



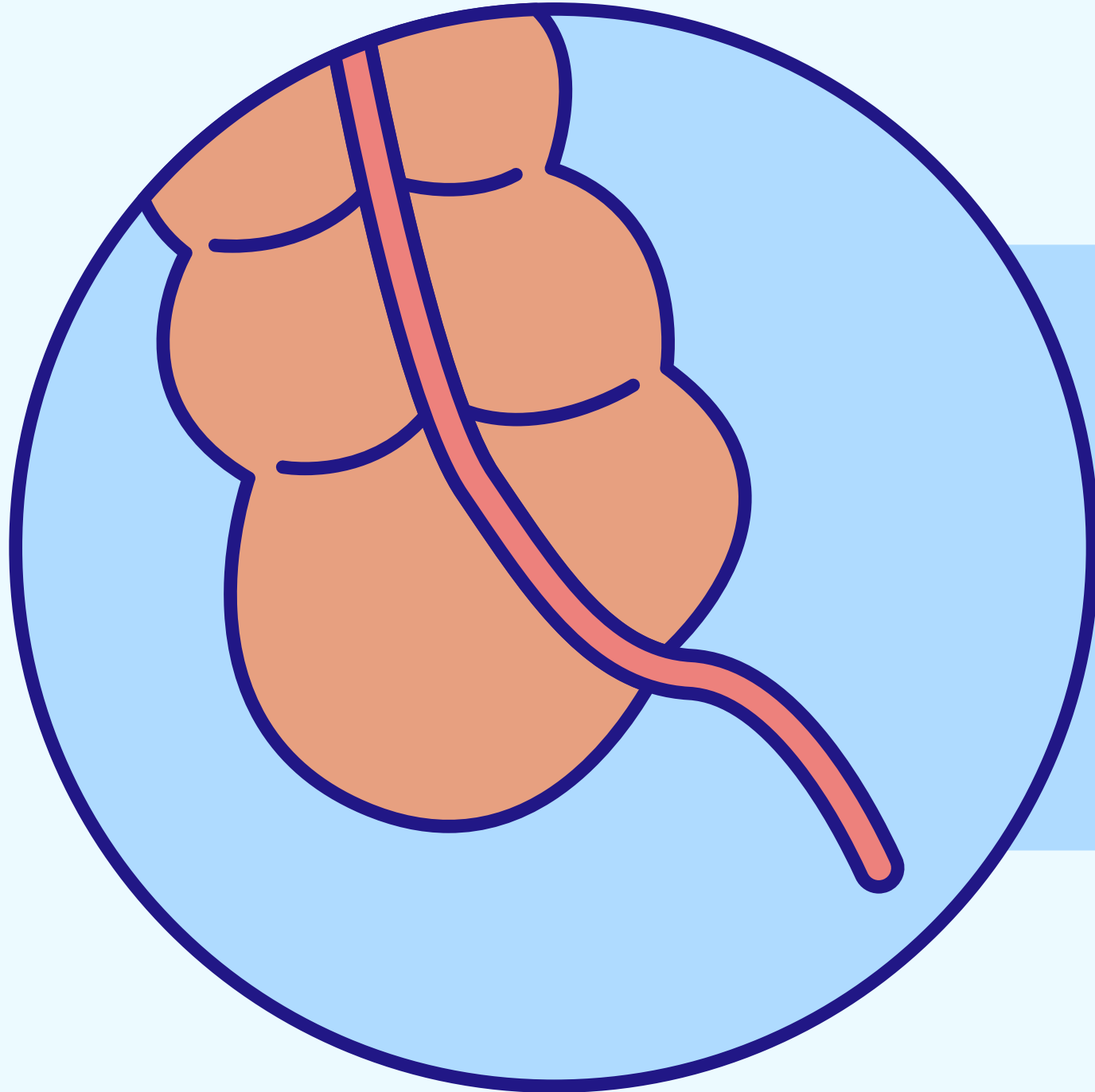
Major Surgery Notes

Done By : Johainah Taha

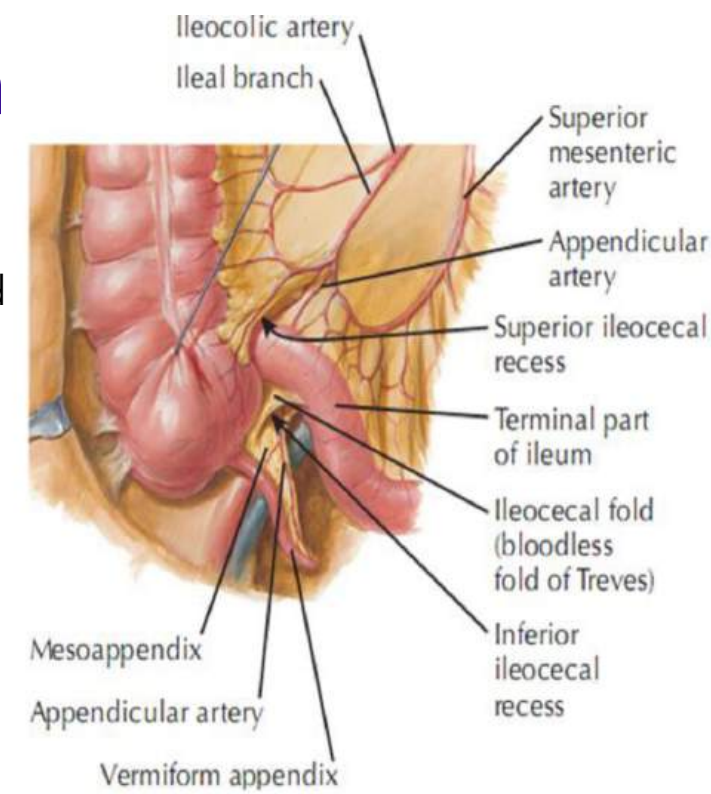




Appendicitis



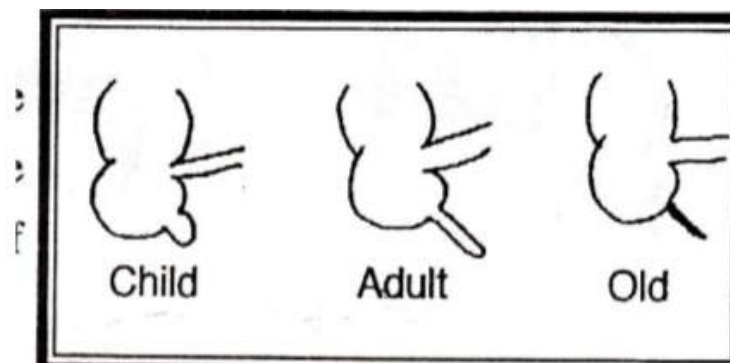
Introduction



- Appendicitis is an acute inflammation of the vermiform appendix, often considered a surgical emergency.
- It commonly affects individuals between the ages of 10 and 30 especially in males, but can occur at any age.
- Prompt diagnosis and treatment are crucial to prevent complications.

- Appendicitis is particularly **dangerous** in children and the elderly, but is not common.
 - Children: The appendix wall in children is thinner, and their peritoneal cavity is smaller, making it easier for infection to spread quickly after perforation.
 - Elderly: Due to decreased tissue elasticity and delayed medical attention, complications such as perforation, abscess formation, or peritonitis are more common.

Appendix in different Age groups



Etiology

Predisposing Factors

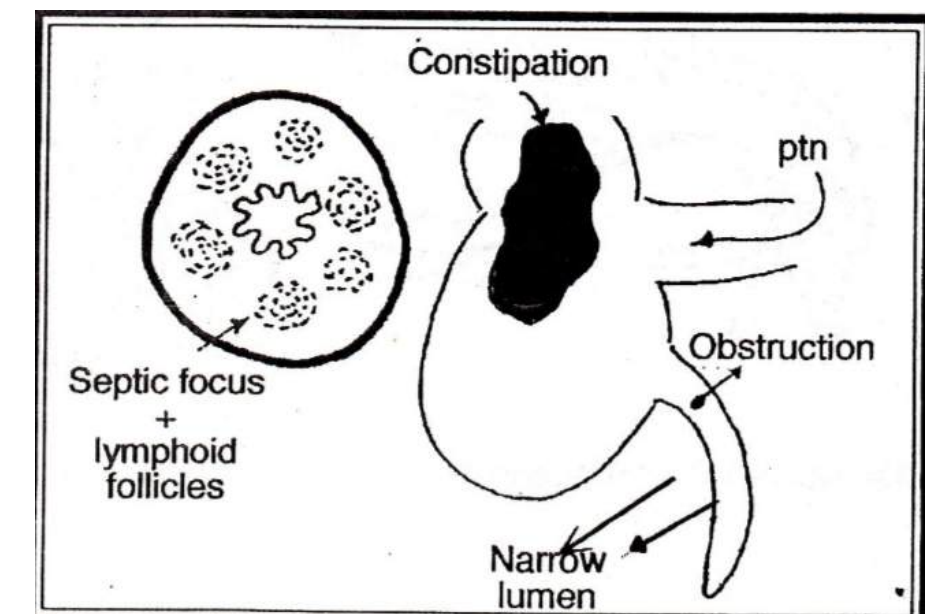
1. Luminal Obstruction:
 - Most common cause.
 - Can be due to fecaliths, lymphoid hyperplasia, impacted stool, or foreign bodies.
 - Tumors (e.g., carcinoid or adenocarcinoma) in rare cases.
2. Dietary Factors:
 - Low-fiber, high-refined carbohydrate diets may increase risk.
3. Infections:
 - Prior gastrointestinal or systemic infections leading to lymphoid hyperplasia.
4. Age and Gender:
 - Commonly seen in individuals aged 10-30.
 - Slight male predominance.

