MEDICAL EDUCATION RESOURCE

Large Blood Vessels of the Gut

? Introduction

Three major **ventral branches** of the abdominal aorta supply the gut:

1. **Coeliac trunk** ? foregut
2. **Superior mesenteric artery (SMA)** ? midgut
3. **Inferior mesenteric artery (IMA)** ? hindgut

There are rich anastomoses among their terminal branches, ensuring collateral flow.

?? Coeliac Trunk

Origin and Length

- Arises from the **front of the abdominal aorta** just below the aortic opening of the diaphragm (disc between **T12 and L1**).
- About **1.25 cm long**, divides into **three branches**:
  - **Left gastric artery**
  - **Common hepatic artery**
  - **Splenic artery**

Distribution

Supplies all **foregut derivatives** in the abdomen:

- Lower end of oesophagus
- Stomach
- Proximal duodenum (up to bile-duct opening)
- Liver
- Spleen
- Greater part of pancreas

Relations

- **Surrounded** by the **coeliac plexus**.
- **Anteriorly:** lesser sac, lesser omentum
- **Right side:** right crus, right coeliac ganglion, caudate process of liver
- **Left side:** left crus, left coeliac ganglion, cardiac end of stomach
- **Inferiorly:** body of pancreas and splenic vein

? Superior Mesenteric Artery (SMA)

Origin, Course, and Termination

- Arises from **abdominal aorta** at **L1**, 1 cm below the coeliac trunk.
- Runs downward and forward between pancreas and third part of duodenum, then between two layers of mesentery to reach the right iliac fossa, where it ends by anastomosing with the **ileocolic artery**.

Branches

(A) *Left side* ? jejunal and ileal branches forming arterial arcades within the mesentery.
(B) *Right side* ?

1. **Inferior pancreaticoduodenal artery** – anastomoses with superior counterpart.
2. **Middle colic artery** – to transverse colon.
3. **Right colic artery** – to ascending colon.
4. **Ileocolic artery** – to terminal ileum, caecum, appendix (via appendicular branch).

Relations

- **Anteriorly:** pancreas, splenic vein, root of mesentery.
- **Posteriorly:** left renal vein, third part of duodenum, aorta.
- **On right:** superior mesenteric vein.

? Superior Mesenteric Vein (SMV)

- Lies to the **right of the artery**; ascends behind pancreas.

- **Tributaries:** veins corresponding to SMA branches + right gastroepiploic + inferior pancreaticoduodenal veins.
- Unites with **splenic vein** behind the neck of pancreas ? forms **portal vein**

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? Dissection Steps

1. Identify the **short coeliac trunk** at the **T12–L1** level.
    - Trace its three branches and their divisions.
2. Clean the **SMA** and its branches on both sides; trace up to organs supplied.
3. Identify the **inferior mesenteric artery** (at L3) and follow its left colic, sigmoid, and superior rectal branches.
4. Demonstrate the **portal vein** formation posterior to the pancreas.

?? Clinical Anatomy

1. **Superior Mesenteric Artery Syndrome (Wilkie's syndrome):**
    - The third part of the duodenum may be compressed between **aorta and SMA**, producing duodenal obstruction — "nut-cracker" effect

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2. **Mesenteric Ischaemia:**
    - Sudden occlusion (embolus/thrombosis) of SMA or SMV ? *haemorrhagic infarction* and rapidly spreading obstruction.
3. **Jejunal Diverticulosis:**
    - Acquired diverticula occur along mesenteric border where **vasa recta** penetrate, due to weak longitudinal muscle coat.
4. **Aneurysm of Coeliac Trunk:**
    - May compress coeliac plexus, producing **epigastric pain** radiating to the back.
5. **Portal Venous Thrombosis:**
    - Thrombosis of splenic + SMV + portal veins ? portal hypertension, splenomegaly, varices.

? Summary Table

ARTERY	LEVEL	SUPPLIES	KEY BRANCHES
Coeliac trunk	T12	Foregut	Left gastric, common hepatic, splenic
SMA	L1	Midgut	Inferior pancreaticoduodenal, middle/right colic, ileocolic, jejunal & ileal
IMA	L3	Hindgut	Left colic, sigmoid, superior rectal

? Inferior Mesenteric Artery

Origin

- Arises from the **front of the abdominal aorta** at the level of the **third lumbar vertebra (L3)**, **3–4 cm above** the aortic bifurcation.
- It originates **behind the third part of the duodenum**.

