# ALIMENTARY TRACT

## MUSEUM CATALOGUE



This booklet belongs to the Department of Pathology at the University of Adelaide.

DO NOT REMOVE

Department of Pathology, University of Adelaide, 2004

# ALIMENTARY TRACT

## INTRODUCTION

The pathology of the alimentary tract is very varied and includes congenital, inflammatory, vascular and neoplastic processes.

The oesophagus is a tube about 25cm long lined by non-keratinising stratified squamous epithelium continuous above with the pharynx and below with the stomach. The mucosal lining tends to be thrown into longitudinal folds.

The stomach comprises several anatomical regions: cardia, fundus, body, antrum and pylorus. The gastric glands are lined by a simple columnar epithelium comprising a variety of cell types, the distribution of which varies between the different regions. Many of the cells are mucus secreting but these are not the same as the goblet cells present in the small and large bowel. The squamocolumnar junction, the region where the oesophageal squamous epithelium meets the gastric glandular epithelium is normally readily identified macroscopically in the fresh state, the squamous epithelium being paler and smoother while the gastric epithelium is more velvety. The mucosa of the stomach is thrown into mainly longitudinal folds, the rugae. Adipose tissue in the form of omentum is attached to the stomach along the lesser and greater curvatures (lesser and greater omentum respectively).

The small intestine is a very long tube and comprises duodenum, jejunum and ileum. It is normally possible to distinguish small bowel from large bowel macroscopically. The small bowel generally has a smaller diameter, has a smooth serosal surface except where the mesentery attaches along one side and the mucosa is thrown into close transverse folds, or plicae circulares. The absorptive surface area of the small bowel is greatly increased by the plicae (the core of which is formed by submucosa), the villi (sometimes just seen macroscopically and the core of which is formed by lamina propria) and the microvilli (tiny surface projections of the enterocytes, barely seen on light microscopy).

The large intestine comprises caecum, from which the appendix arises, and ascending, transverse, descending and sigmoid parts. It is of wider diameter than the small bowel, has 3 longitudinal muscle bands (taeniae coli) seen externally and which tend to bunch the bowel into haustra, has external fatty appendages (appendices epiploicae) and a broader based attachment to the fatty tissue (here called mesocolon) that attaches it to the posterior abdominal wall. The mucosa is thrown into fewer and more irregularly arranged folds than in the small bowel.

The appendix is a short narrow blind-ending tube. It has a fatty mesoappendix along its length that attaches to the caecum.

The rectum is the most distal part of the large bowel. Most of it is retroperitoneal, the retroperitoneal part being circumferentially surrounded by adipose tissue. It is continuous distally with the anus, lined by stratified squamous epithelium, and again a squamocolumnar junction can often be distinguished macroscopically.

The basic histological structure of the alimentary tract is similar throughout its length and comprises several layers. Beneath the surface epithelium (which varies in type from region to region) and its basement membrane, is a lamina propria, a loose fibrovascular connective tissue which in many areas is filled with mononuclear inflammatory cells ready to deal with invading antigens, including plasma cells that make IgA that is transported into the gut lumen. Beneath the lamina propria is a thin smooth muscle layer, the muscularis mucosae, and beneath this, the submucosa, also comprising loose vascular connective tissue. Deep to this is the main muscle coat, the muscularis propria/externa that is in 2 layers, transverse and longitudinal. This smooth muscle layer can be seen macroscopically on

sections through the wall as a dark tan band 1-2 mm thick. The outermost layer is the serosa (a thin layer of loose connective tissue covered by simple squamous epithelium or mesothelium) where the gut is in contact with the peritoneal cavity, or adventitia, where there is more abundant surrounding fat attaching the gut to surrounding tissues. Nerves and ganglia are present in the submucosa and muscularis propria. The epithelium, lamina propria and muscularis mucosae together comprise the mucosa.

Mention will also be made here of the diffuse neuroendocrine system (DNES). The cells belonging to this system are dispersed individually in a wide variety of tissues including the epithelium of the GIT, bladder, lung and skin. The cells in the skin are known as Merkel cells, in the lung as Kulchitsky (K) cells, enteroendocrine cells in the GIT (G cells producing gastrin in the stomach are an example) and in the thyroid as parafollicular or C cells. These cells are thought to originate from the embryonic neural crest and have some features of neurones. They produce hormones, some of which act locally (paracrine). Such cells give rise to neuroendocrine tumours: the better differentiated ones mostly being known as carcinoid tumours, the poorly differentiated ones often being known only as undifferentiated small cell carcinoma (e.g. lung).

## HOW TO USE THIS CATALOGUE

This catalogue can be used as a tool to develop your knowledge, as well as provide an opportunity for revision.

It is divided into:

- Introduction and approach to specimens (pages 2-5).
- Index (pages 6-10). Examples of specific diagnoses can be found via the index.
- Core and classic disease processes (pages 11-42). This gives examples and discussion of core and/or classic diseases of the alimentary tract. These are the specimens that students should focus on being able to identify initially. However, it depends to some extent on what you have covered in lectures and practical classes or resource sessions as to what you should know. Some of the specimens and discussion are directed more towards clinical medical students.
- Main catalogue (pages 43-86). This section covers the specimens in numerical order. Questions and/or comments accompany some of the specimens to help you expand your knowledge. In order to fit more specimens in the museum, not all of the pots are in numerical order on the shelves, and large specimens are often found on the bottom shelves.

You might find it useful to work quietly with a few friends and to have a few textbooks handy (e.g. pathology, medical, anatomy). As well as learning pathology, you will also find that you can learn and revise some anatomy and clinicopathological correlation from the specimens and information given.

You do not have to examine every specimen in the museum. However, just as in clinical practice, you will not become proficient in diagnosing something if you have only seen one case. Exposure to a variety of cases (specific diagnoses can be found via the index) to experience the variability in morphology will help your learning greatly. In general the red and blue dots on the pots indicate basic and straightforward pathology, whereas yellow dots tend to indicate less readily diagnosable conditions. This is not a hard and fast rule, and you will find yellow dot specimens turning up in resource sessions/practical classes and even exams, if they represent classic pathology.

In general

- read the clinical information given
- look at the entire specimen, not just the front
- identify and orientate the organ or tissue (where possible)

- identify the abnormality and from your knowledge of pathology (which will come with time) look for relevant features to help you make the diagnosis. Of course to appreciate the abnormal you first need to have an appreciation of normal anatomy
- make a diagnosis or differential diagnosis using any clinical information given to you – it is often relevant – sometimes the diagnosis is only made with a knowledge of the clinical features. Even when you know the diagnosis, attempt to identify relevant features in the specimen and understand why this is the diagnosis.
- attempt to correlate the pathological features with the clinical features (clinico-pathological correlation) i.e. explain how the pathological features have caused the patients symptoms and signs (when relevant)
- try to answer any questions presented yourself before reading the answers.

You may prefer to look at the specimen 'blind', without reading the clinical information given first.

### Limits to diagnosis on macroscopic examination

In all cases a diagnosis is given, but it is important to realize that sometimes the final diagnosis was only made based on the clinical history and histological examination. In some cases the macroscopic appearance is classic and even without the history and histology you should be able to make the diagnosis from the appearance, in others, it might only be possible to give a list of differential diagnoses or a more general diagnosis.

Remember that some of these specimens are very old, and some of the investigations and treatments mentioned may be out of date.

In relation to pathology pot specimens in examinations, you may be asked

- for a diagnosis
- for a description
- about the pathogenesis of the disease
- about the predisposing factors and/or causes of the disease
- about the potential complications of the disease and how they arise
- to explain a patient's clinical symptoms and signs or investigation results in light of the pathological abnormalities present
- to describe the expected histological abnormalities in the abnormal areas

or other searching questions that we can concoct!

## BASIC APPROACH TO THE INTERPRETATION AND DESCRIPTION OF ALIMENTARY TRACT SPECIMENS

Students are expected to be able to give a brief succinct description of relevant macroscopic features of a specimen using appropriate terminology and to arrive at a diagnosis or differential diagnosis. Even if not asked for a description, identification of relevant features is helpful in the diagnostic process. Your descriptive skills will improve with practice.
In any aspect of medicine, one needs to approach things in a systematic manner, otherwise important points may be omitted.

