SPLEEN , PANCREAS, LIVER

DESCRIBE THE SPLEEN UNDER THE FOLLOWING HEADINGS(LE)

a) **SITUATION, SIZE AND SHAPE**
b) **BORDERS AND SURFACES**
c) **PERITONEAL AND VISCERAL RELATIONS**
d) **LIGAMENTS**
e) **BLOOD SUPPLY**
f) **DEVELOPMENT**
g) **MICROSCOPIC STRUCTURE**
h) **FUNCTIONS**
i) **APPLIED ANATOMY**

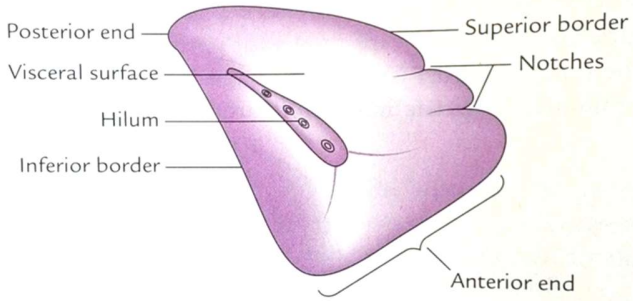


Fig. 7.17 External features of the spleen.

Spleen is a lymphatic organ connected to blood vascular system .It acts as a filter for blood and plays an important role in Immune responses of body .

Situation

It is situated in the Left hypochondrium and partly in epigastrium .

Size

It is a wedge shaped organ and is wedged between the stomach and diaphragm.
Spleen is 1 inch thick, 3 inches broad, 5 inches long 7 ounces in weight and related to 9 – 11 ribs.
1,3,5,7,9,11 – Harris dictum of odd numbers(summarises the splenic statistics)

Shape

spleen is tetrahedral.

Position

spleen lies obliquely along the long axis of 10^{th} rib
It is directed- downwards, forwards and laterally.

Borders and surfaces-

Spleen has - 2 ends, 3 borders and 2 surfaces.

Anterior end

expanded, directed downwards, forwards and reaches midaxillary line.

Posterior end

rounded, directed upwards, backwards and medially. Rests on upper pole of left kidney

Superior border

notched at anterior end

Inferior border

rounded

Intermediate border

rounded, directed to right

Surfaces

Diaphragmatic surface

convex and smooth.

It is related to diaphragm which seperates the spleen from costodiaphragmatic recess of pleura, lung and 9th, 10th and 11th ribs.

Visceral surface

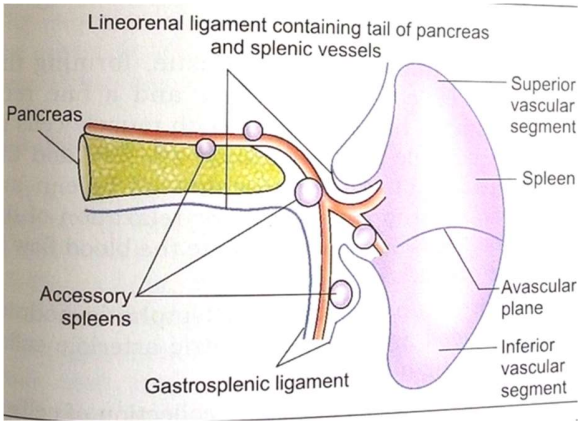
concave , irregular

Impressions on visceral surface:

Gastric –for fundus of stomach, largest impression on spleen

Renal –for L kidney

Colic –for splenic flexure of colon



Ligaments of spleen

Spleen is surrounded by peritoneum and suspended by:-

Gastrosplenic ligament- extends from hilum of spleen to greater curvature of stomach

It contains short gastric vessels, lymphatics and sympathetic nerves

Lienorenal ligament - extends from hilum of spleen to anterior surface of left kidney. It contains the tail of pancreas, splenic vessels, pancreaticosplenic lymphnodes, lymphatics and sympathetic nerves.

Phrenicocolic ligament – is not attached to spleen but supports its anterior end. It extends from splenic flexure of colon to the diaphragm opposite to 11^{th} rib in the midaxillary line.

Blood supply

Arterial supply

Spleen is supplied by Splenic artery- largest branch of coeliac trunk
The artery is tortuous in its course to allow for movements of the spleen.
It passes through lienorenal ligament, reaches the hilum and divides into 5 or more branches to supply it.

