SMU BRANCH IN PAVLODAR

Topic: Clinical anatomy and operative surgery of appendicitis. Localization variability of the appendix.

Prepared by: student of 712 group
Ismagulova Zamira
Checked by: A.V. Shtukert

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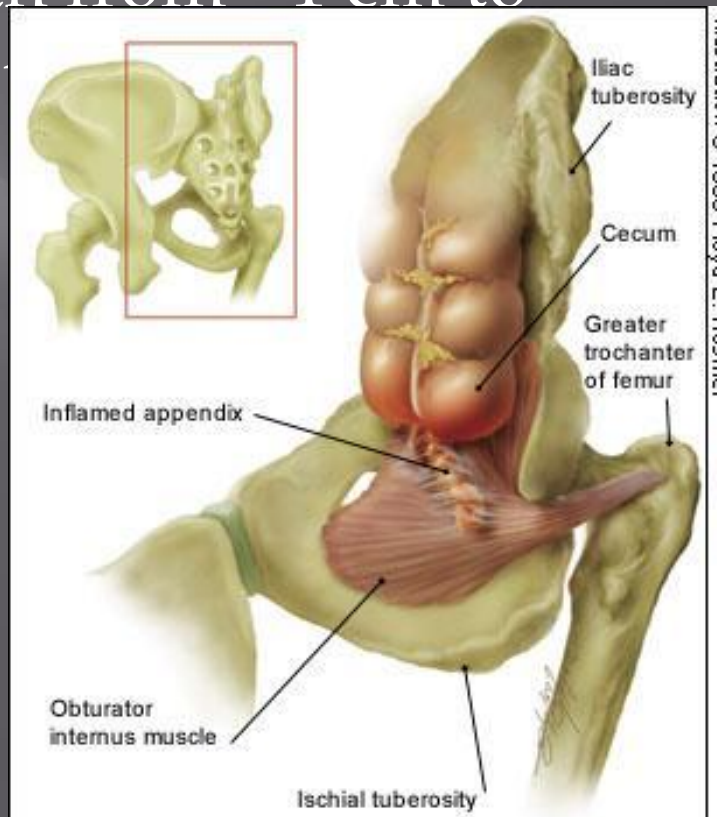
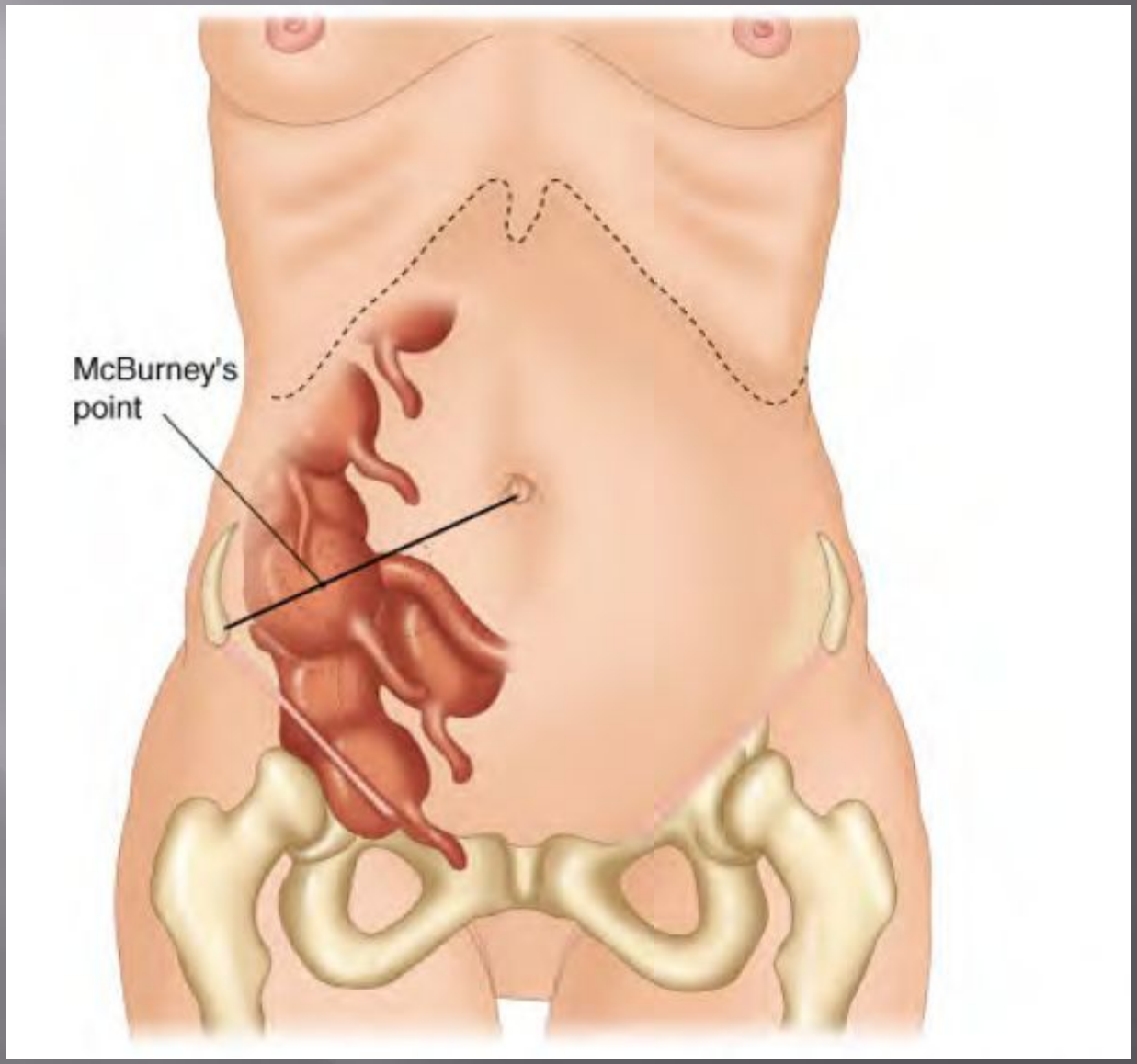
ACUTE APPENDICITIS

