Generalized, Upper, Central & Lower Abdominal Pain

Objectives

- The student is expected to describe and explain the **pathogenesis**, **etiology**, and the **clinical features** of each of the following conditions in addition to **complications** (Extra-abdominal & medical causes of abdominal pain) :
  - Next page

General advices regarding the lecture:

- First of all the lecture is easy don't stress about it and don't freak out by the number of slides it all flows easily
- We recommend that you study this lecture after GI bleeding and jaundice especially that it has a lot of topics in common
- Some of these lecture's objectives are already explained in previous lectures so we've linked them incase anyone wanted to take a second look at them

Colour Index

- Main Text
- Males slides
- Females slides
- Doctor's Notes (438)
- Doctor's Notes (439)
- Textbook
- Important
- Golden notes
- Extra

Summary File

Editing File

Generalized abdominal pain

Random stuff

- Irritable bowel syndrome
- Recurrent adhesive bowel obstruction
- Mesenteric vascular ischemia (LGIB Teamwork)
- Diffuse carcinomatosis
- Chronic constipation
- Radiation visceral damage
- Retroperitoneal neoplasms
- Diffuse endometriosis
- Lumbar spinal pain
- Extensive retroperitoneal fibrosis
- Psychosomatic

Upper abdominal pain

Acute

- Oesophagitis (UGIB Teamwork)
- Boerhaave's syndrome (UGIB Teamwork)
- Acute gastritis
- Perforated peptic ulcer
- Acute cholecystitis
- Gallstone and biliary colic
- Acute pancreatitis

Chronic

- Chronic peptic ulceration (UGIB Teamwork)
- Carcinoma of the stomach
- Chronic cholecystitis
- Chronic pancreatitis
- Liver metastases
- Splenomegaly

Central abdominal pain

Acute

- Meckel's diverticulitis
- Acute gastroenteritis
- Inflammatory bowel disease (Acute ulcerative colitis IBD) (LGIB Teamwork)
- Yersinia ileitis (LGIB Teamwork)
- Typhoid (LGIB Teamwork)
- Urinary tract infection
- Ischaemia of the small bowel (LGIB Teamwork)
- Acute appendicitis
- Carcinoma of the cecum and right colon
- Acute diverticular disease
- Carcinoma of the left colon/rectum
- Bladder outflow obstruction
- Interstitial/irradiation cystitis
- Pelvic inflammatory disease

Chronic

- Radiation bowel damage
- Tumours of the small bowel
- Recurrent adhesive obstruction/malrotation
- Endometriosis
- Chronic appendicitis
- Carcinoma of the cecum and right colon
- Diverticular disease
- Carcinoma of the left colon/rectum
- Bladder outflow obstruction
- Pelvic inflammatory disease

Both Acute & Chronic

- Inflammatory bowel disease (Crohn's disease IBD) (LGIB Teamwork)
- Tuberculosis (LGIB Teamwork)

Lower abdominal pain

Acute

- Acute appendicitis
- Diverticulitis
- Diverticulitis/perforation
- Meckel's diverticulitis
- Mesenteric adenitis
- Salpingitis/pelvic inflammatory disease
- Ectopic pregnancy (LGIB Teamwork)
- Acute urinary retention
- Pyelonephritis/renal colic

Chronic

- Chronic appendicitis
- Diverticular disease (LGIB Teamwork)
- Gynecological malignancy
- Chronic infections
- Chronic pelvic sepsis
- Endometriosis
- Uterine colic
- Urological causes (Urinary retention, bladder colic, ureteric colic)

Both Acute & Chronic

- Crohn's disease IBD (LGIB Teamwork)
- Cystitis
- Carcinoma of the colon (Colonic carcinoma)
- Twisting or degenerating fibroid

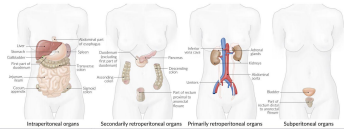
Extra-abdominal & medical causes of abdominal pain

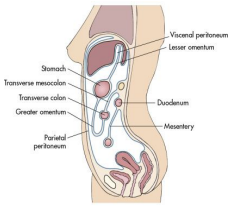
- Pneumonia
- Pleurisy
- Pulmonary infarction
- Inferior myocardial infarction
- Spinal cord disorders
- Hematoma of inferior epigastric artery
- Acute porphyria
- Mesenteric lymphadenitis
- Infectious hepatitis
- Curtis-Fritz-Hugh's syndrome
- Herpes zoster infection
- Diabetic keto-acidosis
- Syphilis (lightening pains)
- Henoch Schöenlein purpura
- Acquired immunodeficiency syndrome (AIDS)
- Sickle-cell crisis
- Non-specific abdominal pain

Abdominal Pain

Peritoneum:

- Abdominal wall is a complex structure. It not about few muscles.
- Aponeurosis and peritoneum, It is more complex than this.
- **Parietal peritoneum** covers the anterior and posterior abdominal walls, the undersurface of the diaphragm and the pelvic cavity. Its nerve supply is therefore derived from **somatic nerves** supplying the abdominal wall musculature and the skin innervation follow the corresponding nerve innervation at the different level of the spinal cord.
- **Visceral peritoneum** forms a partial or complete investment of the intra abdominal viscera. Shares its nerve supply with the viscera (i.e., the **autonomic nerves**)
- Peritoneum work as a bag:
  - Greater sac (**intraperitoneal organs**): Stomach, small bowel, T.colon, Sigmoid, upper rectum
  - Lesser sac (**retroperitoneal organs**): left & right side colon, mid & lower rectum and pancreas





Types of abdominal pain:

Visceral

- **Visceral pain (referred)** from Viscera is typically described as dull and deep seated. It is usually localized poorly and vaguely to the area occupied by the viscus during development.
- The pain precedes acute abdomen and comes from the innervation of the organs themselves, not acute abdomen yet! (Eg: biliary colic)
- Nerve supply is autonomic (if you know the feature of autonomic pain you can differentiate between both pain), Featured as Referred (not connected; pain site is distant from source of stimulus) and radiating pain (continues).
- **Insensitive** to mechanical, thermal, or chemical stimulation. you can cut the bowl without feeling pain
- However, they are sensitive to **tension** (when it is stretched you will stimulate the **nociceptors** receptors and sense the pain), visceral muscle **spasm** (colicy pain pattern of pain in which it's related to the contractions & relaxations of the visceral organ, it will increase with contraction of the organ and decrease in relaxation) and **ischaemia**.
- Which receptors have been stimulated with **constipation?** Visceral
- Visceral: Lining the organs (all, aside of the spleen and lower part of esophagus). nerve endings are mostly all **autonomic nerve endings.**

Parietal

- **Somatic pain (parietal):** is classically described as sharp or knifelike in nature, and is usually well localized to the affected area. there's inflammation (Eg: cholecystitis)
- In the case of acute abdominal pain. The pain comes from the inflammation of the Parietal peritoneum.
- Nerve supply is somatic, featured as radiating only.
- Can come from pertominum which is **sensitive** to mechanical, thermal or chemical stimulation, so when irritated, a reflex contraction of muscles, causing guarding (and hyperaesthesia of skin).
- There will be findings on the examination such as:-
  - Patient looks ill/very bad pain
  - Vitals are abnormal (tachycardia, hypotensive…)
  - Guarding followed by rigidity
- Intra Abdominal inflammation develops in two phases
  - Phase 1: Inflammation limited to organ (Local peritonitis)
  - Phase 2: General peritonitis

Psychosomatic

- Is not real pain, you suspect it when it doesn't make sense and it's not connected especially, in pediatrics and psychiatric patients.
- when the location is changing and the vital signs are normal.

Abdominal Pain

Types of abdominal pain:

	Visceral Pain	Somatic Pain
Cause	Stretch/ Ischemia	Cutting or burning
Nature	Colicky	Continuous
Intensity	Mild to moderate	Severe in intensity
Localization	Generalized Poorly localized	Well localized Sharply Localized
Radiation	Radiates and Refer	Does not refer

Rigidity VS Guarding:

Rigidity

- Rigidity when the inflammation reach the parietal layer Permanent persistence of muscle spasm, i.e. involuntary
- Characteristics of peritoneal inflammation, frank perforation
- Starts with localized tenderness, progresses to tenderness then guarding, and finally it reaches rigidity.
- You don't need a stimulus (Involuntary-permanent)

Guarding

- Muscle contraction produced by additional stimulation, e.g. in physical examination
- Voluntary and involuntary
- Occurs with infection, irritation, early frank perforation and localized perforation..
- Needs a stimulus (A person contract his abdomen once someone touch it-not permanent)

Pattern of pain

- Any pain you encounter, try to ask about all these 10 points:

Site

Character

Duration

Associated problems

Radiation [1]: not every pain radiates

Frequency

Type

Aggravating factors

Relieving factors

Severity [2]: subjective from one person to another

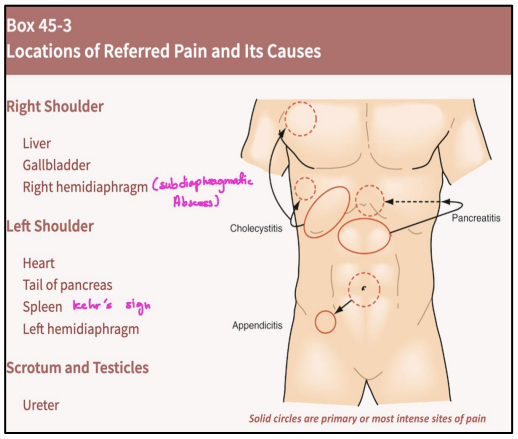
1. Regarding diffuse pain: try to ask the patient to localize it by asking him to point to the area he think the pain emerge from. There is only one pain and the rest are radiation and referral
2. Regarding the severity scale: Try to replace the scale by asking about its activity during the day; is the pain makes him wake up from sleeping, the is at least moderate to severe pain

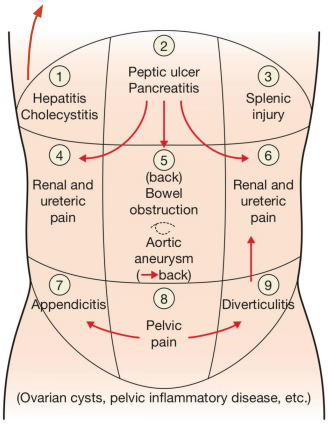
Abdominal Pain

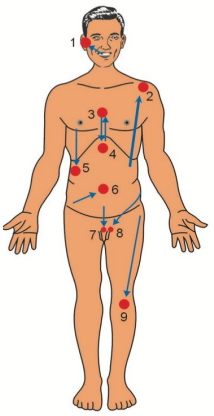
Referred pain

- Pain perceived at a site distant from the source of stimulus (Site of pain & site of stimulus are discontinuous) why? The theory is based on the embryological origin of the organs & interconnected nerves
- Cause: multiple inputs of sensory fibers
- **Examples of referred pain**
    - Cardiac pain: is usually felt in the left jaw.
    - Gallbladder inflammation (cholecystitis): pain is felt in the RUQ and right shoulder.
    - Khmer sign is pain coming from the left shoulder but the problem is in the spleen.
    - Ureteric colic to upper thigh
    - Above diaphragm (lungs) → Neck/shoulder
    - Sub-left diaphragm abscess → L shoulder
    - Ice cream headache
    - Acute onset & unrelenting pain = bad
- Pain is referred to the overlying skin of the abdominal wall according to the dermatome level with the sympathetic supply. The pain felt in:
    - **Midline** if arising from the intestine and its outgrowths (the liver, biliary system and pancreas).
    - **Epigastric** area if arising from Irritation of foregut structures (the lower oesophagus to the second part of the duodenum)
    - **Umbilicus** if arising from midgut structures (the second part of the duodenum to the splenic flexure)
    - **Hypogastrium/ suprapubic** area if arising from hindgut structures (the splenic flexure to the rectum)
- A classical type of referred pain is **appendicitis** as it starts in the umbilicus and then goes down because the pain starts as visceral pain which is central then once it goes beyond the viscera into the peritoneum of the abdominal wall then you start to have some localization. **Visceral pain then becoming parietal** (shifting of pain)

Memorize it







Common referred pain		
	The site of pathology	The site of referred pain
(1)	Tongue.	Ear.
(2)	Diaphragm.	Shoulder.
(3)	Stomach.	Chest.
(4)	Heart.	Epigastrium.
(5)	Pleura.	Hypochondrium.
(6)	Appendix.	Umbilicus.
(7)	Bladder.	Penis.
(8)	Ureter.	Testis.
(9)	Hip.	Knee.

Radiating pain

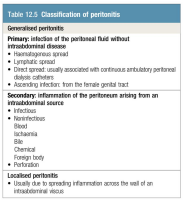
- **Definition:** travelling pain that spreads from the original point of origin to a larger area of body (Site of origin and site of effect are continuous)
- **Examples:** Pain caused by compression of nerves
- **Cause:** Pain sensations are carried along the length of the nerve

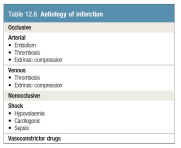
Abdominal Pain

Pathogenesis

Inflammation	• Acute inflammation of an intra abdominal organ or the peritoneum may occur as a result of a variety of irritants, which may be broadly classified into infective or noninfective • the patient will complain of abdominal pain and tenderness, which occurs as a result of tissue stretching and distortion, and is due to the release of inflammatory mediators, some of which also mediate pain • the patient may be pyrexial and have a tachycardia; investigations may reveal a raised white cell count. • Examination of the abdomen will reveal tenderness in the affected area, with guarding, rebound and rigidity if the parietal peritoneum is involved.

Perforation	• Spontaneous perforation of an intra abdominal viscus may be the result of a range of pathological processes. Weakening of the wall of the viscus, which might be associated with a:
	  ○ locally advanced malignancy of the bowel, as well as degeneration, inflammation, infection or ischaemia, will all predispose to perforation.
	  ○ An increase in the intraluminal pressure of a viscus,will predispose to perforation
	  ○ Perforation can also be iatrogenic, and may occur during the insertion of a Verres needle at laparoscopy, because of a careless cut or suture placement during surgery, and during the course of an endoscopic procedure.
	• **Clinical features**
	  ○ Spontaneous perforation of a viscus normally results in the sudden onset of severe abdominal pain, which is usually well localised to the affected area.
	  ○ The resultant clinical picture depends on the nature of the perforated viscus and the relative sterility and toxicity of the material within the abdominal cavity, in addition to the speed with which the perforation is surrounded and sealed (if at all) by the adjacent structures and omentum.
	  ○ The inevitable peritoneal contamination will lead to either localised or generalised peritonitis, and the associated symptoms and signs, as already discussed.
	  ○ Intestinal content, blood and bile are all irritant to the peritoneum.

Peritonitis	• Inflammation of the peritoneum (peritonitis) may be classified according to extent (either localised or generalised) and aetiology.
	• In a surgical setting, the most common cause of generalised peritonitis is perforation of an intra abdominal viscus
	• Peritonitis is usually a bad sign, usually a sign of intra abdominal catastrophe whether its perforation or big abscess.
	• The clinical features of peritonitis vary considerably but the most common symptom is abdominal pain, which is constant and often described as sharp.
	• The patient will look extremely unwell with severe pain. The pain is usually well localised if it is secondary to inflammation of an intra abdominal viscus and involves the parietal peritoneum, but may spread to involve the whole peritoneal cavity.
	• Vitals and labs will be abnormal
	• The term 'peritonitis' or 'peritonism detected on clinical examination' is used to describe the collection of signs associated with inflammation of the parietal peritoneum, and includes **tenderness**, **'guarding'** (voluntary), **rigidity** (involuntary) and **'rebound' tenderness**.
	• **Treatment:**
	  ○ The primary objective is to deal promptly and effectively with the underlying cause
	  ○ Antibiotic cover is indicated early in all patients with established secondary peritonitis and is directed against gut flora in the first instance
	  ○ Thorough peritoneal lavage is an essential adjunct to any operation
	  ○ Patients presenting late and in a moribund condition may require 'damage limitation surgery', whereby immediate life-saving surgery is carried out and further laparotomies are required for more definitive surgery over the next few days
	 

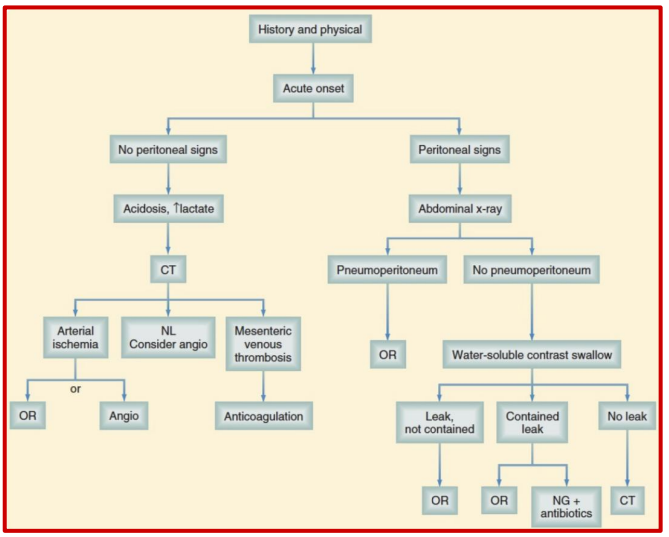
Infarction	• An infarct is an area of ischaemic necrosis caused either by an occlusion of the arterial supply or the venous drainage in a particular tissue, or by a generalised hypoperfusion in the context of shock.
	• The typical histological feature of infarction is ischaemic coagulative necrosis.
	• An inflammatory response begins to develop along the margins of an infarct within a few hours, stimulated by the presence of the necrotic tissue.
	• **The consequences of decreased perfusion of a tissue depend on several factors:**
	  ○ The availability of an alternative vascular supply
	  ○ The rate of development of the hypoperfusion
	  ○ The vulnerability of the tissue to hypoxia, and the blood oxygen content.
	• In the context of acute abdominal pain, intestinal infarction is the most common cause.
	• Other organs that may infarct include the ovaries, kidneys, testes, liver, spleen and pancreas.
	• **Clinical features**
	  ○ In general, the patient will complain of severe abdominal pain and the onset will depend on the nature of the underlying process.
	  ○ Embolisation will result in sudden onset of pain, whereas the onset in thrombosis is likely to be more gradual.
	  ○ Infarction and ischaemia are potent triggers of inflammation of the affected structure, and the clinical features reflect this.
	 

Obstruction	• The term 'obstruction' refers to impedance of the normal flow of material through a hollow viscus. It may be caused by the presence of a lesion within the lumen of the viscus, an abnormality in its wall, or a lesion outside the viscus causing extrinsic compression. The smooth muscle in the wall of the obstructed viscus will contract in an effort to overcome the impedance. This reflex contraction produces 'colicky abdominal pain' suchasseenin'ureteric colic'. The exception to this rule is **'biliary colic'.** The gallbladder and biliary system have little smooth muscle in their wall and attempts at contraction tend to be **more continuous than 'colicky'.** Similarly '**renal colic**' is a misnomer and it should be referred to as '**renal pain**'. • If the obstruction is not overcome, there will be an increase in intraluminal pressure and proximal dilatation. The end result depends on the anatomical location of the obstruction, whether it is partial or complete, and whether the blood supply to the organ is compromised.

