LARGE VESSELS OF THE GUT

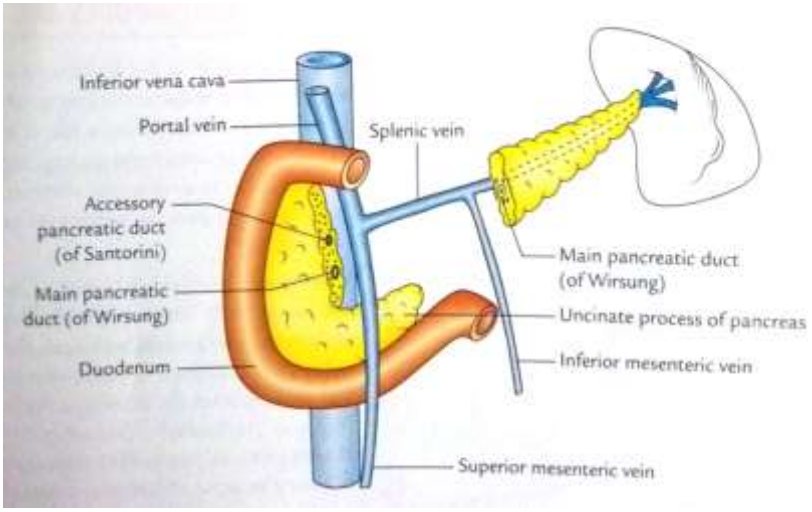
DESCRIBE THE PORTAL VEIN UNDER THE FOLLOWING HEADINGS

a) FORMATION
b) TRIBUTARIES
c) PORTOCAVAL ANASTOMOSIS
d) DEVELOPMENT
e) APPLIED ANATOMY

Portal vein is a large vein which collects blood from

Abdominal part of alimentary tract
Gall bladder
Pancreas
Spleen

The blood is conveyed to the liver where the portal vein breaks up into sinusoids and are drained by hepatic veins into inferior venacava.



Formation

Portal vein is about 8 cm long.

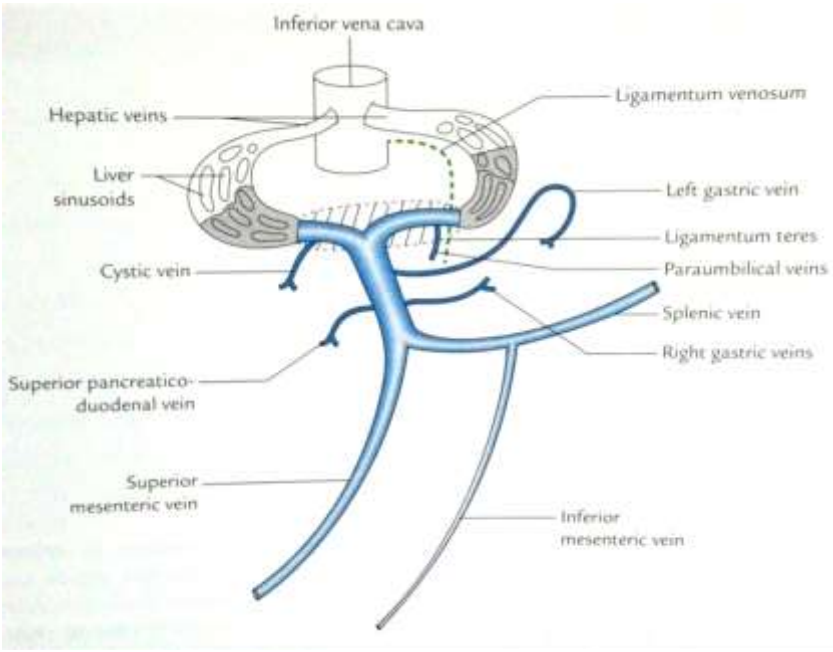
It is formed by the union of superior mesenteric vein and splenic vein behind the neck of pancreas at the level of L2 vertebra

Course

It runs upwards behind the neck of pancreas and first part of duodenum and runs in the right free margin of lesser omentum and terminates into right and left branches which enter the liver.