- Appendicitis is defined as an inflammation of the inner lining of the vermiform appendix that spreads to its other parts. This condition is a common and urgent surgical illness with protean manifestations, generous overlap with other clinical syndromes, and significant morbidity, which increases with diagnostic delay.

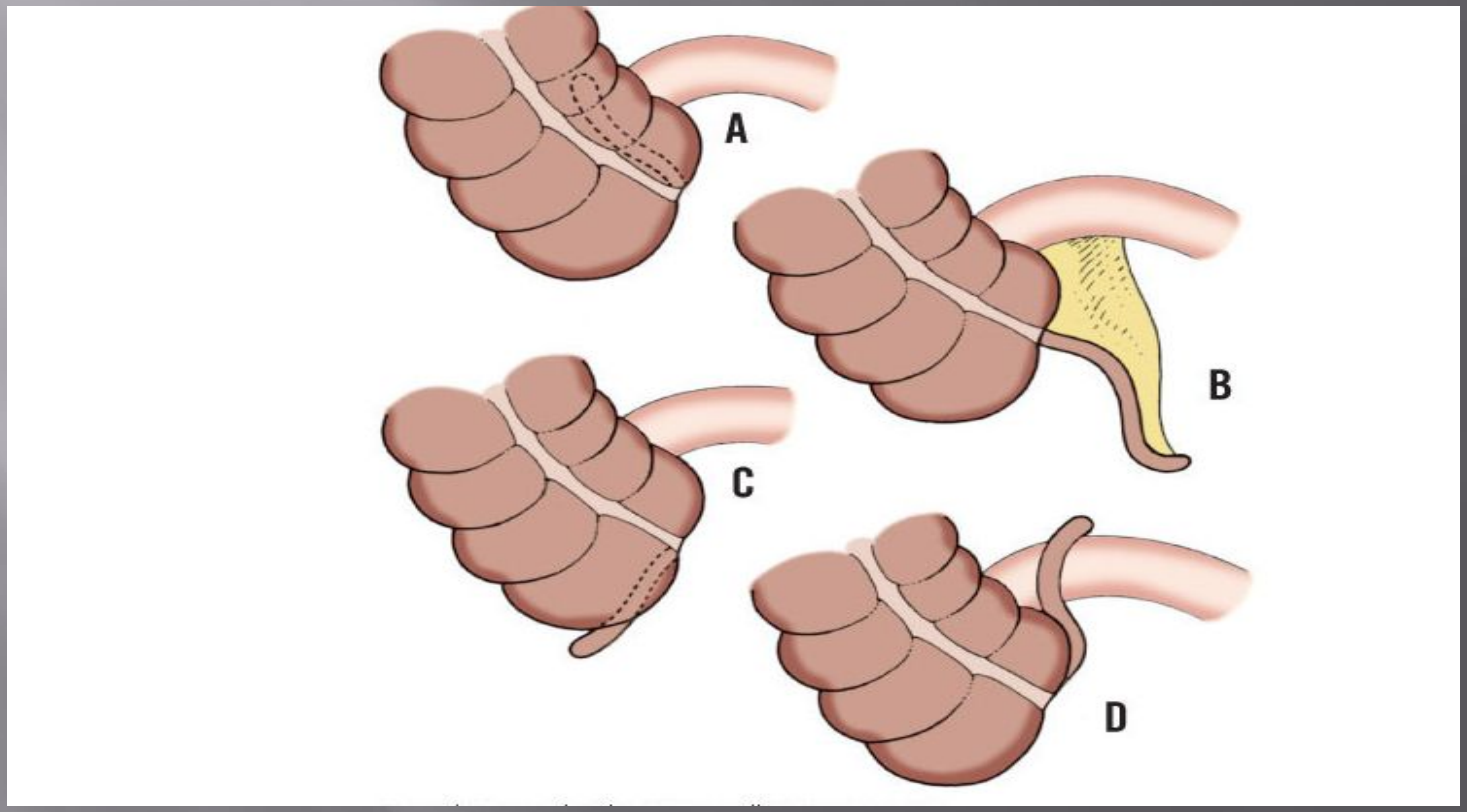
Anatomy

- The three taeniae coli converge at the junction of the cecum with the appendix and can be a useful landmark to identify the appendix.
- The appendix can vary in length from <1 cm to >30 cm; most appendices are 6



