Diagnosis and Management of Acute Abdominal Pain

Prof. G. Zuliani

Definition

- Acute Abdominal Pain (AAP):

1. Presentation of previously undiagnosed abdominal pain
2. Lasting < 6 hours

- ***20 to 40% admission rates***
- ***50 to 65% inaccurate initial diagnosis***

- **AAP represent about 5% of E.R. visits**
- **About 10% of malpractice claims !!**

De Dombal FT. Diagnosis of acute abdominal pain. New York: Churchill Livingstone

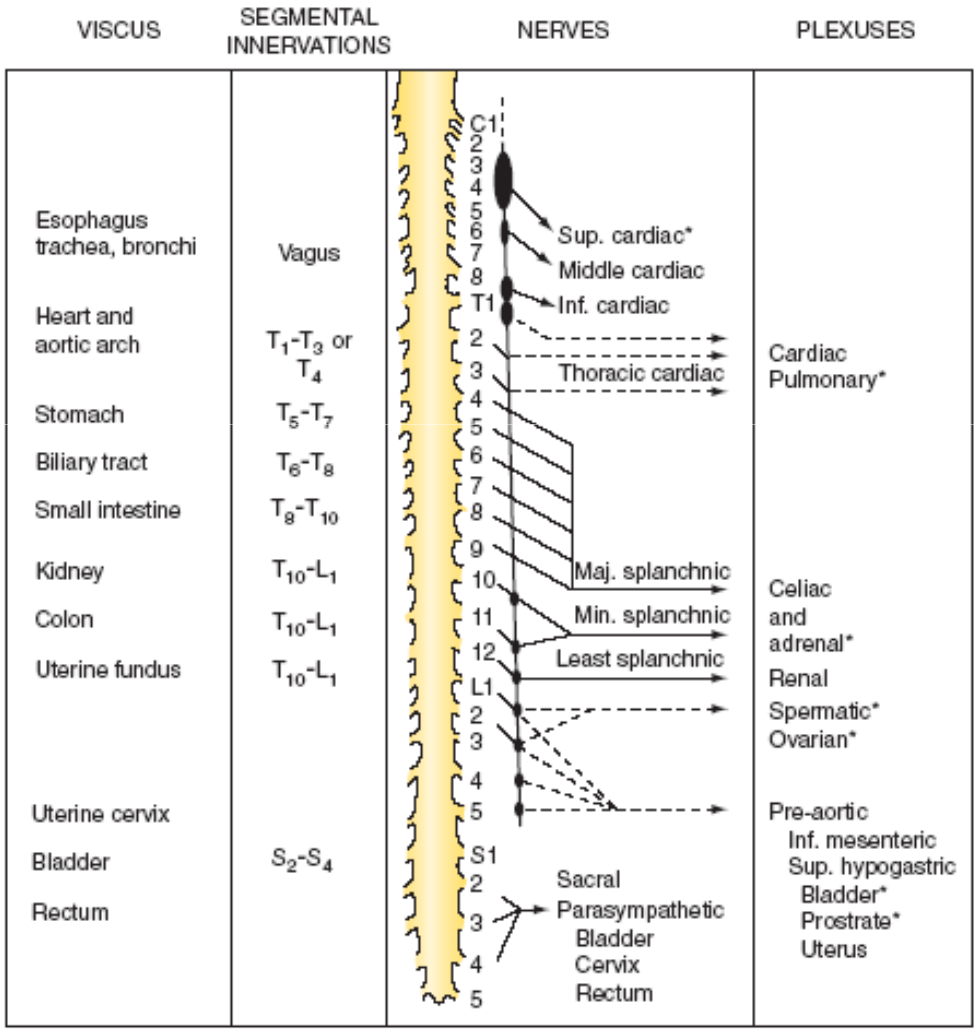
Introduction

- > 100 causes of AAP have been reported !
  - Non Specific Abdominal Pain: 34%
  - Acute appendicitis: 28%
  - Acute cholecystitis: 10%
  - Small bowel obstruction (SBO): 4%
  - Perforated peptic ulcer: 3%
  - Pancreatitis: 3%
  - Diverticular disease: 2%
  - Others: 13%
  - NON SURGICAL AAP …

