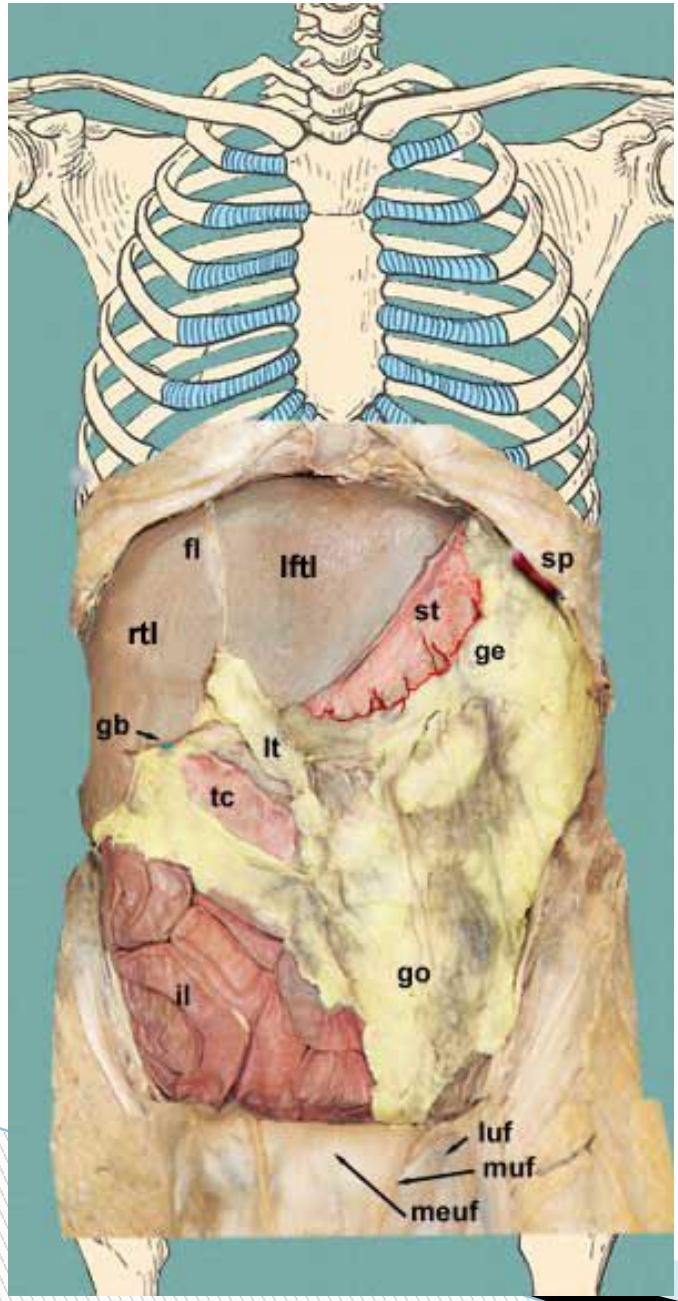
Clinical anatomy of abdominal cavity

Abdomilal cavity



- liver in the upper right quadrant of the cavity. It is separated into right and left lobes by the falciform ligament (fl).
- the tip of the gall bladder (gb) hanging down under the margin of the liver
- stomach (st) in the upper left quadrant
- a small edge of the spleen (sp) in the upper left quadrant
- greater omentum (go) covering most of the abdominal structures
- small intestines (ileum) (il) in the lower right quadrant
- sometimes the transverse colon (tc) can be seen through a thin portion of the greater omentum.

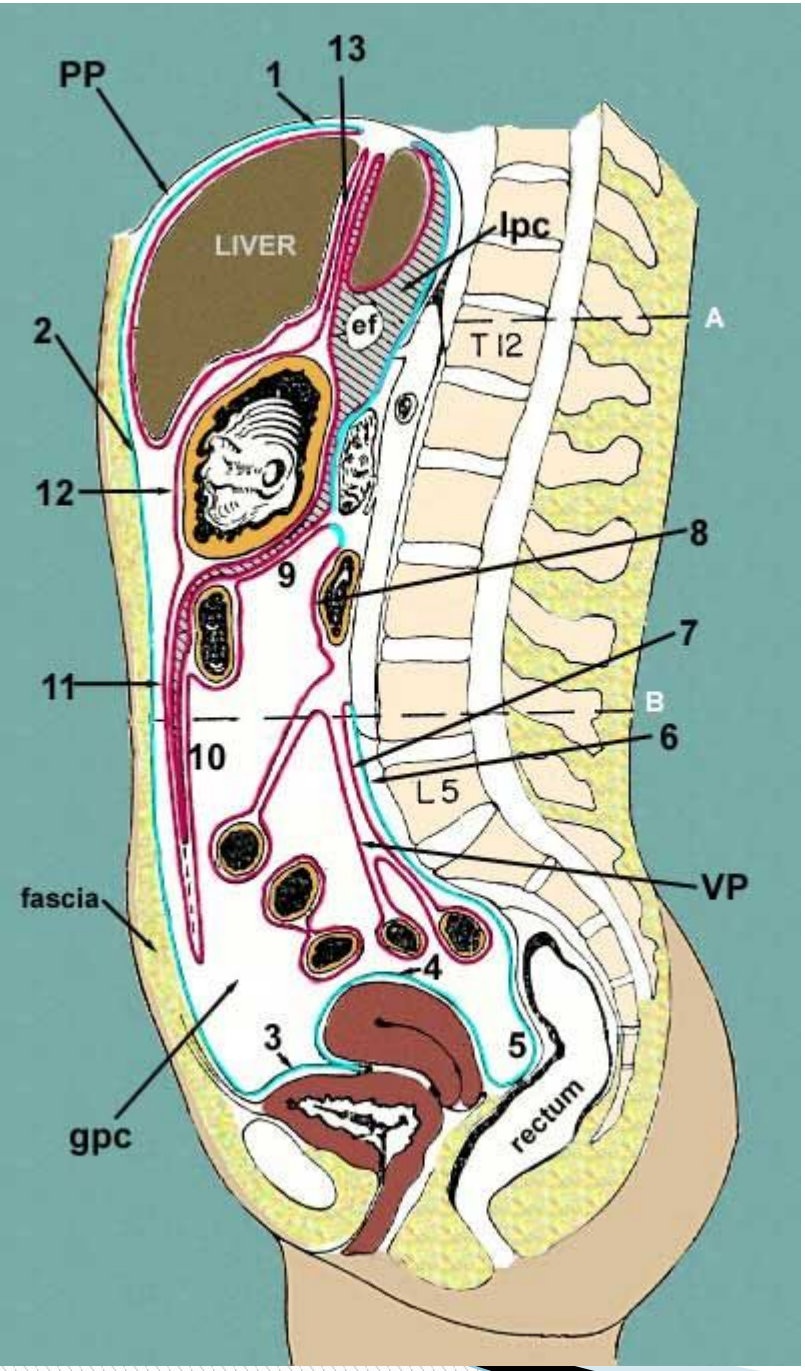
Upper storey

- borders:
- superior: inferior surface of diaphragm
- Inferior: mesocolon transversum
- Contents: hepatic bursa, pregastric bursa, omental bursa, liver, stomach, gall bladder, spleen, adrenal glands, superior poles of the kidneys, superior part of duodenum, abdominal aorta, inferior vena cava

Inferior storey

- Borders:
- Superior: mesocolon transversum
- Inferior: inlet of the lesser pelvis
- contents:
- Right & left paracolic canals
- Right & left mesenteric sinuses
- Mesentry
- Sigmoid mesocolon
- Duodenojejunal recess
- Superior and inferior ileocaecal recesses
- Large and small intestines

peritoneum



- After cutting through the abdominal wall, if you put your hand under the wall, you will be touching parietal peritoneum. If you start by putting your finger as high as possible (1), then run it along the inner aspect of the abdominal wall (2) until you reflect onto the superior surface of the urinary bladder (3), then over the uterus in the female (4), then down into the pouch of Douglas (5), again in the female, up along the anterior surface of the rectum onto the posterior abdominal wall (6) until you reach the root of the mesentery of the small intestine.
- From here you follow the mesentery of the small intestine (7) going around its coils until you reach the other side of the mesentery back down to the posterior abdominal wall where you will cross over the horizontal part of the duodenum (8). Your finger will then travel along the inferior aspect of the gastrocolic ligament (9), down the posterior surface of the greater omentum (go) to its lower border and back up along its anterior surface(11). Your finger then passes over the anterior surface of the stomach (12), along the anterior lamina of the lesser omentum (13). At this time you probably couldn't continue the trip because you would have to enter the epiploic foramen (ef) to enter the lesser peritoneal cavity (lpc) where visceral peritoneum lines this space anteriorly and parietal peritoneum posteriorly.

ligaments

- lig. falciforme
- lig. coronarium hepatis
- lig. triangulare
- lig. hepatogastricum
- lig. hepatoduodenale
- lig. hepatocolicum
- lig. hepatorenale
- lig. gastrophrenicum
- lig. gastrolienale
- lig. gastrocolicum
- lig. gastropancreaticum
- lig. phrenicoesophageale
- lig. phrenicocolicum
- lig. phrenicorenale
- lig. phrenicolienale
- lig. pancreaticolienale
- lig. lienorenale
- lig. pyloropancreaticum
- lig. duodenorenale

Recesses - pouches formed by the peritoneal folds

- duodenojejunal recess
- superior ileocaecal recess
- inferior ileocaecal recess
- retrocaecal recess
- intersigmoid recess

Folds – reflection of the peritoneum arised from the abdominal wall by uderlying structures

- Plica gastropancreatica
- Plica ileocecalis
- Plica duodenalis superior
- Plica duodenalis inferior
- Plica umbilicalis mediana
- Plica umbilicalis medialis
- Plica umbilicalis lateralis

sinuses

RIGHT MESENTERIC SINUS

borders:

- medial-root of the mesentry
- Lateral – ascending colon
- Superior – transverse colon

LEFT MESENTERIC SINUS

Borders

- Medial – descending colon
- Lateral – root of the mesentry
- Inferior – sigmoid colon

Paracolic canals

- Right paracolic canal communicates with right hepatic bursa
- Borders:
- Medial – ascending colon
- Lateral – parietalperitoneum
- inferior – caecum
- Left paracolic canal communicates with lesser pelvis
- Borders:
- Medial – descending colon
- Lateral – parietal peritoneum
- Superior – phrenicocolic ligament

Bursae of the abdominal cavity

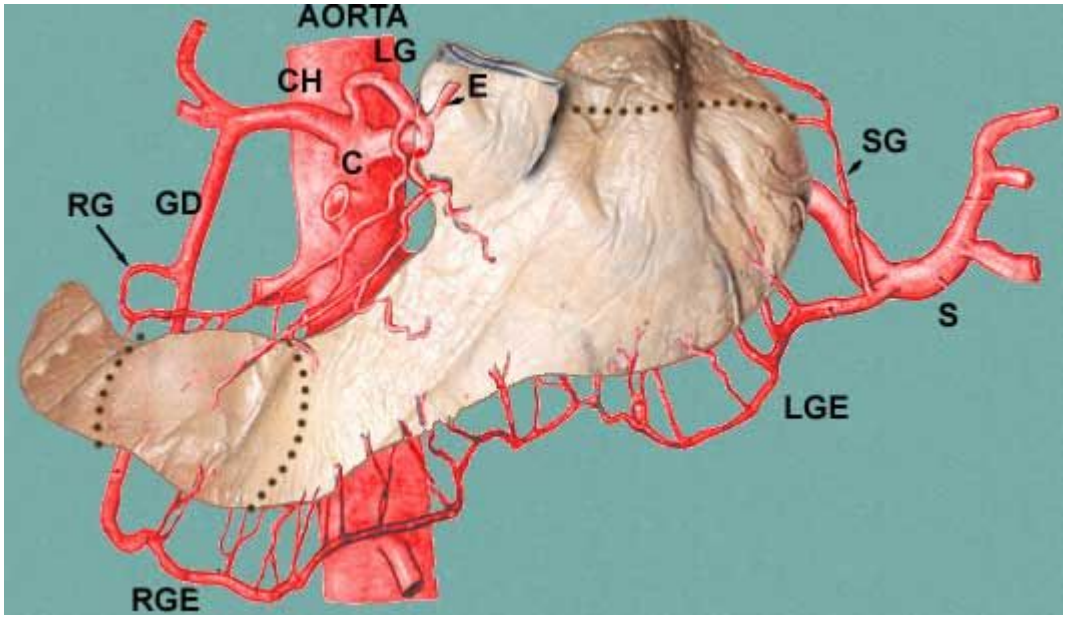
- **HEPATIC BURSA**
- **Borders:**
- Superior – diaphragm
- Inferior – transverse mesocolon
- Anterior – anterior abdominal wall
- Medial – falciform ligament
- Pathology: abscess from the inferior storey of the abdominal cavity may spread here and cause subphrenic abscess through the right paracolic canal

Bursae of the abdominal cavity

- Pregastric bursa
- Borders:
- Anterior – left lobe of the liver and anterior abdominal wall
- Posterior – lesser omentum
- Pathology: abscess from this bursa may spread to the omental bursa

Omental bursa (bursa omentalis)

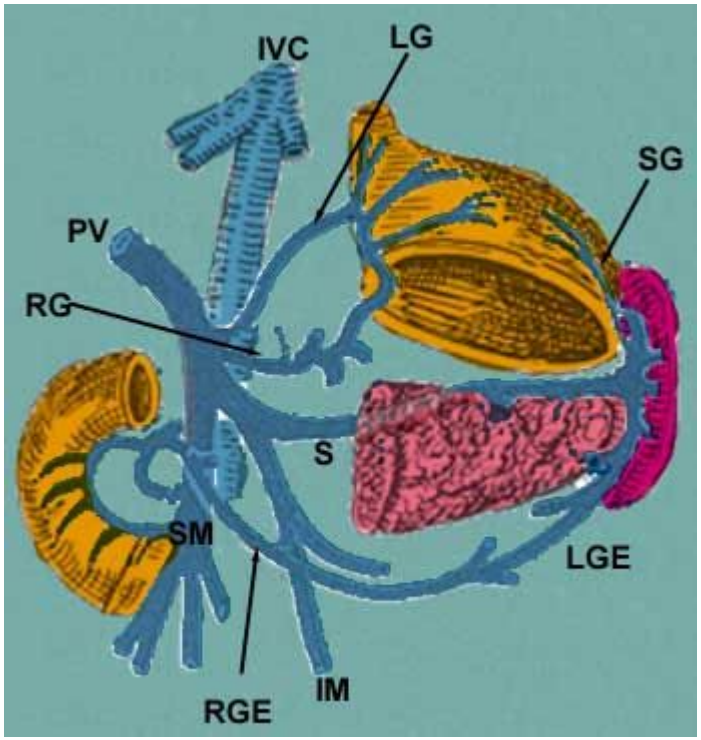
- **BORDERS:**
- Superior – lobus caudatus hepatis
- Inferior – mesocolon transversum
- Anterior – stomach & lesser omentum
- Posterior – parietal peritoneum
- Pathology: inflammation from this bursa may spread to the general peritoneal cavity through the epiploicc foramen.
- **FORAMEN EPIPLOICUM**
- **BORDERS**
- Superior – lobus caudatus hepatis
- Inferior – superior part of duodenum
- Anterior – lig.hepatoduodenale
- Posterior – lig.hepatorenale, parietal peritoneum which covers v.cava inferior



stomach

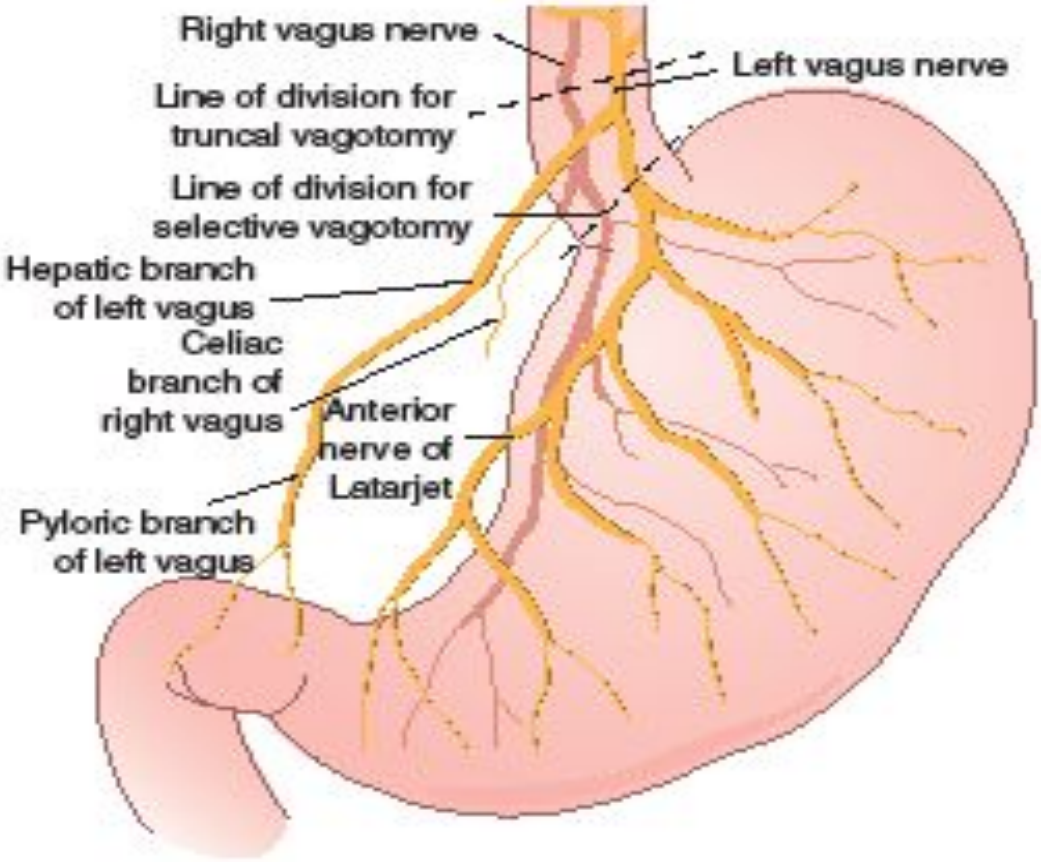
- The branches to the stomach arise from the above: celiac (C)
  - left gastric (LG) - supplies the lesser curvature of the stomach and lower esophagus
    - esophageal (E)
- splenic (S) which gives rise to:
  - short gastric (SG) - supplies area of the fundus
  - left gastroepiploic (LGE) - supplies the left part of greater curvature of the stomach
- common hepatic (CH)
  - gastroduodenal (GD)
    - right gastric (RG) - supplies right side of lesser curvature of the stomach
    - right gastroepiploic (RGE) - supplies the right part of the greater curvature of the stomach

