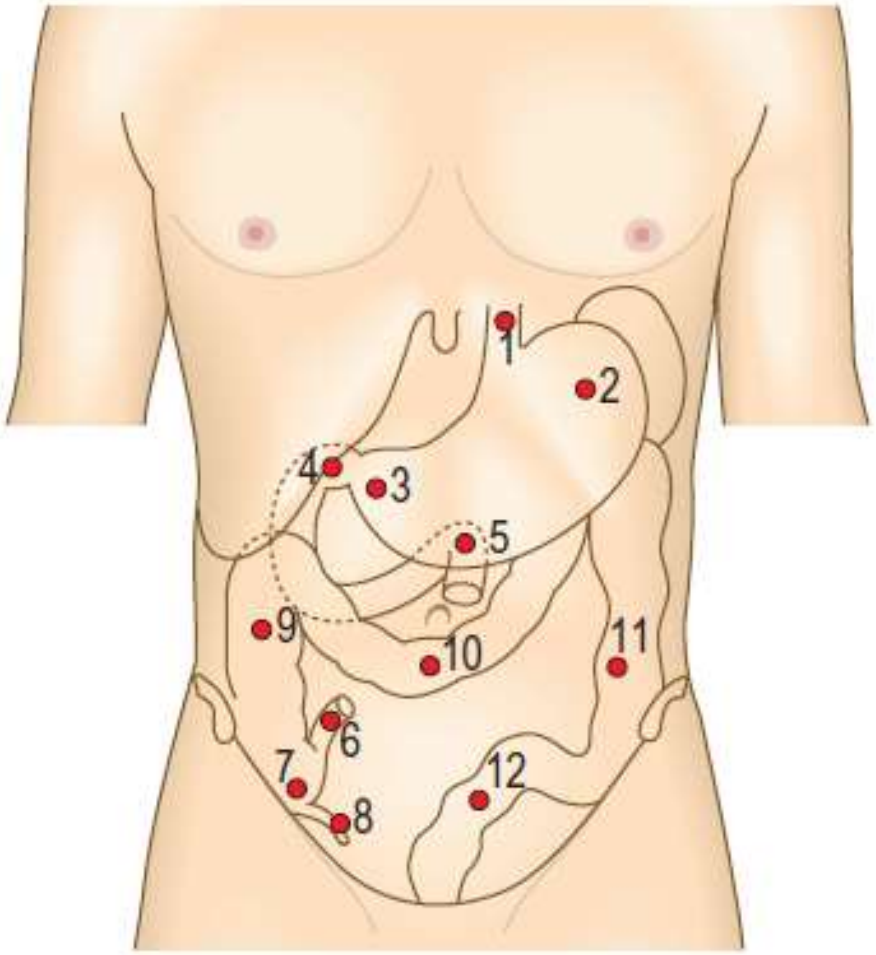
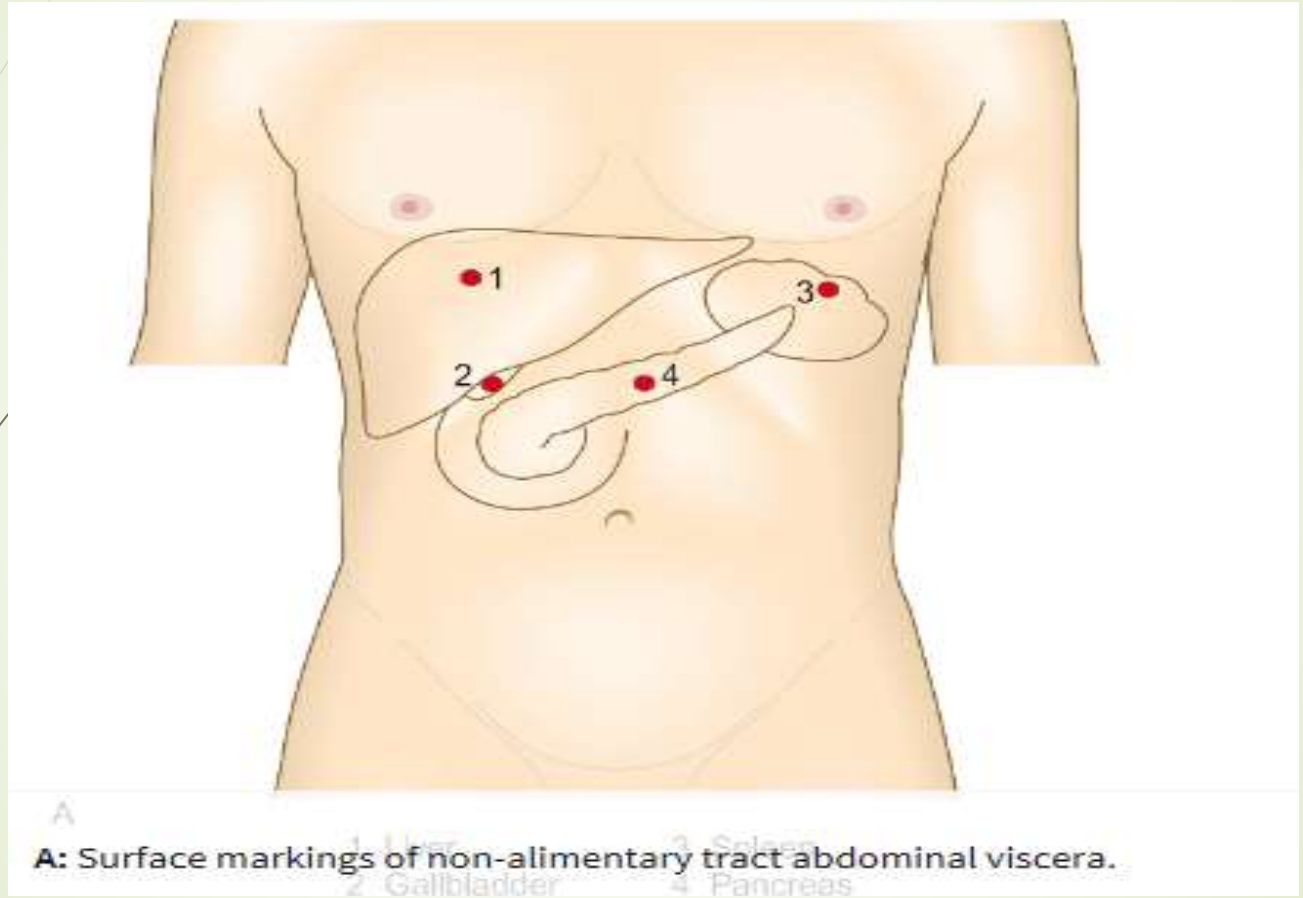
The Gastrointestinal System



1 Oesophagus
2 Stomach
3 Pyloric antrum
4 Duodenum
5 Duodenojejunal flexure
6 Terminal ileum
7 Caecum
8 Appendix (in pelvic position)
9 Ascending colon
10 Transverse colon
11 Descending colon
12 Sigmoid colon