Venous drainage

Splenic vein is formed at hilum of spleen . it joins with superior mesentric vein behind the neck of pancreas to form the portal vein.

Development

Spleen develops in the mesoderm of dorsal mesogastrium during the 6^{th} wk of intrauterine life into a number of nodules. The nodules fuse to form a lobulated spleen.
Notching of spleen is an evidence of its multiple origin.

Microscopic structure

Functions

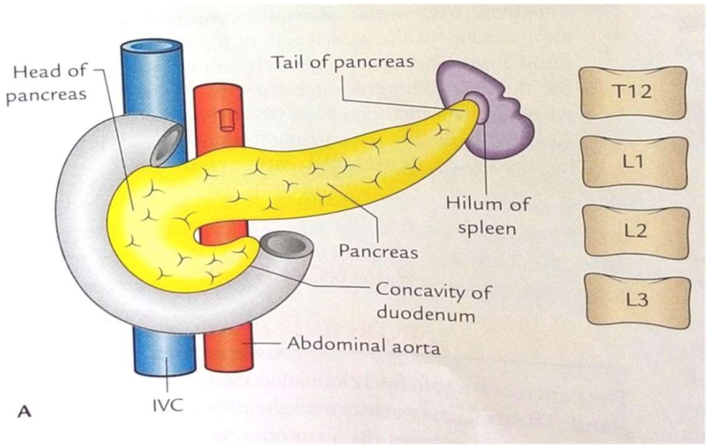
Phagocytosis – of cell debris and old RBCs
Haemopoiesis – during foetal life
Immune responses
Storage of RBC

Applied anatomy

A normal spleen is not palpable. 2-3 times enlarged spleen is palpable under L costal margin
Enlarged spleen is called splenomegaly- occurs in malaria, cirrhosis of liver etc.
Spleen is the most frequently ruptured organ in the abdomen following external trauma.

DESCRIBE PANCREAS UNDER FOLLOWING HEADINGS

a) **POSITION**
b) **PARTS**
c) **PERITONEAL AND VISCERAL RELATIONS**
d) **DUCTS**
e) **BLOOD SUPPLY**
f) **LYMPHATIC DRAINAGE**
g) **DEVELOPMENT**
h) **MICROSCOPIC ANATOMY**
i) **APPLIED ANATOMY**



The pancreas is a gland that is partly exocrine and partly endocrine. It secretes pancreatic juice and certain hormones.

Position

Lies transversely across the posterior abdominal wall at the level of L1 and L2 vertebra.
Shape - J shaped or retort shaped.
15 – 20 cm long

Parts

Pancreas is divided into head , neck, body and tail

Peritoneal and visceral relations

Head of pancreas has
3 borders
superior - related to superior pancreatico duodenal artery
Inferior – related to inferior pancreatico duodenal artery
Right lateral – 2nd part of duodenum, terminal part of bile duct.

2 surfaces

Anterior surface - related to

Duodenum -1st part

Transverse colon

Jejunum

Posterior surface – related to

Inferior venacava

Renal veins- terminal part

R crus of diaphragm

Bile duct

1 process- uncinate process – related

anteriorly to superior mesenteric vessels

posteriorly to aorta

Neck of pancreas

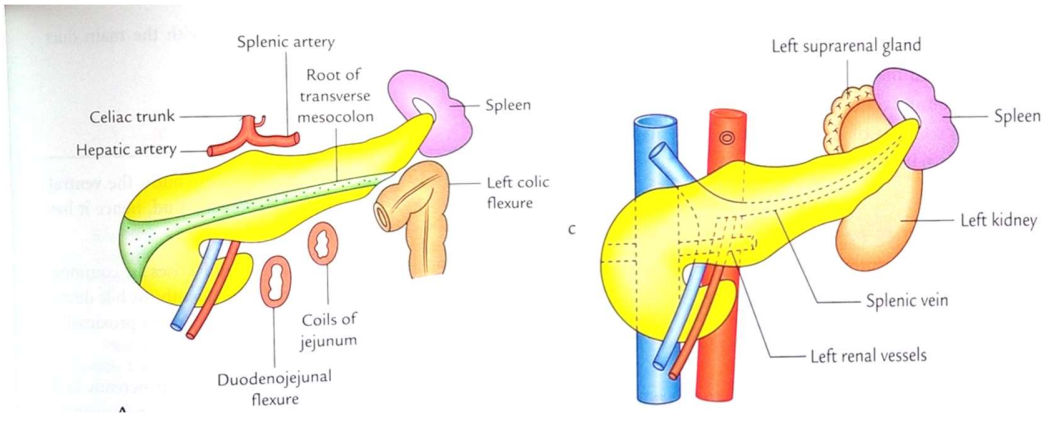
It is the constricted part of pancreas

2 surfaces- anterior

posterior

Anterior surface- is related to peritoneum covering the wall of lesser sac and Pylorus

Posterior surface is related to the termination of superior mesenteric vein and beginning of portal vein.