Abdominal Pain

Clinical assessment

- **Acute abdominal pain is one of the most complains that patient goes to the emergency department for**
- **Acute abdomen** have super classical looks: Patients with severe pain bend their hips and knees to relax their abdominal wall muscles because when it's tight it pushes on the peritoneum and causes pain. They don't want to move because movement causes pain and they have a concerned look because they know that they are about to be examined.
- Signs and symptoms of intra-abdominal disease that is usually best treated by surgery
- Despite improvements in labs and imaging, history and physical examination remains the mainstay of determining the correct diagnosis!
- Proper evaluation and management requires one to recognize:
    - Does this patient need surgery?
    - Is it emergent, urgent, or can wait?
- Learn to think in "worst-case" scenario[1]
- Remember medical "non-surgical" causes of abdominal pain, AFTER you rule out surgical causes
- Intra abdominal diseases may present with something other than pain
    - Eg: stroke, spinal cord injury, they may not have abdominal pain BUT they present with acute abdomen (perforated viscus)
    - Eg: DKA, causes abdominal pain but it's NOT acute abdomen
- **Stable patient:** do all the tests
- **Urgent/perforations**
    - CBC
    - Upright chest x-ray
    - (All while ABCs, resuscitating)
    - No time for CT -> push to surgery



- The first step in any abdominal pain is to establish whether or not this patient is stable ABC
- Then make a distinguish decision is this an acute abdomen or a surgical abdomen by having a patient with serious symptoms such as tachycardia hypotension fever and have an abdomen with diffuse peritonitis (anywhere you touch will get will severe tenderness) → these patients you need to get them to surgery
- If the patient isn't a surgical abdomen then you can take your time by taking history and doing physical examinations

1. if the patient has diffused generalized abdominal pain and looks sick you need to think about the severe causes like: bleeding from ruptured aneurysm or perforation from peptic ulcer or perforated bowel from volvulus or adhesion.

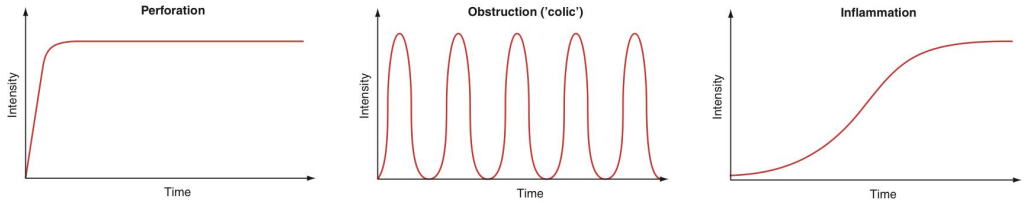
Abdominal Pain

Clinical assessment

History

A full history (Characterizing the pain) is key:

- Sites (Quadrants of Abdomen)
- Onset (Biliary colic)
  - Sudden pain can suggest perforation or embolism and ischemia
  - Gradual can suggest inflammation and abscess formation
  - Acute abdominal pain is pain that present usually in **hours to days**
  - Typhoid, TB, Pelvic inflammatory disease, adhesions, hernias, and all malignancies can give you abdominal pain.
  - Chronic pain is usually months to years and usually not immediate life threatening,
  - Sometimes you can have something we call it acute and chronic (chronic pancreatitis in the other acute episode)

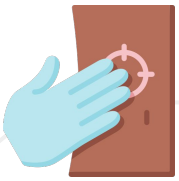


- Duration (Time to develop): No specific duration to separate acute and chronic but 6 weeks is a close estimation
- Progression (Pain which resolves usually is not acutely surgical)
- Character (Colic or Somatic):
  - Pain which is made worse by movement or coughing suggests inflammation of the parietal peritoneum
  - Obstruction of a muscular viscus produces a colicky pain that comes and goes in 'spasms'
  - If stabbing → angina , colicky → gallstones , burning → GERD , grabbing → appendicitis , dull aching → tooth pain, pressure like → heart related , rumbling → chronic appendicitis
- Severity (Moderate or Severe)
- Change in symptoms with eating? Loss of appetite?
- Medication History: NSAID use (perforated Duodenal Ulcer)
- Drinking history (pancreas)
- Prior surgeries (adhesions→ SBO)
- History of hernias
- Urine output (dehydrated)
- Constitutional Symptoms
- Sexual/mesnstrual history may give you a hint about ectopic pregnancy&STDs
- domestic abuse
- Associated symptoms (GI symptoms):
  - Nausea, emesis (bilious or bloody)
  - Constipation, obstipation (last BM or flatus)
  - Diarrhea (bloody)
  - Jaundice, acholic stools, dark urine

Symptoms can be objective or subjective for example muscle weakness, jaundice and severe pain is objective so whenever you read about a disease find which symptoms are objective and very common "appendicitis can present with diarrhea but its not the most common presentation its most common presentation is pain"

Abdominal Pain

Clinical assessment



Physical examination

- As in every emergency patient, a full examination, including the cardiovascular, respiratory and neurological systems, in addition to the abdomen and pelvis, must be carried out
- Start with General Inspection, Scars from previous abdominal or pelvic surgery may be observed, and are of importance in the presence of bowel obstruction, which may be secondary to adhesions.
- Palpate each quadrant
- Work toward area of pain
- Warm hands
- Patient on back, knee bent (if possible),
- Note tenderness, rigidity (involuntary movement), guarding (voluntary movement), masses. If the whole peritoneal cavity is inflamed, then there will be generalised peritonitis and the abdominal wall will be rigid (board-like rigidity).
- When the palpating hand, which has been pushing the parietal peritoneum against the inflamed viscus, is suddenly released, the viscus will bounce back and hit the parietal peritoneum, causing an additional sharp pain (rebound tenderness). This is an excellent indication of underlying peritoneal inflammation (peritonism) but is very painful and is better tested by light percussion or the 'tap test'. history of pain on coughing or moving is also a good indication of peritoneal inflammation.
- Patients with peritoneal irritation lie still with flexion of knee and hips
- Some patients keep moving to find comfortable position (ureteral or biliary colic)
- Fascial hernias may be suspected and can be confirmed during palpation of the abdominal wall
- important features to look for on general examination include clinical evidence of anaemia, jaundice, cyanosis and dehydration
- Rebound tenderness should never be elicited in children. Gentle tapping with the percussing finger will elicit the same information (tap tenderness) in a much less cruel way
- It is important to bear in mind that physical signs are often less obvious than might be expected in the elderly, the obese, the generally unwell and those taking steroids
- Finally, a rectal examination is performed to assess the pelvis and, if a gynaecological disorder is suspected, a vaginal examination is indicated.

Aaron sign	Pain or pressure in epigastrium or anterior chest with persistent firm pressure applied to McBurney point	Acute appendicitis
Bassler sign	Sharp pain created by compressing appendix between abdominal wall and iliacus	Chronic appendicitis
Blumberg sign	Transient abdominal wall rebound tenderness	Peritoneal inflammation
Carnett sign	Loss of abdominal tenderness when abdominal wall muscles are contracted	Intra-abdominal source of abdominal pain
Chandelier sign	Extreme lower abdominal and pelvic pain with movement of cervix	Pelvic inflammatory disease
Charcot sign	Intermittent right upper abdominal pain, jaundice, and fever	Choledocholithiasis
Claybrook sign	Accentuation of breath and cardiac sounds through abdominal wall	Ruptured abdominal viscus
Courvoisier sign	Palpable gallbladder in presence of jaundice	Periampullary tumor
Cruveilhier sign	Varicose veins at umbilicus (caput medusae)	Portal hypertension
Cullen sign	Periumbilical bruising	Hemoperitoneum
Danforth sign	Shoulder pain on inspiration	Hemoperitoneum
Fothergill sign	Abdominal wall mass that does not cross midline and remains palpable when rectus is contracted	Rectus muscle hematomas
Grey Turner sign	Local areas of discoloration around umbilicus and flanks	Acute hemorrhagic pancreatitis
Iliopsoas sign	Elevation and extension of leg against resistance create pain	Appendicitis with retrocecal abscess
Kehr sign	Left shoulder pain when supine and pressure placed on left upper abdomen	Hemoperitoneum (especially from splenic origin)
Mannkopf sign	Increased pulse when painful abdomen is palpated	Absent if malingering
Murphy sign	Pain caused by inspiration while applying pressure to right upper abdomen	Acute cholecystitis
Obturator sign	Flexion with external rotation of right thigh while supine creates hypogastric pain	Pelvic abscess or inflammatory mass in pelvis
Ransohoff sign	Yellow discoloration of umbilical region	Ruptured common bile duct
Rovsing sign	Pain at McBurney point when compressing the left lower abdomen	Acute appendicitis
ten Horn sign	Pain caused by gentle traction of right testicle	Acute appendicitis

Abdominal Pain

Clinical assessment

Laboratory

- **Basic lab tests:** CBC w diff (limited clinical utility): left shift on CBC means neutrophils are the highest = bacterial infections, (Lymphocyte shift), Coagulation, LFT, Total and direct bilirubin, Electrolytes, Creatinine, blood urea nitrogen
- UA / Urine culture
- **Lactic acid** to exclude ischemia,
- Blood gas analysis: Patients with sepsis and intestinal ischaemia are likely to demonstrate a metabolic acidosis
- LFT / Amylase / Lipase
- CE / Troponin
- HCG (quant / qual) because some types of pregnancy are painful (Ectopic pregnancy)
- Stool Culture for chronic pain, C. difficile culture and toxin assay
- Hemoglobin
- Serum calcium, Sickle tests, Blood glucose

Labs & Imaging

Test	Reason	Test	Reason
CBC w diff	Left shift can be very telling	KUB Flat & Upright	SBO/LBO, free air, stones
BMP	N/V, lytes, acidosis, dehydration	Ultrasound	Chol'y, jaundice GYN pathology
Amylase	Pancreatitis, perf DU, bowel ischemia	CT scan Diagnostic accuracy	Anatomic dx Case not straightforward
LFT	Jaundice,hepatiti s	Diagnostic Laparoscopy	Anatomic dx Case not straightforward
UA	GU- UTI, stone, hematuria		
Beta-hCG	Ectopic		

Investigation

- Initially we start with flat & upright KUB x-ray (In upright KUB look for free air under the right hemidiaphragm = perforation. If you suspect biliary diseases & GYN pathology US is better. If you suspect anything else → CT scan.
- upright chest x-ray: The erect chest x-ray (CXR) is the most appropriate first investigation for the detection of free intraperitoneal gas and should be carried out in any patient who might have a perforation
- Plain abdominal radiographs: useful in the diagnosis of free air and bowel obstruction

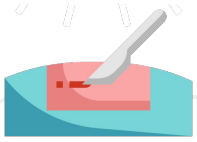
- or abdominal series has several limitations and is subject to reader interpretation
- US: patient come with abdominal pain and has cystic lesion in the pancreas do US.
- **CT scan:** in conjunction with ultrasound is superior in identifying any abnormality seen on plain film, CT is the best modality in the acute abdomen, except in:
    - GYN pathology → US
    - Biliary disease → US (as good as CT)
    - Pregnant patient → US
    - If the case is unstable and needs emergent OR → none or maybe KUB if time allows
    - AAA needs a **CT angio** to diagnose it
- MRI
- **Contrast radiology:** the main issue that requires the use of contrast x-rays is determining the presence or absence of obstruction or perforation.
- **Angiography:** Mesenteric angiography has been superseded by CT angiography in the investigation of suspected mesenteric ischaemia, CT angiography can also reliably differentiate arterial from venous causes and distinguish occlusive from nonocclusive disease
- X-RAY is useful in any patient who come sick to make sure if there is free air or signs of bowel obstruction and CT-scan is the best whenever you have time ,MRI in specific conditions like a pregnant lady with abdominal pain and you want to rule out appendicitis when US is not showing anything and there are adjunct work up test like Endoscopy , colonoscopy.

Abdominal Pain

Clinical assessment

Investigation

- **endoscopy:** PUD doesn't show on imaging unless its perforated so that means that we might need to get an **endoscopy** to diagnose it
- **Peritoneal lavage:** The use of peritoneal lavage in patients suspected of having intra abdominal injury from trauma has now been replaced by CT in the immediate assessment of patients with abdominal trauma to identify free fluid, If free fluid is seen, hemodynamically stable patients should undergo CT; those who are hemodynamically unstable require emergency laparotomy
- **Laparoscopy:** useful in patients for whom the decision to operate is in doubt and in the elderly when findings from the history and examination can be misleading. Young women probably benefit the most from laparoscopy, as it is often difficult in this group to accurately differentiate (even with a pelvic US) acute appendicitis from acute gynaecological conditions



FINDINGS ASSOCIATED WITH SURGICAL DISEASES

Physical Examination and Laboratory Findings	Radiographic Findings	Diagnostic Peritoneal Lavage (1000 mL)
• Abdominal compartment pressures >30 mm Hg • Worsening distention after gastric decompression • Involuntary guarding or rebound tenderness • Gastrointestinal hemorrhage requiring >4 units of blood without stabilization • Unexplained systemic sepsis • Signs of hypoperfusion (acidosis, pain out of proportion to examination findings, rising liver function test results)	• Massive dilation of intestine • Progressive dilation of stationary loop of intestine (sentinel loop) • Pneumoperitoneum • Extravasation of contrast material from bowel lumen • Vascular occlusion on angiography • Fat stranding or thickened bowel wall with systemic sepsis	• >250 white blood cells per milliliter of aspirate • >300,000 red blood cells per milliliter of aspirate • Bilirubin level higher than plasma level (bile leak) within aspirate • Presence of particulate matter (stool) • Creatinine level higher than plasma level in aspirate (urine leak)

Special circumstances

- Situations making diagnosis difficult: Stroke or spinal cord injury & Influence of drugs or alcohol
- Severity of disease can be masked by: Steroids or Immunosuppression (i.e.AIDS), Pain is hard to measure and sometimes one type of pain can take over the other like when you are in pain and you clench your teeth because it elevates the threshold of pain so it doesn't mean that your pain is gone it's there but it's overtaken by another signal and the brain decides which pain is the most painful.
- Threshold to operate must be even lower
- some patient with acute abdomen might not present with clear presentation, ex: obese and immunocompromised patients
- If the patient is Immunocompromised, they usually die faster than healthier patients so you need to be careful. Labs can appear normal because baseline WBC count is low. The physical examination can be normal or mildly abnormal due to the weak inflammatory response!

Emergency OR!!

- **Peritonitis** (Specially If generalized): Tenderness w/ rebound, involuntary guarding
- **Unstable** (hemodynamically, or septic): Tachycardic, hypotensive, white count
- **Intestinal ischemia:** including strangulation, Closed loop obstruction
- **Pneumoperitoneum**
- **Complete or "high grade" obstruction**

Upper Abdominal Pain

Gastritis

- Gastritis describes any histologically confirmed inflammation of the gastric mucosa.
- Acute Gastritis is a widespread name. When you say acute that means there's chronic but there's no acute or chronic gastritis only gastritis
- Usually classified according to the underlying etiology.
- **Clinical manifestations** : polydipsia , postprandial fullness, early satiety, bloating , epigastric tenderness (It's more of discomfort with possible indigestion rather than pain "feels like the food stopped after I ate")

Autoimmune		• Its caused by circulating antibodies to the parietal cell which will results in atrophy of the cell mass and hypochlorhydria (Low level of stomach acidity) and ultimately achlorhydria (absence of acid secretion). • As intrinsic factor is also produced by the parietal cell there is malabsorption of vitamin B12, which, if untreated, may result in pernicious anaemia. • Predisposition to the development of gastric cancer, and screening such patients endoscopically may be appropriate.
Infectious (Acute gastroenteritis)	**Bacterial**	**H. pylori** (Most common cause of gastritis) • Usually gastritis affects the antrum in patients who are prone to peptic ulcer disease • Pangastritis is a very common manifestation of infection and they are the most prone to the development of gastric cancer, endoscopic screening may be appropriate if identified.
		Mycobacterium tuberculosis
		Treponema pallidum
	Viral	e.g., CMV, EBV
	Fungal	e.g., Candida spp.
	Parasitic	e.g., Anisakis spp.
Noninfectious	**Medications**	• **NSAIDs:** inhibition of the cyclooxygenase type 1 (COX-1) receptor enzyme, hence reducing the production of cytoprotective prostaglandins in the stomach • **Aspirin**
	Toxic substances (Alcohol, harsh chemicals)	
	Chemotherapy	
	Radiation	
Stress Gastritis (Curling ulcer)		• Hypoperfusion of gastric mucosa as a consequence of extreme stress resulting from shock • Happens due to inflammatory stress "cytokine storm" (e.g. burn victim, trauma, long term ICU admission, sepsis) where the gastric mucosa is inflamed and starts to slough and necrosis exposing the muscular layer which will start to bleed. • The problem here that there is no single source of bleeding, it's multiple spots. Treated by reversing the underlying cause and PPI to suppress the acid, if that fails you must take the patient to the OR (gastrotomy and suture of the bleeding site).
Ménétrier's disease		• It affects mucosa of the **fundus** and **body** of the stomach, it spares the antrum. **Pathophysiology:** • Increased mucus production → loss of protein (hypoproteinemia) • Atrophy of parietal cells → decreased gastric acid production • Hyperplasia of gastric mucosal rugae **Treatment** • **Most patients : Supportive care:** high-protein diet and possibly IV albumin infusions • **Severe cases** with persistent protein loss: **First line:** cetuximab **Second line:** total gastrectomy • Increases the incidence of gastric malignancy. Therefore, total prophylactic gastrectomy should be considered.

Upper Abdominal Pain

Peptic ulcer disease

Risk factors: H. pylori - NSAIDs
Clinical features:

- Burning epigastric pain
- Sharp, dull, achy, empty or hungry feeling
- Relieved by milk or antacids
- Awakens the patient at night
- Hemorrhage may be heralded by nausea, hematemesis, melena or dizziness

Physical finding epigastric tenderness

Perforated peptic ulcer

Overview:

- if a peptic ulcer erodes the wall of the stomach or duodenum at a point where it is only covered by visceral peritoneum. Acid gastric juice will enter the peritoneal cavity and it'll causes a chemical peritonitis, which later becomes infected with bacteria.
- Drug history It is important to enquire whether the patient has taken steroids, NSAID or salicylates, because these dispose to perforation.

Presentation:

- Sudden severe generalized and diffused constant pain may indicate perforation or peritonitis This usually begins in the epigastrium, gradually extends to involve the whole of the abdomen.
- Reaches its maximum intensity quickly and remains severe for many hours.
- All movement, including respiration, makes the pain worse. causing the patient to lie immobile on the bed.
- After 4–6 hours, the acid in the peritoneal cavity becomes diluted and the pain and guarding decrease. Patients think they are improving but they are **in fact getting worse.** The peritonitis is progressing and hypervolaemia is developing.

Examination:

- Very tender, with intense guarding, often described as board-like rigidity.
- Tachycardia and shallow breathing
- Absent bowel sounds once peritonitis is generalized.

Investigation

- Erect X-ray will reveal free air under diaphragm. In up to 50% of pati
- CT **(more accurate)**
- Amylase level measured in all patients as distinguishing between peptic ulcer and pancreatitis
- **Leukocytosis**

Treatment

- Initial priorities are **resuscitation** and **analgesia**.
- Systemic antibiotics and proton pump inhibitors
- Surgery (laparotomy or laparoscopic) repair the defect by graham patch
- Peritoneal lavage with the removal of all the fluid and food debris.

Liver Metases

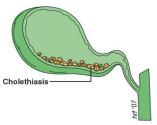
- Liver metastases are a common complication of all intra-abdominal malignancies
- A constant dull ache in the right hypochondrium, general malaise, weight loss and sometimes mild jaundice may be the first indication of their presence
- Distension of the liver capsule stimulates pain fibres

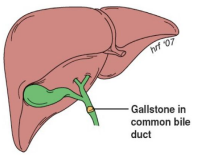
Splenomegaly

- A large spleen can cause dull, persistent left hypochondrial pain
- Splenic infarction, which is often associated with sickle-cell disease, causes a more severe pain which may be exacerbated by deep respiration

Cholecystitis

➢ Biliary colic





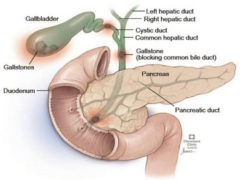
Overview:

- Obstruction of Cystic duct by a stone Resulting in distention of Gallbladder.
- Autonomic pain
- Gallstone colic is a severe pain caused by contraction of the gallbladder as it tries to force a gallstone down the cystic duct, which is why 'gall-stone colic' is a preferable term to 'biliary colic'. Many cases of gallstone colic progress to acute cholecystitis. Types of stones are (Cholesterol stones (75%) or Pigment stones (25%))
- **There's no inflammation**

Presentation:

- **Site :** Rt upper Q
- **Onset:** It develops typically after a heavy meal causing forceful contraction of gall bladder and stone impaction.
- **Character:** Though colic but practically it is almost constant, The pain is severe and constant with excruciating exacerbations. It's not a true colic because it does not remit between exacerbations.
- **Radiation:** To epigastrium / Along Rt side to top of scapula
- **Associated symptoms:** nausea and vomiting and is only relieved by strong analgesia About a fifth of patients who present in this way become jaundiced.
- **Timing:** Lasts few minutes to hours
- **E&R factors :** worse with heavy fatty meals (stomach will release cholycystine enzyme to stimulate gallbladder contraction)
- **Severity:** Pt is stable / Does not look sick
- **Previous episodes:** they have similar previous episodes

Investigation



- **Lab:** elevated serum conjugated bilirubin, CBC and LFTs are normal,
- **Ultrasound:** reveals gallstones with acoustic shadowing.