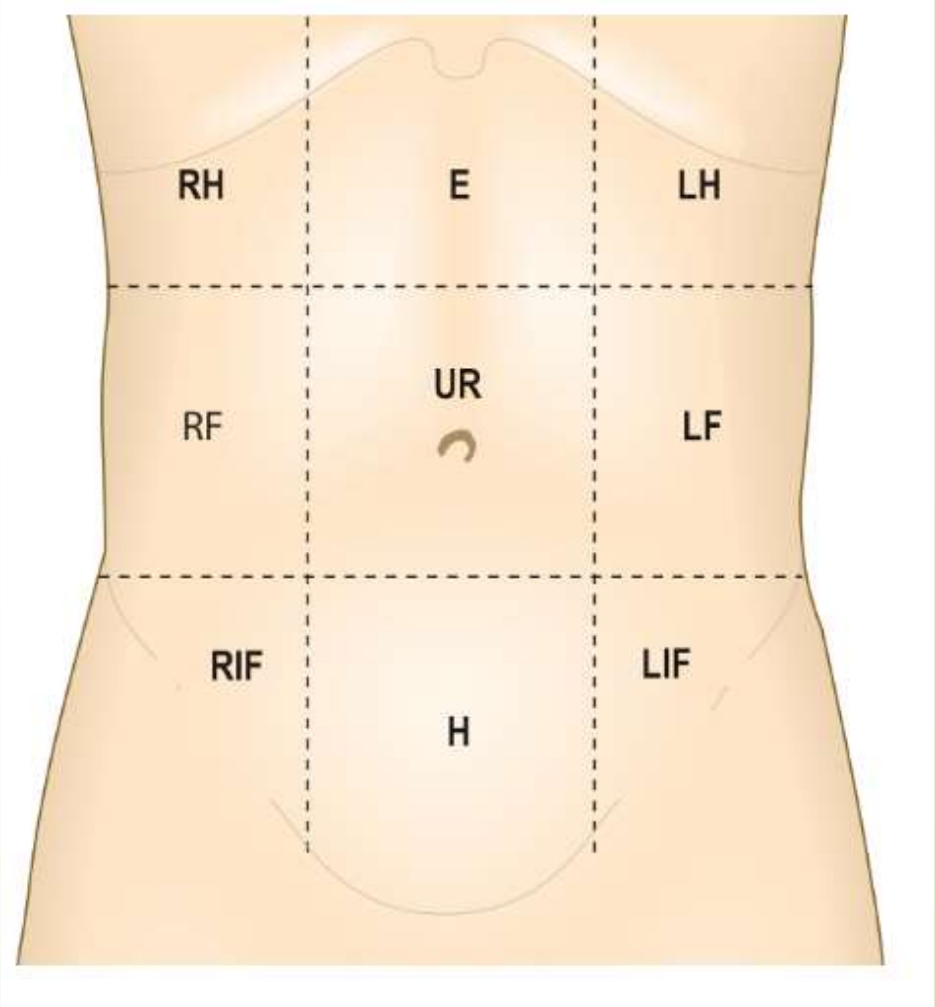


A: Surface markings of non-alimentary tract abdominal viscera.

ANATOMY

Transpyloric L1

Transtubercular L5



6.1 Surface markings of the main non-alimentary tract abdominal organs

Structure	Position
Liver	Upper border: fifth right intercostal space on full expiration Lower border: at the costal margin in the mid-clavicular line on full inspiration
Spleen	Underlies left ribs 9–11, posterior to the mid-axillary line
Gallbladder	At the intersection of the ~~right lateral vertical plane~~ and the costal margin, i.e. tip of the ninth costal cartilage
Pancreas	Neck of the pancreas lies at the level of L1; head lies below and right; tail lies above and left
Kidneys	Upper pole lies deep to the 12th rib posteriorly, 7 cm from the midline; the right is 2–3 cm lower than the left

The history

8.26 Gastrointestinal (GI) 'alarm features'

- Persistent vomiting
- Dysphagia
- Fever
- Weight loss
- GI bleeding
- Anaemia
- Painless, watery, high-volume diarrhoea
- Nocturnal symptoms disturbing sleep

Common presenting symptoms

Mouth Symptoms

- Halitosis
- Xerostomia
- Dysgeusia
- Cacogeusia

Weight loss

- ***SIGNIFICANT WEIGHT LOSS***

Causes of weight loss

1. ***Reduced energy intake***

- Dieting
- Loss of appetite, e.g malignancy .
- Malabsorption.
- Malnutrition.

2. ***Increased energy expenditure***

- **Hyperthyroidism.**
- **Fever.**
- **Adoption of a more energetic lifestyle.**

- A net calorie deficit of 1000 kcal/day produces a weight loss of approximately 1 kg/week .

- Greater weight loss during the initial stages of energy restriction arises from salt and water loss and depletion of hepatic glycogen stores, and not from fat loss.

- Rapid weight loss over days suggests loss of body fluid as a result of vomiting, diarrhea or diuretic therapy.

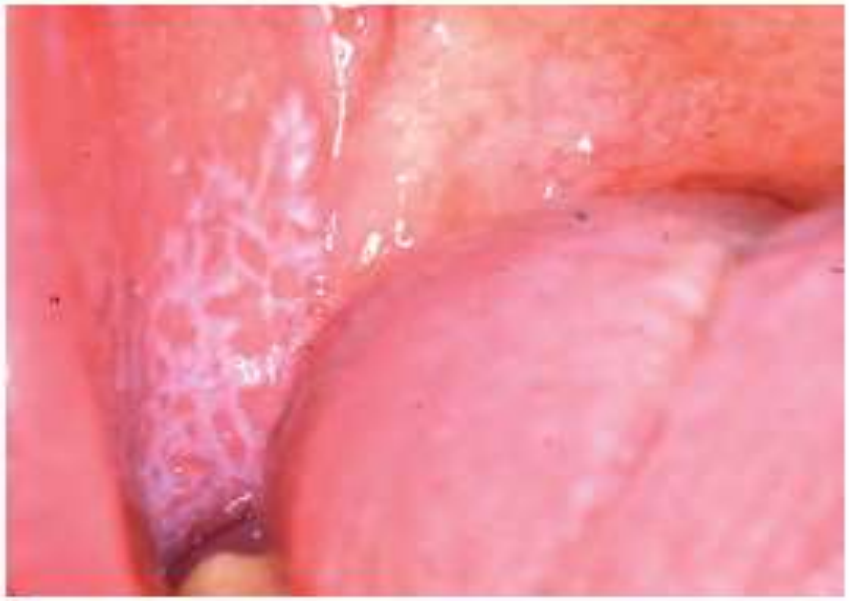
- Ask how much weight has been lost
- Over what time
- Current and previous weight records to confirm apparent weight loss
- Loose fitting clothes

Anorexia

- Loss of appetite and/or lack of interest in food

Pain

Painful Mouth



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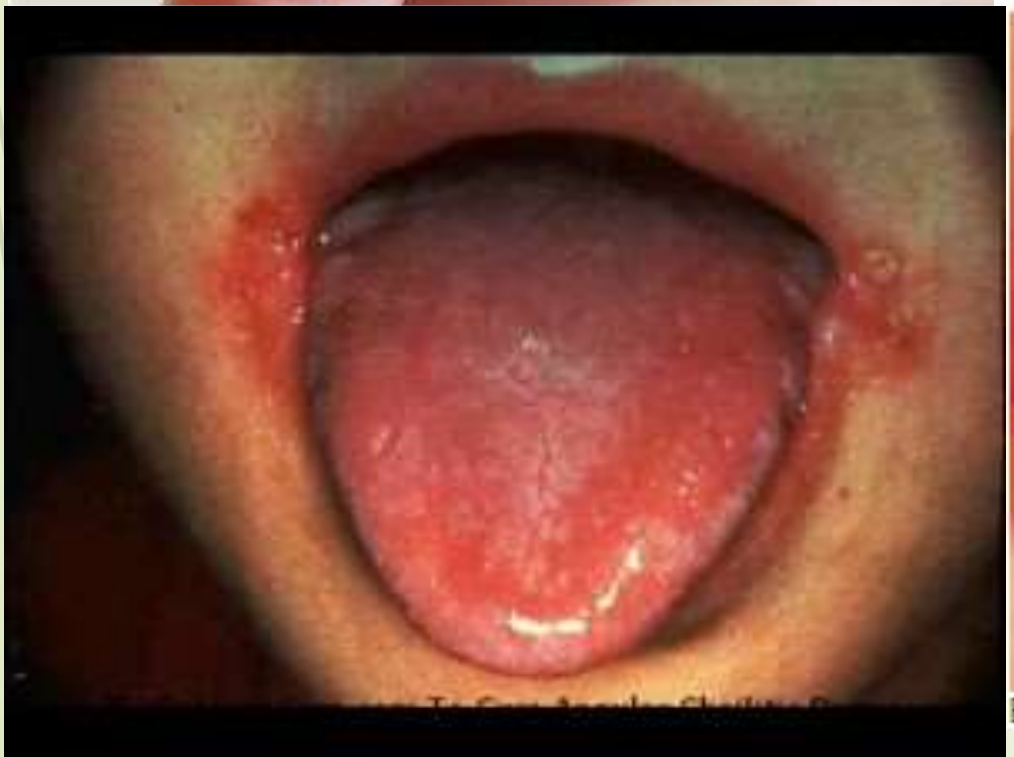
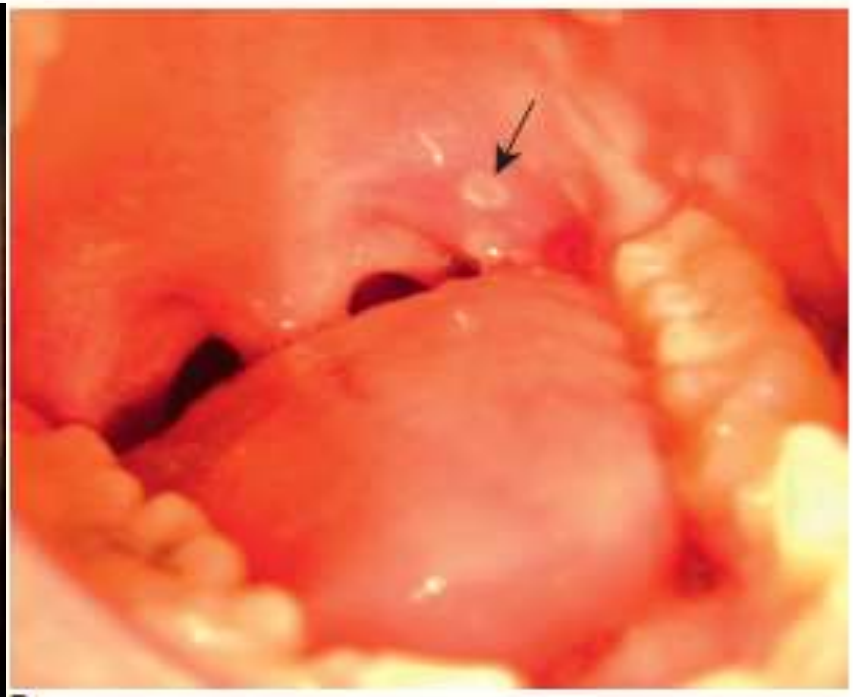




