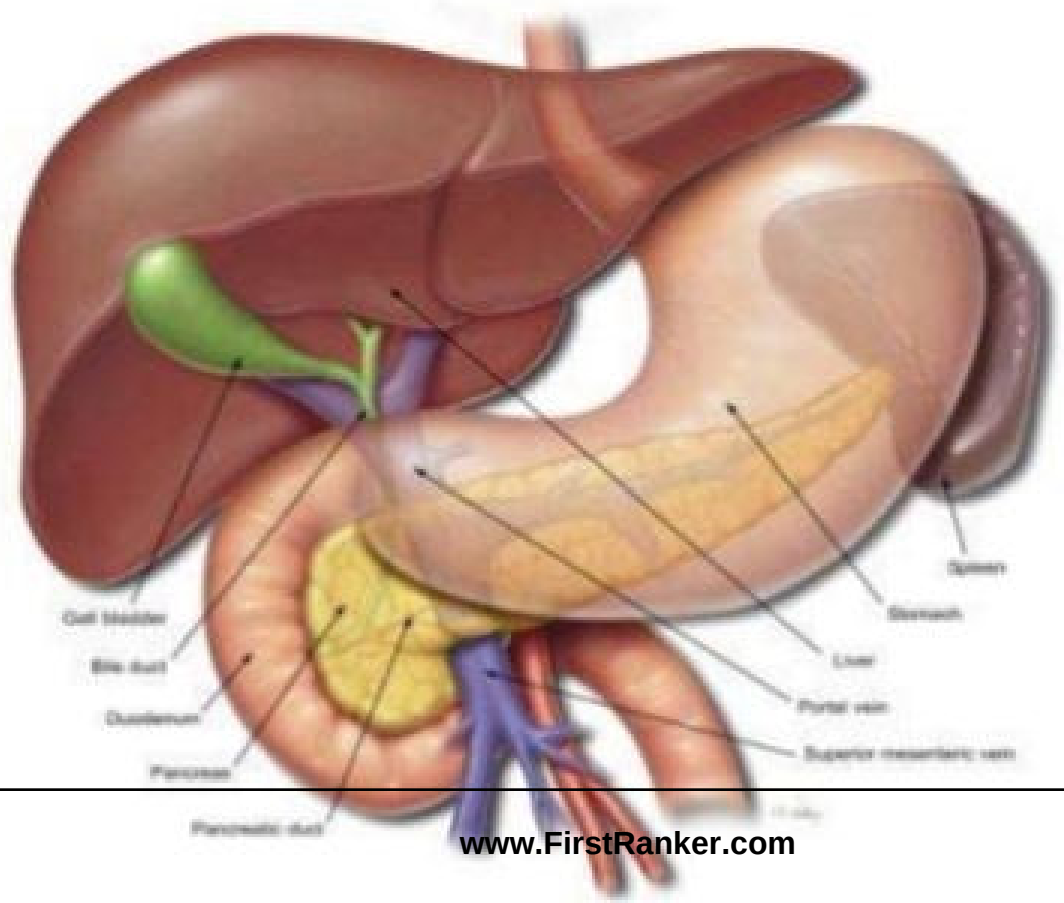
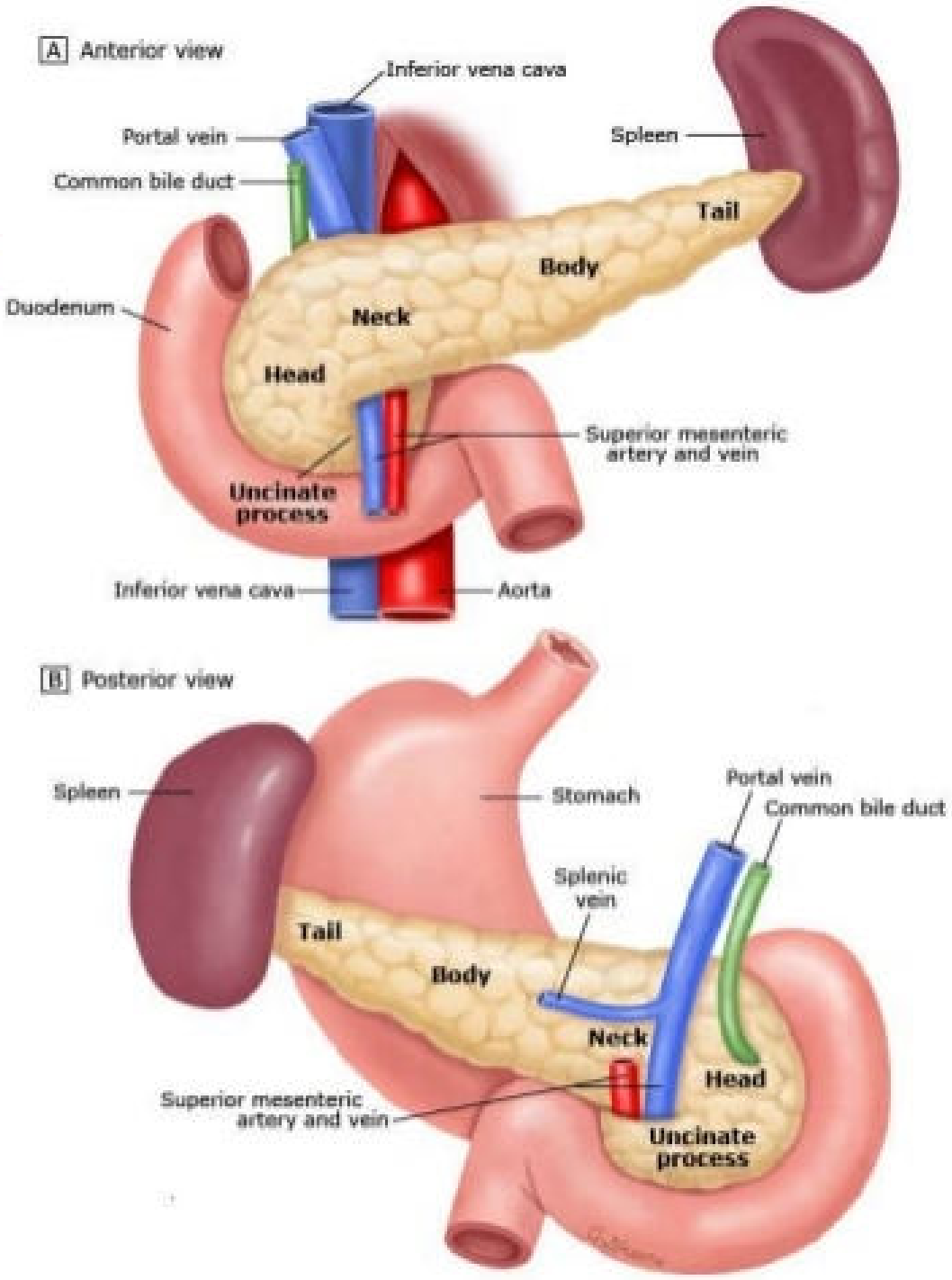
PRINCIPLES OF PANCREATIC OPERATIONS