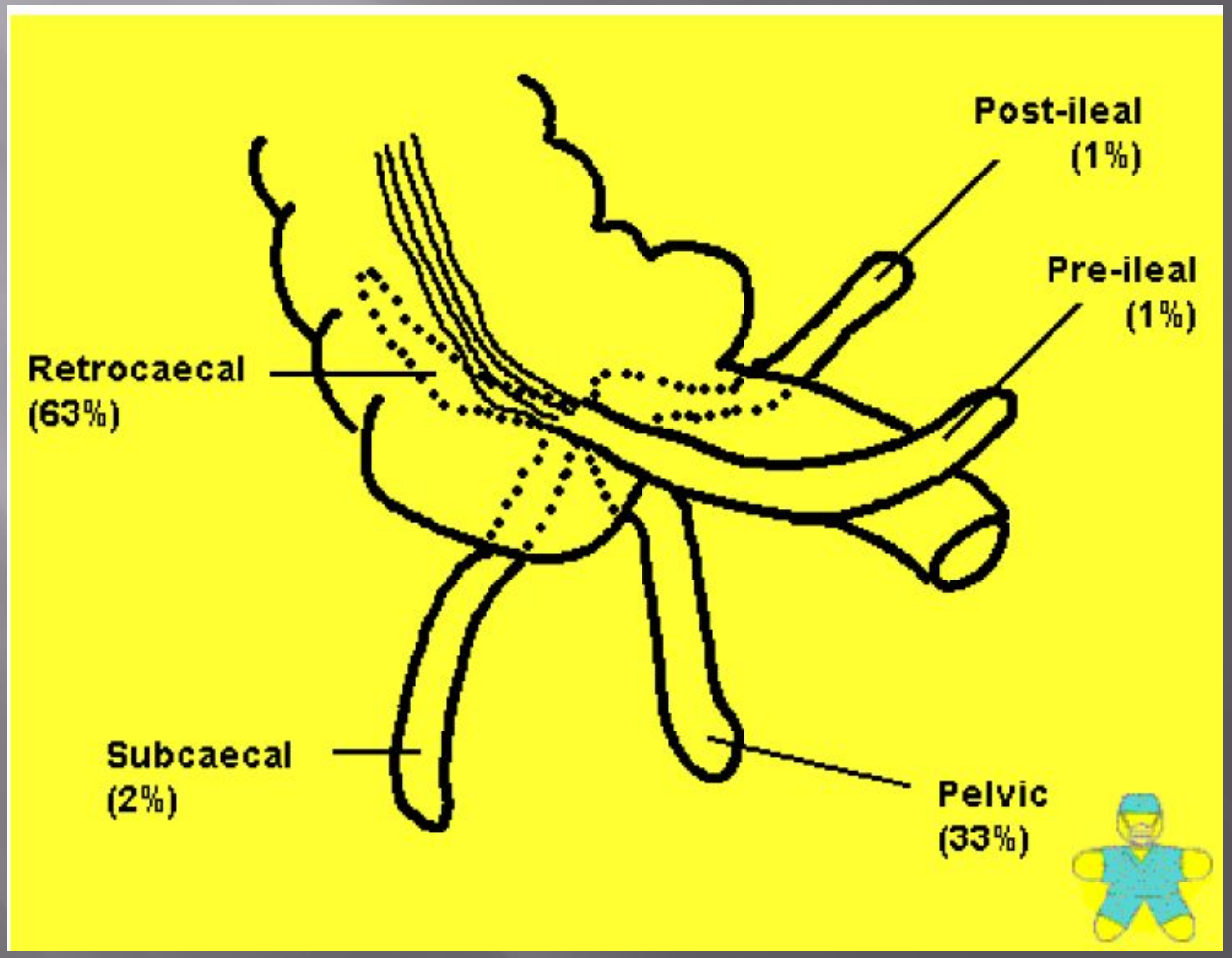

McBurney's
point

Variations in topographic position of the appendix



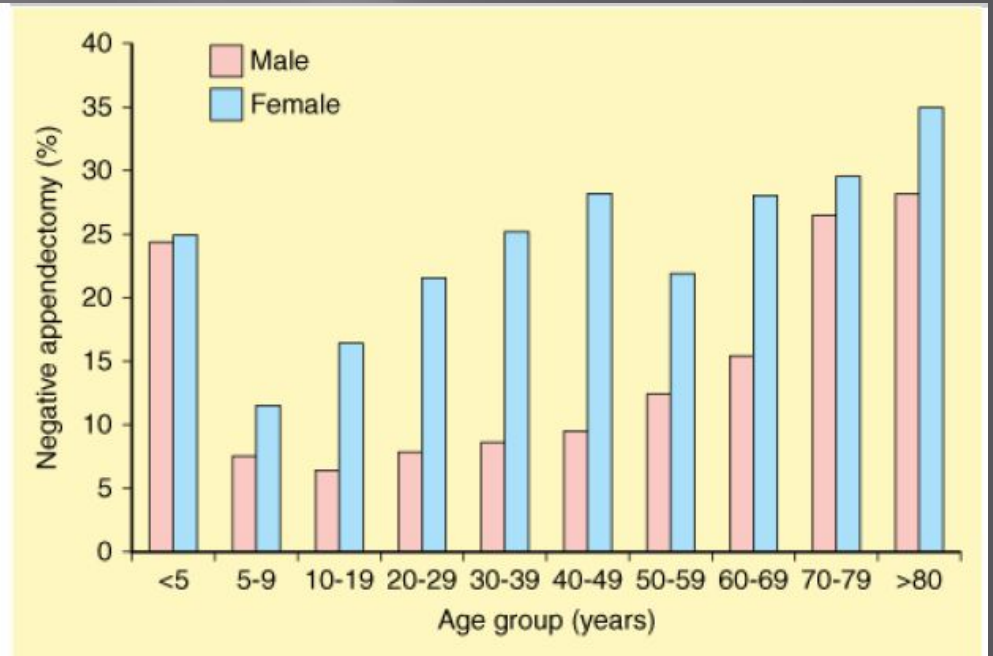
From its base at the cecum, the appendix may extend **(A)** upward, retrocecal and retrocolic; **(B)** downward, pelvic; **(C)** downward to the right, subcecal; or **(D)** upward to the left, ileocecal (may pass anterior or posterior to the ileum)

Surgical Anatomy - Position



Incidence

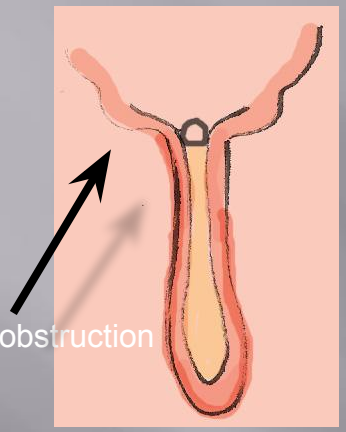
- The lifetime rate of appendectomy is 12% for men and 25% for women, with approximately 7% of all people undergoing appendectomy for acute appendicitis during their lifetim
- Despite the increased use of ultrasonography, computed tomography (CT), and laparoscopy, the rate of misdiagnosis of appendicitis has remained constant (15.3%), as has the rate of appendiceal rupture.