De Dombal FT, Margulies M. Acute abdominal pain. Surgery

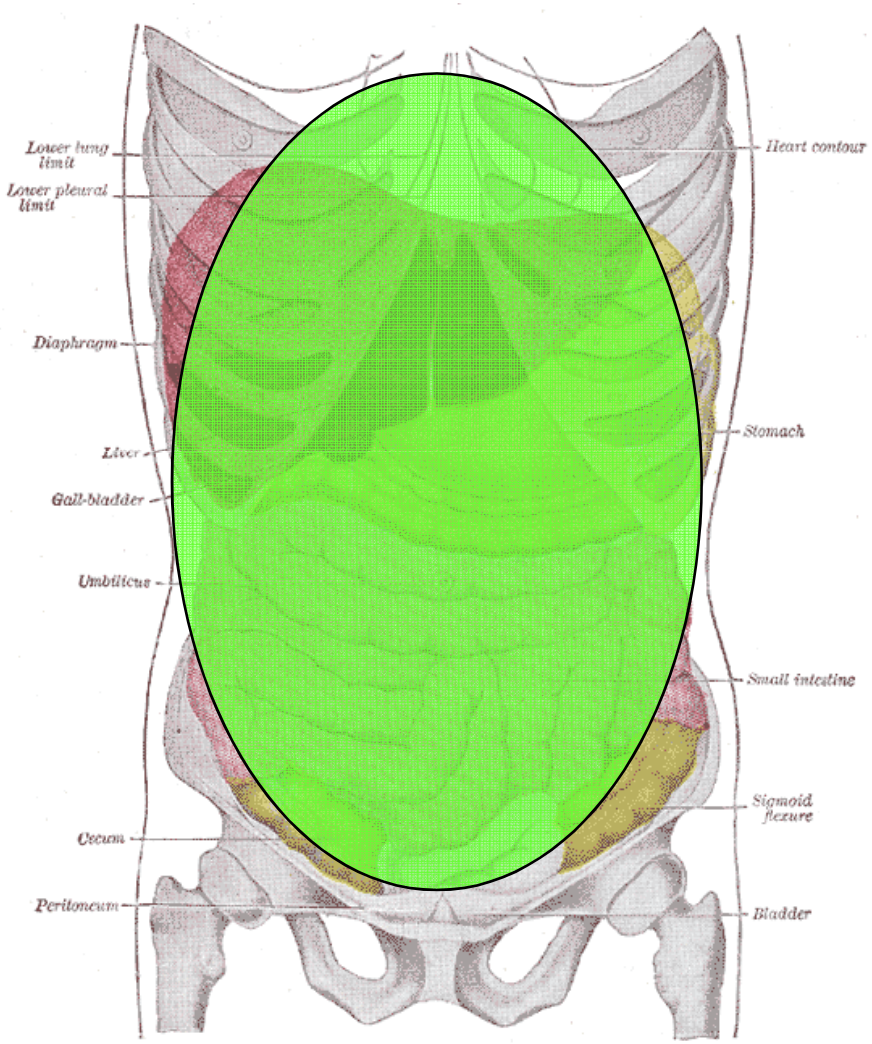
Pathophysiology

- **Visceral pain**
  - **Distention, inflammation or ischaemia in hollow, viscous & solid organs**
  - Localization depends on the embryologic origin of the organ:
    - ***Up gut to epigastrium***
    - ***Mid gut to umbilicus***
    - ***Hind gut to the hypogastric region***
- **Parietal pain**
  - Is localized to the dermatome above the site of the stimulus.
- **Referred pain**
  - Produces symptoms, not signs (e.g. tenderness)