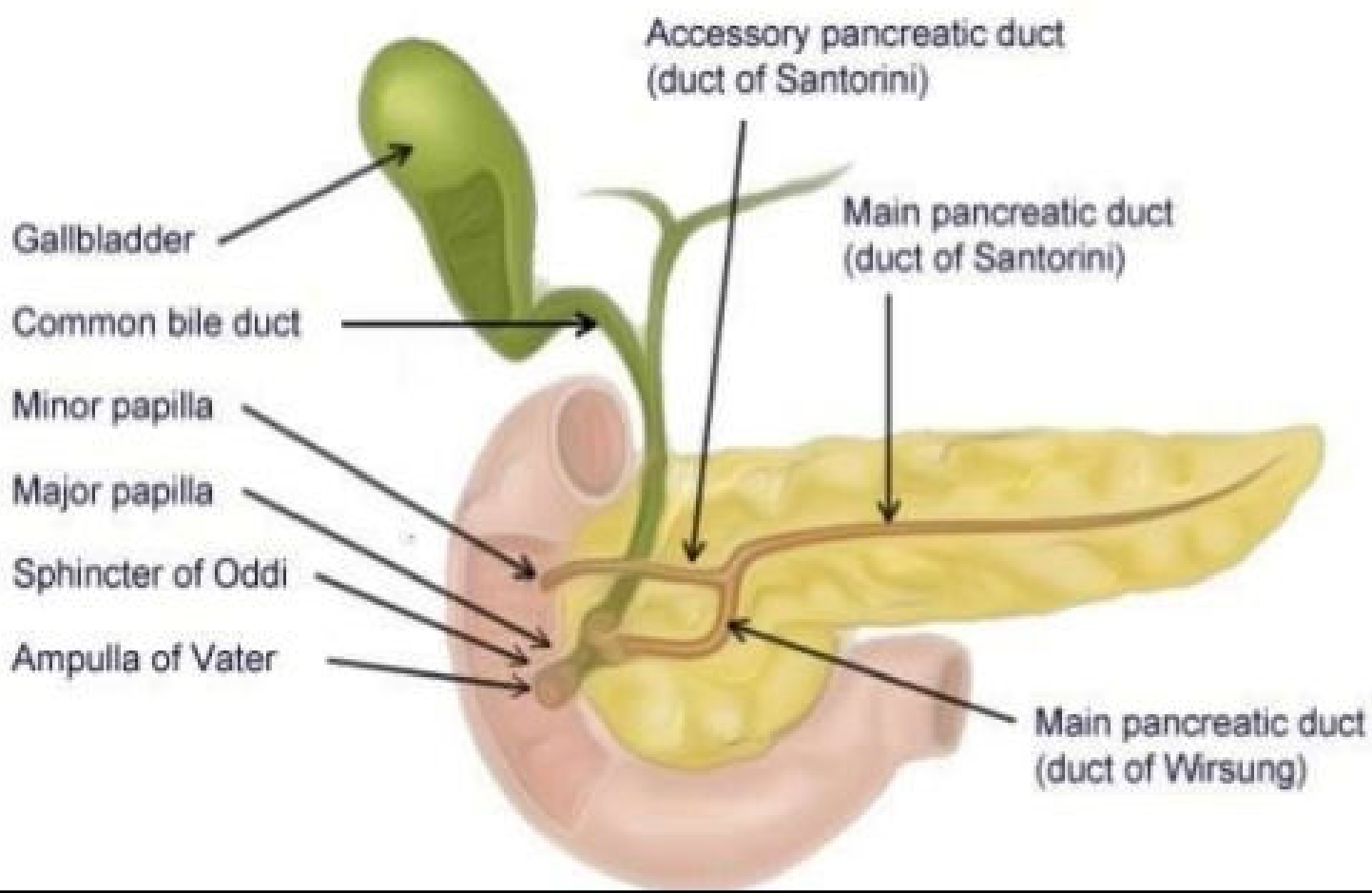
Anatomy

- Pan Kreas (Greek)– all flesh

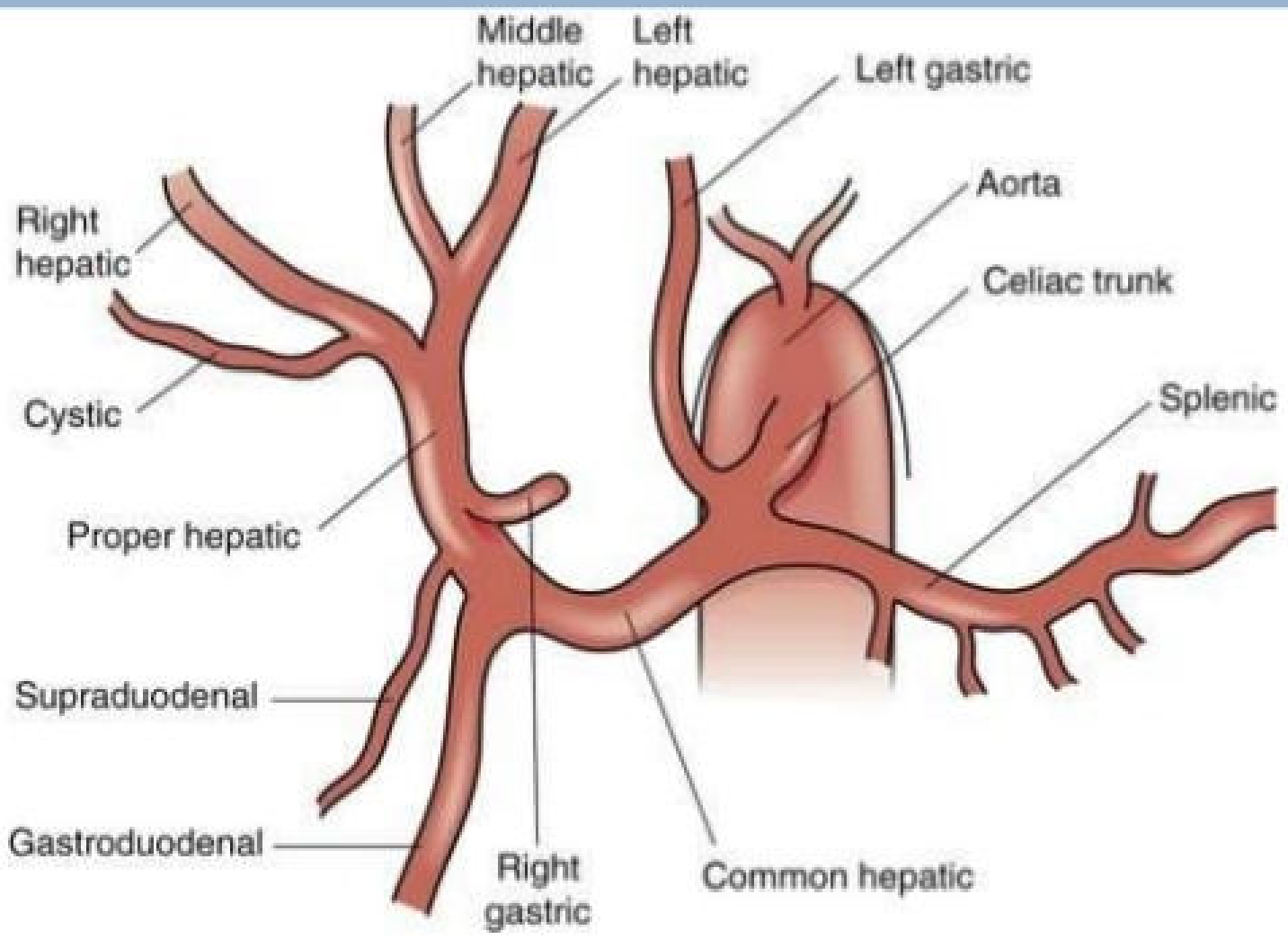




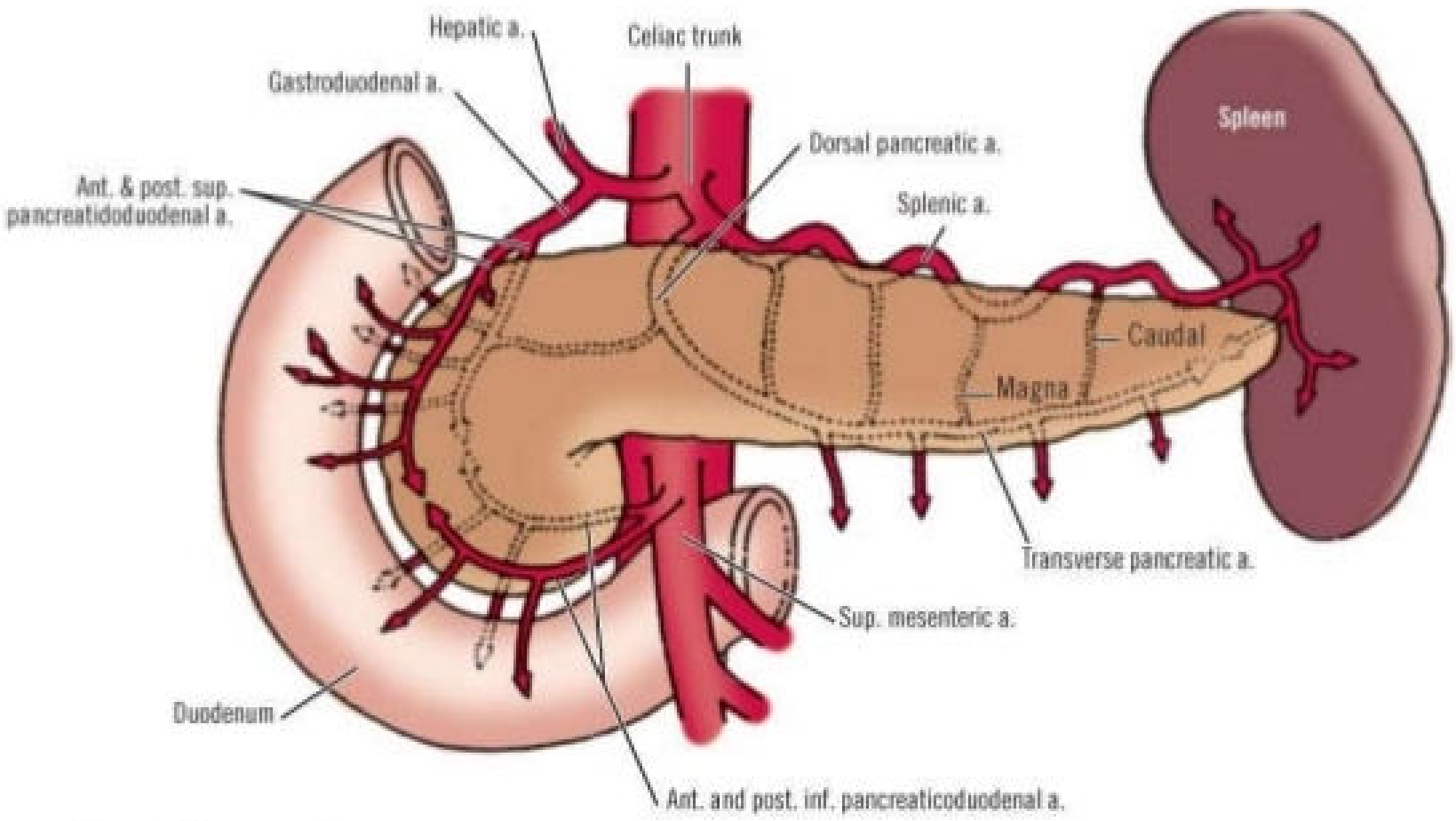
Pancreatic ducts

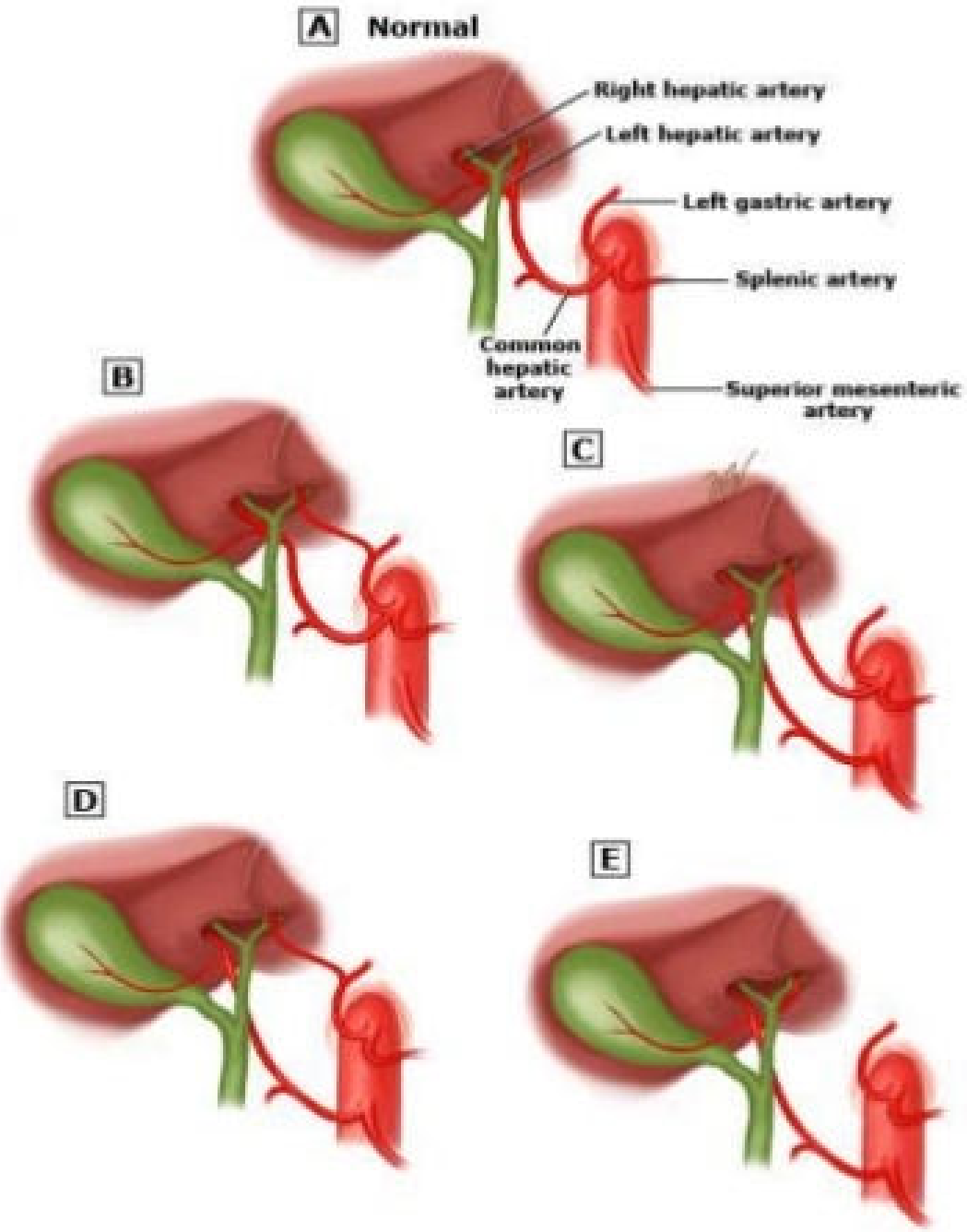


Celiac Trunk

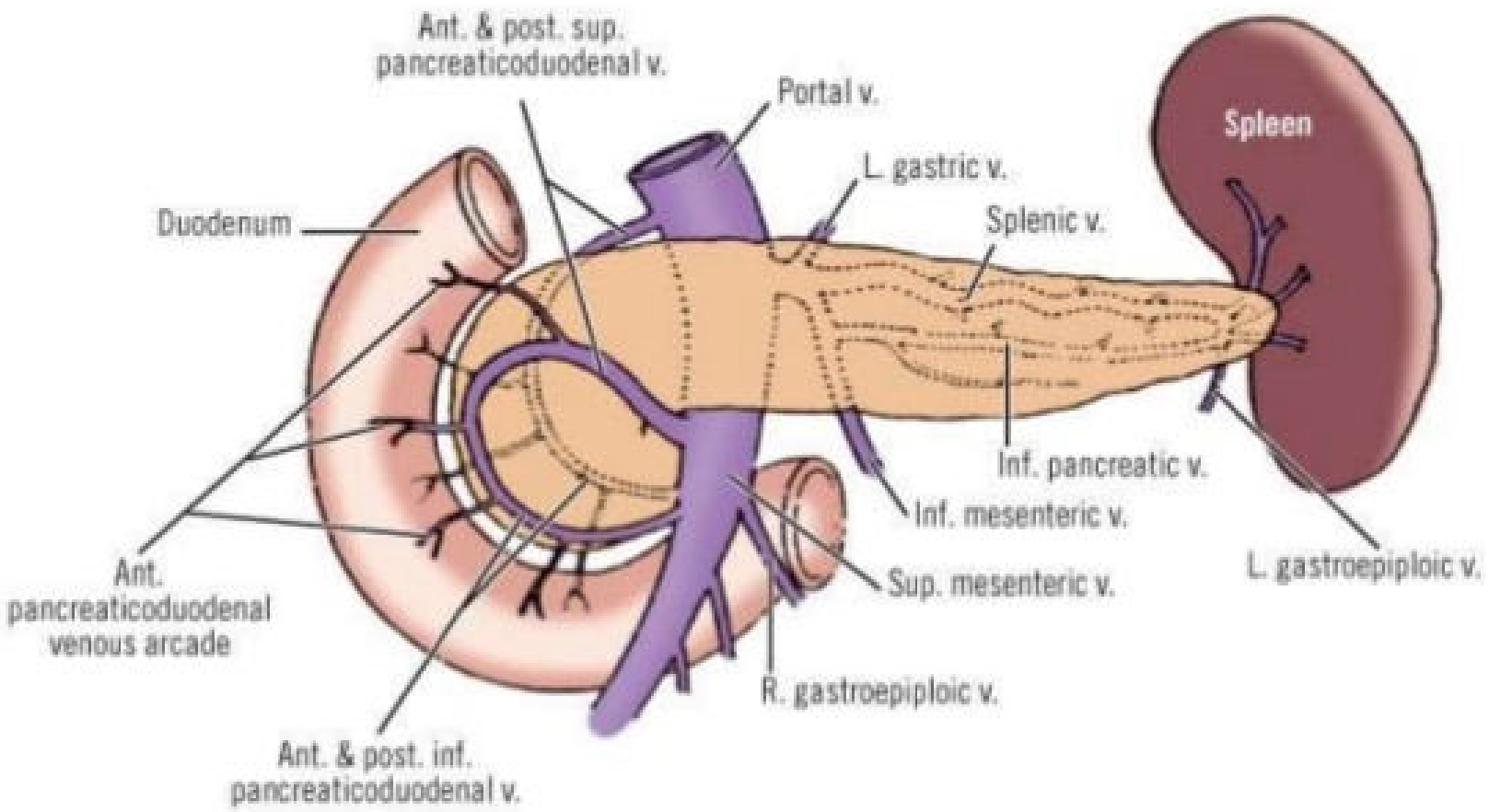


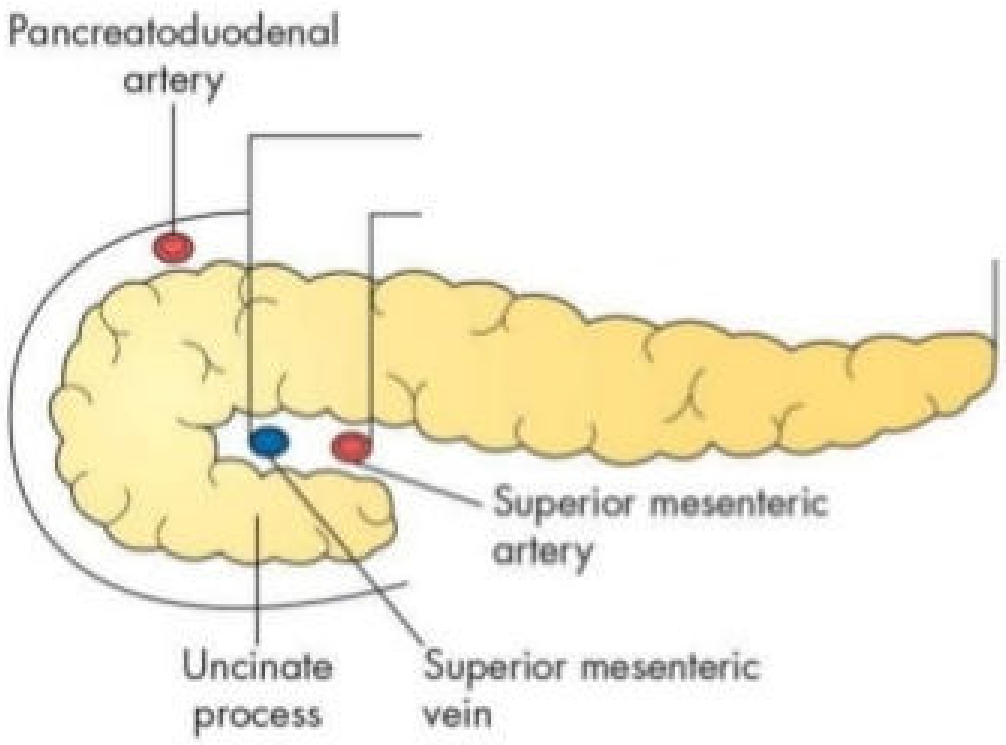
Arterial supply

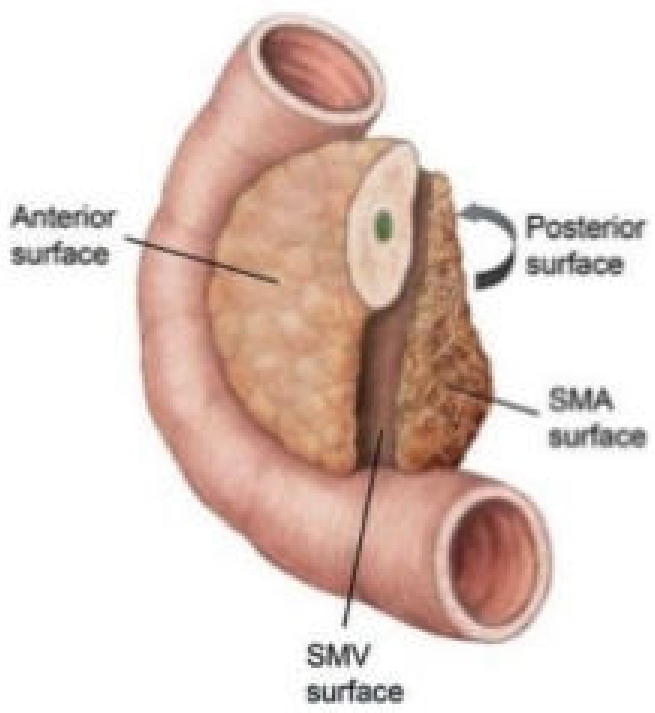




Venous Drainage







Learning points

- Duodenum will always be excised due to a common blood supply with HOP
- Spleen with distal pancreas
- GDA acts as a communicating vessel between celiac & SMA
- Positive resection margin near SMA in uncinate tumours

Pancreatic Pseudocyst

- Encapsulated collection of fluid with a well defined inflammatory wall outside the pancreas with minimal or no necrosis
- >4 weeks after IEP
- CECT criteria:
  - Well circumscribed(round or oval)
  - Homogenous fluid density
  - No non-liquid component
  - Well defined wall

Necrotising Pancreatitis

- Inflammation associated with pancreatic parenchymal or peripancreatic necrosis

- CECT criteria:
  - Lack of parenchymal enhancement by IV contrast
    &/or
  - Presence of peripancreatic necrosis

Acute Necrotic collection

- Collection containing variable amounts of both fluid & necrosis associated with NP
- Can involve pancreatic parenchyma &/or peripancreatic tissue
- CECT criteria:
  - Only with NP
  - Heterogenous & non-liquid density of varying degrees
  - No definable wall
  - Intrapancreatic &/or extrapancreatic

Walled-off Necrosis

- A mature, encapsulated collection of pancreatic &/or peripancreatic necrosis
- >4weeks after onset of necrotising pancreatitis
- CECT criteria:
  - Heterogenous with liquid & non-liquid density (may be homogenous)
  - Completely encapsulated
  - Intrapancreatic &/or extrapancreatic