Route of Infection

1. Lymphatic Spread: Lymphoid hyperplasia secondary to viral or bacterial infections.
2. Direct Spread: Obstruction of the appendix leads to bacterial proliferation.
3. Hematogenous Spread: Rare but possible, particularly in systemic infections.

Organisms Involved : Polymicrobial Flora

- Common organisms include:
- Escherichia coli: Most common aerobic bacteria.
- Bacteroides fragilis: Most common anaerobic bacteria.
- Klebsiella spp.
- Peptostreptococcus spp.
- Pseudomonas spp.



Pathology

A) Acute obstructive appendicitis:(more common , 2/3 of cases).

• Obstruction of the lumen of the appendix → stasis → overgrowth of normal bacterial flora → spread of bacteria to mucosa .

This usually produce rapidly progressive severe inflammation ,gangrene & perforation are rapid & common.
The condition progress rapidly as follows:

1. Catarrhal inflammation

affect mucosa only → swelling → mucocele of the appendix.

If the condition is untreated → spread of inflammation to the wall of the appendix leading to the following:

2. Suppurative inflammation :

formation of multiple abscesses in the wall of the appendix and pus in the lumen → empyaema of the appendix.

If the condition is untreated , the condition usually progress to the followings:

3. Gangrenous inflammation:

Gangrene uually occurs at the tip of the appendix (where appendicular vessels are close to the wall of the appendix) or the site of obstruction (pressure necrosis)

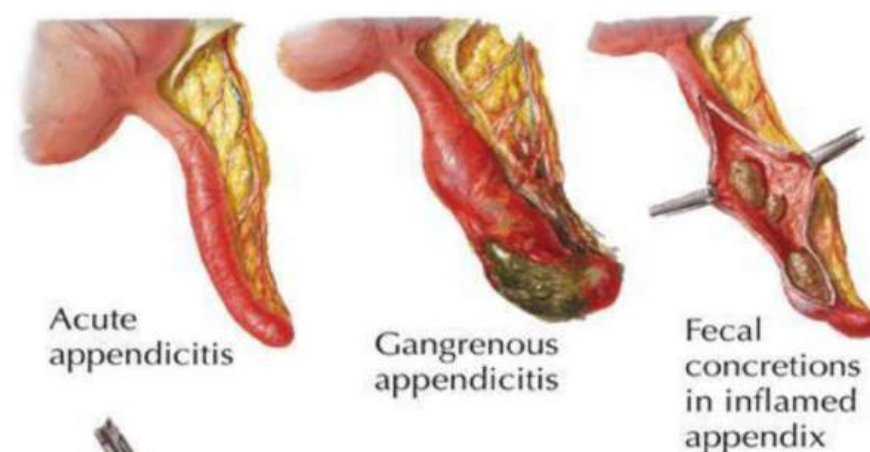
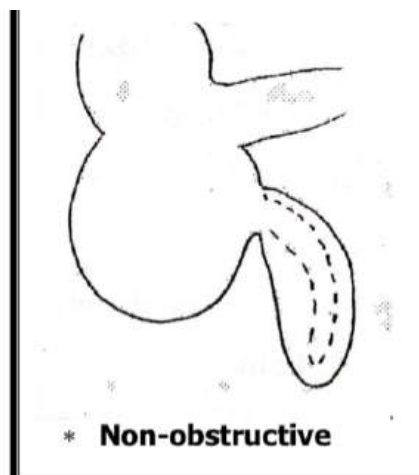
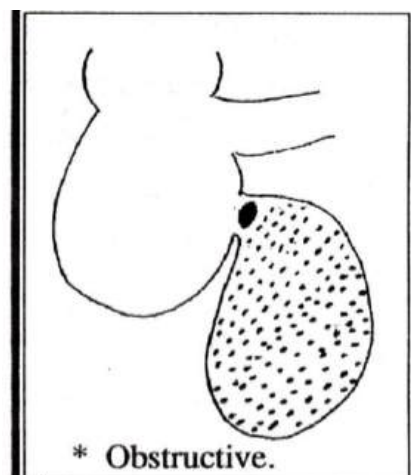
B) Acute Non-obstructive Appendicitis :(Less common,1/3 of cases)

•Definition: Inflammation confined to the appendix without tissue necrosis or perforation (**catarrhal inflammation**), Produce mild slowly progressive inflammation.

•Pathological Features:

Early inflammation of the mucosa and submucosa -> Edema and vascular congestion -> Neutrophilic infiltration in the wall of the appendix -> Luminal obstruction often present due to fecalith or lymphoid hyperplasia.

•Clinical Relevance: If treated early, the appendix can be preserved, and complications can be avoided.



Fate and Complications

1) In non-obstructive type only :

• Resolution and Progression:

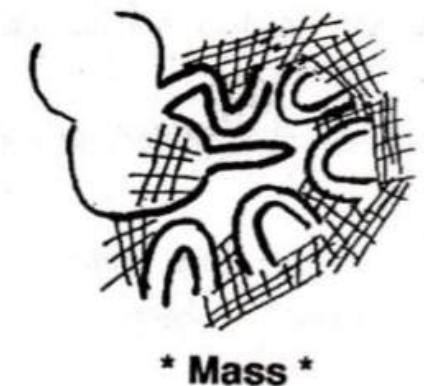
- 1- In some cases, acute inflammation can spontaneously **resolve** without intervention.
- 2- The condition may become **subacute** appendicitis, which presents with milder or intermittent symptoms.
- 3- However, most cases tend to experience **recurrent** acute attacks, as the underlying issue persists.

2) Appendicular Mass:

• **Mechanism:** In **non**-obstructive appendicitis the greater omentum, cecum, loops of intestine create **adhesions** around the inflamed appendix (occurs around the 3rd day after symptom onset)

• Fate of the Appendicular Mass:

1. **Resolution:** The inflammation may subside within a few **weeks** without further complications.
2. **Perforation** within the Mass: If the appendix perforates but is contained by the mass, it can lead to an appendicular **abscess** (localized peritonitis).

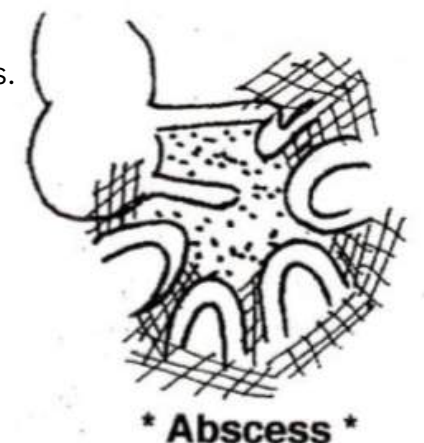


3) Perforation :

• **Risk Groups:** Young **children** below 5 y.o (Thin appendiceal wall) and **Elderly** (Reduced blood supply due to atherosclerosis -> weaker wall)

• Types of Perforation:

1. **Sudden Perforation:**
 - Occurs in patients with poor general resistance.
 - Leads to **generalized peritonitis**, especially in the obstructive type of appendicitis.
2. **Gradual Perforation within an Appendicular Mass:**
 - Results in a **localized appendicular abscess**, which may later rupture and cause generalized peritonitis.



• Fate of Appendicular Abscess:

- The abscess may:
 1. Point externally (e.g., through the abdominal wall, rectum, or vagina).
 2. Burst into the peritoneal cavity, causing generalized peritonitis.
 3. Rarely lead to complications like a subphrenic abscess in cases of a subhepatic appendix.

Fate and Complications

4) Local spread of infection with irritation:

- The inflamed appendix can irritate or infect nearby structures, including:
 - 1- Uterus, uterine tubes, ovaries (may cause gynecological symptoms).
 - 2- Bladder, ureter (can mimic or lead to urinary symptoms).
 - 3- Rectum and ileum.
 - 4- Muscles such as the psoas major and obturator internus, leading to symptoms like pain on movement (e.g., psoas sign, obturator sign).