B

causes

- Iron, Folate, Vitamin B12, Vitamin C deficiency
- Dermatological (lichen planus)
- Chemotherapy
- Apthus ulcer
- Infective stomatitis
- Inflammatory bowel disease

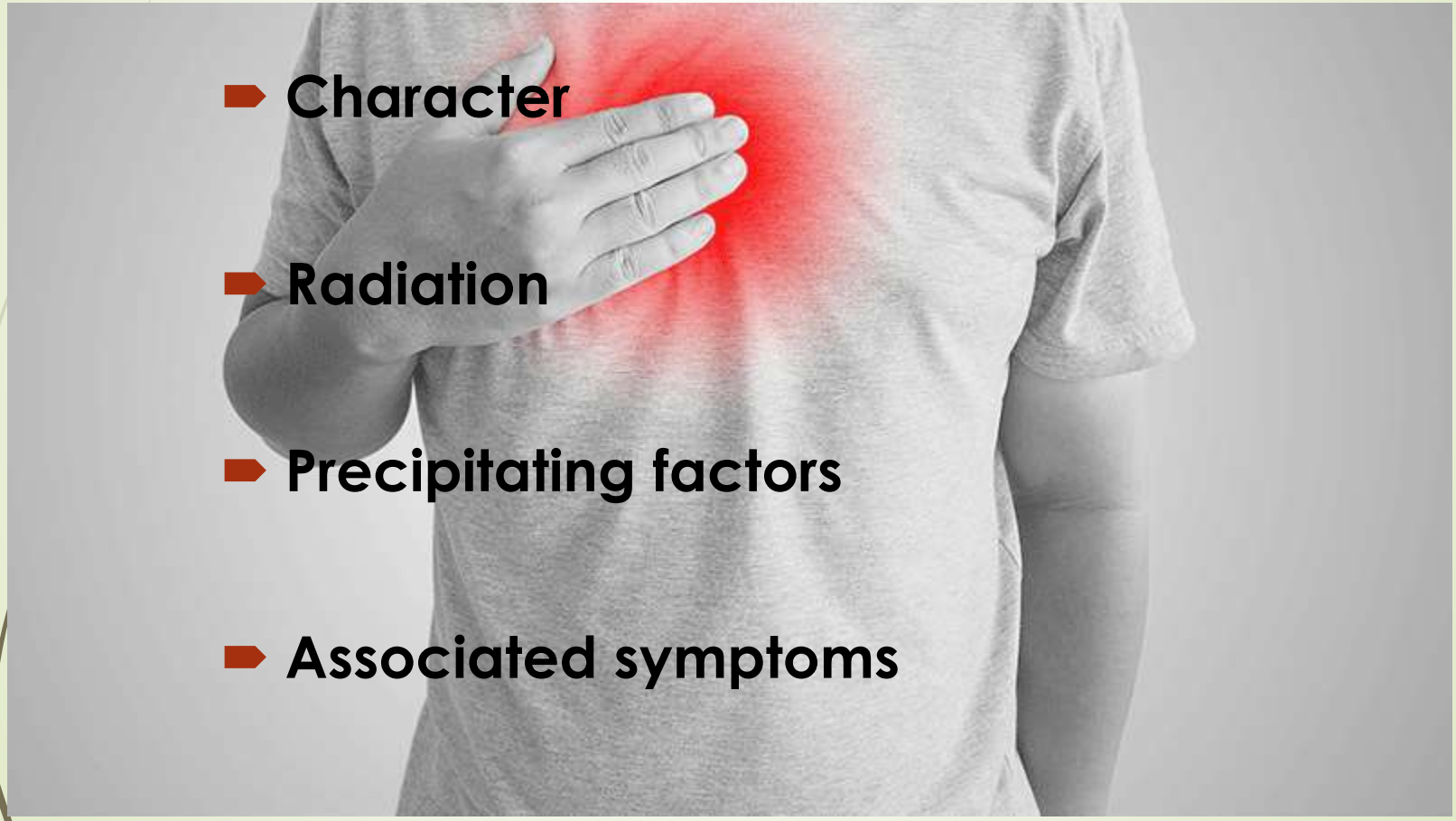
Heartburn and reflux

- ***Heartburn*** is a hot, burning retrosternal discomfort which radiates upwards.

- ***Reflux*** is a sour taste in the mouth from regurgitating gastric acid.

- ***Waterbrash*** is the sudden appearance of fluid in the mouth due to reflex salivation as a result of GERD or, rarely, peptic ulcer disease.

Heartburn VS. Cardiac pain



- **Character**
- **Radiation**
- **Precipitating factors**
- **Associated symptoms**

Dyspepsia

Reflux-like dyspepsia

- (heartburn-predominant dyspepsia)

Ulcer-like dyspepsia

- (epigastric pain relieved by food or antacids)

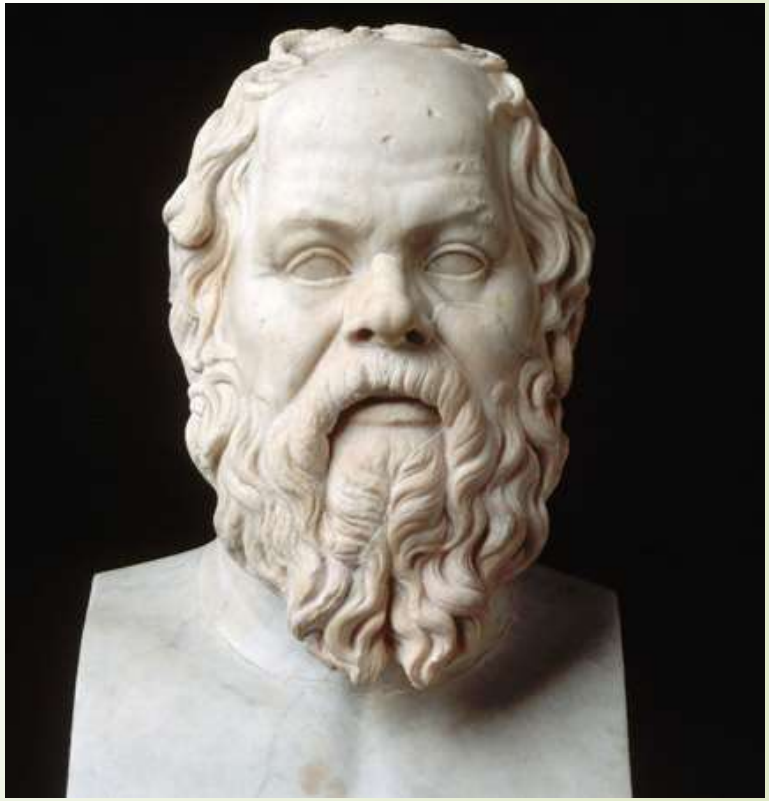
Dysmotility-like dyspepsia

- (nausea, belching, bloating and premature satiety).