- Read the clinical history, it will often provide relevant information (although sometimes it is helpful to look at the specimen without any information and work out what is going on for yourself)
- Look at the front of the pot first (i.e. the one with the number and the dot), but always make sure to look at the back and sides as well.

- Identify and orientate the specimen. Attempt to ascertain what part of the alimentary tract is present (to the level of oesophagus, stomach, small intestine, large intestine, appendix, rectum or anus). You should also have an appreciation of the normal size of organs.
- Identification of and description of the abnormality. Assess where the abnormality is and decide whether it is focal, diffuse (involving an entire organ, region or tissue) or multifocal. Where possible, you should describe the site of the lesion/s using appropriate anatomical terms, not for example, "at the top of the pot". The gastric specimens in the museum have normally been opened along the greater curvature. The lesion itself should then be described.

  Focal lesion

  The description of a discrete or focal macroscopic lesion can incorporate a number of features.

  Size: Give an approximate measurement

  Shape

  Colour: What colour is it? Is it all one colour or is it many colours (variegated)? Does it look homogenous (all the same the whole way through)?

  Consistency: This is of course difficult when the specimen is in a pot and you are unable to touch it. But even just by looking you can get some idea: Does it look solid or firm? Does it look friable (as if it is falling to pieces) or are there bits missing or greyish areas (altered blood) to suggest necrosis? Firm pale tissue may be tumour or fibrosis.

  Margins: Are they well defined/demarcated, or irregular or diffuse? How deeply into the wall does a lesion penetrate?

  Surface: does the surface of the lesion look friable or necrotic i.e. is the lesion ulcerated?

  Multifocal

  This means that there is more than one distinct lesion within the specimen. All the above comments regarding the description of focal lesions apply here as well.

  Diffuse

  Colour, consistency and surface may also be relevant for a diffuse process, however, the other features may not.
- Identification of the major pathological process. In some cases it may be helpful to identify the general pathological process that the abnormality represents e.g. inflammatory or neoplastic (benign or malignant, primary or metastatic). This will be especially useful if you don't immediately know what the diagnosis is, at least you will be able to 'ball park' it. To do this it may be helpful to go through the surgical sieve.
- Identification of related lesions. By now you should have some idea of what you think the diagnosis, or at least the differential diagnosis, is. You should now think about what you know of this condition and look for, and describe, other relevant features that may confirm or refute this diagnosis. It may be useful to include relevant negatives.
- Other pathologies. Have a look at the rest of the specimen to see if there are any other abnormalities. If they are present, describe them.
- Diagnosis. State your diagnosis or differential diagnosis. Be as precise and specific as possible. Use any relevant clinical information given to help you. Sometimes a precise diagnosis is not possible but a presumptive diagnosis based on the macroscopic and/or clinical findings is. If you can't decide on one diagnosis, give a list of reasonable differential diagnoses, in order of decreasing likelihood, give a more general diagnosis (e.g. malignant tumour), or at least attempt to identify the pathological process.

# INDEX: ALIMENTARY TRACT

## HEAD AND NECK



## OESOPHAGUS



## STOMACH

### Acute erosions/ulceration



### Chronic peptic ulceration

Neoplasia

| | |
|---|---|
| CASE 408 | Multiple adenomatous polyps |
| CASE 10468 | Diffuse carcinoma |
| CASE 16372 | Carcinoma at cardio-oesophageal junction |
| CASE 17006 | Lymphoma |
| CASE 19723 | Gastrointestinal stromal tumour |
| CASE 20043 | Diffuse carcinoma |
| CASE 20367 | Localised carcinoma |
| CASE 22732 | Diffuse carcinoma |
| CASE 23082 | Localised carcinoma |
| CASE 23325 | Secondary carcinoma |
| CASE 23569 | Localised carcinoma |
| CASE 24081 | Lymphoma |
| CASE 25263 | Leukaemic infiltration |

Miscellaneous

| | |
|---|---|
| CASE 2873 | Menetrier's disease |
| CASE 4415 | Congenital hypertrophic pyloric stenosis |
| CASE 7659 | Purpuric haemorrhages |
| CASE 17151 | Lysol burns |
| CASE 50183/83 A | Haemochromatosis |

## SMALL INTESTINE

Chronic duodenal ulceration

| | |
|---|---|
| CASE 9109 | With eroded artery |
| CASE 22612 | |
| CASE 23138 | |
| CASE 25433 | Perforated |
| CASE 50053/83 | Bleeding, also with penetration of the pancreas |

Crohn's disease

CASE 13458
CASE 21501
CASE 23429
CASE 10347/83
CASE 15172/83
CASE 18720/84

Intussusception

| | |
|---|---|
| CASE 13 | |
| CASE 12259 | |
| CASE 22435 | Related to metastatic melanoma |
| CASE 23287 | |
| CASE 6878/84 | |

## Infarction

| | |
|---|---|
| CASE 4691 | |
| CASE 11632 | Following herniation |
| CASE 16897 | |
| CASE 17692 | Strangulated inguinal hernia |
| CASE 21945 | Ileal strangulation from an adhesion |
| CASE 23069 | Strangulated inguinal hernia |
| CASE 24686 | Following thrombosis of the superior mesenteric vein |
| CASE 9763/82 | |
| CASE 15843/82 | |
| CASE 15914/85 | Infarcted Meckel's diverticulum |

## Neoplasia

| | |
|---|---|
| CASE 4624 | Lymphoma |
| CASE 7172 | Peritoneal secondaries from a mucinous carcinoma |
| CASE 15720 | Multiple carcinoid tumours |
| CASE 18379 | Lipoma |
| CASE 18884 | Carcinoma of the ampulla of Vater |
| CASE 21733 | Metastatic melanoma |
| CASE 21924 | Lymphoma |
| CASE 21932 | Lymphoma |
| CASE 22435 | Metastatic melanoma |
| CASE 22483 | Metastatic melanoma |
| CASE 22768 | Carcinoma of the ampulla of Vater |
| CASE 15113/84 | Carcinoma of the ampulla of Vater |
| CASE 16525/85 | Mucinous adenocarcinoma |
| CASE 4391/89 | Carcinoma of the ampulla of Vater |

## Miscellaneous

| | |
|---|---|
| CASE 39 | Typhoid ulcers |
| CASE 3897 | Diverticulosis |
| CASE 4651 | Tuberculosis |
| CASE 7183 | Tuberculous ulceration |
| CASE 8625 | Gallstone ileus |
| CASE 8721 | Intestinal obstruction by a gauze swab |
| CASE 10313 | Distended lymphatic vessels from lymphatic obstruction |
| CASE 14236 | Whipple disease |
| CASE 15689 | Salmonella enteritis |
| CASE 16786 | Enteritis necroticans |
| CASE 16989 | Enteritis necroticans with Ascaris lumbricoides |
| CASE 15914/85 | Infarcted Meckel's diverticulum |
| CASE 8694/88 | Meckel's diverticulum with peptic ulceration |

## APPENDIX

### Acute appendicitis

CASE 15751
CASE 18300/87
CASE 2803/88
CASE M90156/92
CASE 90161/M92

### Miscellaneous

| | |
|---|---|
| CASE 7112 | Villous adenoma |
| CASE 18121 | Carcinoid tumour |
| CASE 24175/92 | Mucocele |

## LARGE INTESTINE

### Infective enterocolitis

| | |
|---|---|
| CASE 484 | Typhoid ulcers |
| CASE 3895 | Shigella dysentery |
| CASE 6187 | Amoebic colitis |

### Ulcerative colitis

CASE 6886
CASE 13522
CASE 15220
CASE 18082
CASE 995/85
CASE 3289/88

### Diverticulosis

CASE 16139
CASE 16427
CASE 50249/82
CASE 50135/83
CASE 13120/84 With paracolonic abscesses

### Adenoma

| | |
|---|---|
| CASE 5186 | Familial adenomatous polyposis syndrome |
| CASE 10718 | Villous adenoma |
| CASE 16839 | Polypoid adenomas |
| CASE 23981 | Familial adenomatous polyposis syndrome |
| CASE 15448/82 | Familial adenomatous polyposis syndrome |
| CASE 14380/84 | Villous adenoma |
| CASE 16065/84 | Villous adenoma |

