
MIDLANDS SURGICAL
ANATOMY TEACHING
SERIES

A detailed anatomical illustration of the human torso, showing the rib cage, spine, and major muscles. The illustration is in a dark blue, etched style. It includes various numbers (1-10) and letters (A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z) indicating specific anatomical features.

MSATS HANDOUT 2021/22

High Yield | Surgical Relevance | CPD Accredited

UPPER GI ANATOMY

Objectives: Understand the neurovascular supply and relations of the oesophagus, stomach and duodenum. Describe the structure of the peritoneum, mesentery and omentum. Apply anatomical knowledge to the setting of Upper GI Surgery (oesophagectomy + gastrectomy)

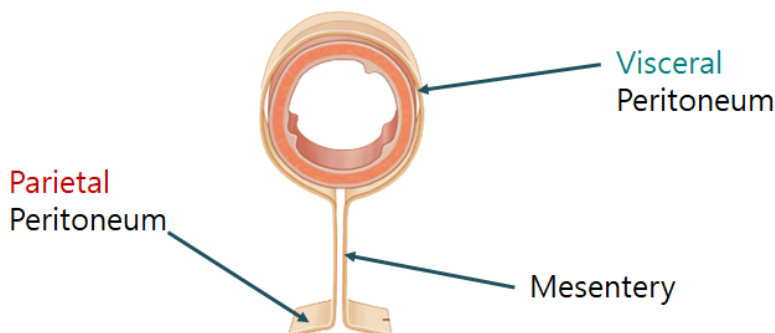
Peritoneum

Parietal

- Lines the abdominal wall – the innermost lining of the abdominal wall
- **Somatic innervation** – pain is well localised

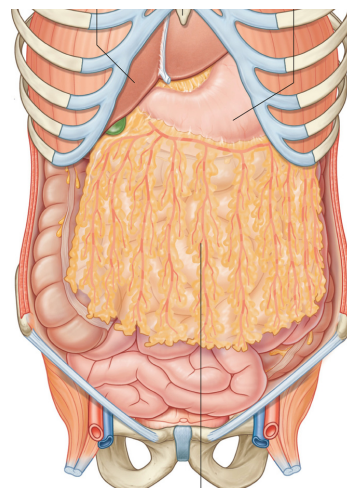
Visceral

- Covers and encloses abdominal viscera
- **Autonomic innervation** – poorly localised pain



Mesentery

- Double layer of visceral peritoneum
- Attaches from small intestines to posterior abdominal wall
- Allows important neurovascular structures to travel from abdominal wall to abdominal viscera.



Greater Omentum

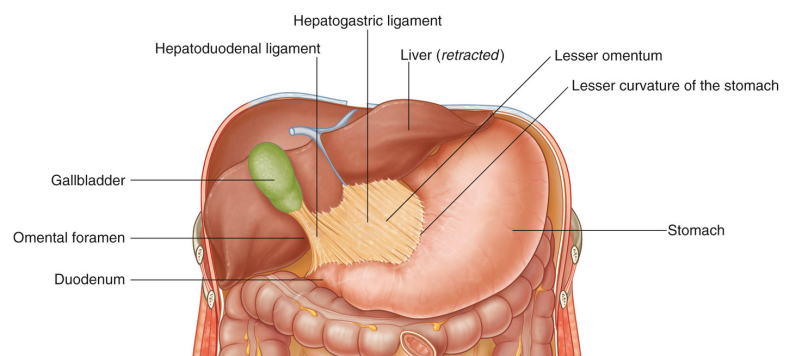
The mesentery can also be associated with other organs. In this case, it is named with the prefix '-meso'. E.g. mesocolon

Greater Omentum

- 4 layers of visceral peritoneum.
- Extends from **greater curvature** of the stomach to transverse colon.
- Mobile and provides immune response "policeman of the abdomen".

Lesser Omentum

- 2 layers of visceral peritoneum.
- Contains the **hepatogastric** and **hepatoduodenal** ligaments.
- **Lesser curvature** and **1st part of duodenum** to inferior surface of the liver.