Infected Pancreatic Necrosis

- The diagnosis of infected pancreatic necrosis is important
  - Need for antibiotic treatment
  - Need for active intervention
- The presence of infection can be presumed
  - extraluminal gas in the pancreatic and/or peripancreatic tissues on CECT or when percutaneous, image-guided, fine-needle aspiration (FNA) is positive for bacteria and/or fungi on Gram stain and culture

Indications for Intervention

- Infected pancreatic Necrosis
- Symptomatic sterile necrosis
  - gastric outlet, intestinal, or biliary obstruction due to mass effect(>4 week)
  - Persistent symptoms (e.g. pain, 'persistent unwellness') (i.e. >8 weeks)

Timing of intervention

- At least >4weeks after the onset of disease
  - When necrotic process has stopped extending
  - Clear demarcation between viable & non-viable tissues
  - Infected necrotic tissue has become walled-off
- This approach
  - Decreases the risk of bleeding
  - Avoiding removal of normal pancreatic tissue-endocrine & exocrine insufficiency

Classification of type of intervention

Depending on how the target lesion is visualized on

- Radiological method
  - CT, USG, Fluoroscope
- Endoscopic methods
  - Gastroscope
  - Laparoscope
  - Nephroscope
- Open surgical

Indications for Open Necrosectomy

- Failure of minimally invasive techniques to drain the infected necrosis & persistent sepsis
- Massive haemorrhage
- Bowel perforation (Duodenum or transverse colon)

Principle of surgical techniques

- Eliminate necrotic & infected tissue/fluid
- Preservation of vital tissue
- Avoidance of haemorrhage
- All fluid collection identified on CT scan should be identified, opened & evacuated

What is a step-up approach ?

- The first step is percutaneous or endoscopic drainage of the collection of infected fluid to mitigate sepsis
