DISEASES OF THE APPENDIX

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Learning objectives:

To understand:

- The aetiology and surgical anatomy of acute appendicitis
- The clinical signs and differential diagnoses of appendicitis
- The management of postoperative problems
- Basic surgical techniques, both open and laparoscopic
- Less common conditions occasionally encountered

Lecture outlines:

1. Anatomy
2. Acute appendicitis
3. Recurrent acute appendicitis
4. Neoplasms of the appendix

Introduction

- The vermiform appendix is considered by most to be a vestigial organ.
- Its importance in surgery results only from its propensity for inflammation, which results in the clinical syndrome known as acute appendicitis.
- Acute appendicitis is the most common cause of an ‘acute abdomen’ in young adults.
- the diagnosis of appendicitis remains essentially clinical, requiring a mixture of observation, clinical acumen and surgical science.

Anatomy of the appendix

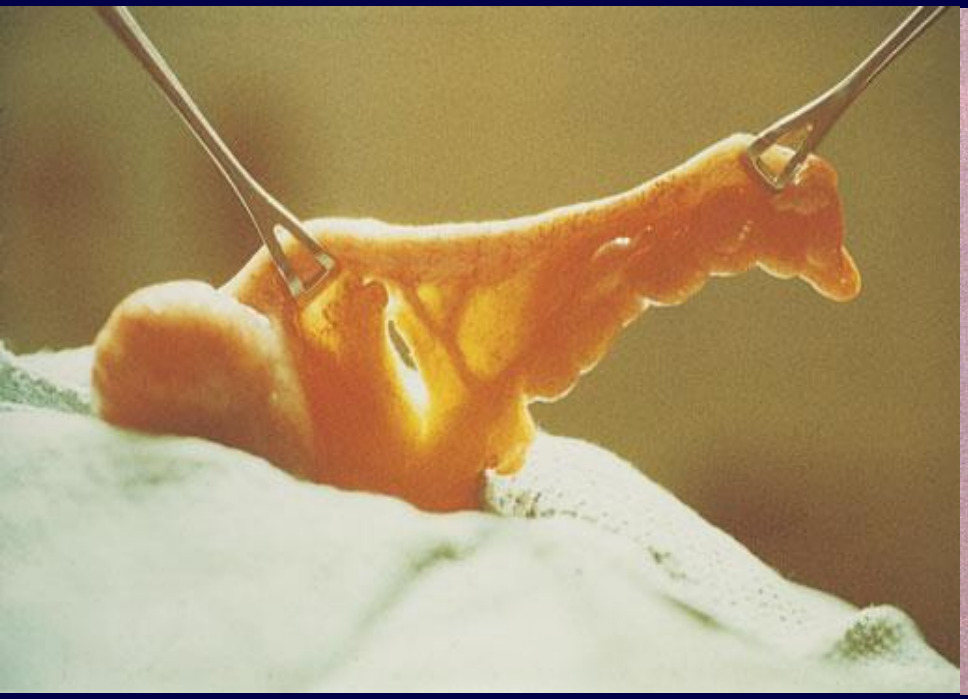
Embryology
- normal developement
- maldescendent caecum
- malrotation of the intestine