Tributaries

Splenic vein
Superior mesenteric vein
Left gastric vein
Right gastric vein
Superior pancreatico duodenal vein
Cystic vein
Paraumbilical veins



Portocaval anastomoses (portosystemic anastomoses)

Communications between the portal and systemic venous system exist in the abdominal wall and cavity.

These communications form important routes of collateral circulation in portal obstruction.

The important sites of portocaval anastomoses are:-

Umbilicus

The left branch of portal vein anastomosis with the veins of anterior abdominal wall through paraumbilical veins.

In portal obstruction the superficial veins around the umbilicus become distended and tortuous which is called caput medusa.

Lower end of oesophagus

The oesophageal tributaries of left gastric vein (portal) anastomose with oesophageal tributaries of acessory hemiazygos vein(systemic).

Anal canal

Superior rectal vein (portal) anastomose with middle and inferior rectal veins(systemic veins)

Bare area of liver

Hepatic venules (portal) anastomose with phrenic and intercostals veins
(systemic).

Posterior abdominal wall

Veins of retroperitoneal organs like duodenum, ascending colon and descending colon (portal) anastomose with the retroperitoneal veins of abdominal wall and of renal capsule (systemic) .

Liver

Rarely ductus venosus remains patent and connects the left branch of portal vein directly to inferior venacava.

Development of portal vein

Portal vein develops from the following sources

Infraduodenal part- from a part of L vitelline vein distal to dorsal anastomosis

Retroduodenal part- from dorsal anastomosis between two vitalline veins

supraduodenal part- from the cranial part of R vitelline vein

Applied anatomy

Portal hypertension

Normal pressure in the portal vein is 5 – 15 mm Hg.

Pressure above 40 mm Hg is called portal hypertension.

Causes – cirrhosis of liver, thrombosis of portal vein.

The effects of portal hypertension are:-

- Splenomegaly
- Ascitis
- Oesophageal varices
- Hemorrhoids
- Caput medusae

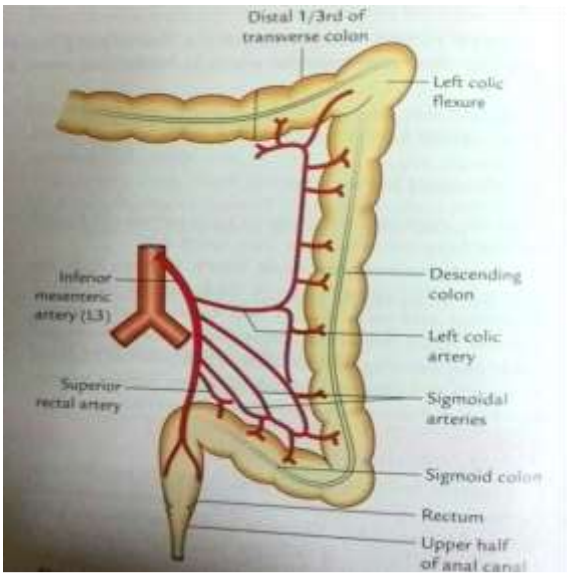
INFERIOR MESENTERIC ARTERY(SE)

Inferior mesenteric artery is the artery of the hind gut.
It supplies the

- Left 1/3rd of transverse colon
- Descending colon
- Sigmoid colon
- Rectum
- Upper part of anal canal above the anal valves.

Origin

The artery arises from the front of abdominal aorta behind the 3rd part of duodenum, at the level of L3 vertebra



COURSE AND TERMINATION

It runs downward and to left, behind the peritoneum , crosses the comman iliac artery and continues in the sigmoid mesocolon as superior rectal artery.
Branches

- Left colic artery
- Sigmoid arteries
- Superior rectal artery

BLOOD SUPPLY OF COLON(SE)

Arterial supply

Colon is supplied by following arteries-

- Iliocolic artery
- Right colic artery
- Middle colic artery
- Left colic artery
- Sigmoidal arteries
- Superior rectal artery

The first 3 arteries are branches of superior mesentric artery and next 3 are branches of inferior mesentric artery.