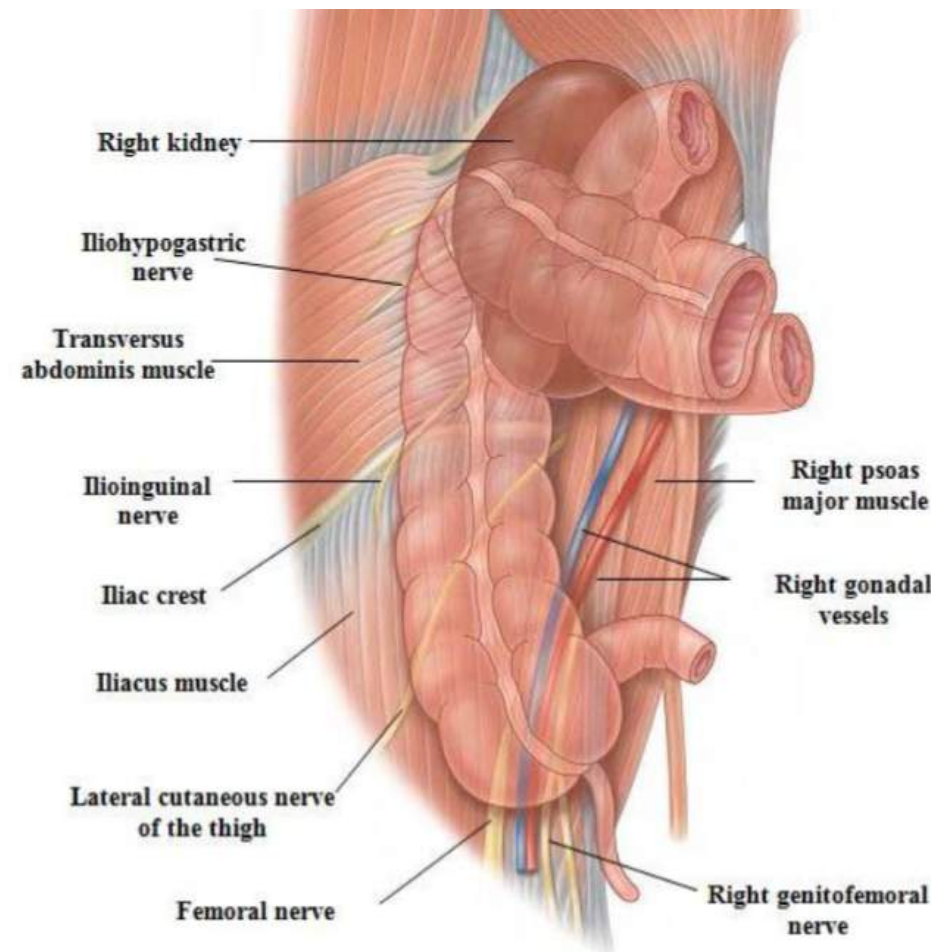
5) Rarely Pylephlebitis :

•**Definition:** A severe complication involving septic thrombophlebitis of the portal vein or its tributaries, commonly the ileocolic vein in retro-ileal appendices.

•**Progression:** Can lead to portal pyaemia, pyogenic liver abscesses, and systemic effects.

•**Clinical Features:** High fever with chills, jaundice, and signs of portal hypertension.

•**Prognosis:** Rare but life-threatening, requiring aggressive treatment with antibiotics and possible surgical intervention.



Clinical Picture of Typical Appendicitis

*Acute appendicitis is mainly diagnosed clinically.

A. Symptoms

1. History of recent constipation or similar attacks are common

↳ But not the first presentation.

2. Pain (**main presentation**):

- Nature: Colicky or dull aching.
- Onset: Rapid and aggravated by movements or coughing.
- Site: Initially **generalized** abdominal pain, most marked **peri-umbilical** (T10 segment shared innervation). After 6-10 hours, becomes sharp and localized to the **right iliac fossa** (somatic pain due to parietal peritoneum irritation).

Note :

-both appendix and umbilicus are supplied by the T10 segment of the spinal cord and the appendix is part of midgut

-Distension of appendix → visceral Pain, which is ill-defined and diffuse
spread of inflammation to serosa →
irritation of parietal peritoneum i.e. somatic pain which is localized and sharp

3. Anorexia (**The first presentation**)

- Always present and **precedes** pain.
- Hunger suggests an alternate diagnosis.

4. Nausea:

- Nearly always occurs **after** pain.

5. Vomiting:

- Occurs in ~75% of cases, usually **once or twice**. **Persistent** vomiting suggests **complications**.
- Key point: Vomiting follows pain. If it **precedes** pain, consider **other diagnoses**.

6. Change in bowel habits:

- Constipation** is common, but diarrhea may also occur.



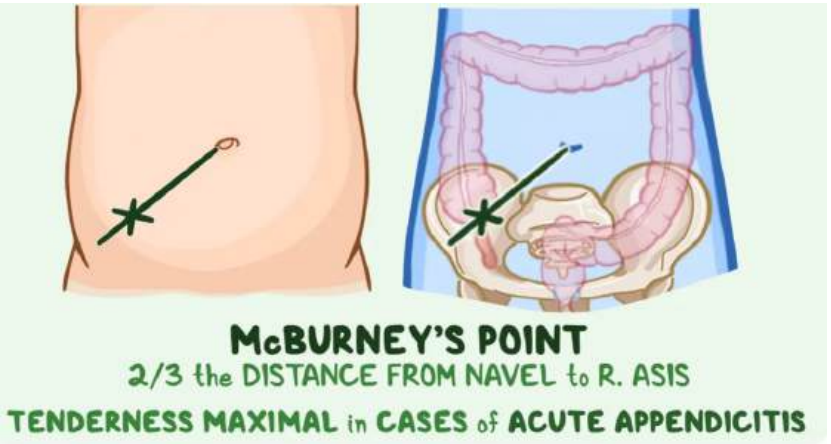
B. Examination

1. General Examination

- Temperature:
 - **Gradually** rises to 38°C. Higher temperatures suggest complications or other diagnoses.
 - Fever $\geq 40^{\circ}\text{C}$ or rigors are not typical of appendicitis.
- Tachycardia:
 - **Slight**. But Marked tachycardia suggests complications.

2. Abdominal Examination

1. Localized tenderness and rebound tenderness:
 - Most commonly at McBurney's point (junction of medial 2/3 and lateral 1/3 of a line from the umbilicus to the right ASIS).
 - Tenderness may shift based on the appendix's position.
2. Cough tenderness: Sharp, localized pain at the appendix site upon coughing.
3. Guarding, rigidity, and reduced abdominal wall movement: Indicate peritoneal involvement (advanced stage or perforation).
4. Rovsing's sign: Pressure on the left iliac fossa elicits pain in the right iliac fossa (gas displacement irritates the appendix).
5. Hyperesthesia: Rare, felt in Sherren's triangle (bounded by the umbilicus, right ASIS, and symphysis pubis).
6. Per rectal (P-R) or per vaginal (P-V) examination:
 - Excludes gynecological causes of acute abdomen.
 - May show tenderness or a mass in pelvic appendicitis.

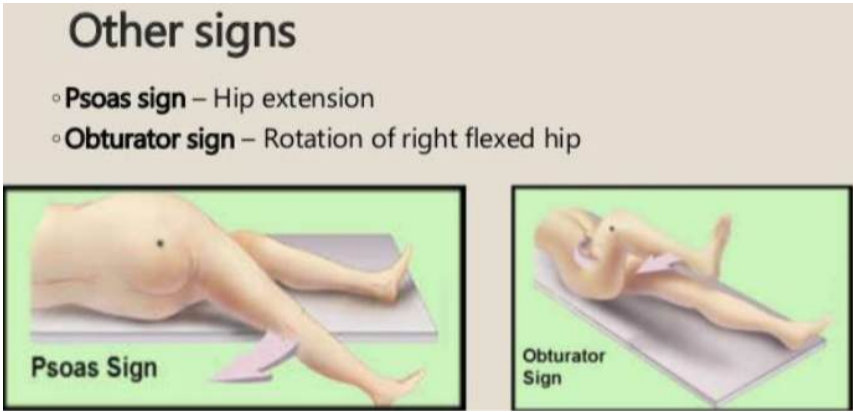


Clinical Picture of Atypical Appendicitis

Atypical presentations occur due to variations in the appendix's anatomical position, age, or associated conditions.

1. Retrocecal Appendix (75%)

- Features:
 - Minimal tenderness and rigidity in the right iliac fossa.
 - Deep tenderness in the loin with rigidity.
 - If in contact with the ureter $\rightarrow$ ureteric colic.
 - Psoas sign: Irritation of the psoas major muscle $\rightarrow$ spasm $\rightarrow$ flexion of the hip joint $\rightarrow$ Abdominal pain on hyperextension of the hip (psoas sign)



2. Pelvic Appendix (20%)

- Features:
 - Pain felt in the pelvis.
 - Deep tenderness elicited via per rectal (P-R) or per vaginal (P-V) examination (الالم يكون بجهة اليمين)
 - Irritation of surrounding structures:
 1. Right obturator internus muscle $\rightarrow$ spasm $\rightarrow$ lateral rotation of the hip and pain on medial rotation (Obturator sign).
 2. Bladder $\rightarrow$ frequency of micturition.
 3. Uterus, uterine tube, and ovaries $\rightarrow$ vaginal discharge.
 4. Rectum $\rightarrow$ tenesmus (رغبة بالاعراج و لكن القولون اصلا فاضي)

3. Paracaecal Appendix (1%)

Tenderness and rigidity localized to the flank.