Appendix

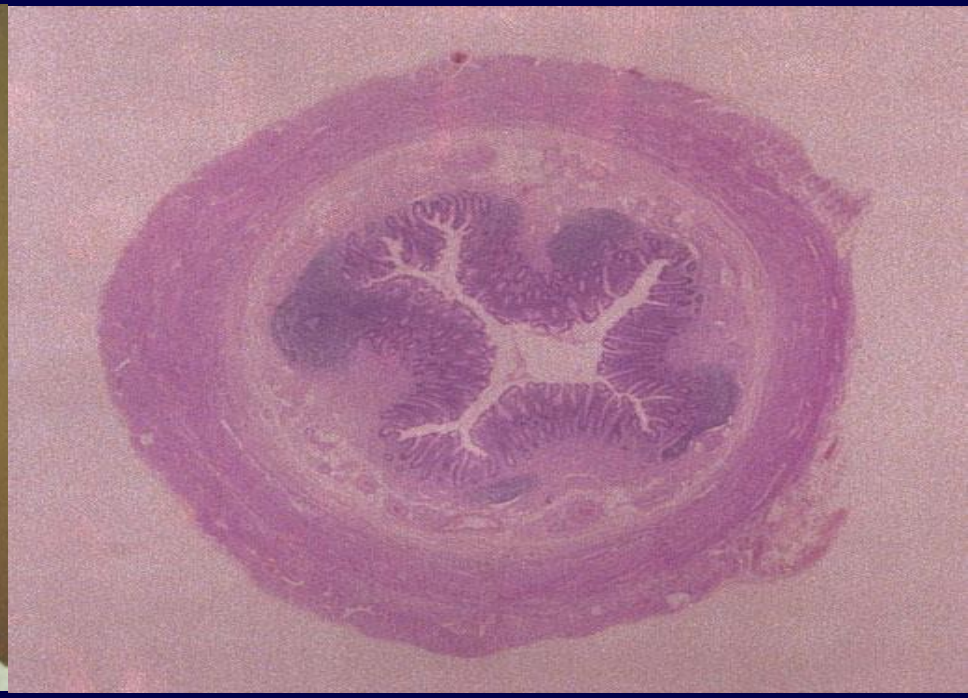
Mesoappendix

Appendicular artery

Anatomy of the appendix



Appendicular artery



Microanatomy

Acute appendicitis

- ✓ Incidence of appendectomy in males is 8.6%
- ✓ Incidence of appendectomy in females is 6.7%
- ✓ Incidence of acute appendicitis according to age groups and sex

