Abdomen: Oesophagus, Stomach and Duodenum

OESOPHAGUS (27cm long)

Nerves: Sensation and motor via vagus nerves
Lining: Stratified squamous (non-keratinising) becoming columnar at stomach
Thick muscularis mucosae ++
Mucous glands in mucosa and submucosa

RELATIONS OF OESOPHAGUS

<table>
<thead>
<tr>
<th>Slight compression from:</th>
<th>C6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cricoid cartilage</td>
<td>Anterior: trachea to T4/5, recurrent laryngeal nerves, left bronchus, left atrium, diaphragm</td>
</tr>
<tr>
<td>Aorta</td>
<td>Left: thoracic duct, aorta, left subclavian artery, lung</td>
</tr>
<tr>
<td>Left bronchus</td>
<td>Right: lung, azygos vein (hence good side to approach the oesophagus surgically)</td>
</tr>
<tr>
<td>Left atrium</td>
<td></td>
</tr>
<tr>
<td>Diaphragmatic hiatus</td>
<td></td>
</tr>
</tbody>
</table>

Endoscopic narrowings as above:
From mouth at 15cm, 27cm, 40cm

Note: 40-45cm is also the length of thoracic duct, vas, femur, spinal cord and transverse colon

<table>
<thead>
<tr>
<th>1/3rds</th>
<th>MUSCLE</th>
<th>ARTERY</th>
<th>VEIN</th>
<th>LYMPH</th>
<th>LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper</td>
<td>Striated</td>
<td>Inferior thyroid</td>
<td>Inferior thyroid</td>
<td>Deep cervical</td>
<td>9cm</td>
</tr>
<tr>
<td>Middle</td>
<td>Striated/smooth</td>
<td>Aortic branches</td>
<td>Azygos branches</td>
<td>Mediastinal</td>
<td>9cm</td>
</tr>
<tr>
<td>Lower</td>
<td>Smooth</td>
<td>Left gastric</td>
<td>Left gastric</td>
<td>Gastric</td>
<td>9cm</td>
</tr>
</tbody>
</table>
STOMACH - TOPOGRAPHY & OESOPHAGOJASTROGASTRIC JUNCTION

Cardia (cardiac orifice)  
T10 vertebral level  
Intra-abdominal oesophagus (3cm)

Lesser curvature & lesser omentum
Incisura angularis
Pylorus

Fundus
Body
Greater curvature & greater omentum

Acid. Oxyntic cells produce hydrochloric acid
Alkaline: Gastrin production

FACTORS PREVENTING GASTRO-OESOPHAGEAL REFLUX

1. Crura. Mostly right but together giving effectively a circle of muscle
2. Angle of oesophagojastrogastric junction
3. Apposition of mucosal folds
4. Phrenico-oesophageal ligament (a fold of connective tissue)
5. Intra-abdominal pressure acting laterally on small section of intra-abdominal oesophagus
STOMACH - MUSCLE COATS & CELLS

- Outer longitudinal
- Inner circular
- Incomplete oblique innermost
- Mucosal rugae caused by muscle fibres

Mucosal cells

Mucous cells (neutral)

Oxyntic (parietal) cells
Acid production under influence of gastrin

Pepsin from zymogenic cells (lipase)

Entero/endocrine cells
G cells in pylorus produce gastric. Apud cells. VIP, 5 hydroxytryptamine, etc

Gastric gland

Note: The following are produced from the cells of the stomach;
Pepsin, hydrochloric acid, gastrin, intrinsic factor, somatostatin, serotonin and endomorphin
STOMACH - RELATIONS

ANTERIOR
- Abdominal wall
- Left costal margin
- Diaphragm
- Left lobe of liver

SUPERIOR
- Left dome of diaphragm

POSTERIOR
- Lesser sac
- Pancreas
- Transverse mesocolon
- Transverse colon
- Left kidney/suprarenal gland
- Spleen/splenic artery
STOMACH - BLOOD SUPPLY
& VENOUS DRAINAGE

