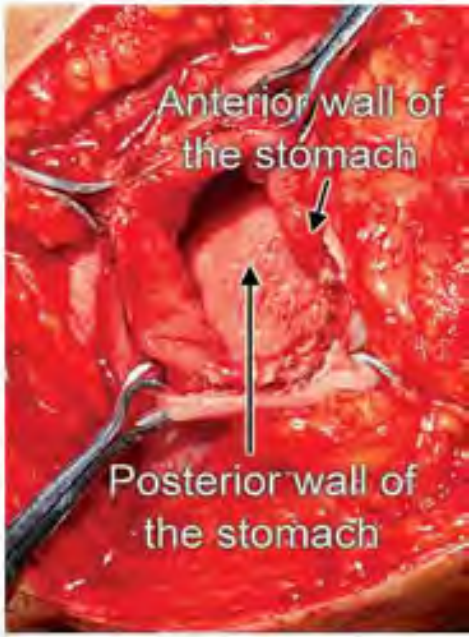
- ***Cystogastrostomy****: At laparotomy, anterior wall and posterior wall of* the stomach is opened. *Brownish fluid is aspirated. The thick capsule* of pseudocyst is opened. All fluid with necrotic material are sucked.

- Fluid should be sent for cytology, culture and sensitivity and amylase estimation. Cyst wall always should be biopsied. Cyst cavity should be washed with normal saline after breaking septae. Pseudocapsule is anastomosed to posterior wall of the stomach—***Jurasz operation.***



Pseudocyst of pancreas aspiration of table.
Note the brownish-black colour of the fluid aspirated.



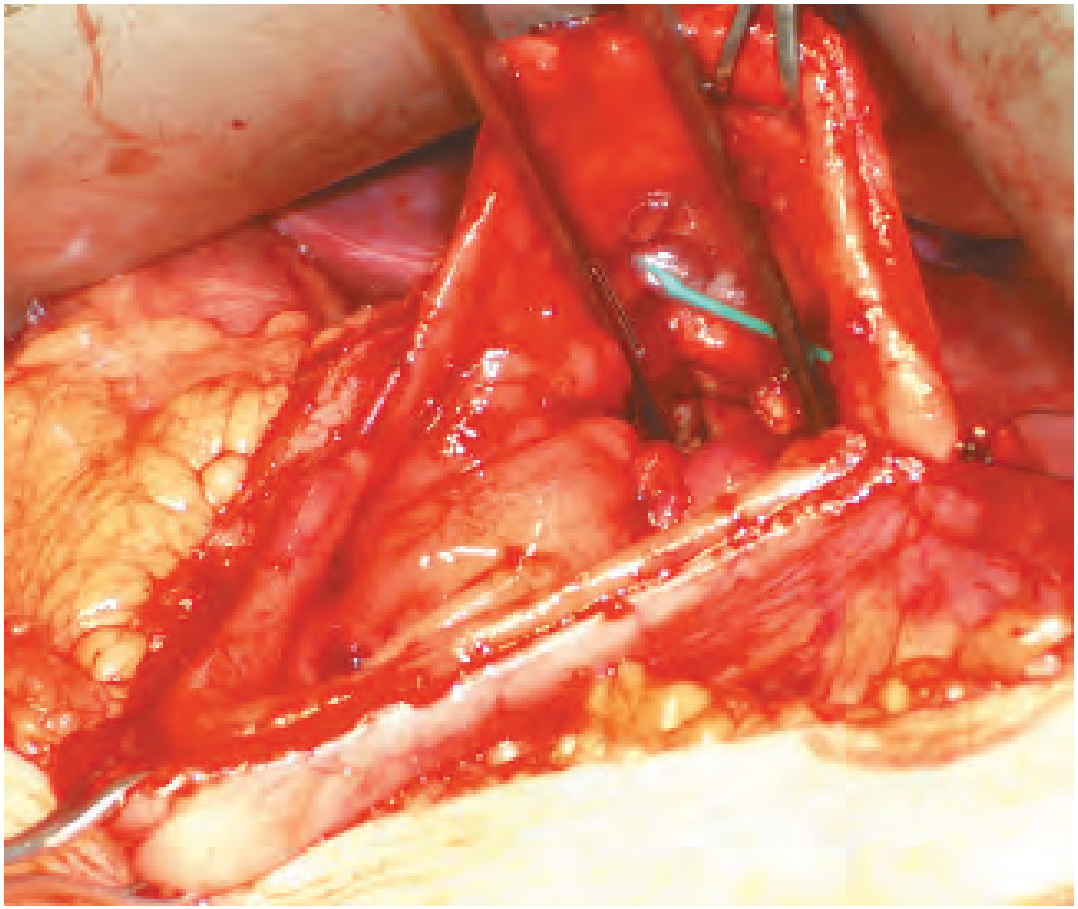


A) **Cystogastrostomy** for pseudocyst of the pancreas;

(B) **Cystogastrostomy procedure.** Anterior layer of the stomach is opened to visualize the bulge in the posterior wall. Aspiration of it shows brownish black coloured fluid, typical of pseudocyst of the pancreas.