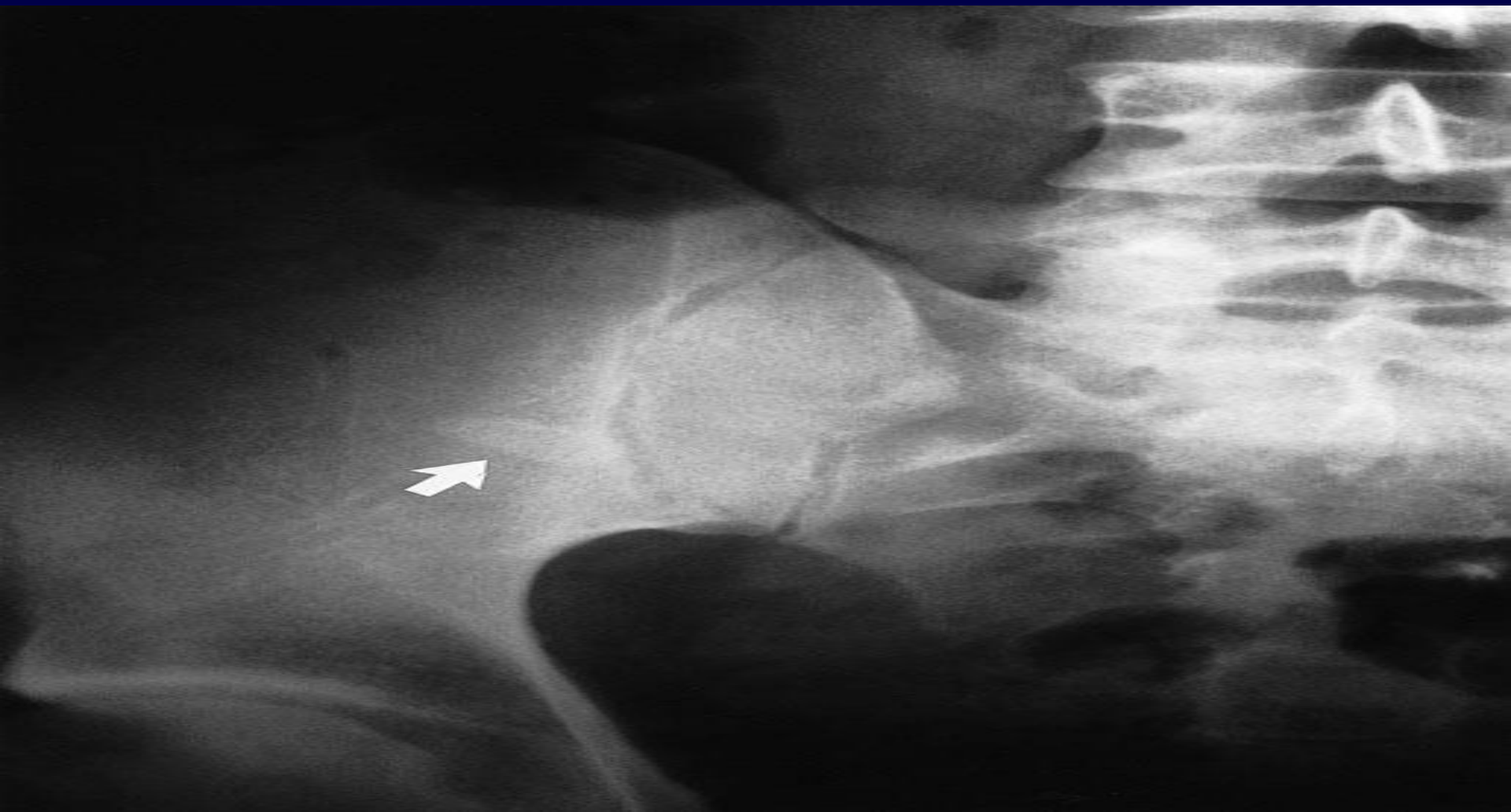
Acute appendicitis

Aetiology

- ✓ more in low fiber diet although it had been decreasing in western society
- ✓ mixed aerobic and anaerobic bacteria
- ✓ obstruction whether by faecolith or stricture
- ✓ A faecolith is composed of inspissated faecal material, calcium phosphates, bacteria and epithelial debris and rarely foreign body in it
- ✓ A fibrotic stricture of the appendix usually indicates previous appendicitis that resolved without surgical intervention
- ✓ carcinoma of the caecum, is an occasional cause of acute appendicitis in middle-aged and elderly patients.
- ✓ Intestinal parasites, particularly Oxyuris vermicularis (pinworm)