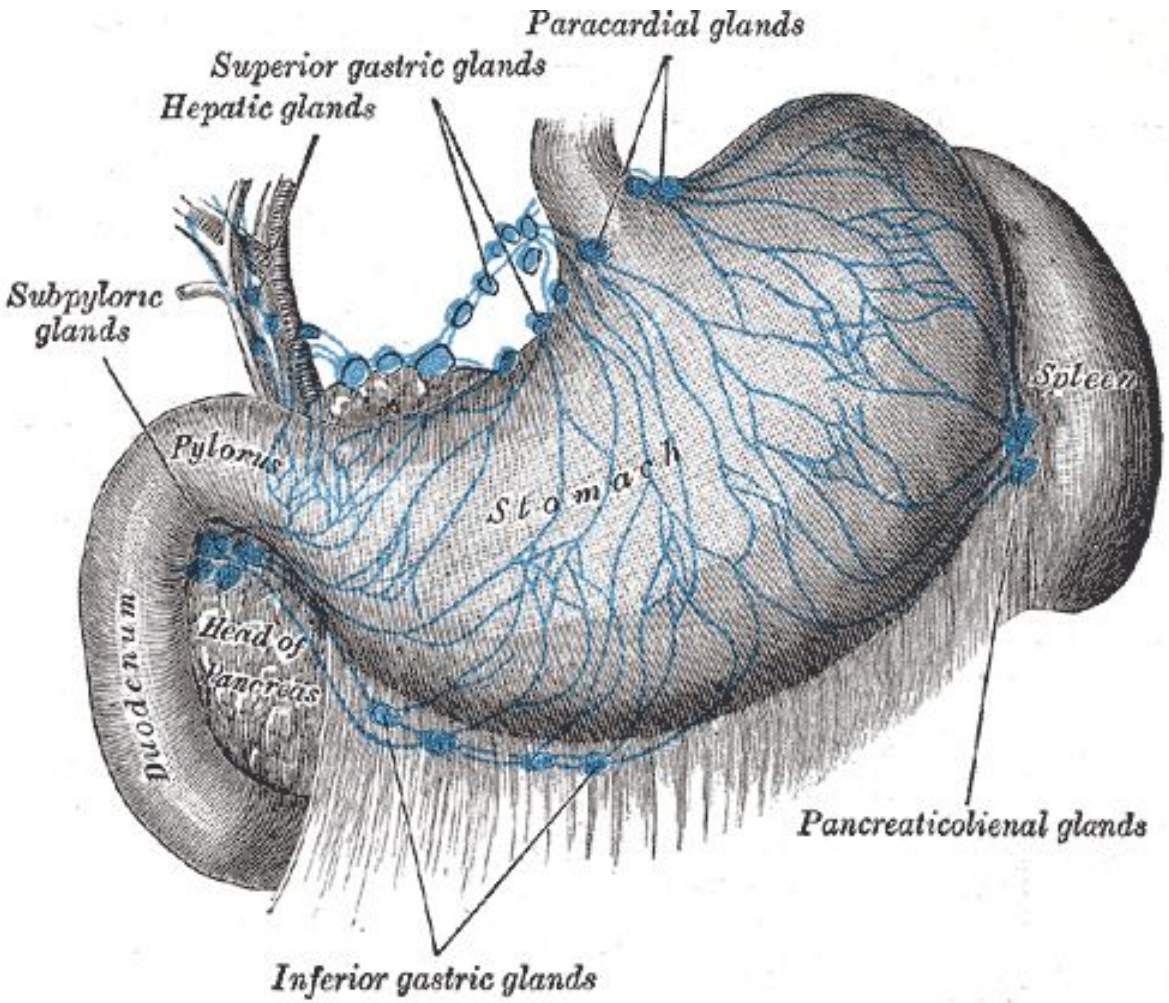
Venous drainage from stomach



- The stomach drains either directly or indirectly into the portal vein as follows:short gastric veins (SG) from the fundus to the splenic vein (S)
- left gastroepiploic (LGE) along greater curvature to superior mesenteric vein (SM)
- right gastroepiploic (RGE) from the right end of greater curvature to superior mesenteric vein (SM)
- left gastric vein (LG) from the lesser curvature of the stomach to the portal vein (PV)
- right gastric vein (RG) from the lesser curvature of the stomach to the portal vein (PV)

Nerve supply

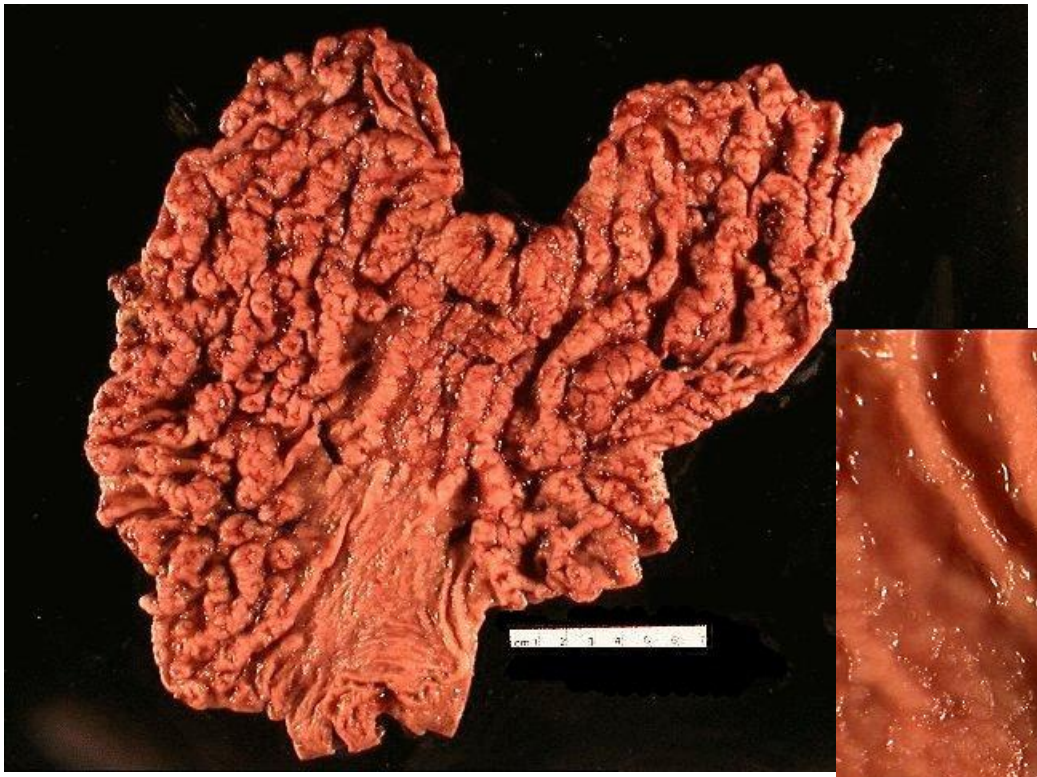



Paracardial glands
Superior gastric glands
Hepatic glands
Subpyloric glands
Spleen
Pylorus
Stomach
Duodenum
Head of pancreas
Pancreaticolienal glands
Inferior gastric glands

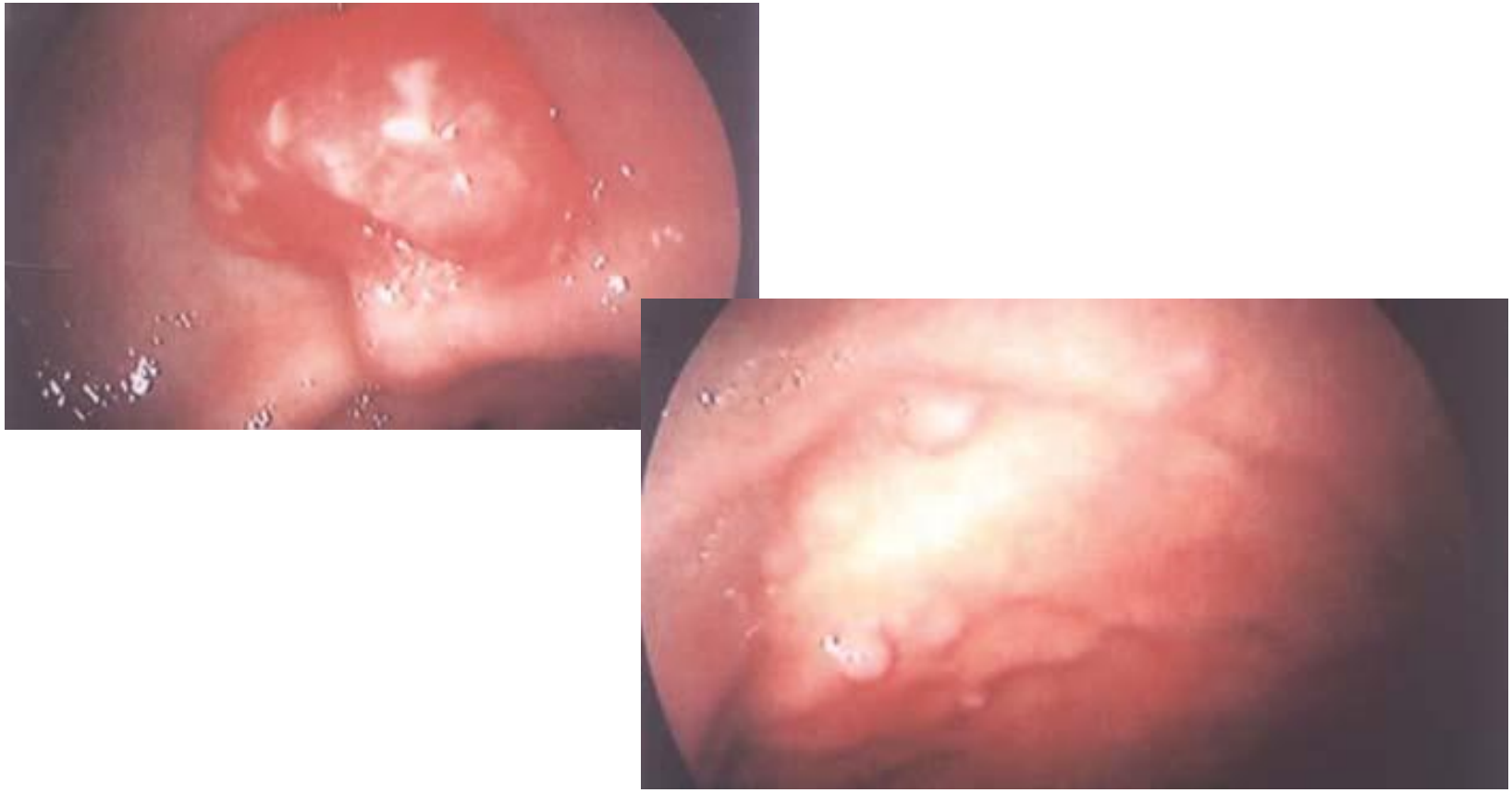
Gastritis (acute or stress)

- Produces inflammation of the mucosa.
- Can be associated with erosions and bleeding.
- Causes:
  - *H. pylori*, NSAIDS, bile reflux, Etoh, radiation, local trauma, physiologic stress.

Menetrier's Disease (aka Hypertrophic Gastritis)



Gastric Polyps



Bezoars

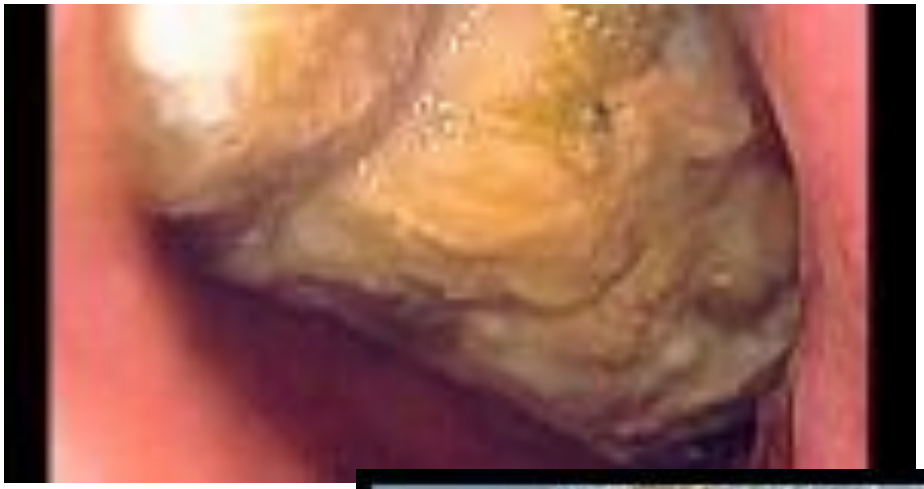
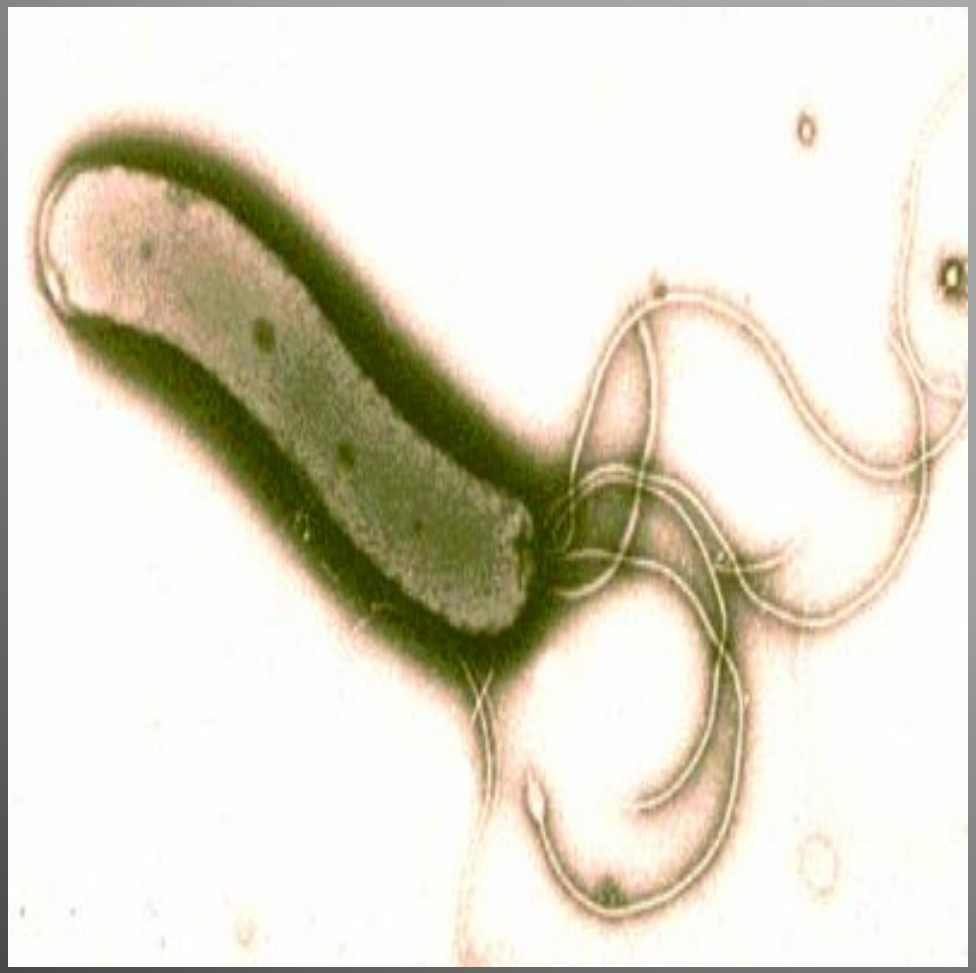


Image 5

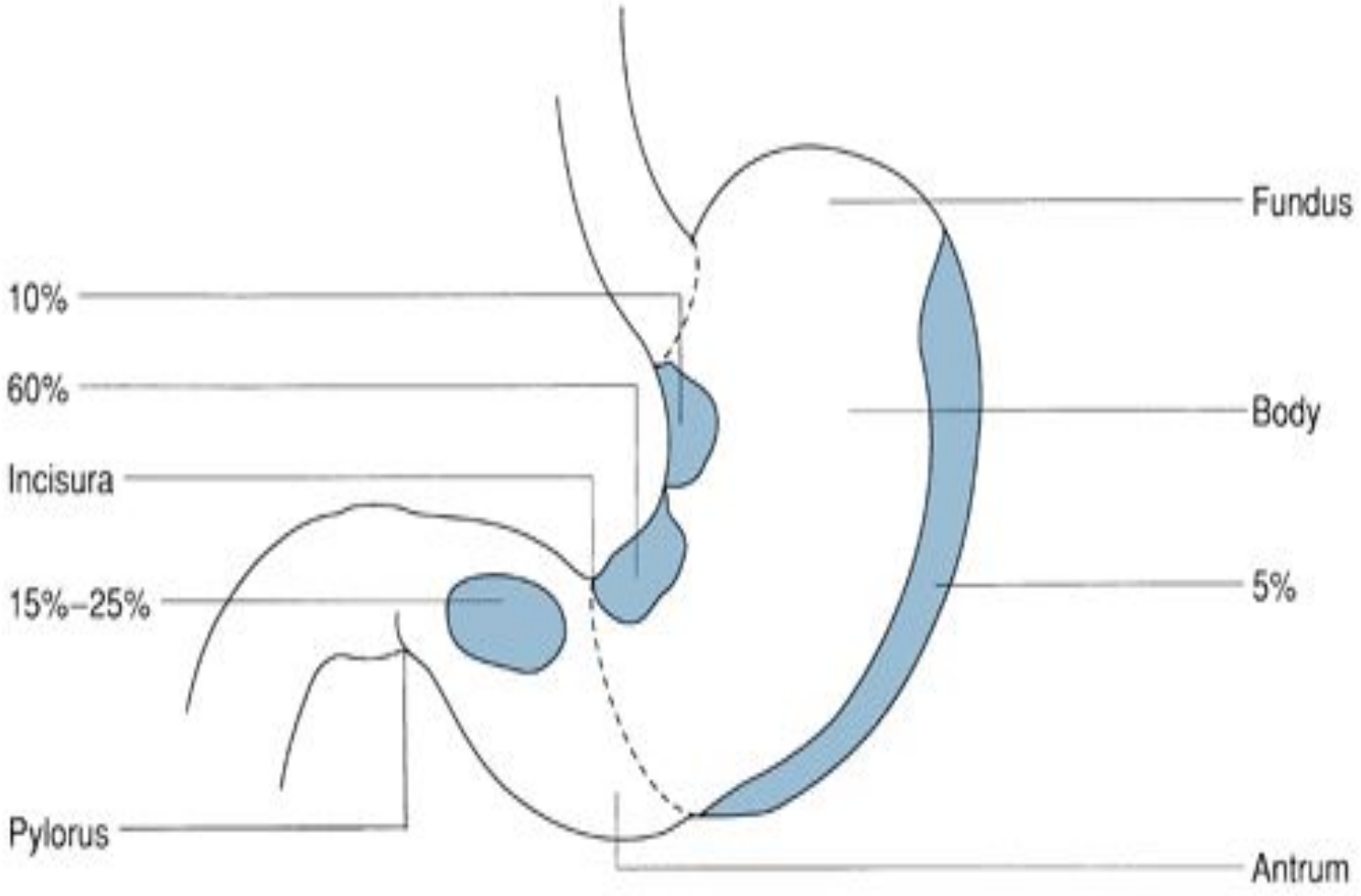
Image 4

The “Culprit”