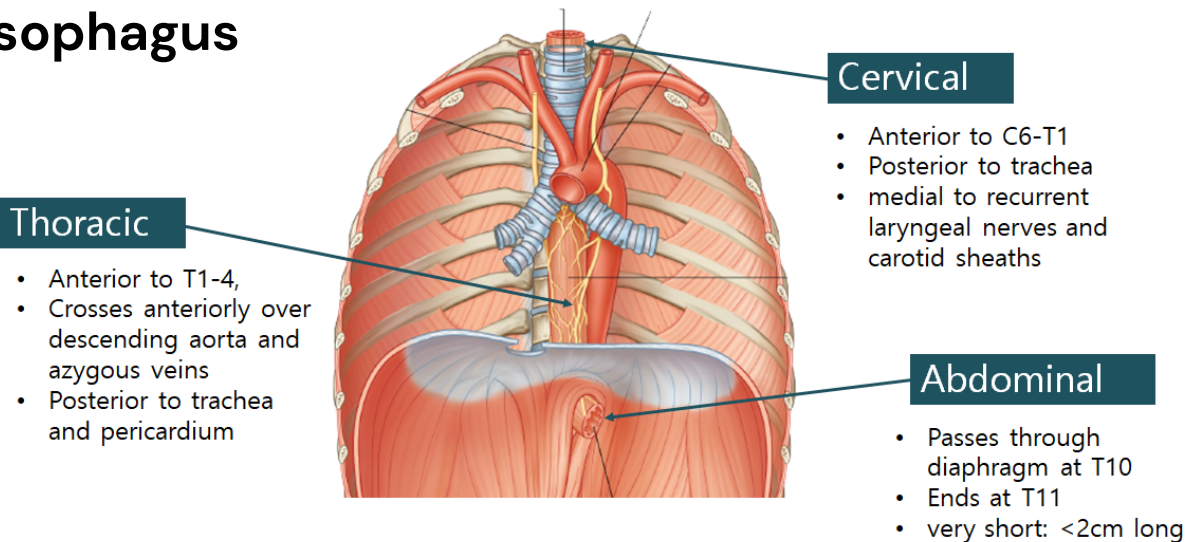
Greater and Lesser Sacs

- **Greater Sac** = most of the peritoneal cavity, deep to the parietal peritoneum
- **Lesser Sac** = posterior to the stomach and liver
 - Continuous with the stomach via the **epiploic foramen (Foramen of Winslow)**

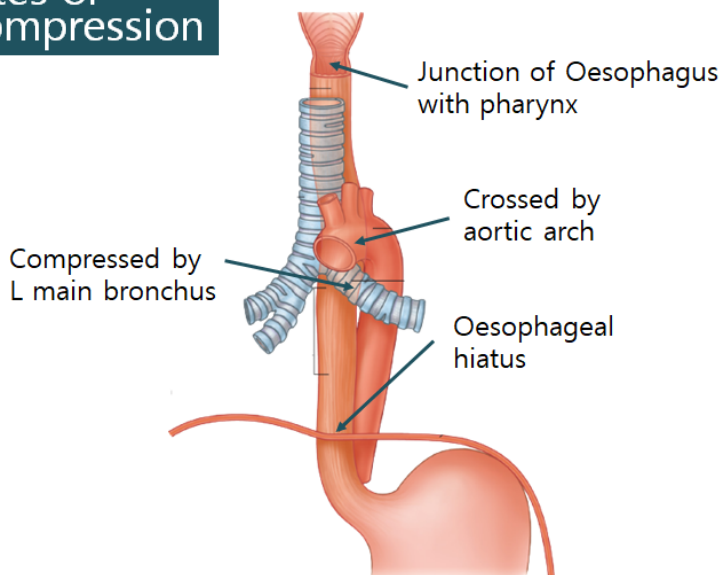
UPPER GI ANATOMY

Objectives: Understand the neurovascular supply and relations of the oesophagus, stomach and duodenum. Describe the structure of the peritoneum, mesentery and omentum. Apply anatomical knowledge to the setting of Upper GI Surgery (oesophagectomy + gastrectomy)

Oesophagus



Sites of compression



Arterial Supply:

- Thoracic aorta
- Left gastric artery
- Other: Bronchial arteries, Inferior thyroid artery, Left inferior phrenic artery

Venous Drainage:

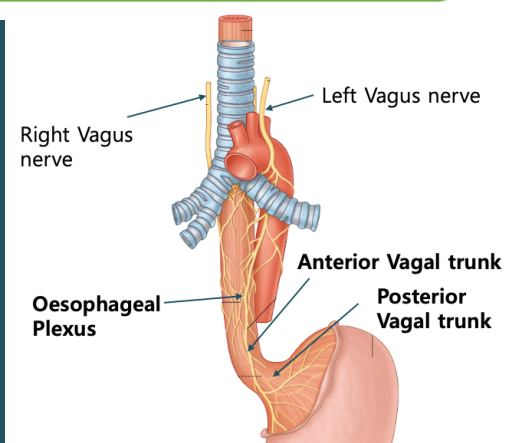
- Azygos and hemiazygos veins
- L gastric vein → portal system