Acute appendicitis

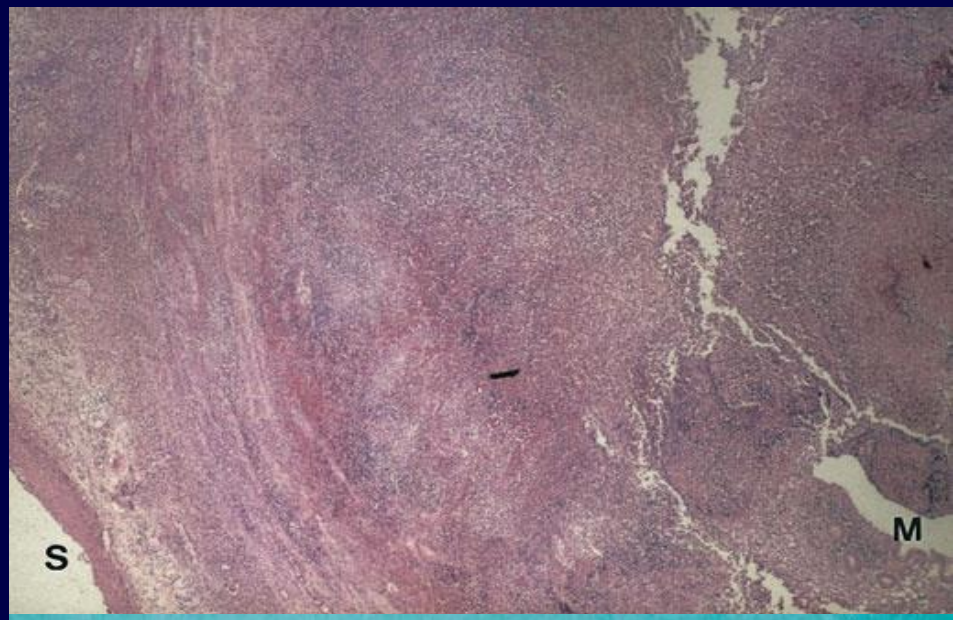
Aetiology

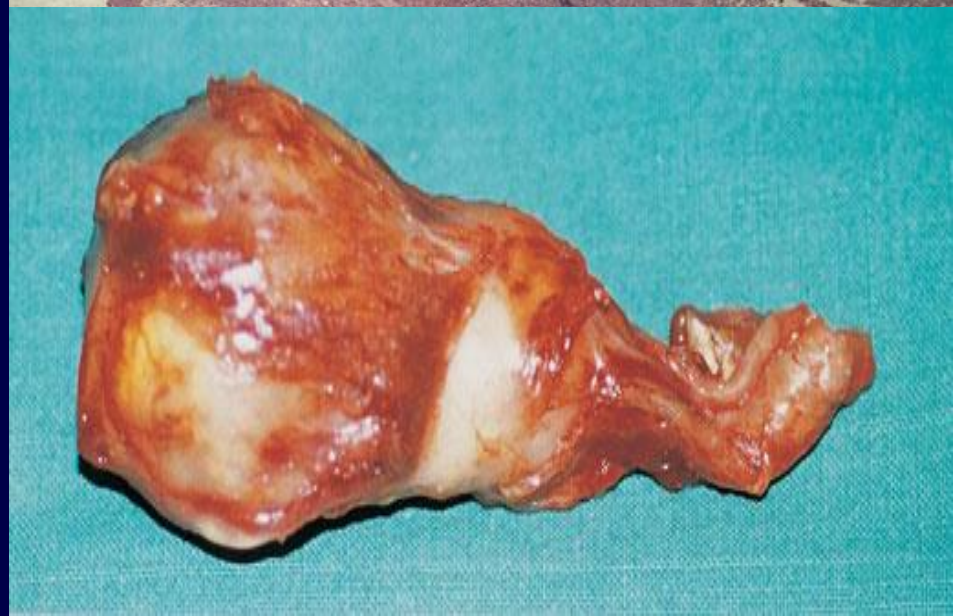


Acute appendicitis

Pathology

- ✓ with or wiyhout obstruction
- ✓ in children and young adult incidence suggest infective agent as viral
- ✓ seasonal variation
- ✓ reversible by conservative treatment if inflammation reaches the mucosa and submucosa
- ✓ irreversible if inflammation reaches muscularis propria
- ✓ Rarely it resolves leaving a mucocele of the appendix
- ✓ venous obstruction lead to gangrene
- ✓ extremes of age, immunosuppression, diabetes mellitus ,faecolith obstruction of the appendix lumen, a free-lying pelvic appendix and previous abdominal surgery all can excacerbate this process





Acute appendicitis

Clinical diagnosis : symptoms

- ✓ Periumbilical colic

  Shifting pain excacerbated by coughing and sudden movement

  Anorexia specially in children

  Nausea with once or twice vomiting

  Recurrent attacks

  Family history
- ✓ Atypical presentation in 50% of cases as elderly and pelvic appendicitis
- ✓ Temp. 37.2°C-37.7°C PR 80-90 beats /min. After > 6 hours
- ✓ In children temp. >39.5°c suggest other pathology as mesenteric lymphadenitis
- ✓ Acute catarrhal (non-obstructive) appendicitis and acute obstructive appendicitis

Acute appendicitis

Clinical diagnosis : signs are more important

- ✓ Pyrexia
- ✓ Localised tenderness in the right iliac fossa
- ✓ Muscle guarding
- ✓ Rebound tenderness
- ✓ Pointing sign
- ✓ Rovsing's sign
- ✓ Psoas sign
- ✓ Obturator sign

Acute appendicitis

Clinical diagnosis : Special features, according to position of the appendix

- ✓ Retrocecal: absent abdominal wall tenderness and guarding
  right loin deep tenderness and guarding of quadratus lumborum
  psoas sign positive
- ✓ Pelvic: Diarrhoea
  Absent abdominal guarding and tenderness
  Rt. Suprapubic tenderness
  Tenderness on PR examination
  Psoas and obturator signs positive
  Frequency of micturition
- ✓ Postileal: Diarhoea
  Retching
  No pain shift
  tenderness if present is ill-defined

Acute appendicitis

Clinical diagnosis : Special features, according to age

- ✓ Infants : Rare under 36 months
  Delayed diagnosis
  More postoperative complications like diffused peritonitis
- ✓ Children : Vomiting common
  Complete avertion to food
- ✓ Elderly : More complications
  Mimic subacute intestinal obstruction
  More mortality because of coincident medical condition
- ✓ Obese : Obscure all local signs
  Delay diagnosis
- ✓ Pregnancy : Diagnosis is complicated by delay in presentation
  pain in the right lower quadrant of the abdomen
  remains the cardinal feature of appendicitis in pregnancy.
  Fetal loss occurs in 3–5% of cases, increasing to 20% if perforation is found at operation.