Body of pancreas

It is elongated and passes towards the left.

It is triangular in cross section

3 borders

Anterior - gives attachment to transverse mesocolon

Superior - related to coeliac trunk , hepatic artery and splenic artery

Inferior- superior mesenteric vessels

3 surfaces

Anterior surface – concave, covered by peritoneum, related to lesser sac

Posterior surface- devoid of peritoneum and is related to

Aorta with the origin of superior mesentric artery origin
Left crus of diaphragm
Left Suprarenal gland
Left Kidney
Left Renal vessels
Splenic vein

Inferior surface- covered by peritoneum, related to duodenojejunal flexure, jejunum and Left colic flexure.

Tail of pancreas - Lies in lienorenal ligament with splenic vessels

It comes into contact with the lower part of gastric surface of spleen.

Ducts

Pancreas is drained by 2 ducts- main pancreatic duct
- accessory duct

The main pancreatic duct of Wirsung – lies at posterior surface of pancreas

Begins at tail, runs towards right through body, bends at neck and runs to head of pancreas.

It recieves tributaries which join at right angles forming – herring bone pattern.

Within the head of pancreas the pancreatic duct is related to bile duct on its right side.

Both the ducts enter the 2nd part of duodenal wall- form hepatopancreatic ampulla of vater – opens at major duodenal papilla.

Acessory pancreatic duct of santorini - begins at lower part of head, crosses front of main duct – opens into minor duodenal papilla in duodenum.

Blood supply

Arterial supply

a) Pancreatic branches of splenic artery
b) Superior pancreatico duodenal artery
c) inferior pancreatico duodenal artery

Venous drainage

Splenic ,
Superior mesentric and
Portal veins

Lymphatic drainage

Pancreatico splenic ,
Coeliac and
Superior mesentric groups of lymph nodes.

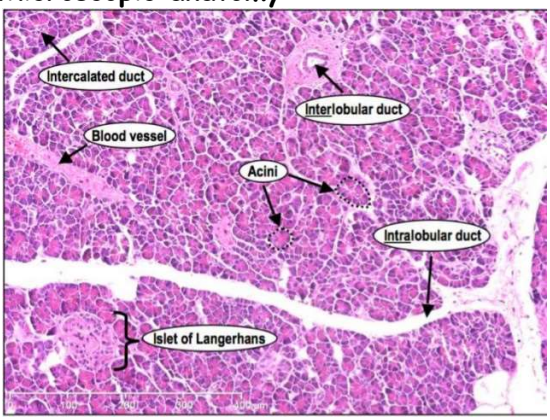
Development

Pancreas arises as a larger dorsal bud and and a smaller ventral bud. These fuse to form the pancreas.

Ventral bud forms uncinate process and inferior part of head of pancreas

Dorsal bud forms part of head , neck , body and tail of pancreas.

Microscopic anatomy



Applied anatomy

Annular pancreas- is a developmental anomaly in which a ring of pancreatic tissue encircles the 2nd part of duodenum.

Acute pancreatitis – is acute inflammation of pancreas due to obstruction of pancreatic duct.

PORTA HEPATIS(SE)