Odynophagia

- Pain upon swallowing.
- It can be present with or without dysphagia, and often precipitated by drinking hot liquids.
- It indicates active oesophageal ulceration or oesophagitis from GERD or oesophageal candidiasis.

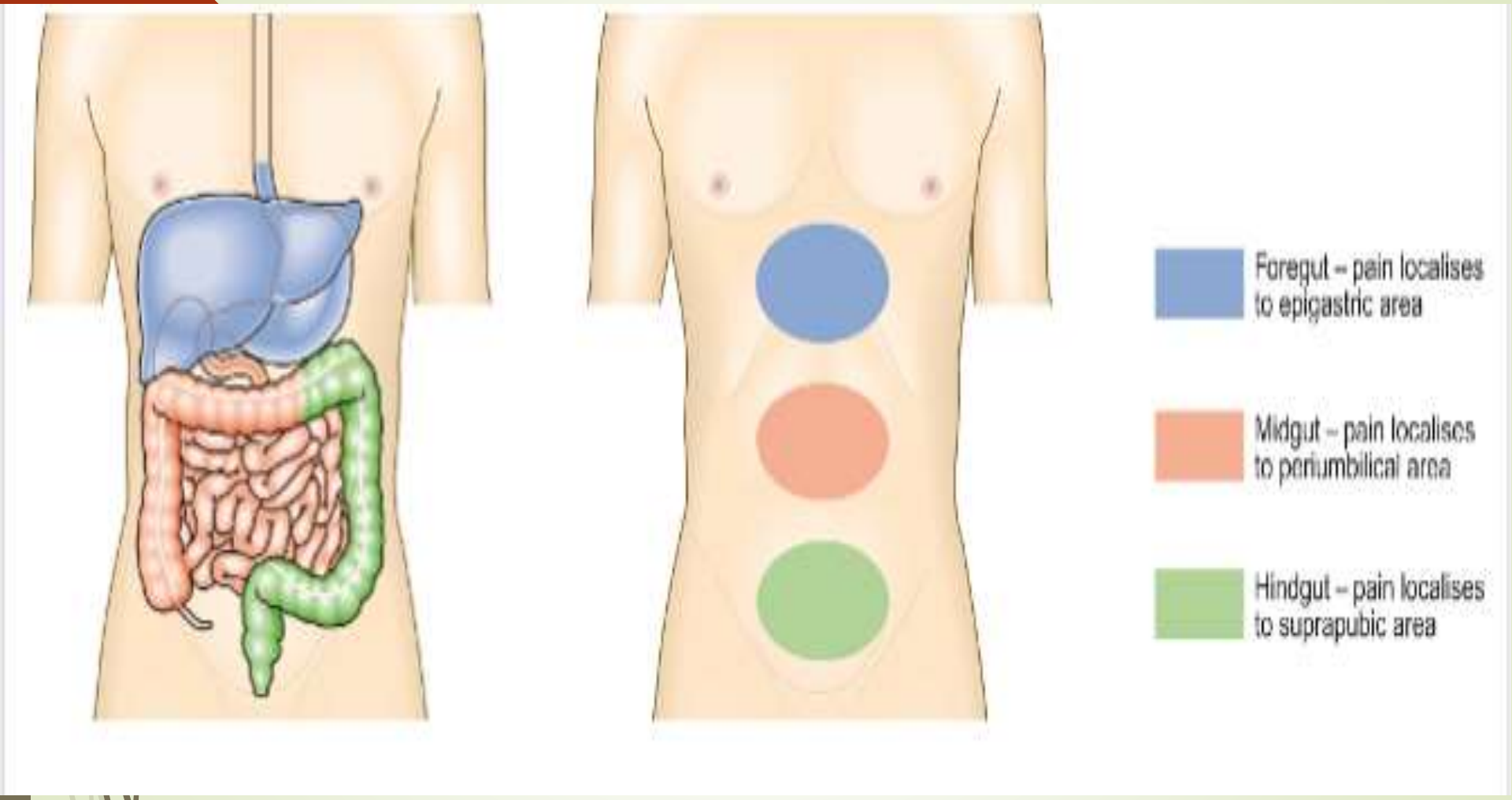
Abdominal pain



SITE

- ***Visceral abdominal pain***

- Arises from ***visceral peritoneum*** , distension of hollow organs, mesenteric traction or excessive smooth-muscle contraction
- It is deep and poorly localized in the ***midline***.
- It is conducted via ***sympathetic*** splanchnic nerves.


Foregut – pain localises to epigastric area
Midgut – pain localises to periumbilical area
Hindgut – pain localises to suprapubic area

Somatic pain

- Arises from the ***parietal peritoneum*** and abdominal wall.
- It is lateralised and localised to the area of inflammation, and conducted via ***intercostal*** (spinal) nerves.
- Examples ..cholecystitis , appendicitis, diverticulitis..

Onset

- The sudden onset of severe abdominal pain, rapidly progressing to become generalized and constant, suggests a hollow viscus perforation, a ruptured abdominal aortic aneurysm or mesenteric infarction.

- Cecal or sigmoid volvulus occur with sudden abdominal pain associated with intestinal obstruction