Acute appendicitis

Differential diagnosis

CHILDREN	ADULT	ADULT FEMALE	ELDERLY
Gastroenteritis	Regional enteritis	Mittelschmerz	Diverticulitis
Mesenteric adenitis	Ureteric colic	Pelvic inflammatory disease	Intestinal obstruction
Meckel's diverticulitis	Perforated peptic ulcer	Pyelonephritis	Colonic carcinoma
Intussusception	Tortion of testis	Ectopioc pregnancy	Tortion appendix epiploicae
Henoch shoenlein purpura	Pancreatitis	Tortion/rupture ovarian cyst	Mesenteric infarction
Lobar pneumonia	Rectus sheath haematoma	Endometriosis	Leaking aotic aneurysm

Acute appendicitis

Rare differential diagnosis

- ✓ Preherpetic pain of the right 10th and 11th dorsal nerves
- ✓ Tabetic crises
- ✓ Spinal conditions
- ✓ The abdominal crises of porphyria and diabetes mellitus
- ✓ Typhlitis or leukaemic ileocaecal syndrome

Acute appendicitis

Investigations

- ✓ *decision to operate based on clinical suspicion alone can lead to the removal of a normal appendix in 15–30% of cases.*
- ✓ Alvarado score
- ✓ Ultrasonography
- ✓ Contrast enhanced CT

Acute appendicitis

The ALVARADO or (MANTRELS) score

SYMPTOMS	SCORE
Migratory RIF pain	1
anorexia	1
Nausea amd vomiting	1
SIGNS	**SCORE**
RIF tenderness	2
Rebound tenderness	1
Elevated temperature	1
LABORATORY	**SCORE**
Leukocytosis	2
Shift to left	1
TOTAL	**10**

Acute appendicitis

Investigations

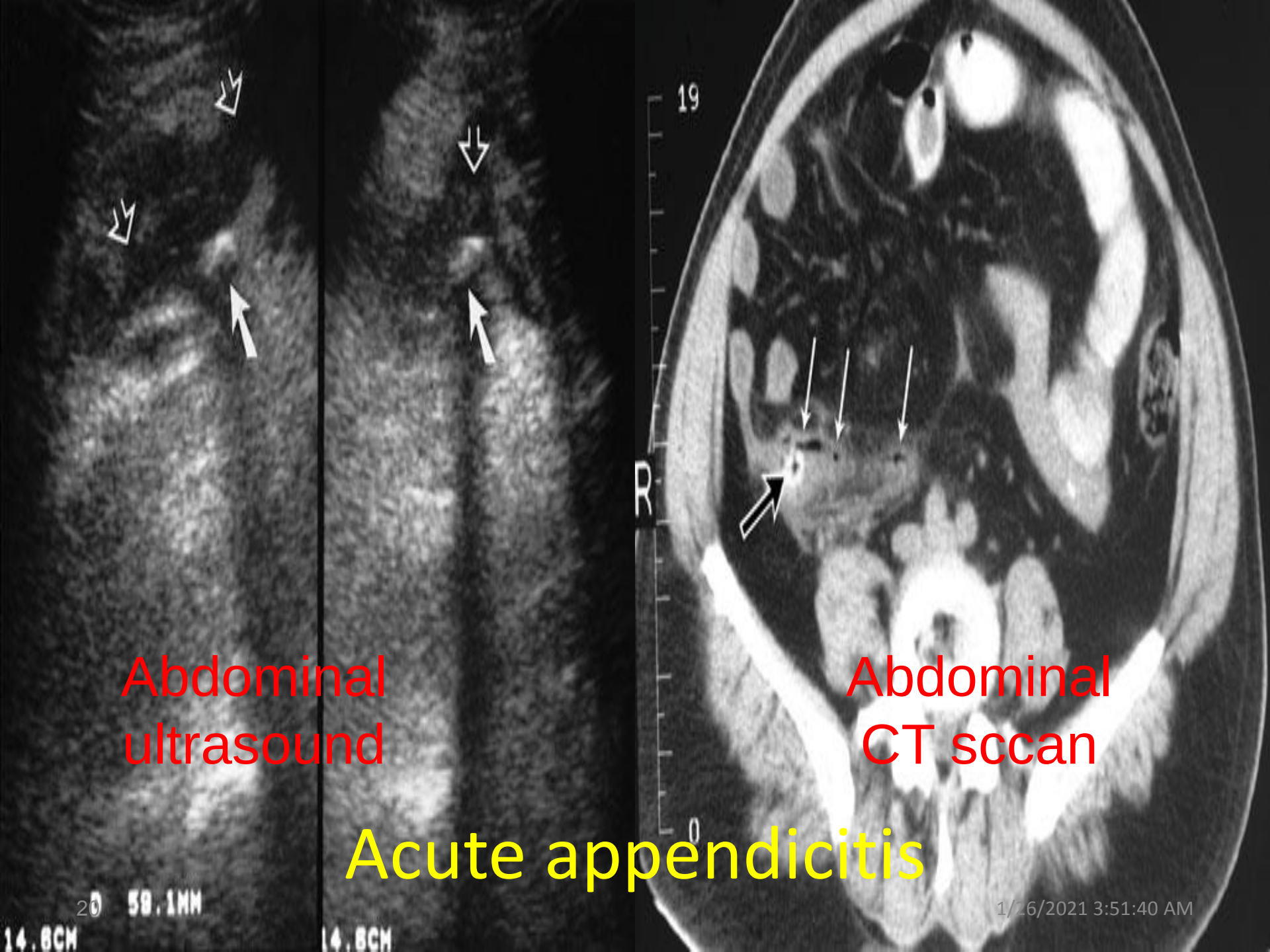
Preoperative investigations in appendicitis