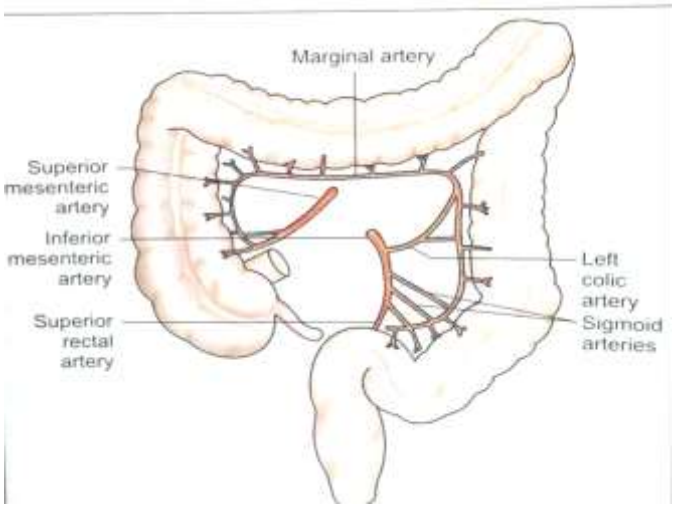
The different parts of the colon supplied by these arteries are

The lower part of ascending colon is supplied by iliocolic artery and the upper part by Right colic artery.

The Right 2/3rd of transverse colon is supplied by middle colic artery and Left 1/3rd by left colic artery

The descending colon is supplied by Left colic artery

The sigmoid colon is supplied by sigmoidal branches of inferior mesenteric artery and superior rectal artery



Marginal artery of Drummond

It is a circumferential anastomotic arterial channel extending from iliocecal junction to rectosigmoid junction.

It is formed by the anastomosis between the branches of superior and inferior mesenteric arteries.

Vasa recta arise from the marginal artery and supply the colon.

Venous drainage

The veins draining the colon accompany the arteries.

The veins accompanying the iliocolic, Right colic and middle colic arteries join the superior mesenteric vein.

The veins accompanying the Left colic and sigmoidal arteries join the inferior mesenteric vein.

The superior and inferior mesenteric veins drain into the portal vein.

PORTAL VEIN – FORMATION, COURSE, RELATIONS , TRIBUTARIES(SE)

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The portal vein is divided into

Infraduodenal

Retroduodenal

Supraduodenal parts

Relations

Infraduodenal part

Anteriorly – neck of pancreas

Posteriorly- inferior venacava

Retroduodenal part

Anteriorly

1st part of duodenum

Bile duct

Gastroduodenal artery

Posteiorly

inferior venacava

Supraduodenal part

Anteriorly

Hepatic artery

Bile duct

Posteriorly

Inferior venaca

Tributaries

Splenic vein

Superior mesenteric vein

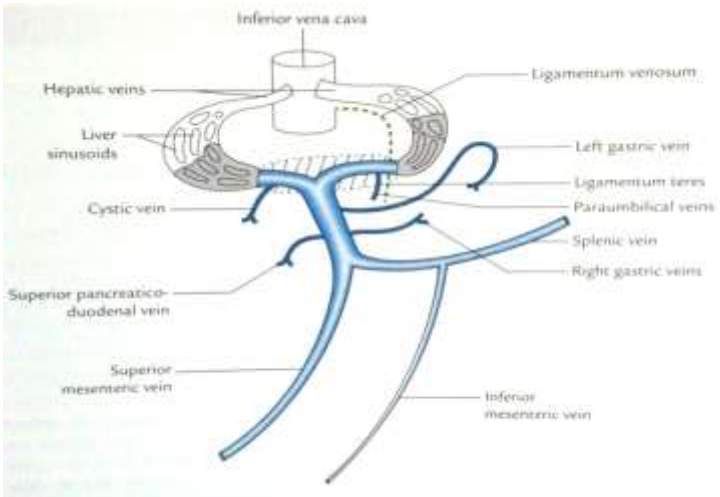
Left gastric vein

Right gastric vein

Superior pancreatico duodenal vein

Cystic vein

Paraumbilical veins



PORTOCAVAL ANASTOMOSES – SITES AND APPLIED ANATOMY(SE)

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Splenonegaly

Ascitis

Oesophageal varices

Hemorrhoids

Caput medusae

INFERIOR MESENTERIC ARTERY – BRANCHES(SA)

Branches of inferior mesenteric artery are -
Left colic artery is 1st branch.
Sigmoid arteries are 2- 3 in number.
Superior rectal artery is continuation of inferior mesenteric artery

NAME THE STRUCTURES SUPPLIED BY INFERIOR MESENTERICARTERY(SA)

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It supplies the
Left 1/3rd of transverse colon
Descending colon
Sigmoid colon
Rectum
Upper part of anal canal above the anal valves.