Treatment

- Only in high risk group patient otherwise no need (Analgesia during acute attacks)

➢ Acute

After few hrs if Gallbladder remains Distended Ischemia / Micro organisms proliferation / Inflammation sets in Now biliary colic converts into pain of **acute cholecystitis** (Acute inflammation of the gallbladder is commonly caused by **obstruction of the cystic duct** by a small stone causing gallbladder distension,chemical inflammation of its wall and, eventually because there will be stasis of bile which causes an infection by the normal flora then).

Presentation:

- Sudden dull pain that It develops after 12 to 14 hrs after biliary colic **(previous history of biliary colic)** if untreated progress to sharper pain in RUQ that is much more severe
- It is felt in the right hypochondrium and often radiates through to the right shoulder
- The pain is continuous, lasting more than 6 hours and can continue for days, and is exacerbated by moving and breathing.
- **Fever and chills,** They always feel nauseated and often vomit.
- Positive murphy's sign (inspiratory arrest elicited by palpation of the RUQ during inspiration) touching the area surrounding the inflammation causes sharp severe localized pain
- If there is an associated obstructive jaundice, the urine may be dark, the stools pale and the skin itchy.
- Rare complication is gallbladder get infarcted or ruptured and causes biliary peritonitis.

Investigation

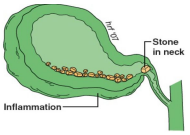
- **Laboratory tests:** CBC show leukocytosis,↑CRP, normal level of bilirubin
- **Ultrasound:** shows distended gallbladder with thickened wall

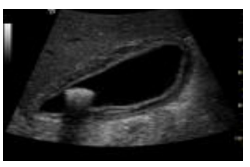
Treatment

- Morphine given in cholecystitis reduces pain by suppressing the pain and relaxation of smooth muscle. When gall bladder relaxes, the gallbladder will suck back the obstructed stone by negative pressure If pain does not subside with morphine, then the patient is in phase 2
- NPO and IV fluids.
- Broad-spectrum antibiotics are effective against gram -ve aerobes (Cefazolin or Cefuroxime) and anaerobes (Metronidazole).
- Emergent cholecystectomy is indicated if the patient presents within 7 days

Risk factors: "Five F's "

- **F**at, hyperlipidemia
- **F**orty, age is >40yo
- **F**emale
- **F**latulent
- **F**ertile, have one or more children
- **F**amily history





➢ Chronic

- **Recurrent infection in the gallbladder** is almost always associated with gallstones.
- gradual onset, and not associated with fever or jaundice, varies in severity
- The combination of stones and infection may present various clinical pictures: upper abdominal indigestion-like pain after eating. The pain normally begins gradually, 15 to 30 minutes after a meal, and lasts for 30 to 90 minutes.
- The patients often notice that the pain is worse after eating a fatty meal, such as bacon and eggs or fish and chips.
- The skin or sclera may show signs of jaundice, indicating that there may be stones in the common bile duct.

Upper Abdominal Pain

Pancreatitis

➢ Acute pancreatitis

Overview:

- **pancreatitis** is a spectrum, from mild pain to multi-organ failure
- Luminal obstruction of Pancreatic duct by a stone → blockade, distention, rupture of acini → Liberation of proenzymes / activation of enzymes → Autodigestion of pancreatic and surrounding tissues.
- More common in female because Gallbladder stones are more common in female

Caused by:

- obstruction of the pancreatic duct, usually by a small **gallstone** obstructing the ampulla of Vater
- periampullary carcinoma
- alcohol abuse
- Viral infections
- trauma

Presentation:

- Pain start as **dull constant vague** periumbilical or epigastric pain then slowly increase intensity over hours to days
- 90% of cases the pain is mild and stable, 10% is very severe and sudden and patient is unstable
- **Pain is high in the epigastrium, usually radiates through to the back.**
- Nothing relieves the pain, Worse after meals and when supine
- Improves on leaning forwards so that the stomach falls away from the pancreas reliving them from pain
- Frequent vomiting and retching .
- Many patients have eaten an unusually large meal or drunk some alcohol before the pain began.
- In severe cases the patient may complain of muscle twitching and cramps.

Examination:

- **pale and sweating,** it is likely that they have become hypovolaemic.
- Respiration is impaired due to severe pain, they become grey, apprehensive, dyspnoeic and cyanosed.
- The sclera may reveal a slight tinge of **jaundice** if the pancreatitis has been caused by a stone lodged in the lower end of the bile duct.
- **Skin changes** (rare)
- Cullen sign: periumbilical ecchymosis and discoloration (bluish-red)
- Grey Turner sign: flank ecchymosis with discoloration
- Fox sign: ecchymosis over the inguinal ligament

Investigation

- **Labs**: Elevation of serum **lipase or amylase** 3 higher than normal, CBC,CRP, TGs,LDH
- **US:** first-line imaging modality , shows Enlarged hypoechoic pancreas
- **CT:** for Severe pancreatitis : optimally performed > 5–7 days after symptom onset

Treatment

- Initiate fluid resuscitation , NSAIDs
- IV broad-spectrum antibiotics. If the patient is febrile

➢ Chronic pancreatitis

Overview: progressively destroys the exocrine and endocrine tissues of the pancreatic gland.

Presentation:

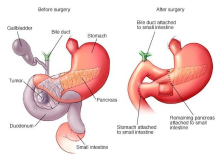
- multiple attacks of acute pancreatitis (acute relapsing pancreatitis) (similar symptoms but milder)
- often develops de novo in patients who subject themselves to **chronic alcohol abuse.**
- Weight loss and nausea are common.
- Diabetes, **steatorrhoea** and jaundice develop in about 10 percent of affected patients.
- Chronic pancreatitis can cause thrombosis of the portal vein, in which case the signs of portal hypertension will be present.

Investigation

- Labs shows elevated serum amylase in early disease and later shows minimally or normal level.
- Plain x-ray shows diffuse pancreatic calcification.
- CT shows speckled pancreatic parenchymal calcification, ductal dilation, masses and pseudocyst.
- **ERCP is the most accurate test**, it shows details of pancreatic duct

Treatment

- Conservative treatment , IV fluids and NSAID
- Surgical intervention for severe cases (drainage , whipple's procedure , pancreatectomy)



whipple's procedure

Upper Abdominal Pain

Carcinoma of the stomach

- The majority of gastric ulcers arise spontaneously
- **Helicobacter pylori** is an important predisposing factor
- Gastric cancer is the fourth most common cancer and the second leading cause of cancer death
- Prevalent in East Asia and South America
- More common at age >65
- More common in male than female
- **Common premalignant conditions :** Pernicious anaemia, gastric polyps and chronic gastric ulcers

Presentation

- Epigastric pain, constant and nonradiating and is generally not relieved by eating.
- Early satiety, and weight loss (The patient may lose 10–20 kg in 1 or 2 months)
- Advanced lesions may manifest with either obstruction or dysphagia depending on the location of the tumor
  - Tumours near the **cardia** may cause esophagogastric junction obstruction and cause the patient to complain of difficulty in swallowing (dysphagia). As the dysphagia increases, undigested food may be regurgitated from the oesophagus.
  - Cancers in the **pyloric** region often obstruct the outflow of food from the stomach. If so, the patient may vomit large quantities of undigested food as vomiting is a cardinal feature in most cases of pyloric outlet obstruction.
- Some degree of GI bleeding is common (melena or hematemesis)
- Enlarged lymph nodes

Investigation

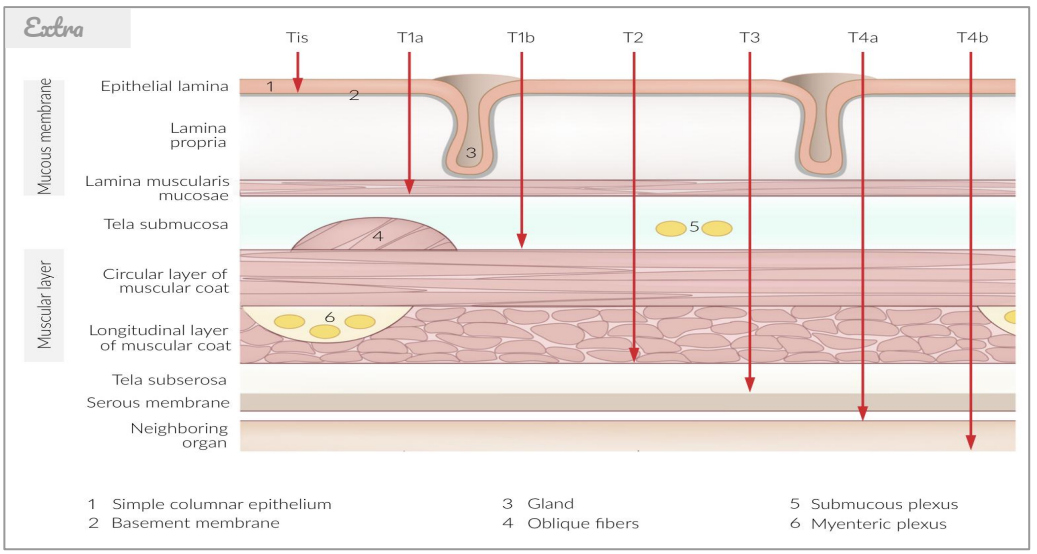
- Esophagogastroduodenoscopy (endoscopy) with biopsy, **the test of choice**
- **CT** for staging

Treatment (according to the cancer stage)

- **Localized**, resectable disease, surgical or endoscopic resection +\- perioperative chemotherapy or adjuvant chemoradiotherapy
- Total gastrectomy , resectable cancer in the proximal or middle third of the stomach
- Subtotal gastrectomy , can be considered for resectable cancer in the distal stomach

Metastases

- Evidence of intra-abdominal metastases such as hepatomegaly, jaundice, or ascites (usually present late)
  - Supraclavicular especially left (Virchow)
  - Periumbilical (Sister Mary Joseph node)
  - During PR Anteriorly enlarged lymph node (Blumer's Shelf)



Central Abdominal Pain

Small bowel neoplasm

- 5% of all GIT neoplasms, >90% are benign, the rest are malignant.
- Malignant small bowel neoplasms (in order of frequency): Adenocarcinoma, carcinoid, lymphoma and GISTs
- All can potentially present with abdominal pain, bleeding and obstruction. Unique clinical presentation occurs in carcinoid syndrome (very rare).

Adenocarcinoma of the Small bowel

- Two-thirds of small bowel malignancies.
- Highest incidence of adenocarcinoma is in the duodenum.
- Other Risk Factors: Alcohol, APC mutations (Adenomatous polyposis coli is a gene that suppresses tumor growth) (10% risk to develop duodenal cancer), celiac disease and Crohn's disease.
- **Symptoms:**
  - **Duodenal**: Abdominal pain, obstruction, nausea, vomiting, bleeding and anemia.
  - **Jejunal and Ileal:** Asymptomatic or nonspecific symptoms (Pain, malaise and nausea), advanced cases present with obstruction, bleeding or even perforation.

Diagnosis

- **Duodenal:** Upper endoscopy **(modality of choice)** imaging studies show filling defects or thickening, **CA-19-9** is elevated in one-third of the patients.
- **CT:** For staging the tumor.
- **Endoscopic US:** Local invasion of vascular structures to assess resectability.
- **Jejunal and Ileal:** Difficult to scope, plain radiography, CT and MRI are often used.
- If there is a high suspicion of malignancy (e.g. Crohn's) → balloon-assisted endoscopy and capsule endoscopy.

Treatment

- **Surgical resection**

Small intestinal carcinoids

- Strongest risk factor is family history of an extrapulmonary carcinoid neoplasm and genetic disorders (MEN1, VHL, NF1, tuberous sclerosis).
- Sporadic risk factors are unknown.
- **Symptoms:**
  - Carcinoid syndrome from excess serotonin (uncommon): flushing, shortness of breath, diarrhea
  - Mass symptoms: Abdominal pain, intermittent obstruction, bleeding or could be totally asymptomatic.

Diagnosis

- 24-hour urinary sample of 5-HIAA (serotonin metabolite)
- **Endoscopy with US:** Gastric, rectal and duodenal carcinoids **(confirmatory test)**
- **CT and MRI:** Helps in staging, calcifications may be seen.
- **Octreoscan (somatostatin receptor scintigraphy):** For staging and to detect small neoplasms or remnant metastases.

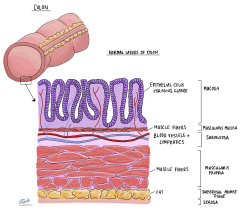
Treatment

- **Surgical resection**

Central Abdominal Pain

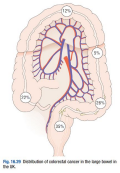
Anatomy Layers of the Colon (#437)

- In the rectum the last layer is mesorectal fat (**no serosa**), so that's why in case of rectal cancer we give radiation because of the high local recurrence. So, T3 of the colon = T4 of the rectum
- Basement membrane = muscularis mucosa
- "Any growth above the basement membrane is benign, whenever it reaches the basement membrane it's considered as malignant tumor and it can metastasize (through lymphatic+blood vessels)"



Colorectal Carcinoma

- Colon cancer (CC) is the leading type of cancer in men and the 3rd runner for women of Saudi Arabia.
- Adenocarcinoma of the colon is the most common malignancy of the gastrointestinal tract (constitutes 98% of all cancers in large intestine).



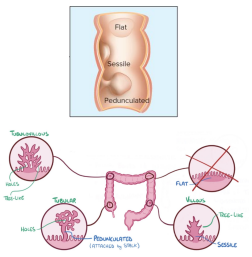
Major and Recognized Pathoetiologic Pathways

- APC/Beta catenin pathway OR Adenoma to Carcinoma pathway (common): Normally APC binds to beta-catenin (proliferative marker) to suppress it from hyperproliferation. If APC is abnormal or absent: hyperproliferation→ dysplastic adenoma→KRAS mutation & other mutations → P53 mutations and finally invasion of basement membrane.

- DNA mismatch repair pathway (MSI-H tumors): gives rise to hereditary non-polyposis colon carcinoma (HNPCC)

Polyp - cancer sequence (#437)

- The process from benign polyp to cancer takes from 7 - 10 years .
- The transformation into cancer is based on:
  1. The type of polyp Adenomatous "sessile growth, and villous histology.
  2. Size of polyp > 2 cm
  3. Multiple polyps = greater risk of cancer.
- Adenomatous Polyp risk → other types
- Villous type of adenomatous Polyp carries greater risk than tubular and tubulovillous.
- Sessile polyp (directly adhere to the wall of bowel) > Pedunculated polyp (has a stick)



Risk factors ★

01 Male gender (1.5 greater lifetime risk, Double risk)

02 **Strong family history (35% of incidence due to genetics)**
- Autosomal dominant (HNPCC[1] "most common", FAP, PJS, JPS)
- Recessive inheritance (MUTYH associated polyposis)

03 IBD

04 Western diet, specifically:
- Low fiber → reducing stool bulk and altering gut microbial profile → proinflammatory flora → constant cell turnover → increased chance of mutation and cancer
- High fat → enhances cholesterol synthesis and bile acids which get can potentially get converted to carcinogens
- Red meat and high energy diets
- Low calcium and vitamin D
- Alcohol and smoking (mainly in men)

1. Males are at a greater risk, also associated with endometrial, gastric, ovarian, urothelial, and small intestinal cancers. It is due to to a mutation in mismatch repair genes such as: MLH1, MSH2 and MSH6

Protective association

01 Aspirin

02 Vitamin D and calcium supplements

03 Hormone replacement therapy

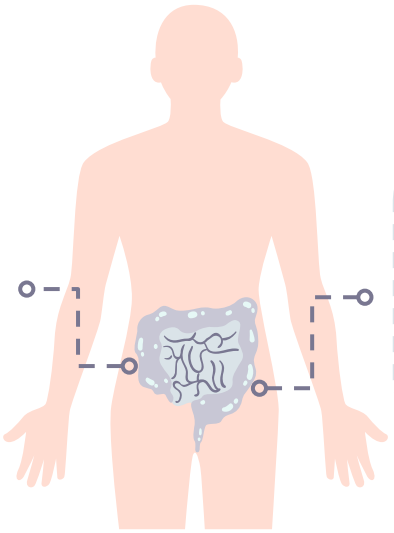
04 Diet: High fiber diet including brassica vegetables, such as broccoli, contain antioxidants and potential antineoplastic compounds.

Clinical Features

- There are no specific features to distinguish a malignancy from a benign disease.
- CC can be divided anatomically into; right-sided (proximal) and left-sided, including the rectum (distal).
- Both of which have unique clinical presentation and manifestation:
  - Hepatomegaly may be present
  - Perianal or sciatic pain is indicative of local invasion
  - Both commonly metastasize to: liver, lung, peritoneum and to lesser degrees the spleen and ovaries.

Cecum and Rt. colon (proximal)

- Better prognosis
- Polypoid, fungating that are sometimes asymptomatic but present with iron deficiency anemia (due to melena) and weight loss.
- Usually silent until it has grown to a considerable size.



Left colon and rectum (distal)

- More aggressive
- Annular, encircling with early-symptoms of obstruction, tenesmus.
- Majority of colon cancers → sigmoid & rectosigmoid junction.
- Presents with a change in the bowel habit (alternating constipation & diarrhea)

Screening

- 45 y.o and above for males and 50 and above for females in Saudi Arabia and then every 10 years (High risk? screen every 2-3 year) by colonoscopy (CT angiography is excellent but polyps under 3 cm can't be seen with it)
- Recommended age group to start screening for colorectal cancer : 45 y.o
- Previous CRC: Colonoscopy at 1 year after resection, then at 3 years then every 5 years.
- Previous history of adenomatous polyp: Colonoscopy every 3-5 years.
- **Positive Family History (single member):** Start at 40 or 10 years earlier than index case, whichever is earliest, every 5-10 years (5 if family history of cancer or advanced adenoma <60) by colonoscopy.
- 3 family members, 2 generations, 1 premature (age <50) as in hereditary nonpolyposis colon cancer syndrome (HNPCC): Screening at age 25 with colonoscopy every 1–2 years.
- Familial adenomatous polyposis (FAP): beginning at age 12, sigmoidoscopy every year.
- Inflammatory bowel disease (ex. Ulcerative colitis)→ Eight years after diagnosis with follow-up every 1-3 years. (colonoscopy every 2 years)

Diagnostic workup

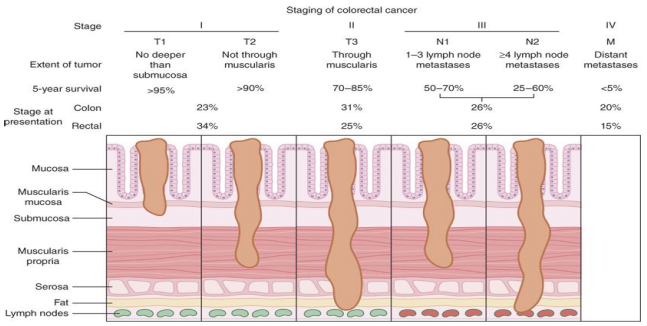
- Digital Rectal Examination: <10% are palpable
- Most prognostic factor in a cytology assessment of colorectal cancer is depletion of goblet cells.
- Colonoscopy and Biopsy: **Gold-standard**, the whole colon should be scoped.
- Double-contrast barium enema: If colonoscopy is incomplete
  - Look for a filling defect or an apple core lesion

Staging

- Endorectal Ultrasound: Depth of infiltration
- CT or MRI of chest, abdomen and pelvis

Carcinoembryonic Antigen (CEA): Treatment monitoring, recurrence and progression.