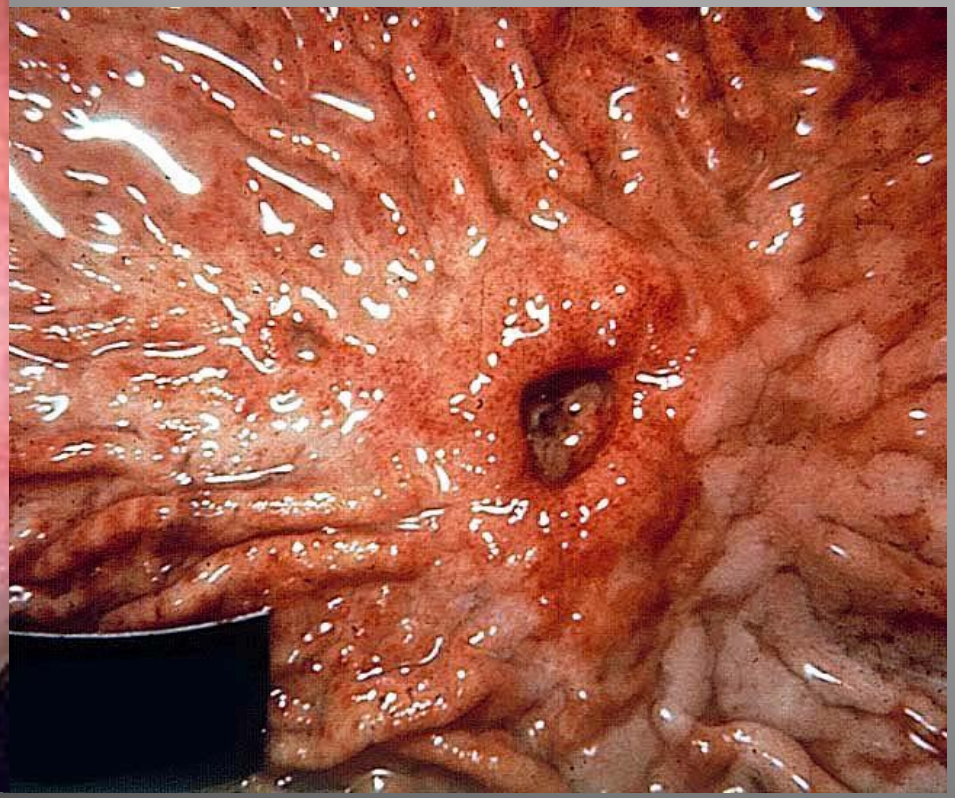
- H. pylori
- Treatment:
  - Triple therapy



Gastric ulcers



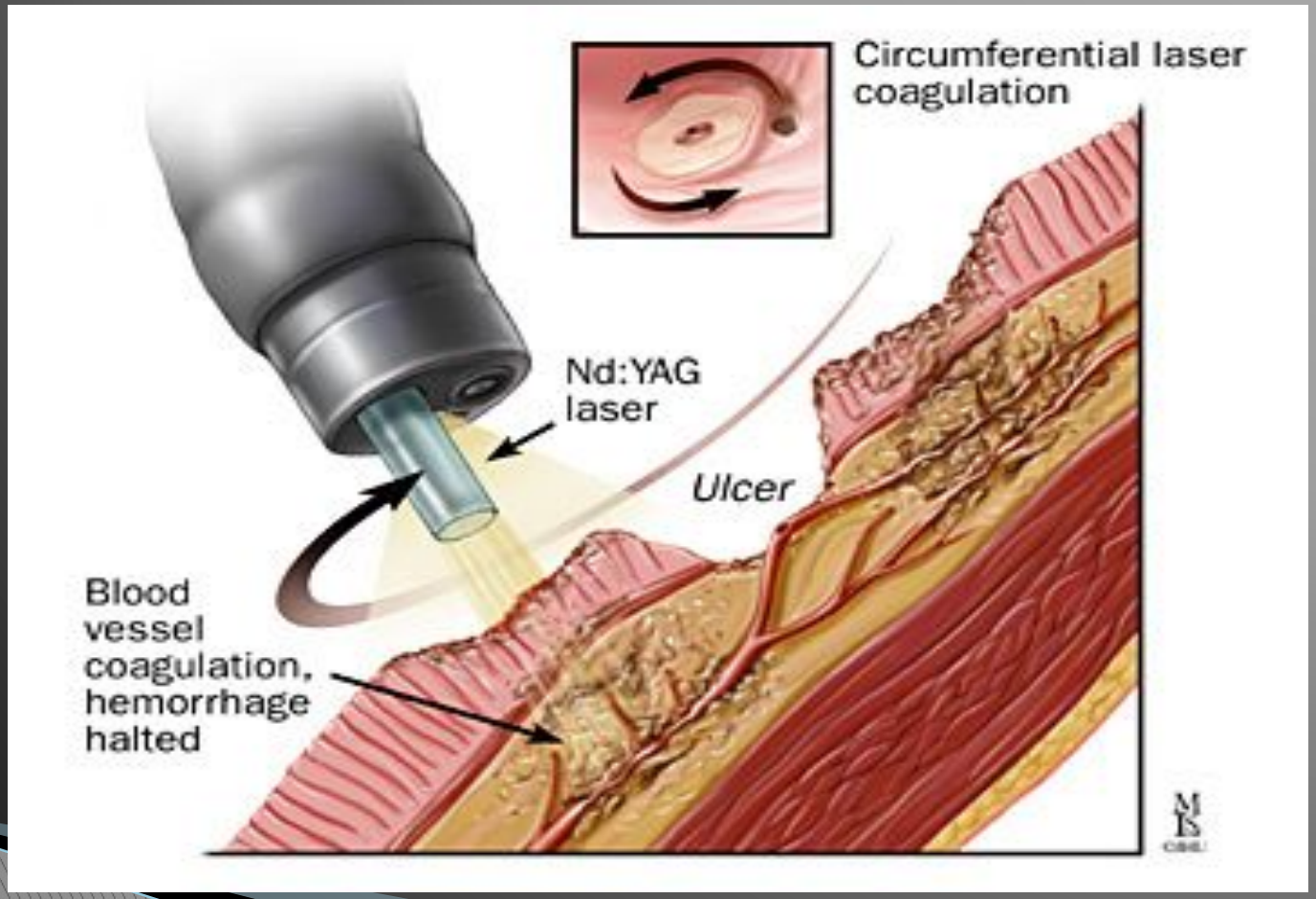
Gastric Ulcers



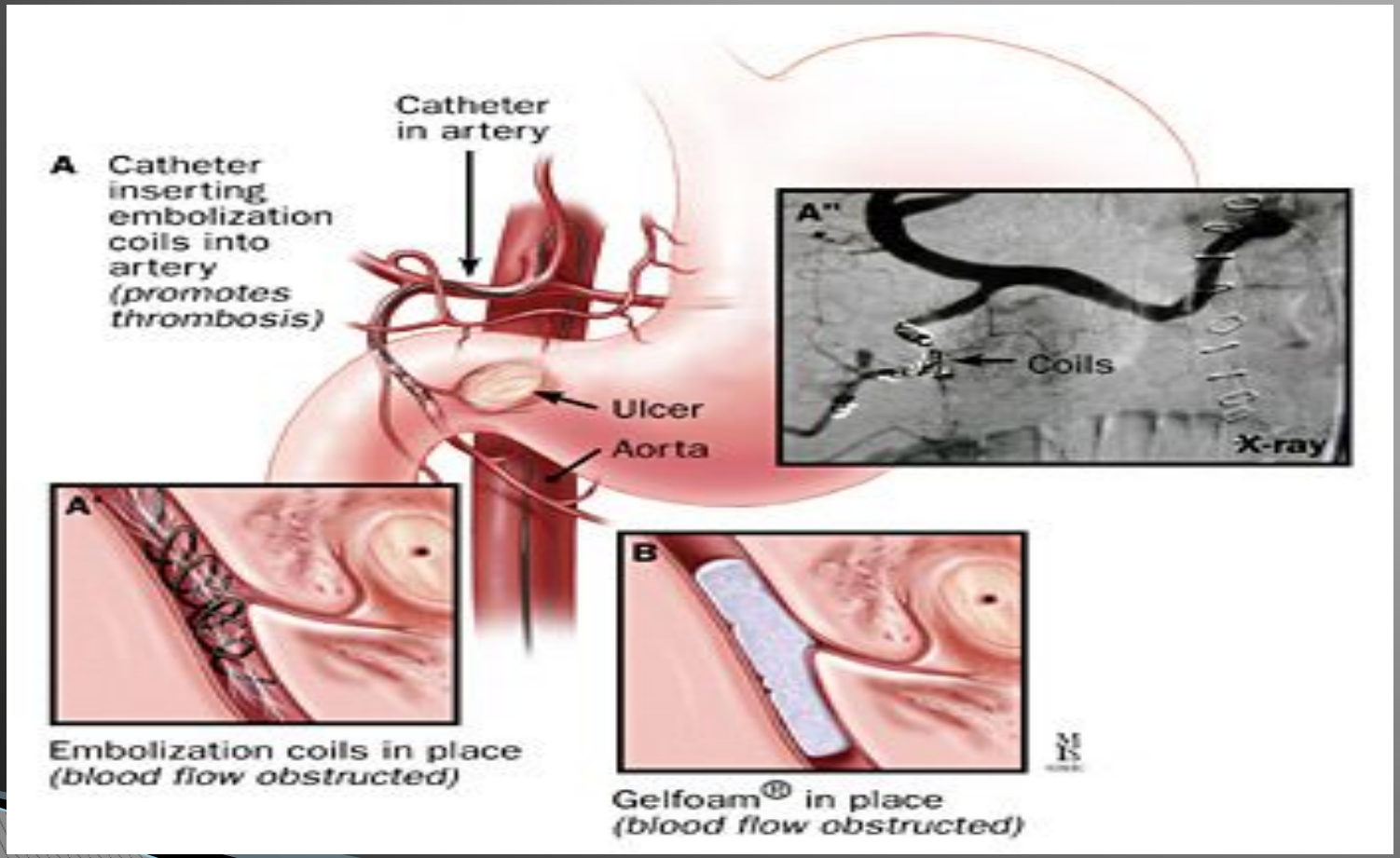
History of Peptic Ulcer Surgery

- Harberer 1882- first gastric resection for ulcer
- Billroth 1885- Billroth II gastrectomy
- Hofmeister 1896- Retrocolic anastamosis
- Dragstedt 1943- Truncal vagotomy
- Visick 1948- vagotomy and drainage
- Johnson 1970- highly selective vagotomy

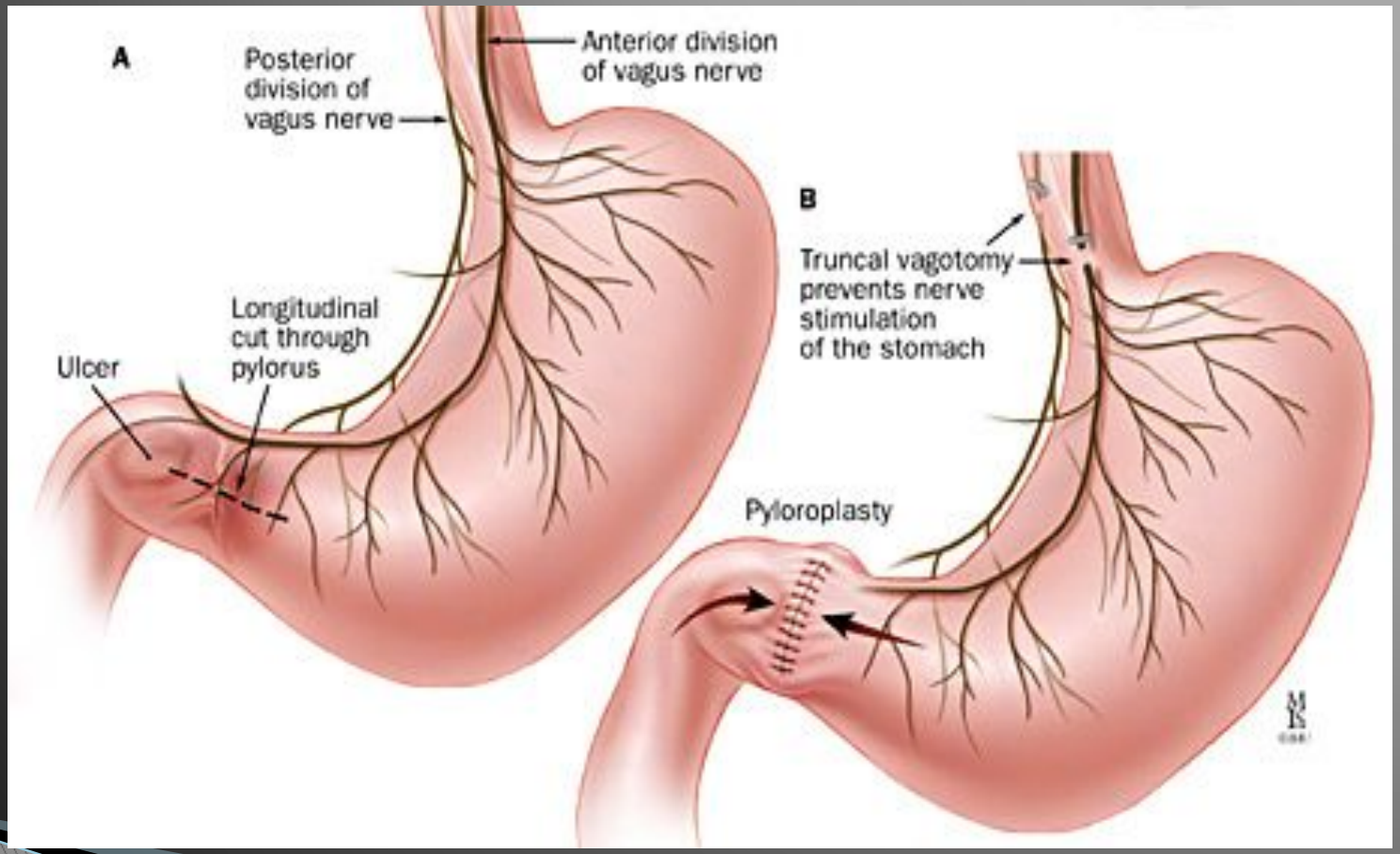
Laser Coagulation of Bleeding Ulcer



Coil Embolization of Bleeding Ulcer



Pyloroplasty for Bleeding Ulcer

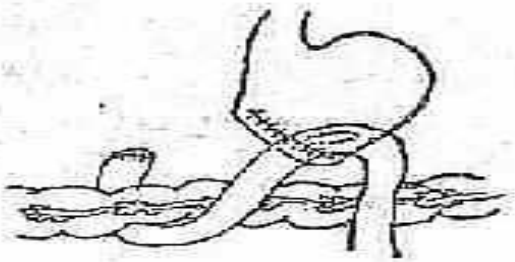


Open Surgical Procedures

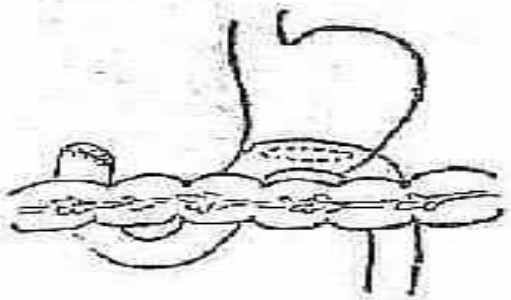
- Truncal vagotomy and pyloroplasty
- Truncal vagotomy and gastrojejunostomy
- Truncal vagotomy and antrectomy
- Highly selective vagotomy

Operations on stomach

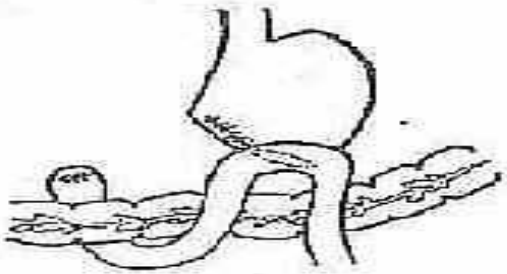
- **GASTROSTOMY**
- **Temporary gastrostomy**
- Minimal gastrostomy
- Vitzel's gastrostomy
- Stamm-Kader's gastrostomy
- **Permanent gastrostomy**
- Toprover's gastrostomy
- Beck Jian's gastrostomy
- **PARTIAL RESECTION OF THE STOMACH**
- **Billroth I –** the stump of the stomach is anastomosed with that of the duodenum
- **Billroth II -** the stump of the stomach is anastomosed with the initial portion of the ileum
- **Modifications of Billroth II**



