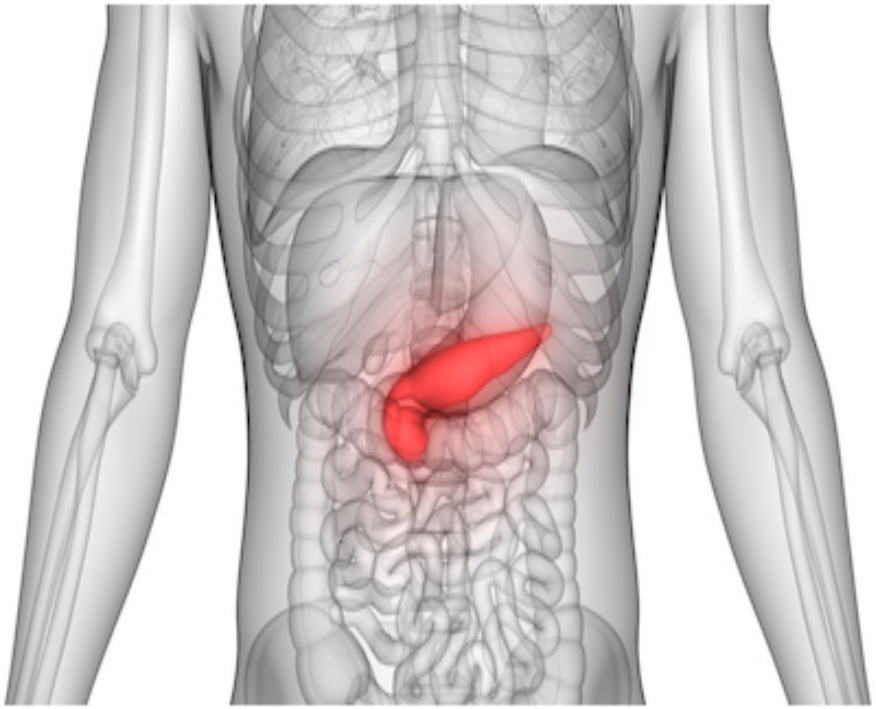

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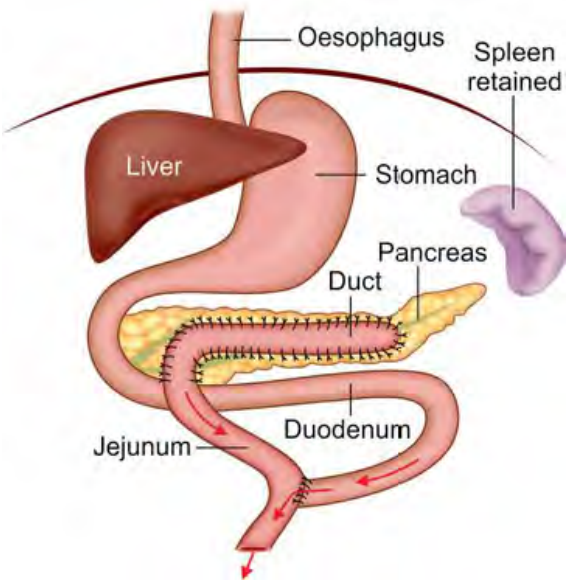
SURGERIES OF PANCREAS

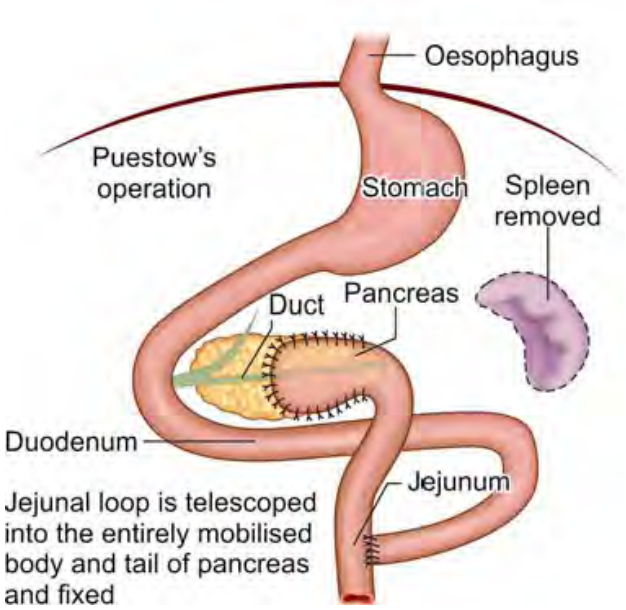
- ***Partington-Rochelle operation***:

- *Here longitudinal pancreaticojejunostomy* is done using almost entire laid open pancreatic duct. Spleen is retained in this procedure. This is now commonly done procedure.