Other procedures:

- Cystoduodenostomy
- Cystojejunostomy is done in large cyst, recurrent cyst.
- If infected, cystogastrostomy with external drainage is done using Malecot's catheter **(*Smith operation).***
- Laparoscopic cystogastrostomy is becoming popular, effective and less invasive.
- Along with cystojejunostomy, pancreaticojejunostomy should be done if there is ductal stricture and dilatation and communication with pseudocyst.
- Distal pancreatectomy with pseudocyst removal if cyst is in distal part.



Cystgastrostomy for the pancreatic pseudocyst shown. The anterior wall of the stomach has been opened and the edges drawn back, held by Babcock's forceps. An opening has been made through the posterior wall of the stomach into the pseudocyst, and the tips of the dissecting forceps are in the cavity of the pseudocyst, which is lined by slough and granulation tissue. The tip of a nasogastric tube is visible.

Complications of pseudocyst:

- Rupture—3%—into bowel or peritoneum
- Infection, commonest—20%, abscess
- Bleeding from the splenic vessels—7%
- Cholangitis
- Duodenal obstruction
- Portal/splenic vein thrombosis and segmental portal hypertension
- Cholestasis due to CBD block

- **CHRONIC PANCREATITIS:**

- It is persistent progressive irreversible damage of the pancreas due to chronic inflammation.
- It can be

❖ Chronic relapsing pancreatitis
❖ Chronic pancreatitis(persistent)

- Chronic pancreatitis is more common in males, common in Kerala (induced by diet, rich in Tapioca).

Etiology:

- Alcohol—80% main cause
- Stones in biliary tree—rare cause
- Malnutrition, diet
- Hyperparathyroidism
- Hereditary (familial hereditary pancreatitis)—Autosomal dominant
- Idiopathic—20%—as mutation
- Trauma
- Congenital anomaly (Pancreatic divisum)
- Cystic fibrosis
- Autoimmune pancreatitis
- Hyperlipidaemia

- **Alcohol** reduces pancreatic blood flow, alters cell viability, releases the free radicals, creates pancreatic ischaemia, and activates the pancreatic stellate cells which produce abundant extracellular matrix and collagen.

- **Genetic** predisposition may be the cause of idiopathic pancreatitis. Mutation in pancreatic secretory trypsin inhibitor causes activation of trypsin causing pancreatitis.

- **Hereditary** pancreatitis is an autosomal disorder with mutation in trypsinogen gene in chromosome 7. It causes recurrent painful episodes of acute pancreatitis in childhood, leading to chronic pancreatitis and pancreatic cancer in adulthood

Pathology:

- It shows atrophy of acini, hyperplasia of duct epithelium, interlobular fibrosis, calcifications, ductal dilatation, with strictures in the duct, focal necrosis.

- There is loss of exocrine function initially and endocrine functions eventually.

- Ductular metaplasia and acinar atrophy along with fibrosis and cyst formation develops.

Spectrum of Chronic Pancreatitis:

- *Early—pancreatic oedema—chronic inflammation—normal secretory* function.

- *Moderate—early fibrosis; only few acinar cells—exocrine*
- dysfunction.

- *Late—fibrosis—loss of secretory function—diabetes mellitus.*

- *Complications develop secondary to healing and fibrosis; deposition* of inspissated proteinaceous material in the duct; over expression of CTGF and TGF-B1 that stimulate extracellular matrix.

Clinical Features:

- *Pain in epigastric region (80%):* It is persistent and severe, which radiates to back. This pain is due to irritation of retropancreatic nerves, or due to ductal dilatation and stasis, or due to chronic inflammation itself.

- *Two patterns of pain have been described (Ammann and* Muellhaupt). ***Type A pain*** *is short relapsing episodes* lasting days to weeks, with pain-free intervals. ***Type B*** **pain** is prolonged, severe, unrelenting pain.

