

Stomach:

ISHITA
KANODIA

→ widest & most distensible part of alimentary canal.

→ Functions: — reservoir of food

— formation of semifluid substance chyme

— gastric glands secrete HCl which destroy bacteria

— Castle intrinsic factor present in gastric juice helps in absorption of vitamin B₁₂.

Location: left hypochondriac, umbilical & epigastric regions

Shape: J-shaped

↳ Long axis passes downward, forward & to the right

Size & Capacity:

Length: 10 inches

Capacity: At birth = 30 mL (1 ounce)

At puberty = 1 L

In adults = 1.5 - 2 L

External Features:

→ 2 ends: cardiac & pyloric

→ 2 curvatures: greater & lesser

→ 2 surfaces: anterosuperior & posteroinferior.

Cardiac End: presents cardiac orifice at junction of lower

end of oesophagus & stomach

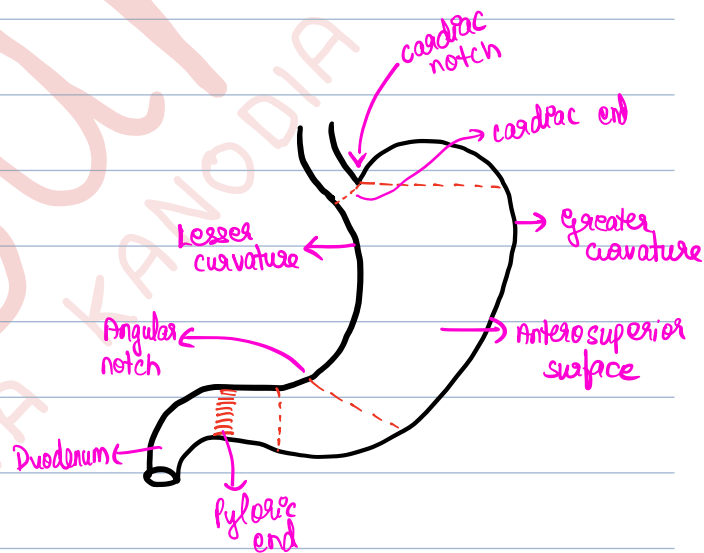
→ at level of T11

Pyloric End: presents pyloric orifice at junction between pyloric

end of stomach & 1st part of duodenum

→ level of L1 (transpyloric plane)

• Stomach is relatively fixed at both ends & mobile in between



Lesser curvature: concave

↳ short right border

→ most dependent part of this curvature -

angular notch/incisura angularis at the

junction of body & pyloric part

→ attached to lesser omentum.

Greater Curvature: convex; longer left border

↳ presents a cardiac notch which separates it from

left aspect of oesophagus.

→ provides attachment to greater omentum, gastrosplenic

& gastrophrenic ligaments.

Parts: Cardiac part (or cardia), Fundus, Body, Pyloric part.

Cardiac Part: part around cardiac orifice

Fundus: upper dome-shaped part of stomach

→ situated above horizontal plane drawn at level of cardiac notch

→ reaches 5th intercostal space just below nipple

∴ gastric pain sometimes imitates pain of angina pectoris.

Body: major part of stomach between fundus & pyloric antrum.

Pyloric part: funnel-shaped outflow region

↳ extends from angular notch to gastroduodenal junction

Pyloric antrum: proximal wide part

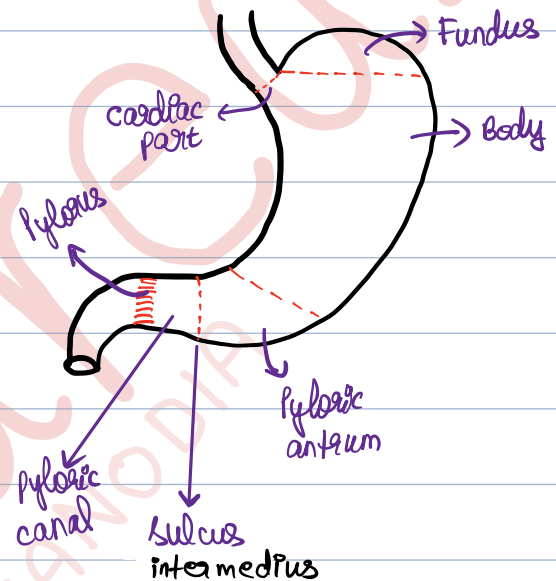
↳ separated from pyloric canal by sulcus intermedius

Pyloric canal: lies on head & neck of pancreas

Pylorus: distal most & sphincteric region of pyloric canal

↳ here, muscle fibers control discharge of stomach contents

through pyloric orifice into duodenum.