- ***Puestow's operation:***

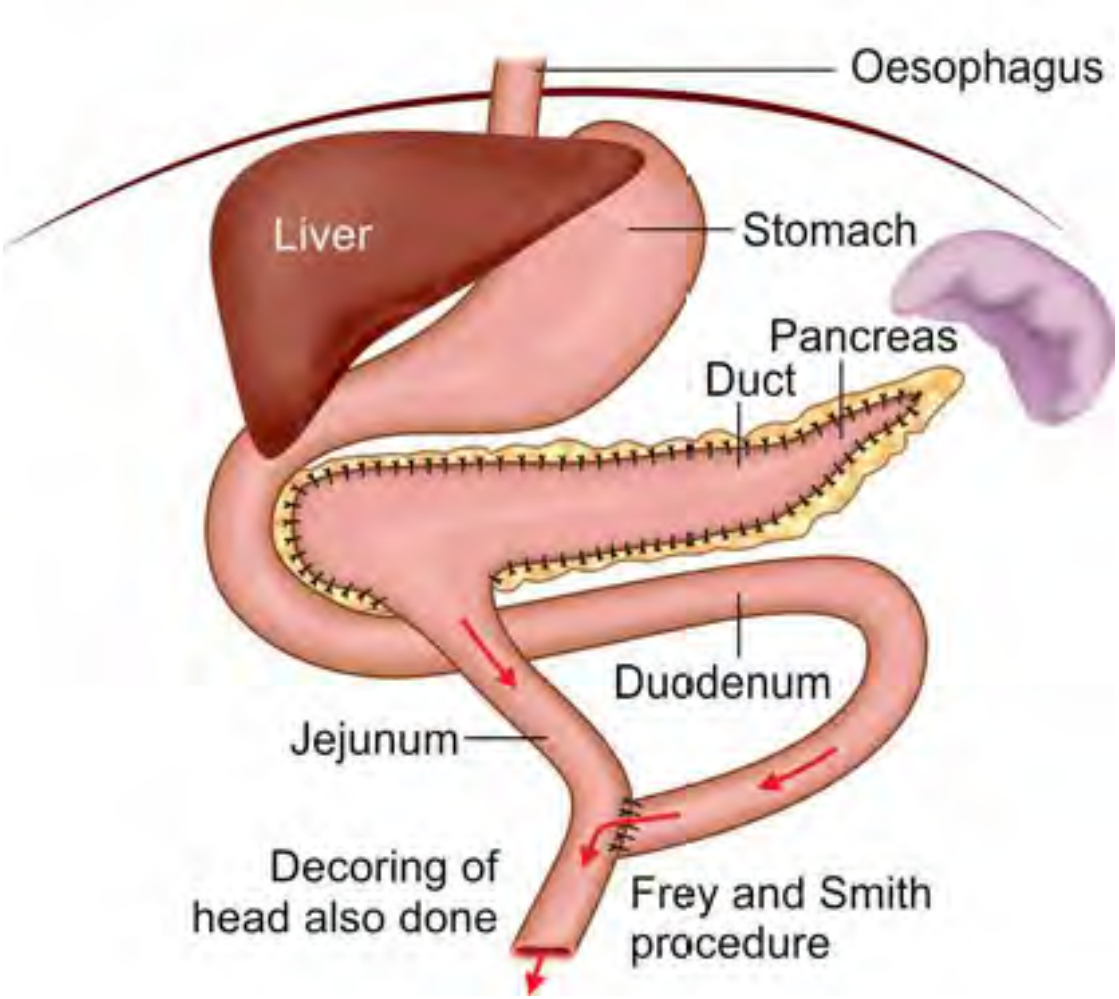
- As the duct is dilated more than 8 mm, duct can easily be opened longitudinally.
- After removing all stones from the duct, it is anastomosed to the jejunum as *Roux-en-Y anastomosis. In Puestow's operation spleen is removed.*



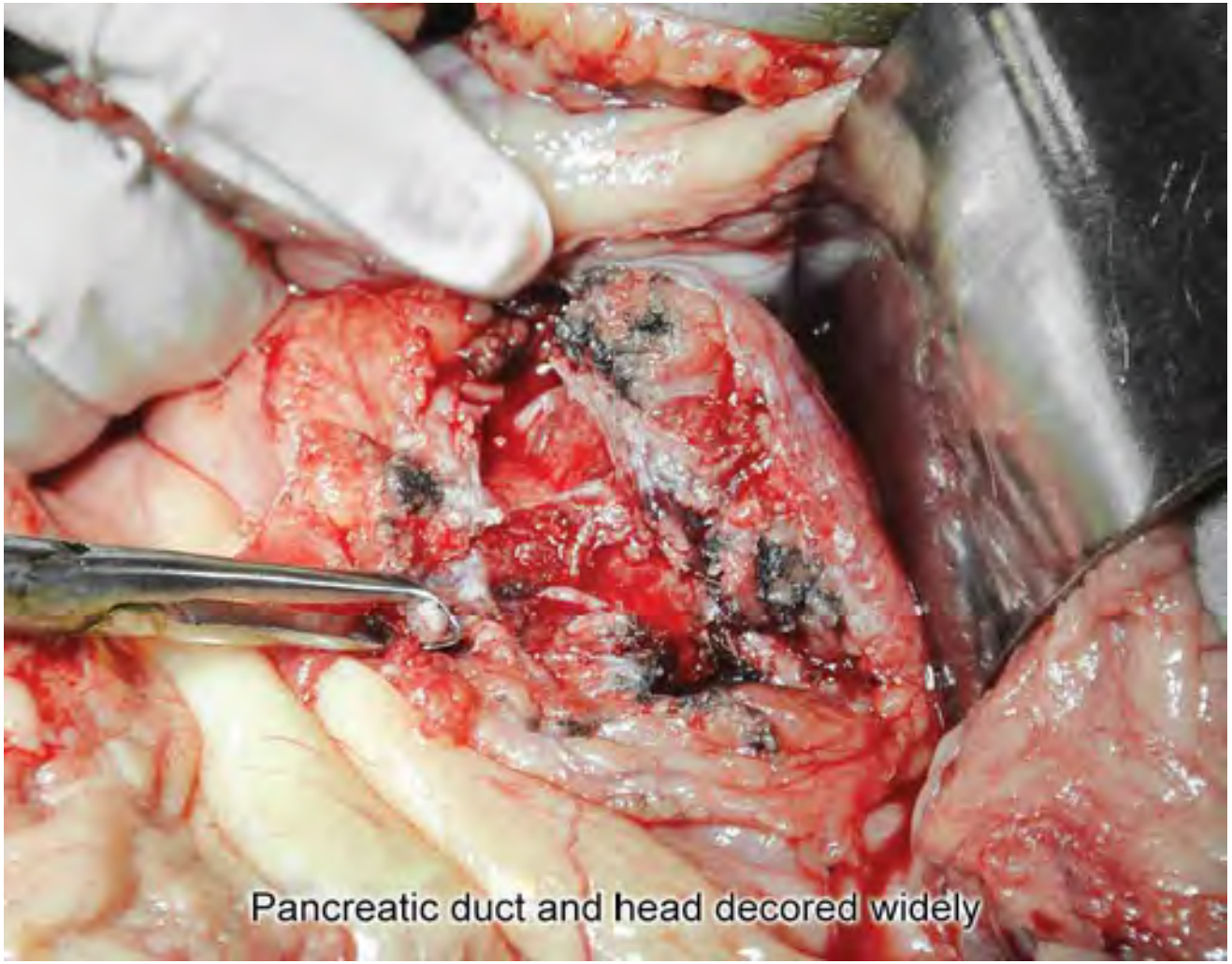
- ***Longitudinal pancreaticojejunostomy*** *after excision of peripancreatic* duct tissue—here superficial part of the head of pancreas is removed to achieve improved **drainage—*Frey procedure.***