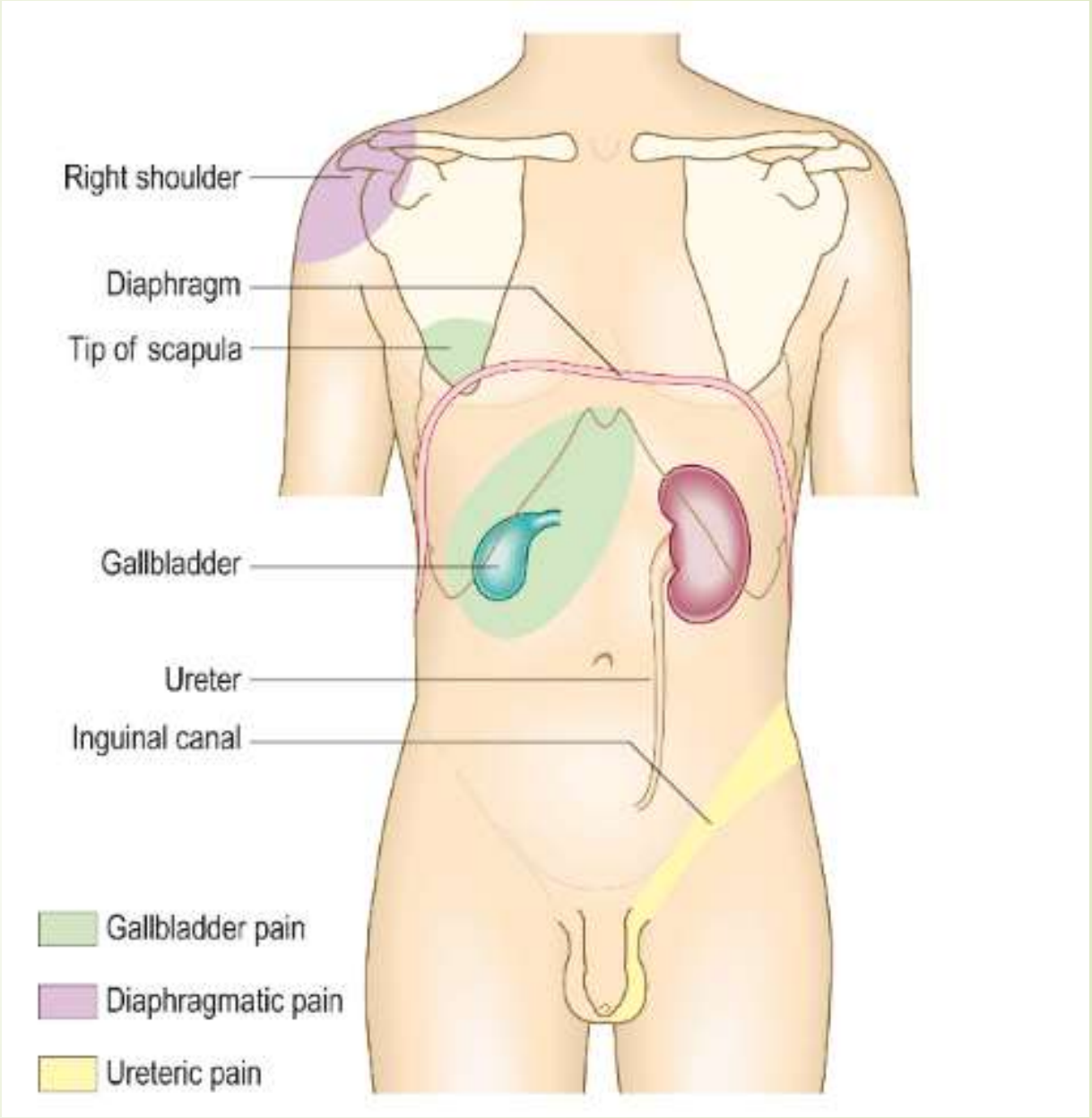
Character

- Colicky pain lasts for a short time (seconds or minutes) eases off and then return. arises from hollow structures such Small and large bowel obstruction.

- Dull constant vague and poorly localized pain is suggestive of inflammation, e.g.. salpingitis, appendicitis or diverticulitis.

- Biliary colic is misnamed , as the pain is rarely colicky , pain rapidly increases to a peak and persists over period of time before gradually resolving

Radiation


Right shoulder
Diaphragm
Tip of scapula
Gallbladder
Ureter
Inguinal canal
Gallbladder pain
Diaphragmatic pain
Ureteric pain

Associated symptoms

- Non-specific symptoms : Anorexia, nausea and vomiting are common but may be absent even in advanced intra-abdominal disease.
- altered bowel habits : IBS, CRC, Diverticular disease
- Breathlessness and Palpitations – non alimentary causes
- Tachycardia , hypotension – sepsis or bleeding

Timing

- Frequency and duration
- acute appendicitis: (periumbilical -right iliac fossa –generalized) -> changing with time to the somatic pain in the RIF)
- ***Silent interval:*** 1-2 hours after perforation
- Change of pattern : either wrong diagnosis or complications happened
- Abdominal pain persisting for hours or days suggests an inflammatory disorder

(appendicitis,cholecystitis,diverticulitis)

Exacerbating and relieving factors

- Pain due to ***Inflammation*** is exacerbated by movement or coughing suggests.
- Patients tend to lie still in order not to exacerbate the pain.
- Patients with ***colic*** typically move around or draw their knees up towards the chest during painful spasms.

Severity

- Excruciating pain, poorly relieved by opioid analgesia, suggests an ischemic vascular event, e.g. bowel infarction or ruptured abdominal aortic aneurysm.

- Severe pain rapidly eased by potent analgesia is more typical of acute pancreatitis or peritonitis secondary to a ruptured viscus.

6.2 Diagnosing abdominal pain

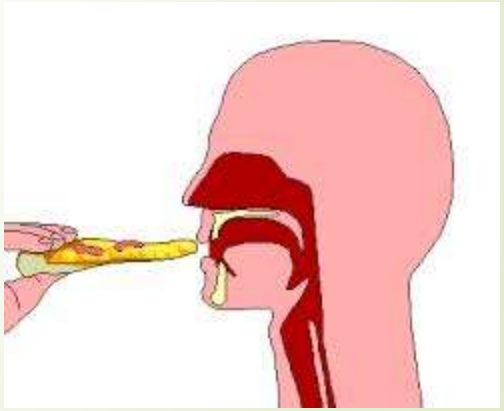
	Disorder			
	Peptic ulcer	**Biliary colic**	**Acute pancreatitis**	**Renal colic**
Site	Epigastrium	Epigastrium/right hypochondrium	Epigastrium/left hypochondrium	Loin
Onset	Gradual	Rapidly increasing	Sudden	Rapidly increasing
Character	Gnawing	Constant	Constant	Colicky
Radiation	Into back	Below right scapula	Into back	Into genitalia and inner thigh
Associated symptoms	Non-specific	Non-specific	Non-specific	Non-specific
Timing				
Frequency/periodicity	Remission for weeks/months	Attacks can be enumerated	Attacks can be enumerated	Usually a discrete episode
Special times	Nocturnal and especially when hungry	Unpredictable	After heavy drinking	Following periods of dehydration
Duration	½–2 hours	4–24 hours	>24 hours	4–24 hours
Exacerbating factors	Stress, spicy foods, alcohol, non-steroidal anti-inflammatory drugs	Eating – unable to eat during bouts	Alcohol Eating – unable to eat during bouts	–
Relieving factors	Food, antacids, vomiting	–	Sitting upright	–
Severity	Mild to moderate	Severe	Severe	Severe

6.3 Non-alimentary causes of abdominal pain

Disorder	Clinical features
Myocardial infarction	Epigastric pain without tenderness *Angor animi* (feeling of impending death) Hypotension Cardiac arrhythmias
Dissecting aortic aneurysm	Tearing interscapular pain *Angor animi* Hypotension Asymmetry of femoral pulses
Acute vertebral collapse	Lateralised pain restricting movement Tenderness overlying involved vertebra
Cord compression	Pain on percussion of thoracic spine Hyperaesthesia at affected dermatome with sensory loss below Spinal cord signs
Pleurisy	Lateralised pain on coughing Chest signs, e.g. pleural rub
Herpes zoster	Hyperaesthesia in dermatomal distribution Vesicular eruption
Diabetic ketoacidosis	Cramp-like pain Vomiting Air hunger Tachycardia Ketotic breath
Salpingitis or tubal pregnancy	Suprapubic and iliac fossa pain, localised tenderness Nausea, vomiting Fever
Torsion of testis/ovary	Lower abdominal pain Nausea, vomiting Localised tenderness

Dysphagia

- Dysphagia is difficulty swallowing.
- Oral vs esophageal
- Not Early satiety
- Not Globus



- *Onset: recent or longstanding*
- *Progressive VS. intermittent.*
- *Liquids VS. Solids.*
- *Level of stucked food*
- *Regurgitation of food or fluids*
- *Associated symptoms (wt loss, heartburn, odynophagia)*

Neurological :

- liquids > solids , choking , spluttering , regurge from nose

Neuromuscular :

- worse for solids , improves with liquid and setting upright

Dysmotility :