Lymphatic Drainage:

- Posterior mediastinal nodes & left gastric nodes

Innervation of Oesophagus

- **Striated muscle** = branchial efferents from Vagus
- **Smooth muscle** = PS – visceral efferents from Vagus
- **Sensory** = visceral afferents from Vagus, sympathetic trunks and splanchnic nerves
 - Vagus – information on physiology and reflexes
 - Sympathetic trunks and splanchnic nerves – pain
- The two Vagus nerves form the **Oesophageal plexus**, which then forms two trunks just above the diaphragm
 - The **Anterior Vagal Trunk** is formed mainly from the L Vagus
 - The **Posterior Vagal Trunk** is formed mainly from the R Vagus

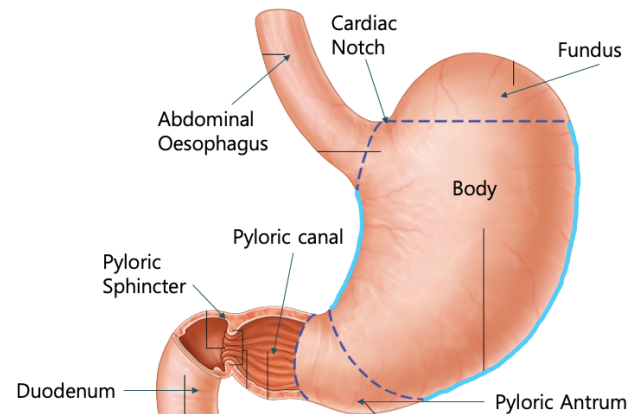


UPPER GI ANATOMY

Objectives: Understand the neurovascular supply and relations of the oesophagus, stomach and duodenum. Describe the structure of the peritoneum, mesentery and omentum. Apply anatomical knowledge to the setting of Upper GI Surgery (oesophagectomy + gastrectomy)

Stomach

- The stomach has a **lesser** and **greater** curvature.
- Transpyloric Plane (of Addison) = L1 corresponds to:
 - Pylorus of stomach
 - Neck of pancreas
 - Fundus of gallbladder
 - Hilum of L & R kidneys
- Lymphatic drainage – **gastric** and **gastro-omental** lymph nodes at curvatures.



Relations of the Stomach

Superior	Anterior	Posterior
<ul style="list-style-type: none"> Oesophagus L dome of diaphragm 	<ul style="list-style-type: none"> Diaphragm Greater Omentum Liver (L lobe) 	<ul style="list-style-type: none"> Lesser sac Pancreas L kidney L adrenal gland Spleen Splenic artery

Venous Drainage

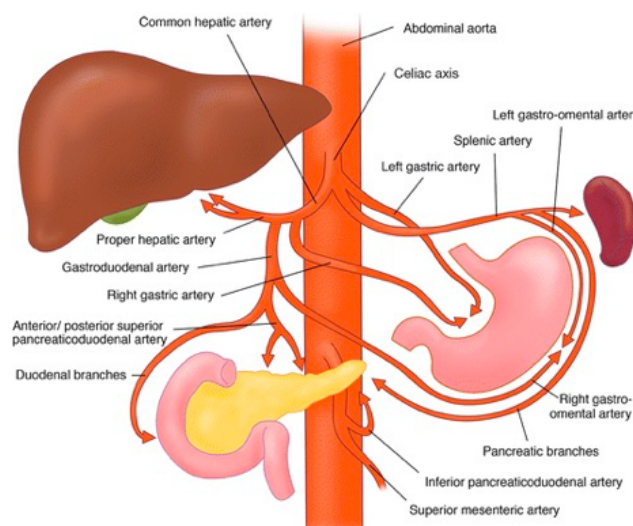
- R and L gastric veins --> hepatic portal vein
- Short gastric veins + L gastro-omental --> splenic vein + SMV --> hepatic portal vein
- R Gastro-omental veins --> superior mesenteric vein