- *It is* done when ductal dilatation is not adequate; head is more than 4 cm thick.

- Head coring is done with retaining 5 mm thick tissue in front of veins, close to duodenum.
- It shows 75% pain relief in 3 years.



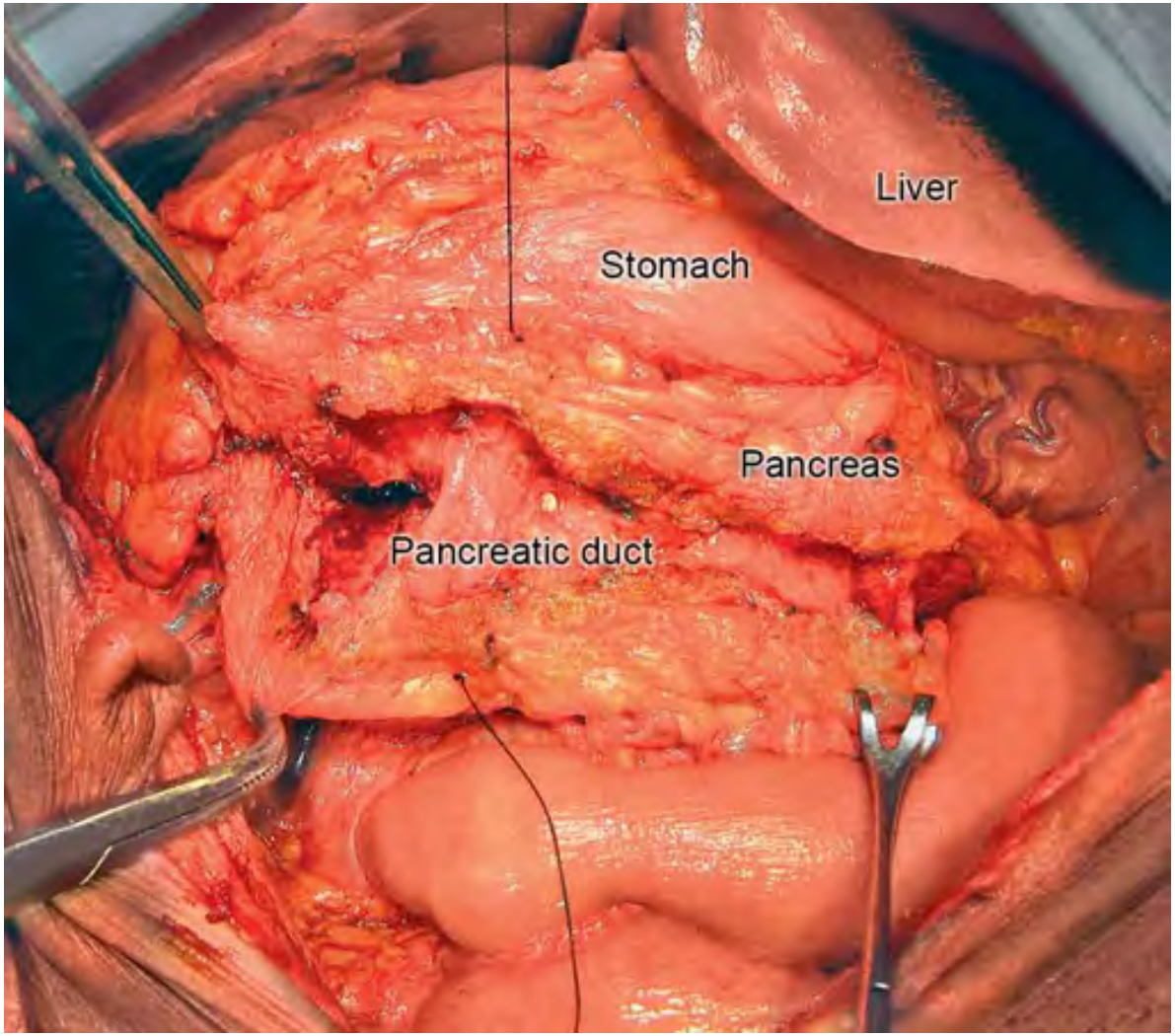
Frey's procedure: *Here head of pancreas is decored and* opened duct with decored head is anastomosed to Roux loop of jejunum.



Decoring of the head with duct part to resect all diseased tissue; it shows good result. But it is technically demanding; bleeds often profusely.

- Duodenal preserving resection of head of pancreas in front of portal vein with jejunal loop anastomosis to transected neck of pancreas—***Beger procedure***. *Here extensive resection of head* (than Frey's) is done.