4. Post-ileal Appendix (0.5%)

Irritation of the ileum $\rightarrow$ diarrhea with early vomiting. (DD : Enterities)

5. Subhepatic Appendix (Rare)

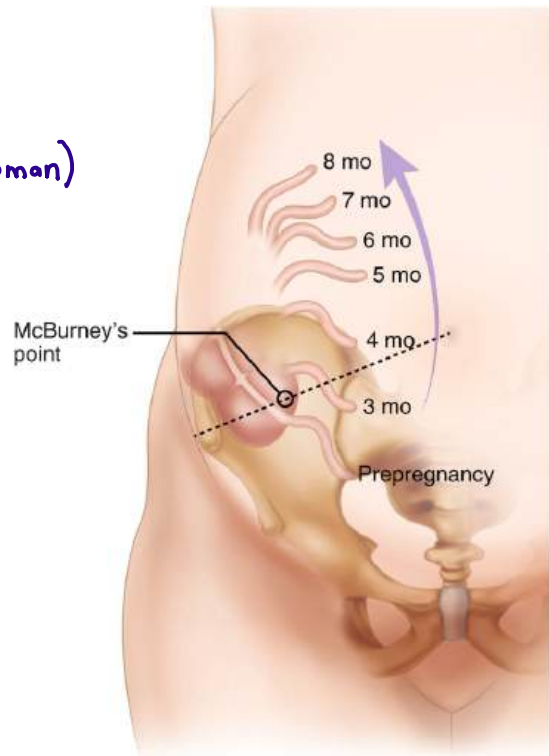
- Cause: Failure of caecal descent during development.
- Pain, tenderness, and rigidity localized to the right hypochondrium, mimicking acute cholecystitis.

بال embryo او Cecum يتكون تحت* او liver ومعا appendix
وبها بجين ال descending و RIF .
لومارني Failure ← او Cecum و appendix حيصروا تحت* او Liver .
المريض بجين كانه acute cholecystitis .
* بعض الاحيان يتكون الزائدة طويلة من 2cm الى 20cm .

Clinical Picture of Atypical Appendicitis

6. Appendicitis in Pregnancy

- Features:
 - Pain displaced upwards as the uterus enlarges.
 - Localization by the omentum is less efficient.
 - Frequently misdiagnosed as **pyelitis**. (most common reason in pregnant woman)
 - Perforation risk → increased chance of **abortion** or **preterm** labor.
- ← لوفي نزاية الحمل . ← لوفي بداية الحمل .



7. Appendicitis in Infants and Young Children

- High perforation rate (80%) due to:
 1. **Difficulty** in examination.
 2. **Thin** appendix wall.
 3. Underdeveloped greater omentum → poor localization.
 4. Often **misdiagnosed** as gastroenteritis.

8. Appendicitis in the Elderly

- Perforation is common due to:
 1. Weak immunity.
 2. Atherosclerosis → early thrombosis and gangrene.
- Often presents atypically, leading to **delayed** diagnosis.

Complications

A. Appendicular Mass

- History of acute appendicitis symptoms for 2-3 days.
- High fever: Above 38°C.
- A firm, tender mass in the right iliac fossa, often with muscle guarding.
- Diagnosis is often made during examination under anesthesia in the operating theater before surgery.

B. Appendicular Abscess

- History of acute appendicitis symptoms for 5-10 days.
- Fever: Progressive, often hectic, accompanied by tachycardia.
- A tense, cystic, tender swelling in the right iliac fossa.
- Pain becomes throbbing, and vomiting persists.
- Ultrasound confirms diagnosis by showing fluid within the mass.

C. Peritonitis

- History of acute appendicitis.
- Fever: Above 38°C.
- Abdominal pain:
 - Initially localized to the right iliac fossa.
 - Later becomes generalized across the abdomen.
- Signs:
 - Tenderness and rebound tenderness.
 - Rigidity of the abdominal wall muscles.

Clinical Picture of Acute Peritonitis

Acute peritonitis results from the spread of infection or perforation of the appendix, leading to generalized inflammation of the peritoneum.

1. Symptoms:
 - Severe, diffuse abdominal pain, often worsening with movement.
 - Vomiting, sometimes persistent.
 - Fever: High-grade, with chills.
2. Signs:
 - Tenderness and rigidity: Board-like abdomen.
 - Rebound tenderness: Pain worsens when pressure on the abdomen is released.
 - Diminished bowel sounds or absent bowel sounds (paralytic ileus).
 - Guarding: Involuntary contraction of abdominal muscles.
3. Systemic Symptoms:
 - Tachycardia.
 - Hypotension (if sepsis or shock ensues).
 - Features of toxicity (e.g., confusion, pallor, sweating).

Investigations

The diagnosis of acute appendicitis primarily relies on clinical examination, but investigations are essential to:

- Exclude other causes of acute abdomen.
- Confirm the diagnosis in doubtful cases.

1. Leucocytic Count

- Findings:
 - Moderate leucocytosis: 10,000–16,000/ μ l.
 - Predominance of neutrophils with a left shift in 90% of cases, indicating acute infection.
- Note: A normal leucocytic count does not exclude appendicitis.

2. Urine Analysis

- Purpose: To exclude urinary tract infections or urinary calculi as differential diagnoses.

3. Pregnancy Test

- Performed when ectopic pregnancy is a suspected cause of lower abdominal pain.

4. Pelvi-Abdominal Ultrasound (U/S)

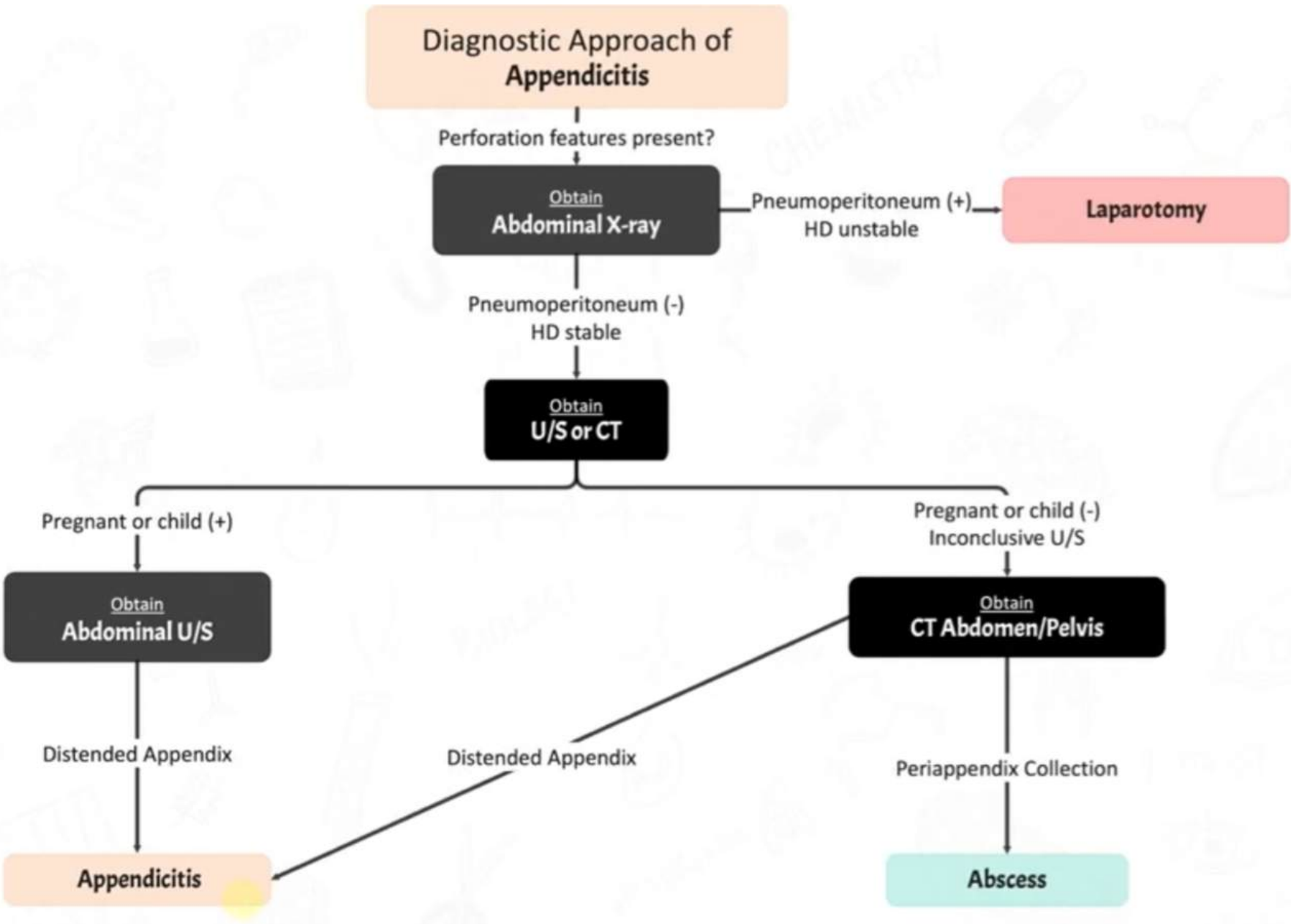
- Advantages: Easy, accessible, inexpensive, and safe during pregnancy.
- Findings Suggestive of Appendicitis:
 - Appendix diameter > 6 mm.
 - Thickened, non-compressible appendix wall.
 - Possible detection of faecolith or periappendicular fluid.
- Accuracy: In expert hands, 75% accuracy.
- Other Uses: Differentiates appendicitis from:
 - Appendicular mass or abscess.
 - Right ureteric calculi with associated kidney changes.
 - Gynaecological issues (e.g., ovarian torsion, ruptured cyst), where transvaginal U/S is more effective.