### Carcinoma

| | |
|---|---|
| CASE 7852 | With fistula |
| CASE 12360 | |
| CASE 16489 | With fistula |
| CASE 19899 | |
| CASE 22197 | |
| CASE 23991 | Invading bladder wall |

CASE 24574 With melanosis coli
CASE 24653
CASE 24689
CASE 24847
CASE 25164
CASE 4119/86
CASE 2818/88
CASE 2422/94 With intussusception

Miscellaneous
CASE 18756 Melanosis coli
CASE 20732 Pneumatosis cystoides intestinalis
CASE 20874 Leukaemic infiltration
CASE 23422 'Phlegmenous procto-colitis' in acute leukaemia
CASE 25495 Haemorrhage and ulceration in acute leukaemia
CASE 50061/80 Pseudomembraneous colitis
CASE 50343/83 B Pseudomembraneous colitis
CASE 11991/84 Pseudopolyps in colitis
CASE 19291/84 Sigmoid volvulus
CASE 2804/88 Ischaemic colitis

RECTUM AND ANUS

Haemorrhoids
CASE 2979
CASE 24592

Adenoma
CASE 60 Villous adenoma

Carcinoma
CASE 23
CASE 4674
CASE 22043
CASE 22757
CASE 22802
CASE 22839
CASE 23392
CASE 24538

# CORE AND CLASSIC DISEASE PROCESSES

# PHARYNX: CARCINOMA

## CASE 3040

### Clinical information
The patient was a migrant from Denmark aged 31, who presented with increasing huskiness of the voice, dysphagia, malaise and fever.

### Specimen description
The specimen comprises tongue, larynx, part of the pharynx, thyroid and upper oesophagus and trachea. The wall of the hypopharynx and upper oesophagus is infiltrated by pale ragged tumour over an area approximately 90 mm in length. Tumour has also invaded the right aryepiglottic fold, considerably distorting it and encroaching on the entrance to the larynx. Anteriorly, nodular masses of tumour protrude into the lumen of the trachea and there is a ragged neoplastic cavity measuring 2.5cm in diameter above the right lobe of the thyroid.

### Diagnosis
Carcinoma of the hypopharynx

### What histological features would be expected in a section through the lesion?
This tumour is likely to be a squamous cell carcinoma. The tumour cells would show features of malignancy: enlarged, pleomorphic, hyperchromatic nuclei with prominent nucleoli, and of squamous differentiation: relatively abundant eosinophilic cytoplasm, intercellular bridge formation and keratinisation.

### What is the pathogenesis of this condition?
As with the related squamous cell carcinomas of the oral cavity and larynx, cigarette smoking and chronic alcohol abuse are important predisposing factors. These promote dysplasia via the development of genetic alterations in the squamous epithelial cells induced by the carcinogens in cigarette smoke with progressive mutations leading to invasive carcinoma. Human Papilloma Virus may play an aetiologic role in some tumours.

### Correlate the clinical history with the pathological abnormalities.
The tumour narrows the lumen of the oesophagus causing the dysphagia. It probably also invades the right recurrent laryngeal nerve or the posterior aspect of the right vocal cord (difficult to see) leading to changes in the voice. Some malignancies can also cause malaise and fever (probably from release of cytokines by tumour cells or associated inflammation), but there could be an alternative explanation for these, such as pneumonia, in this case caused by aspiration.

### Comment
Carcinomas of the oral cavity, pharynx and larynx are common.

# OESOPHAGUS: VARICES

## CASE 16643

### Clinical information

The patient was a man aged 64 from Leigh Creek. He habitually drank 300-600ml of spirits daily, and was admitted to the RAH after a sudden haematemesis. Examination showed ascites, hepatomegaly, mild jaundice, low serum albumin and low haemoglobin. Barium meal showed oesophageal varices. He was transfused and improved, but 2 weeks later haematemesis recurred and there were repeated bleeds during the next week. A Sengstaken tube was passed and he improved again, but then became drowsy, comatose and died after 7 weeks in hospital. At post-mortem the liver weighed 1600g and showed typical cirrhosis.

### Specimen description

The specimen shows the lower 14cm of the oesophagus and the proximal stomach. Varicose dilated veins are visible through the mucosa of the oesophagus and stomach. As is usual in the collapsed vessels of post-mortem specimens, the bleeding point is not evident.

### Diagnosis

Oesophageal varices

### How do oesophageal varices arise?

Oesophageal varices are dilated tortuous vessels of the porto-systemic anastomoses (communications between portal and systemic venous systems) around the gastro-oesophageal junction. Dilatation arises due to increased pressure in the setting of portal hypertension, usually caused by cirrhosis with impaired blood flow through the liver, impairing drainage of these veins.

# OESOPHAGUS: DIVERTICULUM

## CASE 18942

### Clinical information

The patient was a man aged 75 with a carcinoma of the prostate. At post-mortem there was bilateral suppurative pyelonephritis and bilateral suppurative basal pneumonia with incipient empyema. The specimen was an incidental finding and was filled with blood.

### Specimen description

The specimen of oesophagus demonstrates a diverticulum towards its lower end 8cm above the cardiac orifice. The neck of the sac measures 2 x 1.5cm. The body of the diverticulum is spheroidal and measures 5 x 3 x 3cm. It projects downwards and laterally. There is no evident abnormality of the cardiac sphincter.

### Diagnosis

Oesophageal diverticulum

### Comment

Oesophageal diverticula are not common but there are a variety of types. They are usually discovered later in life and may be asymptomatic or present with food regurgitation or aspiration.

# OESOPHAGUS: ACHALASIA

## CASE 11390

### Clinical information
The patient was a woman aged 57 who had been asthmatic for 7 years. For 13 months before her death there had been dysphagia for both liquids and solids, temporarily relieved by atropine. X-ray showed dilatation of the lower oesophagus, but oesophagoscopy did not demonstrate any spasm or stricture. She died during an acute asthma attack.

### Specimen description
The specimen consists of the lower 19cm of oesophagus and the cardiac end of the stomach. There is marked hypertrophy of the muscularis propria in the lower 5cm of the oesophagus with associated narrowing of the oesophageal lumen. Above this the lumen is distended and a broad shallow diverticulum 5cm in diameter projects to the right in this area. The mucosa appears normal.

### Diagnosis
Achalasia of the oesophagus

### Comment
In achalasia there is an abnormality in the innervation of the lower oesophagus with failure of peristalsis and there is nearly complete loss of myenteric ganglion cells here. The muscle may become hypertrophied in this region and there is progressive dilatation of the oesophagus proximally. The cause of primary achalasia is unknown. It usually presents in adulthood with dysphagia and may be complicated by inflammation and stricture formation, aspiration and the development of squamous cell carcinoma of the oesophagus.

# OESOPHAGUS: OESOPHAGITIS AND CHRONIC PEPTIC ULCERATION

## CASE 19615

### Clinical information
The patient was a man aged 80 who developed haematemesis and melaena. He was transported from Eastern York Peninsula to the RAH and arrived confused and pale. He was transfused but died 15 hours later.

### Specimen description
The specimen consists of the lower 7cm of the oesophagus and the cardiac portion of the stomach. There is an ulcer 1cm in diameter in the terminal oesophagus 2cm above the cardio-oesophageal junction. The ulcer is filled with blood clot.

### Diagnosis
Chronic peptic ulcer in the lower oesophagus

### What is the usual cause of lower oesophageal ulceration?
The usual cause of ulceration in the lower oesophagus is acid reflux, though most cases of reflux are not severe enough to cause ulceration. The stratified squamous epithelium is not protective in the acid environment.

### What are the potential complications of chronic oesophageal ulcers?
These ulcers may bleed or perforate. Healing with excessive scarring can lead to an oesophageal stricture and dysphagia.

### What are some other causes of oesophageal ulceration (acute or chronic)?
Other causes include malignancy, fungal infection (specimen 23945) and the ingestion of strong acids or alkalis (usually accidental).