Routine

- ✓ Full blood count
- ✓ Urinalysis

Selective

- ✓ Pregnancy test
- ✓ Urea and electrolytes
- ✓ Supine abdominal radiograph
- ✓ Ultrasound of the abdomen/pelvis
- ✓ Contrast-enhanced CT scan of the abdomen


Abdominal ultrasound
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Acute appendicitis

Treatment

- ✓ Appendectomy
  - Preoperative fluid therapy
  - Antibiotics
  - Antipyeretics
- ✓ Ochsner-sheren regimen for appendicular mass

Acute appendicitis

Treatment

Ochsner-sherren regimen

✓ Conservative

moniter PR and Temp. 4 hourly

abdominal examination

maintain fluid balance intravenously

antibiotics

contrast enhanced CT

Acute appendicitis

Treatment

Ochsner-sherren regimen

Criteria for stopping conservative treatment of an appendix mass

- ✓ A rising pulse rate
- ✓ Increasing or spreading abdominal pain
- ✓ Increasing size of the mass

Acute appendicitis

Treatment

Ochsner-sherren regimen

- ✓ Appendicular abscess found by contrast enhanced CT drained under imaging control and continue the regimen
- ✓ Failure of mass to resolve within 48 hours should suspect carcinoma or crohn's disease
- ✓ The great majority of patient will not have recurrence so interval appendectomy may not be needed after 6-8 weeks

Acute appendicitis

postoperative complications

Check-list for unwell patient following appendicectomy

- ✓ Examine the wound and abdomen for an abscess
- ✓ Consider a pelvic abscess and perform a rectal examination
- ✓ Examine the lungs – pneumonitis or collapse
- ✓ Examine the legs – consider venous thrombosis
- ✓ Examine the conjunctivae for an icteric tinge and the liver for enlargement, and enquire whether the patient has had rigors (pylephlebitis)
- ✓ Examine the urine for organisms (pyelonephritis)
- ✓ Suspect subphrenic abscess
- ✓ Fecal fistula
- ✓ Ileus
- ✓ Adhesive intestinal obstruction