Porta Hepatis

Transverse non peritoneal fissure on the inferior surface of liver

Acts as gateway of liver

Situation & Extent:

from the neck of gallbladder to the fissures for ligamentum teres and venosum

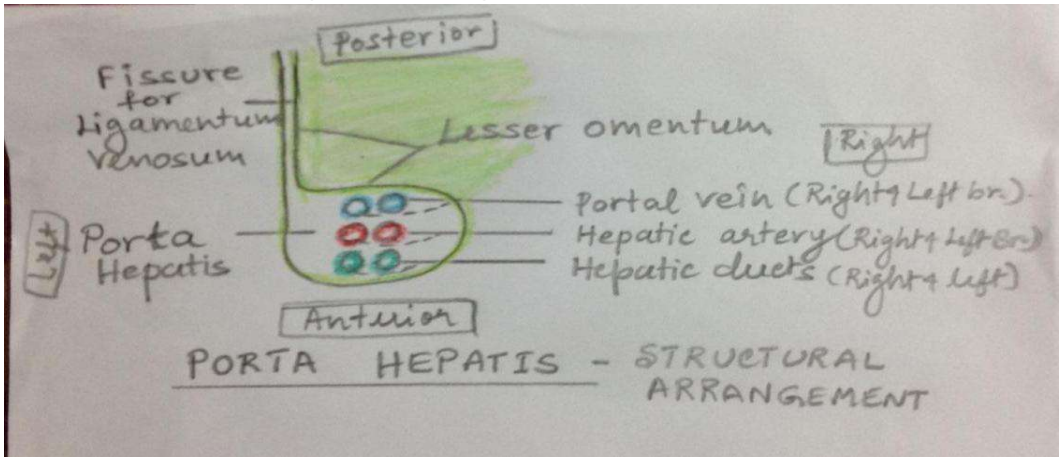
Situated posterior to quadrate lobe

Relation:

It is a nonperitoneal area

The lips of porta hepatis give attachment to the lesser omentum

Along the right margin of porta hepatis, both the layers of lesser omentum are continuous to form right free margin



Structures passing through porta hepatis:
(Anterior to posterior)
Right and left hepatic ducts
Right and left branches of hepatic artery
Right and left division of portal vein

SPLEEN- SITUATION, SURFACES(VISCERAL), RELATIONS, BLOOD SUPPLY(SE)

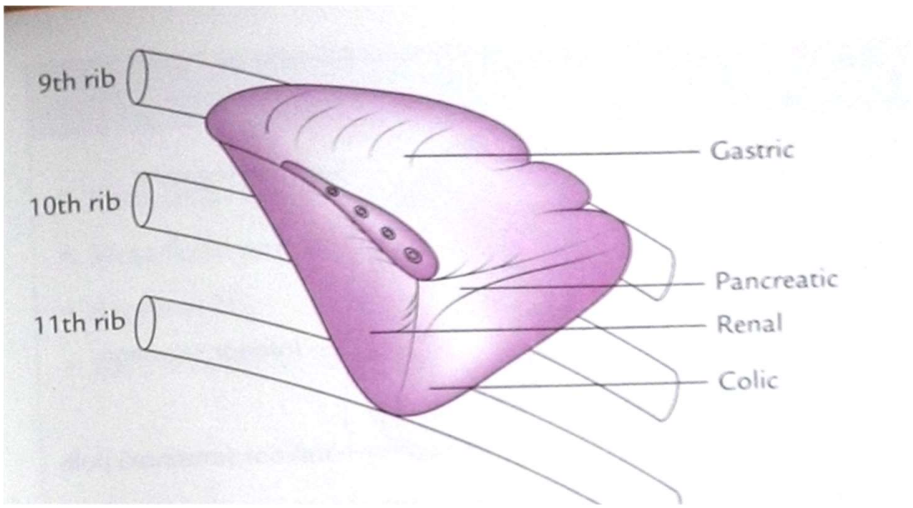
Spleen is a lymphatic organ connected to blood vascular system .It acts as a filter for blood and plays an important role in Immune responses of body .

Situation –

It is situated in the Left hypochondrium and partly in epigastrium .

Position- spleen lies obliquely along the long axis of 10^{th} rib

It is directed- downwards, forwards and laterally.



Borders and surfaces

Spleen has - 2 ends, 3 borders and 2 surfaces.

Anterior end- expanded, directed downwards, forwards and reaches midaxillary line.

