



PIPADOR REVISION

MRCOG Part 1 Revision Notes

Blood Supply of the GI Tract

ANATOMY • LECTURE 29

VISUAL EXAMINATION REVISION NOTES

2026 Edition

MRCOG Part 1 Revision Notes

Lecture 29: Blood Supply of the GI Tract

Anatomy • Visual revision edition

COLOUR CODE USED THROUGHOUT THESE NOTES

COELIAC / FOREGUT

SMA / MIDGUT

IMA / HINDGUT

PORTAL VEINS

MARGINAL ARTERY

LEARNING OBJECTIVES — tick off as you go

- ☐ Name the branches of the coeliac trunk, SMA and IMA and their territories.
- ☐ Describe the marginal artery, arc of Riolan and the watershed points.
- ☐ Describe formation and course of the portal vein and the porto-systemic anastomoses.
- ☐ Describe lymph drainage and the pre-aortic autonomic plexuses.
- ☐ Apply to bleeding ulcer, mesenteric ischaemia, ischaemic colitis and pelvic surgery.

1 Overview

Region	Artery (level)	Territory
Foregut	Coeliac trunk (T12)	Abdominal oesophagus → 2nd part of duodenum (at the papilla); plus liver, spleen, pancreas
Midgut	SMA (L1)	2nd part of duodenum → proximal $\frac{2}{3}$ of transverse colon
Hindgut	IMA (L3)	Distal $\frac{1}{3}$ of transverse colon → upper anal canal (above the pectinate line)

Below the pectinate line: **inferior rectal artery** (internal pudendal). Veins return through the **portal system** to the liver.

2 The Coeliac Trunk — Foregut

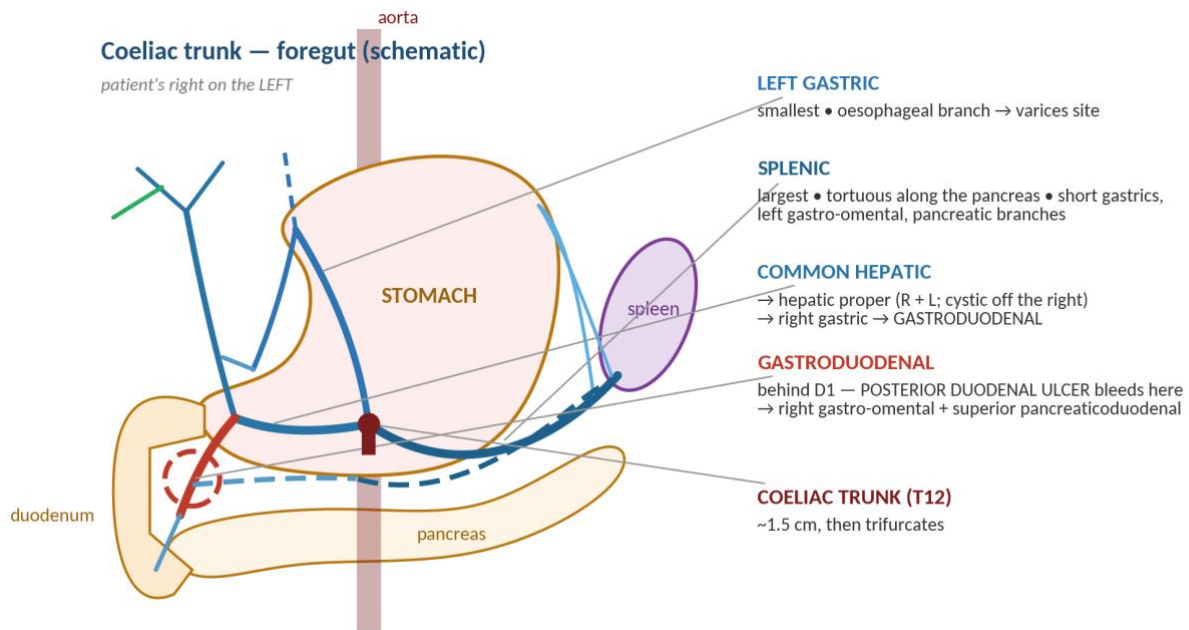


Figure 1. Branches of the coeliac trunk.