- If drainage does not lead to clinical improvement, the next step is minimally invasive retroperitoneal necrosectomy
- Open Necrosectomy

Summary

- Mild acute pancreatitis- 80% case- no role of surgery
- Severe necrotizing pancreatitis- 20%
- Interventions should preferably be delayed: >4weeks
- Indications for interventions : infected necrosis, Clinical deterioration, persistent organ failure- in sterile necrosis
- Step up approach is preferred

Chronic Pancreatitis

Definition :

it is a **benign inflammatory** process and fibrosing disorder characterized by

- **irreversible** morphologic changes,
- **Progressive** and
- **permanent** loss of exocrine and endocrine function

Pain management

- **Stent placement and sphincterotomy :**
- stenosis of the sphincter has produced obstructive chronic pancreatitis

- complications are clogging of stents (producing recurrent pain, attacks of acute pancreatitis, or pancreatic sepsis), stent migration (which may require surgical extraction) and ductal perforation

Pain management

- **ESWL :**
- removal of large or impacted stones requires lithotripsy

- A survey from Japan in 555 patients reported complete stone clearance in 73% of patients.308 Pain improvement or relief is seen in about 75% to 90% of patients who undergo this type of therapy.

- there is some other effect on pancreatic pain separate from the ability to fragment pancreatic stones.

Pain management - surgery

- surgical treatment of CP is based on two main concepts:

1. **Resection of tissue** : nondilated pancreatic ducts, pancreatic head enlargement, or if a pancreatic carcinoma is suspected

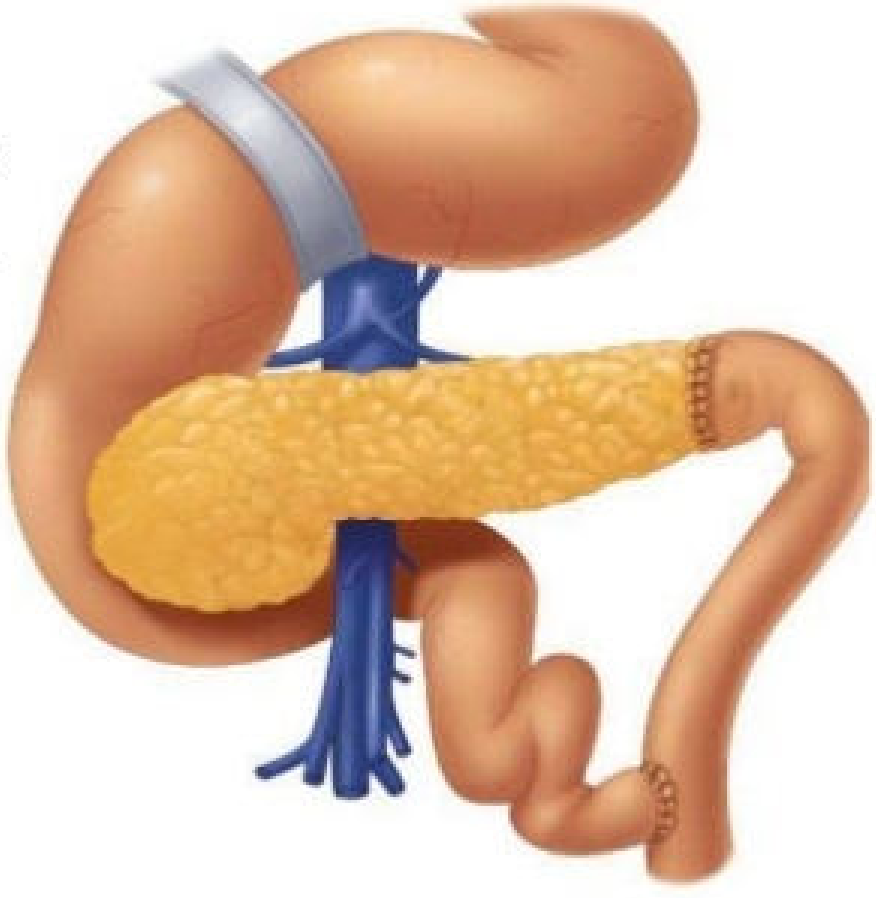
2. ***Drainage & preservation of tissue :*** to prevent further loss of pancreatic function