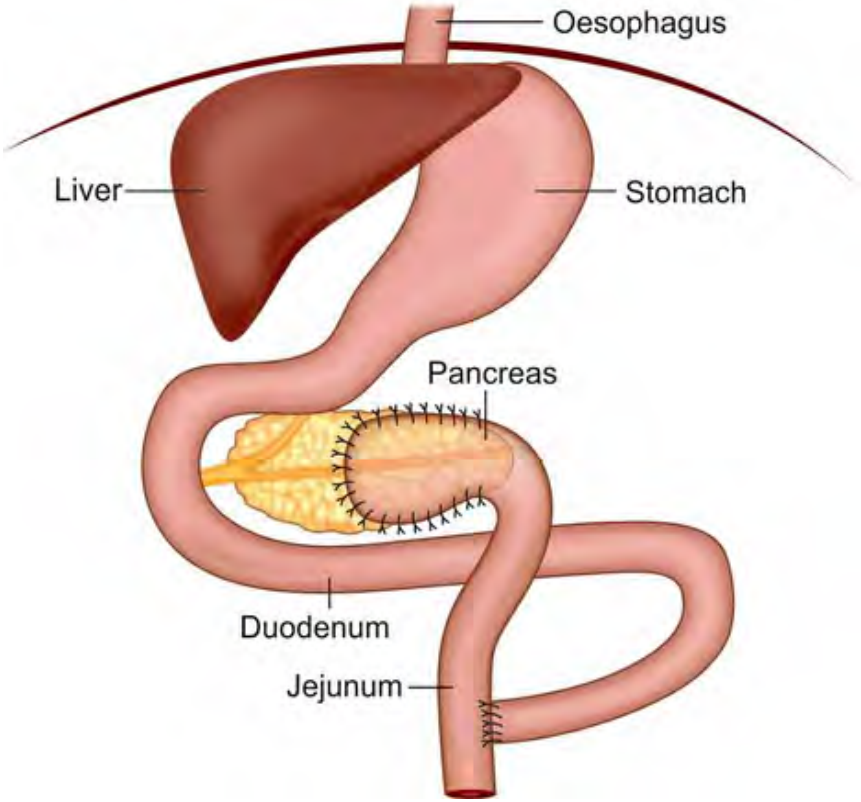
- ***Total pancreatectomy*** *is indicated when entire gland is diseased.* It relieves the pain and also prevents the diseased pancreas from turning into malignancy. Patient has to take insulin and oral pancreatic enzymes permanently (*brittle diabetes).*



Dilated pancreatic duct is laid open; multiple stones are removed and duct is ready for **longitudinal pancreaticojejunostomy (LPJ).**

- *Distal pancreatectomy—Spleen, body and tail of the pancreas are* removed—***Child's operation.***

- Resection of tail of pancreas with retrograde pancreatico-jejunostomy— ***Duval procedure.***



- ***Complications of surgery:***

- Pancreatic leak/fistula (10%);
- Infection;
- Bleeding;
- Recurrence;
- Brittle diabetes.

- *Pain relief in chronic pancreatitis is achieved by drugs; decompression/*drainage surgeries, resection surgeries, epidural analgesia,coeliac ganglion block, operative chemical splanchnicectomy,extra/intra-peritoneal right and left splanchnicectomy, transhiatal bilateral splanchnicectomy, thoracoscopic splanchnicectomy.

- **Post-operative care:**

- Nutrition—TPN/jejunostomy feed
- Fluid and electrolyte management
- Prevention/control of sepsis
- Proper monitoring
- Octreotide on table and postoperatively—regular intervals or
  slow infusion—5 days

PANCREATIC TUMOURS

- **Classification:**

A. ***Exocrine tumours***

- *Benign: Benign cystadenoma. It is rare.*

- *Malignant:*

  1. **Adenocarcinoma in ampulla or periampullary region or head of pancreas.** Periampullary carcinoma may arise from any of the component—duodenal mucosa or CBD or pancreatic duct component or all.

  2. **Cystadenocarcinoma of pancreas** occurs commonly in body and tail of the pancreas, which usually attains a large size (5%).

B. ***Endocrine tumours***

1. Insulinoma (β cells)- Whipple's triad

2. Gastrinoma (G cells)- Peptic ulcer.

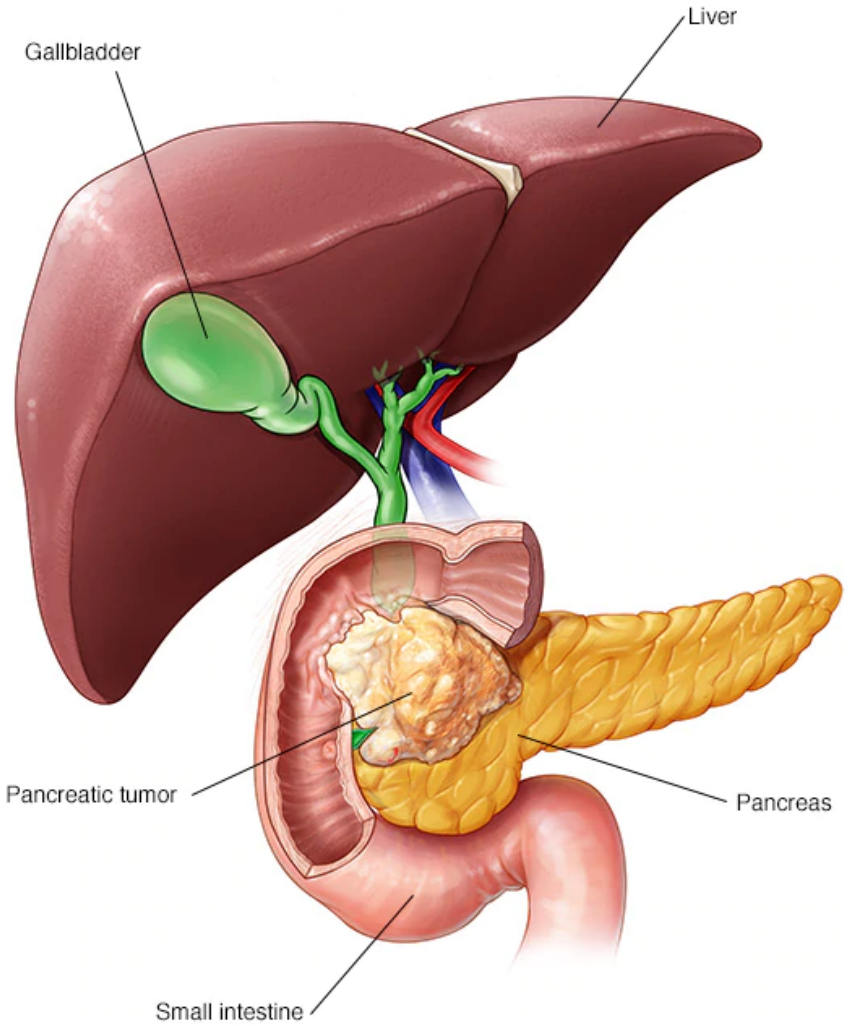
3. Glucagonoma (α cells)- Diabetes, necrolytic migratory erythema.