Branch	Course and branches
Left gastric	Smallest; up to the cardia (oesophageal branch — varices), down the lesser curvature to meet the right gastric
Splenic	Largest; tortuous along the upper pancreas • pancreatic branches • short gastrics (fundus) • left gastro-omental (greater curvature) • hilar branches
Common hepatic	→ hepatic artery proper (free edge of lesser omentum; right + left; cystic from the right) • right gastric • gastroduodenal (behind D1 → right gastro-omental + superior pancreaticoduodenal)

MNEMONIC / MEMORY HOOK

'Left Hand Side' — Left gastric, Hepatic (common), Splenic — the three coeliac branches.

EXAM HOOK

Posterior duodenal ulcer → gastroduodenal artery → torrential bleeding. Lesser curvature gastric ulcer → left gastric artery.

3 SMA, IMA and the Marginal Artery

Colon supply — SMA (green) and IMA (red) territories

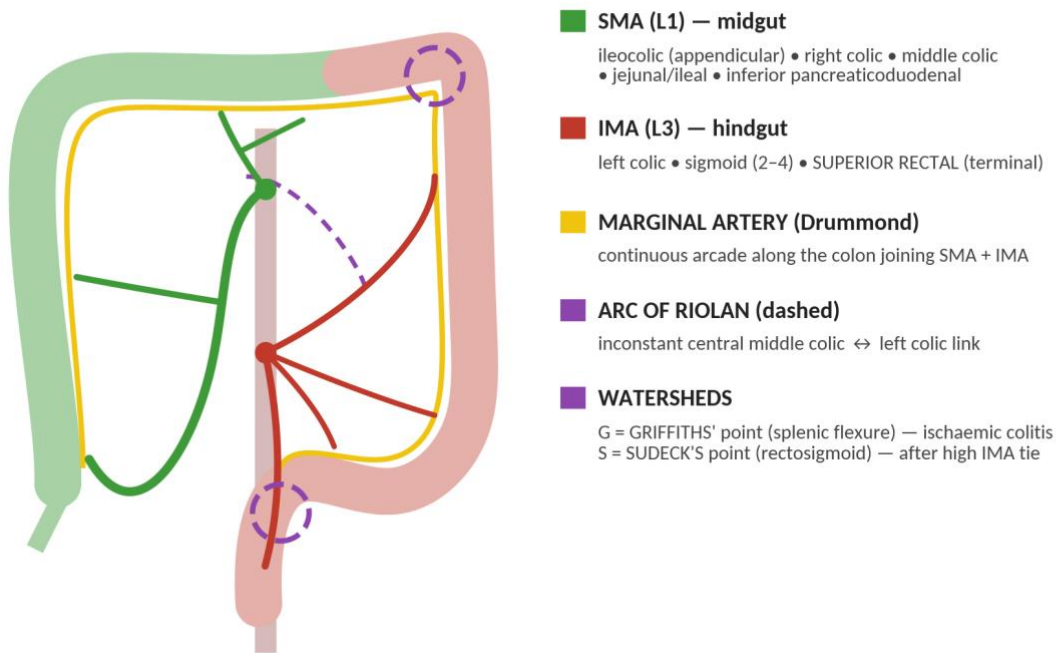


Figure 2. The colon's two arterial territories and their weak points.

SMA (L1) — MIDGUT

- Behind the pancreatic neck → **in front of the uncinate process + D3** (SMA syndrome)
- **Inferior pancreaticoduodenal** — the main coeliac–SMA collateral
- Jejunal + ileal arteries (arcades)
- **Ileocolic** (terminal ileum, caecum, **appendicular**)
- **Right colic • middle colic** (transverse mesocolon)