Posterior end – rounded, directed upwards, backwards and medially. Rests on upper pole of left kidney

Superior border – notched at anterior end
Inferior border – rounded
Intermediate border- rounded, directed to right
Surfaces
Diaphragmatic surface- convex and smooth.
It is related to diaphragm which seperates the spleen from costodiaphragmatic recess of pleura, lung and 9th, 10th and 11th ribs
Visceral surface – concave , irregular
Impressions on visceral surface:
Gastric –for fundus of stomach, largest impression on spleen
Renal –for L kidney
Colic –for splenic flexure of colon
Pancreatic –for tail of pancreas

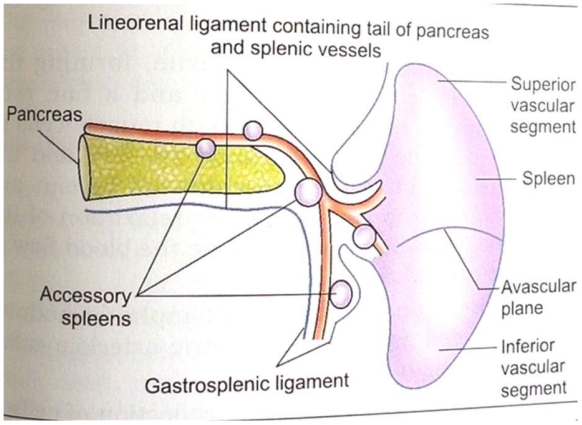
Blood supply

Arterial supply

Spleen is supplied by Splenic artery- largest branch of coeliac trunk
The artery is tortuous in its course to allow for movements of the spleen.
It passes

HILUM OF SPLEEN- CONTENTS(SA)

The hilum of spleen lies on the inferomedial part of gastric impression along the long axis of spleen. It transmits splenic vessels and nerves and provides attachment to gastro splenic and lienorenal ligaments.



LIGAMENTS OF SPLEEN- ATTACHMENTS, CONTENTS, DEVELOPMENT(SA)

Ligaments of spleen

Spleen is surrounded by peritoneum and suspended by:-
Gastrosplenic ligament- extends from hilum of spleen to greater curvature of stomach
It contains short gastric vessels, lymphatics and sympathetic nerves

Lienorenal ligament - extends from hilum of spleen to anterior surface of left kidney. It contains the tail of pancreas, splenic vessels, pancreaticosplenic lymphnodes, lymphatics and sympathetic nerves.

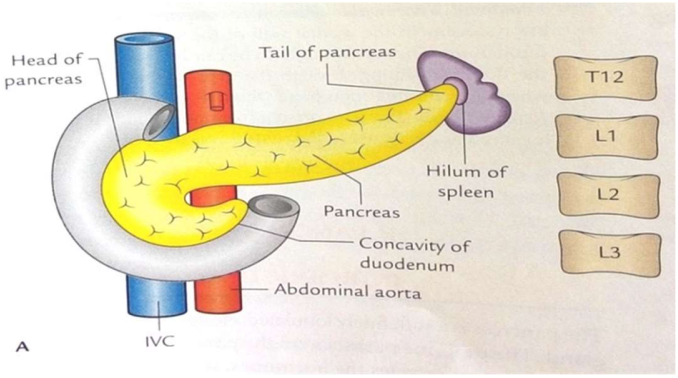
Phrenicocolic ligament – is not attached to spleen but supports its anterior end. It extends from splenic flexure of colon to the diaphragm opposite to 11th rib in the midaxillary line.

Development

Spleen develops from the left layer of dorsal mesogastrium.

Gastrosplenic ligament and lienorenal ligaments are derivatives of dorsal mesogastrium

HEAD OF PANCREAS(SE)



Pancreas is divided into

head , neck, body and tail.

<u>Head of pancreas</u> has

3 borders- superior – related to superior pancreatico duodenal artery

- inferior – related to inferior pancreatico duodenal artery
- right lateral – 2nd part of duodenum, terminal part of bile duct.

2 surfaces- Anterior- related to

Duodenum -1st part
Transverse colon
Jejunum

Posterior – related to

Inferior venacava
Renal veins- terminal part
R crus of diaphragm
Bile duct

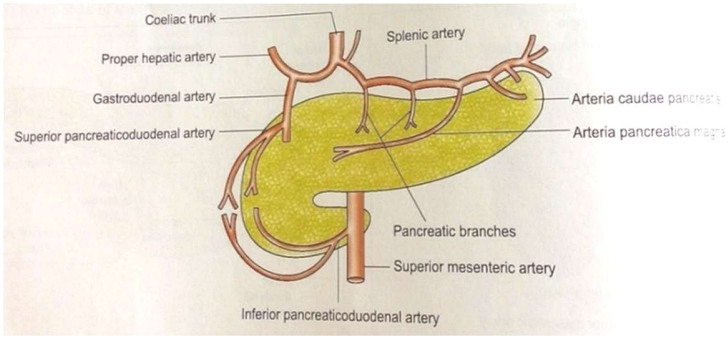
1 process- uncinate process – related
anteriorly to superior mesenteric vessels
posteriorly to aorta