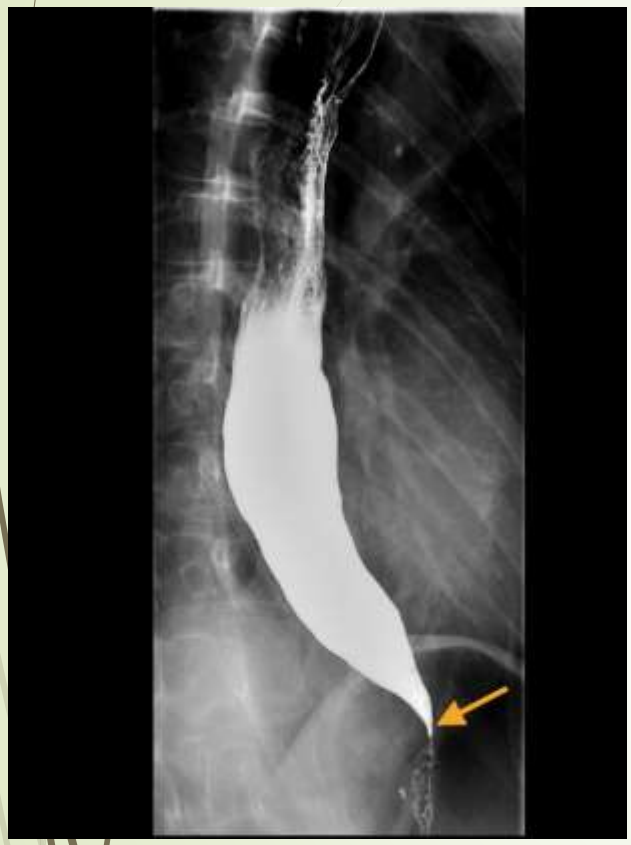
- central chest pain

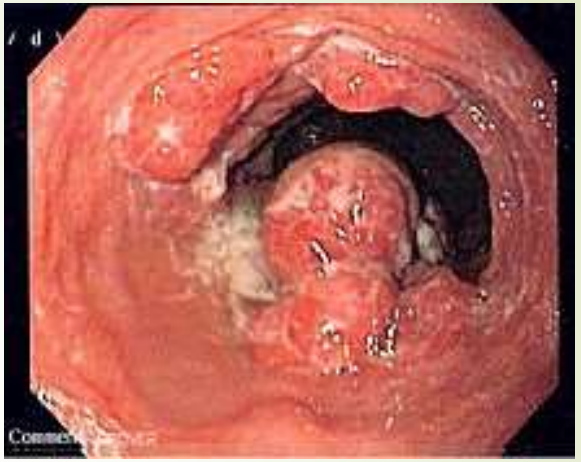
Pharyngeal pouch :

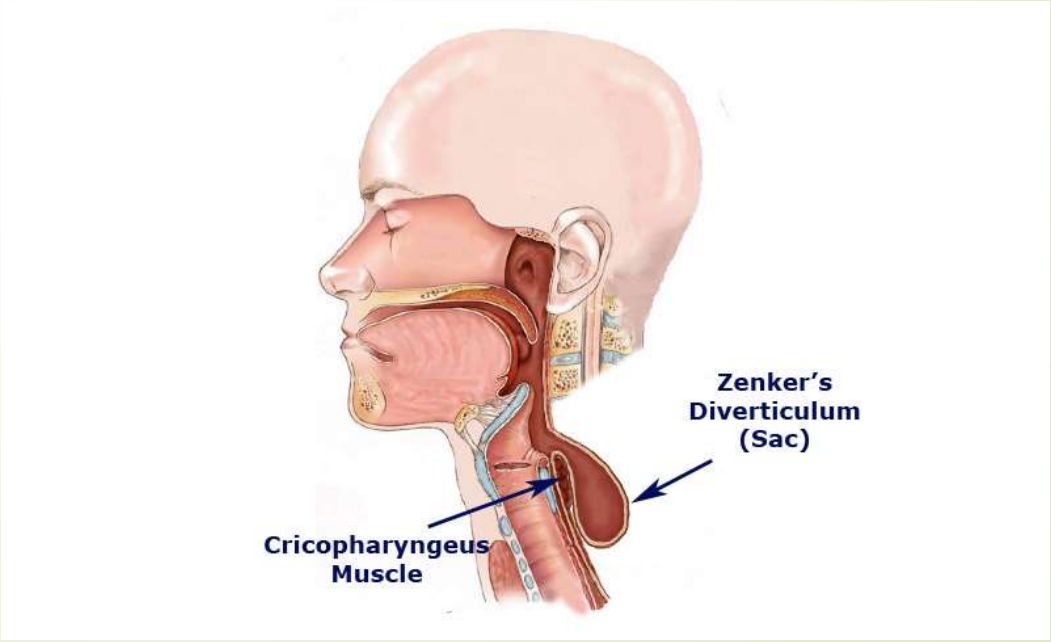
- halitosis , recurrent chest inf.

Mechanical :

- benign vs malignant , ask about associated symptoms






Zenker's
Diverticulum
(Sac)
Cricopharyngeus
Muscle

8.7 Causes of dysphagia

Oral	
• Tonsillitis, glandular fever, pharyngitis, peritonsillar abscess	• Painful mouth ulcers
Neurological	
• Bulbar or pseudobulbar palsy	• Cerebrovascular accident
Neuromuscular	
• Achalasia • Pharyngeal pouch	• Myasthenia gravis • Oesophageal dysmotility
Mechanical	
• Oesophageal cancer • Peptic oesophagitis • Other benign strictures, e.g. after prolonged nasogastric intubation	• Extrinsic compression, e.g. lung cancer • Systemic sclerosis

Nausea and vomiting

- Frequency
- amount
- Relation to meals and timing
- Associated symptoms
- Content : Bile stained , Blood stained or faeculant
- Wt loss
- medications

Dyspepsia

Peptic ulcer

peritonitis

Gastric outlet

Small or large bowel obstruction

Non GI causes

- Drugs
- Pregnancy
- DKA
- Renal or Liver failure
- Hypercalcemia
- Addsion's disease
- Raised intracranial pressure
- Vestibular disorder

Eating disorders

- **Anorexia nervosa.**
- **Bulemia nervosa.**

Wind and flatulence

- ***Belching***

- It is due to air swallowing (aerophagy) and has no medical significance.

- It may indicate anxiety, but sometimes occurs in an attempt to relieve abdominal pain or discomfort, and accompanies GERD.

- ***Excessive flatus***

- **Mixed gases from aerophagia and bacterial fermentation in colon**

- **Normally 200–2000 ml of flatus is passed each day.**

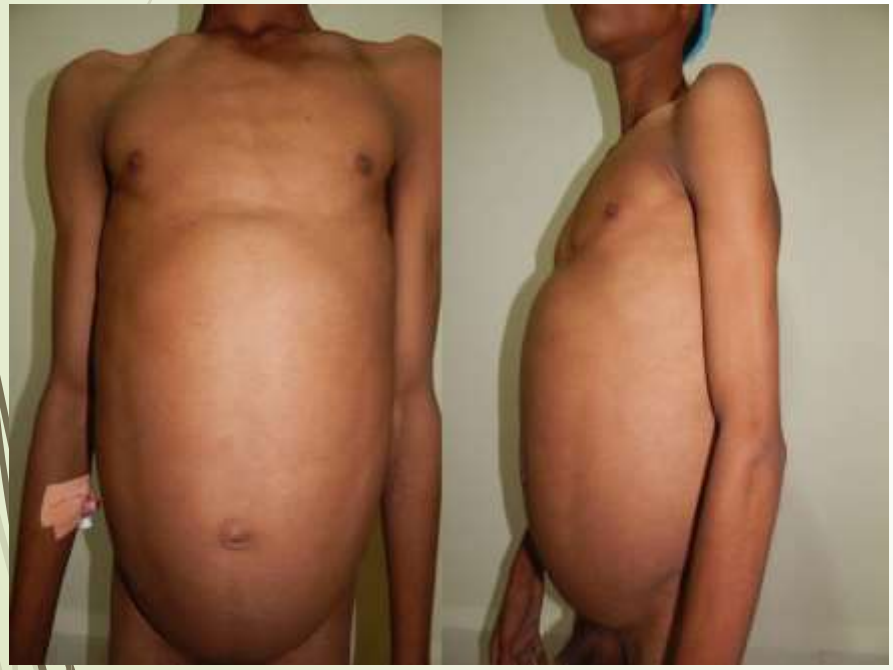
- **Excessive flatus occurs particularly in lactase deficiency and intestinal malabsorption**

Borborygmi

- *audible bowel sounds*

- **Loud borborygmi, particularly if associated with colicky discomfort, suggest small-bowel obstruction or dysmotility.**

Abdominal distention



8.11 Causes of abdominal distension

Factor	Consider
Fat	Obesity
Flatus	Pseudo-obstruction, obstruction
Faeces	Subacute obstruction, constipation
Fluid	Ascites, tumours (especially ovarian), distended bladder
Fetus	Check date of the last menstrual period
Functional	Bloating, often associated with irritable bowel syndrome

Serum-ascites albumin gradient (SAAG)

	SAAG (g/dL)	
	≥ 1.1	< 1.1
Total protein (g/dL)		
< 2.5	Cirrhosis	Nephrotic syndrome
	Acute liver failure	
≥ 2.5	CHF	Peritoneal carcinomatosis
	Constrictive pericarditis	TB peritonitis
	Budd-Chiari syndrome	Pancreatic ascites
	Veno-occlusive disease	Chylous ascites

Altered Bowel Habit

Diarrhea more than 3 times daily or frequent passage of loose stool

- Clarify : frequency vs. consistency
- Steatorrhea : fat 7g/day

Greasy, pale, bulky,

float, difficult to flush

Ask about:

- Onset :

Acute, Chronic, intermittent

- Stool:

frequency, volume, color, consistency (watery, unformed, semisolid),

Content (red blood,mucus,pus)

- Associated features:

urgency, fecal incontinence, tenesmus, abdominal pain, vomiting, sleep disturbance.