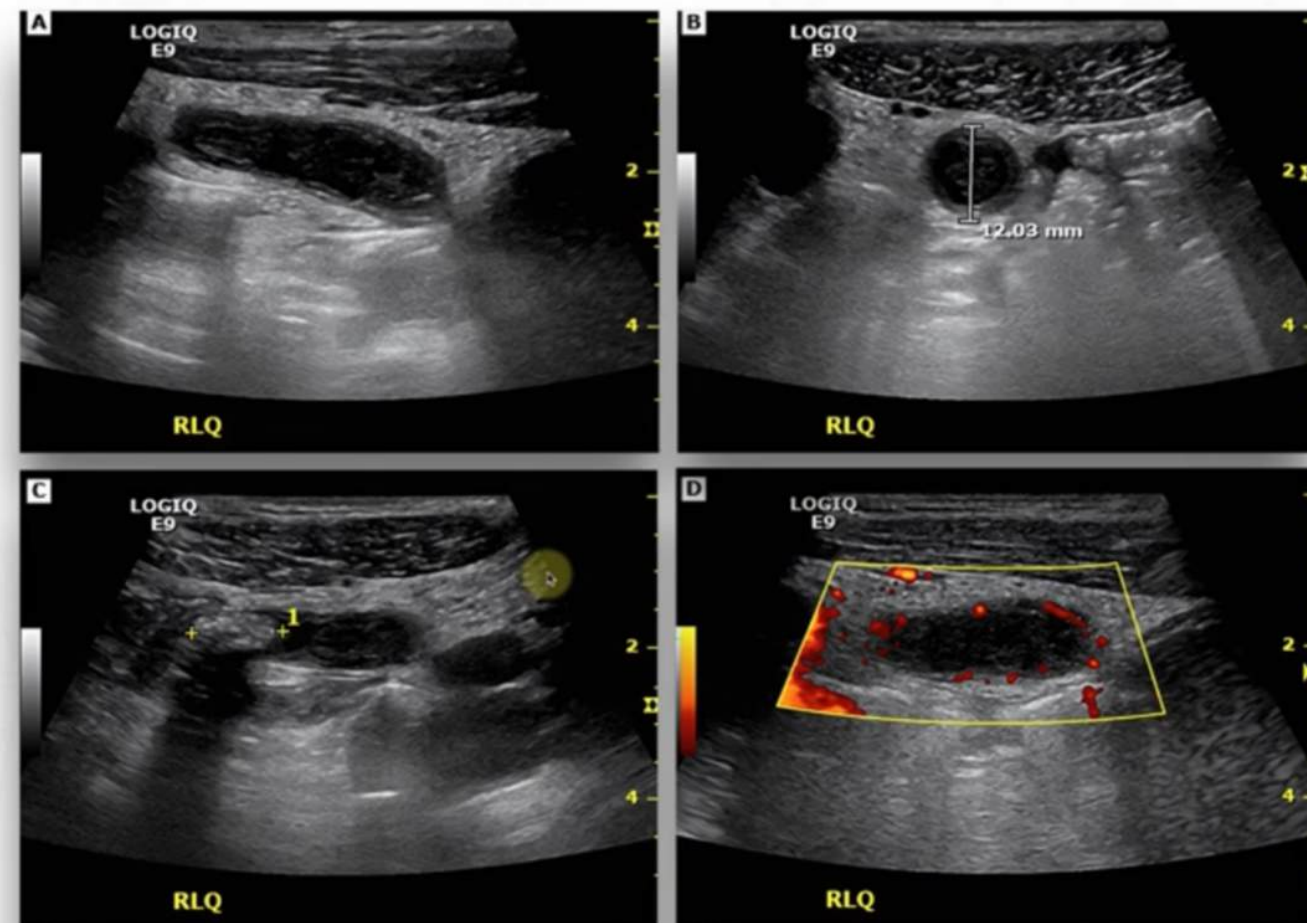
5. CT Scan

- Indicated for doubtful cases to confirm appendicitis or exclude other causes of acute abdomen.
- Accuracy: Approximately 95% in experienced hands.

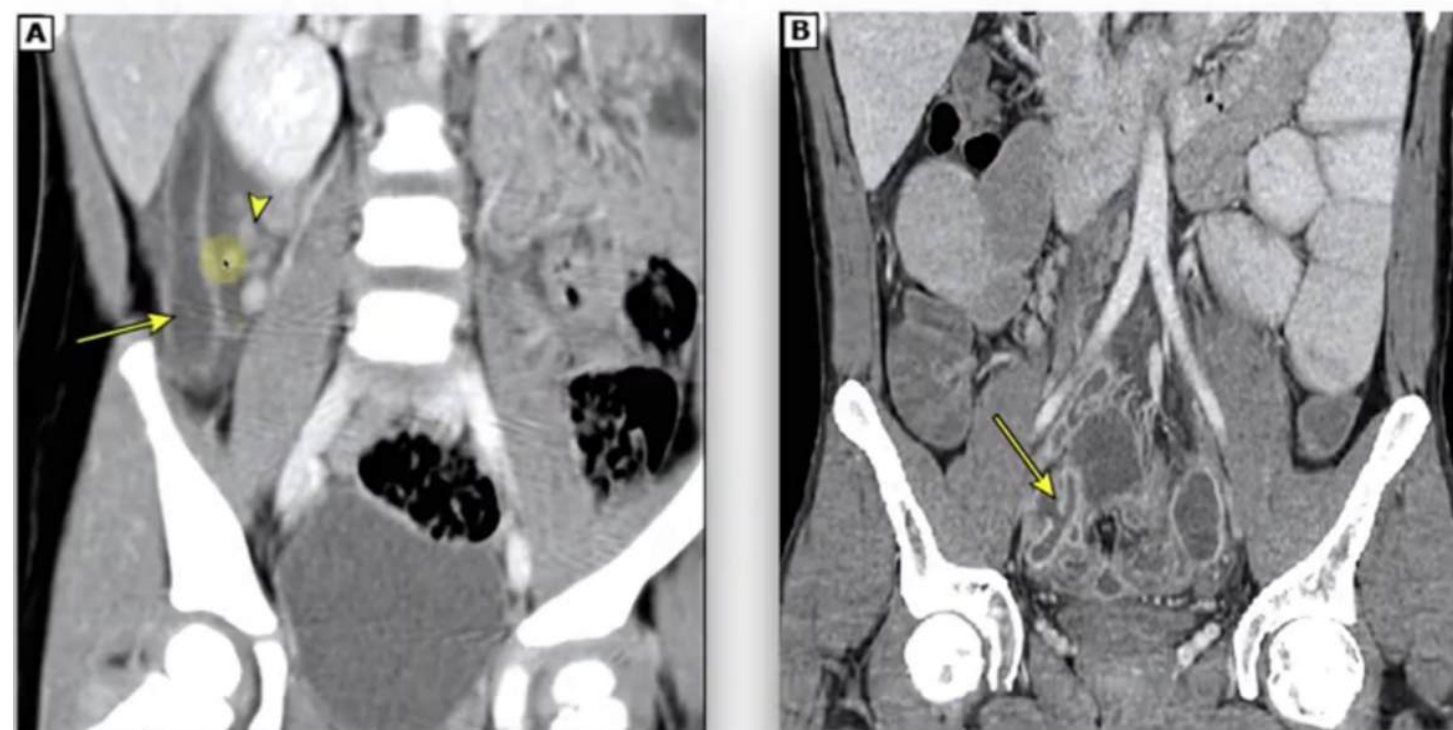
6. Laparoscopy

- Indications:
 - Frequently performed for females of childbearing age presenting with right lower abdominal pain.
- Advantages:
 - Diagnostic: Identifies appendicitis or other pathologies like gynaecological issues.
 - Therapeutic: Allows for laparoscopic appendectomy or other procedures if necessary.





Ultrasound of Acute Appendicitis



A) CT of Appendicitis and Abscess

Differential Diagnosis (D.D.) of Acute Abdomen

I. Causes of Pain in the Right Iliac Fossa.

1. Right Tubo-Ovarian Causes (gynecological):

- Mid-cycle ovulation pain (**Mittelschmerz**).
- Ruptured **ectopic** pregnancy.
- **Twisted** or ruptured ovarian cyst.
- Pelvic inflammatory diseases (**PID**): Examples: Salpingitis, pyosalpinx, tubo-ovarian abscess, or degeneration in a fibroid.
- **Key Diagnostic Tool: Pelvic ultrasound (U/S).**

2. Non-Specific Mesenteric Lymphadenitis:

- Common in children, presenting with:
- Pain and tenderness that shifts with changes in position.

3. Stone in the Right Ureter: Characterized by colicky pain radiating to the groin, often associated with hematuria.

4. Meckel's Diverticulitis:

- Mimics appendicitis but with pain located above and medial to McBurney's point.
- Typically diagnosed during surgical exploration.

5. Gastroenteritis: Diffuse abdominal pain with nausea, vomiting, and diarrhea.

6. Acute Regional Ileitis: The history includes:

- Recurrent RIF pain.
- Diarrhea and rectal bleeding.
- A vague RIF mass may be palpable.

7. Right Iliac Lymphadenitis:

- Localized pain and tenderness below McBurney's point, near the iliac vessels.
- Often associated with the underlying cause, such as infection.

II. Causes of Mass in the Right Iliac Fossa.

1. Appendicular Mass: The most common cause of RIF mass.

2. Appendicular Abscess: Develops from untreated or complicated appendicitis.

3. Cancer of the Caecum, Key features:

- Chronic, irregular, ill-defined, hard, and non-tender mass in the RIF.
- Often associated with anemia, weakness, dyspepsia, and signs of metastases.