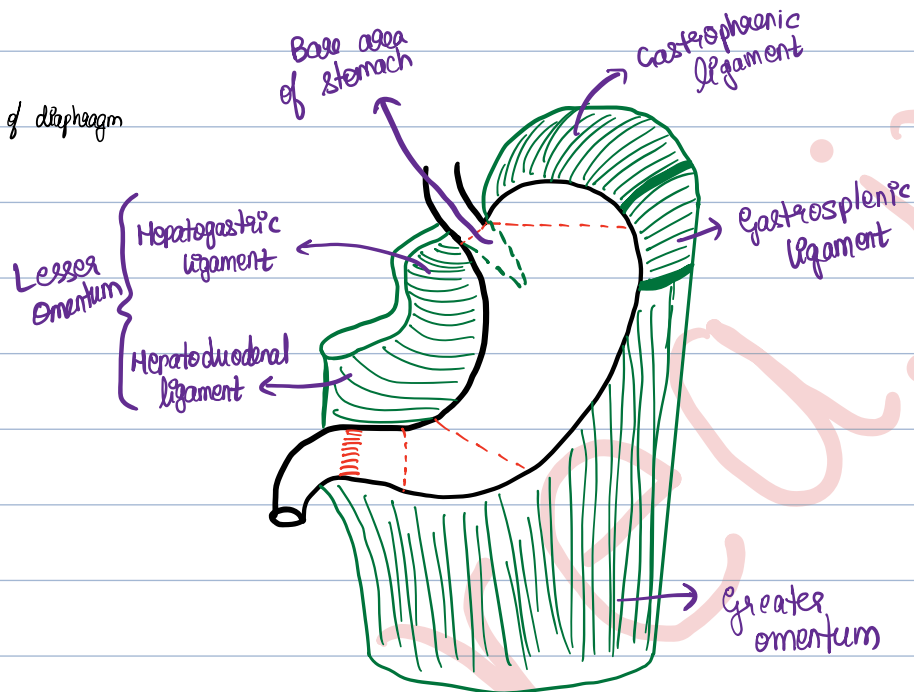
Peritoneal Relations:

→ base area of stomach is directly related to left crus of diaphragm

Visceral Relations:

Relations of anterosuperior surface:

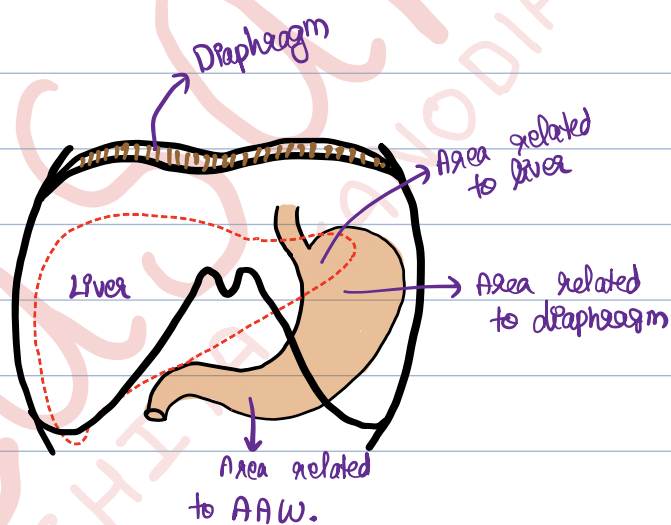
- (i) area related to left lobe of liver & quadrate lobe
- (ii) area related to diaphragm & rib cage
- (iii) area related to AAW.



Gastric triangle: bounded on:

- Left side by left costal margin
- Right side by lower border of liver
- Inferiorly by transverse colon
- In complete esophageal obstruction, gastrotomy is performed in the gastric triangle.

Relations of posteroinferior surface:

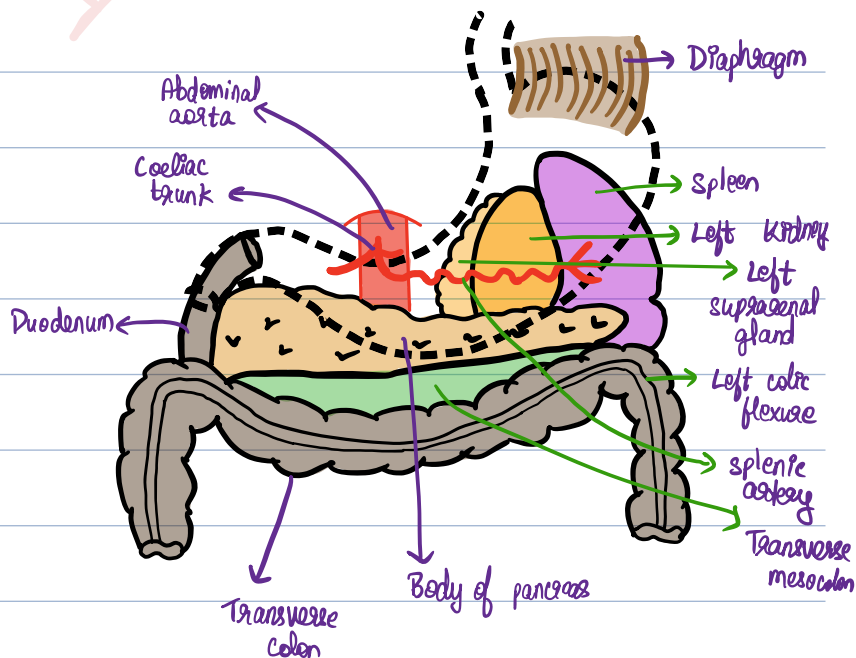


Stomach bed: - diaphragm

- splenic artery
- spleen
- splenic flexure of colon
- kidney (left)
- pancreas
- Mesocolon (transverse)

Dr. S3
kills
Patients
mercilessly.

→ all structures forming stomach bed are separated from stomach by lesser sac except spleen, which is separated from stomach by greater sac of peritoneum.



Microscopic Structure:

→ wall of stomach consists of 4 coats outside inwards:

- (i) serous coat
- (ii) muscular coat
- (iii) submucous coat
- (iv) mucous coat

Serous Coat: formed by peritoneum

Muscular Coat: made of 3 layers of unstriated muscles:

- (i) outer longitudinal
- (ii) middle circular
- (iii) inner oblique

→ circular muscle coat thickens at pylorus to form a ring of muscle called pyloric sphincter.

→ major sphincteric component is derived from circular muscle layer

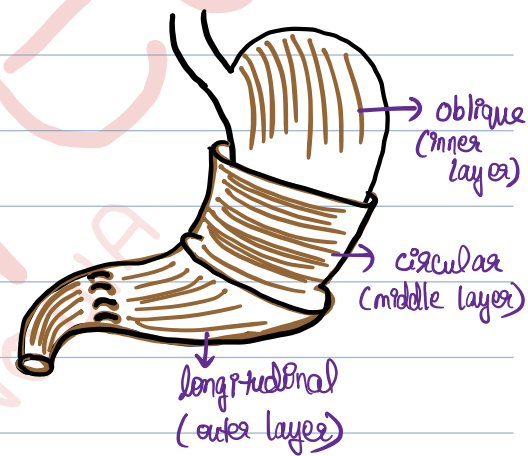
→ minor dilator component is from longitudinal muscle coat.

Submucous Coat: loose areolar tissue

Mucous Membrane: thick ; has temporary folds (rugae) which disappear when stomach is distended

→ lined by simple columnar epithelium with tubular glands

- glands in cardiac region secrete mucus
- glands in fundus & body contain neck cells which secrete mucus, parietal/oxyntric cells secrete HCl & gastric intrinsic factor & chief cells which secrete pepsinogen.
- glands in pyloric region secrete mucus.



Interior of Stomach:

Gastric folds / Rugae: longitudinal folds along lesser curvature

→ Irregular folds in remaining part

→ rugae are flattened when stomach is distended.

Gastric pits: small depressions on the mucosal surface in which gastric glands open.

Gastric Canal (or Magenstrasse): longitudinal furrow formed temporarily during swallowing.

→ along lesser curvature

→ forms due to firm attachment of gastric mucosa to underlying muscle layer which does not have an oblique muscle coat at this site.

→ allows rapid passage of swallowed liquids along lesser curvature to lower part before it spreads to other parts

∴ lesser curvature is subject to maximum insult of swallowed spicy foods & irritant liquids which makes it vulnerable to gastric ulceration.

(Interior of stomach can be directly examined by an endoscope)

Arterial Supply:

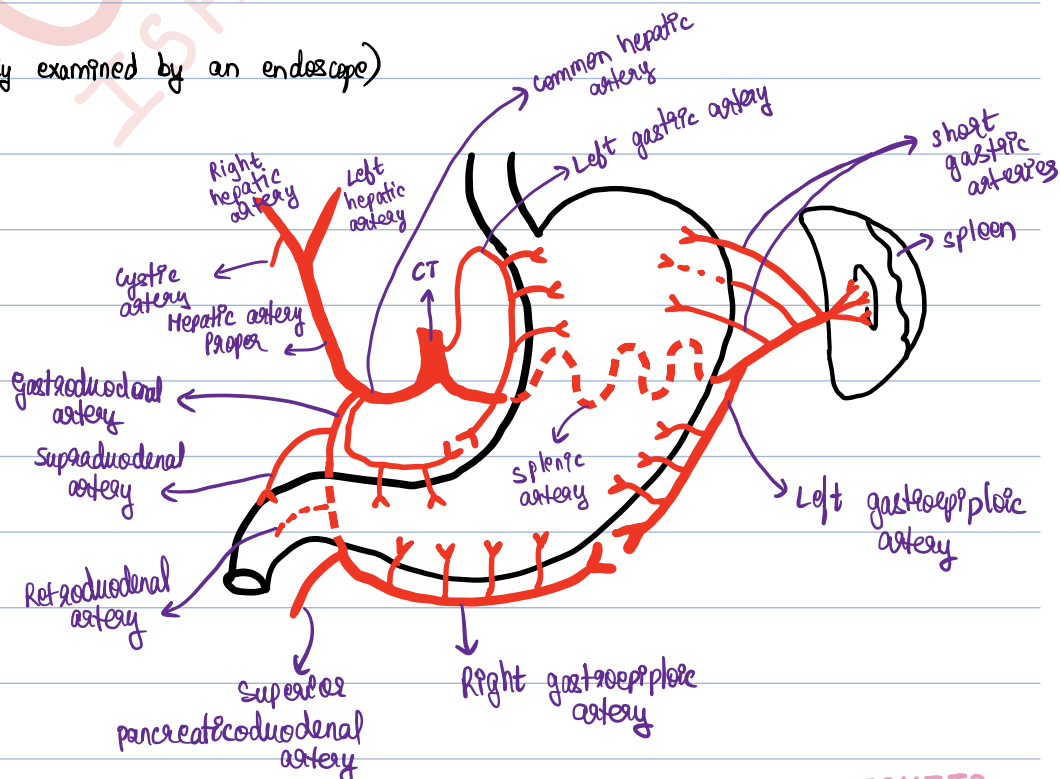
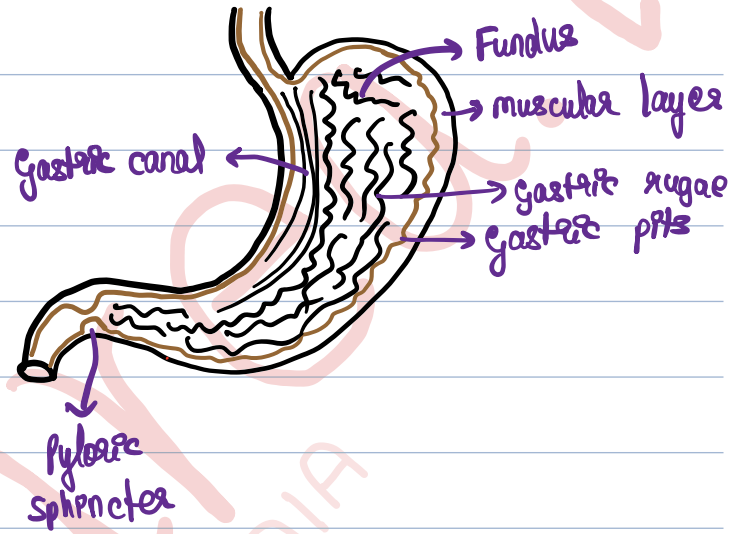
→ left gastric artery

→ right gastric artery

→ Left gastroepiploic artery

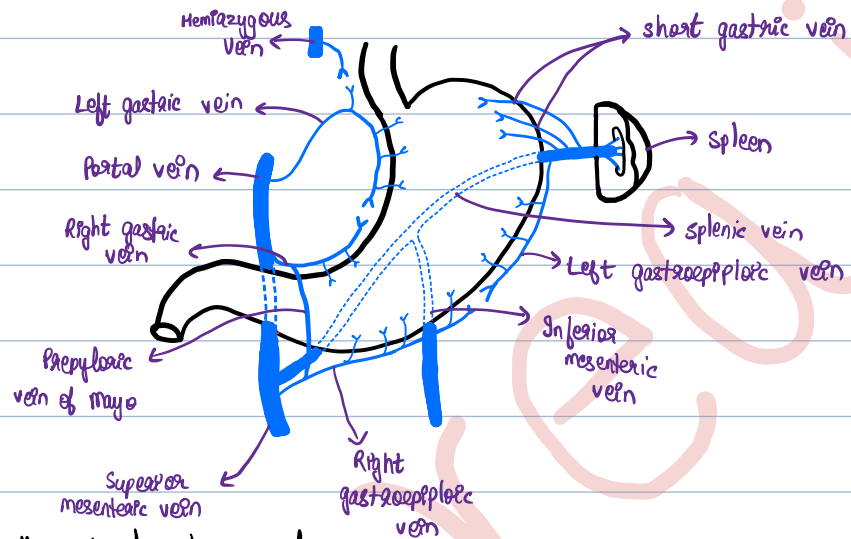
→ Right gastroepiploic artery

→ Short gastric arteries (5-7)