IMA (L3) — HINDGUT

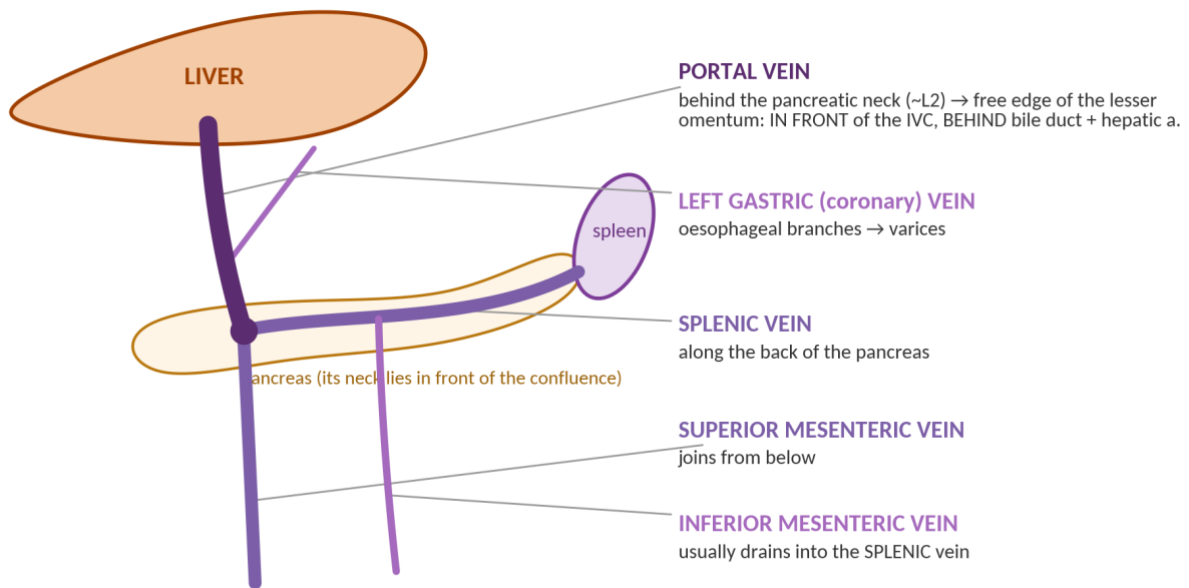
- ~3–4 cm above the aortic bifurcation, retroperitoneal
- **Left colic** — distal transverse + descending colon
- **Sigmoid arteries (2–4)**
- **Superior rectal** — terminal branch; over the left common iliac vessels, into the sigmoid mesocolon → rectum + upper anal canal

Collateral / weak point	Detail
Marginal artery (Drummond)	Continuous arcade along the mesenteric border of the colon — ileocolic → sigmoid branches
Arc of Riolan	Inconstant central middle colic ↔ left colic link — important in chronic mesenteric ischaemia
Griffiths' point	Splenic flexure — commonest site of ischaemic colitis
Sudeck's point	Rectosigmoid — at risk after a high IMA ligation

- Anal canal: superior rectal (above the line), **inferior rectal** (internal pudendal, below), middle rectal (internal iliac) to the rectal wall.

4 Portal Venous Drainage

Formation of the portal vein (schematic)



Mnemonic: 'Spleen + SMV make the portal; IMV is a late guest (joins the splenic)'.

Figure 3. How the portal vein forms.

- **Splenic vein + SMV** join behind the **neck of the pancreas** (~L2); the **IMV** usually drains into the **splenic vein**. Other tributaries: left + right gastric, cystic, para-umbilical veins.
- The portal vein runs up in the **free edge of the lesser omentum** — **in front of the IVC, behind the bile duct and hepatic artery** — to the porta hepatis.