TNM Staging



Tumor

How far into the wall has the tumor grown

- **TX** Cannot be assessed
- **Tis** Invasion of the mucosa only
- **T1** Limited to mucosa and submucosa (dysplastic adenomatous polyp)
- **T2** Extends to muscularis propria
- **T3** Extends through muscularis propria to perirectal or pericolic tissues
- **T4** Extends to adjacent structures or organs

Node

- **NX** Cannot be assessed
- **N0** None
- **N1** <4 regional lymph nodes
- **N2** 4 or more regional lymph nodes
- **N3** Distant lymph node involvement

Metastasis

- **MX** Cannot be assessed
- **M0** None
- **M1** Distant metastasis

Other Staging Methods

Table 16.7 Dukes' staging for colorectal cancer

Dukes' stage	Description	Proportion of colorectal cancers (%)
A	Spread into, but not beyond, muscularis propria	10
B	Spread through full thickness of bowel wall	30
C	Spread to involve lymph nodes	30
D*	Distant metastases	20

*There is formally no D stage in Dukes' staging; this is a misnomer, as Dukes' staging refers only to degree of local invasion and to lymphatic spread. However, the term is widely used in clinical practice.

Table 16.9 American joint committee on cancer (AJCC) stage groupings and equivalence with Dukes' staging

AJCC	TNM		Dukes
I	$T_1N_0M_0$ or $T_2N_0M_0$	Spread into submucosa or just into muscularis propria No lymph node or distant spread	A
IIA	$T_3N_0M_0$	Spread through bowel wall into outermost layers No lymph node or distant spread	B
IIB	$T_4N_0M_0$	Spread through bowel wall into other tissues or organs No lymph node or distant spread	B
IIIA	$T_{1-2}N_1M_0$	Spread into submucosa or just into muscularis propria Spread to ≤ 3 nearby lymph nodes but no distant spread	C
IIIB	$T_{3-4}N_1M_0$	Spread through bowel wall into other tissues or organs Spread to ≤ 3 nearby lymph nodes but no distant spread	C
IIIC	Any T N_2M_0	Any T stage and spread ≥ 4 lymph nodes but no distant spread	C
IV	Any T Any N M1	Any T and N stage but distant spread (e.g. liver, lung, peritoneum)	D*

*There is formally no D stage in Dukes' staging; this is a misnomer, as Dukes' staging refers only to degree of local invasion and to lymphatic spread. However, the term is widely used in clinical practice.

Grading based on the TNM classification (#437)

Stage 0	Stage 1	Stage 2	Stage 3	Stage 4
Tis tumors	T1 and T2 tumors (N0 & M0)	T3 & T4 (N0 & M0)	+ve lymph node involvement with any T	+ve metastases with any T

Treatment

- Total resection with metastasectomy **(mainstay)**: If the patient can tolerate it followed by **chemotherapy** according to sensitivity. If a patient can not tolerate surgery or in cases of extensive metastasis: Palliative chemotherapy or radiotherapy and surgery can be indicated to prevent or treat complications.
- **Mucinous** subtypes are diagnosed late associated with a **poor prognosis** and are sometimes considered to be **high risk.**
- (#437): **Follow up:** office visit every 3 months for 2 years then every 6 months for 3 years (total 5 years), regular blood work (CEA), colonoscopy CT scan every year.

Central Abdominal Pain

Recurrent adhesive obstruction

- Fibrous intraperitoneal strands of connective (scar) tissue between organs and tissues that are not usually physiologically connected
- **The most common cause of small bowel obstruction**

Symptoms:

- Patient will present with the four cardinal signs of mechanical bowel obstruction
- Periumblical or diffuse crampy intermittent colic abdominal pain the bowel try to push more and more
- Abdominal distension
- Nausea and Vomiting due to backflow
- Obstipation and constipation inability to have bowel movement or flatus
  They occur in this order in small bowel obstruction, and the sequence is reversed in large bowel obstruction
- Decreased bowel sounds.

Etiology (mechanical and non-mechanical causes)

- **History of abdominal surgery (adhesions from previous surgery)**, adhesions start to form within hours of abdominal surgery. In the early postoperative period, such a mechanical obstruction may be difficult to differentiate from paralytic ileus.
- **Abdominal tuberculosis**
- **Inguinal incarcerated hernia**
- Congenital bands and internal hernia may also cause recurrent episodes of small bowel obstruction

Investigation

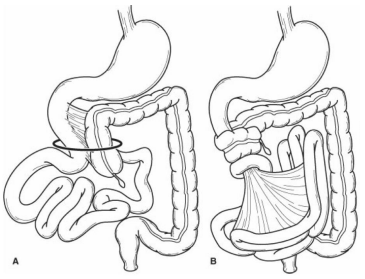
- Abdominal x-ray shows dilation of several small bowel loops.
- Adhesive obstruction is a difficult diagnosis to make and is often applied incorrectly to any patient who experiences pain after abdominal surgery
- The diagnosis can only be made with certainty when the obstruction becomes acute and laparotomy confirms the presence of adhesions obstructing the bowel

Management

- Initially treat conservatively if there are no signs of strangulation.
- rarely continue conservative treatment for longer than 72 hours.
- Laparoscopic adhesiolysis, divide only the causative adhesion(s) and limit dissection.

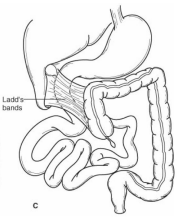
Malrotation

- **Intestinal malrotation (A) :** arrest in the normal rotation of the gut in utero, resulting in an abnormal orientation of the bowel and mesentery within the abdominal cavity.
- **volvulus (B) :** torsion of a malrotated midgut causing mechanical bowel obstruction, mostly in neonates and infants
- Malrotation with volvulus is **life-threatening**
- As the gut strangulates, the baby may pass blood stained stools and becomes progressively sicker.



Presentation

- **Malrotation**: mostly asymptomatic
- **Midgut volvulus:**
  - Bilious vomiting with abdominal distension in a neonate/infant
  - Signs of bowel ischemia: hematochezia, hematemesis, hypotension, and tachycardia
  - Features of duodenal obstruction: bilious vomiting without abdominal distension



Complication

- Mechanical bowel obstruction → accumulation of gas and feces within the loop → increased intraluminal pressure → impaired capillary perfusion of bowel → bowel strangulation, ischemia, and gangrene.

Investigations

- Laboratory studies: CBC; electrolyte levels; ABG
- Upper GI series (fluoroscopic X-ray of the esophagus, stomach and duodenum) , **gold standard**

Management

- Incidentally detected/asymptomatic **intestinal malrotation**: elective surgery (Ladd procedure)
- **Midgut volvulus :**
  - Initial resuscitation: NPO; nasogastric tube insertion; IV fluids; correction of electrolyte imbalance; broad-spectrum IV antibiotics
  - Emergency surgery (Ladd procedure → The volvulus is reduced/untwisted and the Ladd bands removed (**C**)
  - Gangrenous/necrotic bowel, if present, is resected

Lower Abdominal Pain

Bladder obstruction

➔ **Acute retention**

- Sudden and severe painful inability to micturate, **lower abdominal distention** and central lower abdominal pain
- **Initial management** is to drain urine by catheterization: Urethral catheter or Suprapubic catheter
- **Late management** is to treat underlying cause

➔ **Chronic retention**

- Enlarged and painless bladder, whether or not the patient is having difficulty micturating.
- Has 2 types:
  - **High-pressure**, the cause is obstruction of the bladder outlet which ultimately results in renal failure, of the post-renal type.
  - **Low-pressure**, the fault seems to lie with the bladder muscle, which is atonic. There is no back-pressure effect on the kidneys.
- Bladder pressure builds up and produces dilatation of the ureters and the renal collection systems as well as the bladder. This ultimately results in renal failure, of the post-renal type.
- Many patients with chronic retention have dribbling overflow incontinence.
- **Management:** renal failure management , bladder drainage , correct electrolyte

➔ **Common symptoms of outflow obstruction :** (Hesitancy - Poor flow - Intermittent flow - Post Micturition dribbling)

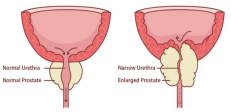
Causes of obstruction

• Bladder

- Bladder cancer involving the bladder neck

• Prostate gland

1. **Benign hypertrophy of the prostate gland**
   - Inner portion of the prostate gland hypertrophies during late adult life (unknown cause) .
   - As it grows, it bulges and compress centrally into the urethra and the base of the bladder.



- **Treatment** :
  - **Medical :** α1-Adrenergic blockers are usually the first-line agent in medical management of BPH (terazosin, doxazosin, tamsulosin, and silodosin)
  - **Surgical:** surgical removal of obstructing prostatic tissue , transurethral prostatectomy (TURP)

2. **Carcinoma of the prostate**
   - More than 95% of prostatic cancers are adenocarcinoma arising from the prostatic acinar structures, commonly arise in the peripheral zone
   - The incidence of prostate cancer increases with age.
   - To distinguish between prostate cancer and BPH, screen for **PSA** (Prostate-specific antigen (PSA))

The causes of retention of urine

Mechanical
- In the lumen of the urethra, or overlying the internal urethral orifice
  - Congenital valves
  - Foreign bodies
  - Tumour
  - Blood clot
  - Stones
- In the wall of the bladder or the urethra
  - Phimosis
  - Trauma (rupture of the urethra)
  - Urethral stricture
  - Urethritis
  - Meatal ulcer
  - Tumour
  - Prostatic enlargement (benign and malignant)
- Outside the wall
  - Pregnancy (retroverted gravid uterus)
  - Fibroids
  - Ovarian cyst
  - Faecal impaction
  - Paraphimosis

Neurogenic
- Post-operative retention
- Spinal cord injuries
- Spinal cord disease
  - Disseminated sclerosis
  - Tabes dorsalis
- Hysteria
- Drugs
  - Anti-cholinergics, anti-histamines, smooth-muscle relaxants, some tranquillizers

• Urethral abnormalities

1. **Urethral strictures**
   - Occur as a result of damage or destruction of the urethral mucosa followed by healing with fibrous scar tissue.
   - **Most common causes are** :
     - Congenital (Pinhole meatus - Urethral valves)
     - Traumatic (Instrumentation (catheterization) - Foreign bodies)
     - Inflammatory (Gonorrhoea)

2. **Urethritis**
   - Produces symptoms of painful micturition with a purulent discharge from the external meatus, which is easier to notice in men than in women. It is almost invariably caused by a sexually transmitted disease, commonly gonorrhoea. If not properly and promptly treated, it heals with a scar, producing a urethral stricture.

Lower Abdominal Pain

Kidney & ureteric stones

Etiology

Stones forms when:

- The amount of solutes increases (e.g. hypercalciuria)
- Amount of solvent decreases (e.g. dehydration)
- Concentration of nucleation inhibitors decreases (e.g. decreased citrate excretion) (Nucleation: initial crystals formation)
- Mineral deposits form in kidney, move to ureter.
- Often associated with history of recent UTI.
- Forign bodies, anatomical abnormalities & calculi can all act as a nidus for nucleation and promote further stone formation

Causes based on types:

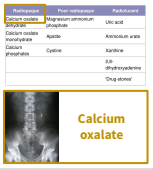
- **Calcium oxalate** (Most common type):
  - Hypercalciuria
  - Hypercalcemia
  - Hyperoxaluria
  - Hypocitraturia
- **Uric acid:** increase in uric acid formation through Gout or myeloproliferative disorders (high cell turnover)
- **Calcium phosphate:** secondary to renal tubular acidosis
- **Magnesium ammonium phosphate (Struvite):** UTI by pathogens that can break urea down into CO_2 and ammonia and thereby alkalinizing the urine.

Symptoms

- Renal calculi: Flank pain which is either colicky (arising from the renal pelvis) or non-colicky dull pain (arising from the renal capsule)
- Upper ureteric calculi: costovertebral angle or flank pain
- Mid-ureteric calculi: pain radiating from loin to groin
- Lower ureteric calculi: radiated to testicales in males and labia majora in females.
- Severe unilateral pain. Paroxysmal or progressively worsening .
- **Renal pain** is dull and aching whereas **ureteric colic** is acute and severe occurring in waves.
- The area around the kidneys may be tender on percussion (costovertebral angle tenderness)
- Nausea, vomiting & and reduced bowel sounds
- Hematuria.
- Restlessness (opposed to patients with peritonitis, who usually prefer to lie still)
- Dysuria, frequency, and urgency

Diagnosis

- **Initial diagnostics**
  - Laboratory studies: CBC, BMP, urinalysis , β-hCG
  - Imaging studies:
    - CT abdomen and pelvis without contrast: preferred if imaging is indicated **(first line)**
    - Ultrasound abdomen and pelvis: suspected nephrolithiasis in patients for whom radiation exposure should be minimized (e.g., pregnant patients, pediatric patients, those with recurrent stones)
    - KUB: Follow up
    - Radioisotope: to determine the function of to kidney
- **Further evaluation**
  - Determine stone composition.
  - Identify metabolic risk factors with a dietary history and laboratory studies.



Treatment

- Initiate **symptomatic management** prior to confirmatory imaging for patients with renal colic: Analgesia (First line: NSAIDs), antiemetics and IV fluids
- **Conservative management:** small (≤ 10 mm), uncomplicated stones**: First-line:** tamsulosin (alpha blocker) and antibiotics in case of UTI
- **interventional treatment:**
  - Renal stones ≤ 20 mm OR lower renal pole stones ≤ 10 mm: Ureterorenoscopy or ESWL
  - Renal stones > 20 mm OR lower renal pole stones > 10 mm: percutaneous nephrolithotomy (PCNL)

    Indications:
    - Uncontrolled symptoms (e.g., intractable pain, inability to tolerate PO)
    - Large stones (> 10 mm)
    - Infected kidney stones (e.g., signs of sepsis in combination with high-grade obstruction)
    - Acute renal failure
    - Solitary kidney or kidney transplant with obstruction
    - Conservative management is unsuccessful after 4–6 weeks.

Bladder stones

Etiology

Stones may form in the bladder in association with stasis, infection or tumour, or enter from the ureter. There is always a degree of bladder outlet obstruction, otherwise the stone would have been rapidly voided.

Symptoms

- The most common symptom is an **increased frequency of micturition**.
- Intermittent sudden cessation of urinary flow, relieved by lying down.
- Suprapubic stabbing pain, exacerbated by standing.
- **Haematuria**, particularly at the end of micturition.

Lower Abdominal Pain

Urinary Tract Infection

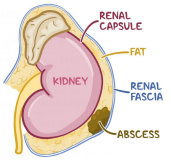
➔ **Acute Pyelonephritis:** Bacterial infection of the renal parenchyma and collecting system (the causative organism is E.coli same as UTI as most infections are ascending infections from the lower tracts)

- Can arise in two ways: hematogenous infection or ascending infection (most common route)
- **Symptoms:** sudden onset of fever, chills, unilateral or bilateral flank pain, dysuria, frequency and urgency.
- UTIs can present with abdominal pain especially suprapubic.
- **Diagnosis:** Urine culture, blood count (leukocytosis) US or CT may reveal an enlarged kidney.
- **Treatment:** Empirical antibiotics that are revised once culture and sensitivity reports are available (antibiotics for 2-3 weeks) absence of response to treatment (48-72 h) alerts towards the development of complications such as renal abscess or associated UTI obstruction. Patients with sepsis needs to be hospitalised and administered IV antibiotics.

➔ **Chronic Pyelonephritis (reflux nephropathy):** Denotes the process of scarring and atrophy of the renal parenchyma ultimately resulting in renal insufficiency.

- Most common association especially in children is vesicoureteral reflux.
- The condition is usually silent and discovered incidentally on investigating abnormal renal functions.
- Imaging may show a small contracted scarred kidney that is poorly functioning.
- **Treatment**: The damage that has already resulted is irreversible so the management is aimed at preventing further damage to the kidney by recurrent UTIs.

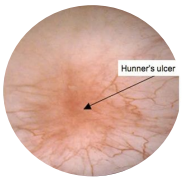
➔ **Perinephric abscess:** Caused by extension of renal abscess into perinephric space.



- **Symptoms:** fever, chills, flank pain, nausea and malaise.
- **Diagnosis:** blood count (Neutrophilia), Urinalysis (pyuria and bacteriuria), CT (modality of choice)
- **Treatment**: hospitalisation, antibiotic therapy, supportive treatment followed by US or CT guided drainage (if percutaneous drainage fails to resolve the abscess open surgical drainage might be needed)

➔ **Cystitis:** is an infection within the bladder within a concomitant reaction in the bladder wall.

- Common predisposing factors are incomplete emptying, abnormalities within the bladder and in women bacteria migrating up the urethra.
- **Symptoms:** most common symptoms are increased frequency and urgency, suprapubic pain, burning micturition, hematuria is common, cloudy urine with characteristic fishy smell.
- **Urinalysis:** Best initial test of all patients. Rules out cystitis.
- **Treatment**:
  - **Behavioural (first-line):** avoid caffeine and recognized triggers with bowel training.
  - Antibiotic treatment is recommended for all patients with symptomatic UTI.



➔ **Interstitial cystitis**

- **Pathophysiology:** A syndrome of **unknown etiology** (non-infectious disease).
- It predominantly affects women
- It consists of a chronic pancystitis, often with marked infiltration with lymphocytes and macrophages.
- Fibrosis of the vesical musculature and areas of avascular atrophy of the epithelium occur.
- Ulceration of the mucosa occurs in the fundus of the bladder.
- Interstitial cystitis is a diagnosis of exclusion and difficult to manage.
- **Investigation**
- Urinary cytology and to biopsy the mucosa to **exclude** underlying neoplastic disease. Rarely, a mucosal ulceration (Hunner's ulcer) is seen.
- Urine cultures for bacteria, fungi, and viruses are **negative**.
- Urinalysis occasionally shows microhematuria.
- **Symptoms:** Increased frequency, lower abdominal pain, relieved by micturition and aggravated by overdistension of the bladder, pyuria and haematuria also occurs
- **Therapeutic options** may include bladder dilatations under general anesthesia, A subtotal cystectomy and augmentation with bowel or a cystectomy with diversion is needed in severe cases.

Mesenteric adenitis (Mesenteric lymphadenitis)

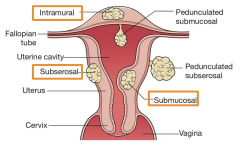
- Non-specific self-limiting inflammation of the mesenteric lymph nodes (>3 nodes, 5mm or greater in the right lower quadrant).
- **Pathology:** It's usually due to an infectious process (organisms leaking through the interstitial space and subsequently the lymph vessels and nodes). This is associated with an upper respiratory tract infection and cervical lymphadenopathy.
- **Etiologies:**
  - Viral gastroenteritis
  - Bacterial gastroenteritis
  - Inflammatory bowel disease.
- **Causative agents:** Yersinia (most common) - Mycobacterium tuberculosis - HIV - Gastroenteritis pathogens
- **Clinical features:** Presents with symptoms similar to appendicitis.
  - Fever
  - RLQ pain (mimics appendicitis)(The pain is caused by swollen glands in the mesentery, so the area of tenderness may move when the patient moves from side to side. The shifting tenderness when a patient moves from side to side is a valuable sign to differentiate it from acute appendicitis)
  - Diarrhea
  - The lymph nodes may show necrosis or immunogenic hyperplasia.
- **Diagnosis:**
  - Usually upon surgical exploration .
  - **US** is usually **the initial the modality of choice** and can differentiate mesenteric adenitis from appendicitis.
  - **CT** is **sometimes considered the modality of choice in older patients.**
- **Treatment:**
  - Self limiting with supportive care
  - It's not an emergency. Treat with conservative measures, and NSAIDs.