4. Chronic Regional Ileitis: Presents with a vague or firm RIF mass, associated with inflammatory bowel disease (e.g., Crohn's disease).

5. Right Iliac Lymphadenitis: Enlarged lymph nodes secondary to infection or malignancy.

6. Hypertrophic Ileocaecal Tuberculosis (TB), Features include:

- Chronic abdominal pain and a palpable mass in the RIF.
- Associated with constitutional symptoms like fever and weight loss.

Appendicitis: Differential Diagnosis III

	Clinical characteristics	But:
Crohn's disease	 RLQ pain; tenderness; nausea/vomiting	May have history of previous attacks; palpable mass leans towards Crohn's diagnosis; imaging
Omental Torsion	 RLQ pain and tenderness	Vomiting less common; Initial mid-epigastric pain usually absent; imaging
Diverticulitis	 Right-sided diverticulitis and redundant sigmoid anatomy may have similar clinical findings to appendicitis	Initial mid-epigastric pain absent; nausea/vomiting uncommon; fever usually higher; imaging
Meckel's Diverticulitis	 May be indistinguishable from appendicitis clinically	Pain may be central and poorly localized; rare (2% of population)
Mesenteric Adenitis	 RLQ tenderness, colicky abdominal pain	Nausea/vomiting usually absent; no progression; recent history of viral infection; Yersinia Enterocolitica common cause

Treatment of Appendicitis

Urgent Appendicectomy

A. Urgent Appendicectomy (Appendectomy)

Indications:

- Appendicectomy should not be delayed, especially in high-risk groups such as: Children, elderly, pregnant women, and patients with diabetes mellitus (D.M.) unless contraindicated.
- The procedure is critical to prevent complications like perforation or peritonitis.

Preferred Surgical Approach:

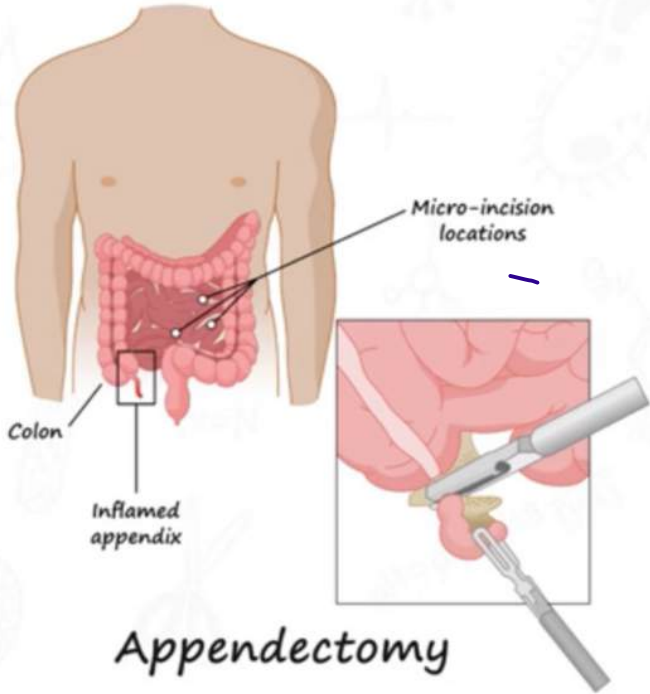
- Laparoscopic Appendicectomy:
 - Gradually replacing open appendicectomy due to:
 - Exposure of the entire peritoneal cavity.
 - Lower morbidity, less post-operative pain, and shorter hospital stays.
 - Faster recovery and earlier return to work.

Contraindications:

- Appendicular mass or abscess due to:
 - Difficulty of the operation.
 - Friable tissues.
 - Risk of bowel injury.

Treatment of Appendicitis

Type of Appendicitis	Indication	Treatment
Uncomplicated	(-) Perforation (-) Abscess	Antibiotics + Laparoscopic Appendectomy
	(+) Perforation	Antibiotics + Emergent Appendectomy
Complicated	(+) Abscess	Antibiotics + Percutaneous drainage ↓ after 3-6 months Interval Appendectomy



Treatment of Appendicitis and Its Complications

1. Appendicular Mass

- Initial Treatment: Conservative management (Ochner-Sheren's regimen).
 - Resolution: Occurs in 80-90% of cases.
 - Follow-up: Interval appendicectomy performed 3 months after resolution.
-
- Conservative Treatment Includes:
 - Rest in bed during initial days.
 - Ryle's tube for gastric suction, stopping oral feeding, and IV fluids until nausea subsides. Gradual reintroduction of oral feeding.
 - Antibiotics: Combination of ampicillin, aminoglycoside, and metronidazole (Flagyl) to cover most pathogens. Administered IV initially, then orally.
 - Analgesics for pain management (after a confirmed diagnosis).
 - Close observation of: Temperature, pulse, blood pressure, pain severity, tenderness, rigidity, vomiting, and mass size.

2. Appendicular Abscess

- Primary Treatment: Drainage of the abscess followed by interval appendicectomy 3-6 months later.
- Drainage Methods:
 - Ultrasound-Guided Percutaneous Aspiration:
 - Preferred method.
 - Involves catheter placement for drainage, avoiding anesthesia and surgery.
 - Open Extraperitoneal Drainage:
 - Used if percutaneous drainage fails or is not feasible.
 - Procedure: Iliac incision → Abscess cavity entered via extra-peritoneal approach → Loculi opened → Pus drained → Rubber drain placed for a few days.
 - Pelvic Abscess Drainage: Access via vagina or rectum, depending on the abscess location.

3. Appendicular Peritonitis

- Urgent laparoscopic or open appendicectomy.
- Peritoneal Toilet: Irrigation and cleaning of the peritoneal cavity.
- Drain Placement: Typically, 3 drains are used:
 - One near the appendiceal stump.
 - One in the pelvic cavity.
 - One in the subdiaphragmatic space.



4. Appendicitis with Portal Pyaemia

- Immediate appendicectomy.
- Ligation of the ileo-colic vein to prevent further septic embolization.

5. Recurrent Subacute Appendicitis

- Aetiology: Inadequate management of acute appendicitis.
- Clinical Presentation: Recurrent RIF pain / Vague dyspepsia.
- Differential Diagnosis: Exclude other causes of chronic RIF pain: Amoebic colitis, irritable bowel syndrome (IBS), chronic cholecystitis, and regional ileitis.
- Treatment: Laparoscopic Appendicectomy.

Appendectomy

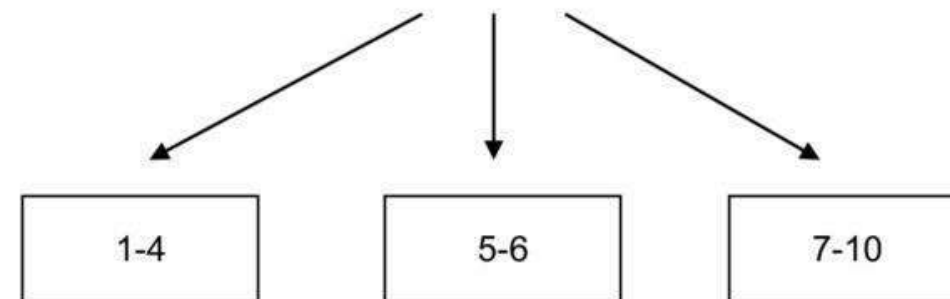
complications

mnemonic: **WRAP IF HOT**

Wound infection
Respiratory (atelectasis, pneumonia)
Abscess (pelvic)
Portal pyemia
Ileus (paralytic)
Fecal fistula
Hernia (R.inguinal)
Obstuction (intestinal due to adhesions)
Thrombus (DVT)



Alvarado score	
Feature	Score
Migration of pain	1
Anorexia	1
Nausea	1
Tenderness in right lower quadrant	2
Rebound pain	1
Elevated temperature	1
Leucocytosis	2
Shift of white blood cell count to the left	1
Total	10



The Alvarado score was developed to assist in diagnosing appendicitis. Studies that look at the score's ability to rule out appendicitis (using Alvarado < 3-4) have a sensitivity of 96%

Neoplasms of the Appendix

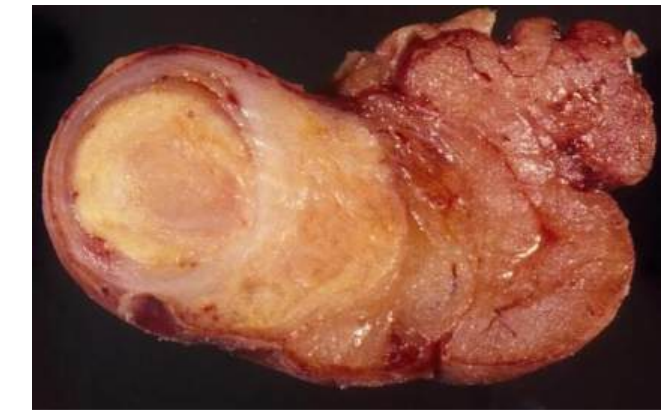
Carcinoid Tumor (Argentaffinoma)

• Incidence:

- Most common tumor of the appendix.
- The appendix is the most common site in the gut (65%) for carcinoid tumors.

• Pathology:

- Originates from Kulchitsky cells located in the depth of mucosal crypts.
- Appears as a bright yellow mass due to high lipid content.
- Usually benign, but 5% can be malignant:
- Tumors <1 cm: Usually benign.
- Tumors >2 cm: More likely malignant, metastasize to the liver, and may cause carcinoid syndrome due to serotonin production.