Course

- Descends **downward and to the left**, behind the peritoneum.
- Crosses the **left common iliac artery** medial to the **left ureter**.
- Continues in the **sigmoid mesocolon** as the **superior rectal artery**.

Distribution

Supplies all **hindgut derivatives**, including:

- Left one-third of transverse colon
- Descending colon
- Sigmoid colon
- Rectum
- Upper part of the anal canal (above anal valves)

? Branches

1. **Left Colic Artery**
    - Ascending branch anastomoses with the **middle colic artery** (from SMA).
    - Descending branch joins **sigmoid arteries**.
    - Supplies the **descending colon** and the **distal transverse colon**.
2. **Sigmoid Arteries**
    - 2–4 branches descending obliquely to the **sigmoid colon**.
    - Anastomose among themselves to form the **lower part of the marginal artery**.
    - The lowest sigmoid branch connects with the **superior rectal artery**

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3. **Superior Rectal Artery**
    - **Continuation** of the IMA beyond the root of the sigmoid mesocolon.
    - Descends in the mesocolon, crosses the **left common iliac vessels**, and divides opposite **S3 vertebra** into **right and left branches**.
    - These branches supply the **rectum** and anastomose with **middle and inferior rectal arteries** forming a **rectal arterial plexus**

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? Inferior Mesenteric Vein

Formation

- Begins as the **superior rectal vein** from the **upper internal rectal venous plexus**.
- Receives blood from **rectum, anal canal, sigmoid colon, and descending colon**.

Course

- Longer than the artery; ascends **behind the peritoneum**.
- Crosses the **left common iliac vessels**, lies **lateral to IMA**, and ascends behind the **pancreas**.
- Passes **lateral to the duodenojejunal flexure** within the **paraduodenal fold**.
- Opens into the **splenic vein**, which then joins the **superior mesenteric vein** to form the **portal vein**

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Tributaries

- Veins corresponding to the **branches of IMA**:
  - Left colic vein
  - Sigmoid veins
  - Superior rectal vein

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?? Clinical Anatomy

1. **Inferior Mesenteric Vein in Surgery**

    - Lies in the **free margin of the paraduodenal fold**; during surgery for **internal hernia at the duodenojejunal recess**, this fold may need to be incised.

    - Important to note: the **vein**, not the artery, lies in the fold — it must be **ligated carefully** to avoid hemorrhage

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2. **Marginal Artery of Drummond**

    - Formed by anastomoses between **ileocolic, right colic, middle colic, left colic, and sigmoid arteries**.

    - Lies 2.5–3.8 cm from the colon and provides **collateral circulation** if one of the main arteries is blocked

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3. **Sudeck’s Critical Point**

    - The weak anastomotic zone between **last sigmoid artery and superior rectal artery**.

    - Prone to ischemia after surgical ligation of IMA or in low-flow states.

4. **Ischaemic Colitis**
    - Often affects the **splenic flexure** (watershed area between SMA and IMA) and **Sudeck's point** due to poor collateral circulation.

? Summary Table

FEATURE	INFERIOR MESENTERIC ARTERY	INFERIOR MESENTERIC VEIN
Origin	Aorta at L3	Superior rectal venous plexus
Termination	Superior rectal artery	Splenic vein
Main Branches	Left colic, sigmoid, superior rectal	Left colic, sigmoid, superior rectal veins
Supplies/Drains	Hindgut derivatives	Corresponding regions
Surgical Note	Lies retroperitoneally	Lies in paraduodenal fold

? Marginal Artery of Drummond

Definition:
A continuous arterial arcade running along the **inner concavity of the colon**, connecting the colic branches of the superior and inferior mesenteric arteries.

Formation:
Formed by the anastomosis of:

- Ileocolic artery
- Right colic artery
- Middle colic artery
- Left colic artery
- Sigmoid arteries

Course:
Lies **2.5–3.8 cm** from the colon wall; closest to the bowel in the **descending and sigmoid colon**.