Porto-systemic anastomoses

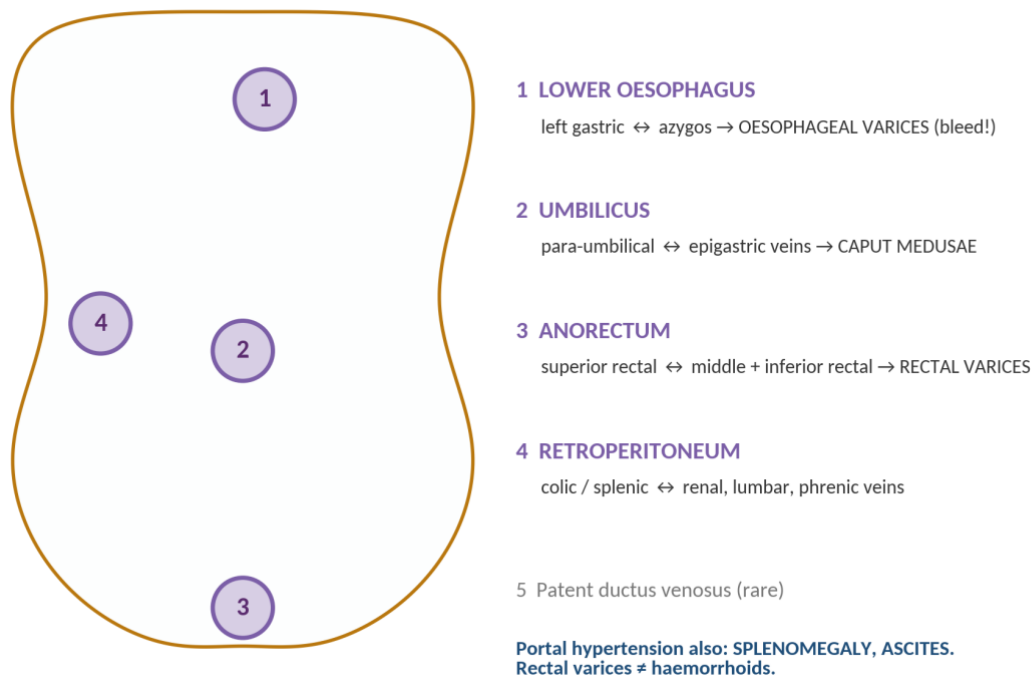


Figure 4. Where portal and systemic veins meet.

Site	Portal side	Systemic side
Lower oesophagus	Left gastric	Azygos → SVC — oesophageal varices
Umbilicus	Para-umbilical veins	Superficial epigastric / thoraco-epigastric — caput medusae
Anorectum	Superior rectal	Middle + inferior rectal → internal iliac — rectal varices
Retroperitoneum	Colic, splenic, pancreatic	Renal, lumbar, phrenic
Ductus venosus	Left portal branch	IVC (rarely patent)

EXAM HOOK

Portal hypertension: **oesophageal varices** (major bleeding risk), caput medusae, **rectal varices** (NOT the same as haemorrhoids), **splenomegaly**, **ascites**.

5 Lymph and Nerves

- Lymph follows the arteries: **coeliac → foregut, superior mesenteric → midgut, inferior mesenteric → hindgut** → pre-aortic nodes → **cisterna chyli (L1–L2)** → thoracic duct → left venous angle.

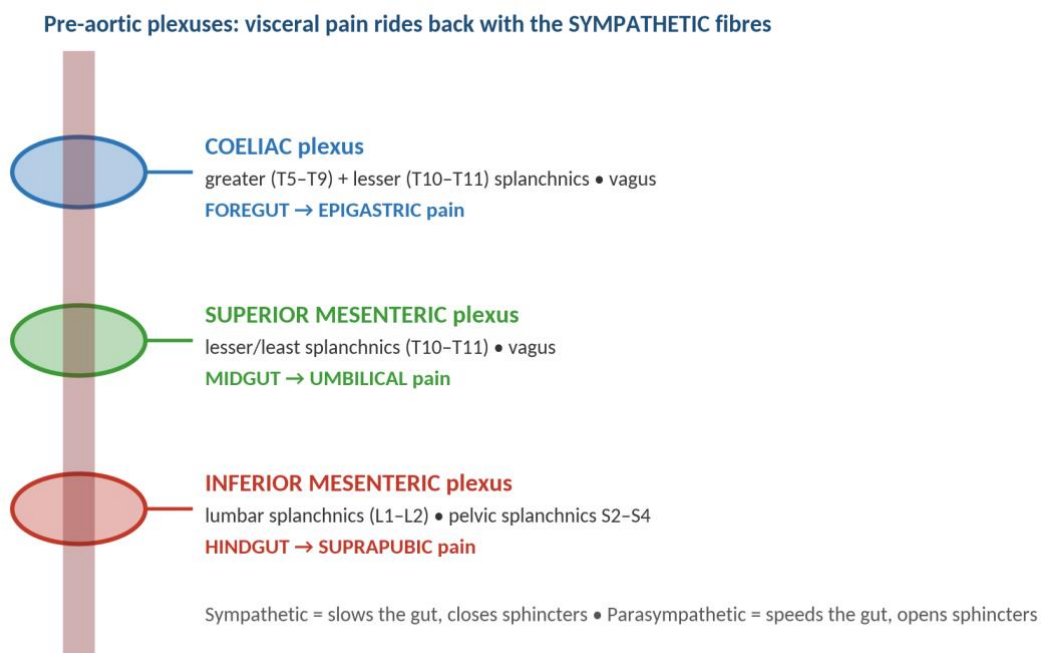


Figure 5. The pre-aortic plexuses and referred pain.