ARTERIES SUPPLYING TRANSVERSE COLON

The Right 2/3rd of transverse colon is supplied by middle colic artery which is a branch of superior mesenteric artery
Left 1/3rd by left colic artery which is a branch of inferior mesenteric artery.

MARGINAL ARTERY OF DRUMMOND

Marginal artery of Drummond
It is a circumferential anastomotic arterial channel extending from iliocecal junction to rectosigmoid junction.
It is formed by the anastomosis between the branches of superior and inferior mesenteric arteries.
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SITES OF PORTOSYSTEMIC ANASTOMOSES(SA)

Sites of portosystemic anastomoses are

- Umbilicus
- Lower end of oesophagus
- Anal canal
- Bare area of liver
- Posterior abdominal wall
- Liver

CAPUT MEDUSA(SA)

In portal vein obstruction the venous drainage through the liver is obstructed. Backflow of blood occurs through paraumbilical veins towards the umbilicus distending them.

These veins radiate out from the umbilicus like spokes of a wheel producing a clinical sign called caput medusa.

ARTERY OF MIDGUT? WHAT IS ITS POSITION, RELATIONS, BRANCHES AND AREA OF SUPPLY (LE)

Position:

It is a ventral branch of abdominal aorta arising 1.25 cm below the origin of celiac trunk at the level of L1 vertebra

Relations:

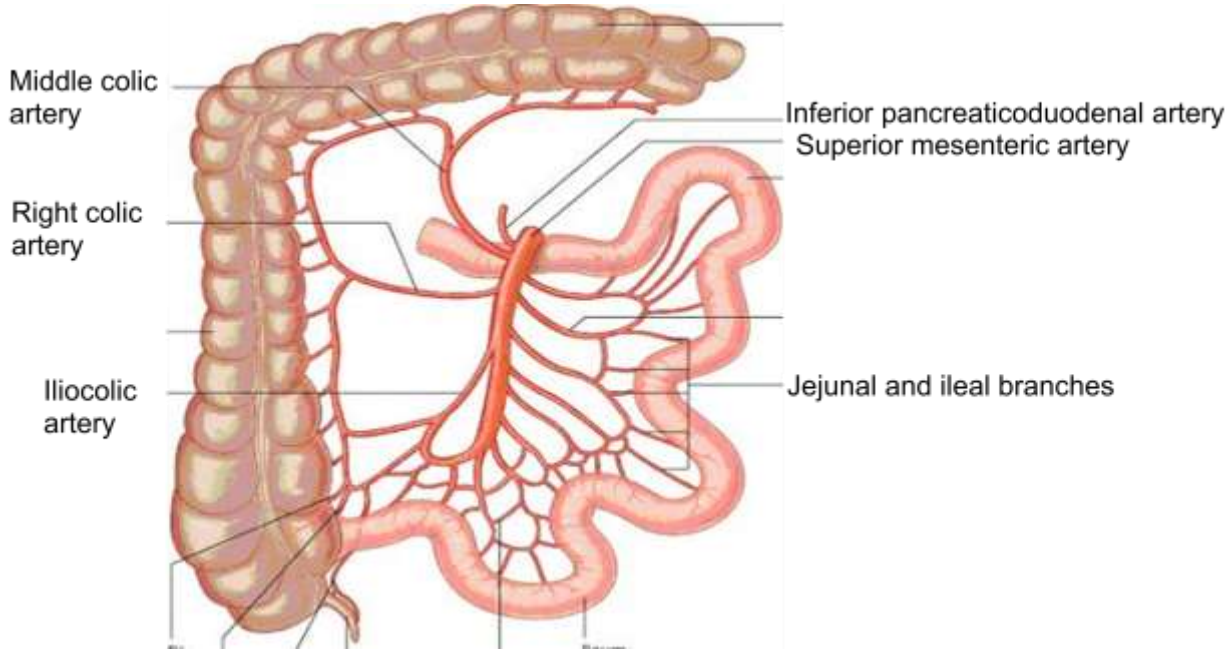
At its origin- anterior: body of pancreas, splenic vein