- Pain exacerbations *need not be always associated with* rise in amylase and lipase levels. There is often a gradual diminish in pain over years due to "*pancreatic burnout" by extensive calcifications,* exocrine and endocrine insufficiency.

- ***Exocrine dysfunction****: Diarrhoea, asthenia, loss of weight* and appetite, steatorrhoea (signifies severe pancreatic insufficiency) (90%), malabsorption.

- ***Endocrine dysfunction:*** *Diabetes mellitus. Pancreatic* diabetes may often be *typically brittle because of concomitant* glucagon deficiency and *requires insulin.*

- ***Mild jaundice*** *is due to narrowing of retropancreatic bile* duct and cholangitis.

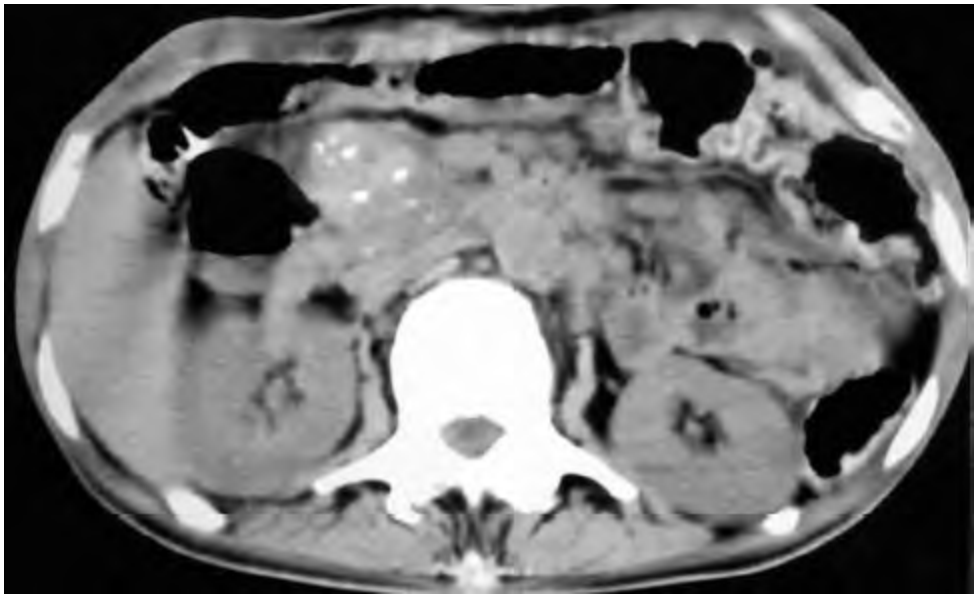
- ***Mass per abdomen****, just above the umbilicus, tender,* nodular, hard, felt on deep palpation, not moving with respiration, not mobile, resonant on percussion.

COMPLICATIONS OF CHRONIC PANCREATITIS:

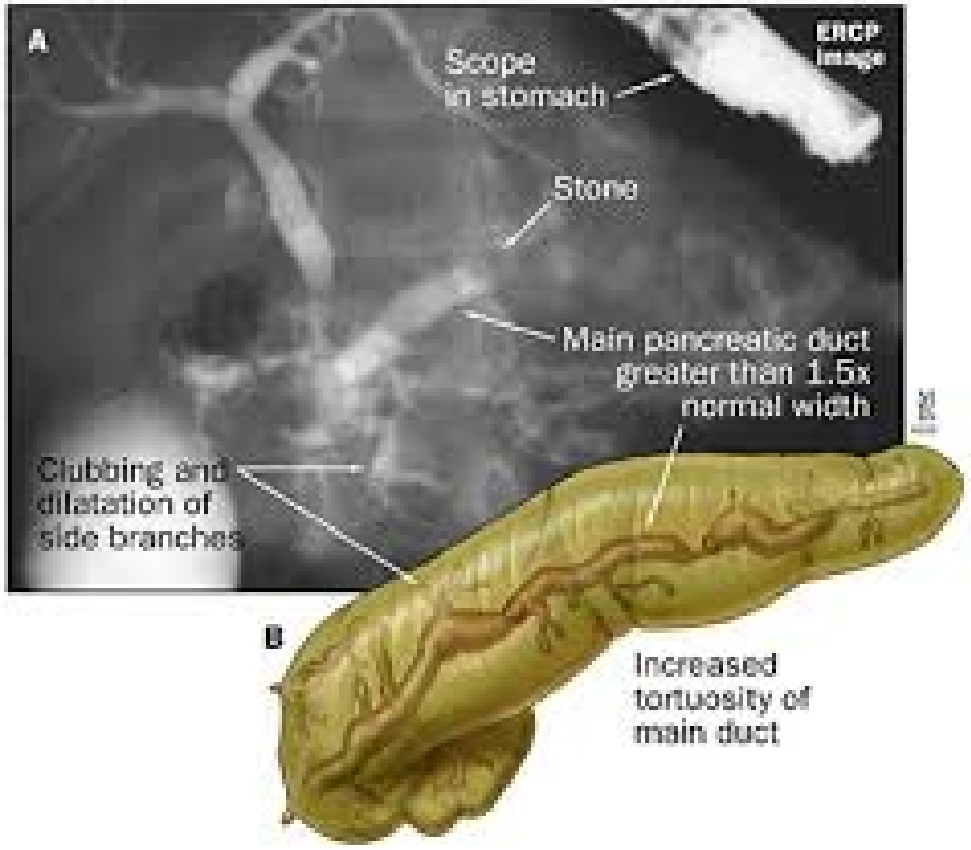
- Pseudocyst of pancreas
- Pancreatic ascites
- CBD stricture due to oedema or inflammation
- Duodenal stenosis
- Portal thrombosis—segmental portal hypertension
- Peptic ulcer
- Carcinoma pancreas
- Pancreatic pleural effusion, pancreatic ascites
- Pancreatic fistula
- Splenic vein thrombosis
- Pancreatico-enteric fistula