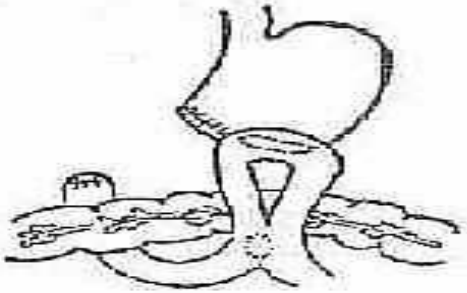
Billroth II



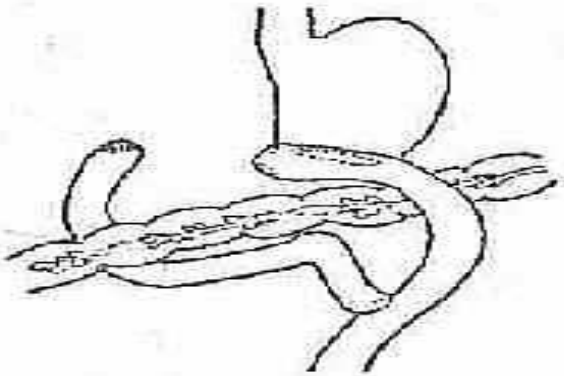
Polya



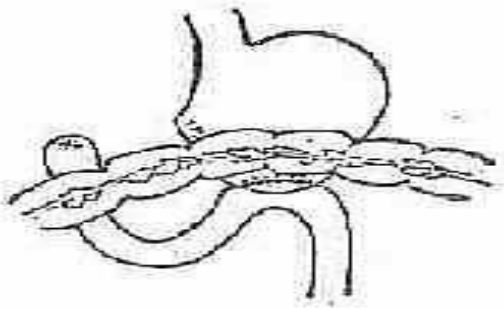
Von-Eisselberg



Braun-Jaboulay

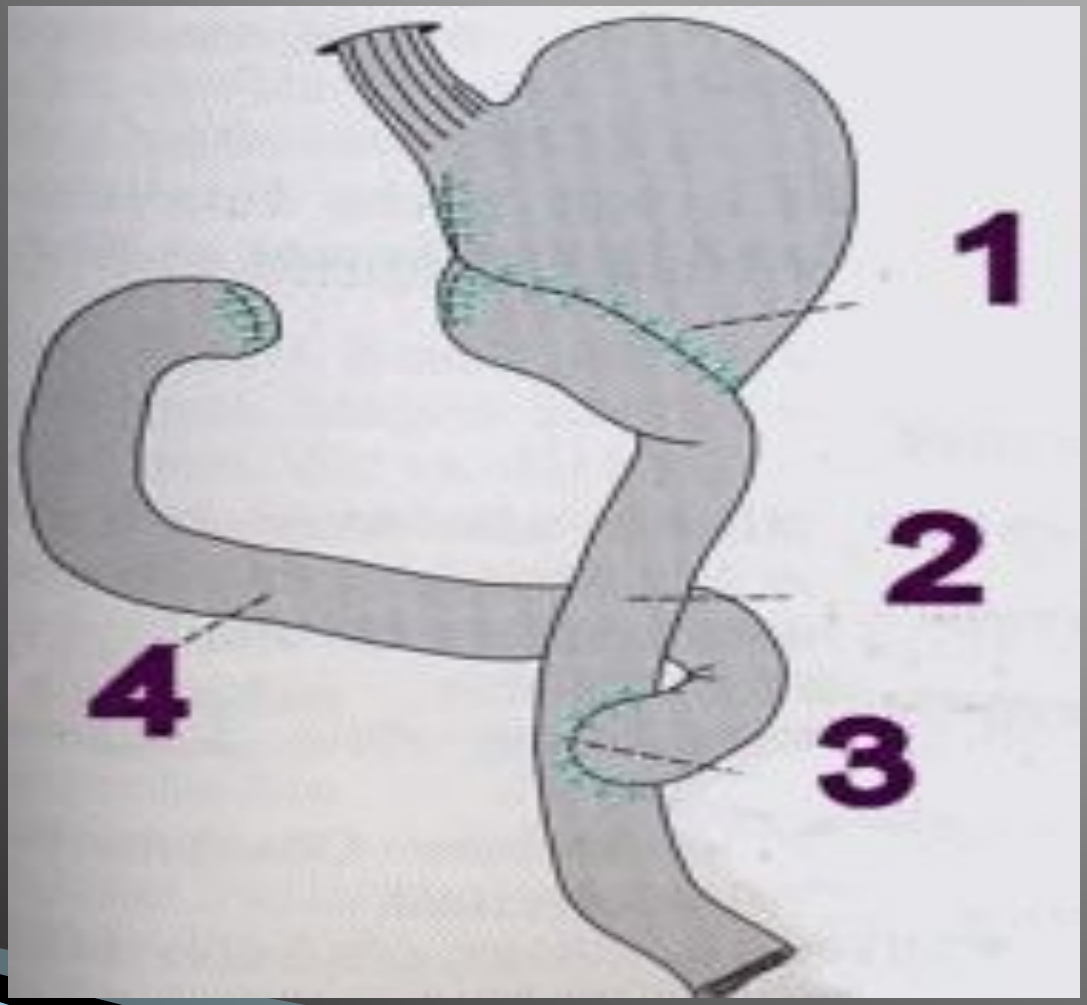


Roux

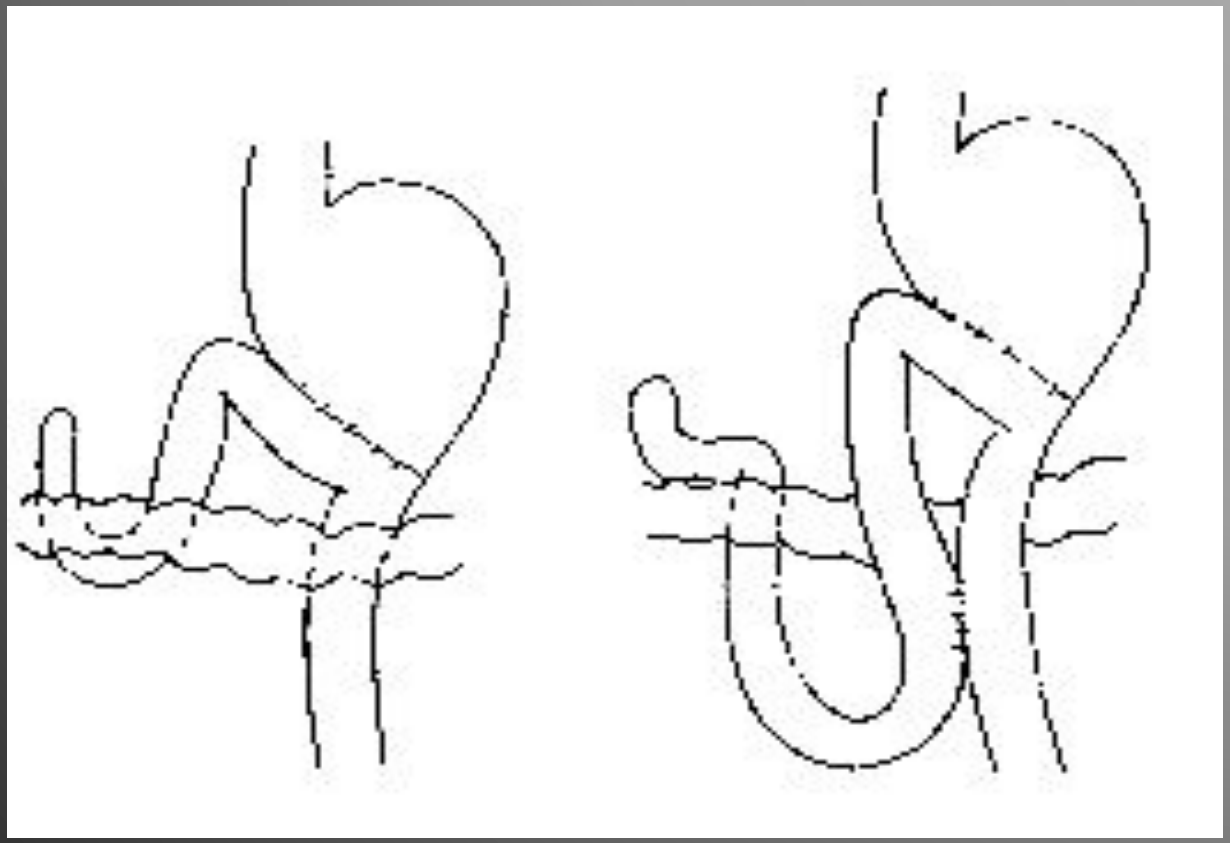


Hofmeister-Finsterer

Roux -en -Y Reconstruction



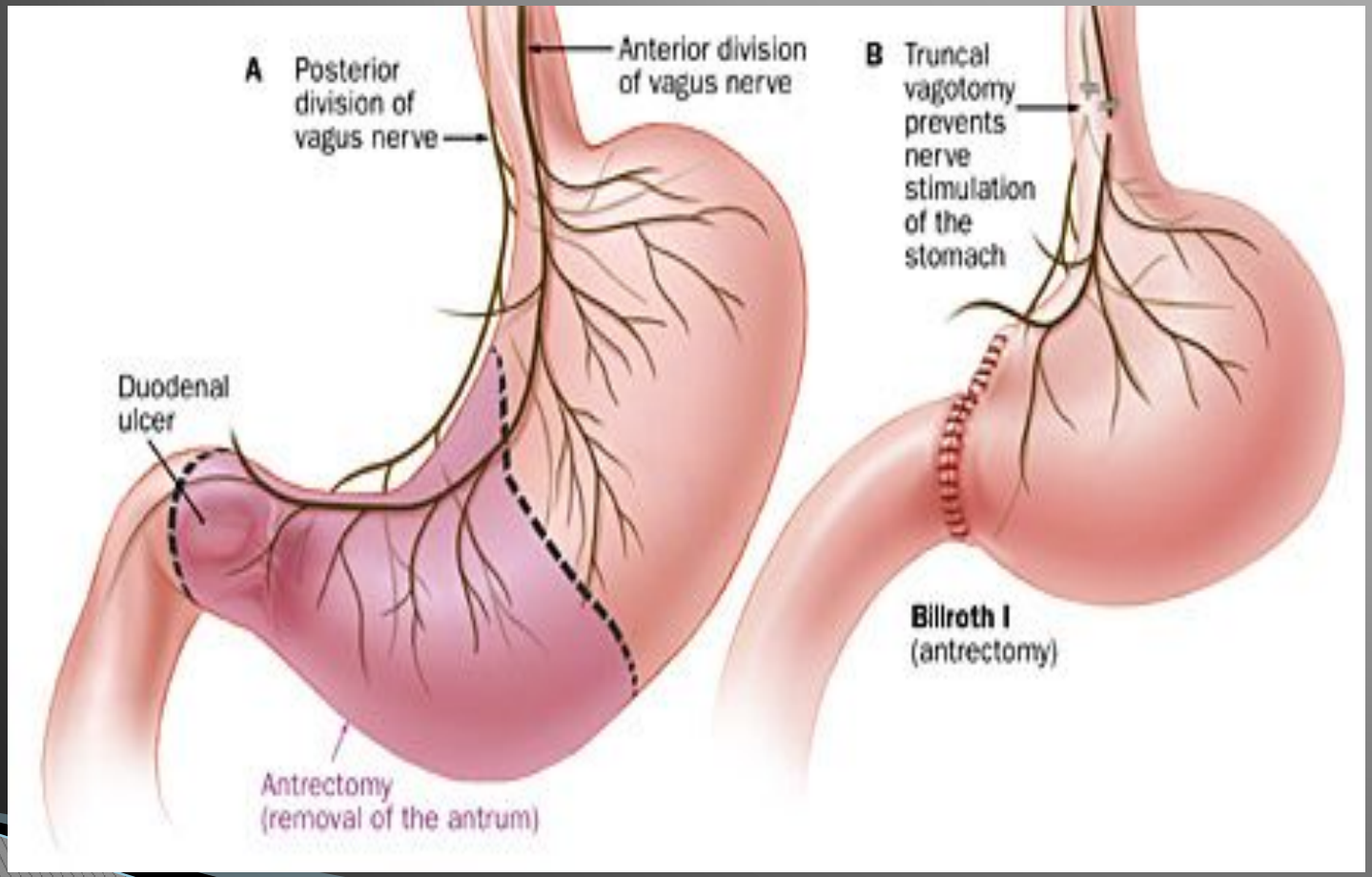
Antecolic and Retrocolic BII



Truncal Vagotomy

- Resect 1-2cm of each vagal trunk on distal esophagus.
- Reduces acid by 80%.
- Denervates parietal cells, antral pump, pyloric sphincter mechanism.
- Delays gastric emptying, so need drainage.
- With pyloroplasty recurrence 3-10%
- With pyloroplasty morbidity 1-2%

Antrectomy and Truncal Vagotomy with BI



Truncal Vagotomy and Antrectomy

- Entails distal gastrectomy of 50-60% of stomach.
- Removes parietal cell mass.
- Requires a BI or BII reconstruction.
- Recurrence rate 0.6-4%
- Morbidity rate 0.9-1.6%

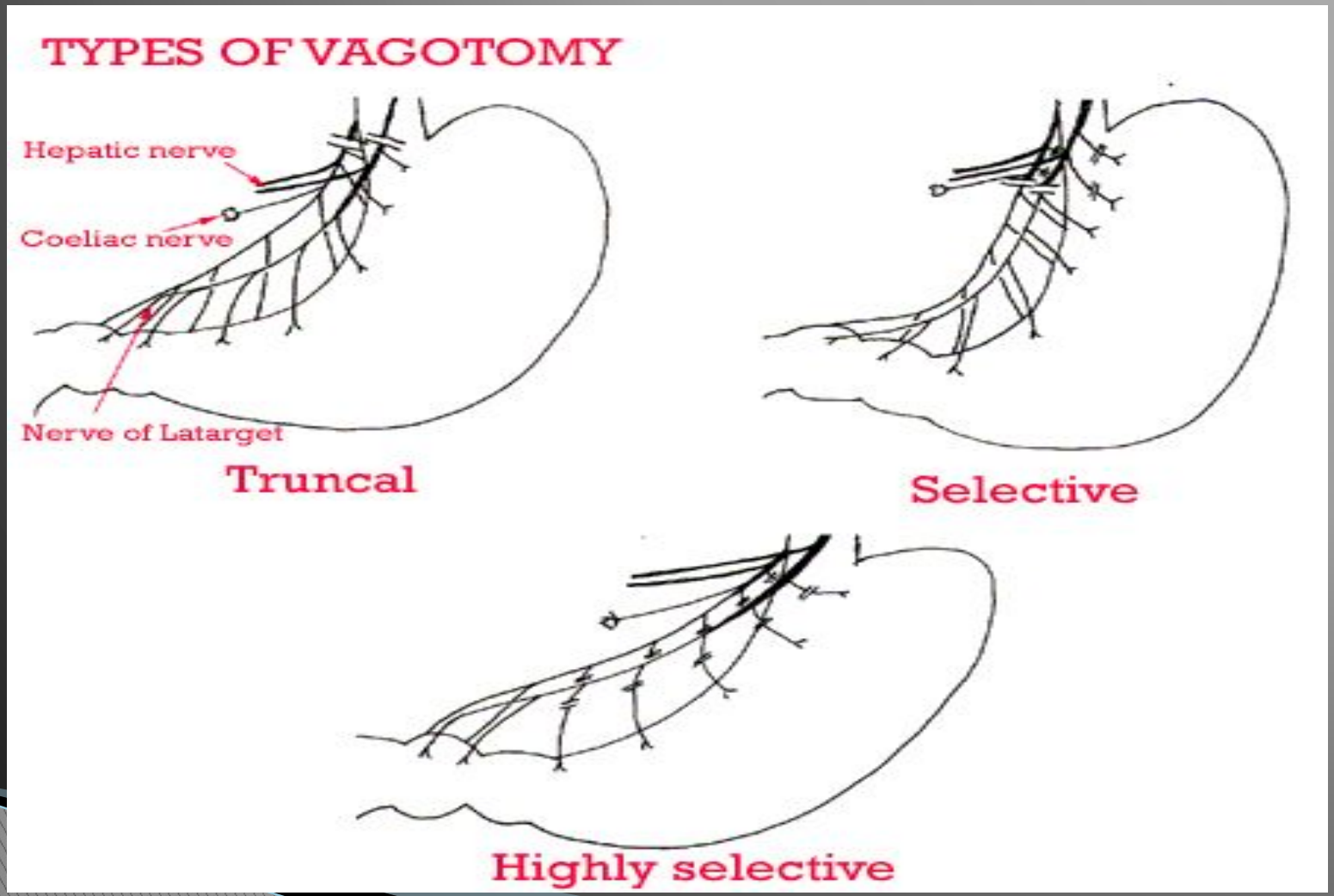
Selective Vagotomy

- Total denervation of the stomach from diaphragmatic crus to pylorus.
- Procedure still needs drainage, but advantage is other organs are spared, liver, gallbladder, small bowel, colon.

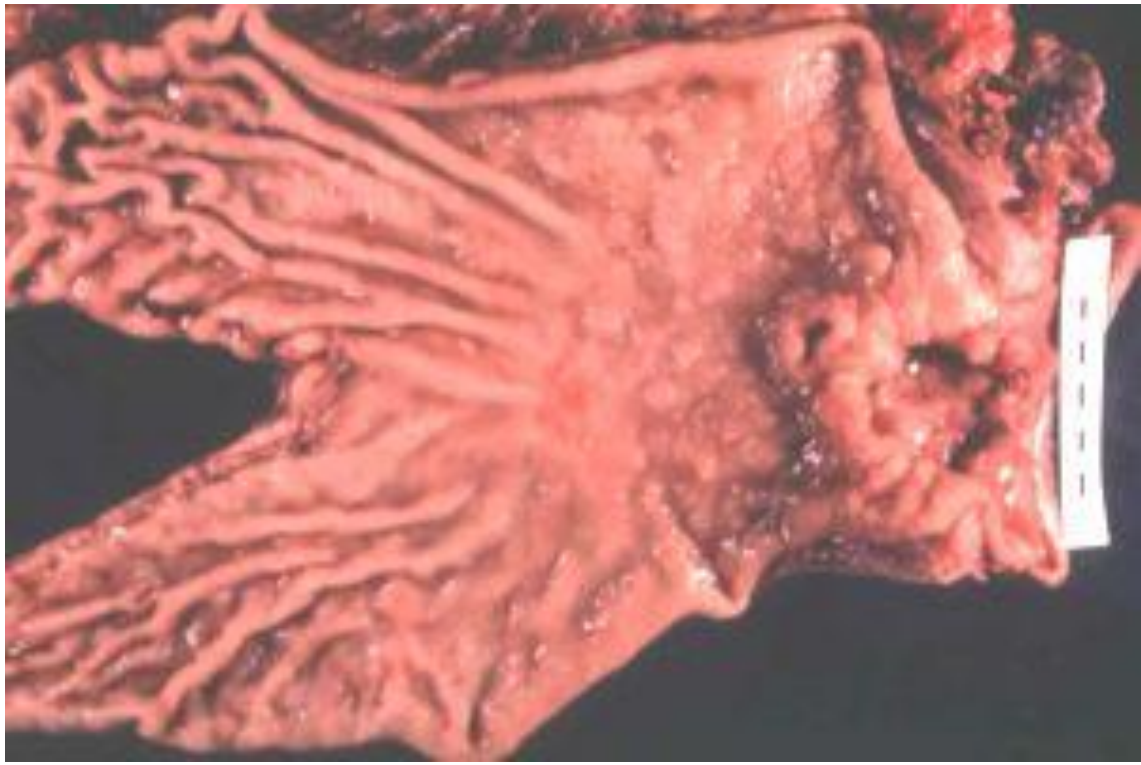
Highly Selective Vagotomy

- Spares nerves of Latarjet, but divides vagal branches to proximal 2/3 of stomach.
- Antral innervation is thus preserved, gastric emptying preserved, so drainage procedure unnecessary.
- Recurrence rate 10-15%
- Lowest morbidity of all