### What are the causes of oesophagitis?
Reflux is the most common. Other causes include ingestion of corrosive acids or alkalis and heavy smoking and alcohol ingestion. Infective causes occurring in immunocompromised persons include candida, Herpes simplex and cytomegalovirus.

### What is Barrett's oesophagus and what is its significance?
Barrett's oesophagus commonly arises in the lower oesophagus in the setting of reflux. The term refers to the metaplastic change of the normal oesophageal mucosa covered by stratified squamous epithelium to a simple gastric or intestinal type mucosa covered by simple columnar epithelium. The mucus secreting columnar epithelium is better adapted to withstand the acid environment compared to the squamous epithelium that is better able to withstand mechanical stresses. There is debate about whether the presence of any type of columnar epithelium is sufficient for a diagnosis of Barretts, or only that demonstrating intestinal features (including goblet cells). The metaplastic epithelium of intestinal type has a propensity to undergo dysplasia with progression to invasive adenocarcinoma.

# OESOPHAGUS: CARCINOMA

## CASE 17652

### Clinical information
The patient was a woman aged 80 who had a carcinoma of the middle third of the oesophagus present for some time. There was severe dysphagia necessitating the use of a Souttar's tube, but this subsequently had to be removed because of repeated blockage. Radiotherapy was given but obstruction progressed to almost complete blockage. She survived for 3 weeks and died of bronchopneumonia.

### Specimen description
The specimen consists of 17cm of the oesophagus and part of the right lung. The oesophageal tumour is 9cm in length and has produced nodular thickening of the wall and irregular narrowing of the lumen. Its surface is necrotic. The oesophagus is adherent to the medial surface of the upper lobe of the right lung. The reverse of the specimen shows some pneumonic consolidation in the lingular segment of the upper lobe. Enlarged pigmented hilar lymph nodes are noted.

### Diagnosis
Carcinoma of the oesophagus

### Comment
Carcinomas of the oesophagus are usually squamous cell carcinomas. Predisposing factors include smoking, alcohol, achalasia and dietary factors. Adenocarcinomas can arise at the lower end in the setting of Barrett's oesophagus – metaplasia of the normal squamous epithelium to gastric or intestinal type columnar epithelium in the setting of gastric acid reflux. The intestinal type metaplastic epithelium in particular may become dysplastic and then invasive.

### Why are the hilar lymph nodes pigmented?
This is a common finding in city dwellers and smokers. Inhaled pollutant carbon is phagocytosed by alveolar macrophages. These enter the lymphatics and cluster in groups along bronchovascular bundles in the lung tissue, seen macroscopically as black spots (anthracosis) when abundant. Many of the carbon containing macrophages also reach the local lymph nodes, resulting in pigmentation and enlargement of the nodes.

# STOMACH: CONGENITAL HYPERTROPHIC PYLORIC STENOSIS

## CASE 4415

### Clinical information
The specimen is from a baby (sex not stated) aged nine weeks.

### Specimen description
The specimen is stomach and part of the duodenum. There is hypertrophy of the muscularis propria in the pylorus, ceasing abruptly at the pyloric opening but tapering upwards into the pyloric antrum. The stomach itself is perhaps dilated but the mucosa appears essentially normal.

### Diagnosis
Congenital hypertrophic pyloric stenosis

### Comments
This disorder is more common in boys than girls. It typically presents in babies with regurgitation and persistent vomiting.

# STOMACH: ACUTE GASTRIC EROSIONS

## CASE 50332/84

### Clinical information
The patient was a man aged 83.

### Specimen description
The specimen consists of the terminal oesophagus with much of the stomach that has been opened along the greater curvature. There are numerous tiny black slightly depressed lesions up to 4mm in diameter scattered over part of the greater curvature.

### Diagnosis
Acute gastric erosions

### Comment
Each of these dark lesions is an erosion (a very superficial ulcer involving only the mucosa). The discolouration is caused by altered blood. Gastric erosions develop acutely in the setting of acute gastritis following heavy use of NSAIDs, excessive acute alcohol ingestion or in post-operative and severely debilitated patients e.g. in shock, or with severe trauma or burns. There is no scarring as in a chronic ulcer. They may cause very severe acute haemorrhage or perforate as they may develop into more deeply penetrating acute ulcers.

Gastritis refers to inflammation of the gastric mucosa. There are three basic patterns:

- Acute
- Chronic
- Less common special forms (e.g. lymphocytic or granulomatous types)

# STOMACH: CHRONIC PEPTIC ULCERATION

## CASE 13154

### Clinical information
The patient was a woman aged 87 who had chronic rheumatoid arthritis for many years. She had vomited blood on one occasion 5 years previously, but was not investigated. She had recently become very weak and pale and then passed a melaena stool. She was therefore admitted to hospital and that night had another massive melaena. The BP fell from 120/80 to 90/40 and atrial fibrillation was noted. She was transfused 1100ml of blood at once and a further 550ml later. On the 5th day ventricular extrasystoles occurred and she died quite suddenly.

### Specimen description
The specimen consists of the stomach opened along the greater curvature to show two peptic ulcers measuring 1-1.5cm in dimension on the lesser curvature. The larger ulcer is near the antral-body junction and has slightly swollen edges and necrotic slough in its floor. The smaller ulcer in the pyloric canal has overhanging edges.

### Diagnosis
Chronic gastric peptic ulcers x2

### Comment
The main risk factor for chronic gastric ulceration is the organism Helicobacter pylori that resides in the stomach on the surface of the mucosa, particularly in the antrum. The organisms interfere with the normal gastric mucosal defence against gastric acid although how it does this is not well understood. The main other risk factor is heavy long-term use of NSAIDs that impair prostaglandin formation. Prostaglandins produced by epithelial and other cells help to maintain mucosal integrity via various mechanisms e.g. limiting acid secretion and stimulating bicarbonate and mucus secretion. Other factors such as smoking, alcohol, corticosteroids, diet and stress play lesser roles in their pathogenesis.

Chronic peptic ulcers are usually present on the lesser curvature in the antrum, are round to oval in shape and have a classic punched out appearance. They can be difficult to distinguish macroscopically from some gastric carcinomas and biopsy is necessary.

As these ulcers develop, scarring takes place at the base and sides in an attempt at healing. Nonetheless, some do penetrate through to tissues behind (e.g. pancreas depending on site) or perforate right through into the peritoneal cavity leading to acute peritonitis. They may also bleed from erosion of blood vessels – insidiously leading to iron deficiency anaemia or massively leading to shock. Scarring around pyloric ulcers may lead to gastric outlet obstruction.

Chronic gastric peptic ulcers may arise in the setting of chronic gastritis.
There are three main patterns of chronic gastritis.

- Helicobacter pylori-associated. This is the most common form. The antrum is most severely involved but the gastritis may also affect the body and fundus. There is usually acute inflammation as well as chronic (active chronic gastritis) and intestinal metaplasia is often seen. Helicobacter pylori will only colonise the gastric epithelium and not the areas of intestinal metaplasia. Infection with H. pylori and associated inflammation may occur in up to 60% of the population and is not usually associated with any specific symptoms.
- Autoimmune gastritis. This is generally seen in elderly patients and is uncommon. Antibodies form against parietal cells and intrinsic factor (necessary of course for vitamin B12 absorption in the small intestine). Patients develop atrophy of parietal cells and fundic glands with subsequent

hypochlorhydria and intrinsic factor deficiency leading to vitamin B12 deficiency and a macrocytic anaemia, which in this setting is called pernicious anaemia. Intestinal metaplasia may also be seen and patients are at risk for developing gastric adenocarcinoma. The gastritis itself is often asymptomatic.

- Reactive, reflux or chemical irritant gastritis. This is thought to result from a number of factors including reflux of duodenal fluid (containing bile) back into the stomach, excessive alcohol ingestion, or prolonged administration of NSAIDs and aspirin.

# STOMACH: LOCALISED/INTESTINAL TYPE ADENOCARCINOMA

## CASE 23569

### Clinical information
The patient was a man aged 78 with a past history of angina and Parkinson's disease. He was admitted to hospital flushed and confused. During the next 3 weeks he was observed but not actively treated and died from bronchopneumonia. At post-mortem there was a carcinoma of the stomach with many metastases in the liver.