Branches:
Gives rise to **vasa recta**, straight arteries entering the colon wall alternately on both sides.

Functional Importance:
Maintains **collateral circulation** between SMA and IMA territories. Even if one main trunk is obstructed, the marginal artery maintains perfusion to the colon.

Surgical Note:
At the junctions of its component vessels (especially between middle and left colic, and between sigmoid and superior rectal arteries), anastomoses may be weak.
These weak points are called **Sudeck's critical points**, prone to ischemia after IMA ligation.

? Portal Vein

Definition:
A large vein that **collects blood from the gastrointestinal tract and associated organs** (from lower oesophagus to upper anal canal, pancreas, spleen, and gallbladder) and carries it to the **liver**.

Formation

- Formed by the **union of the superior mesenteric vein (SMV)** and **splenic vein**
- Occurs **behind the neck of the pancreas** at the level of **L2 vertebra**.
- The **inferior mesenteric vein (IMV)** drains into the **splenic vein** before this junction.

Course

1. **Infra-duodenal part:** behind the neck of pancreas.
2. **Retroduodenal part:** behind the first part of the duodenum.
3. **Supraduodenal part:** within the **right free margin of the lesser omentum**, anterior to the epiploic foramen (of Winslow).

Ends by dividing into **right and left branches** at the **porta hepatis** of the liver.

? Tributaries of the Portal Vein

1. **Splenic vein**
2. **Superior mesenteric vein**
3. **Left and right gastric veins**
4. **Cystic vein** (from gallbladder)
5. **Paraumbilical veins**
6. **Superior pancreaticoduodenal veins**

Note:
Portal blood flow shows "**streamline flow**" —

- SMV blood ? right hepatic lobe
- Splenic + IMV blood ? left hepatic lobe

?? Portosystemic Communications (Portocaval Anastomoses)

Sites where **portal and systemic venous channels** communicate — clinically vital because they become enlarged in **portal hypertension**.

SITE	PORTAL VEIN TRIBUTARY	SYSTEMIC VEIN COMMUNICATION	CLINICAL FEATURE
Lower end of oesophagus	Left gastric vein	Azygos vein	Oesophageal varices
Anal canal (upper part)	Superior rectal vein	Middle & inferior rectal veins	Haemorrhoids
Umbilicus	Paraumbilical veins	Superficial epigastric veins	Caput medusae
Bare area of liver	Hepatic veins	Diaphragmatic veins	Silent anastomosis
Retroperitoneal colon	Colic veins	Lumbar veins	Retroperitoneal varices

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?? Clinical Anatomy

1. Portal Hypertension

- Caused by obstruction to portal flow (e.g., cirrhosis, thrombosis, or compression).
- Leads to raised portal pressure and dilatation of the portosystemic channels.
- Manifestations:
  - **Oesophageal varices** ? haematemesis
  - **Caput medusae** around umbilicus
  - **Haemorrhoids**
  - **Splenomegaly and ascites**

2. Caput Medusae

- Radiating tortuous veins around the umbilicus due to engorged paraumbilical and superficial epigastric veins.
- Named after Medusa’s head in Greek myth.

3. Surgical Importance

- Portocaval shunts (e.g., splenorenal or mesocaval anastomoses) are created to **divert portal blood** into systemic circulation and reduce portal pressure.

4. Portal Vein Thrombosis

- May follow inflammation, pancreatitis, or infection; results in **portal hypertension without cirrhosis**.

5. Varices Rupture

- Bleeding from oesophageal varices is a **medical emergency**.
- Treated by endoscopic band ligation, sclerotherapy, or TIPS (Transjugular Intrahepatic Portosystemic Shunt).