- Recent travel

- Medications

- ***High-volume diarrhea*** **(>1 liter per day) occurs when stool water content is increased**

- ***Low-volume diarrhea*** **is associated with the irritable bowel syndrome.**

- **Secretory: due to intestinal inflammation, e.g. infection, or inflammatory bowel disease.**

- **Osmotic: due to malabsorption, adverse drug effects or motility disorders.**

Causes → high volume diarrhea

- Infective gastroenteritis – most common , norovirus/ salmonella/ c.diff , if > 4 weeks → chronic (giardia , amebic)
- IBD → bloody
- Colonic ischemia → bloody
- Colon cancer → rt sided ca
- Thyrotoxicosis → secretory
- Celiac disease → steatorrhea
- Chronic pancreatitis → steatorrhea
- Cystic fibrosis → steatorrhea

Causes → low volume diarrhea

- Irritable bowel syndrome → pain , dyspepsia , bloating → rome criteria of diagnosis of IBD (not required)

Constipation Less than once in three days

- **Infrequent passage of hard stool**
- Onset: lifelong, recent
- Stool frequency: How frequent, time spent straining
- Shape of stool → Bristol classification (not required)
- Associated symptoms: pain, anal pain, rectal bleeding
- Drugs

- **Obstipation:**

Absolute constipation with no gas or bowel movements, suggests intestinal obstruction

- **Tenesmus: feeling of incomplete evacuation, suggests rectal inflammation or cancer(the sensation of needing to defecate although the rectum is empty)**
- **Anesmus : difficulty to empty the rectum despite straining due to paradoxical contraction of puborectalis muscle**

Causes

- Lack of fibers
- IBS
- Intestinal obstruction (CA)
- Drugs
- Immobility
- Metabolic\endocrine

Bleeding

Haematemesis

vomiting blood, which can be fresh and red, or when it is dark brown in colour and resembles *coffee grounds.*

Ask about :

Color → fresh , coffee ground

Amount

Onset

Previous hx

Alocohol , nsaid , sterolds

Melaena

the passage of tarry, shiny black stools with a characteristic odor and results from upper gastrointestinal bleeding.

Distinguish this from the matt black stools associated with oral iron or bismuth therapy.

Melena: > 50 ml\day

Hemoccult: >20 ml\day

Fresh rectal bleeding (heamatocazia)

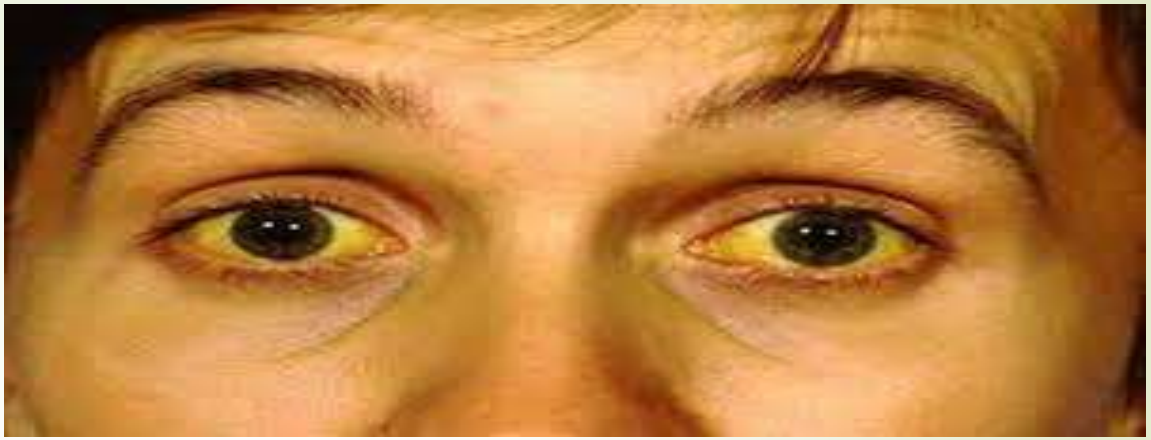
indicates a disorder in the anal canal, rectum or colon .

- **Blood may be mixed with stool, coat the surface of otherwise normal stool, or be seen on the toilet paper or in the pan.**
- **During severe upper gastrointestinal bleeding, blood may pass through the intestine unaltered, causing fresh rectal bleeding.**

Causes of rectal bleeding

- Haemorrhoids
- Anal fissure
- Colorectal polyps
- Colorectal cancer
- Inflammatory bowel disease
- Ischaemic colitis
- Complicated diverticular disease
- Vascular malformation

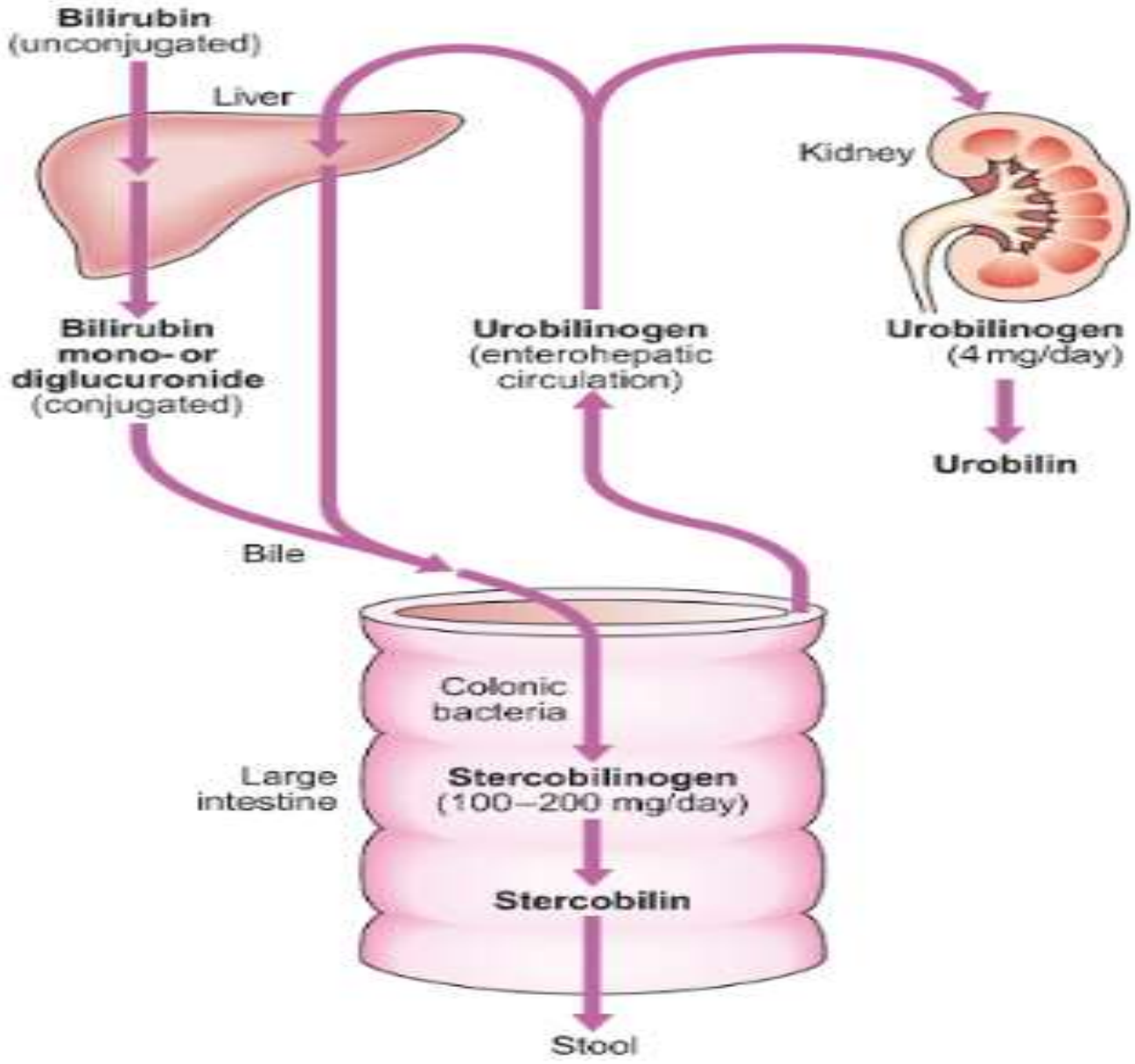
Jaundice



- Jaundice is a yellowish discoloration of the skin, sclerae and mucous membranes due to hyperbilirubinaemia.