### Specimen description
The specimen consists of the stomach opened to show an ulcerated neoplastic plaque 5cm in diameter on the lesser curvature, 4cm from the oesophago-gastric junction. The edge is raised and there is central excavation covered with ragged slough. The reverse of the specimen shows direct extension of the tumour into the lesser omentum. No lymph nodes are seen.

### Diagnosis
Localised or intestinal type gastric adenocarcinoma

### Comment
Morphologically, localised or intestinal type gastric adenocarcinomas may be fungating, polypoid or form a flat or excavated ulcerated mass, the latter resembling a chronic peptic ulcer. Histologically, tumour cells form glands but also functionally demonstrate features of intestinal epithelium, hence its name. Most tumours arise in the setting of intestinal metaplasia and dysplasia developing in the setting of H. pylori related or autoimmune chronic gastritis. Secondary mucosal atrophy as a result of the gastritis leads to a degree of hypochlorhydria that is postulated to allow the growth of bacteria that convert dietary nitrates into carcinogenic compounds. Cigarette smoking, dietary and genetic factors may also contribute in their pathogenesis. A small proportion of cases arise from gastric polypoid adenomas. Gastric adenocarcinoma generally has a poor prognosis, unless of the ‘early gastric carcinoma type’ (localised to the mucosa +/- submucosa with or without regional lymph node involvement).

## STOMACH: DIFFUSE TYPE ADENOCARCINOMA (LINITIS PLASTICA, SIGNET RING CARCINOMA)

### CASE 10468

### Clinical information
The patient was a man aged 68 who died after 10 days in hospital. There had been anorexia, loss of weight and weakness for 3 months. A mass could be felt in the epigastrium and occult blood was present in the faeces. The haemoglobin level was low. He developed bilateral pleural effusions and had several falls in the ward. Finally he lapsed into a coma and died. At post-mortem, additional findings included a small left fronto-parietal subdural haematoma and antemortem thrombus in the right pulmonary artery with two recent infarcts in the right lung.

### Specimen description
The specimen is the stomach, terminal oesophagus and proximal duodenum. The stomach shows extensive and marked thickening of its wall by a pale infiltrate. Much of the thickening has occurred in the mucosa and submucosa, although small tongues of tumour can be seen infiltrating muscularis externa/propria. Tumour has spread extensively and directly to the external surface along the lesser curvature, where nodular masses of tumour are present beneath the serosa. There is some infiltration of the remaining greater omentum also. A few small areas of mucosal ulceration are noted. The intramural extension of the tumour ends at the pylorus, but several lymph nodes around the first part of the duodenum are mildly enlarged, probably by metastatic tumour.

### Diagnosis
Diffuse type gastric adenocarcinoma (linitis plastica, signet ring carcinoma)

### Comment
This carcinoma has a particularly poor prognosis. Its predisposing factors are largely unknown. Histologically, it comprises cells filled with mucin that push the nucleus to one side, resembling a signet ring. These cells diffusely infiltrate the wall and only rare glands are formed. Adenocarcinomas with signet ring morphology may also arise in other sites but the stomach is the commonest.

In women, the stomach is the commonest primary site for Krukenberg tumours of the ovaries. This term refers to bulky ovaries, often bilaterally involved, containing metastatic tumour demonstrating a signet ring morphology.

# STOMACH: NON-HODGKIN'S LYMPHOMA

## CASE 24081

### Clinical information
No history is available for this surgical specimen.

### Specimen description
The specimen consists of a portion of stomach containing a bisected pale tan fleshy tumour 5cm in diameter and 3cm in depth with irregular margins. The tumour protrudes into the lumen and invades into the wall to serosa. It exhibits a large central ulcer crater 2cm in diameter with overhanging edges and lined by haemorrhagic slough.

### Diagnosis
Gastric lymphoma (non-Hodgkin's)

### Comment
The macroscopic differential here is localised adenocarcinoma (although it does not look typical), gastrointestinal stromal tumour and even a single metastasis. Histology reportedly showed a type of non-Hodgkin's lymphoma.

Primary non-Hodgkin's lymphomas are the second most common tumour of the stomach, following adenocarcinoma. The stomach may also be involved secondarily as part of a systemic lymphoma. Lymphomas may form well-defined masses (as here) or infiltrate more diffusely (specimen 17006).

The commonest primary lymphoma of the stomach is Mucosa Associated Lymphoid Tissue (MALT) lymphoma, a B cell non-Hodgkin's lymphoma. The main predisposing factor for this is Helicobacter pylori infection. Normally in the stomach there is relatively little lymphoid tissue, but chronic inflammation occurs with Helicobacter infection and aggregates of lymphocytes form. Proliferating lymphocytes may eventually give rise to lymphoma.

Mucosa Associated Lymphoid Tissue is a term referring to the component of the lymphoid system that has developed to protect mucosal membranes that are exposed to the external environment. It includes lymphocytes and plasma cells of the lamina propria, intraepithelial lymphocytes and lymphoid nodules that in the ileum form Peyer's patches.

MALT lymphomas can arise in other sites including elsewhere in the gastrointestinal tract, thyroid, tonsils, salivary glands and lungs. In some of these sites, lymphoid tissue is not normally present but their pathogenesis is thought to relate to chronic inflammation e.g. in association with autoimmune disorders in the thyroid. They are usually low-grade small B cell non-Hodgkin's lymphomas that are slow to disseminate but they can change to become more aggressive intermediate grade large B cell lymphomas.

Various types of non-Hodgkin's lymphomas can involve the small bowel. These include MALT type lymphomas, Burkitt's lymphoma, follicular lymphomas and enteropathy associated T cell lymphoma that arises in a small proportion of patients with coeliac disease.

Other primary tumours of the stomach include gastrointestinal stromal tumour and carcinoid tumour.

# DUODENUM: CHRONIC PEPTIC ULCERATION

## CASE 25433

### Clinical information

The patient was a man aged 72 with dementia and hypertension who was admitted with a 3-day history of cough. There were signs of broncho-pneumonia, but no special symptoms apparently directed attention to the abdomen. He died after 5 days, and at post-mortem general peritonitis resulting from a perforated duodenal ulcer was found.

### Specimen description

The specimen consists of the gastric antrum and pylorus, together with the duodenum and pancreas. There is a perforated ulcer measuring 1.5 x 1cm on the posterior wall of the first part of the duodenum through which a red probe has been passed. Some congestion can be seen in the peripancreatic fat on the reverse side of the specimen

### Diagnosis

Perforated chronic peptic duodenal ulcer

### Comment

Chronic duodenal ulcers are more common than chronic gastric ulcers. This one is in the typical site: the first part. The main risk factor for chronic duodenal ulcers is the organism Helicobacter pylori that resides in the stomach on the surface of the mucosa, particularly in the antrum. The exact role of H. pylori in the aetiology of duodenal ulceration is unknown. Some but not all cases are associated with hyperacidity.

As these ulcers develop, scarring takes place at the base and sides in an attempt at healing. Nonetheless, some do penetrate through to tissues behind (e.g. pancreas depending on site) or perforate right through into the peritoneal cavity. They may also bleed from erosion of blood vessels – insidiously leading to anaemia or massively leading to shock. Scarring around the ulcer may lead to gastric outlet obstruction.

Helicobacter pylori is an S-shaped gram negative rod that colonizes the stomach. In Western countries, the prevalence of colonization increases with age. While most colonized persons remain asymptomatic, the organism is thought to play a role in the pathogenesis of the following gastrointestinal disorders:

- Helicobacter associated (active chronic) gastritis
- Chronic peptic ulceration in the stomach and duodenum
- Gastric adenocarcinoma of localized/intestinal type. This is thought to arise as a result of a H. pylori related chronic gastritis-intestinal metaplasia-dysplasia-carcinoma sequence. The tumour cells have features of small intestinal epithelium
- Gastric MALT (Mucosa Associated Lymphoid Tissue) non-Hodgkin's lymphoma. Normally in the stomach there is relatively little lymphoid tissue, but chronic inflammation occurs with Helicobacter infection and lymphoid aggregates develop, the proliferating cells of which may eventually give rise to lymphoma.