• Complications:

1. Acute or chronic appendicitis.
2. Spread: Direct, Lymphatic, Hematogenous (commonly to the liver).

• Clinical Picture:

1. Often symptomless.
2. Sometimes found incidentally during histopathological examination after appendicectomy.
3. Carcinoid Syndrome (rare, occurs with liver metastasis of malignant tumors):
 - Flushing with cyanotic attacks.
 - Diarrhea with borborygmi (audable intestinal sounds).

• Investigations: Elevated urinary serotonin metabolites (e.g., 5-HIAA).

• Treatment:

- Tumors <2 cm confined to the appendix → Appendicectomy.
- Tumors >2 cm or with metastasis → Right hemicolectomy.

Adenocarcinoma

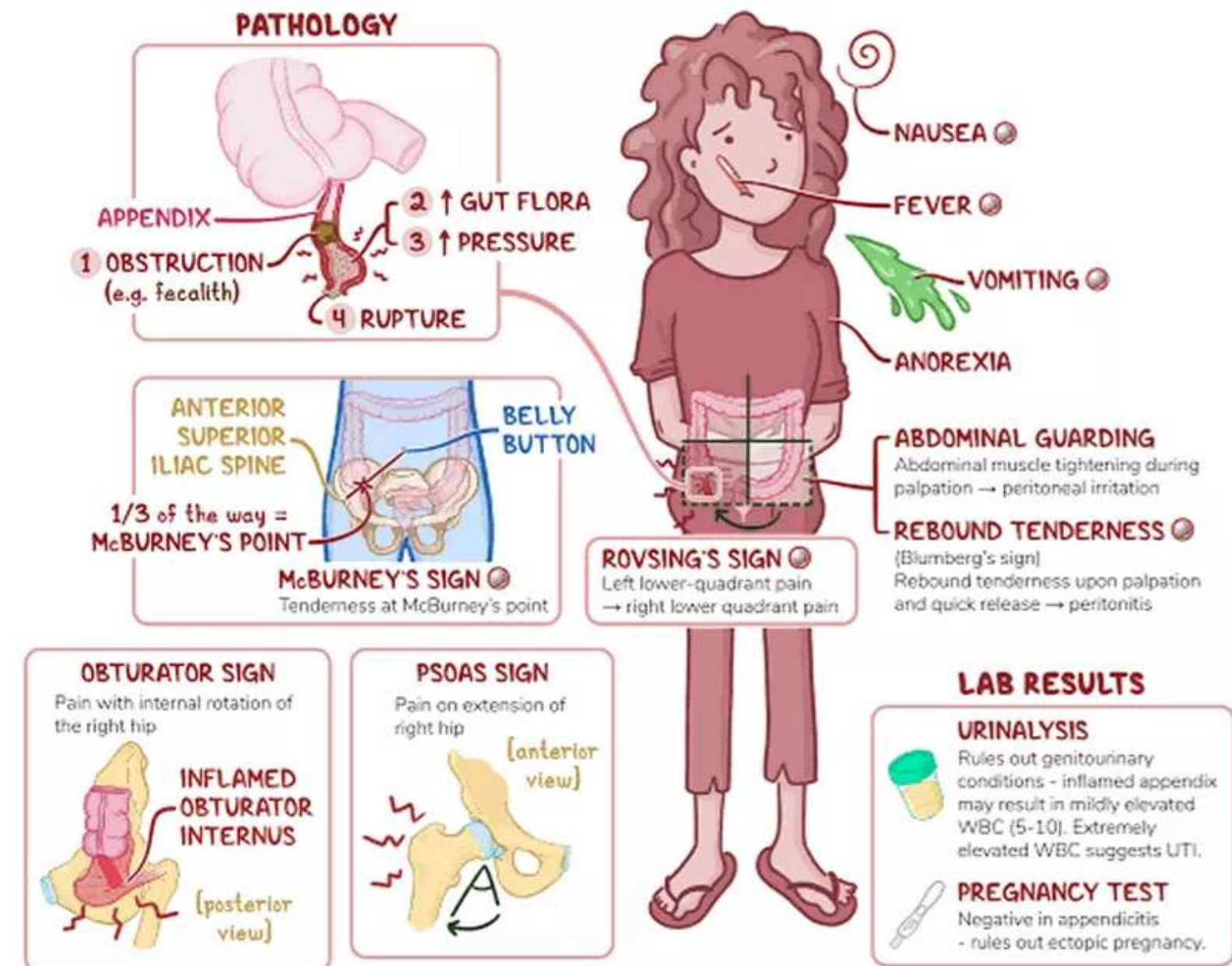
- **Incidence:** Rare in the appendix.
- **Pathology:** Greyish, irregular, ill-defined, and hard mass.
- **Complications:**
 1. Acute or chronic appendicitis.
 2. Spread: Direct, Lymphatic, Hematogenous.
- **Clinical Picture:**
 1. May present as acute appendicitis.
 2. Similar clinical behavior to carcinoma of the right colon.
- **Investigations & Treatment:**
 - Same as carcinoma of the cecum (e.g., CT scan, biopsy, surgical resection).

Exam Notes

- Key Differentiators:
 - Carcinoid tumor is more common than adenocarcinoma.
 - Carcinoid tumors have distinct features like their yellow color and serotonin-related complications.
- Important Exam Questions:
 - What is the most common tumor of the appendix?
 - Which tumors produce carcinoid syndrome, and under what conditions?
 - Management of carcinoid tumors based on size and spread.
- Carcinoid Syndrome Triad:
 1. Flushing with cyanosis.
 2. Diarrhea.
 3. Borborygmi.
- Investigations:
 - Focus on urinary serotonin metabolites (5-HIAA) for carcinoid tumors.
 - Imaging for adenocarcinoma should be part of a broader cancer workup similar to colorectal carcinoma.
- Treatment Approach:
 - Know the size cutoffs (2 cm) for surgical decision-making in carcinoid tumors.
 - Hemicolectomy is a shared treatment for both advanced carcinoid tumors and adenocarcinoma.

Summary

APPENDICITIS



Quiz

1. Which of the following statements is false?

- A The appendicular artery arises from the right colic artery.
- B The commonest position of the appendix is retrocaecal.
- C The position of the base of the appendix is constant.
- D The submucosa is rich in lymphoid aggregates.
- E Argentaffin cells are found in the base of the crypts.

2. Which of the following statements are true?

- A The peak incidence of acute appendicitis is in the teens and early 20s.
- B The incidence of acute appendicitis is lowest in those who have a high intake of dietary fibre.
- C Obstruction of the appendix lumen by a caecal carcinoma may give rise to acute appendicitis.
- D Aerobic and anaerobic organisms are responsible for acute appendicitis.
- E A mucocoele of the appendix is a clinical variation of acute appendicitis.

3. Which of the following types of patients do not have an increased risk of perforation?

- A Extremes of age
- B Immunosuppressed
- C Diabetes mellitus
- D Pelvic position of appendix
- E Obese patient.

4. Which of the following is not a sign of acute appendicitis?

- A Rovsing's sign
- B Pointing sign
- C Obturator sign
- D Psoas sign
- E Murphy's sign.

5. Which of the following statements are true in acute appendicitis?

- A Perforation is more common in acute obstructive appendicitis than in acute catarrhal appendicitis.
- B Acute appendicitis in pregnancy will result in fetal loss in 3-5 per cent.
- C An Alvarado score of 7 or more is suggestive of the diagnosis.
- D Routine use of contrast-enhanced CT scan will reduce the incidence of removal of a normal appendix.
- E Cancer of the caecum may masquerade as acute appendicitis.

6. In children, which of the following is not part of the differential diagnosis of acute appendicitis?

- A Gastroenteritis
- B Mesenteric adenitis
- C Meckel's diverticulitis
- D Intussusception
- E Urinary tract infection
- F Lobar pneumonia.

7. In the adult male, which of the following is not part of the differential diagnosis of acute appendicitis?

- A Regional ileitis
- B Ureteric colic
- C Perforated peptic ulcer
- D Acute pancreatitis
- E Torsion of testis
- F Mesenteric cyst.

8. In the adult female, which of the following is not part of the differential diagnosis of acute appendicitis?

- A Mittelschmerz
- B Pelvic inflammatory disease
- C Pyelonephritis
- D Biliary colic/acute cholecystitis
- E Ruptured ectopic pregnancy
- F Torsion or ruptured ovarian cyst.

9. In the elderly, which of the following is not part of the differential diagnosis of acute appendicitis?

- A Diverticulitis
- B Intestinal obstruction
- C Mesenteric infarction
- D Leaking abdominal aortic aneurysm
- E Carcinoma of the caecum
- F Bladder calculus.

Answers:

1. A

The appendicular artery arises from the lower branch of the ileocolic artery.

2. A, B, C, D

A mucocele is not a variation of acute appendicitis. It occurs when acute inflammation of the appendix resolves. This causes the appendix to distend with mucus, resulting in a mucocele.

3. E

The obese patient will have ample greater omentum. This will help localise the acutely inflamed appendix and reduce the risk of perforation.

4. E

Murphy's sign is found in acute cholecystitis

5. A, B, C, E

Contrast-enhanced CT scan is not used routinely. Selective use, particularly in an equivocal Alvarado score of 5-6, helps to exclude acute appendicitis and thus prevents an unnecessary appendicectomy.