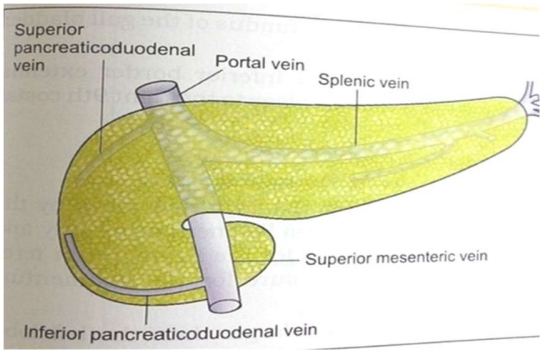
BLOOD SUPPLY OF PANCREAS(SE)

Blood supply

Arterial supply

a) Pancreatic branches of splenic artery
b) Superior pancreatico duodenal artery
c) inferior pancreatico duodenal artery





Venous drainage

Splenic , Superior mesentric and Portal veins

LIGAMENTS OF SPLEEN – ATTACHMENTS AND CONTENTS(SE)

Ligaments of spleen:-

Spleen is surrounded by peritoneum and suspended by:-

Gastrosplenic ligament- extends from hilum of spleen to greater curvature of stomach

It contains short gastric vessels, lymphatics and sympathetic nerves

Lienorenal ligament - extends from hilum of spleen to anterior surface of left kidney. It contains the tail of pancreas, splenic vessels, pancreaticosplenic lymphnodes, lymphatics and sympathetic nerves.

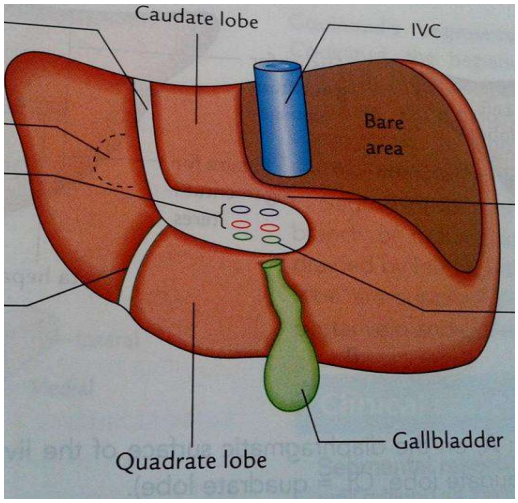
Phrenicocolic ligament – is not attached to spleen but supports its anterior end. It extends from splenic flexure of colon to the diaphragm opposite to 11th rib in the midaxillary line

PARTS OF PANCREAS(SA)

Pancreas is divided (from right to left) into head, neck, body and tail.
Head is enlarged and lies within the concavity of duodenum.
The tail reaches the hilum of spleen.
The entire organ lies posterior to the stomach separated from it by the lesser sac.

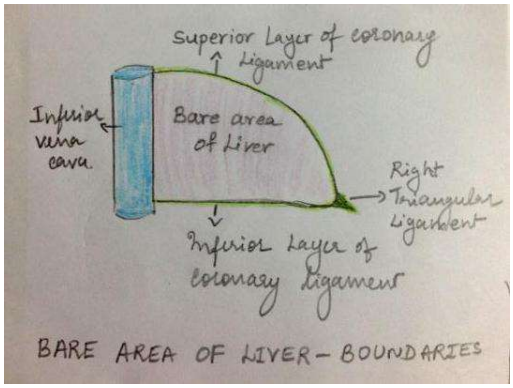
BARE AREA OF LIVER(SE)

Largest non peritoneal area of liver
Situated on the posterior surface
It is a Triangular area



Boudaries:

Apex - Right triangular ligament.
Base - Groove for IVC
Upper & lower limits –
Superior and inferior layers of coronary ligament.



Relations of bare area of liver:

Diaphragm

Part of right suprarenal gland

Applied Anatomy-

Commonest area for **amoebic liver abscess**

If the abscess ruptures, infection can lead to pleural sac and then to the lungs

Bare area is one of the sites for porto-caval anastomoses.