4. Vipoma—Pancreatic Watery diarrhoea, cholera (Verner-Morrison syndrome) achlorhydria.(WDHA syndrome)

5. Somatostatinoma-Diabetes, steatorrhoea, gallstones.

C. ***Lymphomas***

CARCINOMA PANCREAS



- Carcinoma pancreas is higher in men.
- It is common in African American males.
- 80% of pancreatic cancers are metastatic at the time of first diagnosis.
- It is common in Jewish heritage and native Hawaiians.
- Its incidence is 9 new cases per 100000 people. Mean age is 60–65 years.

Aetiology:

- Smoking.
- High energy diet rich in fat.
- Chronic pancreatitis and Familial pancreatitis.
- Diabetes mellitus.
- Carcinogens like benzidine.
- Hemochromatosis with pancreatic calcification.
- Cirrhosis, obesity.
- Occupational exposure to carcinogens like DDT, benzidine.
- Previous cholecystectomy.
- 85% show mutant *K ras gene on codon 12; 60% show* mutation of p53 gene in chromosome 17; over expression of EGFR.
- *Peutz-Jegher syndrome, HNPCC (Hereditary Non-polyposis* Colonic Cancer—Lynch II type), ataxia telangiectasia,*hereditary breast and ovarian cancers, hereditary atypical multiple mole melanoma syndrome, familial adenomatous* polyposis (FAP).

Sites:

- Head and neck region
- Ampullary and periampullary region
- Body and tail

- More than 85% of pancreatic cancers are ductal adenocarcinomas.

- The remaining tumours constitute a variety of pathologies with individual characteristics. Endocrine tumours of the pancreas are rare.

- **<u>Periampullary Carcinoma</u>:**

- It is tumour arising at or near the ampulla.

It could be:

- Adenocarcinoma from head of pancreas close to the ampulla—50%.
- Tumour from ampulla of Vater—30%.
- Distal bile duct carcinoma—10%.
- Duodenal carcinoma adjacent to ampulla—10%.

- **Pathology**

- *Gross:*

- Grayish white scirrhous nodular gritty tumour in the head is the usual gross look. More than 3 cm sized tumour shows nodal and distant spread commonly. Induration, areas of haemorrhage and necrosis are common.

- Pancreatic duct may be dilated due to obstruction.

- Carcinoma head of pancreas present earlier than carcinoma body and tail of pancreas.

- **Spread:**

- *Local Spread:*

- To adjacent structures like duodenum, portal vein, superior mesenteric vein, retroperitoneum.
- Spread is more likely in carcinoma head of pancreas than in periampullary carcinoma.

- *Nodal Spread:*

- Usually to perihepatic nodes around the duodenum and CBD, subpyloric, celiac nodes.
- Hard dark greenish nodes are typical. Often nodal enlargement may be due to just reactive hyperplasia.

- *Distant Spread:*

- To *liver commonly as multiple secondaries in both lobes.*
- Occasionally to lungs, adrenals, brain, bone, etc.