Innervation

- Sympathetic**
 - Greater splanchnic nerve (T5-9)
 - Synapses in coeliac ganglion to innervate foregut
- Parasympathetic**
 - Coeliac plexus from Vagus nerve

Arterial Supply

- Greater Curvature**
 - R gastro-omental (gasroduodenal)
 - L gastro-omental (splenic)
 - Short gastric arteries (splenic)
- Lesser Curvature**
 - R gastric (common hepatic)
 - L gastric (coeliac trunk)



Thoracic Splanchnic Nerves

- Greater** – T5-T9 & travels to coeliac ganglion
- Lesser** – T9+T10 & travels to superior mesenteric ganglion
- Least** – T12 & travels to inferior mesenteric ganglion & renal plexus

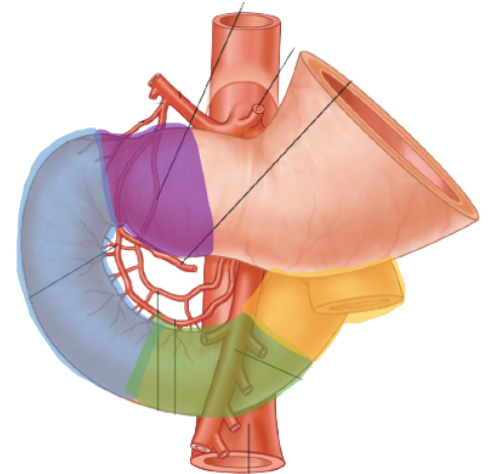
UPPER GI ANATOMY

Objectives: Understand the neurovascular supply and relations of the oesophagus, stomach and duodenum. Describe the structure of the peritoneum, mesentery and omentum. Apply anatomical knowledge to the setting of Upper GI Surgery (oesophagectomy + gastrectomy)

Duodenum

- **Superior part** – pyloric orifice to gallbladder neck (L1)
- **Descending part** – gallbladder neck to lower border of L3
- **Inferior part** – inferior duodenal flexure (L3)
- **Ascending part** – L3 to L2, duodenojejunal flexure

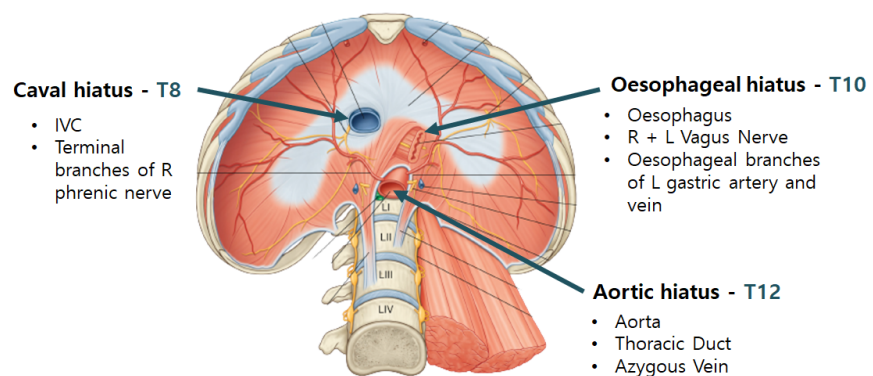
The duodenum is mostly retroperitoneal, however the first part is intraperitoneal.



Duodenum – Vasculature

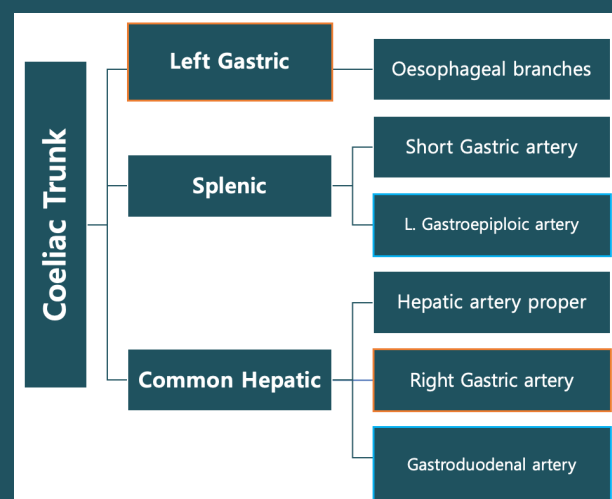
- **Arterial Supply:**
 - Supraduodenal arteries (gastrooduodenal of coeliac)
 - Superior pancreaticoduodenal arteries (from coeliac trunk)
 - Inferior pancreaticoduodenal arteries (from SMA)
 - Jejunal branches
- **Venous Drainage:**
 - Pre-pyloric vein
 - Superior pancreaticoduodenal veins
 - Inferior pancreaticoduodenal veins