Indications

- **Intractable pain**
- Symptomatic local complications
- Unsuccessful endoscopic management
- Suspicion of malignancy

Drainage / Decompression procedures

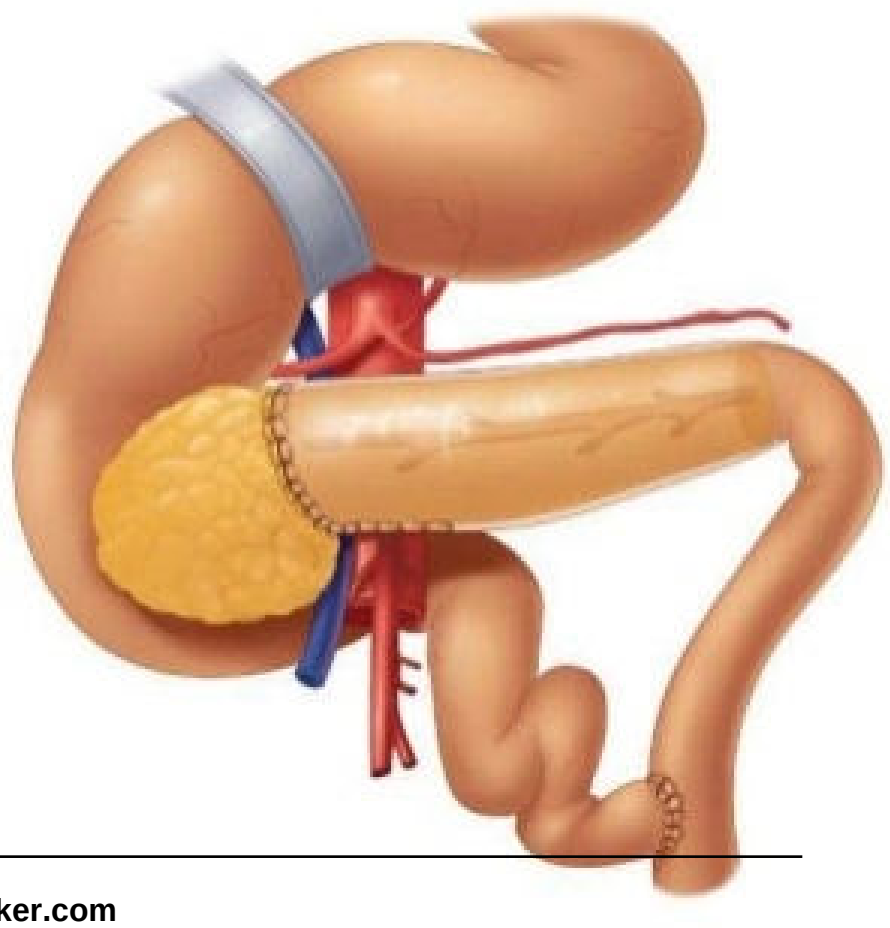
- Duval described using distal pancreatectomy and splenectomy with an end-to-end pancreaticojejunostomy between the cut end of the body or tall of the pancrea and a Roux-en-Y limb of jejunum to decompress the pancreatic duct.



Drainage -

- Puestow and Gillesby. 'Ihey modified Duval's procedure

longitudinal opening along the main pancreatic duct through the tail and body of the pancreas and then invaginating the distal gland into a Roux-en-Y limb of jejunum



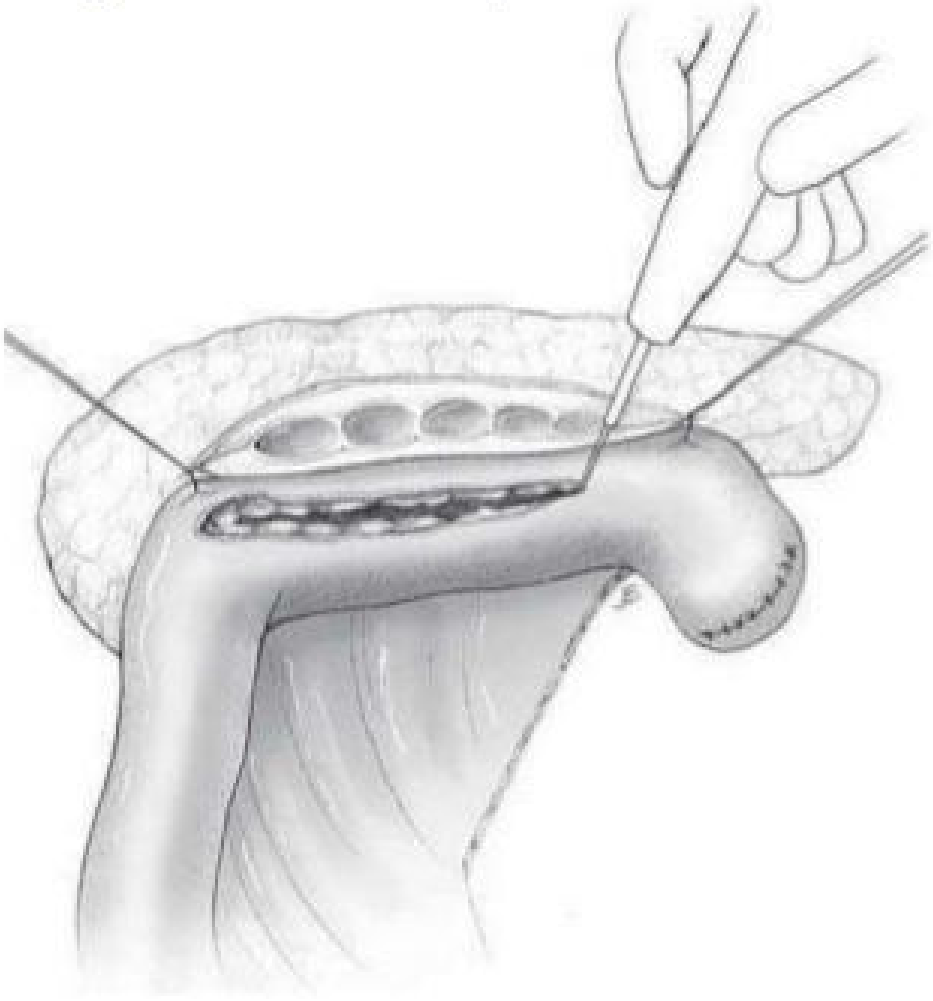
Longitudinal pancreaticojejunostomy

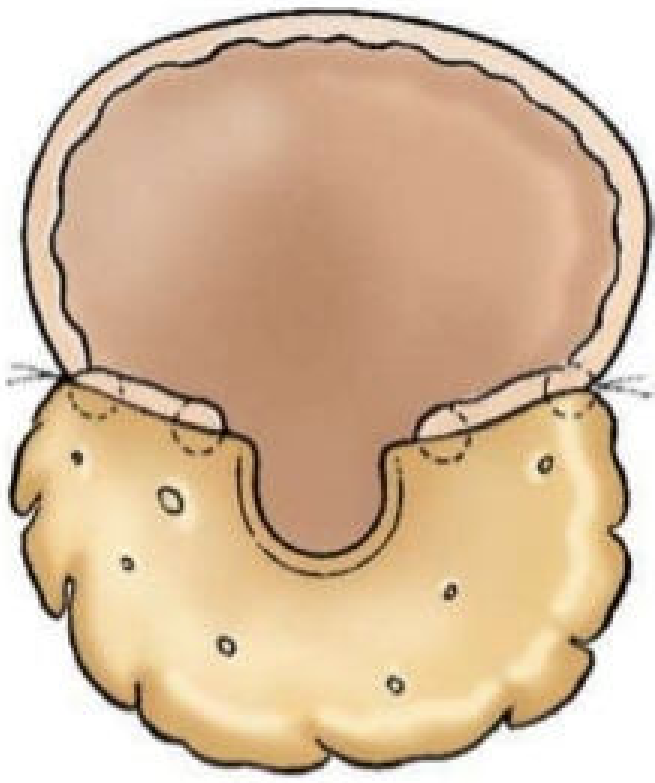
- Partington and Rochelle described the side-to-side longitudinal pancreaticojejunostomy that is currently referred to as **the modified Puestow procedure.**
- Remains as a standard approach to pancreatic ductal decompression
- best applied to patients with parenchymal disease and pancreatic ductal dilatation **diffusely involving the pancreatic head. neck. body**, and tail of the gland