Recurrent acute appendicitis

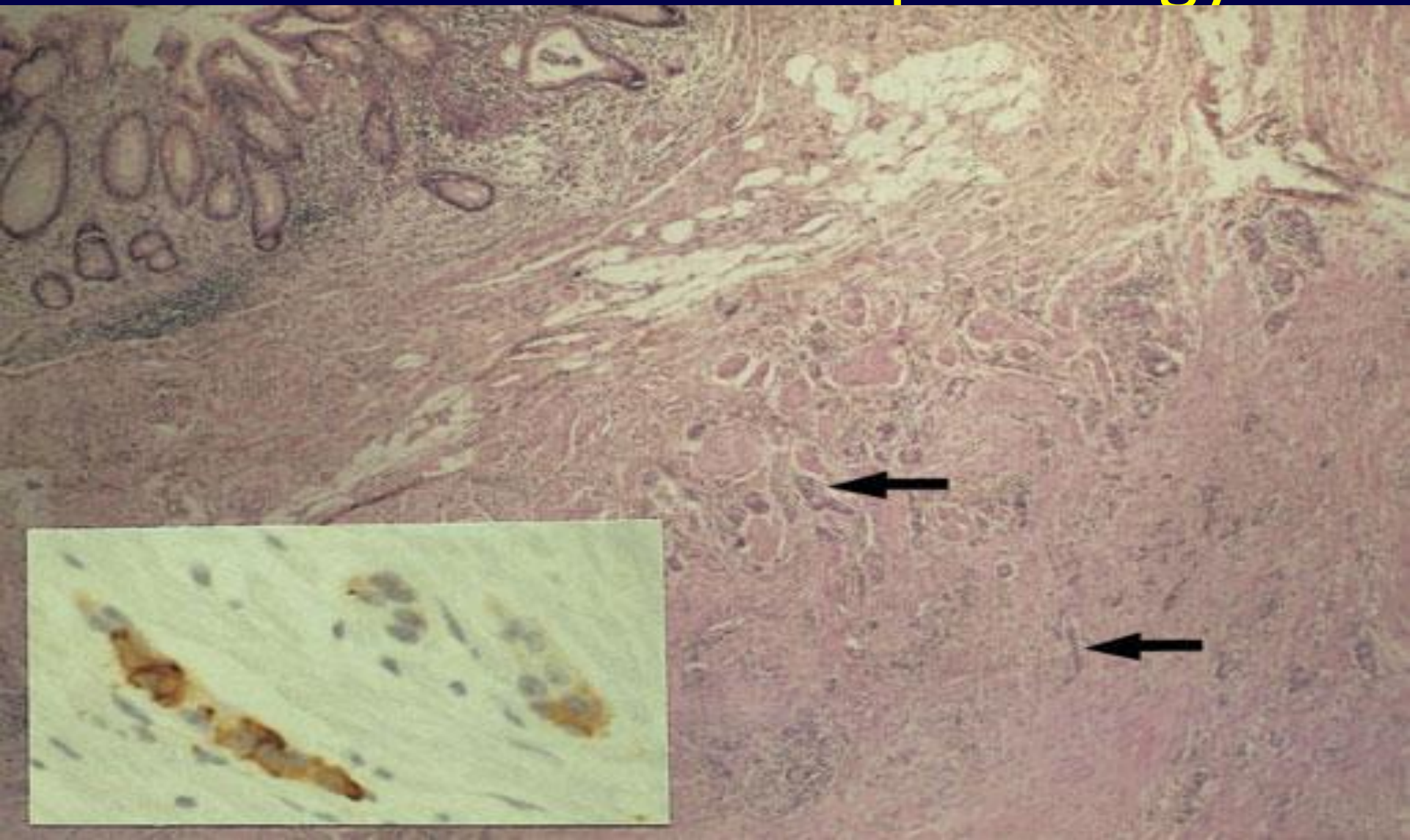
- ✓ Not uncommon
- ✓ The appendix in these cases shows fibrosis indicative of previous inflammation.
- ✓ Chronic appendicitis,per se, does not exist; however, there is evidence of altered neuroimmune function in the myenteric nerves of patients with so called recurrent appendicitis

Neoplasm of the appendix

Carcinoid tumour (synonym: argentaffinoma)

- ✓ Argentaffin tissue (Kulchitsky cells of the crypts of Lieberkühn) and are most common in the vermiform appendix.
- ✓ Mostly present as subacute or recurrent appendicitis
- ✓ Mostly distal in the appendix
- ✓ Macroscopically hard and yellow
- ✓ Microscopically small cells in small nests between the muscles
- ✓ Has characteristic pattern using immunehistochemical stain of chromogranin B
- ✓ In the appendix it rarely metastasize
- ✓ appendectomy usually enough, sometimes right hemicolectomy.

Neoplasm of the appendix
Carcinoid tumour histopathology



Neoplasm of the appendix

Primary adenocarcinoma Rare

Right hemicolectomy

Mucus secreting adenocarcinoma

Seeding the peritioneal cavity with mucus secreting malignant cells (pseudomyxoma peritoneii) mimic ascites,

Treatment by radical resection of peritoneum and intraperitoneal chemoyherapy.

References

1. Bailey & Loves short practice of surgery 25th edition.