? Summary Table

STRUCTURE	KEY FEATURES
Marginal artery	Continuous arterial arcade along colon, connects SMA and IMA
Portal vein	Formed behind pancreas (SMV + Splenic vein)
Portosystemic sites	Oesophagus, rectum, umbilicus, bare area of liver
Critical point	Sudeck's point at junction of sigmoid and superior rectal arteries
Clinical link	Portal hypertension ? varices, haemorrhoids, caput medusae

> **? Facts to Remember**

1. The **abdominal aorta** gives three unpaired anterior branches to supply the gut:
    - **Coeliac trunk** ? Foregut

- **Superior mesenteric artery (SMA)** ? Midgut
- **Inferior mesenteric artery (IMA)** ? Hindgut

2. The **coeliac trunk** arises at **T12–L1**, just below the aortic opening of the diaphragm.
3. The **SMA** arises at the level of **L1**, about 1 cm below the coeliac trunk, and runs in the **root of the mesentery**.
4. The **IMA** arises at **L3**, about 3–4 cm above the aortic bifurcation.
5. **Coeliac trunk branches:** left gastric, splenic, and common hepatic arteries.
6. **SMA branches:** inferior pancreaticoduodenal, middle colic, right colic, ileocolic, and multiple jejunal and ileal arteries.
7. **IMA branches:** left colic, sigmoid, and superior rectal arteries.
8. The **marginal artery of Drummond** forms a continuous arcade along the inner border of the colon, linking the SMA and IMA systems.
9. The **Sudeck's point** marks the weak anastomosis between the **last sigmoid artery** and **superior rectal artery**.
10. **Portal vein** is formed behind the **neck of pancreas** by union of **SMV and splenic vein**.
11. **Inferior mesenteric vein** joins the **splenic vein**, not the SMV.
12. The **portal vein** carries about **1,200 mL of blood per minute** to the liver—about **75% of hepatic inflow**.
13. **Hepatic veins** drain into the **inferior vena cava (IVC)** just below the diaphragm.

14. The **portosystemic anastomoses** form communications between portal and systemic veins, providing alternate channels in portal hypertension.

15. The most important anastomotic sites:
    - Lower oesophagus
    - Umbilicus
    - Anal canal
    - Bare area of liver
    - Posterior abdominal wall (retroperitoneal colon)

16. **Portal hypertension** results from cirrhosis, thrombosis, or obstruction of the portal vein.

17. **Oesophageal varices, haemorrhoids, and caput medusae** are classical manifestations of portal hypertension.

18. **Collateral shunts** (splenorenal, mesocaval, portocaval) are used surgically to relieve portal pressure.

19. **Superior mesenteric artery syndrome** compresses the third part of the duodenum between SMA and aorta, causing obstruction.

20. The **portal venous system has no valves**, permitting free communication and spread of infection or metastasis between abdominal viscera and systemic circulation.

?? Clinicoanatomical Problems

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1. Superior Mesenteric Artery Syndrome

- **Cause:** Compression of the third part of duodenum between SMA and aorta due to loss of retroperitoneal fat (cachexia, trauma, prolonged bed rest).
- **Symptoms:** Nausea, bilious vomiting, epigastric distension after meals.
- **Investigation:** Barium meal shows duodenal obstruction.
- **Treatment:** Postural correction or surgical duodenojejunostomy.

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2. Coeliac Trunk Aneurysm

- **Effect:** Compresses the coeliac plexus ? causes **severe epigastric pain** radiating to the back.
- May mimic peptic ulcer pain.
- Diagnosed by angiography.

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3. Mesenteric Ischaemia

- **Cause:** Thromboembolism of SMA.
- **Clinical Picture:** Sudden severe abdominal pain, bloody diarrhoea, and peritonitis.
- **Complication:** Infarction of midgut, high mortality without emergency resection.

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4. Sudeck’s Critical Point Ischaemia

- **Site:** Junction between the last sigmoid branch and superior rectal artery.

- **Clinical Relevance:** During ligation of IMA (in colorectal surgeries), inadequate collateral flow here may lead to **rectosigmoid necrosis**.

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5. Portal Hypertension

- **Causes:** Cirrhosis (most common), portal vein thrombosis, hepatic fibrosis.
- **Effects:** Splenomegaly, oesophageal varices, haemorrhoids, ascites, caput medusae.
- **Mechanism:** Blood diverted via portosystemic channels.

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6. Oesophageal Varices

- **Anatomy:** Between left gastric (portal) and azygos (systemic) veins.
- **Clinical Significance:** Common cause of fatal upper GI bleeding in cirrhotic patients.

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7. Caput Medusae

- **Cause:** Engorged paraumbilical and superficial epigastric veins due to portal obstruction.
- **Appearance:** Radiating veins around umbilicus — “head of Medusa” sign.