Longitudinal pancreaticojejunostomy

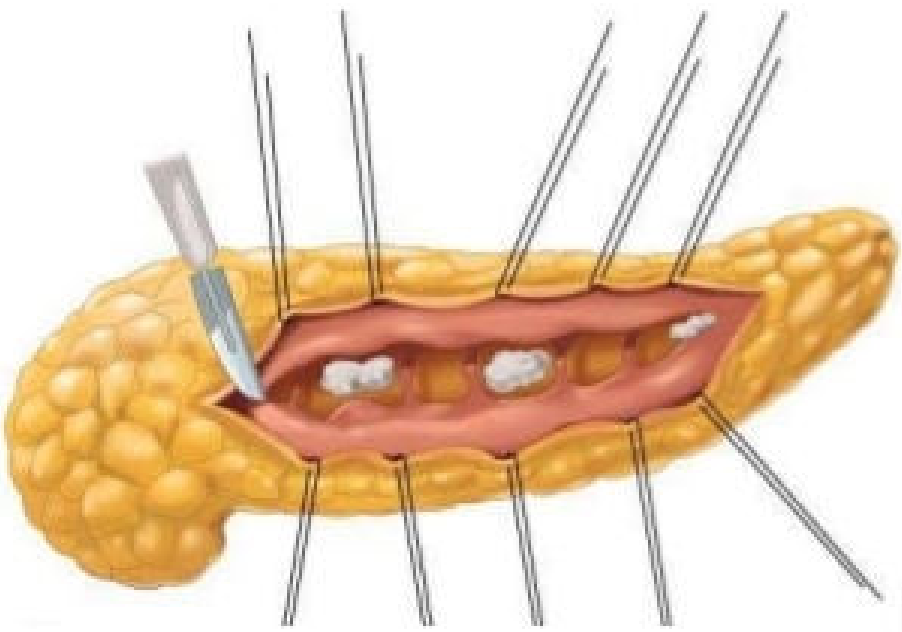
- Minimal diameter of pancreatic duct should be >7 mm
- Should not be any mass in the pancreatic tissue
- Omitted splenectomy , distal pancreatectomy

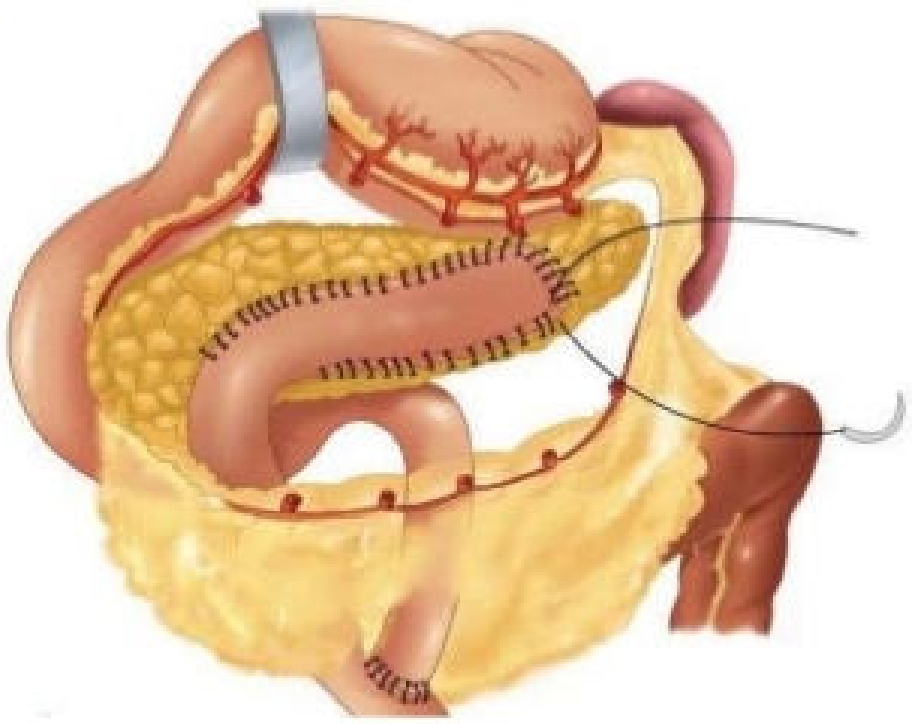
Longitudinal pancreaticojejunostomy





Longitudinal pancreaticojejunostomy





LPJ - RESULTS

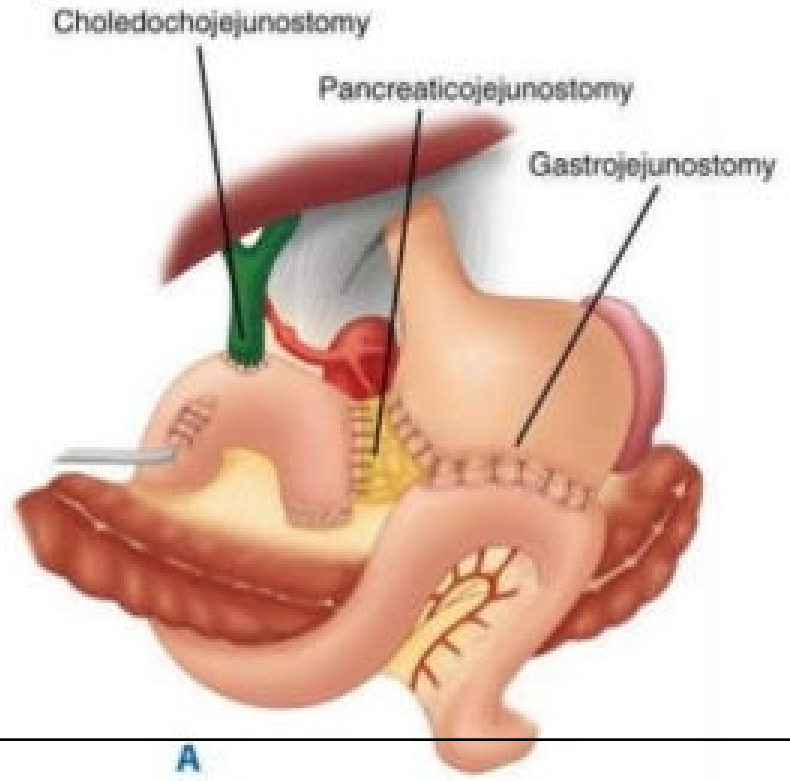
- 75–80% of patients with diffusely dilated main pancreatic ducts (>7 mm) and no dominant inflammatory mass, have **achieved durable pain relief** over 5–10 years of followup

- morbidity is low
- because no pancreatic parenchyma is removed, endocrine and **exocrine functions are generally preserved**

Resection procedures

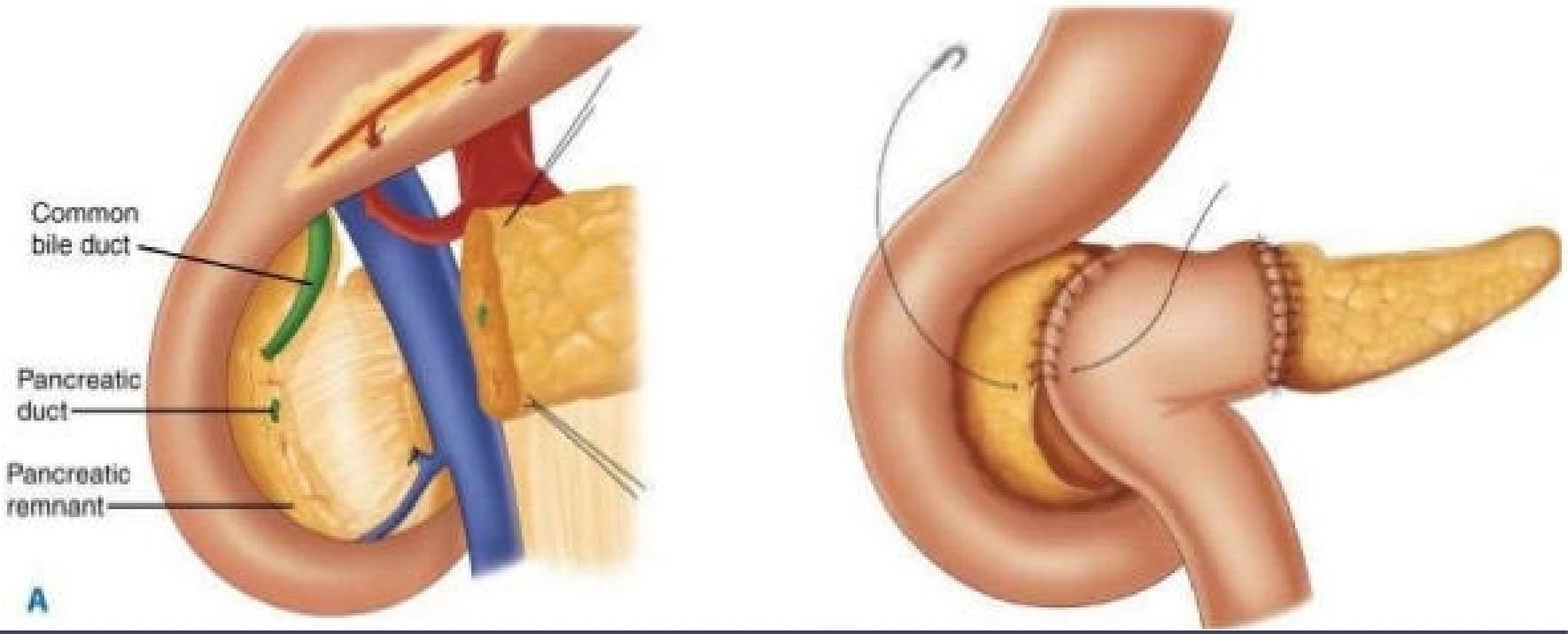
- patients with focal disease largely confined to the head of the pancreas without duct dilation - pancreaticoduodenectomy [PD]

- resection of the head of the pancreas with
- the distal CBD,
- distal stomach,
- duodenum,
- proximal jejunum