- **Clinical Features:**

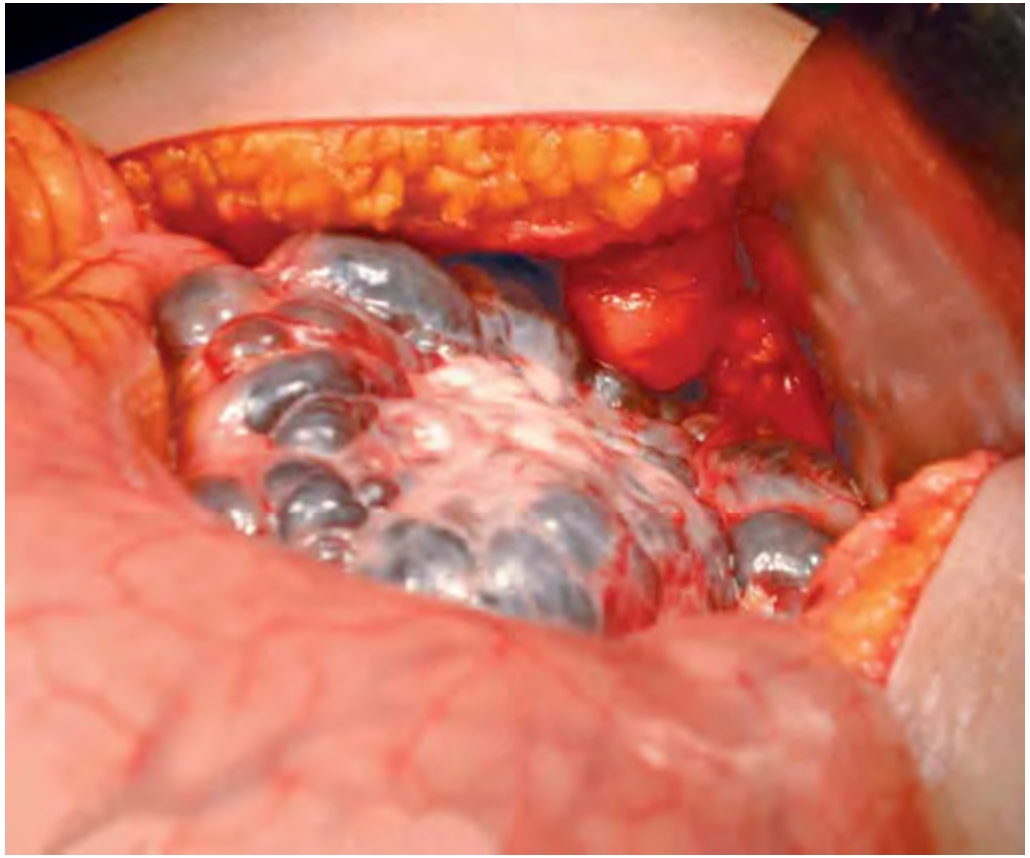
- *Presentations:*

a. Ampullary tumours mainly present with *jaundice and weight loss.*

b. Carcinoma of head and neck region present with *weight loss and jaundice.*

c. *Cystadenocarcinoma of pancreas present with pain, weight* loss and mass.

Obstructive jaundice due to periampullary carcinoma in male and female patients.



On table finding of cystadenocarcinoma of pancreas.

- ***Jaundice*** *is of obstructive nature which is of short duration,* severe, progressive, associated with pruritus (due to deposition of bile salts in the skin which releases histamine).
- Painless jaundice is seen in ampullary malignancies.
- **Pain** in the right hypochondrium, epigastrium, or left hypochondrium depending on location of the tumour.
- **Back pain**, when present, is due to involvement of retropancreatic nerves, or pancreatic duct obstruction or stasis, disruption of nerve sheath by tumour. Pain is more at night, after food and on recumbency; it is relieved by leaning forward.
- **Diarrhoea, steatorrhoea,** acholic stools, tea coloured urine.
- **Silvery stool** (due to mixing of undigested fat with metabolised blood derived from the ooze of periampullary growth).
- **Loss of appetite** and weight.
- Scratch marks on the back.
- ***Migratory superficial thrombophlebitis—Trousseau's sign*** **(10%)** is due to release of platelet aggregating factors from the tumour or its necrotic material (Trousseau himself died of carcinoma pancreas, also had migrating thrombophlebitis).

- Left supraclavicular palpable lymph node.

- Secondaries in rectovesical pouch (Blumer's shelf).

- Gallbladder may be palpable which is nontender, soft, globular, smooth, moving with respiration, mobile horizontally, dull on percussion (30% in carcinoma head of pancreas; 50% in periampullary carcinoma). *Courvoisier law favours* gallbladder enlargement.

- Liver is enlarged, smooth, firm, non-tender, due to dilated bile filled biliary radicles—*Hydrohepatosis. Liver can show* multiple hard nodules due to secondaries (70%).

- **Differential diagnosis:**

- Retroperitoneal mass/tumour/lymph nodes
- Advanced adherent carcinoma of stomach
- Advanced carcinoma of transverse colon
- CBD stone
- Bile duct stricture
- Lymph node compressing CBD
- Cholangiocarcinoma of CBD
- Chronic pancreatitis

- **Investigations:**

- *Liver function tests: Serum bilirubin, direct component* (conjugated) is increased (van den Bergh's test). Serum albumin is decreased with altered A : G ratio.

- Prothrombin time is widened. Serum alkaline phosphatase is increased.

- US abdomen to see gallbladder, liver, growth, CBD size (normal diameter is < 10 mm), lymph node status, portal vein, ascites.

- *Spiral CT scan (ideal) shows portal vein infiltration, retroperitoneal* lymph nodes, size of the tumour.

- *Endoscopy is helpful in periampullary carcinoma to visualize and* take biopsy.

- Barium meal shows widened duodenal *"C" loop—**pad sign**.*
- ***Reverse 3 sign** is seen in carcinoma—periampullary* region.

- *CA 19–9 (carbohydrate antigen) is a useful tumour marker. More* than 37 units/ml is significant with 85% sensitivity and specificity.
- CA 494 is useful to differentiate it from chronic pancreatitis. CEA is also often done in suspected cystadenocarcinoma.

- *Coeliac and superior mesenteric angiogram* can be done to reveal tumour circulation and invasion .

- Gastroduodenoscopy reveals ampullary tumour and biopsy can also be taken.

- Laparoscopy to assess. Laparoscopy and laparoscopic US is useful for staging and to identify peritoneal deposits which prevents unnecessary laparotomy. Palliative laparoscopic bypass like choledochojejunostomy can also be done.

- CT angiogram to see the vascularity. It also provides idea about resectability of the tumour in 70% cases.

Differences between presenting features of carcinoma of head of pancreas and periampullary carcinoma of pancreas

		Carcinoma of head of pancreas	*Periampullary carcinoma*
1.	Pain and weight loss	Early features	Late features
2.	Jaundice	Persistent and progressive	Intermittent
3.	Occult blood in stool	Absent	Present; stools are silvery
4.	Endoscopic examination	Growth not visible	Growth visible
5.	Prognosis	Not good	Good

- **Treatment:**

- Only 10–15% of pancreatic carcinomas (head) are operable.
- 40–50% are locally advanced. Another 40–50% will have distant spread to liver or lungs.