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8. Internal Haemorrhoids

- **Cause:** Portal hypertension ? dilatation of superior rectal veins (portal) communicating with middle and inferior rectal veins (systemic).
- **Feature:** Painless bleeding per rectum.

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9. Portocaval Anastomosis in Surgery

- **Example:** *Splenorenal shunt* — connects splenic vein (portal) to left renal vein (systemic).
- **Purpose:** Bypasses liver to reduce portal pressure.

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10. Portal Vein Thrombosis

- **Causes:** Pancreatitis, infection, trauma.
- **Result:** Portal hypertension with preserved liver function.
- **Radiological Finding:** Cavernous transformation (multiple small collateral veins replacing the obstructed portal vein).

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11. Inferior Mesenteric Vein in Hernial Sac

- **Rare Occurrence:** Internal hernia at paraduodenal recess.
- **Risk:** Iatrogenic bleeding if the vein is incised accidentally during surgery.

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12. Ischaemic Colitis

- **Occurs at:** Splenic flexure and rectosigmoid junction.
- **Reason:** Poor collateral flow in marginal artery and Sudeck’s point.
- **Symptoms:** Abdominal pain, bloody stools, mucosal necrosis.

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13. Pancreatic Tumour Involvement

- **Effect:** May compress the splenic vein behind pancreas ? **segmental portal hypertension**, splenomegaly, and gastric varices.

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14. Posthepatic Obstruction (Budd–Chiari Syndrome)

- **Cause:** Thrombosis of hepatic veins or IVC.
- **Symptoms:** Painful hepatomegaly, ascites, elevated hepatic venous pressure.

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15. Dissemination of Cancer via Portal System

- **Example:** Colonic carcinoma ? spreads to liver via portal vein ? secondary hepatic metastases.

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16. Ascites Formation

- **Mechanism:** Increased portal pressure and decreased albumin synthesis ? transudation of fluid into peritoneal cavity.
- **Finding:** Shifting dullness, fluid thrill on examination.

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17. Surgical Ligation of IMA

- Must be performed **proximal to the left colic branch** to preserve the **marginal artery circulation** and avoid sigmoid ischaemia.

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18. Portosystemic Encephalopathy

- **Cause:** Shunting of ammonia-rich portal blood into systemic circulation bypassing the liver.

- **Manifestation:** Confusion, altered consciousness, flapping tremor (asterixis).

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19. Portal-Systemic Gradient Measurement

- Clinically measured via hepatic venous pressure gradient (HVPG);
    - Normal: <5 mmHg
    - Portal hypertension: >12 mmHg ? risk of variceal bleed.

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20. Recanalisation of Umbilical Vein

- In portal hypertension, the obliterated umbilical vein (ligamentum teres) may reopen, forming part of **caput medusae**.

? Summary Table

STRUCTURE	CLINICAL RELEVANCE
Coeliac trunk	Foregut supply, aneurysm pain
SMA	Midgut supply, SMA syndrome
IMA	Hindgut supply, Sudeck’s point
Portal vein	Liver inflow, site of hypertension
Marginal artery	Collateral supply along colon

STRUCTURE	CLINICAL RELEVANCE
Portocaval anastomoses	Sites of varices in portal obstruction

? Frequently Asked Questions – Large Blood Vessels of the Gut

1. **What is the artery of the midgut?**
   ? The **Superior Mesenteric Artery (SMA)**.
   Describe its origin, course, and branches.

   - Arises from the **front of the abdominal aorta at L1** level, behind the pancreas.
   - Runs between the layers of the mesentery to the right iliac fossa.
   - **Branches:** Inferior pancreaticoduodenal, middle colic, right colic, ileocolic, jejunal, and ileal branches.
   - **Clinical anatomy:** Thrombosis can cause *mesenteric ischaemia*; compression between SMA and aorta leads to *SMA syndrome*.

2. **Describe the portal vein under following headings:**
   a. **Formation:** Behind the neck of pancreas by union of **SMV and splenic vein**.
   b. **Tributaries:** Left and right gastric, cystic, paraumbilical, and superior pancreaticoduodenal veins.
   c. **Clinical anatomy:** In *portal hypertension*, the pressure increases, leading to varices, haemorrhoids, and caput medusae.
   d. **Sites and veins taking part in portosystemic anastomoses:**

   - Lower end of oesophagus ? Left gastric ? Azygos

- Umbilicus ? Paraumbilical ? Superficial epigastric
- Anal canal ? Superior rectal ? Middle and inferior rectal
- Bare area of liver ? Phrenic veins.