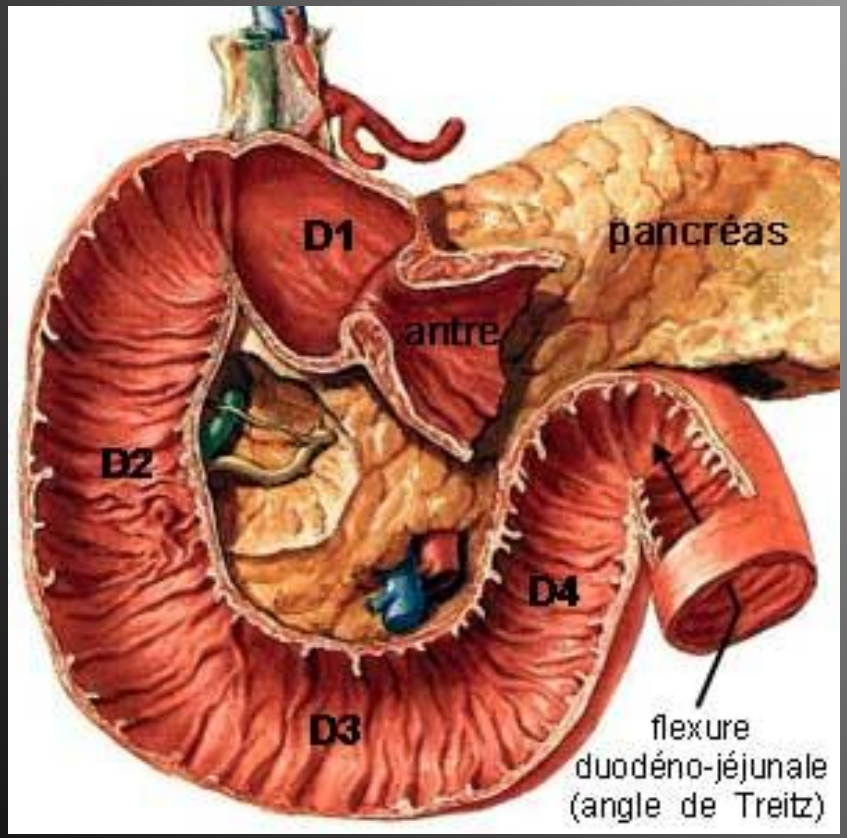
Types of Vagotomies



Gastric Adenocarcinoma



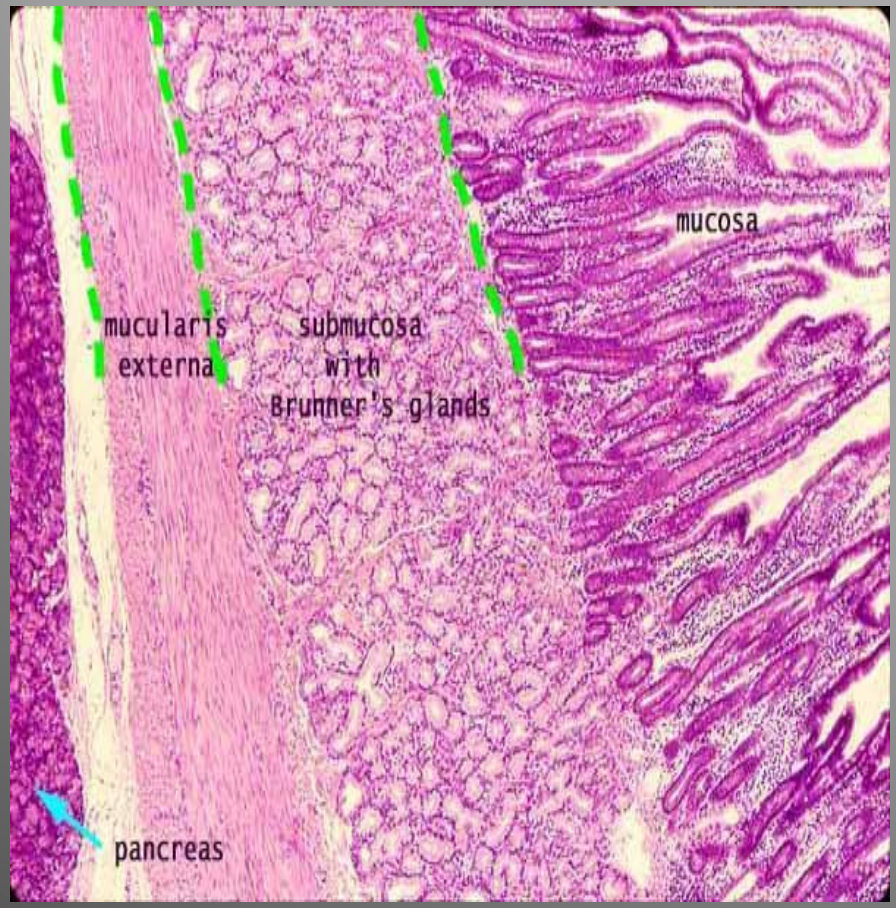
Duodenum



- 4 parts
- Metabolically active
  - Produces many enzymes
- D2: site of pacemaker
- D2: posterolateral insertion of ampulla.
- Becomes jejunum at the _____?

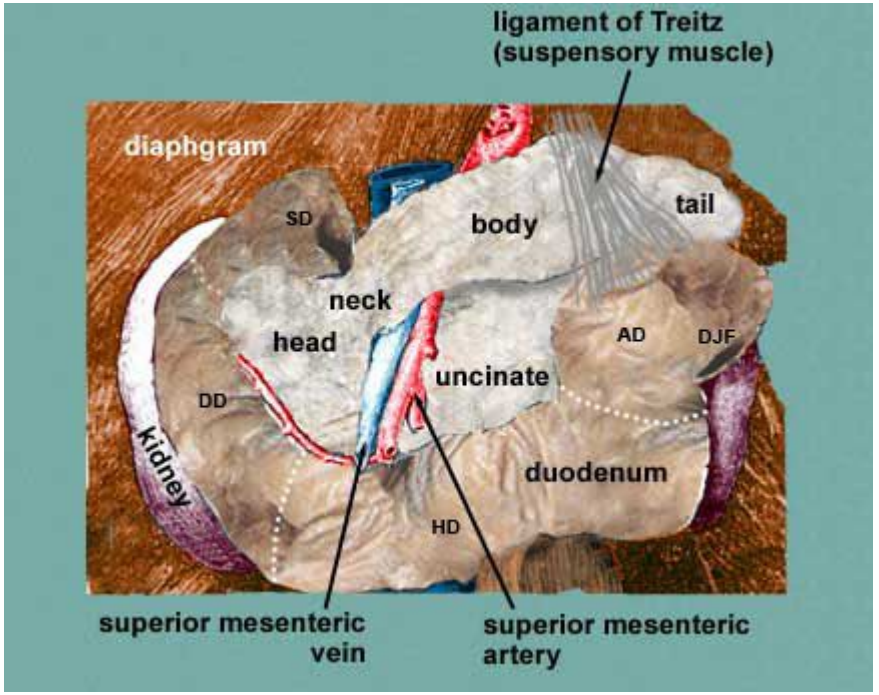
Duodenum

- Brunner's glands
- Blood supply:
  - GDA- superior pancreaticoduodenal
  - SMA- inferior pancreaticoduodenal



duodenum

- **Blood Supply of the Duodenum**
- superior pancreaticoduodenal
  - anterior and posterior branches
- inferior pancreaticoduodenal
  - anterior and posterior branches

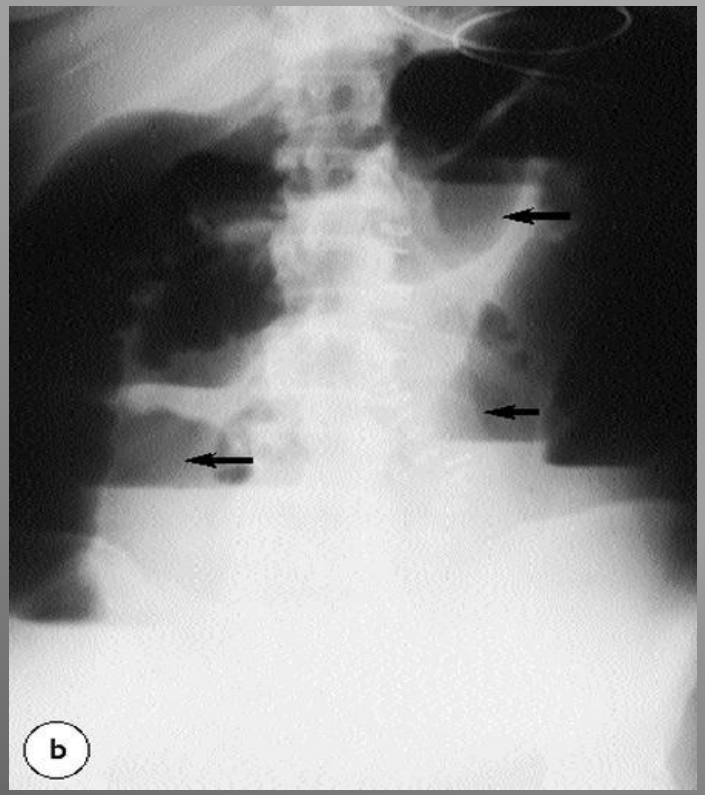


Duodenal Ulcers

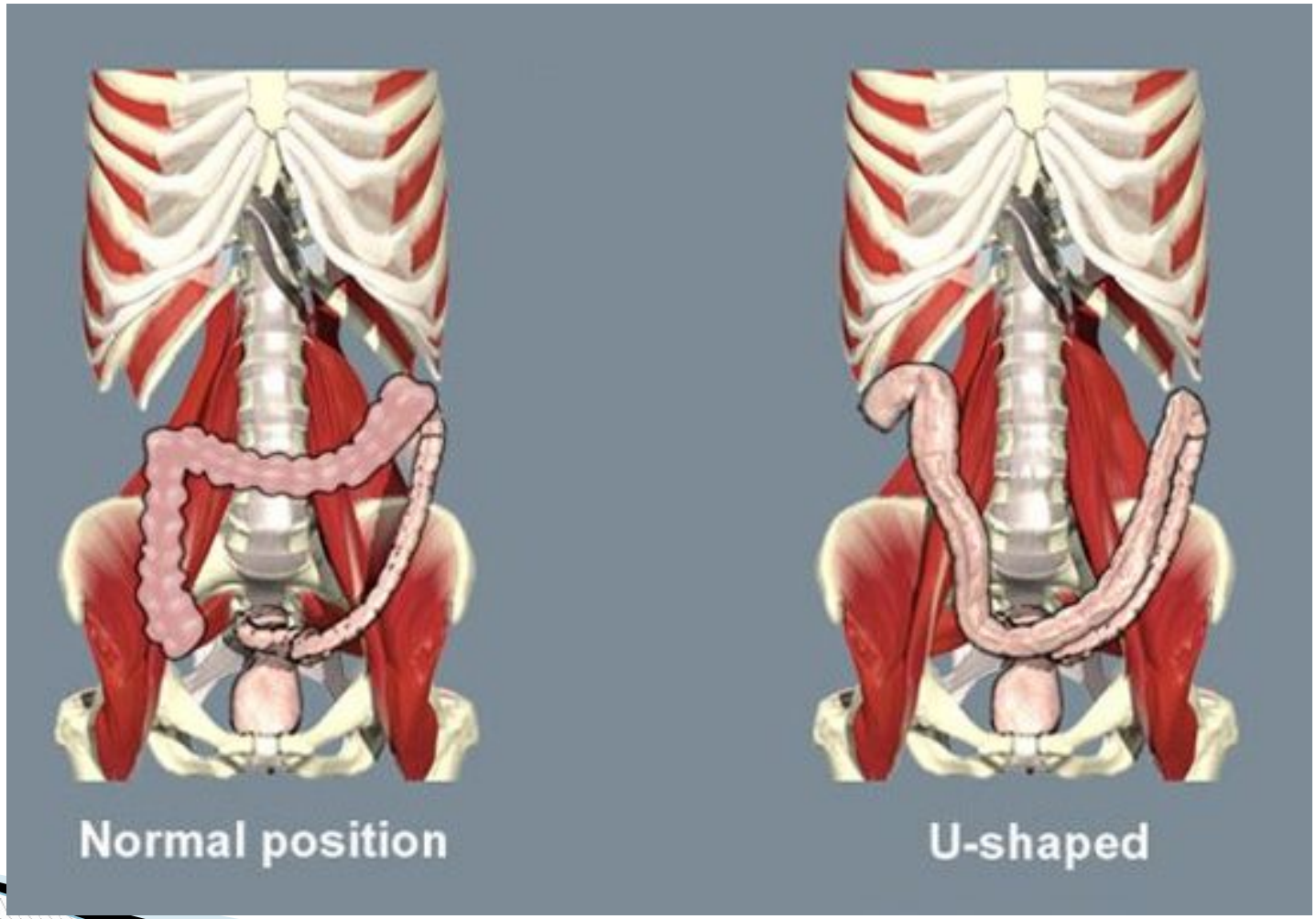
Obstruction

Small Bowel Obstruction

- History
  - Prior surgery
  - Hernias
- Signs and Symptoms
  - Colicky abdominal pain
  - Nausea and vomiting
  - Abdominal distension
  - Rectal exam
- No peritoneal signs

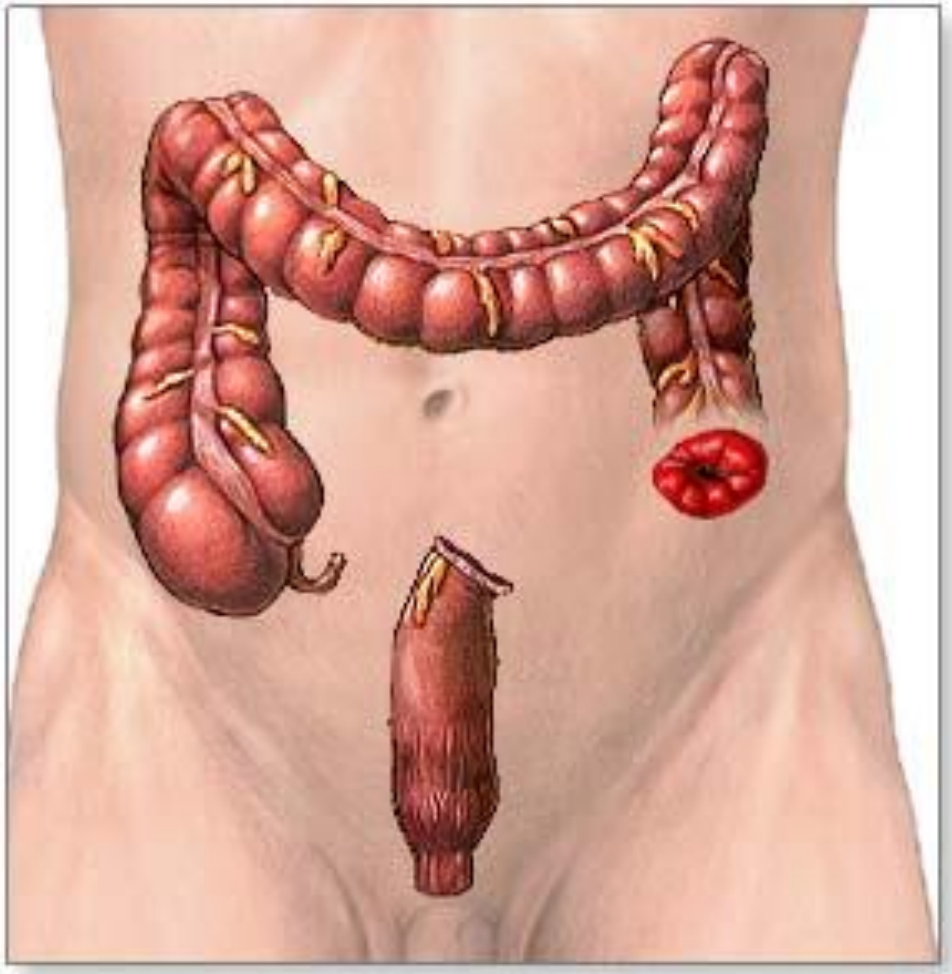


Intestinum Crasum



Large Bowel Obstruction

colostomy

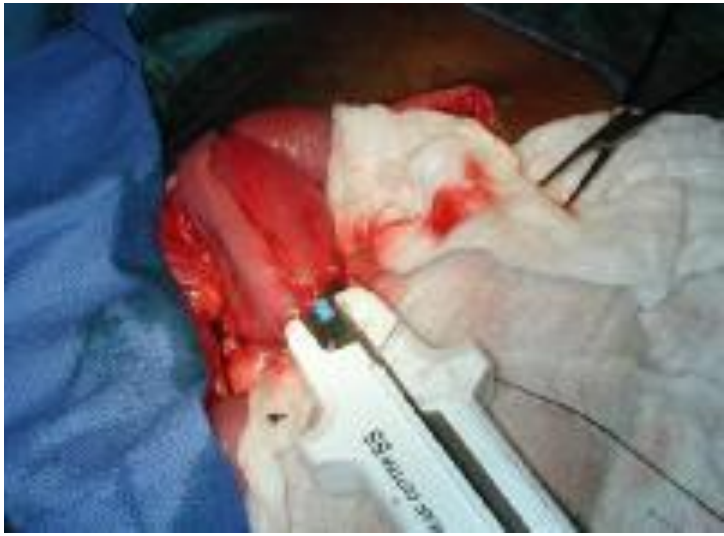


Healthy bowel tissue is stitched to the abdomen (colostomy)

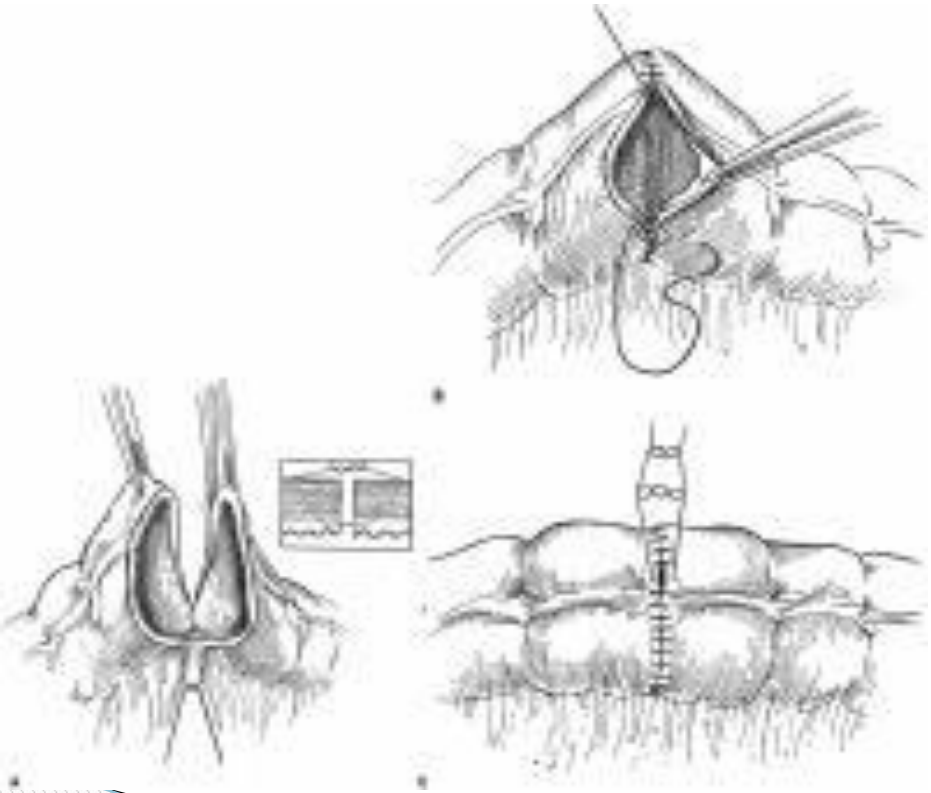
A.D.A.M.