6. E

7. F

8. D

9. F

Choose and match the correct diagnoses with each of the scenarios given below:

1 A 25-year-old female complains of severe pain in her central lower abdomen of 4 h duration. It started with some initial discomfort around her suprapubic area. She feels faint and is very thirsty. She is not sure about her last menstrual period and is on the oral contraceptive pill (OCP). On examination she is in agony, looks pale and is cold, clammy and sweaty. She is afebrile and has marked tenderness, rigidity and rebound tenderness over her entire lower abdomen. She has some discoloration around her umbilicus.

2 A 35-year-old female complains of colicky pain in the right iliac fossa for the last 6 h. In between the attacks she is left with a dull ache. She has vomited a few times and feels feverish. In the past she has had diarrhoea on and off for almost a year. On examination she has a temperature of 38°C, is in discomfort from her pain and has tenderness, rigidity and minimal rebound tenderness in the right iliac fossa.

3 A 40-year-old male complains of pain in his right iliac fossa over the last 2 days. His pain in the right iliac fossa was preceded by a bout of sudden-onset severe epigastric and right upper quadrant pain 3 days ago that lasted for a few hours. This initial pain subsided with some antacids which he has been taking on and off for 'indigestion' for almost 18 months. On examination he is febrile (39°C) and very tender and rigid over the right iliac fossa.

4 An 18-year-old female complains of generalised colicky abdominal pain for about 6 h. She feels unwell, has vomited a couple of times and is anorexic. The pain has shifted to the right iliac fossa. On examination she has fever of 38°C, is tender over the right iliac fossa with rigidity and has rebound tenderness.

5 A 28-year-old female complains of sudden onset of severe right-sided abdominal pain which she is unable to localise. She is in agony, writhing around and cannot find a comfortable position in which to get any relief from her pain. She has some straining. On examination she is tender all over the right side of her abdomen with some rigidity but no rebound. On percussion there is a tympanic note.

6 A 22-year-old female patient complains of pain in the right iliac fossa. The pain started suddenly and has spread all over the lower abdomen. Her last menstrual period was 2 weeks ago. On examination she looks slightly pale, afebrile and is tender with rigidity and rebound tenderness in the right iliac fossa.

7 A 60-year-old male patient complains of pain in his right iliac fossa of 24 h duration. The pain has been constant in the right iliac fossa. He has felt unwell for a few months, being unduly short of breath during his normal activities. On examination he looks pale and is tender with rigidity and rebound tenderness in the right iliac fossa.

Answers:

1- Ruptured ectopic pregnancy.

This is a young female who is unsure about her menstrual periods. She has had a sudden onset of very severe lower abdominal pain and has presented with features of hypovolaemic shock. Although she is on the OCP, the clinical picture is typical, particularly with Cullen's sign (bloodstained discoloration around the umbilicus), of a ruptured ectopic pregnancy.

2- Crohns disease

This female patient complains of colicky right-sided abdominal pain from the start, denoting an obstructive feature. Her past history of diarrhoea should alert one to the possibility of primary ABDOMINAL bowel pathology. She is generally feeling unwell with acute signs in the right iliac fossa. These features should point to a diagnosis of acute terminal ileitis from Crohn's disease.

3-Perforated Ulcer

This patient who has suffered from indigestion in the past, for which he has taken antacids, has had a sudden attack of epigastric and right hypochondrial pain from a leaking peptic ulcer. This pain was thought by the patient to be an acute episode of his indigestion for which he tried to get relief by taking some more antacids. However, he did not get better and has come in with signs of peritonitis in the right iliac fossa. This scenario is typical of a leaking peptic ulcer that has been closed off by omentum and the leaked contents have gravitated to the right iliac fossa along the right paracolic gutter, mimicking acute appendicitis.

4- acute Apendicities

This 18-year-old female has the classical features of acute appendicitis. The clinical examination is in keeping with her history of visceral-somatic sequence of pain. When asked to point to the site of her pain, she would almost certainly point to where the pain started (periumbilical) and where it subsequently moved (right iliac fossa).

5- Right uretric colic

This young man has sudden onset of severe right-sided abdominal pain which he is unable to localise. He is in agony and writhing around in pain, unable to find a position of comfort. Abdominal examination shows a tympanitic abdomen which is due to ileus, a common accompaniment of ureteric colic.

6- Mittelschmerz

This young woman has developed pain in the right iliac fossa halfway through her menstrual period. She has signs in her lower abdomen of bleeding from a ruptured lutein cyst. The diagnosis is Mittelschmerz.

7- Carcinoma in caecum

This 60-year-old patient has pain and signs of an acute abdominal episode in the right iliac fossa. He has felt short of breath in his daily routine and looks pale – features of anaemic hypoxia. He has signs in the right iliac fossa. The scenario is very typical of a carcinoma of the caecum masquerading as acute appendicitis. It is important to remember that true acute appendicitis will not cause anaemia.

1. A 16-year-old male has a 10-hour history of periumbilical pain and anorexia that is now localized to the right lower quadrant. On examination, he has tenderness medial and superior to the anterior superior iliac spine. Which of the following explains the localized nature of his pain?

- a. Localized ileus from appendiceal inflammation
- b. Inflammation of the visceral peritoneum
- c. Localized pain is unequivocal for perforation
- d. Referred pain from appendiceal inflammation
- e. Irritation of the parietal peritoneum

2. A 30-year-old woman is 24 weeks pregnant and presents with a 5-hour history of abdominal pain. On examination, she has point tenderness over the right iliac fossa. Pelvic examination is normal. Her laboratory examination is remarkable for WBC 14. You suspect a diagnosis of acute appendicitis. What is the next best diagnostic step?

- a. Diagnostic laparoscopy
- b. MRI of the abdomen and pelvis
- c. US of the right iliac fossa
- d. Transvaginal US to monitor the fetus
- e. CT scan of the abdomen and pelvis

3. The patient described above undergoes the appropriate diagnostic workup and acute nonperforated appendicitis is diagnosed. All of the following are part of the management of acute appendicitis in pregnant women EXCEPT :

- a. Tocolytic therapy prior to further treatment to protect the fetus
- b. Intravenous antibiotics
- c. Urgent laparoscopic appendectomy
- d. Urgent open appendectomy
- e. Preoperative bowel rest

4. An 18-year-old female presents to the emergency department for evaluation of right lower quadrant pain that started approximately 1 week ago. Her temperature is 38.3°C and her abdominal examination reveals mild right lower quadrant tenderness. Her labs are significant for WBC 15 and a negative urine pregnancy test. CT imaging shows a 3-cm rim-enhancing fluid collection anterior to the cecum. Which of the following is the most appropriate treatment?

- a. Prescribe 10-day course of oral antibiotics and instruct patient to return in 6 to 8 weeks for interval appendectomy
- b. Admit patient for 10-day course of IV antibiotics and close monitoring
- c. Admit patient for percutaneous drainage of the abscess and antibiotics
- d. Urgent laparoscopic appendectomy with irrigation and drain placement
- e. IV antibiotics and serial CT scans every 24 to 48 hours

5. You are consulted by the emergency department to evaluate a 19-year-old man with acute abdominal pain. The patient reports the pain started around his umbilicus approximately 12 hours ago and is now most severe in the RLQ. You have a high suspicion for acute appendicitis and elect to take this patient to the operating room for laparoscopic appendectomy, foregoing diagnostic imaging. Upon entry into the abdomen, you note the appendix appears grossly normal. However, the cecum and terminal ileum are severely inflamed. The abdomen otherwise looks normal. What is the most appropriate next step?

- a. Continue with appendectomy and refer the patient to a gastroenterologist
- b. Leave the appendix, close the abdomen, and refer the patient to a gastroenterologist
- c. Resect cecum, appendix, and terminal ileum en bloc
- d. Biopsy an area of inflammation and send for frozen section to determine the best surgical option
- e. Biopsy an area of inflammation for pathology and close the abdomen

6. A 45-year-old man presents to the emergency department with right lower quadrant pain, fever, nausea, and anorexia. Given high clinical suspicion for acute appendicitis, the patient is taken immediately to the operating room for a laparoscopic appendectomy. On entry into the abdomen, the appendix is noted to appear normal except for a 3-cm mass at the tip. What is the next best step?

- a. Continue with laparoscopic appendectomy only
- b. Perform right colectomy
- c. Perform right colectomy with removal of at least 30 cm of terminal ileum
- d. Close and refer to medical oncology for neoadjuvant chemotherapy
- e. Close and perform regular CT scans for surveillance

- 1. Answer: e.**
- 2. Answer: c.**
- 3. Answer: a.**
- 4. Answer: c.**
- 5. Answer: b.**
- 6. Answer: b.**

Mini-osce

How is a ruptured appendix diagnosed?

Fever >39°C, high WBC count, rebound tenderness, and periappendiceal fluid collection on ultrasound.

What is the most common cause of emergent abdominal surgery?

Appendectomy for acute appendicitis.

Write features found on US in patient with appendicitis?

- 1) Blind-ending tubular dilated structure >6mm
- 2) Appendicolith with acoustic shadow
- 3) Distinct appendiceal wall layers
- 4) Periappendiceal fluid collection
- 5) Periappendiceal reactive nodal enlargement