Posterior: left renal vein, uncinate process of pancreas, 3rd part of duodenum. In the root of mesentery it crosses inferior venacava, right ureter, right psoas major

Branches and distribution: all the branches anastomose with each other

- Inferior pancreatico duodenal artery: anastomosis with superior pancreaticoduodenal artery
- Jejunal and ileal branches- 12 to 15 in number arises from left convex side. Pass inbetween two layers of mesentery and supplies jejunum and ileum
- Ileocolic artery: lowest branch on right side, and supplies ileum, ceacum, appendix, ascending colon through its branches
- Right colic artery: ascending colon and hepatic flexure of colon

Middle colic artery: right 2/3rd of transverse colon



CELIAC TRUNK (RELATIONS, BRANCHES, VISCERA SUPPLIED) (SE)

Relations:

Anterior:

Parietal peritoneum, lesser sac

Right side:

Right celiac ganglion, left crus of diaphragm, caudate process of liver

Left side:

Left celiac ganglion, left crus of diaphragm, cardiac end of stomach

Above:

Aortic opening of diaphragm

Below:

Tuber omentale of pancreas

Branches:

Left gastric artery- stomach, esophagus

Splenic artery- pancreas, stomach, spleen

Common hepatic artery- stomach, duodenum, pancreas, liver

SPLENIC ARTERY (SE)

It arises from celiac trunk, runs retroperitoneally towards the spleen along the upper border of pancreas. In its course it runs in front of left suprarenal gland, upper part of left kidney, then in lienorenal ligament. Close to the hilum of spleen it divides into 5 to 6 terminal branches which enter hilum.

Branches-

- 5-6 small gastric arteries- fundus of stomach
- left gastroepiploic artery- left part of stomach
- pancreatic branches- pancreas
- terminal branches- spleen

SUPERIOR MESENTERIC ARTERY-ORIGIN, COURSE, BRANCHES (SE)

Origin:

It is a ventral branch of abdominal aorta arising 1.25 cm below the origin of celiac trunk at the level of L1 vertebra

Course:

from the origin the artery runs downwards and to the right with convexity towards left. It crosses behind by uncinate process of pancreas, third part of duodenum enters root of mesentery where it runs over inferior venacava, right ureter, right psoas major and ends in right iliac fossa by anastomosing with iliocolic artery.

Branches and distribution:

All the branches anastomose with each other

Inferior pancreatico duodenal artery:

- anastomosis with superior pancreaticoduodenal artery

Jejunal and ileal branches

- 12 to 15 in number arises from left convex side.
- Pass inbetween two layers of mesentery and supplies jejunum and ileum

Ileocolic artery:

- Lowest branch on right side, and supplies ileum, ceacum, appendix, ascending colon through its branches

Right colic artery:

- Ascending colon and hepatic flexure of colon

Middle colic artery:

- Right 2/3rd of transverse colon

SUPERIOR MESENTERIC ARTERY- BRANCHES (SA)

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Right 2/3rd of transverse colon

CELIAC ARTERY- BRANCHES(SA)

Left gastric artery

The left gastric artery is the smallest of the three branches.

It ascends across the diaphragm, giving rise to **oesophageal branches**, before continuing anteriorly along the lesser curvature of the stomach. Here, it anastomoses with the right gastric artery.

It supplies stomach, esophagus

Splenic artery

The splenic artery arises from the coeliac trunk just inferior to the left gastric artery.

During its course, it is contained within the **splenorenal ligament**.

It terminates into five branches which supply the segments of the spleen.

It gives rise to

Left gastroepiploic: supplies the greater curvature of the stomach.

Short gastrics: 5-7 small branches supplying the fundus of the stomach.

Pancreatic branches: supply the body and tail of the pancreas.

Common hepatic artery

The common hepatic artery is the sole arterial supply to the liver and the only branch of the coeliac artery to pass to the right.

As it travels past the superior aspect of the duodenum, it divides into its twoterminal branches – the **proper hepatic** and **gastroduodenal** arteries.

It supplies stomach, duodenum, pancreas, liver