Venous Drainage:

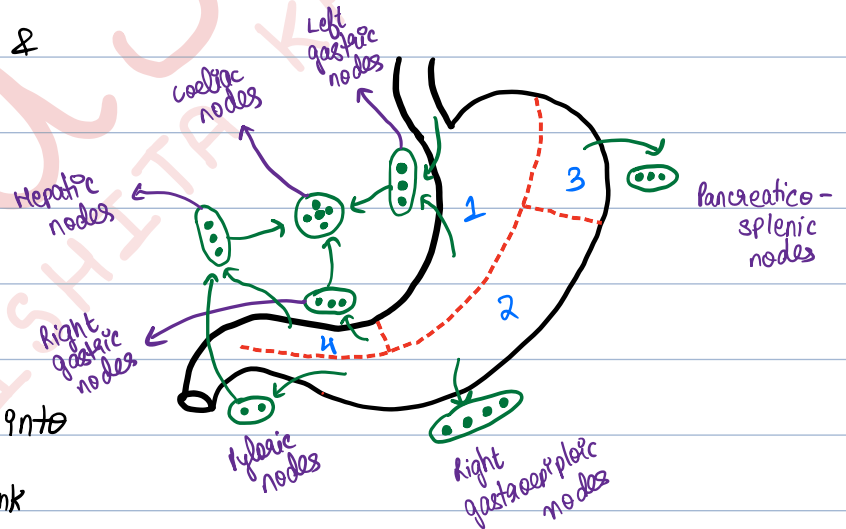
- left gastric vein
- right gastric vein
- Left gastroepiploic vein
- Right gastroepiploic vein
- short gastric veins



Lymphatic Drainage:

- carcinoma of stomach spreads through lymph vessels
- 4 lymphatic territories in stomach:
 - Area 1: left gastric lymph nodes
 - Area 2: carcinoma most frequently occurs in this area
 - ↳ right gastroepiploic lymph nodes &
 - pyloric lymph nodes
 - Area 3: pancreaticosplenic lymph nodes
 - Area 4: → right gastric nodes
 - hepatic nodes

All these lymph node groups drain into
coeliac nodes → intestinal lymph trunk
↓
cisterna chyli.



Nerve Supply:

Sympathetic: T6 - T10

- vasomotor to stomach
- motor to pyloric sphincter
- inhibitory to remaining gastric musculature
- chief pathway for pain sensation from stomach

Parasympathetic: vagus nerves

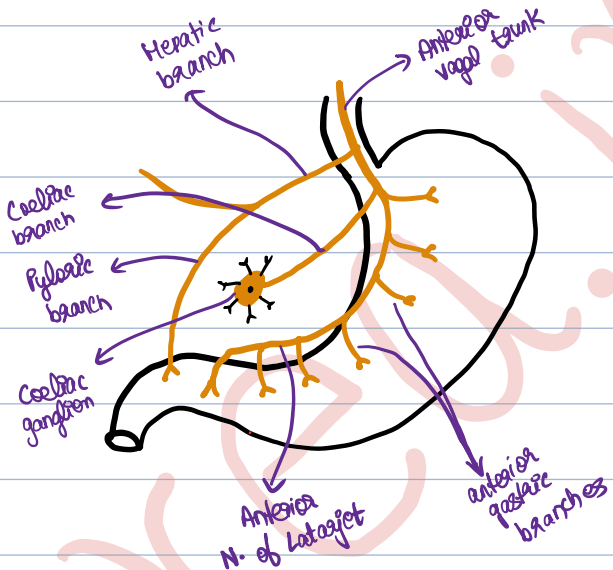
→ At gastro-oesophageal (G.E) junction, left vagus N.

largely becomes anterior vagal trunk & right

vagus N. largely becomes posterior vagal trunk.