- The percentage of misdiagnosed cases of appendicitis is significantly higher among women than among men



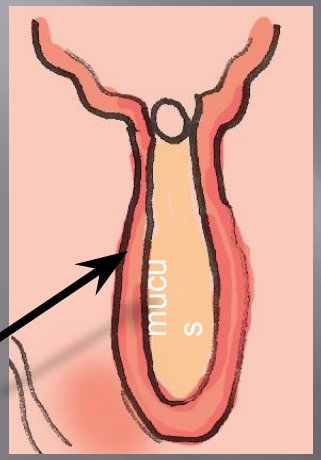
Etiology

- Obstruction of the lumen is the dominant etiologic factor in acute appendicitis.
  - – Faecolith / faecal stasis
  - – Submucosal lymphoid hyperplasia
  - – Inspissated barium
  - – Vegetable/fruit seeds
  - – Worms (Entrobius vermicularis
  - – Tumours of caecum/appendix

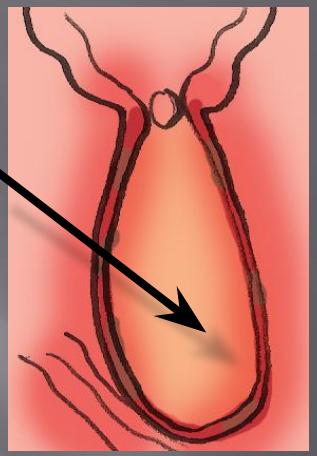
Pictorial Explanation

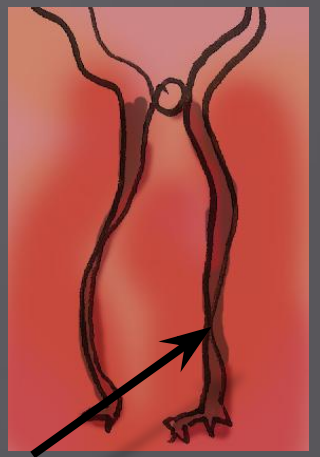


Distention



Distention causing Ischemia





Gangrene

Appendiceal obstruction/early appendicitis – visceral peritoneal irritation	Appendiceal distension	Irritation of parietal peritoneum (localised)	Perforation, localised/generalised peritonitis, mass