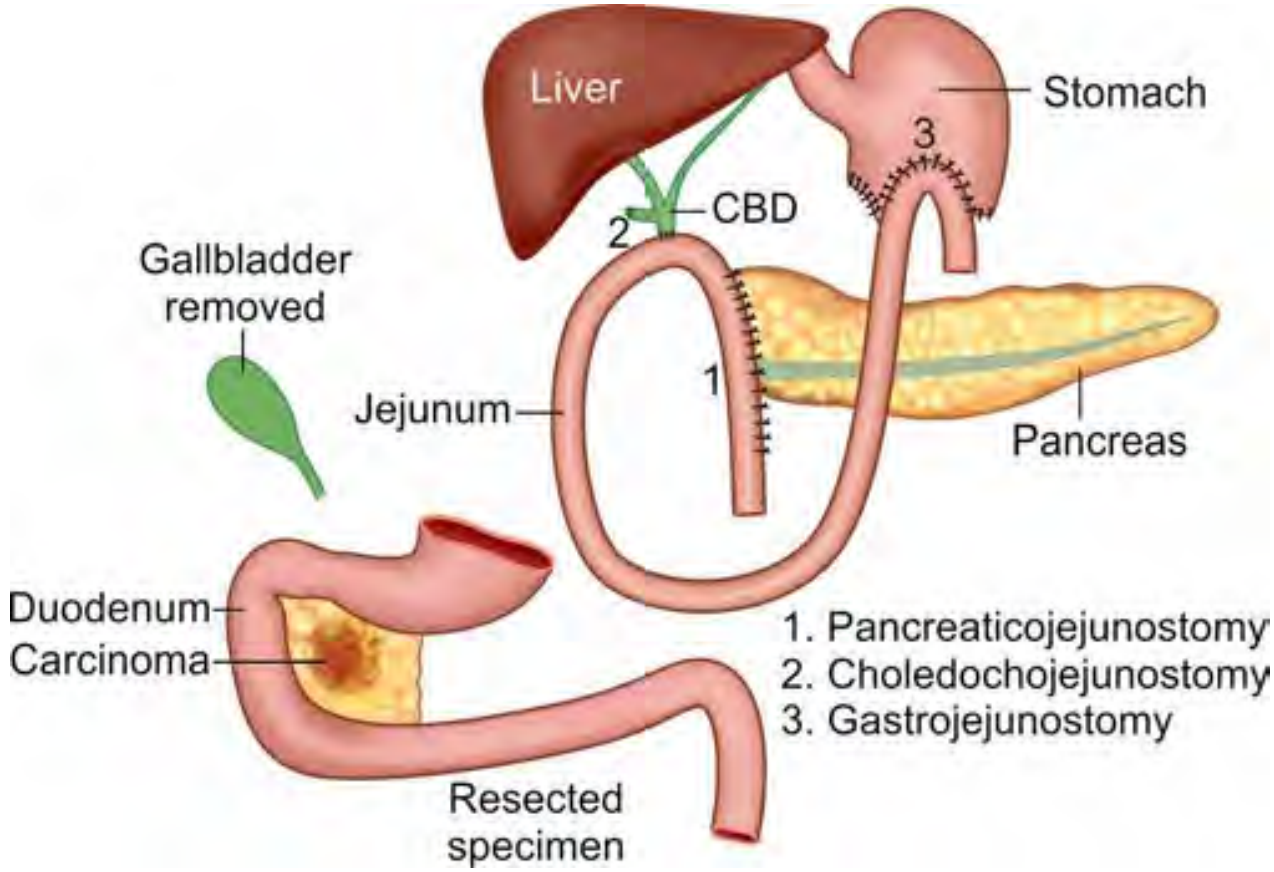
Criteria for resection:

- Tumour size less than 3 cm
- Periampullary tumours
- Growth not adherent to portal system

- **In operable cases:**

- ***Whipple's operation*** *is done by removing tumour with head* and neck of pancreas, C loop of duodenum, 40% distal stomach, 10 cm proximal jejunum, lower end of the common bile duct, gallbladder, peripancreatic, pericholedochal, paraduodenal and perihepatic nodes.

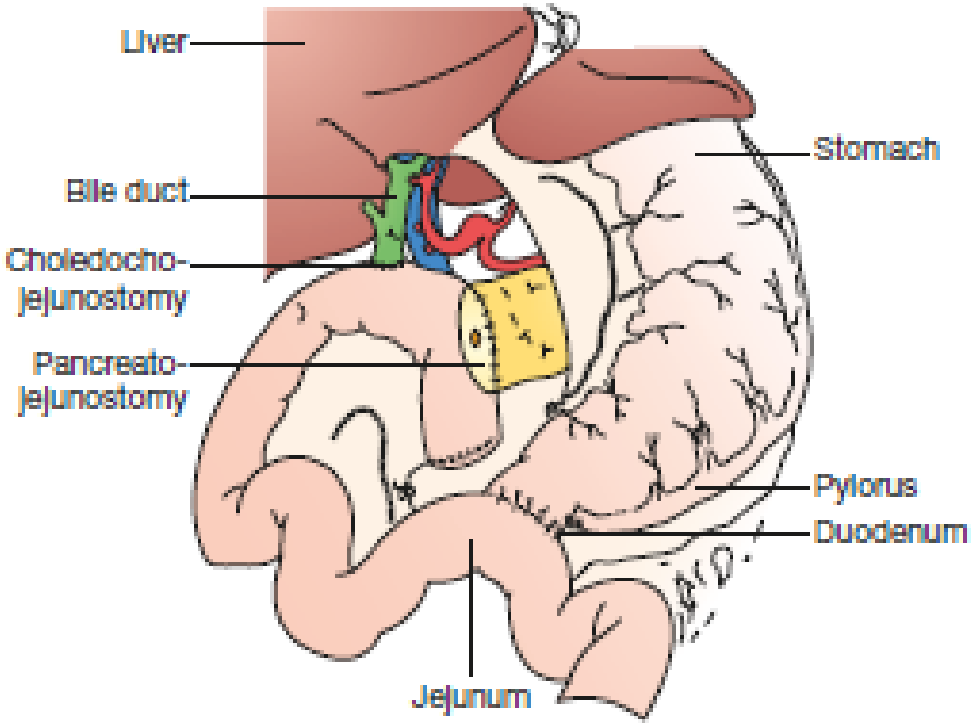
  Continuity is maintained by choledochojejunostomy, pancreaticojejunostomy and gastrojejunostomy.