Lower Abdominal Pain

★ **Dr. Yasser: There won't be any questions about OB/GYNE**

Fibroid twisting & degeneration

- Fibroid is another name for uterine leiomyoma (uterine smooth muscle neoplasm).
- It is a benign hormone-sensitive neoplasm and it's the most common tumor of the female genital tract. Less than 1% of fibroids undergo malignant transformation (leiomyosarcoma)
- **Predisposing factors:** Nulliparity, early menarche (< 10 years), Age 25 - 45 years (reproductive age) and it's influenced by hormones, African American individuals, obesity and family history.
- During menopause hormones levels begins to decrease and leiomyomas begin to shrink.
- These tumors are classified as either **submucosal** (beneath the endometrium), **intramural** (within the muscular uterine wall of the uterus), or **subserosal** (beneath the peritoneum) and rarely sites include broad ligament and cervix.
- **Symptoms:**
  - Heavy and/or irregular menstrual bleeding, anaemia
  - Pressure-type symptoms or infertility, especially if the fibroid is distorting the uterine cavity. The pressure-type symptoms include pelvic Discomfort, urinary incontinence, frequency and retention, constipation and backache.
  - When large fibroids are present, back pressure may cause or exacerbate varicosities.
  - Although these symptoms are common, it is important to note that some women with fibroids are asymptomatic.
  - Patients may present with acute pain in case of torsion of a pedunculated fibroid or red degeneration usually during pregnancy (Degeneration in this context refers to the fibroid outgrowing its blood supply, the cells will necrotize and the patient will present with acute pain. Red refers to its color)
- **Diagnosis:** Usually clinical, US **(best initial test)**.
- **Treatment:**
  - **Degeneration:** Bed rest, hydration and analgesics. Definitive: Uterine fibroid embolization.
  - **Twisting/torsion:** Myomectomy (in case conception is desired) or hysterectomy.



Uterine colic

★ **Dr. Yasser: you won't be asked about it in the exam**

- Incoordination of the different parts of the uterus in contraction.
- This is always associated with pregnancy and more common in primigravidae (first pregnancy).
- The presence of a large pelvic mass should confirm the presence of a pregnant uterus.
- **Medical management:** Analgesics and antispasmodics and epidural analgesia.
- **Caesarean section indicated in:** failure of previous measures, cephalopelvic disproportion (fetal head too large to fit through the maternal pelvis) and foetal distress before full cervical dilatation.
- Trauma is the most common cause of **uterine rupture**

Gynecological malignancy

Cervical, Vaginal & Vulvar Cancer

- High risk HPV infection (16, 18) due to sexual transmission is the most common cause.
- **Symptoms** include pain during sex, pelvic pain along with the classical constituitonal symptoms of cancers.
- **Cervical Cancer Staging**
  - In-situ (no basement membrane invasion)
  - Stage I: Confined to the cervix
  - Stage II: Invasion of uterus
  - Stage III: Invasion of the pelvic wall and/or lower third of vagina and/or hydronephrosis
  - Stage IV: Beyond the true pelvis to adjacent organs
- **Screening is advised for cervical cancer**
- **Treatment** is by surgery with or without chemotherapy and radiation.

Endometrial Cancer

- Postmenopausal bleeding in an elderly woman is the cardinal symptom with a usually normal pelvic examination.
- **Diagnose** by US and confirm by biopsy
- **Treatment** usually involves surgical removal of the uterus or pharmacological/chemotherapy in advanced diseases or in young patients with early cancers who desire pregnancy

Lower Abdominal Pain

Gynecological malignancy

Ovarian Cancer

- More common in the elderly population
- **Risk factors:** Asbestos, BRCA1/BRCA2 mutation/ HNPCC syndrome, family history, Peutz-Jeghers syndrome, endometriosis elevated number of lifetime ovulations due to infertility or low number of pregnancies or early manarche or late menopause
- **Classification:**
  - Epithelial ovarian tumors: Arise from ovarian surface epithelium (Most commonly benign)
  - Germ cell ovarian tumors: Arise from the primordial germ cells (e.g., oocytes) (Can be benign or malignant)
    Subtypes are determined by structural differentiation
    - Extraembryonic differentiation: yolk sac tumor
    - Somatic differentiation: teratoma
    - No differentiation: dysgerminoma
  - Sex cord and stromal ovarian tumors: Arise from sex cord cells (e.g., Sertoli or granulosa cells) or stromal cells (e.g., fibroblasts or primitive gonadal stroma) (May be benign or malignant)
- **Symptoms:** The first symptom of ovarian cancer is increased abdominal girth where clothes no longer fits at the waist, weight gain, abdominal pain and distention, change in appetite, urinary obstruction with classical constitutional symptoms of cancers.
- **Ovarian cancer staging:**
  - Stage I: Growth limited to the ovaries
  - Stage II: Growth involving one or both ovaries with pelvic extension.
  - Stage III:
    - Tumor involving one or both ovaries with histologically confirmed peritoneal implants outside the pelvis and/or positive retroperitoneal or inguinal nodes
    - Superficial liver metastasis
    - Tumor is limited to the true pelvis but with histologically proven extension to the small bowel or omentum.
  - Stage IV:
    - Growth involving one or both ovaries with distant metastasis
    - If pleural effusion is present there must be positive cytology to classify a case as stage IV.
    - Parenchymal liver metastasis equals stage IV
- **Diagnosis:**
  - US or CT **(best initial)**
  - Confirm by biopsy **(most accurate)**

Serum tumor markers	
Epithelial ovarian tumors	CA-125 (cut off value 35 U/mL) may also be mildly elevated in endometriosis, PID, pregnancy, fibroids, peritoneal inflammation and non- ovarian peritoneal cancer
Germ cells ovarian tumors	
Dysgerminoma	LDH, β-hCG
Yolk sac tumor	AFP
Immature teratoma	AFP, LDH, CA-125
Sex cord and stromal ovarian cancer	
Granulosa cell tumor	Inhibin
Others	None

- **Treat** by removing the tumor and chemotherapy.

Lower & Central Abdominal Pain

Pelvic inflammatory disease (PID)

- PID is one of the most common causes of infertility.
- **Pathophysiology**: Infection from the lower genital tract (e.g., vagina, cervix) ascends to infect the upper reproductive tract (endometrium, fallopian tubes, ovaries) and/or peritoneal cavity.
- **Possible sites of infection**
  - **Acute Salpingitis:** an infection in one or both Fallopian tubes. It is often associated with infection within the surrounding supporting tissues hence the term pelvic inflammatory disease.
  - **Endometritis:** Endometrium
  - **Oophoritis:** Ovaries
  - **Adnexitis:** Uterine adnexa (ovaries, fallopian tubes and ligaments that secure the female reproductive organs)
  - **Parametritis:** Surrounding pelvic structures
  - **Peritonitis:** peritoneum
- **Commonly caused by:** Chlamydia trachomatis, Neisseria gonorrhoeae and Mycoplasma genitalium.
- **Risk Factors:** Unprotected sex, multiple sexual partners, intrauterine devices, vaginal dysbiosis (loss of Lactobacillus dominance and increase of microbial diversity "imbalance of intravaginal flora") and STDs.
- **Symptoms:**
  - Some presents asymptomatic
  - Fever (Sweating and rigors are common)
  - Gradual onset of typically lower bilateral abdominal pain or pelvic pain, constant and can become severe. It may radiate to the lower part of the back.
  - PID should be suspected in young, sexually active women who present with lower abdominal pain and adnexal/cervical motion tenderness (A pelvic examination finding characterized by extreme pain with bimanual examination)
  - Menorrhagia (heavy bleeding, including prolonged menstrual periods or excessive bleeding during a normal-length period), metrorrhagia (bleeding at irregular intervals, particularly between expected menstrual periods), abnormal vaginal bleeding, dysmenorrhoea (painful periods) or dyspareunia (painful intercourse).
  - Abnormal purulent cervical discharge
  - Urinary tract symptoms, such as painful, frequent and urgent micturition with elevated WBC (neutrophils), are common as the urinary tract is often also infected.
  - PID may manifest with symptoms of appendicitis due to periappendicitis or perihepatitis. Symptoms may also mimic ectopic pregnancy.
- **Diagnosis:** Mainly clinical. A pregnancy test should be performed to rule out ectopic pregnancy.
  - Cervical and urethral swabs followed by gonococcal and chlamydial DNA (PCR) and cultures and Giemsa stain for C. trachomatis.
  - US if there is no response to treatment: free fluid, abscesses, pyosalpinx or hydrosalpinx. (Hydrosalpinx is a descriptive term and refers to a fluid-filled dilatation of the fallopian tube. If the fluid is infected, i.e. pus, then it is a pyosalpinx)
  - Mid-stream urine sample if co-existing UTI is suspected.
- **Treatment**
  - **First-line:** IM ceftriaxone and doxycycline, add metronidazole in cases of vaginitis or recent instrumentation
  - **First-line if Mycoplasma genitalium is present:** Ofloxacin and metronidazole
  - **In severe cases, inability to ingest oral antibiotics:** Cefotaxime or cefotetan and doxycycline or clindamycin and gentamicin.

Chronic pelvic sepsis

- Pelvic sepsis is a complication of untreated pelvic inflammatory disease. Same as acute but prolonged.
- A number of patients with acute pelvic inflammatory disease proceed to develop lower abdominal pain which is often related to the menstrual cycle.
- **Symptoms:**
  - Adnexal tenderness on bimanual exam + low-grade fever + continuous vaginal discharge indicates the Dx.
  - May be associated with urinary frequency and dysuria.
- **Diagnosis:** Gonococcal pathogen on high vaginal swab (HVS) confirms the Dx.
- **Treatment:**
  - Abscess → drainage → failure? → pelvic washout
  - Sometimes broad-spectrum antibiotics are used alone as conservative treatment.

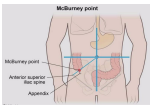
Acute salpingitis

- Caused most commonly by chlamydial infection, but streptococcal, gonococcal or even tuberculous infection can also be responsible.
- Gonococcus & Streptococcus usually reach the Fallopian tubes by direct spread through the vagina and uterus, rarely from the bloodstream.
- Salpingitis is a well-recognized complication of the puerperium and following abortion.
- **Symptoms:**
  - Bilateral pain felt just above the pubis and inguinal ligament
  - Urinary frequency
  - Irregular menstruation
  - Pyrexia
  - Both tubes are often involved and adhesions may seal the fimbriated end producing a pyosalpinx and subsequent infertility.
- **Diagnosis:**
  - Labs: ↑C - reactive protein , Leukocytosis
  - Vaginal examination: unusual warmth, tender cervix and a viginal discharge. The cervix appears red and inflamed and a swab reveals the causative agent.
- **Treatment:** Antibiotic therapy

Take a break & Click here to Play Pacman

Lower & Central Abdominal Pain

Acute Appendicitis



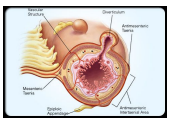
- The commonest cause of acute pain in the western world.
- Acute appendicitis is the most common abdominal surgical emergency in the world in all age groups, with a lifetime risk of 8.6 percent in males and 6.9 percent in females
- **Etiology**: Despite its prevalence, the aetiology of acute appendicitis remains unclear.
  - Viral infection may be an aetiological agent, as there is an association between appendicitis and concurrent viral illness and because there is a seasonal variation in the incidence of appendicitis.
  - It is suggested that it's related to obstruction of the lumen by any cause e.g. fecalith
    - **Fecal** (most common cause in adults).
    - Lymphoid hyperplasia (most common cause in children and young adults).
    - Consider a **neoplasm** in elderly (Second most common cause in adults)
- **Pathophysiology:** Obstructed proximal appendiceal lumen (closed-loop obstruction), resulting in:
  - Distention→ Stasis of mucosal secretions → bacterial multiplication and local acute inflammation → transmural spread of infection → clinical features of appendicitis
  - Increased intraluminal pressure → obstruction of veins → edema of the appendiceal walls → obstruction of capillaries → ischemia → gangrenous appendicitis with/without perforation
  - Inflammation can spread to serosa, leading to peritonitis
- **Symptoms:**
  - Migrating abdominal pain: Presents with dull vague pain which begins in the center of the abdomen (epigastric or periumbilical pain) (visceral midgut pain) (first 12 hours) with increase in the bowel movement & vomiting and nausea. After 4-6 hours to 2-3 days pain shifts to the right Iliac fossa at McBurney's point & becomes more severe (somatic pain) (sharp aching pain). +/- Rebound tenderness, guarding, rigidity
  - May continue for few days, initially colic later pain.
  - History of previous episodes is not significant.
  - The pain is aggravated by movement and coughing if peritonitis developed. (You can differentiate urethritis stones and appendicitis if the patient keeps moving to find a comfortable position)
  - If it poliferates it will cause spillage and it will cause general abdominal pain.
  - Mild to low moderate intensity (easily tolerated by the patient)
  - Clinically patient is stable, does not look sick.
  - Loss of appetite, nausea and vomiting
  - Anorexia (**Hamburger sign:** If there is no loss of appetite, appendicitis is unlikely)
  - An '**appendix mass**' is formed by an inflamed or **perforated appendix** surrounded by oedematous small bowel, caecum and omentum.
  - The "typical" history is almost diagnostic but only occurs in about 1/2 patients.
- **Diagnosis:**
  - Diagnosis of appendicitis is usually based on Hx & PE.
  - Tenderness and guarding in the right iliac fossa **(McBurney's point)** usually excludes the need of investigations (if the diagnosis in doubt or to exclude a malignancy).
  - **Rebound tenderness (Blumberg sign):** due to localized RLQ peritoneal inflammation
  - **Rovsing sign:** RLQ pain elicited on deep palpation of the LLQ (Deep palpation of the LLQ → ↑ in intraluminal pressure of the descending colon that is transmitted to the cecum and appendix → ↑ RLQ peritoneal irritation and pain)
  - **Obturator sign:** RLQ pain on passive internal rotation of the right hip with the hip and knee flexed
  - **Positive psoas sign:** RLQ pain may be elicited on passive extension of the right hip when the patient is positioned on their left side. The psoas sign is an indicator of irritation to the iliopsoas group of hip flexors in the abdomen. Can be
  - If the diagnosis in doubt or to exclude a malignancy:
    - **CT with IV** (initial modality in adults): Enlarged appendix (>6mm), edema.
    - **US** (initial in children and pregnant women): Target sign (rings of hyper- and hypoechogenicity) and maybe a fecalith.
    - **MRI** if findings remain inconclusive.
    - **Labs:** CBC, HCG, WBC range from 10,000-16,000. In the assessment of patients with possible appendicitis, recent studies have demonstrated that, in the presence of a normal C-reactive protein and white cell count, **acute appendicitis is very unlikely**
- **Treatment:**
  - **Supportive care** followed by **broad-spectrum antibiotics.**
  - **Mnemonic: PAIN**: **P**ain management, **A**ntibiotics, **I**ntravenous fluid therapy, and **N**PO are part of conservative management of appendicitis.
  - **Surgery: Appendectomy:** operate them under 36 hours to avoid rupture of appendix preferably using laparoscopic approach but in the presence of widespread sepsis open approach should be considered.
  - In patients with minimal clinical signs non-operative management with **antibiotics** is an acceptable option although there remain concerns as to recurrent problems in the future.
  - Perforated appendicitis (appendices like mass): IV fluids and antibiotics and drainage followed by surgery
  - Can progress to generalized peritonitis if left untreated which can result in death (for every hour Antibiotics are not given in peritonitis, the mortality goes up 10%!)
  - Abx or surgery (Most studies show that surgery is superior). However sometimes if the appendix is already perforated and there is phlegmonous changes and a big abscess cavity we drain the abscess and give the patient Abx and then come back later to take the appendix (3-6 months after) "when the risk of surgery outweighs its benefits" It's called **interval appendectomy (Delayed appendectomy)**

Chronic Appendicitis

- Two forms of chronic inflammation may develop in the appendix:
  - Mucocele
  - Empyema
- Both follow an attack of acute inflammation & both may cause recurrent pain in the right iliac fossa.
- Recurrent episodes of mild acute infection commonly classified as a grumbling appendix.
- Usually happens when the appendicitis is managed with antibiotics and not surgically.

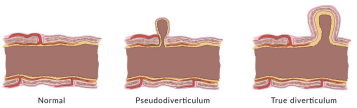
Lower & Central Abdominal Pain

Diverticulosis



- **Diverticula**: blind pouches that protrude from the gastrointestinal wall and communicate with the lumen
- Diverticulosis is perhaps the most common abnormal finding in routine colonoscopy
- Usually found in sigmoid and descending colon, could be found proximally in elderly.
- Only a minority develop diverticulitis.
- Diverticulosis tend to develop between the mesenteric and antimesenteric taenia coli
- Anatomy recap: The mesentery attaches the intestines to the abdominal wall, antimesenteric refers to the site opposite to mesenteric attachment. The teniae coli are the longitudinal muscle bands that run through the colon.

- **Classified into:**
  - **True diverticulum:** a type of diverticulum that affects all layers of the intestinal wall.
  - **False diverticulum or pseudodiverticulum:** type of diverticulum that involves only the mucosa and submucosa and does not contain muscular layer or adventitia. (Typical GIT layers: mucosa, submucosa, muscularis, serosa or adventitia).

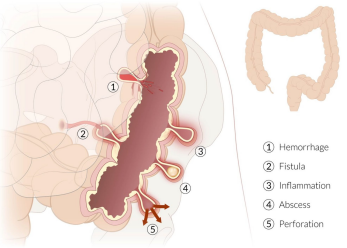


- **Risk factors:**
  - Increasing age
  - Obesity (↑ proinflammatory adipokines → ↑ collagenases and connective tissue turnover)
  - Diet: Low-fiber, rich in fat and red meats.
  - Sedentary lifestyle (↑ colonic pressure)
  - NSAIDS (↑ Complications (bleeding, as blood contains enzymatic irritants that aggravate inflammation)
  - Steroids (reduce collagen → progressive weakness → ulcers or perforation)
  - Immunosuppressed (infection)
  - Smoking (decreases collagen)
  - Alcohol (autonomic neuropathy or a direct toxic effect on smooth muscle cells → ↓motility → ↑ stasis and colonic pressure)
  - Connective tissue disorders: Marfan syndrome, Ehler-Danlos syndrome
  - Autosomal dominant polycystic kidney disease

- **Pathology:** Unclear pathogenesis (could be caused by one or more of the following):
  - Low fiber diet (major factor): Less water and smaller stool → Greater colonic contractions → high intracolonic pressure → diverticula.
  - Increased intraluminal pressure
  - Weakness of the intestinal wall due to age related loss of elasticity of the connective tissue or physiological gaps in the intestinal wall
  - Intrinsic colonic abnormalities: increased elastin deposition or collagen abnormalities (e.g. Ehler-Danlos Syndrome)
  - Dysmotility and fecal stasis: Dysfunction or lack of interstitial cells of Cajal of the circular muscles.
  - Dysbiosis: increase in proinflammatory flora → an inflammatory soup of cytokines → chronic inflammation and destruction leading to weakening, diverticula and acute flares if severe. (Bacteroides are an example of such flora)
  - Some inflammation triggers: (1) Obstruction, (2) Stasis, (3) Dysbiosis, (4) Positive association with older age.

- **Clinical features:**
  - Asymptomatic, left lower iliac abdominal pain with or without bleeding and/or constipation.
  - Change in stool: flattened or ribbon like.
  - Acute Diverticulosis: Diverticula often cause no symptoms but they become obstructed & often inflamed
  - Chronic Diverticulosis:
    - Disease commonly presents in middle-aged or elderly patients with episodes of central and lower left-sided abd pain for generally at least two months of pain
    - Often associated or preceded by **constipation**.

- **Complications:**
  - Destructive perforations
  - Inflammation
  - Obstruction
  - Bleeding
  - Sepsis
  - Abscess
  - Fistula (Bladder, vagina especially in hysterectomy, uterus, skin or bowel loop)



- **Diagnosis:**
  - **Colonoscopy:** Initial modality of choice - indicated in lower GI bleeding, recurrent abdominal pain, suspected malignancy (Avoid in suspected acute diverticulitis due to the risk of perforation).
  - **Barium studies:** Bleeding if colonoscopy cannot be performed, alteration in bowel habits (to identity luminal narrowing), abdominal pain without signs of inflammation (no fever, tenderness or inflammatory markers). (Avoid in suspected diverticulitis or perforated diverticulum).
  - CBC
  - Stool for occult blood.