Resection procedures

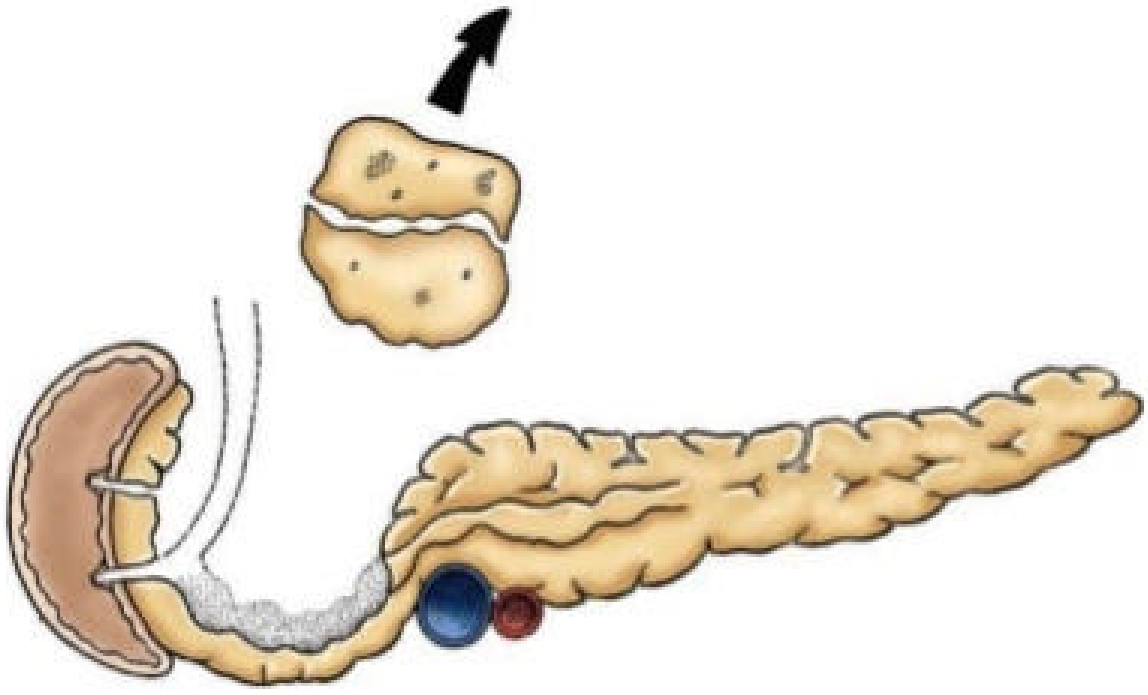
- Beger introduced duodenum-preserving pancreatic head resection **(DPPHR)**
- division of the neck of pancreas and removal of the head of the pancreas, leaving a small rim of pancreatic tissue along the duodenum.



Hybrid procedures - FREY procedure

- **Frey** introduced a procedure that **combines duodenum-sparing** resection of the pancreatic head, without formal division of the neck of the pancreas**, combined with longitudinal pancreaticojejunostomy** of the dorsal duct .

Hybrid procedures - FREY procedure



TOTAL PANCREATECTOMY WITH ISLET AUTOTRANSPLANTATION

- small duct disease
- diffuse parenchymal inflammation,
- hereditary syndromes,
- failures of prior pancreatic operations

- Complete or near complete pain relief in about 75% of patients, with 60% to 70% achieving narcotic independence

Nerve blocks and Neurolysis

- The celiac plexus transmits visceral afferent impulses from the pancreas

- The greater, lesser, and least splanchnic nerves travel from the celiac plexus and then pass through the diaphragm to reach the spinal cord.

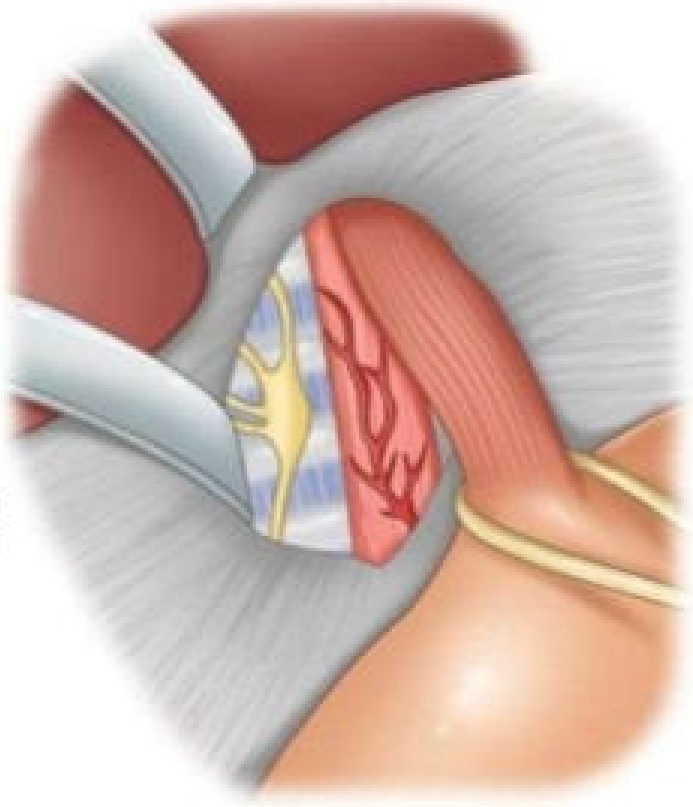
Nerve blocks and Neurolysis

- **Celiac plexus block** (usually using a combination of a glucocorticoid and a long-acting local anesthetic like bupivacaine)

- **celiac plexus neurolysis** (using an injection of absolute alcohol) can be administered by CT- or EUS-guided techniques

- These are used in pancreatic carcinoma

splanchnicectomy



- block central perception of nociceptive inputs.
- involves sectioning the greater splanchnic nerve on 1 or both side
- 50 – 75 % will get pain releif
- The **multiple spinal levels** that receive input from the splanchnic nerves and the **variation in the number of splanchnic roots**, makes complete neurotomy difficult

Summary

- Benign inflammatory process and fibrosing disorder characterized by irreversible morphologic changes, Progressive and permanent loss of exocrine and endocrine function
- Alcohol consumption is the most common cause
- Pain is the most common symptom
- CECT is 1st investigation of choice and best being EUS

Summary

Treatment

- Local inflammation - Pharmacotherapy (pancreatic enzymes,analgesics,narcotics)
- Ductal hypertension - Decompression (Puestow, endoscopic stenting)
- Organ hypertension - Resection(Whipple,Frey)
- Retroperitoneal damage - Neuroablation (celiac block, splanchnicectomy)

Pancreatic & Periampullary Tumours

Pancreatic Ca

- Most common site is pancreatic head (78%)
- body and tail (20-25%)
- Surgery is the cornerstone of treatment
- In the late 1960s postoperative morbidity rate was up to 60% and mortality rate approaching 25%
- Mortality rate is less than 2% and morbidity rate 30-40% in high volume centre

Büchler et al, 2003; Cameron et al, 2006; Wagner et al, 2004

Preoperative Preparation

- Nutrition
- Assess for vascular involvement & liver mets
- CBD stent placement
- An absolute indication for biliary drainage is
  - Bil >15mg%
  - Cholangitis
  - Malnutrition

Types of Resections

- Whipple's Pancreaticoduodenectomy
- Distal pancreatectomy
- Segmental pancreatectomy
- Total pancreatectomy

- Nonresectable lesions:
  - Encase (i.e., >180° invasion) SMA, CA or CHA
  - Occlude the SMV- PV such that no reconstruction is possible
- Borderline resectable lesions:
  - Abut the visceral arteries (<180° invasion)
  - Distort the visceral veins, or even occlude the SMV-PV but venous reconstruction still technically feasible