3. **Write short notes on:**
   a. **Coeliac trunk** — Artery of foregut, arises at T12, branches: left gastric, splenic, common hepatic.
   b. **Inferior mesenteric artery** — Artery of hindgut; branches: left colic, sigmoid, superior rectal.
   c. **Blood supply of colon** — From SMA (up to proximal 2/3 transverse colon) and IMA (distal 1/3 transverse colon onwards).
   d. **Caput medusae** — Dilated veins around umbilicus due to recanalised paraumbilical veins in portal hypertension.
   e. **Marginal artery of Drummond** — Continuous anastomosis along colon between SMA and IMA branches; maintains collateral supply.

MCQ Preview from Same Page

1. Inferior mesenteric vein opens into:
   a. Portal vein
   b. Inferior vena cava
   ? **c. Splenic vein**
   d. Superior mesenteric vein

2. Which of the following is *not* a direct branch of the coeliac trunk?
   ? **d. Inferior pancreaticoduodenal artery**

3. Cystic artery arises from:
   ? **a. Right hepatic artery**

4. Jejunal and ileal branches arise from:
   ? **b. Superior mesenteric artery**

5. Appendicular artery arises from:
   ? **c. Ileocolic artery**

6. Portal vein is formed by:
   ? **b. Union of superior mesenteric and splenic veins**

7. Ligamentum venosum is attached to:
   ? **b. Left branch of portal vein**

8. Portocaval anastomoses occur at all the following except:
   ? **c. Stomach**

9. Hepatic flexure of colon is supplied by:
   ? **b. Middle colic artery**

10. Superior rectal artery is continuation of:
    ? **c. Inferior mesenteric artery**

? Multiple Choice Questions

1. **Inferior mesenteric vein opens into:**
   a. Portal vein
   b. Inferior vena cava
   ? **c. Splenic vein**
   d. Superior mesenteric vein

2. **Which of the following arteries is *not* a direct branch of the coeliac trunk?**
   a. Left gastric
   b. Common hepatic
   c. Splenic
   ? **d. Inferior pancreaticoduodenal**

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3. **Cystic artery is a branch of:**
   ? a. Right hepatic
   b. Left hepatic
   c. Coeliac trunk
   d. Common hepatic

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4. **Jejunal and ileal branches for small intestine arise from:**
   a. Coeliac trunk
   ? **b. Superior mesenteric artery**
   c. Inferior mesenteric artery
   d. Abdominal aorta

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5. **Appendicular artery is a branch of:**
   a. Middle colic
   b. Right colic
   ? **c. Ileocolic**
   d. Left colic

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6. **Portal vein is formed by union of which veins?**
   a. Inferior mesenteric and splenic
   ? **b. Superior mesenteric and splenic**
   c. Superior mesenteric and inferior mesenteric
   d. Splenic, superior mesenteric, and inferior mesenteric

7. **Ligamentum venosum is attached to which vein?**
   a. Right branch of portal vein
   ? **b. Left branch of portal vein**
   c. Both branches of portal vein
   d. None of the above

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8. **Portocaval anastomoses occur at the following sites, except:**
   a. Umbilicus
   b. Lower end of oesophagus
   ? **c. Stomach**
   d. Bare area of liver

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9. **Hepatic flexure is supplied by which artery?**
   a. Ileocolic
   ? **b. Middle colic**
   c. Right colic
   d. Jejunal branches

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10. **Superior rectal artery is the continuation of:**
    a. Superior mesenteric artery
    b. Coeliac trunk
    ? **c. Inferior mesenteric artery**
    d. Abdominal aorta

Short Objective Add-ons

- **Branches of coeliac trunk:** Left gastric, splenic, and common hepatic.

- **Branches of SMA (right side):** Inferior pancreaticoduodenal, middle colic, right colic, ileocolic.
- **Number of arterial arcades:**
    - Jejunum ? 1–2 arcades (long vasa recta)
    - Ileum ? 3–5 arcades (short vasa recta).