Anastamosis

- Stapled vs. Hand-Sewn
  - Brundage et al. J trauma. 1999
  - Multicenter retrospective cohort design
- “anastamotic leaks and intra-abdominal abscesses appear to be more likely with stapled bowel repairs compared with sutured anastamoses in the injured patient. Caution should be exercised in deciding to staple a bowel anastomosis in the trauma patient.”



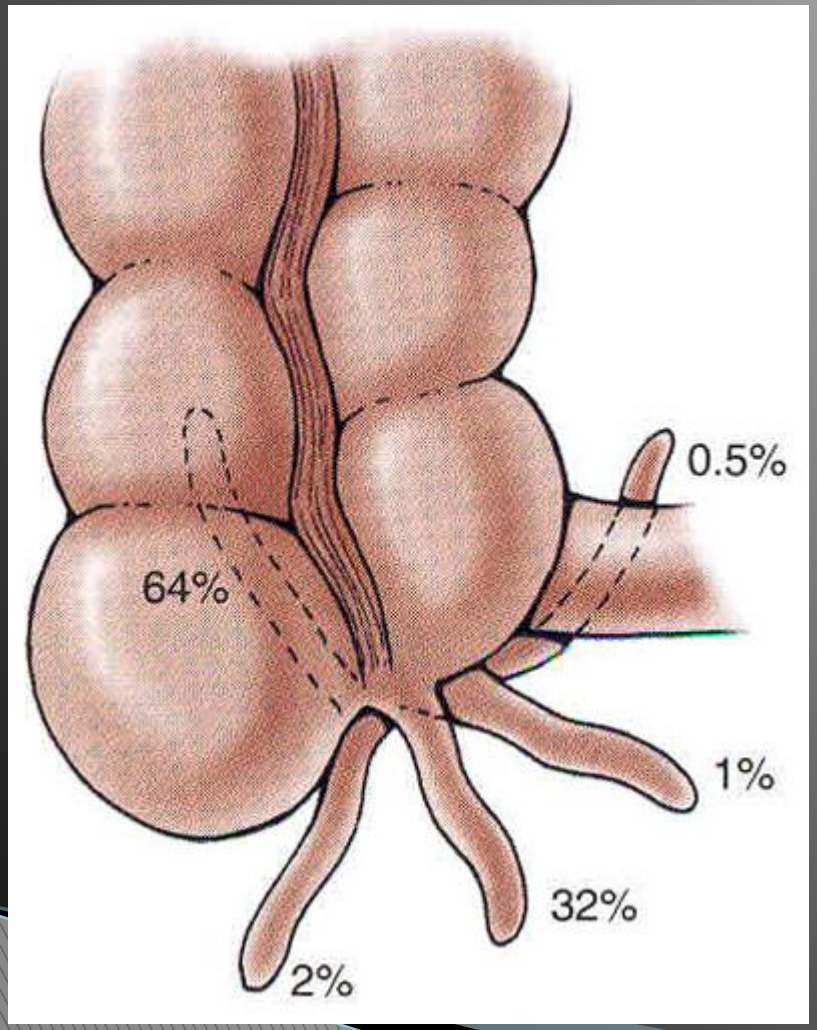
Anastamosis

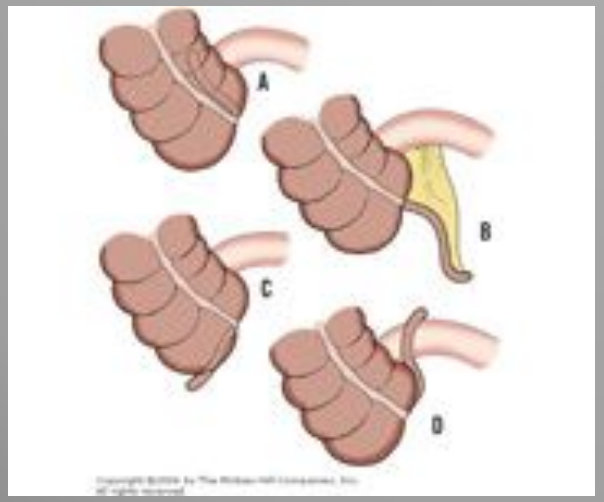


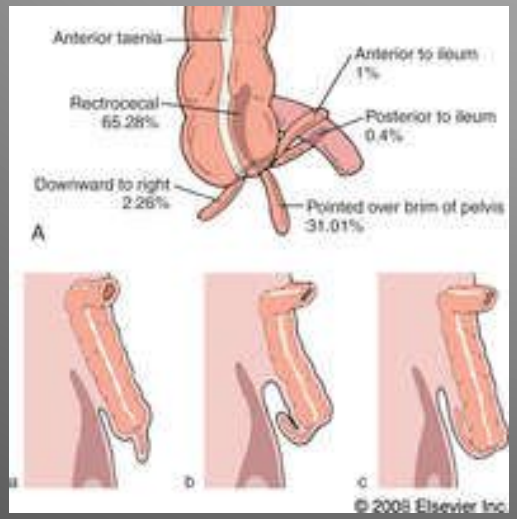
Burch et al. *Ann Surg*. 1999

- Burch et al. Ann of Surg. 1999.
- Prospective randomized trial of single-layer continuous vs. two layer interrupted intestinal anastamosis
- NB: Important to invert, 4-6mm seromuscular bites, 5mm advances, larger bites at mesenteric border
- Single layer – similar leak rate (approx 2%), cheaper, faster

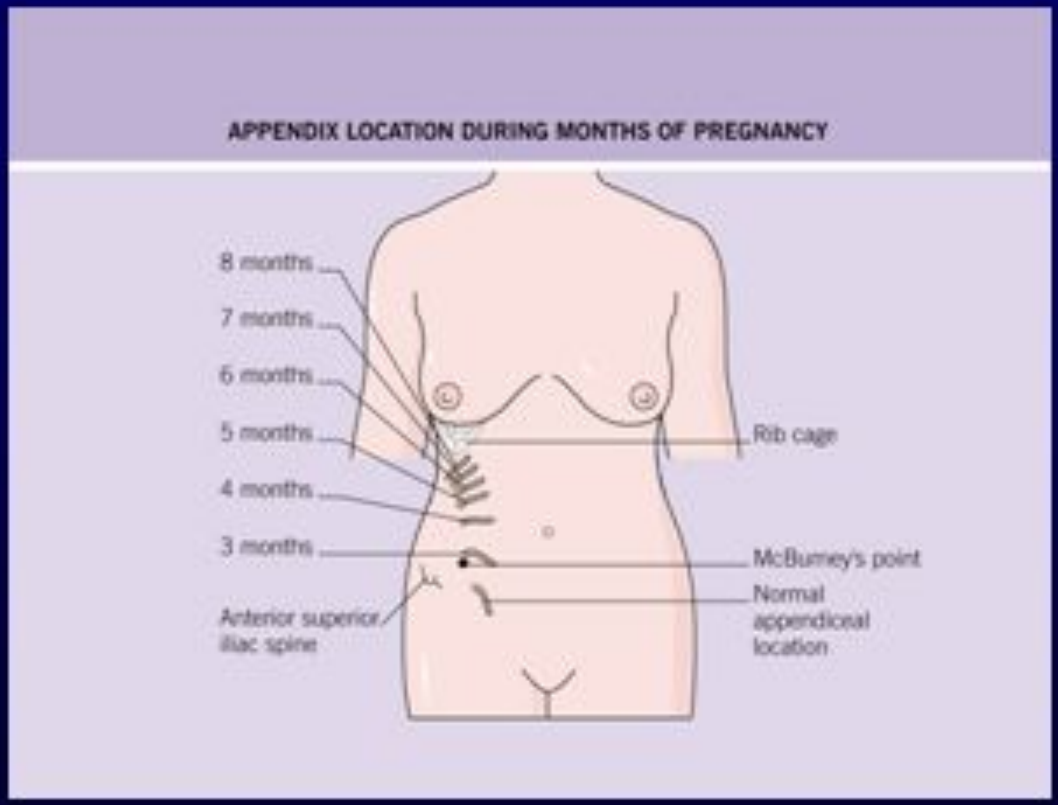
Appendix vermiformis







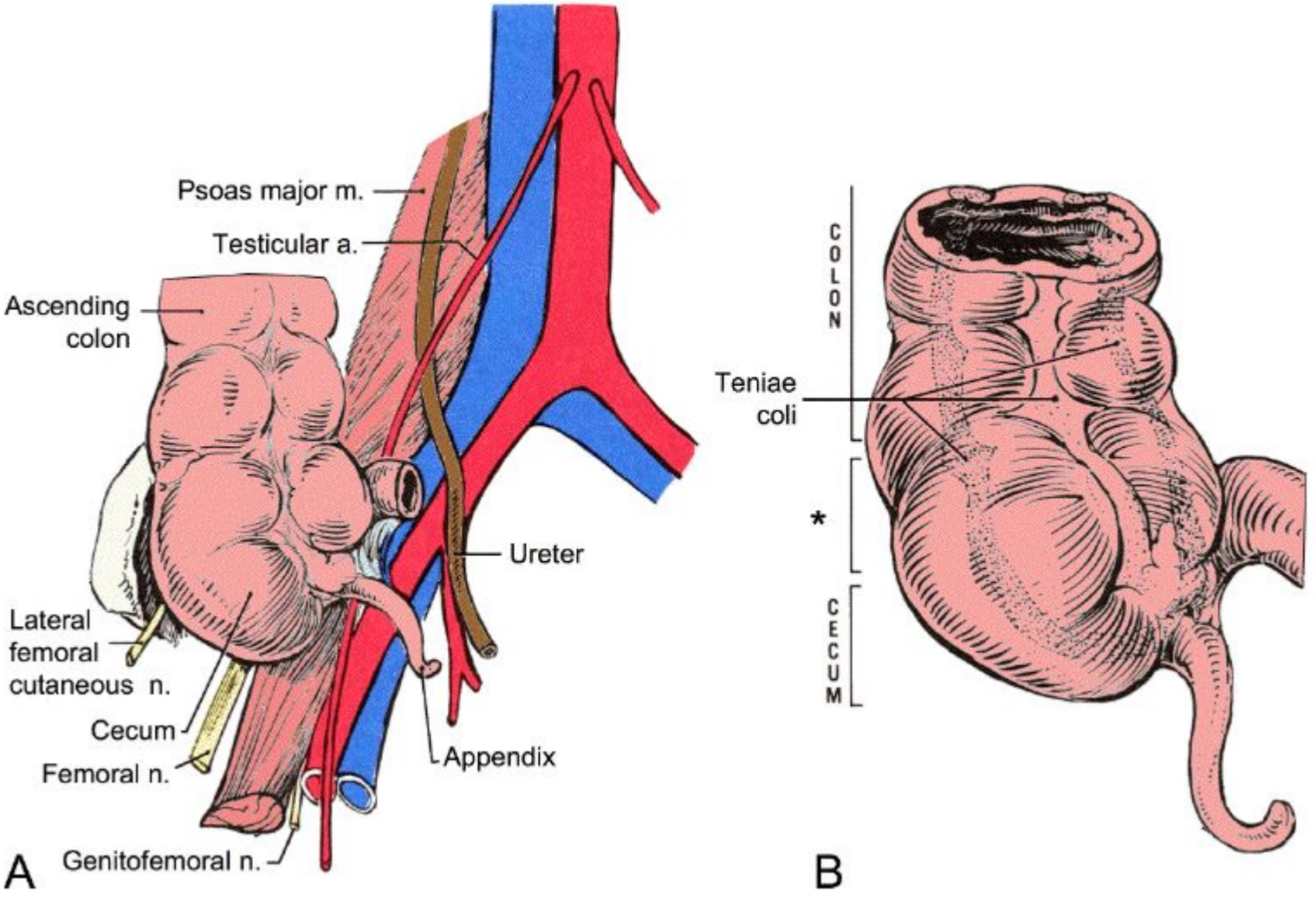
Appendicitis in Pregnancy

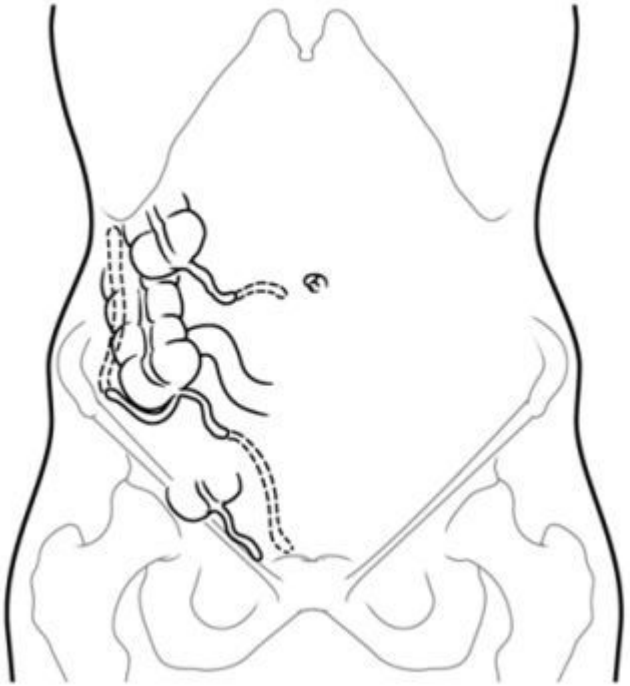


- The caecum was at McBurney's point in 245 (80.9%) patients, pelvic in 45 (14.9%) and high lying in 13 (4.3%). The appendix was pelvic in 155 (51.2%) patients, pre-ileal in 9 (3.0%), para-caecal in 11 (3.6%), post-ileal in 67 (22.1%) and retrocaecal in 61 (20.1%) patients.

- The average length was 8.9 cm in males and 9.4 cms in females. The appendix was commonly found to be retrocaecal (58.3%) on pelvic (21.7%) or paracaecal (11.7%). Anomalies of the appendix were more common in children than adults and occurred in 47% of cases.

Topography of appendix vermiformis and ceacum

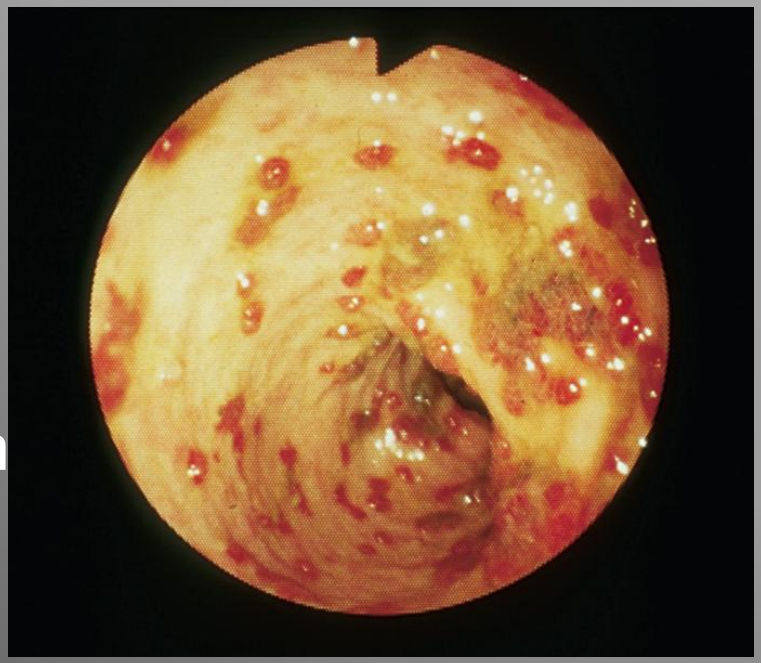





McBurney's
Point
Position
Appendix

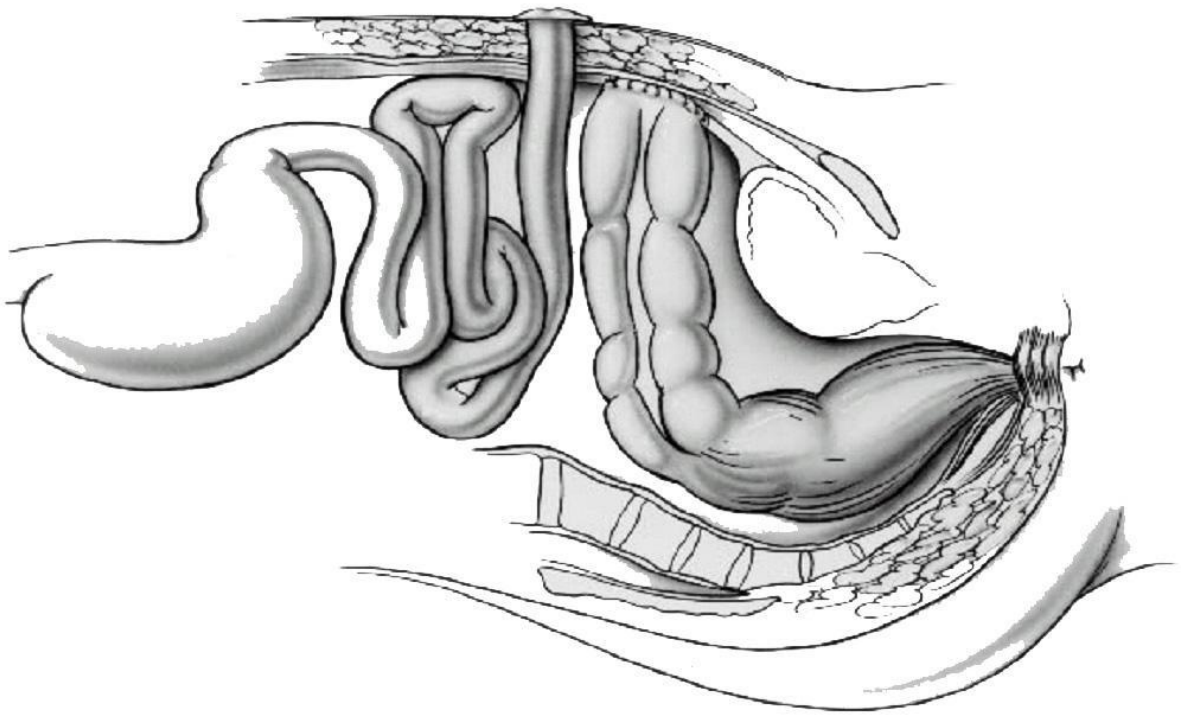
Ulcerative Colitis

- Disease Severity
  - Mild colitis: 20%
  - Moderate colitis: 71%
  - Severe colitis: 9%
- Acute disease complications
  - Toxic colitis or megacolon
  - Perforation
  - Hemorrhage