Arterial supply

Oesophageal branches
left gastric

Hepatic

Right gastric

Gastroduodenal

Superior pancreatico-duodenal

Short gastrics

Splenic

Left gastro-epiploic (greater curvature & omentum)

Right gastro-epiploic (greater curvature & omentum)

Venous drainage

Left gastric & oesophageal branches

Portal

Right gastric

Superior pancreatico-duodenal

Superior mesenteric

Portal

Short gastrics

Splenic

left Gastro-epiploics

Right

* Pre-pyloric vein of Mayo but first described by Laterjet
Vagus nerves are 80% sensory. 20% motor for increasing motility, opening pylorus & initiating secretions.

Sympathetics
Greater splanchnic nerves (T5-9) for decreasing motility, vasoconstriction, closing pylorus & sensation.

Note: Highly selective vagotomy destroys vagus to fundus & body but preserves nerve to antral pump.
DUODENUM - GENERAL
10" (25cm) Greek for 12 fingers

SECOND PART (3" or 8cm)
• Retroperitoneal
• In transpyloric plane
• Downwards over hilum of right kidney
• Anterior: Gallbladder, hepatic flexure
• Medial: Pancreas, ampulla (posteromedial, 4" or 10cm from pylorus)
• Lateral: Ascending colon

Blood supply: Superior & inferior pancreatico-duodenal arteries, right gastric artery, right gastro-epiploic artery
Veins: Splenic, superior mesenteric & portal

FIRST PART (2" or 5cm)
• 1st 1/2 with mesentery, 2nd 1/2 without.
• Slightly longer in female
• Just above transpyloric plane
• Passes to right, upwards, backwards
• Anterior: Liver & gallbladder
• Superior: Epiplioic foramen
• Inferior: Pancreas

THIRD PART (4" or 10cm)
• Retroperitoneal
• Below subcostal plane
• Passes forwards & to left
• Anterior: Small bowel mesentery, superior mesenteric artery & vein
• Superior: head of pancreas
• Inferior: Jejunum

FOURTH PART (1" or 2.5cm)
• Mesentery begins
• Ascends to L2
• Ends as duodenojejunal junction
• Anterior: Transverse colon & mesocolon
• Left: Left kidney & ureter
• Superior: Body of pancreas
DUODENUM - POSTERIOR RELATIONS
& LIGAMENT OF TREITZ

POSTERIOR RELATIONS OF DUODENUM

SECOND PART
- Hilum of right kidney
- Right ureter

FIRST PART
- Lesser sac
- Pancreas
- Bile duct
- Portal vein
- Hepatic artery
- Gastroduodenal artery

Arrow in opening of lesser sac

Pancreas in "curve"

Inferior mesenteric vein

Aorta & inferior mesenteric artery

IVC

THIRD PART
- Right psoas
- Right genitofemoral nerve
- Right gonadal artery & vein
- Right ureter
- Inferior vena cava
- Aorta
- L3 vertebra

FOURTH PART
- Left sympathetic chain
- Left psoas
- Left genitofemoral nerve
- Left renal artery & vein
- Left gonadal artery & vein
- Inferior mesenteric vein

LIGAMENT OF TREITZ
2 parts, probably neither attached to crura
1. Slip of striated muscle from diaphragm at oesophageal opening, ending in connective tissue at coeliac artery
2. Fibromuscular (non striated) band from region of coeliac artery to duodenojejunal junction and 3th & 4th parts of duodenum

Referred pain via general visceral afferents in sympathetics to T8-10 (epigastrium & para-umbilical)
DUODENUM - HISTOLOGY

- Villi/microvilli
- Crypts of Lieberkuhn
- Apud cells in base
- Brunner's glands producing alkaline mucus (only found in duodenum)

Note: Mucosa is thrown into folds called plicae circulares or valvulae conniventes