6 Clinical Correlations

BLEEDING PEPTIC ULCER

- Posterior D1 ulcer → **gastrooduodenal artery**
- Lesser curvature gastric ulcer → **left gastric artery**

ACUTE MESENTERIC ISCHAEMIA

- SMA embolus (AF) or thrombosis
- Pain out of proportion to signs**, lactic acidosis
- Mortality > 50% — revascularise early

ISCHAEMIC COLITIS

- Watershed — **splenic flexure**
- Elderly, low-flow states (heart failure, sepsis, after AAA repair)
- Cramping pain + bloody diarrhoea

COMPRESSION SYNDROMES

- **SMA syndrome:** D3 squeezed between SMA and aorta after rapid weight loss
- **Median arcuate ligament syndrome:** coeliac trunk compressed — post-prandial epigastric pain

CLINICAL LINK

Gynaecological oncology: the IMA arises at L3 and is met during **para-aortic lymphadenectomy** and **rectosigmoid resection** in ovarian cancer surgery. If it is tied, the sigmoid survives only if the **marginal artery** is intact (watch Sudeck's point).

★ PEARL

The portal vein has **no valves**, so raised pressure transmits freely back into the porto-systemic anastomoses. **Splenic vein thrombosis** (pancreatitis, pancreatic cancer) → 'left-sided' portal hypertension: splenic blood reroutes through the **short gastric veins** → **isolated gastric (fundal) varices**.

7 MRCOG Exam Pearls — Last-Minute Page**Numbers to know**

T12 Coeliac trunk	L1 SMA	L3 IMA	~L2 Portal vein forms
~1.5 cm Coeliac trunk length	2–4 Sigmoid arteries	5 Porto-systemic sites	> 50% Mesenteric ischaemia mortality

HIGH-YIELD CHECKLIST

- ☐ Coeliac (T12): left gastric, splenic, common hepatic.
- ☐ Gastroduodenal behind D1 — posterior ulcer bleed.
- ☐ SMA (L1): inferior pancreaticoduodenal, jejunal/ileal, ileocolic, right colic, middle colic.
- ☐ IMA (L3): left colic, sigmoid, superior rectal.
- ☐ Midgut/hindgut junction: $\frac{2}{3}$ along the transverse colon.
- ☐ Marginal artery links SMA + IMA; Griffiths' point (splenic flexure), Sudeck's (rectosigmoid).
- ☐ Portal vein = splenic + SMV behind the pancreatic neck; IMV usually into the splenic.
- ☐ Portal vein: in front of IVC, behind bile duct + hepatic artery.
- ☐ Porto-systemic: oesophagus, umbilicus, anorectum, retroperitoneum.
- ☐ Splenic vein thrombosis → isolated gastric varices via short gastrics.
- ☐ Coeliac T5–T9 (epigastric), SMA T10–T11 (umbilical), IMA L1–L2 (suprapubic).

Quick-fire self-test — cover the right-hand column

Question	Answer
Three branches of the coeliac trunk?	Left gastric, splenic, common hepatic
Artery eroded by a posterior duodenal ulcer?	Gastroduodenal

Question	Answer
Which artery supplies the appendix?	Appendicular (from ileocolic, SMA)
Terminal branch of the IMA?	Superior rectal artery
Commonest site of ischaemic colitis?	Splenic flexure (Griffiths' point)
Which two veins form the portal vein?	Splenic + superior mesenteric
Where does the IMV usually drain?	Splenic vein
What lies behind the portal vein in the lesser omentum?	IVC (through the epiploic foramen)
Porto-systemic site causing caput medusae?	Umbilicus (para-umbilical veins)
Splenic vein thrombosis causes which varices?	Isolated gastric (fundal) varices
Structure compressed in SMA syndrome?	3rd part of the duodenum

8 References

- Standring S, editor. Gray's Anatomy. 42nd ed. 2020.
- Moore KL et al. Clinically Oriented Anatomy. 8th ed. 2017.
- Drake RL et al. Gray's Anatomy for Students. 4th ed. 2019.