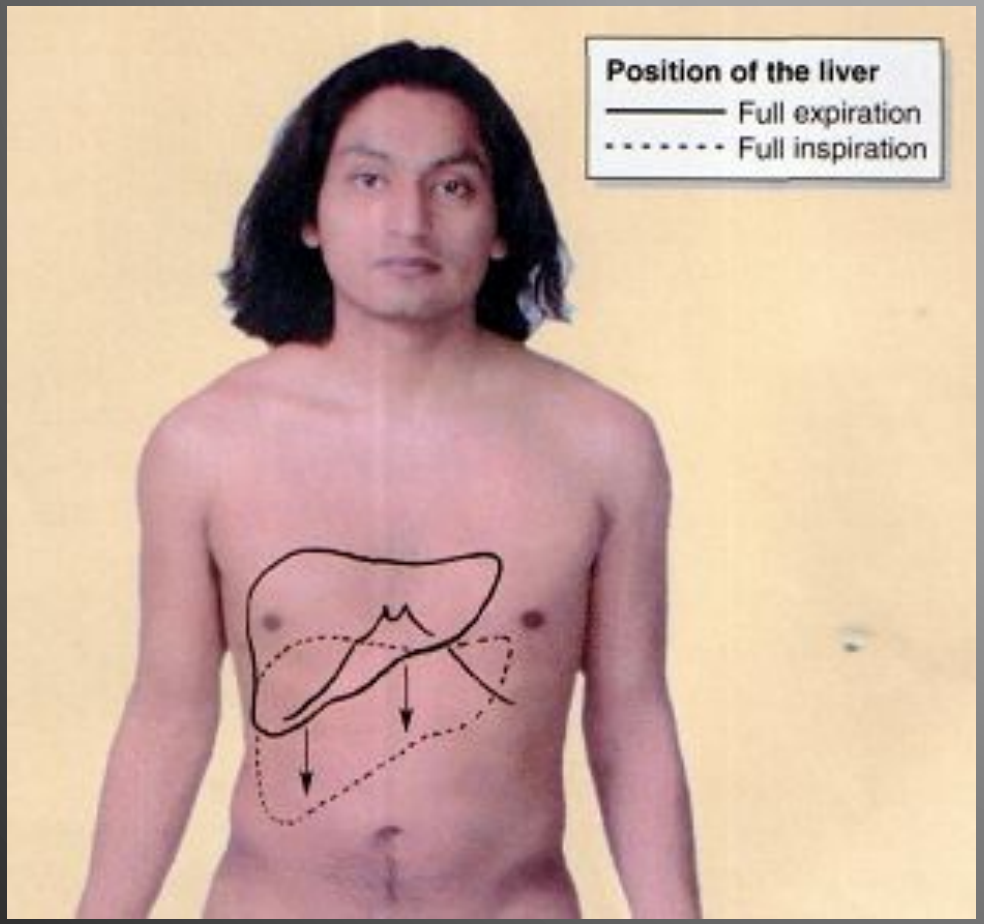


Langholz 1991

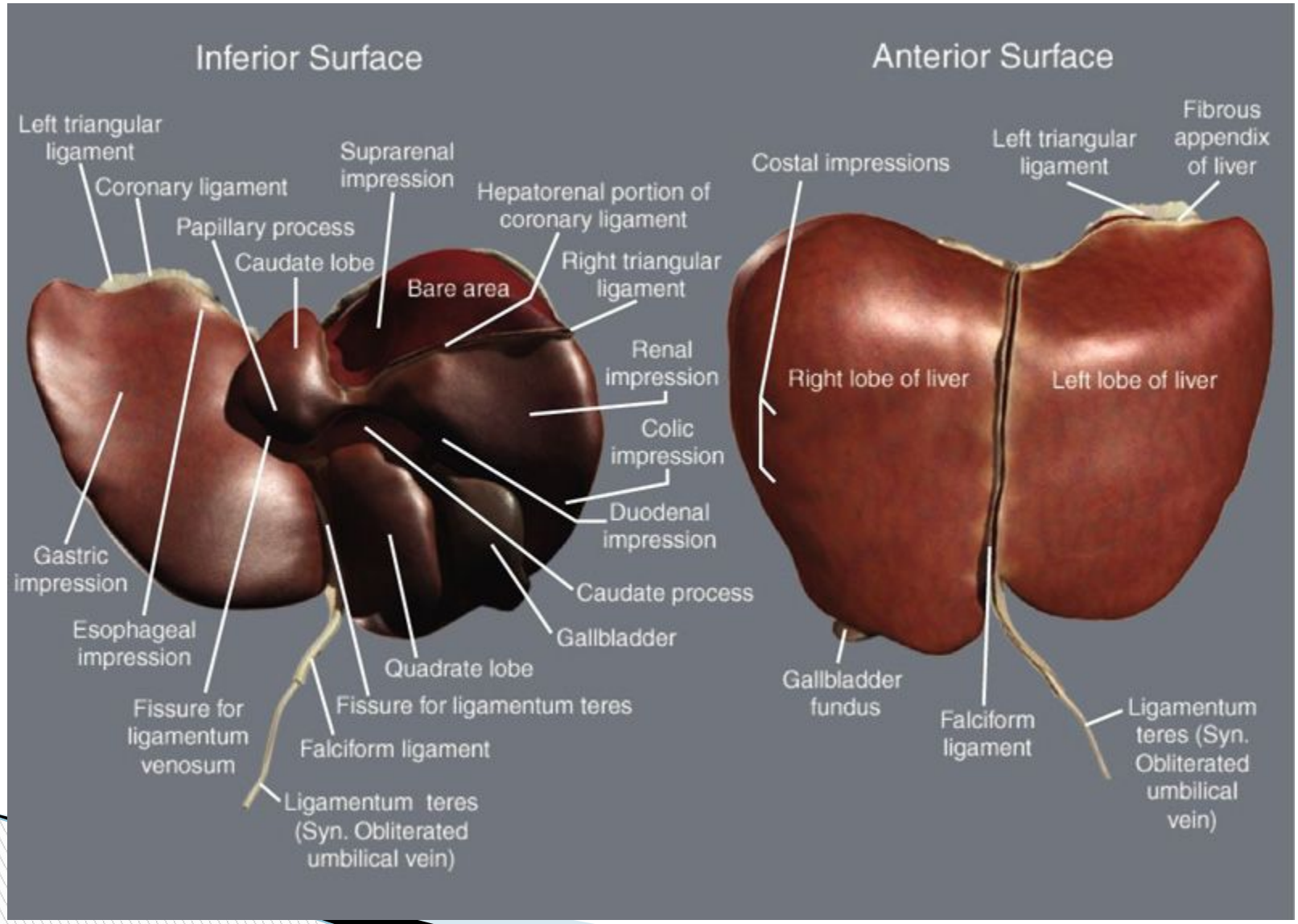
Subtotal Colectomy



Liver



Liver


Inferior Surface
Left triangular ligament
Coronary ligament
Suprarenal impression
Papillary process
Caudate lobe
Hepatorenal portion of coronary ligament
Bare area
Right triangular ligament
Renal impression
Colic impression
Duodenal impression
Gastric impression
Caudate process
Esophageal impression
Gallbladder
Quadrate lobe
Fissure for ligamentum venosum
Fissure for ligamentum teres
Falciform ligament
Ligamentum teres (Syn. Obliterated umbilical vein)
Anterior Surface
Costal impressions
Left triangular ligament
Fibrous appendix of liver
Right lobe of liver
Left lobe of liver
Gallbladder fundus
Falciform ligament
Ligamentum teres (Syn. Obliterated umbilical vein)

Liver Structure

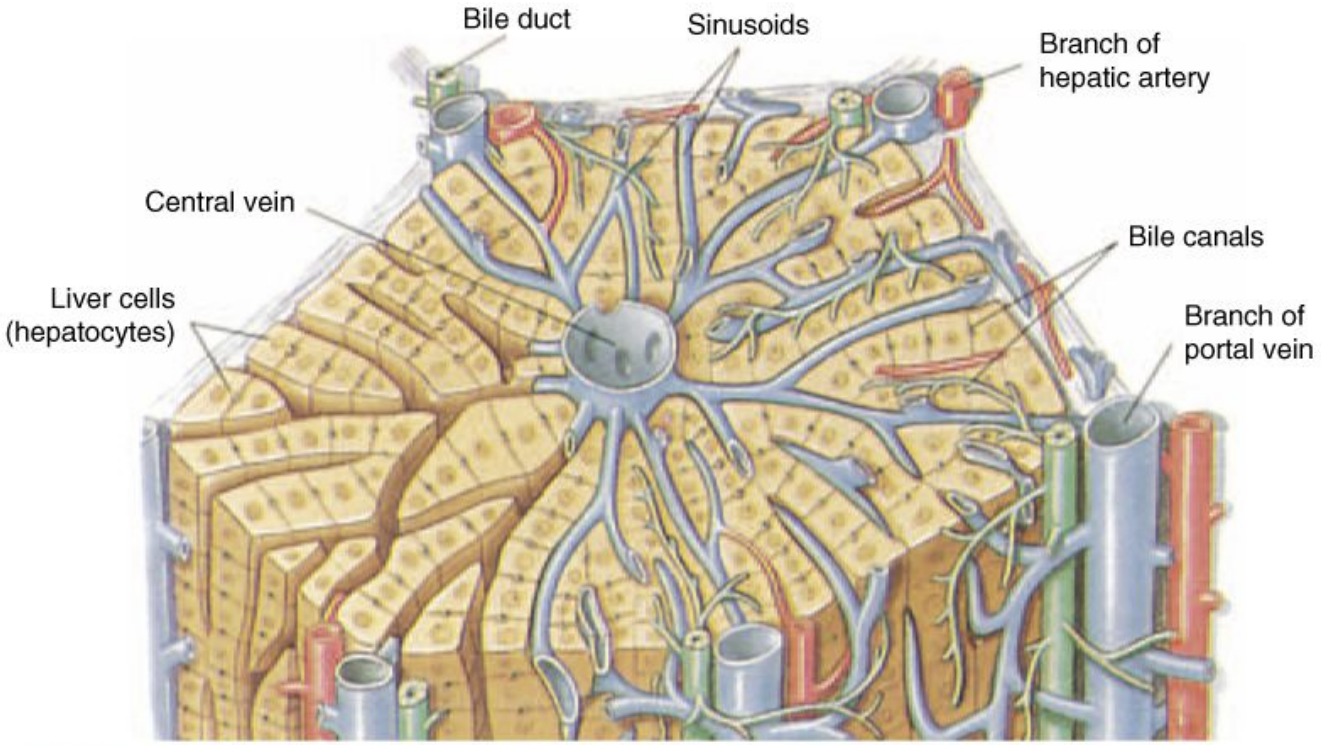
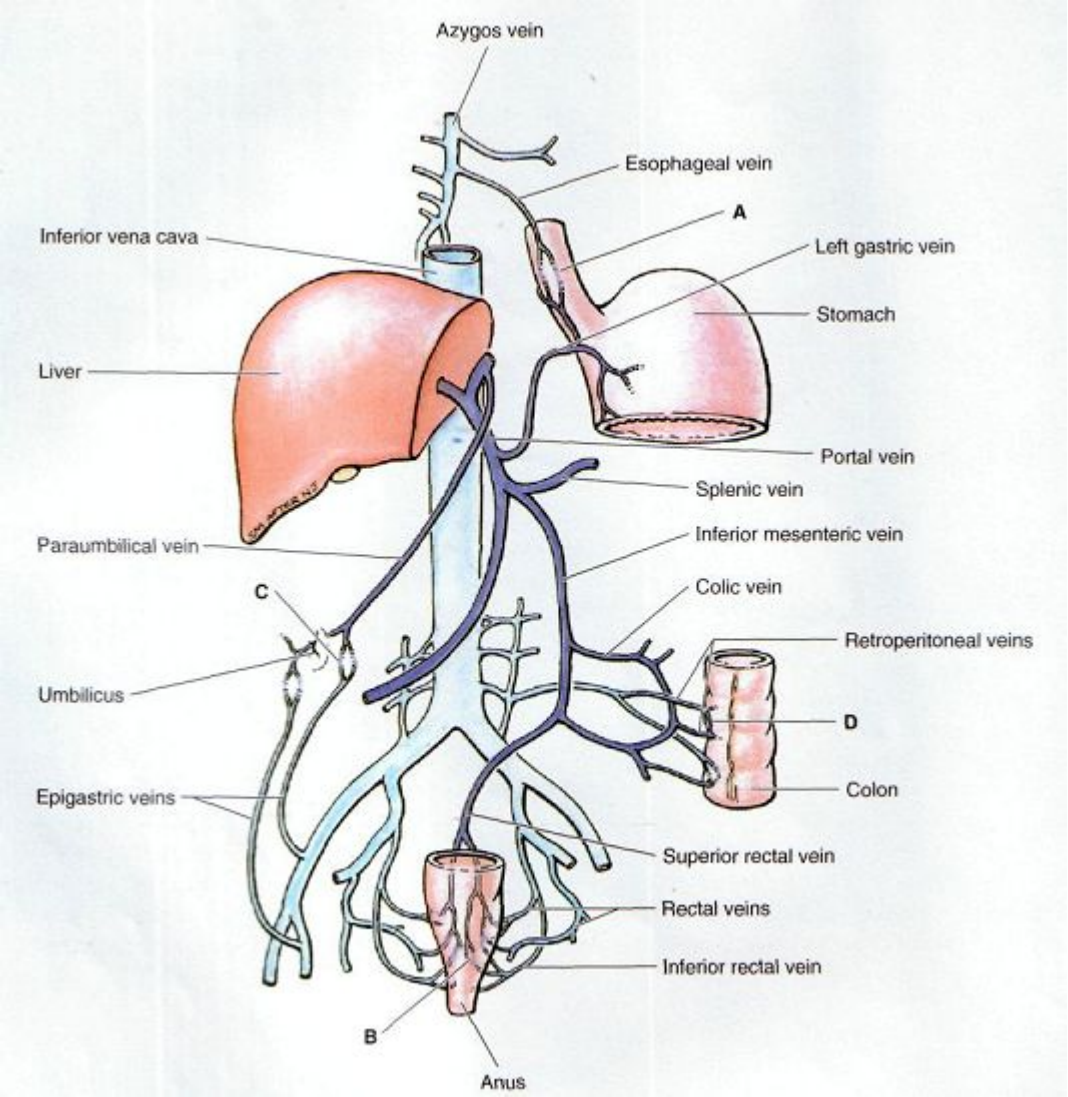


Figure 18–7 Liver structure showing hepatic lobule and hepatic cell. (Credit: Medical and Scientific Illustration.)