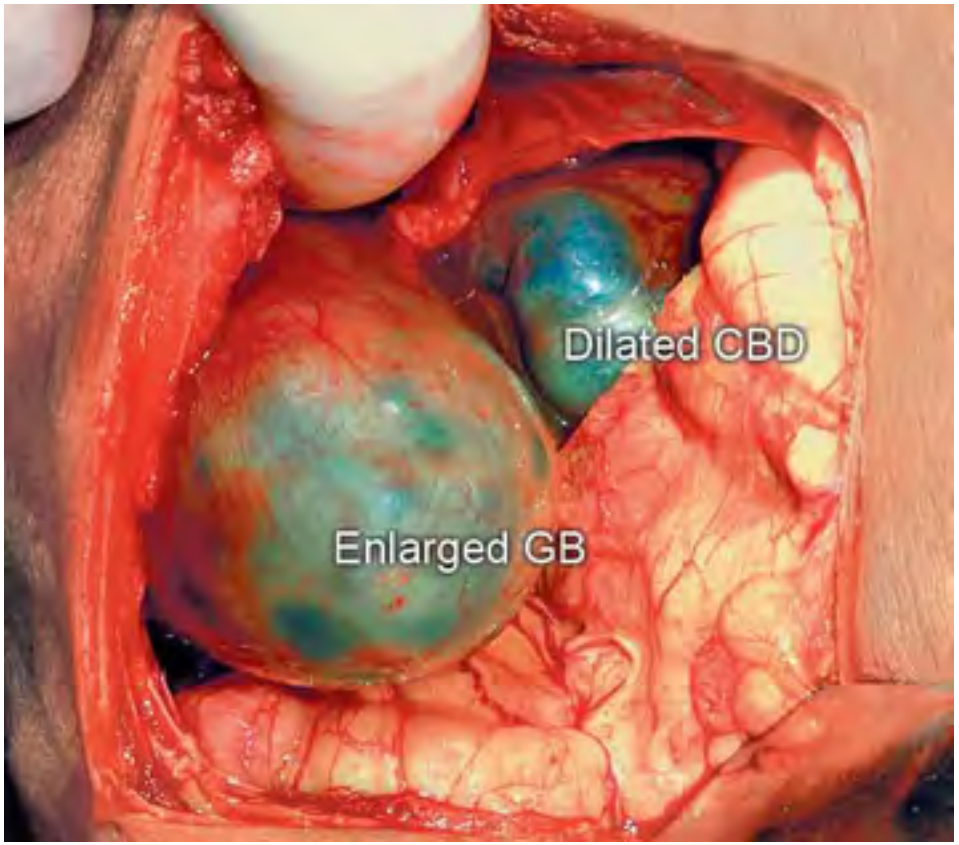


WHIPPLE PROCEDURE

- ***Traverso-Longmire pylorus preserving pancreatico-duodenectomy*** (1978):

  Here duodenum is cut 2 cm distal to the pylorus and continuity is maintained by anastomosing with jejunum.





On table finding in periampullary tumour showing dilated gallbladder and CBD.

- ***Adjuvant Therapy:***

- Adjuvant chemotherapy using gemcitabine—better but costly; dose is 1000 mg/m2 surface area; 5-fluorouracil; mitomycin; vincristine, cisplatin, docetaxel, oxaliplatin are used along with gemcitabine.

- Radioactive iodine seeds I125 to the field are on trial. External radiotherapy 4000 cGy units to relieve pain and to reduce the tumour size.

- *Immunotherapy—specific type to increase the effectiveness* of chemotherapy and to improve the cure rate (allogeneic tumour cell vaccine).

- ***Neoadjuvant Chemoradiotherapy:***

- Only 20% of pancreatic carcinomas are amenable for surgical resection. Even in these patients in spite of resection, overall outcome is poor. So neoadjuvant chemoradiotherapy is becoming popular [(50 Gy dose of *radiotherapy for 5–6* weeks (25–30 fractions) with *infusion chemotherapy.*

- **Post-operative Management in Carcinoma Pancreas:**

- Maintenance of proper fluid and electrolyte balance.
- Observation for bleeding and its control by transfusion of blood, fresh frozen plasma (FFP), and prevention of DIC at initial period.
- Injection vitamin K 10 mg IM for 5 days.
- Respiratory care—ideally post-operative ICU care is better. Often ventilator is needed for 24 hours.
- Maintaining adequate urine output—mannitol should be continued.
- Injection octreotide infusion for 5 days to suppress pancreatic secretion so as to prevent leak.
- Antibiotics, nasogastric aspiration.
- Continuous monitoring the patient with pulse/blood pressure/ oxygen saturation/hourly urine output/inspection of drain site/ abdomen distension/by doing HB%, LFT, serum creatinine, bilirubin, arterial blood gas analysis if needed, platelet count, prothrombin time.