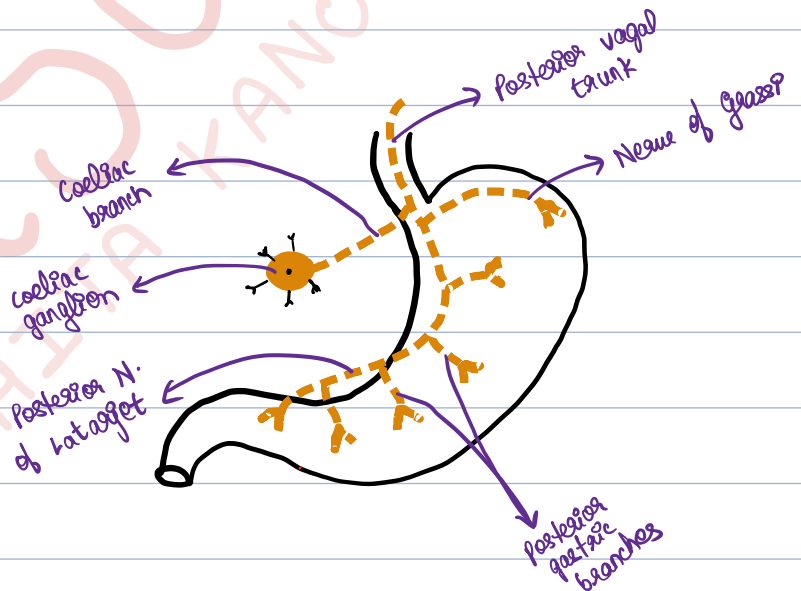
Anterior vagal trunk: 3 branches

- Hepatic branches
- Coeliac branch
- Anterior nerve of Latafet.



Posterior Vagal Trunk: 3 branches

- Coeliac branch
- Nerve of Grassi
- Posterior nerve of Latarjet.



→ Vagus N. controls secretion of acid by parietal cells

∴ excessive acid secretion is main cause of peptic ulcers, section of vagal trunks (vagotomy) as they enter abdomen is carried out to reduce production of acid.

Applied Aspect:

Gastric carcinoma: → commonly occurs in region of pyloric antrum along greater curvature

→ cancer spreads by lymph vessels to left supraclavicular lymph nodes

→ enlarged & palpable left supraclavicular node (Virchow's node) may be the first sign of gastric cancer (Troisier's sign)

→ cancer cells reach left supraclavicular lymph nodes through thoracic duct.

Vagotomy (surgical procedure of cutting the vagus Ns.):

→ done to cure chronic duodenal ulcers.

* Truncal Vagotomy: anterior & posterior vagal trunks are cut at lower end of oesophagus (above origin of hepatic & coeliac branches).

* Selective Vagotomy: both vagal trunks are cut below origin of hepatic & coeliac branches

* - cause defect in gastric emptying

Highly selective Vagotomy: only parietal cells of stomach are denervated by cutting anterior & posterior gastric branches of nerves of Latarjet

→ Nerves of Latarjet & their antial branches are preserved

∴ gastric emptying remains normal.

Gastric Pain: usually referred to epigastric region ∵ stomach is supplied by T6-T10.

Spleen: largest lymphoid organ

ISHITA
KANODIA

Functions: - filter blood by removing worn-out RBCs.

- produce RBCs in fetal life & lymphocytes after birth
- provide immunity by producing IgM.
- store RBCs & release them into circulation when required

Location: left hypochondrium; between fundus of stomach & diaphragm

↳ behind mid-axillary line

→ opposite 9th, 10th, 11th ribs

→ its long axis is parallel to long axis of 10th rib

→ moves a bit during respiration

Size, Shape: wedge-shaped

→ purple colour

→ size of a fist

Thickness: 1 inch

Breadth: 3 inch

Length: 5 inch

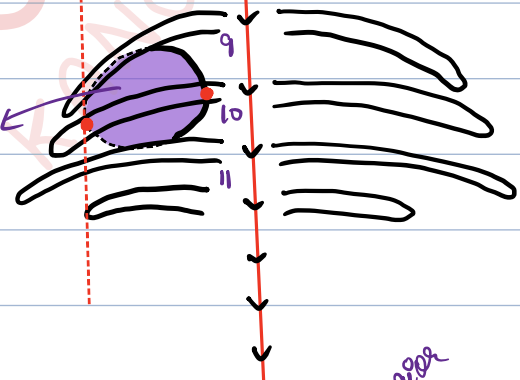
Weight: 7 oz

Related ribs: 9-11

Harris' dictum
of
odd
numbers

midaxillary line

Spleen



External Features: 2 ends (anterior, posterior)

- 3 borders (superior, inferior, intermediate)
- 2 surfaces (diaphragmatic, visceral)