- **Treatment:**
  - **Asymptomatic**: Nothing, except increasing fiber intake, antispasmodics in case of smooth muscle spasm and avoidance of diverticulitis risk factors. (No treatment can reverse the growth of existing diverticula. The goal is the prevention of progression)
  - Avoid: popcorn, corn, nuts, seeds.
  - **Bleeding:**
    - **Endoscopic treatment** (epinephrine, cauterization, ligation etc..)
    - **Angioembolization (1st) or intra-arterial vasopressin (less common):** If hemodynamically unstable or ongoing bleeding after endoscopy.
    - **Surgery:** Last resort, ongoing bleeding (a choice between surgery and angioembolization is made after consultation)

Lower & Central Abdominal Pain

Diverticulitis

- Inflammation within the diverticulum usually in the sigmoid (you can get diverticulitis in right colon or cecum but it's less common)
- **Pathophysiology:**
  - Most commonly: chronic inflammation and increased intraluminal pressure → erosion of diverticula wall → inflammation and bacterial translocation
  - Rarely: stool becomes lodged in diverticula → obstruction of intestinal lumen → inflammation
- **Clinical features:**
  - Fever (low-grade)
  - Nausea & vomiting
  - Altered bowel habit
  - Left lower quadrant pain (sigmoid colon usually most affected)
  - Guarding
  - Possible tender palpable mass
  - **Constipation** or **diarrhea**
  - Urinary urgency and frequency (prompted by the close proximity of the bladder).

  - Acute Diverticulitis: Pain, fever, leukocytosis
  - Chronic Diverticulitis: Bloating and sometimes obstruction
- **Complications:**
  - Perforations
  - Abscess
  - Obstruction (Narrowing due to inflammatory swelling)
  - Fistula (most commonly colovesical, other forms: colovaginal, coloenteric, colocutaneous)

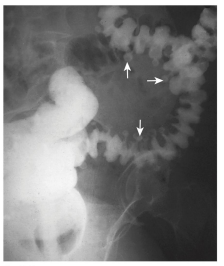
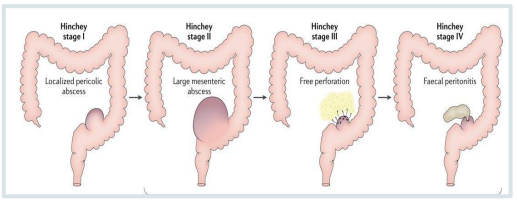


Fig. 16.19 Diverticular disease; barium contrast radiography.

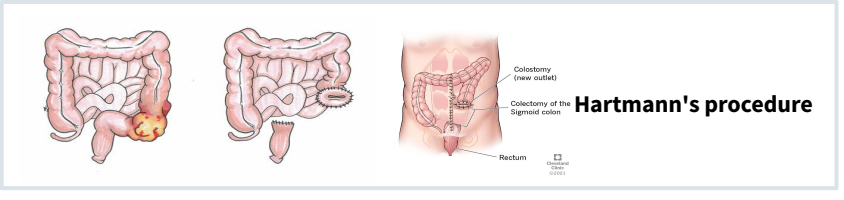
- **Diagnosis:**
  - **CT scan:** Initial modality of choice in suspected diverticulitis (thickening of the wall > 3mm, outpouching and identifies complications). contrast-enhanced CT should be undertaken, preferably combined with rectal contrast to reveal any communication with abscess cavity or free perforation.
  - **MRI:** If CT is contraindicated.
  - **US:** If CT & MRI are contraindicated.
  - Oral and IV contrast if partial obstruction, and IV contrast only if complete obstruction, non-contrast if there is a contraindication to its use.
  - **Labs:** Leukocytosis and ↑CRP > 50 mg/L
  - Colonoscopy (delayed after complicated diverticulitis)
  - **Avoid colonoscopy** during the acute phase of diverticulitis because of the risk of perforation!
- **Treatment:**
  - **Conservative**
  - **Antibiotics/Drainage**
  - **Depends on hinchey classification** **Please read about it I promise you that it will come in the exam)**

Table 16.5 **Hinchey classification of septic complications of diverticular disease**

Hinchey grade I	Localised para-colonic abscess
Hinchey grade II	Distant abscess (e.g. pelvic, sub-phrenic)
Hinchey grade III	Purulent peritonitis
Hinchey grade IV	Faecal peritonitis



- **Stage 1 & 2** if there is a small abscess we can drain it with interventional radiology or US guided drainage and give them antibiotics like we treat any diverticulitis once they heal based on the circumstances sometimes we offer a prophylactic sigmoid resection in a patient with recurrent diverticulitis episodes.
- **Stage 3 & 4** are usually treated by **surgery (Hartmann's)**
  Type of surgery done for perforated diverticulitis: resect the perforated part (most commonly sigmoid) with all the diverticulum for the future. When you do a sigmoid resection and there is stool everywhere **(stage 4)** we don't do an anastomosis, we diverte the colon do a stoma (end colostomy) and abdominal drainage and washout and a few months later after everything heals we go back and connect it. Usually the stoma is left for 6 or 8 -12 weeks. These 3 steps are a procedure named after a surgeon called
- The priority in stage 4 diverticulitis is to save the patient's life because you can't live with stool inside your peritoneal cavity.
- **Obstruction:** Partial: Consider stents or elective resection l Complete: Usually resected



Lower & Central Abdominal Pain

Perforated diverticulitis

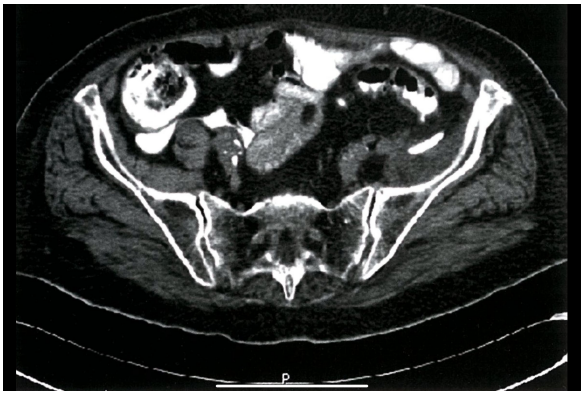
- **Perforation:**
  - **Locally-contained perforation:** can lead to the formation of an abscess or phlegmon
  - **Intraperitoneal perforation** Caused by:
    - Rupture of an inflamed diverticulum → free communication with the peritoneum → generalized fecal peritonitis
    - Rupture of a diverticular abscess → generalized purulent peritonitis
  - Can present with symptoms of acute abdomen and widespread intraperitoneal free air on imaging
  - Hemodynamically stable: Colectomy with or without stoma
  - Unstable: Hartmann's procedure (rectosigmoid colon removal and stoma formation).
  - Perforation with generalized peritonitis: emergency surgery
- Rupture of a pericolic abscess gives rise to purulent peritonitis, whereas free perforation of the bowel produces faecal peritonitis.

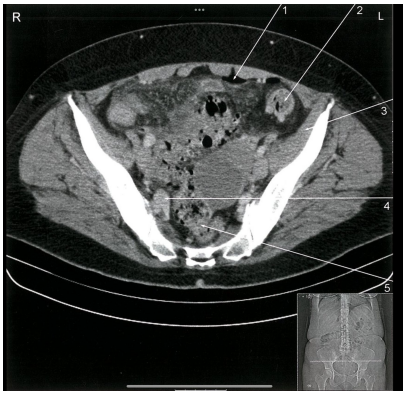
- **Clinical features:**
- The patient is usually profoundly ill
- Septic shock
- Dehydration
- Marked abdominal pain
- Tenderness
- Distension.

- **Treatment:**
- Intravenous broad-spectrum antibiotics and vigorous preoperative resuscitation are essential, followed by resection of the affected bowel and peritoneal lavage.

- Specialist colorectal surgeons may elect to perform an anastomosis, given that only 30% of colostomies are subsequently closed.
- Hence, a second laparotomy may be avoided. If peritoneal contamination is severe and there is poor bowel perfusion of the gut, a colostomy may be preferable.

- **The mortality of perforated diverticular disease is 10–20%, but may be as high as 50% in the elderly with faecal peritonitis.**





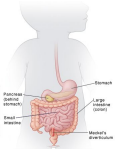
-

A break to breathe

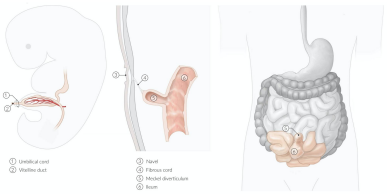
Lower & Central Abdominal Pain

Meckel's diverticulum

- The three most common small bowel diverticula are: duodenal (45%), jejunoileal (25%) and Meckel's (25%). Duodenal and jejunoileal diverticula are false diverticula while Meckel is a true diverticulum.
- The most common congenital anomaly of the small intestine.
- Can cause bleeding (mainly in younger patients) or inflammation, obstruction, and rarely perforation.
- **The rule of two's:** Meckel diverticulum occurs in **2% of the population**, **2% are symptomatic**, mostly in **children < 2 years**, affects **males twice as often** as females, is located **2 feet** (60 cm) **proximal to the ileocecal valve**, is **≤ 2 inches long**, and can have **2 types of heterotopic "misplaced" mucosa**
- **Types of mucosa:**
  - Native ileal mucosa
  - Ectopic mucosa:
    - Most common: acid-producing gastric mucosa (~ 60%)
    - Other types include pancreatic, colonic, and duodenal mucosa.

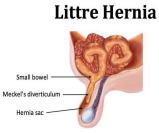


- **Pathology:**
  - Early in embryological life, the intestinal tract consists of a one longitudinal tube divided into three parts (foregut, midgut, hindgut).
  - The midgut is connected to the yolk sac through the vitelline duct (also called vitellointestinal duct, the yolk stalk, the omphaloenteric duct, or the omphalomesenteric duct). This provides a pathway for the vitelline vessels to reach the yolk sac where nutrient exchange occurs, similar to the placental circulation prior to its establishment in the 11th-12th week.
  - Between the 5th and 9th week, the duct normally obliterates. The Meckel diverticulum is often connected to the navel via a fibrous cord, which is the obliterated part of the omphalomesenteric duct.
  - Failure to obliterate from the umbilical side → vitelline duct cyst (may cause pain, mostly pediatric)
  - Patent vitelline duct → ileal umbilical fistula (discharge of dark green feces called meconium)
  - Failure of the vitelline duct (omphaloenteric duct) to obliterate from the intestinal side (most common 90%) → Meckel's diverticulum (only true diverticulum of the small intestines).
  - Meckel diverticulum heterotopic mucosa (normally it has small intestinal mucosa):
    1. **Pancreatic** (most common)
    2. **Gastric** (most common in symptomatic patients)

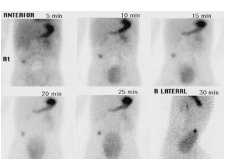


- **Clinical features:**
  - Usually asymptomatic (Detected incidentally on imaging or during surgery)
  - Symptoms, usually with complications (2-4%).
  - Colicky abdominal pain
  - Nausea and vomiting
  - Diarrhea
  - Pyrexia
  - Right lower gastrointestinal bleeding (most common) Pancreatic enzymes or gastric acid → lysis of ileal wall → ulceration → bleeding (hematochezia if severe or quick, melena if slow, or stool mixed with blood and mucus "currant jelly" indicating a possible intussusception)
  - The symptoms are indistinguishable from acute appendicitis, although pain & tenderness is felt more towards the center of the abdomen than in the right iliac fossa.
  - When a patient presents with signs and symptoms of appendicitis with an intraoperative normal appearing appendix, look for a Meckel diverticulum or a possible mesenteric adenitis.

- **Complications:**
  - Bowel obstruction: Mechanisms: Entrapment of the intestine within a fibrous band attached to the umbilicus, intussusception, volvulus (Latin for twisting), and stenosis (repeated bouts of diverticulitis in chronicity).
  - Infection: Diverticulitis (mimicking acute appendicitis or acute mesenteric lymphadenitis)
  - Ulcer or perforation → Hemorrhage (reported as the most common complication along with obstruction)
  - Herniation: can slip into a femoral or an inguinal hernial sac (Littre hernia).
  - Neoplasm (rare):
    - Most common are benign tumors (e.g.leiomyoma)
    - Other tumors: carcinoid tumor, leiomyosarcoma among others



- **Diagnosis:**
  - Can be indistinguishable from appendicitis in presentation and complications, like perforation.
  - Meckel diverticulum does not have any unique presenting features, rather it is a rare cause for many common presentations (obstruction, diverticulitis and bleeding). Therefore the key to approach Meckel diverticulum is knowing the original workup for these complications, as they tend to present as medical emergencies.
  - **Imaging:** Indicated in hemodynamic stable patients, usually with bleeding
    - Can be diagnosed with a **CT scan** but in thin people it's hard to see it because of the bowel loops so there is something called Meckel's scan where a radiolabeled isotope is given and binds to gastric and pancreatic mucosa so we can see the stomach shining out but if there was another accumulation somewhere else in the body that's a Meckel's diverticulum.
    - Meckel Scan
    - **Tagged RBC scans:** useful to detect a bleeding Meckel diverticulum



- **Management:**
  - **Incidental finding during abdominal surgeries for different reason:**
    - Pediatrics: Resected
    - Adults: Left without resection
  - **Symptomatic Meckel:** → **Surgery**
    - It secretes acid or enzymatic secretions so the area of the small bowel will be inflamed and bleeds "Meckel's bleed" and the treatment for that is resecting the whole segment of the diverticulum.

Generalized Abdominal Pain

Irritable Bowel Syndrome

- The irritable bowel syndrome is a functional disorder of the bowel of unknown aetiology without a specific organic cause which causes **chronic intermittent abdominal pain,** very vague ill defined pain that may be associated with changes in bowel habit and abdominal distension.
- **Types :**
  - IBS-D (diarrhea is the predominant symptom)
  - IBS-C (constipation is the predominant symptom)
  - IBS-M (mixed diarrhea and constipation)
  - IBS-A (alternating diarrhea and constipation)
- **Clinical features:** Normal examination, Constipation / diarrhea, On and off pain and Discomfort.
- **Diagnosis of exclusion,** The following symptoms suggest the diagnosis of irritable bowel syndrome:
- **Rome IV criteria for IBS :** diagnosis can be made if the following criteria are present
  Recurrent abdominal pain or discomfort on average at least 1 day per week during the previous 3 months that is associated with ≥2 of the following :
  - Pain related to defecation
  - A change in the frequency of defecation
  - A change in the consistency of the stool
- It is important to exclude all other causes of abdominal pain, so enquire about any symptoms or signs that might indicate the presence of organic disease such as anaemia, bleeding, weight loss, fever or a change in bowel habit

Red flag symptoms: nighttime diarrhea and abdominal pain, fever, bloody stools, weight loss and acute onset of symptoms!

Constipation

- **Acute constipation**: Pain, tenderness and hard mass (stool)
- **Severe chronic constipation** may cause a rather **indeterminate abdominal pain** and **general abdominal distension** (according to the doctor no pain because its chronic)
- In these cases there are hard faeces in the rectum and palpable, indentable masses in the abdomen
- In fecaloma CT scan will show that feces reached the terminal ileum (abnormal) “Normally the bowel is liquid and water absorption happens in the colon”
- **Rome IV diagnostic criteria for functional constipation in adults** (At least two of the following must have occurred in ≥ 1/4 of defecations during the past 12 weeks with onset of symptoms ≥ 6 months ago) :
  - Passage of stool < 3 times/week
  - Passage of hard or lumpy stool
  - Sensation of anorectal obstruction/blockage
  - Manual aid to evacuate stool
  - Straining during attempts to defecate
  - Sensation of incomplete evacuation

Diffuse Carcinomatosis

- Patients with extensive ‘seeding’ metastases through out the peritoneal cavity may develop **a non-specific aching abdominal pain** which they find difficult to describe and which may be associated with few physical signs.
- Eventually, **clinical ascites**, **abdominal masses**, **evidence of tumour** at other sites and **generalized weight loss** and **cachexia** make the diagnosis obvious
- Sensation of incomplete evacuation

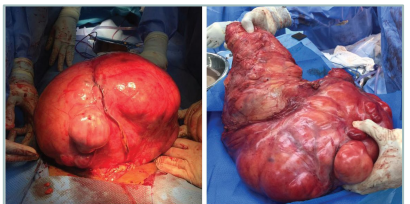
Generalized Abdominal Pain

Diffuse Endometriosis

- The presence of endometrial tissue outside the uterus. Which will acts like super-glue so it will cause adhesions and then may cause obstruction, also it will cause pain in that area
- **Etiology:**
  - Retrograde menstruation followed by implantation of endometrial tissue in the ovaries. Controversial, as endometriosis can occur in men. It is probably that endometriosis is a final manifestation of various mechanisms.
  - Coelomic metaplasia (The coelomic (peritoneum) contains pluripotent cells that differentiated into endometrial cells during embryonic development).
  - Iatrogenic implantation: Post surgical scars through episiotomy or laparotomy are thought to be prime locations for implantation of endometrial cells that are spread from delivery or surgical procedures.
  - Hematogenic and lymphogenic dissemination of endometrial cells
  - Hereditary component
- **Most Common Sites**: Ovaries (most common), rectouterine pouch and other pelvic organs. Distant organs: Lungs (hemoptysis), nose (epistaxis), bowels (GI bleeding).
- Regardless of where the endometrial tissue is located, it reacts to the **hormone cycle** in much the same way as the endometrium and proliferates under the influence of **estrogen**.
- **Symptoms:**
  - Up to one third of the patients are asymptomatic.
  - Chronic pelvic pain that worsens before the onset of menses.
  - Uterosacral tenderness, uterosacral nodularity
  - Dysmenorrhea: Crampy pelvic pain that begins two days before menses and can last for several days
  - Pre- or post menstrual bleeding
  - Dyspareunia: A symptom of pain that occurs during or after sexual intercourse.
  - Infertility: Endometriosis may change the pelvic anatomy through inflammation and adhesions, altering egg quality and impairing implantation.
  - Dyschezia: A condition of difficult or painful defecation (usually due to hard stools/constipation).
- **Diagnosis**
  - Transvaginal US **(best initial test)** which shows ovarian chocolate cysts or peritoneal nodules.
  - Laparoscopy **confirms** the diagnosis. **(Gold standard)**
- **Treatment**
  - **Medical**
    - Mild or moderate pain in the absence of complications
      - NSAIDs and contraceptives
      - NSAIDs alone if pregnancy is desired
      - Synthetic androgens
    - Severe symptoms: GnRH agonists and combined estrogen-progestin oral contraceptives
  - **Surgical** (no response to medical therapy or in case of ectopic extension)
    - **First-line:** Laparoscopic removal and ablation of ectopic endometrium
    - **Second-line** (treatment resistant symptoms and no desire to conceive): Hysterectomy

Retroperitoneal neoplasms

- **Retroperitoneal lipoma:**
  - The patient complains of abdominal swelling or pain.
  - myxomatous degeneration sometimes occurs in retroperitoneal lipoma. A myxomatous degeneration can happen which results in the malignant transformation (liposarcoma), which increase in size rapidly
- These are rare tumors, which occur in adult age. The most frequently encountered cell type sarcomas are:
  - **1. Liposarcoma.**
  - **2. Leiomyosarcoma.**
  - **3. Malignant fibrous histiocytoma**
- **Clinical features:**
  - Presentation is late because the tumors grow to a large size without producing symptoms.
  - The usual symptoms are vague abdominal pain and fullness.
  - these symptoms usually dismissed as being due to other less serious conditions. Therefore these sarcomas are usually diagnosed when the tumor is very large



Operative view of retroperitoneal liposarcoma.

- **Investigation**
  - **US**
  - **CT , MRI** scanning not only for tumour detection, staging and surgical planning, but also for guiding percutaneous or surgical biopsy
- **Treatment**
  - **surgical resection**, Chemotherapy and radiotherapy without surgical debulking have rarely been beneficial.