Appendix – Normal

Bacteriology

- **Common organisms seen in patients with acute appendicitis**

Gram-negative bacilli
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Escherichia coli
Bacteroides fragilis
Pseudomonas aeruginosa
Other *Bacteroide* s species
Klebsiella species
Fusobacterium species
Gram-positive cocci
Gram-positive cocci
Streptococcus anginosus
Peptostreptococcus species
Other *Streptococcu* s species
Gram-positive bacilli
Enterococcus species
Clostridium species

Symptoms

1-Abdominal pain is the prime symptom of acute appendicitis. Classically, pain is initially diffusely centered in the lower epigastrium or umbilical area, is moderately severe, and is steady, sometimes with intermittent cramping superimposed.
After a period varying from 1 to 12 hours, but usually within 4 to 6 hours, the pain localizes to the right lower quadrant

2-Anorexia nearly always accompanies appendicitis. It is so constant that the diagnosis should be questioned if the patient is not anorectic.

3-vomiting occurs in nearly 75% of patients

4-obstipation beginning before the onset of abdominal pain

The sequence of symptom appearance has great significance for the differential diagnosis. In >95% of patients with acute appendicitis, anorexia is the first symptom, followed by abdominal pain, which is followed, in turn, by vomiting (if vomiting occurs). If vomiting precedes the onset of pain, the diagnosis of appendicitis should be questioned.

signs

-Temperature elevation is rarely >1°C

-Pulse rate is normal or slightly elevated

-Tenderness often is maximal at or near the McBurney point

-Direct rebound tenderness

-indirect rebound tenderness

-The Rovsing sign—pain in the right lower quadrant when palpatory pressure is exerted in the left lower quadrant

-Muscular resistance to palpation of the abdominal wall roughly parallels the severity of the inflammatory process

-psoas sign - indicates an irritative focus in proximity to that muscle

-obturator sign of hypogastric pain on stretching the obturator internus indicates irritation in the pelvis. The test is performed by passive internal rotation of the flexed right thigh with the patient supine.

LABORATORY FINDINGS

Mild leukocytosis, ranging from 10,000 to 18,000 cells/mm3, usually is present in patients with acute, uncomplicated appendicitis and often is accompanied by a moderate polymorphonuclear predominance. White blood cell counts are variable,however. It is unusual for the white blood cell count to be >18,000 cells/mm3 in uncomplicated appendicitis. White blood cell counts above this level raise the possibility of a perforated appendix with or without an abscess.

Urinalysis can be useful to rule out the urinary tract as the source of infection