- **Investigations :**

- *CT scan abdomen: It is 95% reliable; to see pseudocyst,* calcification, ductal stones, duct stricture and dilatation, vasculature, fibrosis, surrounding structures, CBD status.
- It shows 90% sensitivity; 95% specificity.



- *ERCP is useful in chronic pancreatitis to see dilatations,* strictures and altered ductal anatomy. It is mainly to assess s*tructural pathology of the pancreas.*
- It shows *chain of lakes* appearance .



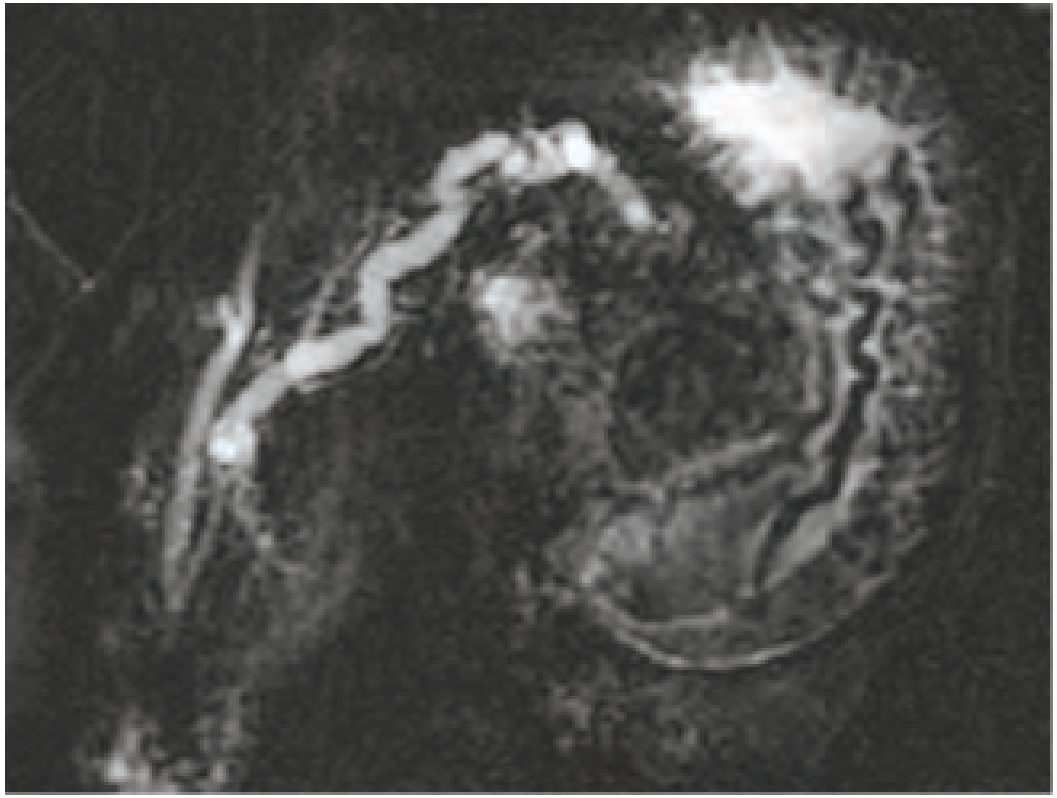
- *MRCP is non-invasive method to see ductal anatomy.*

- *Endosonography (EUS) to see possible malignant site and to* take FNAC. Site, duct status, stricture, stones, parenchyma, pseudocyst, CBD status, nodes are identified in EUS. Positive five parameters suggest chronic pancreatitis. It also helps in assessing operability.