Generalized Abdominal Pain

Lumbar spinal pain

- Pain caused by abnormalities in the spine may radiate from the back to the front of the abdomen and cause diagnostic difficulties. Nerve root originated mainly from lumbar region
- Any suggestion that an abdominal pain is affected by movement and position should indicate the possibility that the pain is arising in the back
- This can sometimes be confirmed by careful examination of the spine

Extensive retroperitoneal fibrosis

- Very rare & unknown case
- It often causes a **vague central**, **persistent abdominal pain**
- **Causes :**
  - Idiopathic (Ormond's disease)
  - Chronic inflammation
  - Extravasation of urine
  - Retroperitoneal irritation by leakage of blood or intestinal content
  - Aortic aneurysm (inflammatory type)
  - Trauma and Drugs (chemotherapeutic agents and previously methysergide)
- If the fibrosis obstructs the vena cava, the patient may present with the symptoms of an acute deep vein thrombosis or oedema of the lower limbs
- Treatment will be directed to the cause

Psychosomatic

- **Diagnosis of exclusion**
- The pain has no organic origin
- Some patients with profound psychological disturbances, severe anxiety or 'cancer phobia' who persistently present with abdominal pain for which no cause can be found
- Malingering: the pain has no organic origin they & don't have psychological disease the patient. (intentional production or display of false or grossly exaggerated physical or psychological symptoms)
- Beware of adopting the 'cry wolf ' attitude. Each new episode of pain requires an open-minded new history and examination.

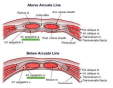
Radiation Enteritis (Radiation damage)

- Can appear after months or decades following radiation treatment.
- Both the small and large bowel can be damaged by the **external beam radiation** used to treat malignancies such as cancer of the uterus, cervix and bladder.
- The terminal ileum is the most commonly affected site in the small intestines.
- **Pathology:** Ionizing radiation → breaks chemical bonds and produces reactive oxygen species → DNA damage and cellular stress
- **Risk factors:** High radiation treatment - Chemotherapy - HIV - Vascular connective tissue diseases - IBD
- **Clinical features:**
  - Colicky or continuous Abdominal pain
  - Vomiting
  - Constipation or diarrhea (acute) (Most patients develop transient diarrhoea at the time of the radiation, but some present months or years later)
  - Malabsorption
  - Weight loss (chronic)
  - Eventually, the endarteritis (inflammation of the blood vessel wall) in the small mesenteric vessels, caused by the irradiation, may lead to ischaemia, necrosis and perforation of the bowel it damage the surrounding structure.
- **Diagnosis:**
  Endoscopy and CT or MRI: **Acute:** Edema and thickening **Chronic:** Fibrosis and strictures **Complicated:** Fistula and leakage
- **Treatment:**
  - **Medical:**
    - Antidiarrheal agents
    - Cholestyramine (in case of bile salt malabsorption)
    - Antibiotics (in case of bacterial overgrowth)
    - Hyperbaric oxygen (increases angiogenesis)
  - **Surgical:**
    - **Perforation:** Resection
    - **Fistula:** Resection or bypass
    - **Obstruction:** Resection, bypass or stricturoplasty (removes strictures without removing any part of the guy)

Extra-abdominal & Medical Causes of Pain

Extra pic from davidson of DDx

Dr. Yasser Alfraih: Students must know that there are extra-abdominal and medical causes of abdominal pain and list examples but will not go into details of each.

Pneumonia	- Pneumonia is a respiratory infection characterized by inflammation of the alveolar space and/or the interstitial tissue of the lungs. - Causes pain that radiates to the **abdomen and epigastric region**
Pleurisy (Pleuritis)	A condition of inflammation of the pleura that lines the lungs.
Pulmonary infarction	An infarction of the lung parenchyma that results from embolic occlusion of the smaller segmental arteries (segmental pulmonary embolism), leading to a wedge-shaped area of hemorrhage and necrosis.
Inferior myocardial infarction	MI: Ischemic necrosis of myocardial tissue. - Type 1 myocardial infarction occurs when an unstable plaque ruptures, leading to occlusion of a coronary artery. - Type 2 myocardial infarction occurs when there is a mismatch between oxygen supply and demand - And there is 3 more types (5 types in total)… Inferior wall infarction causes **Epigastric** pain
Hematoma of inferior epigastric artery	Rectus sheath hematoma (RSH) is an uncommon and often clinically misdiagnosed cause of abdominal pain. It is the result of bleeding into the rectus sheath from damage to the superior or inferior epigastric arteries (most commonly) or their branches or from a direct tear of the rectus muscle. 
Acute porphyria	- Porphyrias are a group of rare, inherited or (less commonly) acquired metabolic disorders in which defective enzymes impair the biosynthesis of heme in the liver and/or bone marrow. - This is associated with severe intestinal colic which is particularly precipitated by barbiturates and alcohol. The urine is often dark and turns red/purple on standing. - - Abdominal pain is seen in around 90% of patients with acute intermittent porphyria and may resemble pain similar to an **acute abdomen**, leading to unnecessary surgeries (e.g., appendectomy, cholecystectomy). - The 5 **P**'s of acute intermittent porphyria: **P**ainful abdomen, **P**olyneuropathy, **P**sychological disturbances, **P**ort wine-colored **p**ee (Red - purple color, porphyria is from the Greek "porphyros," meaning purple), **P**recipitated by triggers like drugs
Infectious hepatitis (glandular fever)	- A condition of liver inflammation which causes **RUQ pain (right hypochondrium).** The pain is caused by swelling of the liver stretching the liver capsule. - Jaundice usually develops within a few days.
Curtis-Fritz-Hugh's syndrome (Perihepatitis)	- A chronic manifestation of pelvic inflammatory disease (PID). - It is described as an inflammation of the liver capsule, without the involvement of the liver parenchyma, with adhesion formation accompanied by **RUQ pain**. The pain of this syndrome is caused by a pericapsulitis around the liver that is related to pelvic inflammation with Chlamydia. - A preceding vaginal discharge suggests the diagnosis, which has to be differentiated from acute cholecystitis.
Herpes zoster infection (Shingles)	- Shingles (herpes zoster) is a dermatomal rash with painful blistering that is caused by the reactivation of the varicella-zoster virus (VZV) in cells of the dorsal root ganglia after chickenpox.. - Visceral pain from herpes zoster can be misdiagnosed as an **acute abdomen** leading to unnecessary surgical exploration. Diagnosis is often delayed because the vesicular rash may appear days after abdominal pain develops.
Diabitic ketoacidosis	- In diabetic ketoacidosis (DKA), which is more common in patients with type 1 diabetes, no insulin is available to suppress lipolysis, resulting in ketone formation and acidosis. - The state of ketoacidosis leads to irritation of the peritoneum. This can cause **diffuse abdominal tenderness** on palpation with guarding, possibly even to the extent that an acute abdominal pathology is suspected - The diagnosis is confirmed by finding glycosuria and elevated blood glucose levels. - Patients are often very thirsty and drowsy.
Syphilis (lighting pain)	- Syphilis is a predominantly sexually transmitted bacterial infection with the spirochete *Treponema pallidum.* - Gastric syphilis is a rare presentation observed in 1% of cases and usually develops in secondary syphilis. The most common symptoms are **epigastric pain,** fullness, nausea, vomiting, and weight loss.
Henoch schöenlein purpura (IgA vasculitis)	- It is an acute immune complex-mediated small vessel vasculitis that most commonly occurs in children. It is often preceded by an upper respiratory tract infection and typically presents with a tetrad of symptoms: palpable purpura, arthritis/arthralgia, abdominal pain, and renal disease. - **PAPAH**: **p**urpura, **a**bdominal **p**ain, **a**rthritis/**a**rthralgia, and **h**ematuria.
Acquired immunodeficiency syndrome	- AIDS (The last stage of HIV) is characterized by AIDS-defining conditions, such as Kaposi sarcoma, and/or a CD4 count < 200 cells/mm3. - Patients with AIDS have an increasing risk of developing abdominal lymphomata which may perforate or obstruct. Because of the compromised state of their immune system, appendicitis and other intra-abdominal infections can have a fulminating course.
Sickle cell crisis	Abdominal pain is an important component of vaso-occlusive painful crises. These episodes are often attributed to micro-vessel occlusion and infarcts of mesentery and abdominal viscera (intestinal and splenic infarction)
Non-specific abdominal pain	In some patients, no cause for acute abdominal pain can be found, despite hospital admission, re- examination and special investigations. These patients are categorized as having non-specific abdominal pain and represent a fair proportion of the many patients admitted with abdominal pain as acute surgical emergencies. In the great majority, the pain disappears spontaneously and does not recur. In some, however, the cause eventually becomes apparent.
Spinal cord disorders	

General notes

- We can divide the abdomen into quadrants and it's important because it can shape your differential diagnosis by relating the pain to an organ.
- Acute abdominal pain is the pain acutely presented (less than 24 hours up to a few weeks) or the patient is known to have chronic abdominal pain and had an episode of acute pain (example chronic pancreatitis patients).
- Chronic abdominal pain patients are less likely to have life threatening conditions.
- Surgical abdomen : can present sometimes with peritonitis and you should pay attention to these signs because they usually indicate either perforation, ischemia or catastrophic intra abdomen.
- In generalized AP or peritonitis If you detect a mass on the physical exam that means it's AAA
- Hepatitis can cause abdominal pain but rarely

General Abdominal Pain

- Diffused pain is mainly caused by peritonitis or any acute severe disease of the abdomen
- Vague not specific, related to the gastrointestinal tract most of the time
- Abdominal Aortic Aneurysm might cause generalized abdominal pain
- Any irritation to the peritoneum will cause pain (free poreferation)

Carcinoma of the stomach, Liver metastasis, splenomegaly were mentioned in the objectives but according to the doctor they don't cause abdominal pain why?

- Splenomegaly: it's like any other organ megaly why should it? It causes discomfort and indigestion
- Carcinoma of the stomach : ulceration → bleeding → gastritis → might cause pain
- Liver metastasis if it causes perforation or bleeding

Generally they don't cause pain "period"

Neoplasm, lumbar spine, extensive retroperitoneal fibrosis mentioned in the objectives but the doctor doesn't believe that it causes pain

- Neoplasm: high pressure and the tumor is 20 cm or larger (severe compression) it will press on the retroperitoneal organs and cause pain other than that no pain because if it did we would've discovered the tumor early on

Iatrogenic abdominal pain

Laparoscopic surgery → infiltrates to the abdomen with CO2 which is very irritable to the bowel → will be absorbed by the bowel and the patient will return to normal

Click here to check this lecture Recall's summary

Dr. Mohammed Alnaami Cases

- **ACUTE UPPER GI:**

1. Scenario : 34 yo male complains of substernal pain.
   When asked about the pain (SOCRATES):
   S Patient feels the pain in the stomach up to the throat
   O Gradual
   C Burning in nature
   R -
   A Accompanied with choking/regurgitation/wheezing
   T Timing is when going to sleep especially after a late meal
   E Worse with coffee, better with milk and antacids
   S Severity varies
   -> DDX: GERD

2. Scenario : 45 yo male who was at a party, drank lots of alcohol, started vomiting and retching. He presented to the ER with hematemesis with epigastric substernal pain.
   When asked about the pain (SOCRATES):
   S epigastrium and goes up behind the chest
   O sudden and continuous, for the first time
   C burning in nature
   R pain goes to the throat
   A accompanied with vomiting
   T he was drinking a lot prior to the pain
   E nothing remarkable
   S rated as 8
   -> DDX: mallory weiss tear

3. Scenario : patient with pain in the epigastrium, that is burning in nature, relieved by food, aggravated by fasting.
   -> DDX: gastritis, (if it was chronic: gastric ulcer)

4. Scenario : patient with pain in the epigastrium that radiates to the right flank, relieved by food, aggravated by fasting. Wakes up from sleep.
   -> DDX: duodenal ulcer

5. Scenario : patient with severe pain in the epigastrium that radiates to the back, dull aching in nature, relieved by fasting, aggravated by eating
   -> DDX: pancreatitis

6. Scenario : patient with right upper quadrant pain that radiates to the right shoulder, collicky in nature,relieved by fasting, aggravated by fatty food, could be associated with fever, jaundice, severe.
   -> DDX: acute cholecystitis (if its chronic cholecystitis it will have same site/character/ radiation, but with gradual onset, and not associated with fever or jaundice, varies in severity)

7. Scenario patient with fever, jaundice, and itching
   -> DDX: acute cholangitis

- **CHRONIC UPPER GI:**

1. Scenario : patient complaining of dysphagia
   -> DDX: achalasia, tumors of the esophagus (squamous cell carcinoma), tertiary contractures (overexcited nerve supply to the esophagus), psychological/psychiatric diseases, strictures

2. Scenario : patient with dull aching pain in the stomach, constant and not relieved or aggravated by anything, could be associated with melena, hematemesis, vomiting
   -> DDX: gastric tumors (benign: GEST, malignant: comes with weight loss)

3. Scenario: patient with projectile vomiting after eating, associated with pain and relieved by vomiting.
   -> DDX: gastric outlet obstruction (due to hypertrophic pyloric stenosis in infants, peptic ulcer stenosis in adults)

4. Scenario: patient with dull aching chronic pain similar to acute pancreatitis but with milder symptoms .
   -> DDX: chronic pancreatitis (due to chronic alcohol consumption)

5. Scenarios: patient with dull aching pain/ or/ no pain at all with weight loss, could be accompanied with jaundice
   -> DDX: tumors of the pancreas

Cases from the doctor

Case 1:

24 years old healthy male with one day history of abdominal pain. Pain was generalized at first, now worse in right lower abdomen & radiates to his right groin. He has vomited twice today. Denies any diarrhea, fever, dysuria or other complaints.
T: 37.8, HR: 95, BP 118/76, Uncomfortable appearing, slightly pale. Abdomen: soft, non-distended, tender to palpation in RLQ with mild guarding; hypoactive bowel sounds. What is your differential diagnosis and what do you do next?

Appendicitis

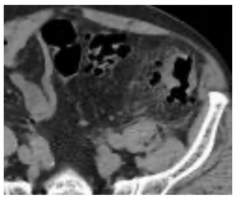
- The patient's pain is localized on the RLQ.
  Investigations: History
  Physical exam: tender RLQ
  Labs: Slight increase in WBCs otherwise normal
  Imaging: plain imaging is unremarkable, US, CT.

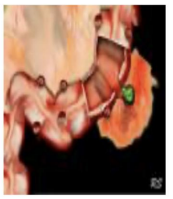
Case 2:

68 years old Female with 2 days of LLQ abdominal pain, diarrhea, fevers/chills, nausea; vomited once at home.
Past medical history: HTN on hydrochlorothiazide, T: 37.6, HR: 100, BP: 145/90, R: 19. Abdomen: soft, moderately LLQ tenderness.
What is your differential diagnosis & what next?

Diverticulitis

- **DDx**: Diverticulitis, cystitis, Acute pancreatitis, same as Suprapubic differentials.
  Investigations: History, physical exam
  Lab: CBC, electrolytes, LFT, RFT, UA, Lipase and amylase
  Imaging: X RAY followed by CT OR CT right away





Case 3:

46 years old male with history of alcohol abuse with 3 days of severe upper abdominal pain, vomiting, subjective fevers.
Vital signs: T: 37.4, HR: 115, BP: 98/65, Abdomen: mildly distended, moderately epigastric tenderness, +voluntary guarding
What is your differential diagnosis & what next?

Pancreatitis

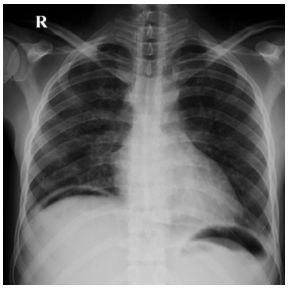
DDx: Pancreatitis, peptic ulcer, esophagitis
Approach: labs: CBC, electrolytes, LFT, RFT, UA, Lipase and amylase
Imaging: CT

Case 4:

72 years old male with history of CAD on aspirin and Plavix with several days of dull upper abdominal pain and now with worsening pain "in entire abdomen" today. Some relief with food until today, now worse after eating lunch
T: 99.1, HR: 70, BP: 90/45, R: 22
Abdomen: mildly distended and diffusely tender to palpation, rebound and guarding
What is your differential diagnosis & what next?

Peptic Ulcer Disease

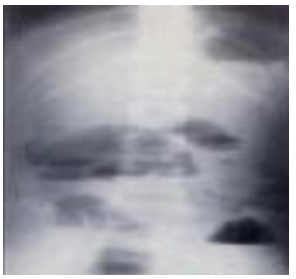
DDx: perforation from Stomach due to peptic ulcer disease due to NSAIDs
Usually those patients can relieve their pain by drinking milk or taking antacids but when the perforation happens that can lead to generalized peritonitis and it can wake the patient up
CXR: shows air under the diaphragm as a sign of gastric perforation



Cases from the doctor

Case 5:

35 years old healthy female to ED c/o nausea and vomiting for 1 day along with generalized abdominal pain
T: 36.9, HR: 100, BP: 130/85, R: 22
Abdomen: moderately distended, mild TTP diffusely, hypoactive bowel sounds, no rebound or guarding
What is your differential and what next?



Bowel Obstruction

- **Approach**: labs: CBC, electrolytes, LFT, RFT, UA, Lipase and amylase
- **Imaging**: CXR multiple air-fluid levels and dilated intestine.
- Small bowel obstruction causes: all types of hernia, foreign body ingestion,...
- **Clinical features**: The pain can be diffused or periumbilical.
- **History**: the patient will report to you that they haven't had any bowel movements
- And classically present with distended abdomen N\V

Case 6:

48 years old Female with one day history of upper abdominal pain after eating, N/V, no diarrhea, subjective fevers.
T: 100.4, HR: 96, BP: 135/76, R: 18
Abdomen: moderately TTP RUQ, +Murphy's sign, non-distended, normal bowel sounds
What is your differential diagnosis & what next?

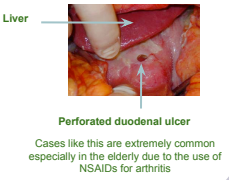
Cholecystitis

- **DDx**: Cholecystitis
  Approach : labs: CBC, electrolytes, LFT, RFT, UA, Lipase and amylase
  Imaging: US the modality of choice.
  If all came out negative we can do an endoscopy.

Case 7:

83 years old female brought to emergency department by daughter, with progressive weakness & functional decline over the past 5 days, initially vague abdominal complaints, on physical exam she looks sick, & she has generalized tenderness maximum over RUQ. DDx?

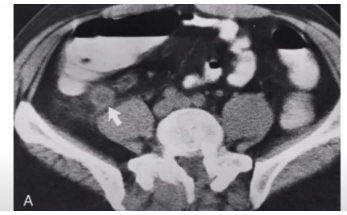
- Pancreatitis , Cholysitis, Cholangitis, PUD
- **Generalized tenderness?** Perforated Ulcer.



Cases like this are extremely common especially in the elderly due to the use of NSAIDs for arthritis

Case 8:

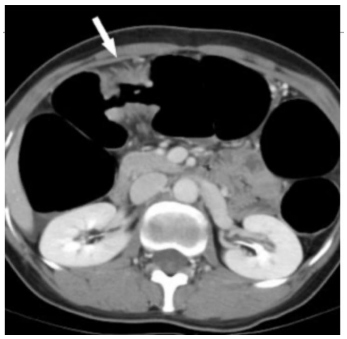
19 years old male with periumbilical pain that shifted to RUQ, on exam he was febrile, sick, and has RLQ tender.
CT scan showed:
What is the diagnosis? Appendicitis.



Cases from the doctor

Case 9:

Elderly with generalized peritonitis , most likely Ddx?
1-perforation
2-ischemia in the whole bowl
= Most likely diagnosis : Perforated Duodenal ulcer



What causes it ?
1-peptic ulcer
2-appendix
3-colon
4-gallbladder

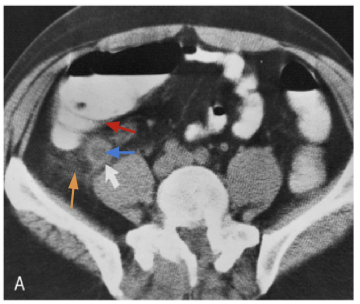
Management?
*Very imp to ask about NSAIDS use in perforations

- Emergency OR :-
  Peritonitis Specially If generalized
- Extra: left shift on CBC means neutrophils are the highest = bacterial infections

Case 10:

The doctor said the clinical scenario is enough for the diagnosis for the exam. So, the radiology explanation is extra:

- Red arrow: notice the size of the wall of the colon
- White arrow: Thickened appendix wall (2x thicker than colon wall or even more)
- Blue arrow: Fluid inside the appendix
- Orange arrow: Fat stranding



Congrats you officially finished all surgery lectures!