Anterior/Lateral/Lower End: broad ⇒ more like a border

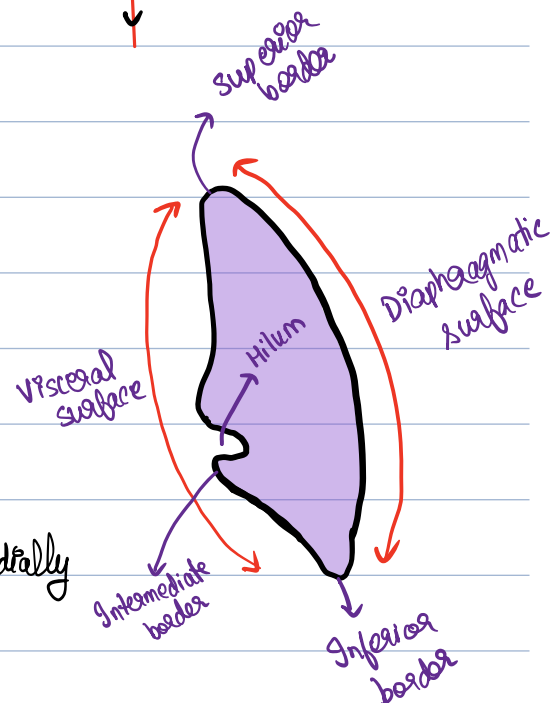
↳ directed downwards, forward, laterally

→ related to - left colic flexure in front

- phrenicocolic ligament below

Posterior/medial/upper End: blunt; directed upward, backward, medially

↳ related to upper pole of left kidney



Superior Border: thin, convex

↳ separates visceral & diaphragmatic surfaces

→ presents 1 or 2 notches near anterior end

(notches indicate lobular development of spleen)

Inferior Border: rounded; separates visceral & diaphragmatic surfaces

Intermediate Border: rounded; separates gastric impression from renal impression

Diaphragmatic Surface: smooth, convex

Visceral surface: • gastric impression ⇒ fundus of stomach

↳ between superior & intermediate borders

• Renal impression ⇒ left kidney

↳ between intermediate & inferior borders

• Colic impression ⇒ left colic flexure

• pancreatic impression (occasional) ⇒ tail of pancreas

Positional Relations: completely enclosed in peritoneum except at hilum from

where 2 peritoneal folds extend — one to stomach & other to left kidney (gastrosplenic, lienorenal ligaments)

Gastrosplenic Ligament: from hilum of spleen to upper $\frac{1}{3}$ of greater curvature

↳ contains short gastric vessels

Lienorenal Ligament: from hilum of spleen to anterior surface of left kidney

↳ contains — tail of pancreas

— splenic vessels

Visceral Relations: — fundus of stomach

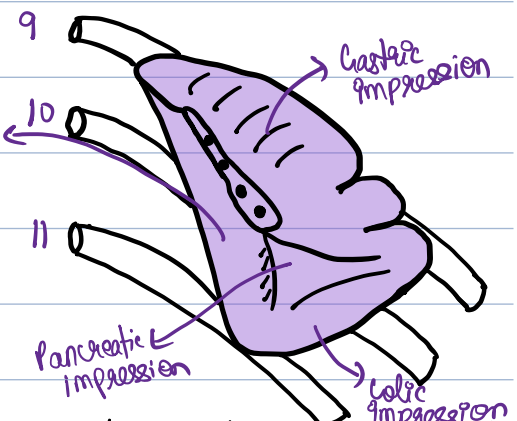
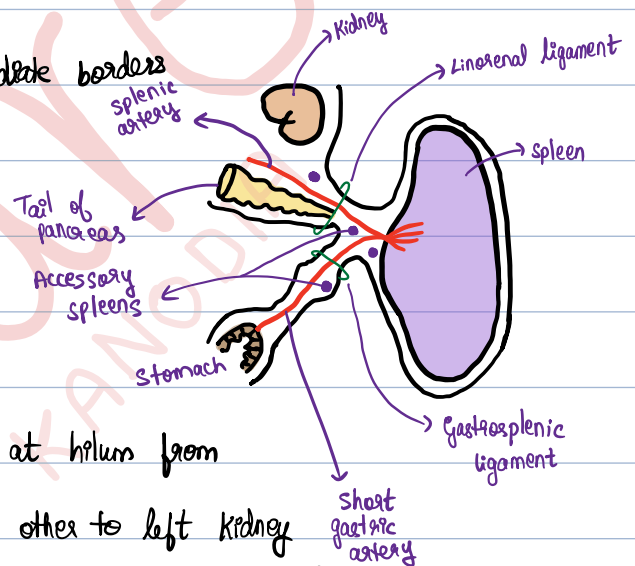
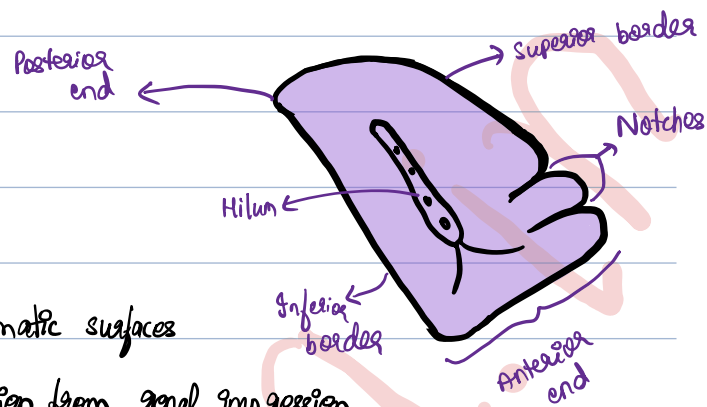
— anterior surface of left kidney