- Most clinicians will recognize jaundice when bilirubin levels exceed 3 mg\dl

- Appetite and weight change
- Abdominal pain, altered bowel habit
- Gastrointestinal bleeding
- Pruritus, dark urine, rigors
- Drug and alcohol history
- Past medical history (pancreatitis, biliary surgery)
- Previous jaundice or hepatitis
- Blood transfusions (hepatitis B or C)
- Family history, e.g. congenital spherocytosis, haemochromatosis
- Sexual and contact history (hepatitis B or C)
- Travel history and immunisations (hepatitis A)
- Skin tattooing (hepatitis B or C)


Bilirubin
(unconjugated)
Liver
Kidney
Bilirubin
mono- or
diglucuronide
(conjugated)
Urobilinogen
(enterohepatic
circulation)
Urobilinogen
(4 mg/day)
Urobilin
Bile
Colonic
bacteria
Large
intestine
Stercobilinogen
(100–200 mg/day)
Stercobilin
Stool

6.6 Common causes of jaundice

Increased bilirubin production

- Haemolysis (unconjugated hyperbilirubinaemia)

Impaired bilirubin excretion

- Congenital:
  - Gilbert's syndrome (unconjugated)
- Hepatocellular:
  - Viral hepatitis
  - Cirrhosis
  - Drugs
  - Autoimmune hepatitis
- Intrahepatic cholestasis:
  - Drugs
  - Primary biliary cirrhosis
- Extrahepatic cholestasis:
  - Gallstones
  - Cancer: pancreas, cholangiocarcinoma

8.23 Urine and stool analysis in jaundice

	Urine			Stools
	Colour	Bilirubin	Urobilinogen	Colour
Unconjugated	Normal	–	++++	Normal
Hepatocellular	Dark	++	++	Normal
Obstructive	Dark	++++	–	Pale

- Prehepatic jaundice
- Hepatic jaundice
- Posthepatic / cholestatic jaundice

Direct VS. Indirect hyperbiliirubenemia

- *Indirect : <20 % of congugated(D) billrubin*
- *Mixed : 20-50% of congugated(D) billrubin*
- *Direct : >50% of congugated(D) billrubin*

Groin swellings and lumps

- Hernia
- Lymph nodes
- Skin and subcutaneous Lumps
- Saphena varix
- Hydroceele
- Undescended testis
- Femoral aneurysm
- Psoas abscess

Past history

- History of a similar problem may suggest the diagnosis: for example, bleeding peptic ulcer or inflammatory bowel disease.
- Primary biliary cirrhosis and autoimmune hepatitis are associated with thyroid disease.
- (NAFLD) is associated with diabetes and obesity.

Drug history

6.8 Examples of drug-induced gastrointestinal conditions

Symptom	Drug
Weight gain	Oral glucocorticoids
Dyspepsia and gastrointestinal bleeding	Aspirin Non-steroidal anti-inflammatory drugs
Nausea	Many drugs, including selective serotonin reuptake inhibitor antidepressants
Diarrhoea (pseudomembranous colitis)	Antibiotics Proton pump inhibitors
Constipation	Opioids
Jaundice: hepatitis	Paracetamol (overdose) Pyrazinamide Rifampicin Isoniazid
Jaundice: cholestatic	Flucloxacillin Chlorpromazine Co-amoxiclav
Liver fibrosis	Methotrexate

Family history

- Inflammatory bowel disease is more common in patients with a family history of either Crohn's disease or ulcerative colitis.
- Colorectal cancer in a first-degree relative increases the risk of colorectal cancer and polyps.
- Peptic ulcer disease is familial but this may be due to environmental factors, e.g. transmission of Helicobacter pylori infection.

- Gilbert's syndrome is an autosomal dominant condition.
- Haemochromatosis and Wilson's disease are autosomal recessive disorders.
- Autoimmune diseases, particularly thyroid disease, are common in relatives of those with primary biliary cirrhosis and autoimmune hepatitis.
- A family history of diabetes is frequently seen in the context of NAFLD

Social history

- Dietary history and food intolerance

- alcohol consumption

- Smoking

risk of oesophageal cancer, colorectal cancer, Crohn's disease and peptic ulcer, while patients with ulcerative colitis are less likely to smoke.

- stress

Irritable bowel syndrome and dyspepsia

- Foreign travel

Risk factors for liver disease

- IV drug abuse
- Tattoos
- Foreign travel
- Blood transfusion
- Homosexuality
- Multiple sexual partners
- History of hepatitis B or C

Acute abdomen

6.4 Typical clinical features in patients with an 'acute abdomen'

Condition	History	Examination
Acute appendicitis	Nausea, vomiting, central abdominal pain that later shifts to right iliac fossa	Fever, tenderness, guarding or palpable mass in right iliac fossa, pelvic peritonitis on rectal examination
Perforated peptic ulcer with acute peritonitis	Vomiting at onset associated with severe acute-onset abdominal pain, previous history of dyspepsia, ulcer disease, non-steroidal anti-inflammatory drugs or glucocorticoid therapy	Shallow breathing with minimal abdominal wall movement, abdominal tenderness and guarding, board-like rigidity, abdominal distension and absent bowel sounds
Acute pancreatitis	Anorexia, nausea, vomiting, constant severe epigastric pain, previous alcohol abuse/cholelithiasis	Fever, periumbilical or loin bruising, epigastric tenderness, variable guarding, reduced or absent bowel sounds
Ruptured aortic aneurysm	Sudden onset of severe, tearing back/loin/abdominal pain, hypotension and past history of vascular disease and/or high blood pressure	Shock and hypotension, pulsatile, tender, abdominal mass, asymmetrical femoral pulses
Acute mesenteric ischaemia	Anorexia, nausea, vomiting, bloody diarrhoea, constant abdominal pain, previous history of vascular disease and/or high blood pressure	Atrial fibrillation, heart failure, asymmetrical peripheral pulses, absent bowel sounds, variable tenderness and guarding
Intestinal obstruction	Colicky central abdominal pain, nausea, vomiting and constipation	Surgical scars, hernias, mass, distension, visible peristalsis, increased bowel sounds
Ruptured ectopic pregnancy	Premenopausal female, delayed or missed menstrual period, hypotension, unilateral iliac fossa pain, pleuritic shoulder-tip pain, 'prune juice'-like vaginal discharge	Suprapubic tenderness, periumbilical bruising, pain and tenderness on vaginal examination (cervical excitation), swelling/fullness in fornix on vaginal examination
Pelvic inflammatory disease	Sexually active young female, previous history of sexually transmitted infection, recent gynaecological procedure, pregnancy or use of intrauterine contraceptive device, irregular menstruation, dyspareunia, lower or central abdominal pain, backache, pleuritic right upper quadrant pain (Fitz-Hugh–Curtis syndrome)	Fever, vaginal discharge, pelvic peritonitis causing tenderness on rectal examination, right upper quadrant tenderness (perihepatitis), pain/tenderness on vaginal examination (cervical excitation), swelling/fullness in fornix on vaginal examination

Thank you