Diaphragmatic Openings



Overview of Foregut

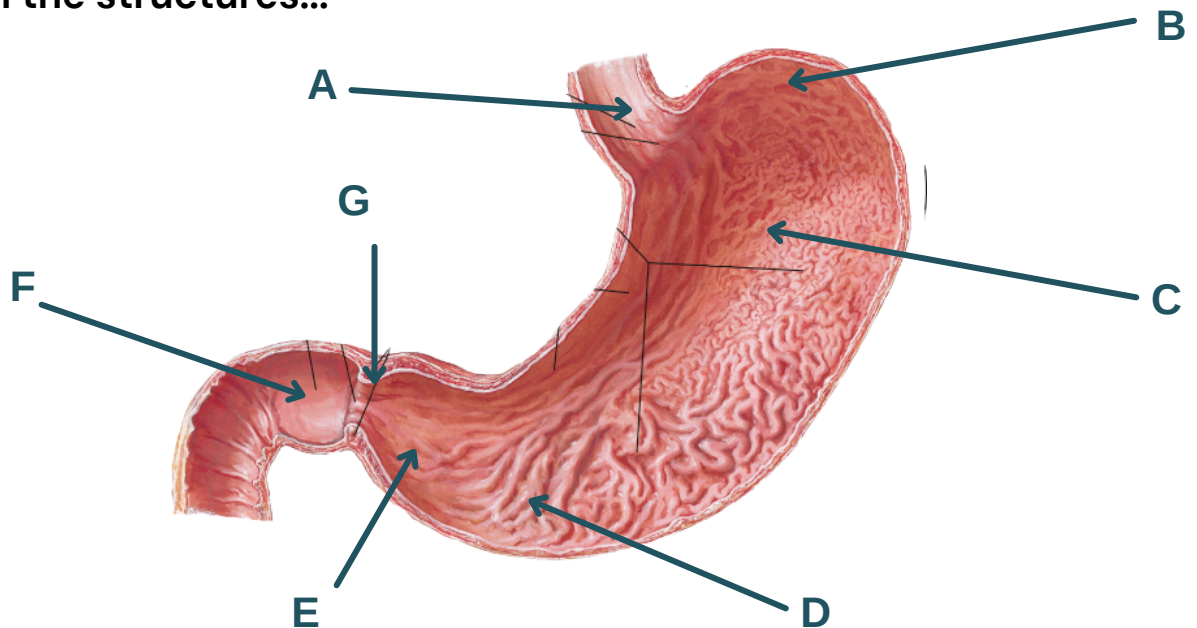
- From the inferior oesophagus to the 2nd part of the duodenum.
- **Arterial supply** = coeliac trunk.
- **Venous drainage** = portal vein, splenic veins and SMV.
- **Sympathetic innervation** = greater splanchnic nerve (synapses in coeliac ganglion).
- **Parasympathetic innervation** = Vagus nerve.