- *LFT, prothrombin time is needed to manage the patient.*

- Serum trypsinogen <20 ng/ml and fecal elastase < 200 mcg/g stool—severe exocrine insufficiency.

- Plain X-ray abdomen may show ductal calculi or parenchymal calcifications.



Magnetic resonance cholangiopancreatography in a patient with chronic pancreatitis, showing a stricture of the pancreatic duct in the body of the gland (arrow), with dilatation upstream.

TREATMENT:

Conservative:

- Avoid alcohol.
- Low fat, high protein, high carbohydrate diet; small and more frequent meals.
- Pancreatic enzyme supplements, vitamins and minerals, medium chain fatty acids.
- For pain—analgesics, splanchnic nerve or coeliac plexus block.
- *Pancreatic enzyme replacement therapy (PERT) is used to relieve* pain based on—negative feedback mechanism of pain; protease content responsible for pain relief (dose: >50,000 units). It may be beneficial only in females with idiopathic pancreatitis, small duct disease and pancreas divisum. Other drugs used are—antioxidants, amitriptyline, fluoxitine, octreotide. Novel pain therapies like NGF, antinociceptive agents, mast cell directed therapies are also used.
- Control of diabetes by oral hypoglycaemics or insulin.
- Somatostatin and its analogues. Its role is not clear.
- Repeated ascitic taps for pancreatic ascites.
- *Steatorrhoea can be controlled by proton pump inhibitors with* 1,50,000 units of oral lipase with low fat diet. PPI inhibits acid in stomach to prevent lipase getting inactivated in stomach.

Endoscopic Therapy in Chronic Pancreatitis:

- Main *indications are—pain relief, ductal stones, main duct stricture,* pseudocyst drainage, pancreatic ascites, effusion and fistula.

- It is quite useful for main pancreatic duct obstruction and pseudocyst.

- ***Procedures*** *are—pancreatic duct sphincterotomy, main ductal stone* extraction using Dormia basket, main ductal stenting in strictures , stricture dilatation, ESWL of main duct stones, minor papillary sphincterotomy.

- *Pseudocyst can be treated by transmural stenting across gastric* wall if there is visible bulge, distance of cyst wall is less than 1 cm, no major vessel at puncture site. *Transpapillary stenting is done* if pseudocyst is communicating, if cyst is less than 6 cm, if there is no visible bulge in the stomach.

- *Complications are—pancreatitis, stent displacement/occlusion,* perforation, bleeding, sepsis, restenosis.

Surgery:

- **Indications for surgery:**

- Persisting pain—main indication
- Severe malabsorption
- Suspicion of malignant transformation
- Multiple relapses
- Complications like pseudocyst, segmental portal hypertension
- Biliary obstruction (*Wadsworth syndrome)*
- Pseudocyst
- Pancreatic ductal dilatation > 7 mm
- Pancreatic ascites/fistula
- Pancreatic ductal stenosis

- ***Principles of Surgery:***

- ***Pancreatic duct decompression (drainage)*** *reduces the pain and* retains the existing exocrine and endocrine functions. But chances of malignant transformation are still high. In significant number of patients recurrence of symptoms (50% recurrence of pain in 5 years) and progression of the disease pathology occurs and it does not give a complete cure. Normal diameter of pancreatic duct 4 mm in head; 3 mm in body; 2 mm in tail of the pancreas. *Pancreatic duct diameter more than 7 mm is an indication for surgery (pancreaticojejunostomy).*

- ***Pancreatic resection (total pancreatectomy)*** *is the actually ideal technique* which relieves pain, removes entire diseased tissue. But technical difficulty; high surgical mortality (21%); and severe exocrine and endocrine deficiency (brittle diabetes) are the drawbacks.

- A ***combined resection and drainage*** *procedures are also done. Head* is decored at various levels and decompressed duct is anastomosed to jejunum.