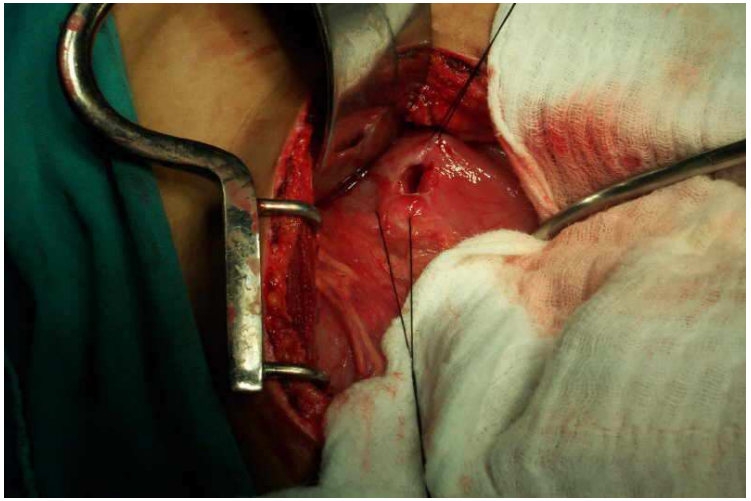


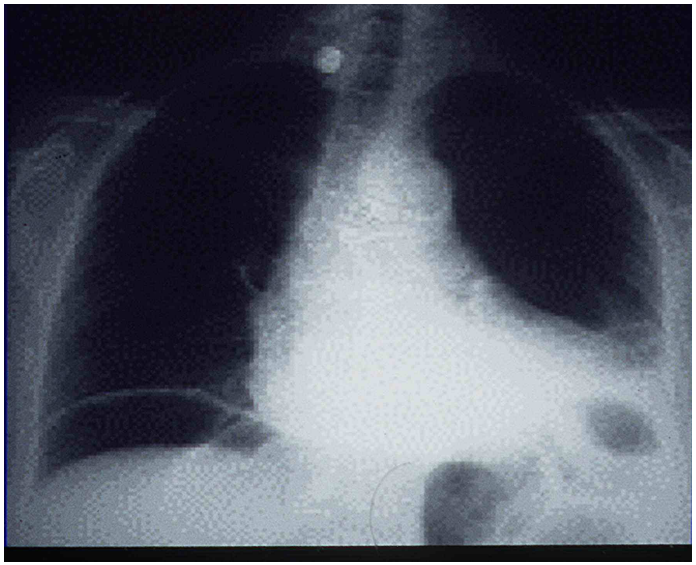
Generalized AP

- Perforation
- Abdominal Aortic Aneurism (AAA) rupture
- Acute pancreatitis
- Diabetes: ketoacidosis
- Bilateral pleurisy
- FMF & hereditary fevers