# DUODENUM: CARCINOMA OF THE AMPULLA OF VATER

## CASE 22768

### Clinical information
The patient was a man aged 64 with increasing obstructive jaundice for 3 months. The specimen was removed at surgery.

### Specimen description
The specimen consists of 16cm of the duodenum together with the head of the pancreas and the lower 5cm of the common bile duct. In the region of the ampulla of Vater is an ill-defined 3cm diameter ulcerated nodular invasive pale mass that occludes the end of the common bile duct and protrudes into duodenum. Above this the duct is dilated.

### Diagnosis
Carcinoma of the ampulla of Vater

### Comment
A classic cause of obstructive jaundice, along with carcinoma of the head of the pancreas and gallstones. Carcinomas of the small intestine are uncommon, certainly much less common than in the large intestine.

# SMALL INTESTINE: MECKEL'S DIVERTICULUM

## CASE 8694/88

### Clinical information
The patient was a woman aged 59.

### Specimen description
The specimen consists of a length of small bowel with a Meckel's diverticulum that has been turned inside out so that it appears as an elongated polyp. There is a 1cm diameter chronic ulcer near what was the fundus of the diverticulum.

### Diagnosis
Meckel's diverticulum with peptic ulceration

### Comment
Meckel's diverticula are congenital diverticula of the ileum arising from persistence of the embryonic vitello-intestinal duct, a structure that connects the lumen of the developing gut to the yolk sac. Some contain heterotopic rests of gastric or pancreatic epithelium. Most are asymptomatic, however, peptic ulcers may arise in those with gastric epithelium leading to bleeding or perforation. Alternatively they may present with acute appendicitis like symptoms or bowel obstruction from intussusception.

# SMALL INTESTINE: INFARCTION

## CASE 9763/82

### Clinical information
The patient was an adult woman of unknown age. She had evidence of small bowel obstruction for 3 days before coming to operation. At operation 120cm of small bowel and attached mesentery were resected.

### Specimen description
The specimen consists of a portion of the small bowel that has a striking dark plum colour owing to infarction and interstitial haemorrhage involving all layers. The mesentery likewise is engorged and congested.

### Diagnosis
Infarction of the small intestine

### Comment
Infarction of the small bowel is more common than of the large bowel. It is not uncommon in the elderly and usually presents with symptoms and signs of bowel obstruction. Bowel infarcts are typically haemorrhagic because of the rich anastomotic connections of blood vessels within the wall that bleed once infarcted. Also, in many there is a degree of venous occlusion leading to congestion.
Causes include:

- Venous occlusion:
    - Strangulation in a hernia or around a peritoneal adhesion. Loops of bowel can become caught within a hernial sac or around peritoneal adhesions. Compression of or twisting of the viscus initially leads to compromise of the venous and later arterial blood supplies leading to infarction.
    - Volvulus
    - Intussusception
- Arterial occlusion:
    - Atherosclerosis and thrombosis
    - Embolism
    - Vasculitis (uncommon)
- Severe prolonged hypotension may precipitate infarction, especially if there is atherosclerotic arterial narrowing

### What are the potential complications of bowel infarction?
Dehydration may result from bowel obstruction leading accumulation of fluid within the bowel lumen and vomiting. Bacteria can gain access to the blood stream as the defences of the infarcted mucosa are impaired leading to septicaemia, and necrotic bowel wall may perforate leading to acute peritonitis (and septicaemia).

# SMALL INTESTINE: INTUSSUSCEPTION

## CASE 13

### Clinical information
No clinical information is available.

### Specimen description
The specimen consists of a portion of small bowel opened to show a swollen intussuscepted mass of bowel measuring some 16cm in length. There is marked haemorrhagic congestion of its wall with fibrinous exudate on the exposed surfaces.

### Diagnosis
Intussusception

### Comment
Intussusception arises when a segment of bowel becomes telescoped into the immediately distal segment and is propelled along by peristalsis. Constriction of the intussuscepted wall causes vascular compromise and infarction with subsequent bowel obstruction and sometimes perforation.
In children it can arise spontaneously with no underlying abnormality but there is often an underlying lesion in adults that gets caught up in the peristaltic activity.

# SMALL INTESTINE: CROHN'S DISEASE

CASE 10347/83

## Clinical information
The patient was a man aged 45.

## Specimen description
The specimen consists of loops of terminal ileum with attached caecum and appendix. The wall of the ileum is thickened, the lumen narrowed and the serosa markedly congested and haemorrhagic. Mesenteric fat creeps around the outside of the bowel wall. The mucosa is flattened and demonstrates a few small areas of ulceration. Normal ileum is present proximally. An enlarged reactive lymph node is noted in the mesenteric fat on the posterior aspect of the specimen.

## Diagnosis
Crohn's disease

## Comment
The term inflammatory bowel disease refers to a group of chronic inflammatory diseases of the gastrointestinal tract that run a remitting and relapsing course. Their cause is unknown but there is evidence that they are autoimmune. Onset is typically in young adults. Most can be sub-classified either as Crohn's disease or ulcerative colitis, however, there is a group that cannot be subcategorised: known as indeterminate colitis. Some patients have extra-intestinal manifestations e.g. arthritides, skin rashes, eye inflammation. Crohn's disease may involve any part of the GIT at any time. Involvement of the terminal ileum is common.

Morphology

Macroscopically there are typically:

- Skip lesions
- Thickening of the bowel wall
- Fissuring ulceration
- Cobblestone appearance of mucosa
- Creeping fat over the serosa

Microscopically there is:

- Patchy transmural chronic inflammation with lymphoid aggregates and germinal centres
- Acute mucosal inflammation and ulceration, often deep and fissuring, when active
- Non-necrotising granulomas common but not always present. Reactive mesenteric lymph nodes also often demonstrate granulomas.

Complications include

- Bowel obstruction
- Malabsorption of specific nutrients/vitamins
- Bowel perforation
- Fistulas to other organs
- Anaemia
- Carcinoma: prolonged inflammation can cause dysplasia which may progress to invasive carcinoma (less common than in ulcerative colitis)

# APPENDIX: ACUTE APPENDICITIS

## CASE M90156/92

### Clinical information
The patient was a young boy aged 12.

### Describe the specimen
The specimen consists of the appendix and mesoappendix that are congested and the surface is covered by whisps of fibrin. The mucosa appears necrotic.

### What is the diagnosis?
Acute appendicitis

### What causes acute appendicitis?
The cause of acute appendicitis is usually unknown. It is not considered to be caused by infection. Some may arise from obstruction due to a faecolith (inspissated faeces) or lymphoid hyperplasia in the wall, the obstruction leading to contraction of the wall and possibly ischaemia causing inflammation. There may be secondary infection.

### How does the serosal exudate of fibrin develop?
Inflammation starts in the mucosa and spreads transmurally to the serosa. Acute serosal inflammation is manifest by a fibrinous and neutrophilic exudate which when marked can be seen as a creamy or whispy surface exudate.

### What relationship does the serosal inflammation and exudate have to the typical pattern of pain in acute appendicitis (vague central abdominal changing to sharp right iliac fossa pain) explained?
Vague visceral pain from early acute appendicitis (before inflammation is transmural) is typically felt in the epigastrium as the organ develops from the embryonic midgut. However, once inflammation becomes transmural and there is visceral peritoneal/serosal involvement, the adjacent parietal peritoneum also becomes inflamed and pain becomes more sharp and localised to the right iliac fossa from stimulation of somatic pain fibres.

### What are the potential complications of acute appendicitis and how do they develop?
- perforation -> acute peritonitis: there is an intense neutrophil infiltrate in the appendix wall and as neutrophils die they release their lysosomal enzymes causing necrosis. Secondary infection may contribute. Transmural necrosis leads to perforation with acute peritonitis and potentially G-ve septicaemic shock. (Hence the need to remove the acutely inflamed appendix before it perforates.)
- appendiceal abscess: sometimes the perforated appendix becomes walled off by omentum and an abscess develops locally around the appendix
- ascending infection via the portal vein (ascending pyelophlebitis) -> liver abscesses

# APPENDIX: CARCINOID TUMOUR

## CASE 18121

### Clinical information
This is a surgical specimen from an adult woman.

### Describe the specimen
The specimen consists of an appendix measuring 5cm in length. There is an ovoid yellow tumour 2cm in length filling the distal end.