INFERIOR SURFACE OF LIVER(SE)

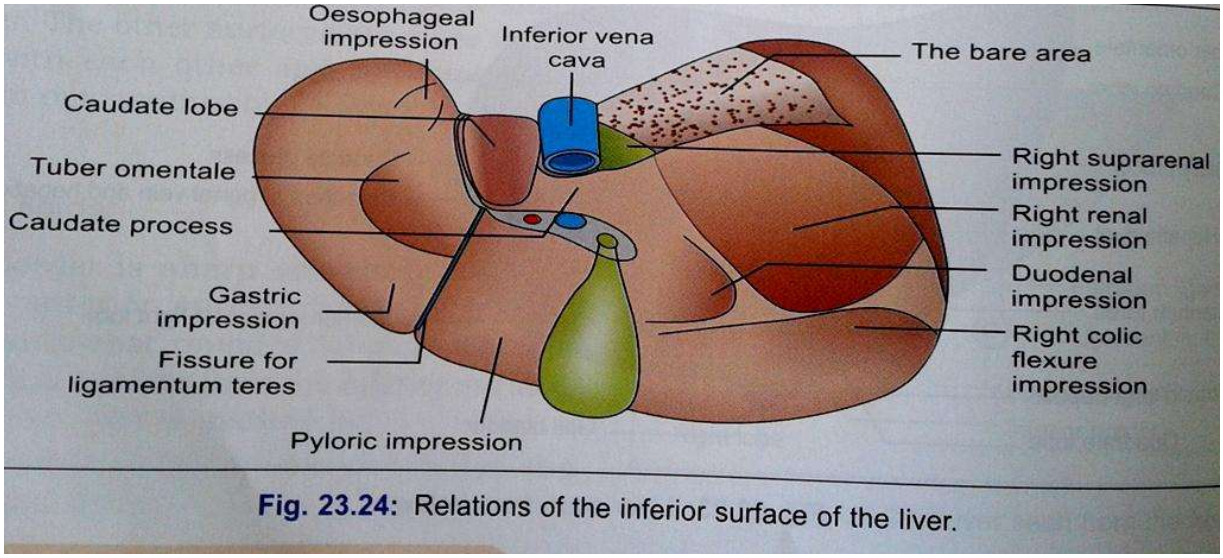


Fig. 23.24: Relations of the inferior surface of the liver.

Gastric impression-

Shallow concave fossa on the inferior surface of left lobe of liver

Related to Fundus of stomach & anterior surface of stomach near lesser curvature

Tuber omentale

Rounded elevation, comes in contact with lesser omentum

Fissure for ligamentum Teres

lodges ligamentum teres (represents embryological remnant of left umbilical vein)

Quadrate lobe

Lies between fossa for gall bladder and fissure for ligamentum teres

Situated anterior to porta hepatis

Related to pyloric part of stomach & 1st part of duodenum in middle

Porta hepatis

It is nonperitoneal horizontal fissure

Acts as gateway of liver

Structures passing through porta hepatis (anterior to posterior)

right & left branches of hepatic ducts

right & left branches of hepatic artey

right & left branches of portal vein

Caudate & papillary process of caudate lobe

Fossa for gall bladder- Non peritoneal fossa
Related to upper surface of body & neck of gall bladder

Duodenal impression -Shallow fossa on right side of neck of gall bladder
Related to superior duodenal flexure

Colic impression- Shallow depression on the right side of body of gall bladder,
Related to right colic flexure

Renal impression- Situated above and behind colic impression.
Related to anterior surface of right kidney

BARE AREAS OF LIVER(SA)

The bare area of the liver
Groove for IVC
Fossa for gall bladder
Floor of fissure for ligamentum venosum
Floor of fissure for ligamentum teres
Porta Hepatis
Along the attachment of falciform ligament
Small bare area over the cardiac impression

PORTA HEPATIS(SA)

Porta Hepatis is a Transverse non peritoneal fissure on the inferior surface of liver
Acts as gateway of liver
Situated posterior to quadrate lobe
The lips of porta hepatis give attachment to the lesser omentum
Structures passing through porta hepatis:
(Anterior to posterior-)
Right and left hepatic ducts
Right and left branches of hepatic artery
Right and left division of portal vein

LIGAMENTS OF LIVER(SA)
Peritoneal ligaments/false ligaments

Falciform ligament
Coronary ligament
Lesser omentum
Right triangular ligament
Left triangular ligament

True ligaments

Ligamentum teres hepatis
Ligamentum venosum