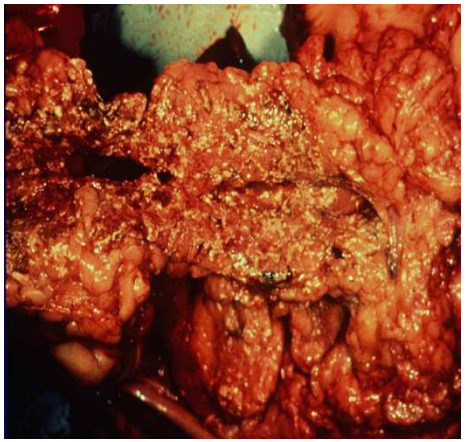


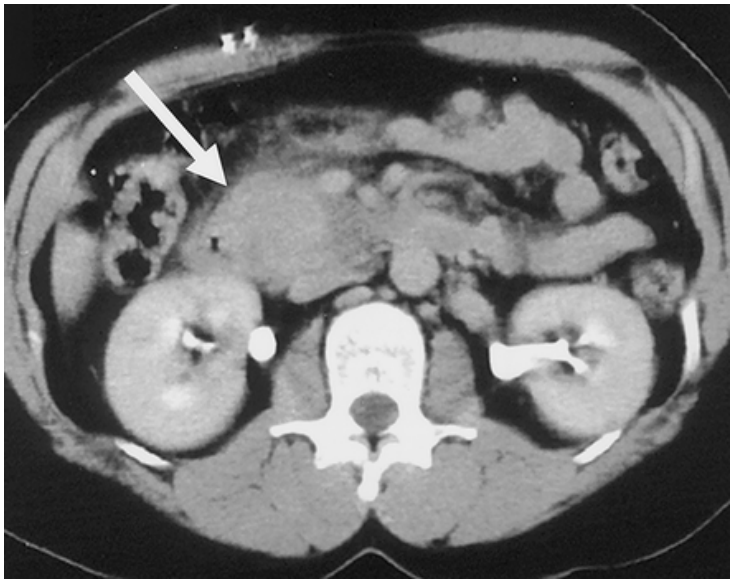
Perforation





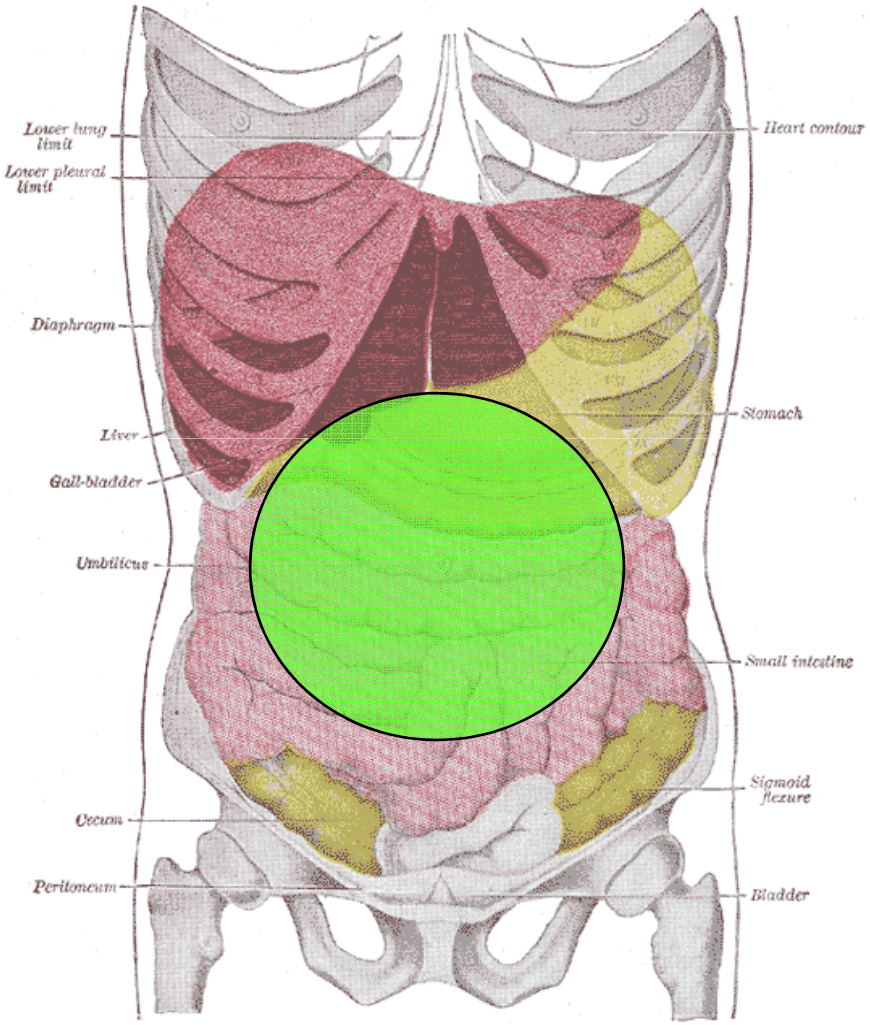
Acute pancreatitis



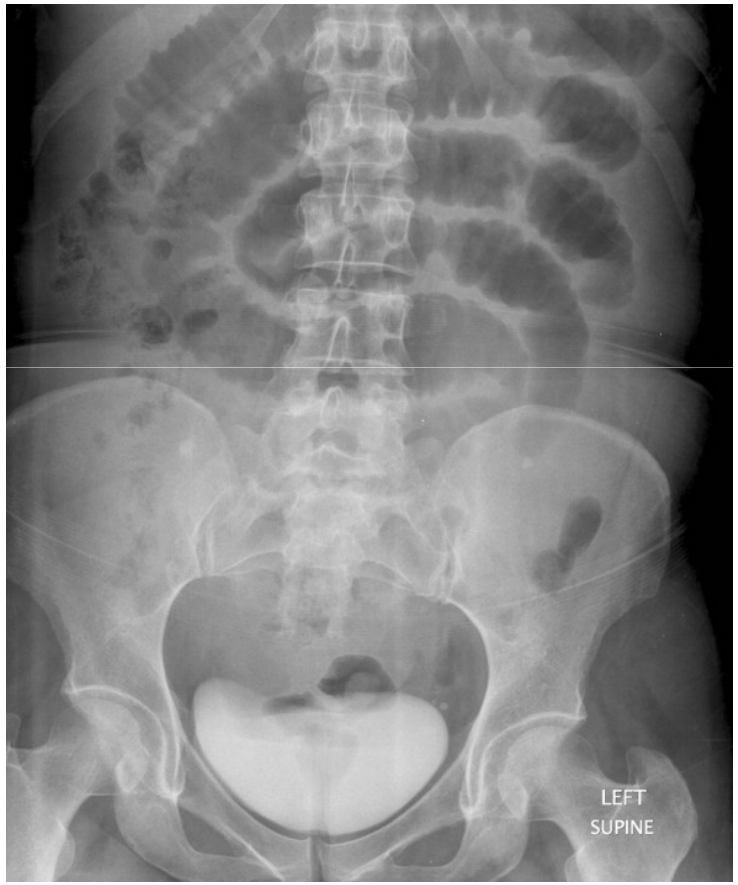