Porto-caval anastomoses

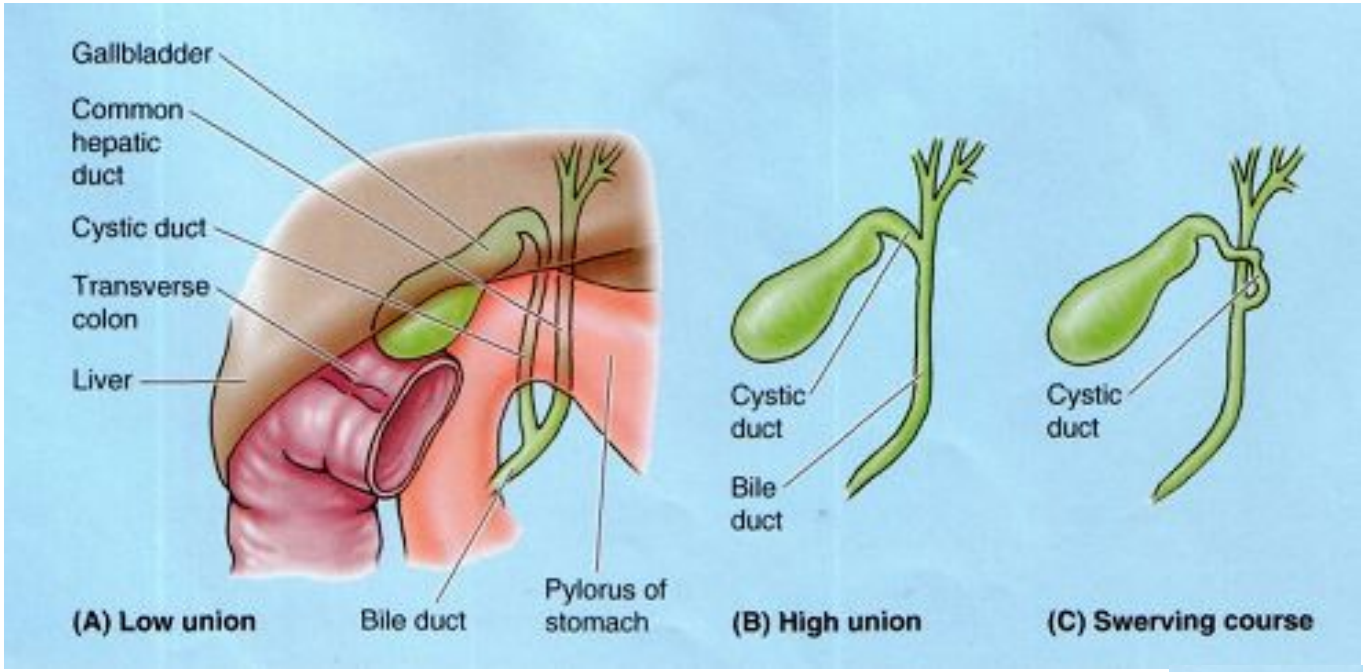


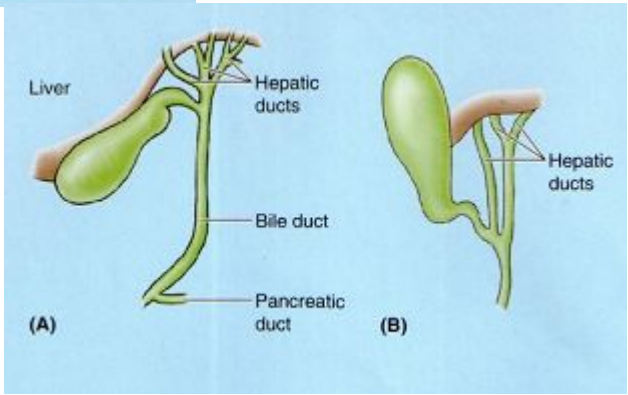
Caput Medusa

Varices on EGD

Varix Banding

Gall bladder





Arteries of the gall bladder

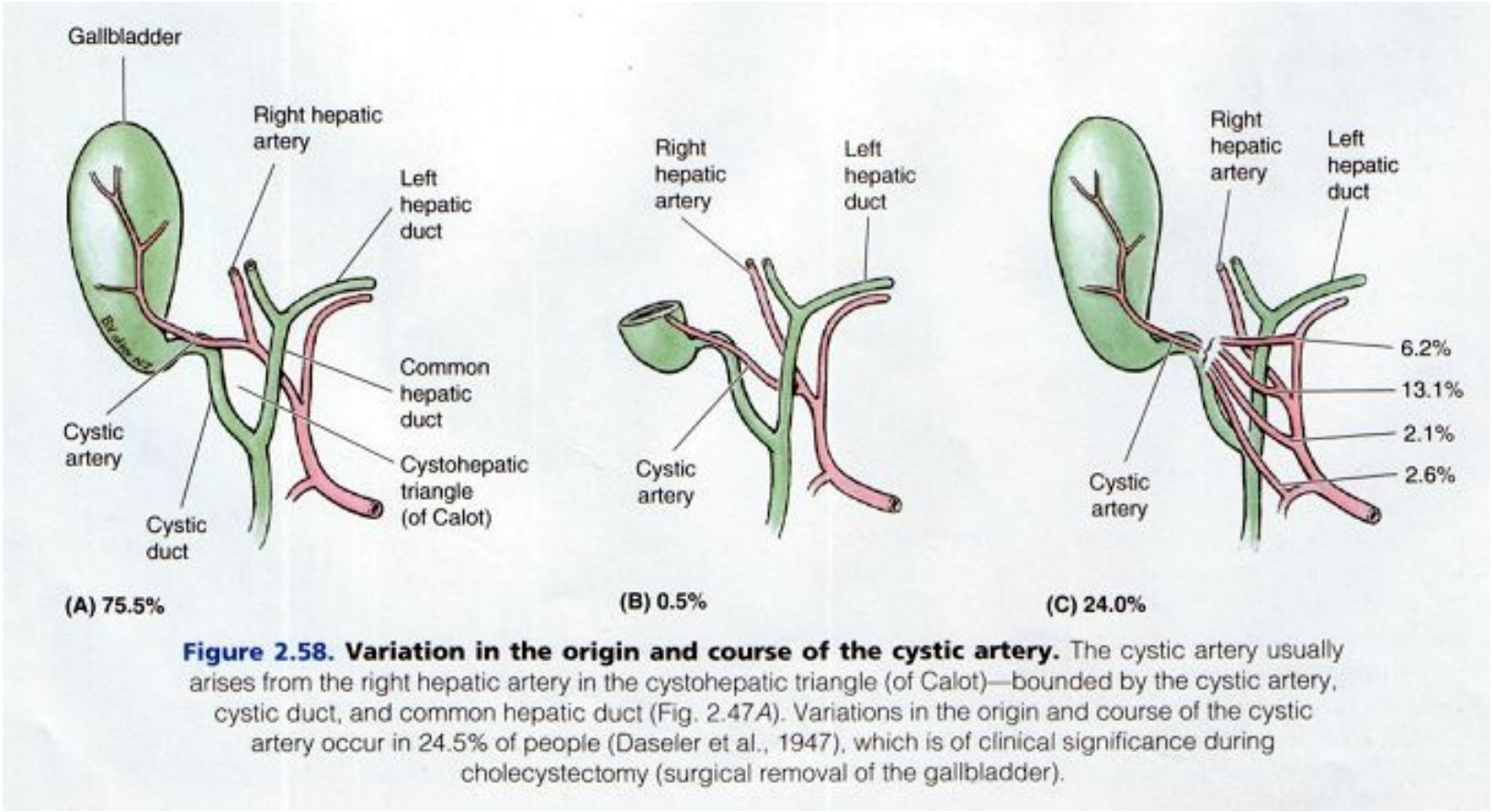
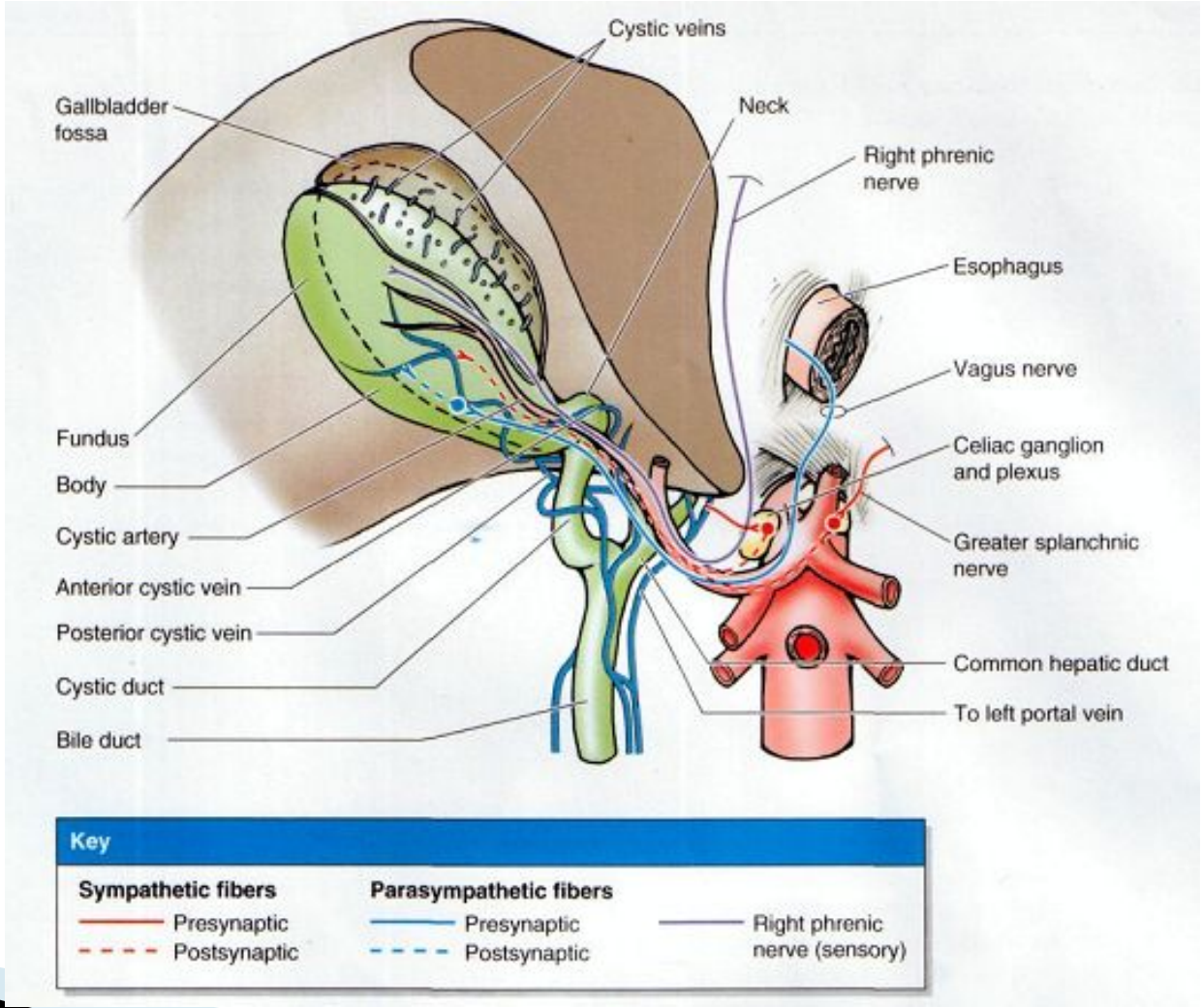
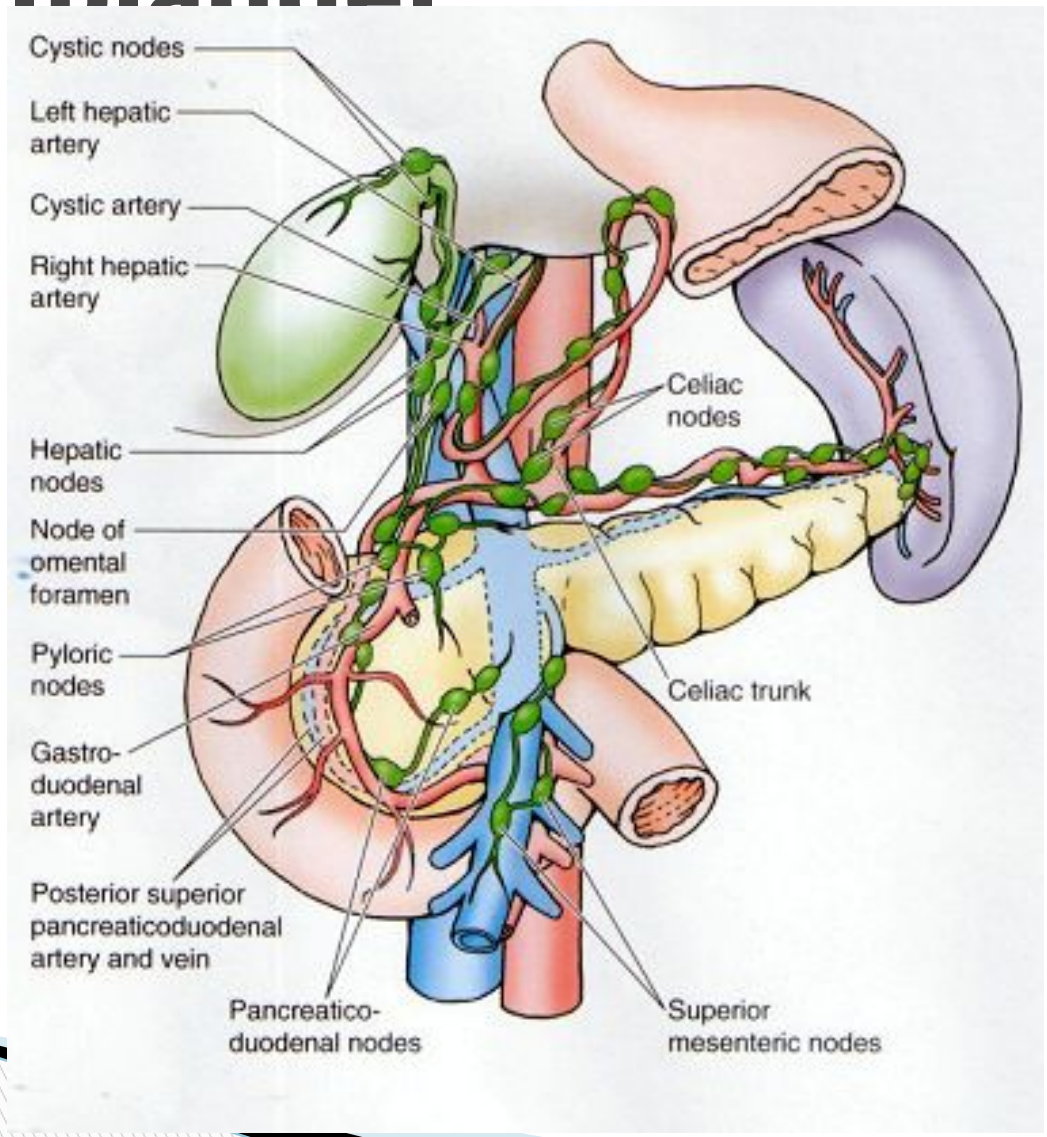


Figure 2.58. Variation in the origin and course of the cystic artery. The cystic artery usually arises from the right hepatic artery in the cystohepatic triangle (of Calot)—bounded by the cystic artery, cystic duct, and common hepatic duct (Fig. 2.47*A*). Variations in the origin and course of the cystic artery occur in 24.5% of people (Daseler et al., 1947), which is of clinical significance during cholecystectomy (surgical removal of the gallbladder).

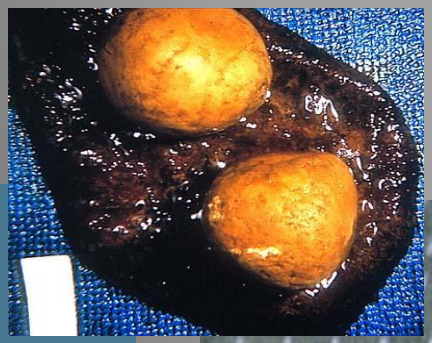
Innervation of gall bladder

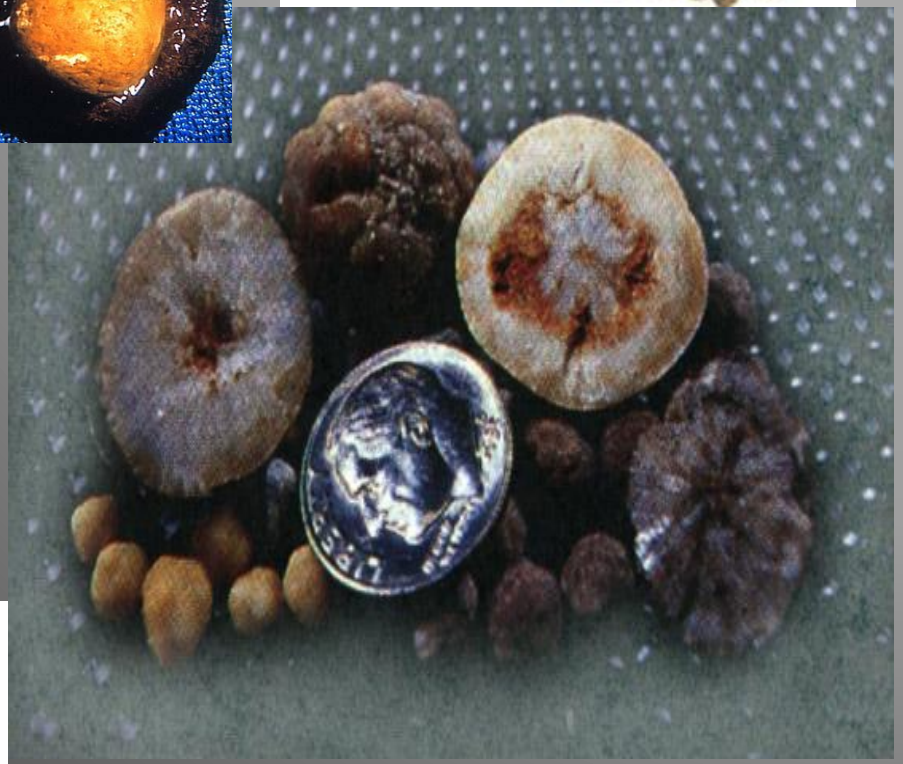


Lymphatic drainage of the gallbladder



Harvest Time



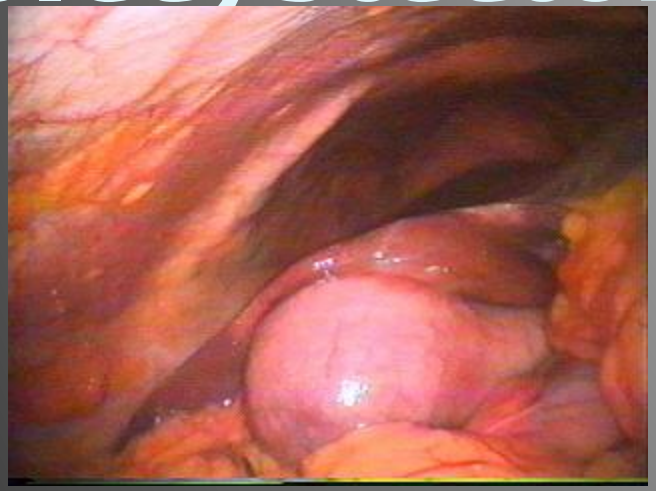


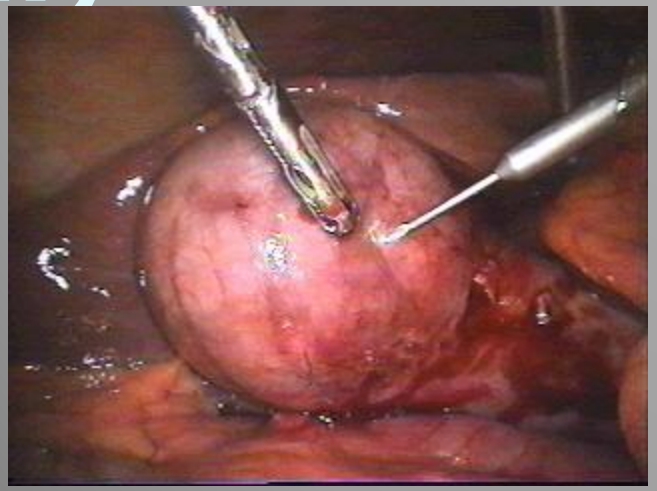
CT Scan

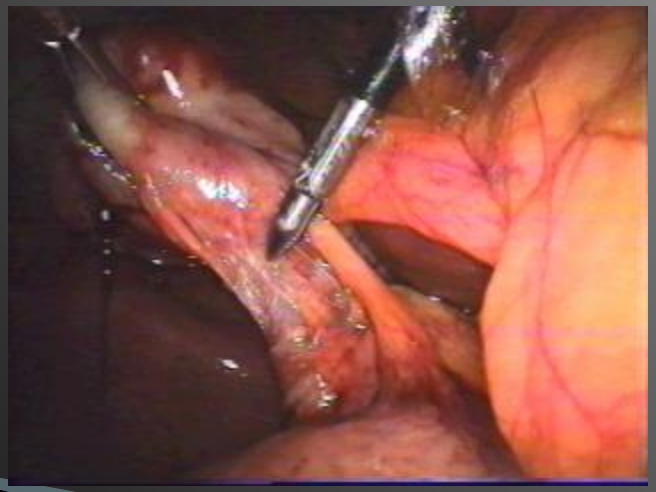
Plain Films

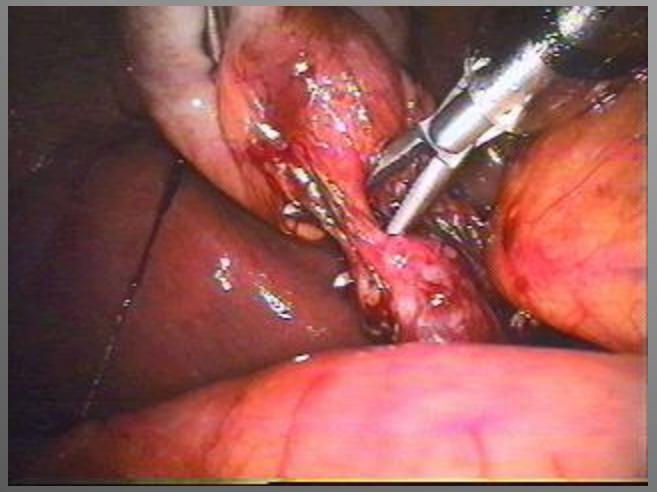
Ultrasound

Laparoscopic Cholecystectomy









cancer

Surgical Options

- Simple cholecystectomy
- Radical cholecystectomy
- Radical chole w/ anatomic liver resection
- Radical chole w/ Whipple