### What is the diagnosis?
Carcinoid tumour of the appendix
(This needs histological confirmation but it demonstrates the typical appearance of a carcinoid tumour).

### What are carcinoid tumours?
Carcinoid tumours are essentially well-differentiated neuroendocrine carcinomas. Neuroendocrine cells are dispersed individually in a wide variety of tissues including the epithelium of the GIT, bladder, lung and skin. The cells in the skin are known as Merkel cells, in the lung as Kulchitsky (K) cells, enteroendocrine cells in the GIT (G cells producing gastrin in the stomach are an example) and in the thyroid as parafollicular or C cells. These cells are thought to originate from the embryonic neural crest and have some features of neurones. They produce hormones, some of which act locally (paracrine). Such cells give rise to neuroendocrine tumours: the better differentiated ones mostly being known as carcinoid tumours, the poorly differentiated ones often being known only as undifferentiated small cell carcinoma (e.g. lung).

### Where do they occur?
The appendix is the commonest site but they may also arise in the lung and other parts of the GIT, most commonly in the small intestine (specimen 15720).

### What paraneoplastic syndrome can carcinoid tumours cause?
Carcinoid tumours can secrete a variety of hormones, especially serotonin, which can cause the carcinoid syndrome. As this is degraded in the liver, the syndrome only arises in patients with liver metastases or in primary extra-intestinal carcinoids. In carcinoid syndrome, patients develop variable vasomotor disturbances, intestinal hypermotility, bronchoconstriction, retroperitoneal fibrosis and fibrosis of the tricuspid and pulmonary valves of the heart.

### Comment
Carcinoid tumours are often multicentric in the small bowel but are unicentric in the appendix. The prognosis is generally good (especially appendiceal ones) but depends on size and site.

# LARGE INTESTINE: ULCERATIVE COLITIS

CASE 995/85

## Clinical information
The patient was a young woman aged 19. The specimen is a colectomy specimen.

## Specimen description
The specimen consists of the anus, rectum and most of the colon. The caecum and distal ileum have been removed. The distal five-sixths of the specimen are grossly abnormal. The mucosa is red, granular and extensively ulcerated. The wall is not thickened.

## Diagnosis
Ulcerative colitis

## Comment
The term inflammatory bowel disease refers to a group of chronic inflammatory diseases of the GIT that run a remitting and relapsing course. Their cause is unknown but there is evidence that they are autoimmune. Onset is typically in young adults. Most can be sub-classified as Crohn's disease or ulcerative colitis, however, there is a group that cannot be subcategorised: indeterminate colitis. Some patients have extra-intestinal manifestations e.g. arthritides, skin rashes, eye inflammation. Ulcerative colitis only involves the large bowel, starting in the rectum and extending continuously for a variable distance proximally.

Morphology

Macroscopic:

- No skip lesions (compare with Crohn's disease)
- Reddened, superficially ulcerated mucosa
- Sometimes regenerating mucosal pseudo-polyps
- No or minimal thickening of the wall (compare with Crohn's disease)
- No fissuring ulcers (compare with Crohn's disease)
- Eventual mucosal atrophy

Microscopic:

- Chronic inflammation of the mucosa +/- superficial submucosa with acute inflammation when active
- Superficial ulceration
- Crypt abscesses (not specific)
- No granulomas

Complications include

- Toxic megacolon -> perforation
- Carcinoma: prolonged inflammation can cause dysplasia which may progress to invasive carcinoma

# LARGE INTESTINE: INFECTIVE ENTEROCOLITIS

## CASE 3895

### Clinical information

The patient was a woman aged 65 who had had diarrhoea with blood in the motions for 2 weeks. During the second week of the illness she complained of tiredness and weakness. On examination the temperature was $40^{0}$ C, pulse 100, her tongue was dry and there was general dehydration. Frequent motions continued and she lapsed into unconsciousness. Shiga dysentery bacilli were isolated from the faeces. She died after one month in hospital (1938).

### Specimen description

The specimen consists of some 21cm of colon. There are numerous ulcers in the mucosa. Their edges are generally irregular and swollen and there is patchy vasocongestion.

### Diagnosis

Infective enterocolitis

### Comment

The diagnosis of this case cannot be made macroscopically but you should have a differential diagnosis of ulceration of the colon. In this case it would include certain infections (e.g. TB and shigella) and ulcerative colitis. Shigella are acquired by the faecal-oral route and can cause severe ulceration of the bowel leading to severe bloody diarrhoea.

Not all infectious diarrhoeas result from epithelial necrosis and ulceration of the bowel. There are various mechanisms by which infective agents can cause diarrhoea. The main ones are:

- Toxin mediated e.g. cholera, certain strains of E. coli
- Adhesion and damage to microvilli e.g. certain strains of E. coli
- Invasion and destruction of enterocytes e.g. salmonella, Shigella, certain strains of E. coli, rotavirus

Many organisms affect both small and large bowel.

# LARGE INTESTINE: PSEUDOMEMBRANEOUS COLITIS

## CASE 50061/80

### Clinical information
The patient was a man aged 71.

### Describe the specimen
The specimen is of the colon. The mucosa is extensively studded by plaques of exudate comprising sloughed mucosa and inflammatory debris.

### What is the diagnosis?
Pseudomembraneous colitis

### What causes pseudomembraneous colitis?
Pseudomembranous colitis tends to develop following antibiotic administration that alters the normal colonic flora, allowing Clostridium difficile to flourish and release its toxin which initiates damage to epithelial cells. A similar pattern of injury with pseudomembrane formation can also arise in some cases of ischaemic colitis and with some infections.

### Comment
This is a typical but severe example of pseudomembranous colitis. Students would not be expected to make this diagnosis in the absence of any history.

# LARGE INTESTINE: DIVERTICULOSIS

50249/82

## Clinical information
The patient was a woman aged 64.

## Describe the specimen
The specimen consists of a length of large bowel (sigmoid) that is severely affected by diverticular disease. The diverticula form a series of sacs alongside the taeniae coli. One has been opened to show that the diverticulum is lined by mucosa and has a very thin wall, lacking the normal muscle coat.

## What is the diagnosis?
Diverticulosis/diverticular disease of the colon

## In what part of the bowel does diverticulosis arise and why?
These acquired diverticula mainly occur in the sigmoid and descending colon. They are thought to arise as a result of constipated faeces in the distal colon causing increased intraluminal pressure resulting in outpoutchings of the wall at weak points.

## What layers form the wall of the diverticulum?
The wall is formed by mucosa and some submucosa that protrude through the muscularis externa/propria and are covered by serosa.

## What are the potential complications of this disease and how do they arise?
- Diverticula can become acutely inflamed (diverticulitis)
- Severe acute inflammation with subsequent necrosis of the wall can lead to perforation with local abscess formation, acute peritonitis, or if adherent to an adjacent hollow organ, fistula formation
- Ulceration with the inflammation can cause acute bleeding
- Recurrent bouts of inflammation can lead to scarring and stricture formation.

N.B. Most are asymptomatic.

# LARGE INTESTINE: ADENOMATOUS POLYPS

## CASES 16839 AND 14380/84

### CASE 16839

#### Clinical information

The patient was a man aged 69 who died of myocardial infarction. The specimen was an incidental finding at post-mortem.

#### Describe the specimen

The specimen is of colon and demonstrates three pedunculated polyps. Each takes the form of a 6mm diameter button-like mass of mucosa capping an elongated flat stalk. The orifices of several colonic diverticula are also visible.

#### What is the diagnosis?

Pedunculated tubular adenomatous polyps

### CASE 14380/84

#### Clinical information

The patient was a man aged 53.

#### Describe the specimen

The specimen is of a short length of large bowel. Protruding into the lumen is a tumour 4cm long and 1cm high with a fine papillary architecture. There are no apparent areas of more solid tumour or invasion.

#### What is the diagnosis?

Villous adenoma/villous adenomatous polyp

#### To what does the term polyp refer?

Polyp is a descriptive term that refers to a lesion that protrudes into a lumen. The term conveys no information about the diagnosis or cause of the polyp. Polyps may be on a stalk (pedunculated) or have a broad flat base (sessile).