— Left colic flexure

— tail of pancreas

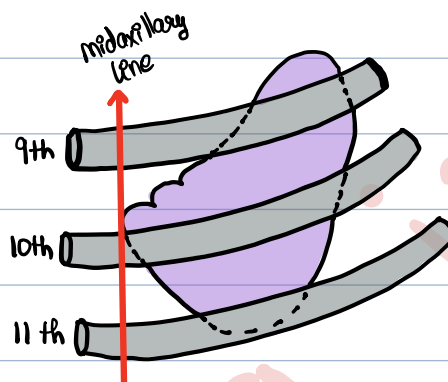
visceral surface

→ Diaphragmatic surface is related to diaphragm which separates it from costophrenic recess of pleura, lung & 9 to 11 ribs.



Arterial supply: splenic artery

↓
largest branch of coeliac trunk
↓
traverses through lienorenal ligament
↓
remarkably tortuous

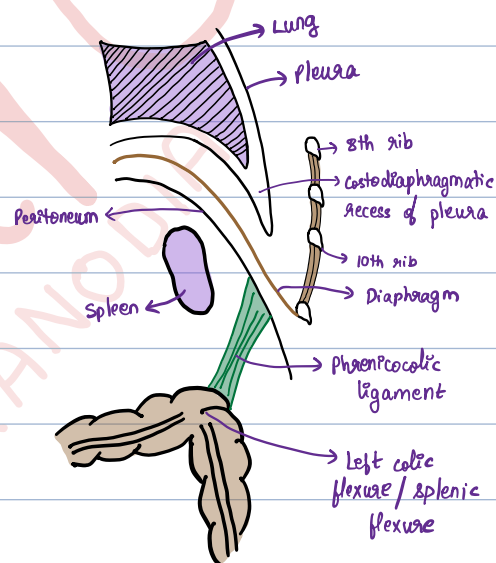


Diffuse spleen: terminal branches of splenic artery are long & arise far away from hilum

Compact spleen: terminal " " " " " small " " close to hilum.

Venous Drainage: splenic vein

- ↳ runs a straight course from left to right behind pancreas
- behind neck of pancreas, it joins superior mesenteric vein to form portal vein.
- Tributaries - short gastric veins
 - left gastroepiploic vein
 - inferior mesenteric vein
 - pancreatic veins



Lymphatic Drainage: splenic tissue proper has no lymphatics

↳ tissue fluid freely enters sinusoids

Nerve supply: sympathetic fibres derived from coeliac plexus (vasomotor to blood vessels)

Segments of spleen: splenic artery within the spleen gives 2 branches - superior & inferior

→ these branches do not anastomose & each branch supplies its own segment

∴ an avascular plane perpendicular to long axis of the spleen exists.

Development: spleen develops between 2 layers of upper part of dorsal mesogastrium from a number of condensations of mesenchymal cells

→ these separate masses of mesenchymal cells (called splenunculi) fuse together to form lobulated spleen.

Accessory spleens: failure of fusion of splenunculi results in formation of accessory spleens

↳ usually found in the derivatives of dorsal mesogastrium - gastrosplenic ligament, lienorenal ligament, greater omentum.

→ rarely formed in left spermatic cord & in broad ligament of uterus (left side).

Applied Aspect:

Palpation of spleen: normal spleen is not palpable

Splenomegaly: enlargement of spleen

↳ causes - malaria, cirrhosis of liver, CML (chronic myeloid leukaemia), kala-azar.

→ very large spleen project downward & medially towards right iliac fossa in the direction of axis of both ribs
(prevented from falling/extending into left paracolic gutter by phrenocolic ligament)

Splenectomy: surgical removal of spleen when spleen is ruptured or inadvertently nicked at operation

→ if accessory splens are located in splenic pedicle, they should also be removed.

→ removal of spleen does not impair immune response seriously.

Rupture of spleen: spleen is most frequently ruptured organ in the abdomen following severe external blow.

→ pain is referred to left shoulder due to irritation of left dome of diaphragm by splenic blood



Kehr's sign.