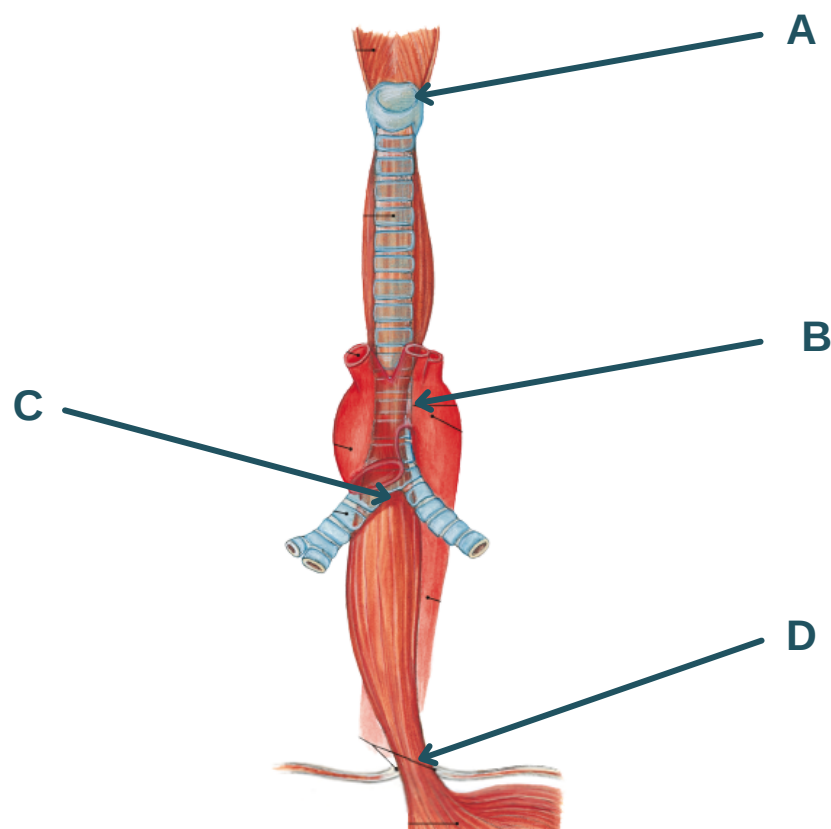
UPPER GI ANATOMY

Test yourself...

1) Label the structures...



2) Label the areas of oesophageal compression:



UPPER GI ANATOMY

Test yourself...

MCQ 1

At which vertebral level does the oesophagus pass through the diaphragm?

- A. T10
- B. T9
- C. T8
- D. L1
- E. T12

MCQ 2

The transverse colon is attached to the posterior abdominal wall by a double fold of peritoneum. Which other organ is attached in a similar manner?

- A. Ascending colon
- B. 3rd part of the duodenum
- C. Stomach
- D. Left kidney
- E. Right kidney

MCQ 3

Which of these structures is not found at the transpyloric plane of Addison?

- A. Neck of the pancreas
- B. Pylorus of the stomach
- C. Fundus of the gallbladder
- D. Hilum of the kidneys
- E. 1st part of duodenum

MCQ 4

A 70-year-old man presents with severe central upper abdominal pain. He is investigated and found to have ischaemia of the first part of his duodenum. Which of the following arteries supplies this region?

- A. Splenic artery
- B. Inferior mesenteric artery
- C. Superior mesenteric artery
- D. Coeliac trunk
- E. Jejunal artery

MCQ 5

Which of the following structures does not pass through the oesophageal hiatus of the diaphragm?

- A. Oesophagus
- B. R and L Vagus nerves
- C. Oesophageal branch of L gastric artery
- D. Thoracic duct
- E. Oesophageal branch of L gastric vein

MCQ 6

From which spinal levels does the greater splanchnic nerve originate?

- A. T4-T8
- B. T5-T9
- C. T9-T10
- D. T10-T11
- E. T9-T11

UPPER GI ANATOMY

Test yourself...

OSCE Station – Case Based Discussion

A 64-year-old male presents to the GP with a hoarse voice, difficulty swallowing and recent weight loss. His past medical history includes Barrett's Oesophagus, hypertension, type 2 Diabetes Mellitus and obesity. He has smoked 15 cigarettes a day for the past 45 years, and has a weekly alcohol intake of 22 units. Physical examination is unremarkable and the patient does not report any other areas of pain.



- Q1. How many pack years does this patient have?**
- Q2. What is this patient's likely diagnosis?**
- Q3. What investigations would you do to confirm this diagnosis?**
- Q4. Where is this tumour likely to be found?**
- Q5. How would you manage this patient?**
- Q6. What are the potential complications of surgical management?**

Answers

1. A = abdominal oesophagus, B = fundus, C = body, D = antrum, E = pyloric canal, F = 1st part duodenum, G = pyloric sphincter

2. a = junction of oesophagus and pharynx, b = where oesophagus is crossed by aortic arch, c = where left main bronchus crosses oesophagus, d = oesophageal hiatus

MCQs = 1. A, 2. C, 3. E, 4. D, 5. D, 6. B

OSCE

1. 34 pack years (0.75x45)

2. Adenocarcinoma of the oesophagus – this is most linked to Barrett's Oesophagus.

3. 2 week wait referral – Upper GI endoscopy, subsequent CT scan (thorax, abdomen, pelvis for staging)

4. Inferior 1/3 of the oesophagus, close to the gastro-oesophageal junction.

5. Surgical resection, chemotherapy, radiotherapy, counselling

6. Anastomotic leak and mediastinitis, fistula, hoarse voice, reflux oesophagitis, infection