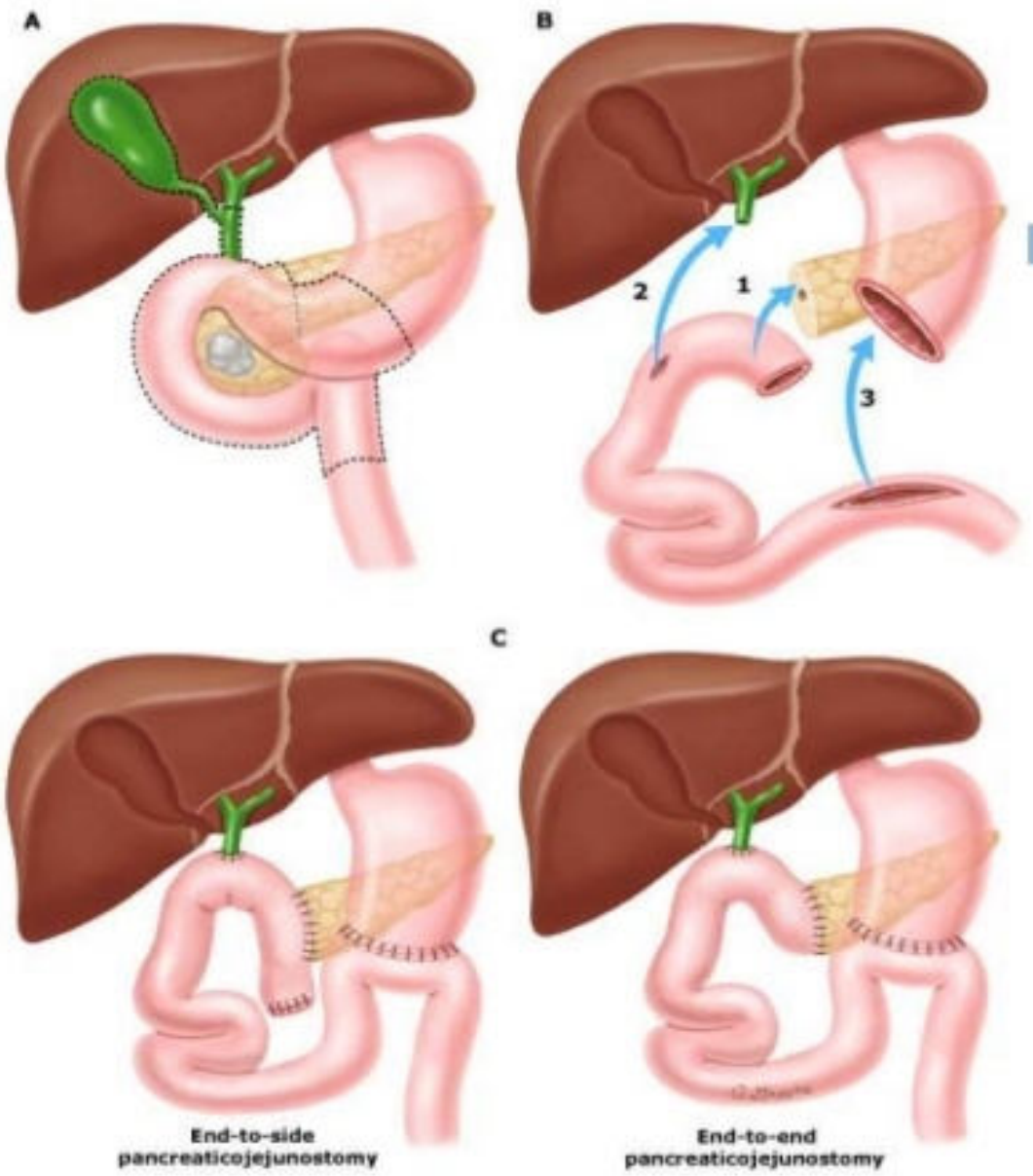
Callery MP et al. *Ann Surg Oncol 2009*

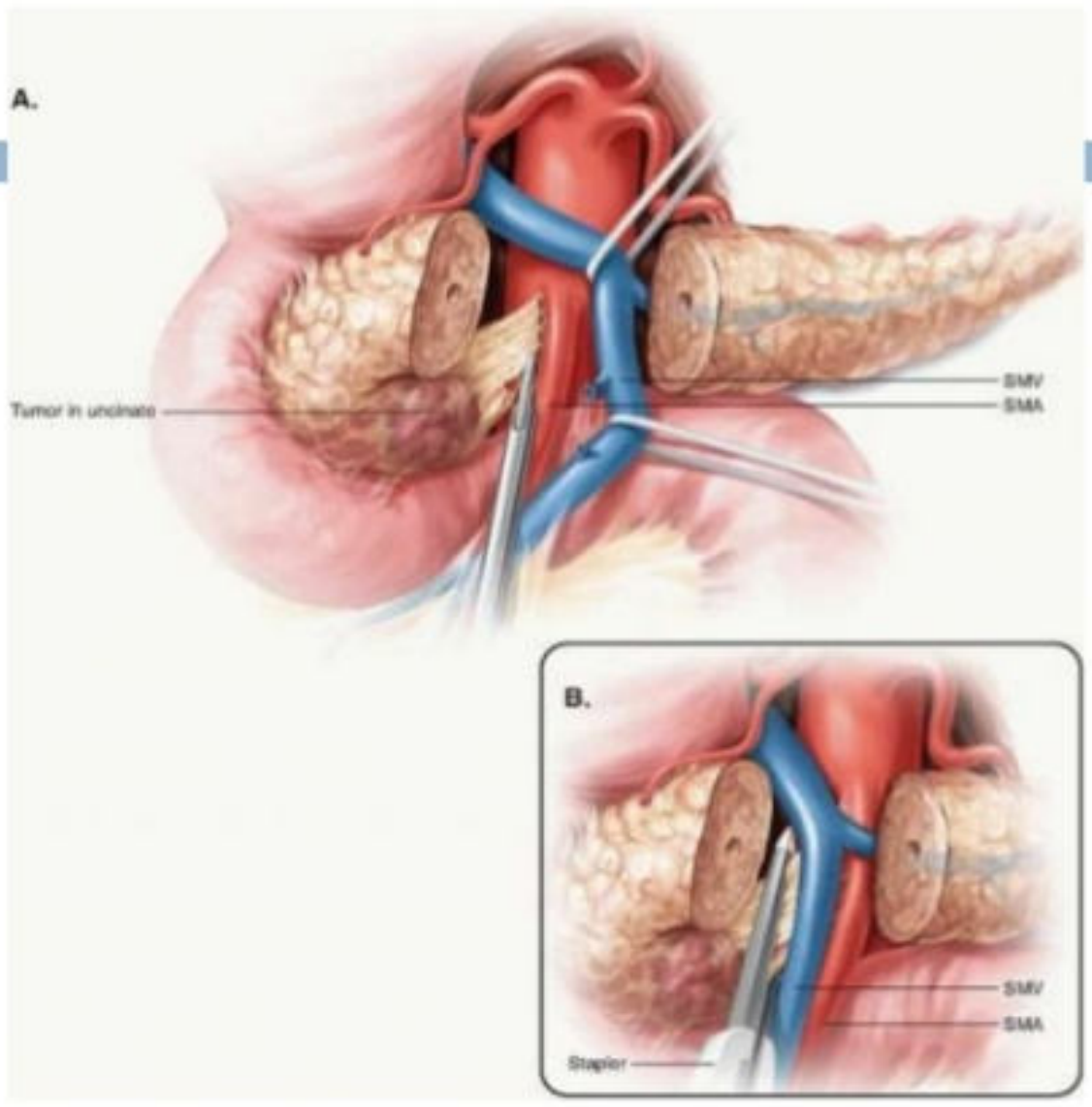
Role of staging laparoscopy

- Approximately 50% of patients with pancreatic cancer can have liver or peritoneal mets on operation
- SL can avoid unnecessary exploration
- Prospective study at MSKCC: of 115 pts 36% saved from exploration Conlon KC et al. Ann Surg 1996

Staging Lap - Indications

- HOP tumor size >4cm
- Boarder line resectable tumors
- CA 19-9 >150 IU/ml
- Body and tail carcinoma





WPD specimen

PJ Vs PG

- PG was developed as an alternative to PJ
- Chance of leakage may be less due to rich gastric vascularity
- Pancreatic enzymes may be inactivated by the gastric acid
- Meta analysis including 3RCTs, concluded no added advantage of PG over PJ Menahem B, Ann Surg 2014

Extended Lymphadenectomy

- Standard PD involves removal of peripancreatic and subpyloric nodes
- Extended lymphadenectomy involves removal of nodes from liver hilum, paraaortic nodes from diaphragm to IMA
- Riall et al showed no difference in survival with significant higher morbidity

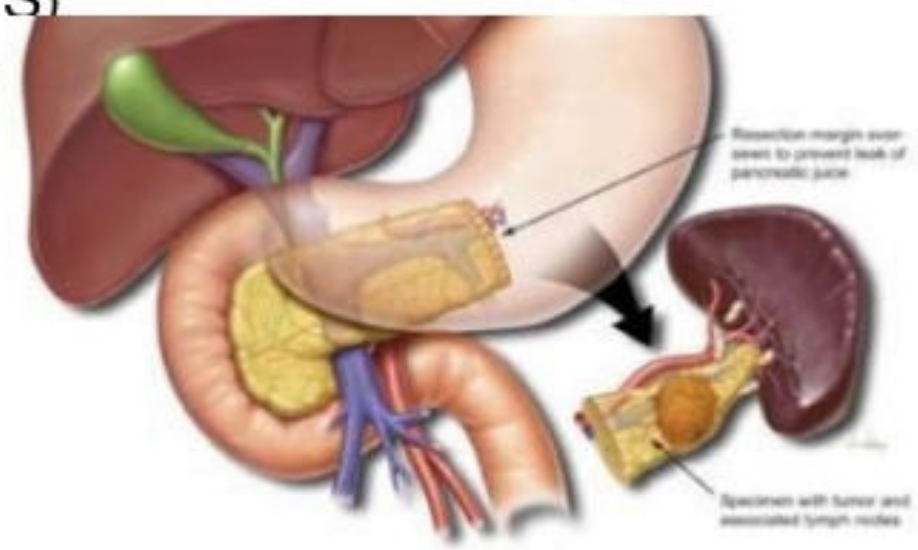
  Riall TS J Gastrointest surg, 2005
- Jin Young et al showed increased operative time with similar morbidity and mortality without any survival benefit

  Jin Young Ann Surg, 2014
- Exteneded lymphadenectomy is not recommended for pancraetic cancers

Distal Pancreatectomy

- For tumors arising in the body or tail of the pancreas
- Types

1. Classical Left to right distal pancreatectomy
2. Radical antegrade modular pancreaticosplenectomy (RAMPS)
3. Distal p section



Total Pancreatectomy

- Indications
  1. IPMN – for clear margins
  2. To achieve negative margin
  3. Atrophic, soft, friable remnant
- c/c
  1. Brittle diabetes
  2. steatorrhea