Imaging Studies

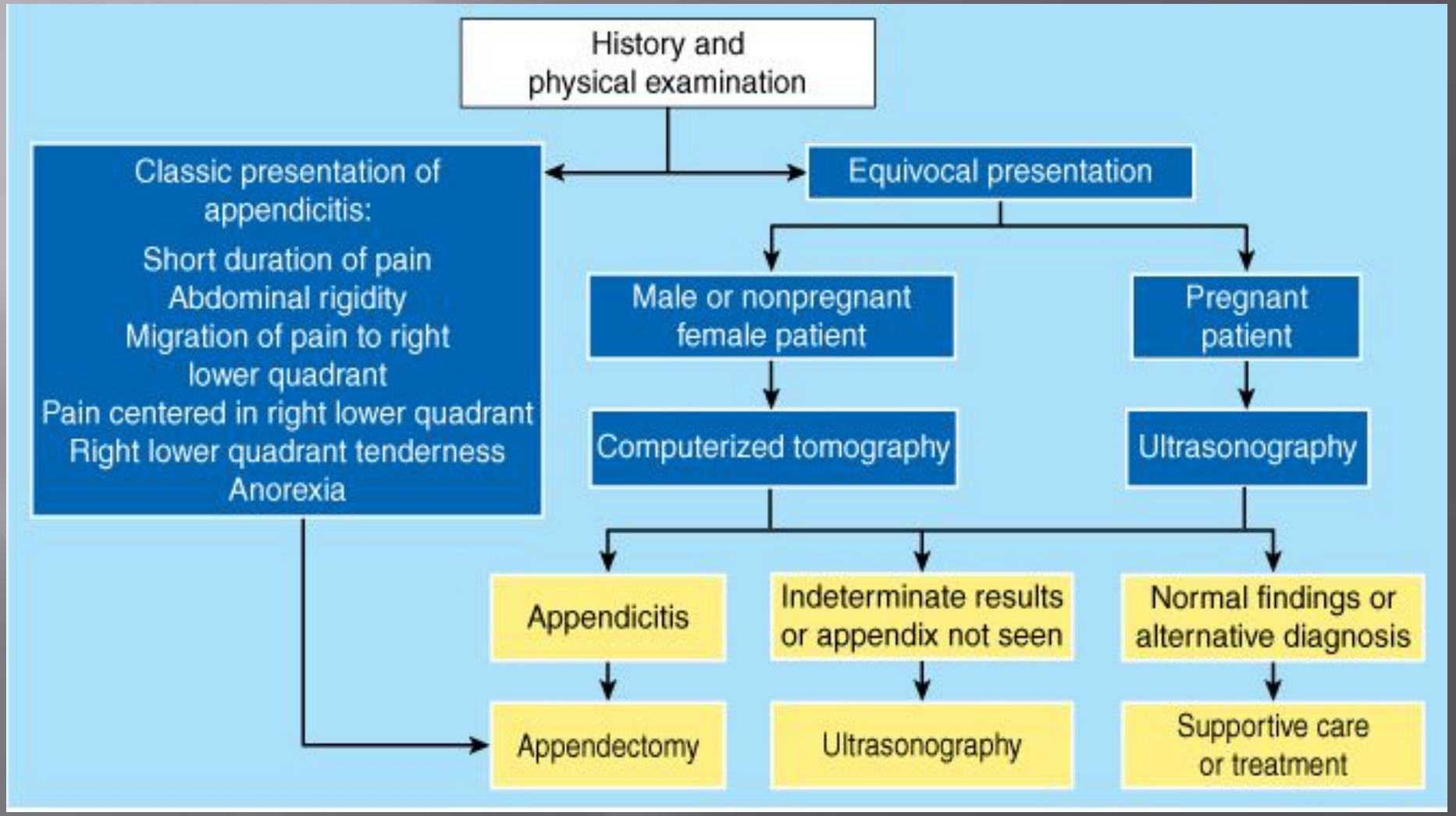
In patients with acute appendicitis, one often sees an abnormal bowel gas pattern, which is a nonspecific finding

Graded compression sonography has been suggested as an accurate way to establish the diagnosis of appendicitis. The technique is inexpensive, can be performed rapidly, does not require a contrast medium, and can be used even in pregnant patients. Sonographically, the appendix is identified as a blind-ending, nonperistaltic bowel loop originating from the cecum.
With maximal compression, the diameter of the appendix is measured in the anteroposterior dimension. Scan results are considered positive if a noncompressible appendix ≥6 mm in the anteroposterior direction is demonstrated (Fig. 30-3). The presence of an appendicolith establishes the diagnosis. Thickening of the appendiceal wall and the presence of periappendiceal fluid is highly suggestive.