#### What types of polyp occur in the colon?

Non-neoplastic

- hyperplastic (metaplastic) polyps: small (usually <5mm diam.) sessile polyps, commonest type of polyp
- juvenile polyps: uncommon, usually in children
- hamartomatous polyps: uncommon, typically seen in Peutz-Jeghers syndrome
- inflammatory polyps: proliferations of mucosa resulting from inflammation

Neoplastic

- adenomatous/dysplastic (benign)
- malignant: colon cancers can be polypoid

#### What are adenomatous polyps and what is their significance?

Adenomatous polyps are dysplastic in nature. Their significance is that they have the potential to become malignant although only a small proportion actually do.

What characteristics of an adenomatous polyp suggest that it is more likely to become malignant?
The risk of becoming malignant is related to size (larger -> greater risk), type (villous > tubular) and degree of dysplasia.

Describe the histological features that would be seen in a section through an adenomatous polyp.
The colonic glands would be elongated, tortuous and branched. The epithelial cells would be crowded with enlarged variably pleomorphic nuclei and they would contain less mucin than normal indicating incomplete differentiation. There would be no invasion through the basement membrane. The degree of dysplasia could be graded by the degree of architectural and cytological atypia. The lesion may be on a stalk, the core of which comprises submucosa.

Comment
Although in common usage, the term adenoma is misleading in this situation. It is normally used for benign non-dysplastic lesions. The term dysplastic polyp conveys more about its true nature.

# LARGE INTESTINE: FAMILIAL ADENOMATOUS POLYPOSIS

## CASE 5186

### Clinical information

The patient was a man aged 21. For several years he had had 3 regular bowel actions each day. For the last 3-4 months he noticed that there was sometimes blood in the motions, occasionally dark and at other times bright red. Rectal examination revealed numerous polyps and a sessile papillomatous mass 4cm in diameter on the anterior rectal wall. Sigmoidoscopy with biopsy was performed. Four biopsies were of dysplastic polyps but the fifth was reported as showing several areas of malignant change. Further investigations showed multiple polyps throughout the whole of the colon including the appendix. Colectomy and ileostomy were performed. Family history could not be ascertained but the patient believed his father died of cancer.

### Describe the specimen

The specimen consists of two portions of colon. Distal ileum and appendix are attached. The mucosa of the large bowel is extensively studded with small rounded sessile polyps. Occasional larger stalked polypoid adenomata are also present. Obvious invasive carcinoma is not present in this portion of the bowel.

### What is the diagnosis?

Familial adenomatous polyposis

### Explain the pathogenesis of the development of dysplastic polyps and carcinoma in this condition.

- Familial adenomatous polyposis is an autosomal dominant disease that arises from a germline mutation in one allele of the adenomatous polyposis coli (APC) tumour suppressor gene on chromosome 5.
- However as with other tumour suppressor genes, both copies of the gene must be altered for the encoded protein not to function.
- Mutations invariably develop in the other allele in affected individuals leading to the development of hundreds or thousands of dysplastic polyps in the colon by the age of around 25 with invariable development of carcinoma in a further 10-15 years due to development of subsequent mutations in other genes
- An important function of the APC protein is to bind to and degrade β-catenin, a cytoplasmic protein that can enter the nucleus and contribute to activation of transcription of genes promoting cell proliferation (i.e. behaves as an oncoprotein)
- Loss of functional APC protein thus leads to reduced binding of APC to β-catenin -> enhanced β-catenin stimulated cell proliferation
- APC binding to β-catenin is also important in intercellular adhesion via the binding also of E-cadherin. Defects in APC binding to β-catenin may also lead to defects in intercellular contact, a property of carcinomas.

### What main other hereditary syndrome predisposes to colonic carcinoma?

Hereditary Nonpolyposis Colorectal Cancer (HNPCC) or Lynch syndrome. This is an autosomal dominant condition responsible for 3-5% of cases of colorectal carcinoma caused by mutations in DNA mismatch repair genes. There are few or no polyps. Tumours are often of earlier onset and occasionally of more aggressive histological types. The incidence of certain other cancers, e.g. endometrial and ovarian, is also increased in affected patients.

### Comment

Accurate diagnosis of a polyp requires histopathological examination, however, in this case the polyps macroscopically look like typical adenomatous or dysplastic polyps. So many would have been caused by a genetic abnormality such as occurs in familial adenomatous polyposis (FAP) or the related Gardner's and

Turcot's syndromes. These are transmitted as autosomal dominant conditions although some arise as spontaneous new mutations, the mutation being in the APC tumour suppressor gene. The colon (predominantly, although other parts of the GIT develop polyps to some extent) develops hundreds (minimum of 100 required for diagnosis) of adenomatous polyps by age 25 with cancer almost invariably developing in a further 10-15 yrs. Gardner's syndrome is a variant of FAP where there are also various soft tissue, bone and other lesions. APC mutations are also commonly found in sporadic adenomas and carcinomas of the colon.

# LARGE INTESTINE: ADENOCARCINOMA

## CASE 4119/86

### Clinical information
The patient was a man aged 54.

### Describe the specimen
The specimen consists of the terminal ileum, caecum, appendix and ascending colon. There is an annular ulcerated fungating pale tumour 4cm in length a little above the ileo-caecal valve. The lesion has infiltrated through the full thickness of the wall into mesocolonic fat and caused characteristic dimpling and distortion of the overlying serosa. Enlarged pale lymph nodes suggestive of metastases are seen in the mesocolon at the back of the specimen.

### What is the diagnosis?
Colorectal carcinoma

### What type of tumours are these usually?
Adenocarcinomas

### What are the predisposing factors for this condition?
- Dietary: low in fibre, high in animal fats, high in refined carbohydrates, excess caloric intake
- Adenomatous/dysplastic polyps: sporadic and familial
    - villous > tubular
    - increased risk with increased size
    - severe dysplasia > mild
- Hereditary non-polyposis colorectal cancer
- Familial syndromes of non-neoplastic polyps (but risk not as great as with dysplastic polyps)
- Long standing inflammatory bowel disease, especially ulcerative colitis

### What complications of this condition may lead the patient to present clinically? How does each complication develop?
- Iron deficiency anaemia: from chronic occult blood loss related to ulceration
- Red blood PR from ulceration and bleeding in more distal lesions
- Change in bowel habit: especially left sided lesions from obstruction to passage of more solid faeces
- Bowel obstruction: obstruction to passage of faeces
- Bowel perforation: tumours can show variable necrosis and if it is a deeply penetrating lesion, it can perforate into the peritoneal cavity
- Fistula formation: tumour may invade adjacent hollow organ e.g. bladder, necrosis through the tumour may lead to a communication between the organs
- Metastases: lymph nodes, liver (-> jaundice, RUQ discomfort), peritoneal cavity (-> ascites and abdominal distension), other
- General loss of weight, anorexia etc ?from cytokines released by tumour stimulating metabolism

Presenting symptoms depend to some extent on site: left sided lesions are more likely to cause change in bowel habit, obstruction, red blood PR.
Lesions may be asymptomatic for many years.

# RECTUM: INTERNAL HAEMORRHOIDS

## CASE 2979

### Clinical information
The patient was a man aged 53 who died of carcinoma of the oesophagus that had perforated into the left bronchus to cause bronchopneumonia.

### Describe the specimen
The specimen is of distal rectum and anus. A series of varicose internal veins encircle the anal margin. Some appear to be thrombosed. The veins of the rectum above the haemorrhoids are somewhat congested.

### What is the diagnosis?
Internal haemorrhoids

### What are haemorrhoids?
These very common lesions are dilatations of the inferior or superior haemorrhoidal venous plexuses.

### Who gets haemorrhoids and why do they arise?
Haemorrhoids often develop in patients with constipation and in pregnant women. Some develop in the setting of portal hypertension. They arise as a result of impaired drainage with increased pressure in the relevant plexuses.

### What symptoms can they cause?
Traumatisation from the passage of faeces can lead to thrombosis and ulceration with subsequent pain and bleeding.