You should be proud of yourself

438's Quiz

Q1: A 42-year-old man with no history of use of NSAIDs presents with recurrent gastritis. The patient was diagnosed and treated for Helicobacter pylori 6 months ago. Which of the following tests provides the least invasive method to document eradication of the infection?

A) Serology testing for H. pylori
B) Carbon-labeled urea breath test
C) Rapid urease assay
D) Histologic evaluation of gastric mucosa
E) Culturing of gastric mucosa

Q2: A 22-year-old college student notices a bulge in his right groin. It is accentuated with coughing, but is easily reducible. Which of the following hernias follows the path of the spermatic cord within the cremaster muscle?

A) Femoral
B) Direct inguinal
C) Indirect inguinal
D) Spigelian
E) Interparietal

Q3: A 29-year-old woman complains of postprandial right upper quadrant pain and fatty food intolerance. Ultrasound examination reveals no evidence of gallstones or sludge. Upper endoscopy is normal, and all of her liver function tests are within normal limits. Which of the following represents the best management option?

A) Avoidance of fatty foods and reexamination in 6 months.
B) Ultrasound examination should be repeated immediately, since the false negative rate for ultrasound in detecting gallstones is 10% to 15%.
C) Treatment with ursodeoxycholic acid.
D) CCK-HIDA scan should be performed to evaluate for biliary dyskinesia.
E) Laparoscopic cholecystectomy for acalculous cholecystitis.

Q4: A 28-year-old woman who is 15 weeks pregnant has new onset of nausea, vomiting, and right-sided abdominal pain. She has been free of nausea since early in her first trimester. The pain has become worse over the past 6 hours. Which of the following is the most common non obstetric surgical disease of the abdomen during pregnancy?

A) Appendicitis
B) Cholecystitis
C) Pancreatitis
D) Intestinal obstruction
E) Acute fatty liver of pregnancy

Q5: An 18-year-old woman presents with abdominal pain, fever, and leukocytosis. With the presumptive diagnosis of appendicitis, a right lower quadrant (McBurney) incision is made and a lesion 60 cm proximal to the ileocecal valve is identified (see photo). Which of the following is the most likely diagnosis?

A) Intestinal duplication
B) Mesenteric cyst
C) Meckel diverticulum
D) Ileoileal intussusception
E) "Christmas tree" type of ileal atresia

Q6: A 58-year-old man presents with a bulge in his right groin associated with mild discomfort. On examination the bulge is easily reducible and does not descend into the scrotum. Which of the following changes is most concerning for possible strangulation requiring emergent repair of the hernia?

A) Increase in size of the hernia
B) Descent of hernia into the scrotum
C) Development of a second hernia in the left groin
D) Inability to reduce hernia
E) Worsening pain over the hernia with walking

Answers

Q1	B	Q4	A
Q2	C	Q5	C
Q3	D	Q6	C

Extra Questions

438's Quiz

Explanations

Q1 Explanation:

The carbon-labeled urea breath test is the noninvasive method of choice to document eradication of a H pylori infection. This test samples the entire stomach and has sensitivity and specificity both greater than 95%. The test is performed by having the patient ingest a carbon-isotope labeled urea. After ingestion the urea will be metabolized to ammonia and labeled bicarbonate if a H pylori infection is present. The labeled bicarbonate is excreted in the breath as labeled carbon dioxide, which can then be quantified. Serology is another noninvasive test to establish the diagnosis of H pylori infection. However, it cannot be used to assess eradication after therapy because antibody titers can remain high for over a year. Endoscopy with biopsy is necessary to provide a specimen for the rapid urease test, histologic evaluation, and culturing of gastric mucosa.

Q2 Explanation:

An indirect inguinal hernia leaves the abdominal cavity by entering the dilated internal inguinal ring and passing along the anteromedial aspect of the spermatic cord. The internal inguinal ring is an opening in the transversalis fascia for the passage of the spermatic cord; an indirect inguinal hernia, therefore, lies within the fibers of the cremaster muscle. A femoral hernia passes directly beneath the inguinal ligament at a point medial to the femoral vessels, and a direct inguinal hernia passes through a weakness in the floor of the inguinal canal medial to the inferior epigastric artery. Neither lies within the cremaster muscle fibers. Spigelian hernias, which are rare, protrude through an anatomic defect that can occur along the lateral border of the rectus muscle at its junction with the linea semilunaris. An interparietal hernia is one in which the hernia sac, instead of protruding in the usual fashion, makes its way between the fascial layers of the abdominal wall. These unusual hernias may be preperitoneal (between the peritoneum and transversalis fascia), interstitial (between muscle layers), or superficial (between the external oblique aponeurosis and the skin).

Q3 Explanation:

This patient most likely has biliary dyskinesia. The diagnosis is confirmed by CCK-HIDA scan. Technetium-labeled hydroxy-iminodiacetic acid (HIDA) is injected intravenously, which is subsequently excreted into the biliary tract. After filling of the gallbladder, cholecystokinin (CCK), a hormone that is normally released by the duodenum after ingestion of a meal, is infused intravenously to stimulate gallbladder contraction. A gallbladder ejection fraction of less than 35% at 20 minutes is diagnostic of biliary dyskinesia. Cholecystectomy results in improvement in symptoms in 85% to 94% of patients with biliary dyskinesia. A laparoscopic cholecystectomy should not be performed without confirmation of the gallbladder as the etiology of the symptoms. There is no role for oral dissolutional therapy with ursodeoxycholic acid in the treatment of biliary colic, since no gallstones are present. Avoidance of fatty foods is a temporary measure to control the symptoms. It does not provide

438's Quiz

Explanations

Q4 Explanation:

Appendicitis complicates approximately 1 in 1700 pregnancies at an incidence comparable with that in nonpregnant women matched for age. It is the most prevalent extrauterine indication for laparotomy in pregnancy. The duration of gestation does not influence the severity of the disease, but the diagnosis does become more difficult as the pregnancy progresses. By the twentieth week of gestation, the appendix often lies at the level of the umbilicus and more lateral than usual. Pregnancy should not delay surgery if appendicitis is suspected; appendiceal perforation greatly increases the chance of premature labor and fetal mortality (approximately 20% for each). After appendicitis, biliary tract disease (biliary colic, cholecystitis) is the second most common non obstetric surgical disease of the abdomen during pregnancy. Pancreatitis, intestinal obstruction, and acute fatty liver of pregnancy are all less common general surgical conditions encountered during pregnancy.

Q5 Explanation:

This is an inflamed Meckel diverticulum. This common lesion is often clinically indistinguishable from acute appendicitis. It is the remnant of the vitelline duct. Meckel diverticula are usually located 60 cm proximal to the ileocecal valve, are antimesenteric, and may contain either gastric and pancreatic or only pancreatic tissue. Complications from a Meckel diverticulum include hemorrhage and obstruction, which are more common than inflammation. A technetium 99m (99mTc) pertechnetate scan ("Meckel scan") can be useful in the workup of a child with an occult source of lower gastrointestinal hemorrhage. Since complications are relatively rare, most surgeons do not recommend removing asymptomatic diverticula when they are incidentally discovered during abdominal procedures. Those diverticula with a narrow neck, palpable heterotopic tissue, or nodularity are prone to obstruction and should be excised. In addition, patients explored for abdominal pain of unknown etiology should also undergo diverticulectomy, as should those operated on for appendicitis who are to be left with a scar of the right lower quadrant.

Q6 Explanation:

Acute incarceration of a previously reducible inguinal hernia may lead to strangulation. Therefore, immediate surgical repairs of inguinal hernias are indicated in cases of acute incarceration. Chronically incarcerated hernias do not have an increased risk for strangulation. Descent of the hernia into the scrotum, worsening of the pain over the hernia with walking, and development of a contralateral hernia are not indications for urgent surgical repair.

438's Quiz

Q7: A 28-year-old woman who is 15 weeks pregnant has new onset of nausea, vomiting, and right-sided abdominal pain. She has been free of nausea since early in her first trimester. The pain has become worse over the past 6 hours. Which of the following is the most common non obstetric surgical disease of the abdomen during pregnancy?

A) Appendicitis
B) Cholecystitis
C) Pancreatitis
D) Intestinal obstruction

Q8: An 18-year-old woman presents with abdominal pain, fever, and leukocytosis. With the presumptive diagnosis of appendicitis, a right lower quadrant (McBurney) incision is made and a lesion 60 cm proximal to the ileocecal valve is identified. Which of the following is the most likely diagnosis?

A) Intestinal duplication
B) Mesenteric cyst
C) Meckel diverticulum
D) Ileoileal intussusception

Q9: Which of the following statements about ectopic pregnancy is false?

A) Lower abdominal pain with vaginal bleeding in early pregnancy should alert one to ectopic pregnancy unless otherwise proven.
B) Transvaginal US showing absence of intrauterine gestational sac and a positive urinary pregnancy test points to ectopic pregnancy.
C) Levels of beta-human chorionic gonadotropin (β-HCG) are a useful guide.
D) Laparoscopy is the best diagnostic test.
E) Salpingectomy is the treatment of choice.

Q10: Which of the following statements about pelvic inflammatory disease (PID) is false?

A) The majority are caused by sexually transmitted ascending infection.
B) Streptococcus is the most common organism.
C) A low threshold for empirical treatment should be adopted

Q11: Which of the following concerning the staging of colorectal cancer are true?

A) T3b refers to invasion of between 5 and 15 mm beyond the muscularis propria.
B) N2 means involvement of four or more regional lymph nodes.
C) V1 means intramural vascular invasion.
D) T0 means tumour limited to mucosa.
E) R0 means complete surgical resection with adequate margins.

Q12: Which of the following is not a clinical presentation of Crohn's disease?

A) Blood Stained diarrhoea
B) Intermittent abdominal pain
C) Mass in the right iliac fossa
D) Typical evening rise of temperature
E) Pneumaturia and urinary tract infections

Answers

Q1	A	Q4	B
Q2	C	Q5	B , E
Q3	E	Q6	D

Extra Questions

438's Quiz

Explanations

Q7 Explanation:

Peritoneal adhesions are responsible for about 75% of all cases of small bowel obstruction. A past history of abdominal surgery is the most important risk factor for the formation of peritoneal adhesions, which cause mechanical obstruction through extraluminal compression of the bowel. Given this patient's history of appendectomy, the clinical findings of mechanical small bowel obstruction support the notion that previous abdominal surgery is the cause of this patient's complaints.

Q8 Explanation:

Both a CT scan of the abdomen and an upper endoscopy can be used to confirm the diagnosis of structural GOO. In cases of suspected malignant GOO, endoscopic evaluation with biopsy is the preferred method to obtain a histological diagnosis.

Q9 Explanation:

Opioids, such as the hydromorphone that was used for analgesia in this patient, also have an inhibitory effect on peristalsis, which has likely contributed to the development of paralytic ileus. Treatment consists mainly of supportive measures (i.e., bowel rest, using a nasogastric tube for intestinal decompression, fluid resuscitation, and electrolyte correction). Drugs that might sustain or prolong paralytic ileus (e.g., anticholinergics, opioids) should be reduced or discontinued

Q10 Explanation:

This patient presents with diffuse abdominal pain, nausea, vomiting, high-pitched bowel sounds, and a distended and diffusely tender abdomen, all of which suggest bowel obstruction, possibly due to adhesions from the patient's previous abdominal surgery. A trial of conservative management is appropriate in all patients with mechanical SBO who have no indication for immediate intervention (i.e., no bowel ischemia, necrosis, or perforation), as in the present case.

439's Quiz

Q1: A 60-year-old woman complains of fever and constant left lower quadrant (LLQ) pain of 2-day duration. She has not had vomiting or rectal bleeding. She has a history of hypertension but is otherwise healthy. She has never had similar abdominal pain, and has had no previous surgeries. Her only regular medication is lisinopril. On examination, blood pressure is 150/80, pulse 110, and temperature 38.9°C (102°F). She has normal bowel sounds and left lower quadrant abdominal tenderness with rebound. A complete blood count reveals WBC = 28,000/μL. Serum electrolytes, BUN, creatinine, and liver enzymes are normal. What is the best next step in evaluating this patient's problem?

A) Colonoscopy
B) Barium enema
C) Exploratory laparotomy
D) Ultrasound of the abdomen
E) CT scan of the abdomen and pelvis

Q2: A 65-year-old woman is admitted with rectal bleeding. She noticed a significant amount of blood in the toilet after going to the bathroom this morning and experienced severe abdominal pain which has persisted for several hours. Her medical history is positive for coronary artery disease (recent drug-eluting stent managed with aspirin and clopidogrel) and osteoarthritis (for which she has been taking ibuprofen). She denies weight loss and has no history of bleeding. On examination she is slightly diaphoretic. Vital signs are BP 124/72 and pulse 88 with the patient supine, BP 94/52 and pulse 110 with the patient standing. Abdomen is nontender and nondistended. NG aspirate is negative for occult blood. After establishing two large-bore intravenous lines, administering an IV fluid bolus and otherwise stabilizing the patient, what will be the most important study to perform?

A) Upper endoscopy
B) Air-contrast barium enema
C) Colonoscopy
D) X-ray of the abdomen—flat and upright
E) CT scan of the abdomen

Answers

Q1	B	Q4	C
Q2	B	Q5	A
Q3	A	Q6	A

Extra Questions

439's Quiz

Explanations

Q1 Explanation:

The answer is e. The most likely diagnosis in this patient is acute diverticulitis. Diverticulitis results from obstruction of a preexisting colon diverticulum. Colonic diverticulosis is very common in Western societies, and over half of Americans older than 60 have diverticula. Diverticulosis is asymptomatic. However, obstruction of a diverticulum can result in a microscopic perforation contained by the mesentery, or frank perforation and development of a diverticular abscess. Diverticulitis is classically associated with abdominal pain and fever. The pain is typically located in the left lower quadrant because the sigmoid is the most common region of the colon to be affected by diverticulosis. The marked leukocytosis in this patient combined with rebound tenderness suggests the possibility of a diverticular abscess. Diverticulitis can usually be diagnosed by CT scan of the abdomen and pelvis, which can also detect an associated diverticular abscess. Abdominal ultrasound is rarely useful in assessing colon pathology. Diverticulitis should be treated with antibiotics that are effective against coliforms and anaerobes. A typical choice is ciprofloxacin and metronidazole. Diverticular abscesses over 4 cm in size frequently require drainage, which can often be done percutaneously. Surgery is reserved for cases refractory to antibiotics and percutaneous drainage. Because of the increased risk of colon perforation, colonoscopy and barium enema are usually deferred for 4 to 6 weeks in patients with acute diverticulitis.

Q2 Explanation:

The answer is c. This patient has ischemic colitis, which typically occurs in people older than 50. Risk factors include atherosclerotic disease, including peripheral vascular disease and coronary artery disease. Episodes of bleeding are often accompanied by abdominal pain and watery diarrhea. The bleeding in diverticulosis (another common cause of acute rectal bleeding) is usually painless. Colonoscopy in ischemic colitis will reveal inflammatory changes (sometimes patchy) from the splenic flexure to the sigmoid colon with sparing of the rectum. Nonsteroidal-induced colitis is also a possibility and could be evaluated by colonoscopy. Given the history of red blood per rectum, upper endoscopy would not be the first choice of examination. An air-contrast barium enema could be obtained if colonoscopy were unavailable, in order to evaluate for colitis and to rule out a carcinoma. Plain x-rays of the abdomen occasionally show thumbprinting from edematous mucosal folds but are less sensitive than colonoscopy. CT of the abdomen is not a sensitive or specific test for mucosal disease of the colon.

Since it's the last surgery lecture, we hope that we were able to simplify as much information as possible and made studying surgery more easy and fun!

We will start with a **huge** thanks to 438 and their superb leaders
Naif Alsulis, Haneen Somily, Nouf Alshammari & Mohammed AlShuwaier & their team
for all the support and help they provided us with

Special thanks to the members that supported us throughout the whole 3rd year, this work would've never been done without the AMAZING:

- Abdulaziz Khalid
- Abdullatif Alshuraimi
- Abdulrahman Almebki
- Abdulrhman Alsuhaibany
- Abdurahman Addweesh
- Alaa Alsulami
- Alia Zawawi
- Aljoharah Albnyan
- Aljoud Algazlan
- Asma Alamri
- Dana Naibulharam
- Faisal Alosaimi
- Farah Alsayed
- Fatimah Alhelal
- Feras Alqaidi
- Ghada Alabdi
- Ghada AlOthman
- Ghaida Alassiry
- Hind Almotywea
- Homoud Algadheb
- Ibrahim Alabdulkarim
- Ibrahim Alnamlah
- Joud Alnujaidi
- Khalid Alosaimi
- Lama Alahmadi
- Leen Almadhyani
- Mona Alabdely
- Muhannad Alomar
- Nada Bin Obied
- Naif Alsulais
- Norah Alsalem
- Noura Aldahash
- Noura Alkathiri
- Noura Alshathri
- Noura Baamarei
- Omar Alsuliman
- Osama Alharbi
- Raghad Alasiri
- Rakan Aldohan
- Rakan AlKharan
- Rand Alrefaei
- Rania Almutairi
- Rayan Jabaan
- Sarah Alaidarous
- Saad Aldohaim
- Saleh Alqarni
- Sarah Alqahtani
- Shahad Alrasheed
- Shatha Aldossari
- Sumo Alzeer
- Tarfa Alsharidi
- Wesam Alhuways
- Wojoud Alruhaimi
- Yara Alasmari
- Yasmine Alqarni
- Yazeed Alomar

And lastly but not least surgery BST leaders our secret soldiers:

- A1: Abdullah Alburikan
- A2: Abdulrahman AlMezaini
- A3: Ahmed Alhawamdah
- A4: Khalid Alanezi
- A5: Mohammed Alturki
- A6: Saleh Algarni
- A7: Saad Almousa
- B1: Homoud Algadheb
- B2: Abdulrahman Addweesh
- B3: Abdulaziz Alrabiah
- B4: Naif Alshaikh
- B5: Mohamed Albabtain
- B6: Abdulrahman Alswat
- B7: Fahad Alajmi
- F1: Ghada Alabdi
- F2: Ghada Alothman
- F3: Sarah Alqahtani
- F4: Reem Alamri
- F5: Bushra Alotaibi
- F6: Albandri Alanazi
- F7: Shaden Alsaiedan
- F8: Ghada Alsuwailem
- F9: Muneerah Alsadhan
- F10: Yara Alzahrani

I hope we didn't forget anyone...

Thank you for your perfect work! Your hard work is greatly appreciated.

Academic leaders:

Thank you for putting such a tremendous time & effort this year.
Our batch are fortunate to have you.

Mishal Althunayan & Muneerah Alsadhan

Team leaders:

Mona Alomiriny Sarah AlQuwayz Shayma Alghanoum Reem Alqahtani

Good Luck!

Team leaders:

439	438
Reem Alqahtani	Haneen Somily
Sarah AlQuwayz	Nouf Alshammari
Shayma Alghanoum	Naif Alsulais
Mona Alomiriny	Mohammed Alshuwaier

This lecture was done by:

439

- Yazeed Alomar
- Homoud Algadheb
- Omar Alsuliman
- Alia Zawawi
- Shatha Abdullah
- Fatimah Alhelal
- Aljohara albnyan
- Sara Alqahtani

438

- Noura Alturki
- Wejdan Alnufaie
- Abeer Almutairi
- Rema Alkahtani
- Alhanouf Alhaluli
- Razan AlRabah
- Jude Alkhalifah
- Mohammed Alshoieer
- Badr Alqarni
- Rakan Alfaifi
- Sedra Elsirawan
- Lama AlAssirii
- Nujud Alabdullatif
- Zyad aldosari
- Nayef Alsaber

Special thanks to:
Naif Alsulais
Rand AlRefaei
Muneerah Alsadhan

BST Groups Notetakers:
B1, F3

Feedback

Note taker Reviser