? Viva Voce – Large Blood Vessels of the Gut

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1. Name the three unpaired arteries of the abdominal aorta supplying the gut.

- **Answer:** Coeliac trunk, superior mesenteric artery, and inferior mesenteric artery.
- **Mnemonic:** *“CSI – Coeliac, Superior, Inferior.”*

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2. What is the vertebral level of origin of the coeliac trunk?

- **Answer:** At the level of **T12–L1 intervertebral disc**.

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3. What are the branches of the coeliac trunk?

- **Answer:**
    - Left gastric artery
    - Common hepatic artery

- Splenic artery.

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4. What is the artery of the midgut?

- **Answer: Superior mesenteric artery.**

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5. What is the vertebral level of origin of the superior mesenteric artery?

- **Answer: L1** (just below the coeliac trunk).

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6. Name the branches of the superior mesenteric artery.

- **Answer:**
  - **Left side:** Jejunal and ileal branches
  - **Right side:** Inferior pancreaticoduodenal, middle colic, right colic, ileocolic arteries.

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7. What is the artery of the hindgut?

- **Answer: Inferior mesenteric artery.**

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8. At which vertebral level does the inferior mesenteric artery arise?

- **Answer: L3**, about 3–4 cm above the aortic bifurcation.

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9. Name the branches of the inferior mesenteric artery.

- **Answer:**

- Left colic artery
- Sigmoid arteries
- Superior rectal artery.

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10. What is the continuation of the inferior mesenteric artery?

- **Answer: Superior rectal artery.**

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11. What is the significance of the marginal artery of Drummond?

- **Answer:** It forms a continuous arterial arcade along the inner border of the colon, providing **collateral circulation** between SMA and IMA.

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12. What is Sudeck's critical point?

- **Answer:** It's the weak anastomosis between the **last sigmoid artery** and the **superior rectal artery**, prone to ischaemia after IMA ligation.

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13. What are the tributaries of the portal vein?

- **Answer:**
  - Splenic vein
  - Superior mesenteric vein
  - Left and right gastric veins

- Cystic vein
- Paraumbilical veins.

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14. How is the portal vein formed?

- **Answer:** By the union of **superior mesenteric vein** and **splenic vein** behind the **neck of the pancreas**.

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15. What are portosystemic (portocaval) anastomoses?

- **Answer:** Sites where portal and systemic venous channels communicate — they provide alternate pathways in portal hypertension.

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16. Name four important sites of portosystemic anastomoses.

- **Answer:**
  1. Lower end of oesophagus
  2. Umbilicus
  3. Anal canal
  4. Bare area of liver.

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17. What is Caput Medusae?

- **Answer:** Dilated tortuous veins radiating from the umbilicus due to **recanalization of paraumbilical veins** in portal hypertension.

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18. What is the surgical importance of the inferior mesenteric vein?

- **Answer:** Lies in the **paraduodenal fold**; it must be identified carefully during surgery to prevent **massive bleeding**.

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19. What is the difference between portal vein and hepatic veins?

- **Answer:**
  - Portal vein brings blood *to* the liver (from gut).
  - Hepatic veins drain blood *from* liver to inferior vena cava.

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20. Why does portal vein thrombosis not cause ascites?

- **Answer:** Because hepatic sinusoids are not congested; liver architecture is intact — pressure rise is *prehepatic*.

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21. Why is the splenic flexure of colon more prone to ischaemia?

- **Answer:** It lies in the **watershed area** between SMA and IMA territories with poor collateral supply.

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22. Why is the superior mesenteric artery clinically important?

- **Answer:**
  - Supplies major portion of small intestine and colon.
  - Its occlusion causes *mesenteric ischaemia*.

- It may compress the third part of the duodenum (*SMA syndrome*).

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23. What is the “nutcracker effect”?

- **Answer:** Compression of the **left renal vein** between **SMA and aorta**, causing left-sided renal venous hypertension.

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24. What percentage of hepatic blood flow is supplied by the portal vein?

- **Answer:** Approximately **75–80%**.

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25. What is the clinical consequence of rupture of oesophageal varices?

- **Answer: Haematemesis (vomiting of blood)** — life-threatening emergency in portal hypertension.