Alvarado Scale for the Diagnosis of Appendicit

	Manifestations	Value
Symptoms	Migration of pain	1
	Anorexia	1
	Nausea and/or vomiting	1
Signs	Right lower quadrant tenderness	2
	Rebound	1
	Elevated temperature	1
Laboratory values	Leukocytosis	2
	Left shift in leukocyte count	1

Clinical algorithm for suspected cases of acute appendicitis



Appendiceal Rupture

Immediate appendectomy has long been the recommended treatment for acute appendicitis because of the presumed risk of progression to rupture. The overall rate of perforated appendicitis is 25.8%. Children <5 years of age and patients >65 years of age have the highest rates of perforation (45 and 51%, respectively)
delays in presentation are responsible for the majority of perforated appendices.

Appendiceal rupture occurs most frequently distal to the point of luminal obstruction along the antimesenteric border of the
appendix. Rupture should be suspected in the presence of fever with a temperature of >39°C (102°F) and a white blood cell
count of >18,000 cells/mm3

Differential Diagnosis

The differential diagnosis of acute appendicitis depends on four major factors: the anatomic location of the inflamed appendix; the stage of the process (i.e., simple or ruptured); the patient's age; and the patient's sex

1-ACUTE MESENTERIC ADENITIS

2-Pelvic Inflammatory Disease

3-Ruptured Graafian Follicle

4-Twisted Ovarian Cyst

5-Ruptured Ectopic Pregnancy

6-ACUTE GASTROENTERITIS

7-Meckel's Diverticulitis

8-Crohn's Enteritis

9-Colonic Lesions

Treatment

Once the decision to operate for presumed acute appendicitis has been made, the patient should be prepared for the operating room. Adequate hydration should be ensured, electrolyte abnormalities should be corrected, and pre-existing cardiac, pulmonary, and renal conditions should be addressed. A large meta-analysis has demonstrated the efficacy of preoperative antibiotics in lowering the infectious complications in appendicitis.

Most surgeons routinely administer antibiotics to all patients with suspected appendicitis

Appendetomy :

1-open appendetomy

2-Laparoscopic appendetomy

Open appendetomy

- For open appendectomy most surgeons use either a McBurney (oblique) or Rocky-Davis (transverse) right lower quadrant muscle-splitting incision in patients with suspected appendicitis. The incision should be centered over either the point of maximal tenderness or a palpable mass

Laparoscopic appendetomy

- Laparoscopic appendectomy usually requires the use of three ports. Four ports may occasionally be necessary to mobilize a retrocecal appendix. The surgeon usually stands to the patient's left. One assistant is required to operate the camera. One trocar is placed in the umbilicus (10 mm), and a second trocar is placed in the suprapubic position. Some surgeons place this second port in the left lower quadrant. The suprapubic trocar is either 10 or 12 mm, depending on whether or not a linear stapler will be used.
- The placement of the third trocar (5 mm) is variable and usually is either in the left lower quadrant, epigastrium, or right upper quadrant.

LA	OA
Decreased wound infection rate	Cheaper
Earlier return to normal life	Shorter operating time
Shorter Hospital stay	
Can assess the rest of the abdominal cavity with ease	
? Associated with increased intra-abdominal infections	
More beneficial in obese, females and employed pts	

Prognosis

- The mortality from appendicitis in the United States has steadily decreased from a rate of 9.9 per 100,000 in 1939 to 0.2 per 100,000 today. Among the factors responsible are advances in anesthesia, antibiotics, IV fluids, and blood products. Principal factors influencing mortality are whether rupture occurs before surgical treatment and the age of the patient. The overall mortality rate in acute appendicitis with rupture is approximately 1%. The mortality rate of appendicitis with rupture in the elderly is approximately 5%—a fivefold increase from the overall rate. Death is usually attributable to uncontrolled sepsis peritonitis, intra-abdominal abscesses, or gram-negative septicemia. Pulmonary embolism continues to account for some deaths.

Thanks for your attention

PRESENTED BY:
FARZANEH SHISHEHBOR