Central AP (mesogastrium)

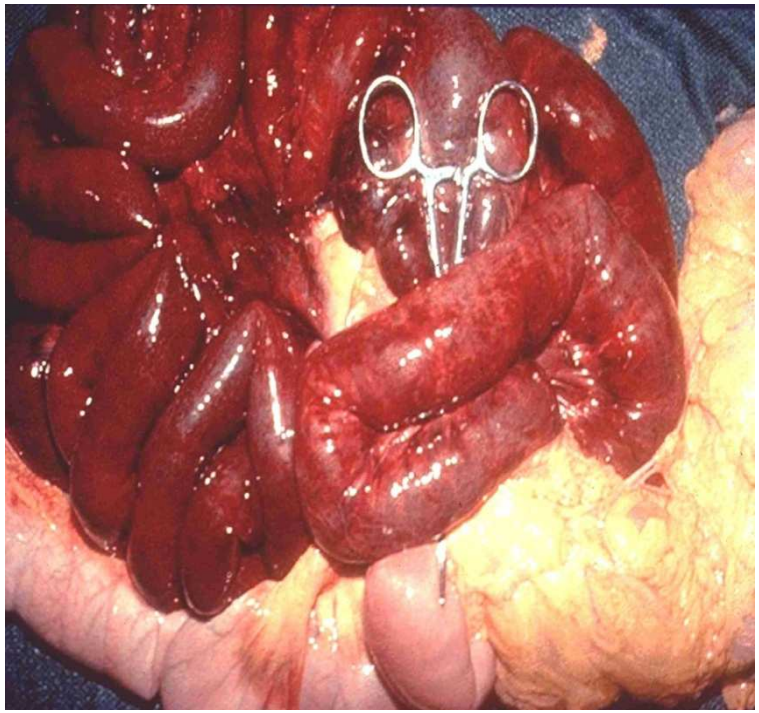
- Early appendicitis
- Small Bowel Obstruction
- Acute gastritis
- Acute pancreatitis
- Rupture of AAA
- Mesenteric infarction



Small Bowel Obstruction



Mesenteric infarction



Mesenteric ischemia-infarction

- Occlusion of the mesenteric vessels is regarded as one of those conditions of which: ***"the diagnosis is impossible, the prognosis hopeless, and the treatment almost useless".***
- This indicates the extreme difficulties faced by physicians in diagnosing and treating acute mesenteric ischemia.
- ***Symptoms are <u>non-specific</u>*** before evidence of peritonitis presents. Thus, diagnosis and treatment are often delayed.
- Overall, the mortality rate in the last 15 years averages **70%,** with a range of 59-93%

Mesenteric ischemia-infarction

- **Superior Mesenteric Artery Occlusion (at least 60% of cases)**
  - ***Embolism:*** Atrial Fibrillation, AMI, Endocarditis, Valve disorders
  - ***Thrombosis:*** Atherosclerotic plaque rupture
- **Non-occlusive Mesenteric Ischemia**
  - Atherosclerosis + shock-hypotension
- **Mesenteric Venous Thrombosis**
  - Primary clotting disorder

Mesenteric infarction

Clinical presentation

- Early (in the absence of peritonitis) physical signs are few and non-specific: **abdominal pain, nausea, vomiting, diarrhea, blood per rectum.** Tenderness is minimal to non-existent.

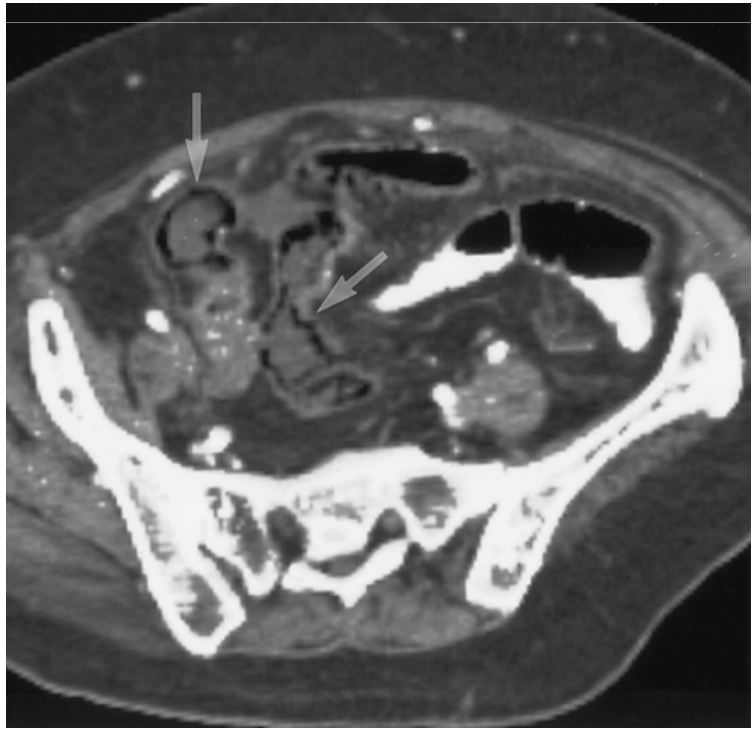
- Later, **peritoneal signs** may develop when infarction with necrosis or perforation occurs. Tenderness becomes severe. ***Bowel sounds range from hyperactive to absent*****. Fever, hypotension, tachycardia, tachypnea, and altered mental status** are observed. Foul breath may be noted with bowel infarction, from the putrefaction of undigested alimentary material accumulated proximal to the pathologic site

Mesenteric infarction

Diagnosis

- ↑ WBC count, LDH, CPK, AST
- ABG: acidosis (lactic acid)

- **Abdomen CT scan:** good sensitivity and specificity only if occlusion of small bowel is present
- **Abdomen X-ray:** usually not useful (non specific findings)



Acute appendicitis

Always think to a possible acute appendicitis in a subjects with appendix !

The classic symptoms of appendicitis include:

• ***Dull pain near the umbilicus or the upper abdomen that becomes sharp as it moves to the lower right abdomen;*** this is usually the first sign.

• Loss of appetite

• Nausea and/or vomiting soon after abdominal pain begins

• Abdominal swelling

• Fever

• Inability to pass gas

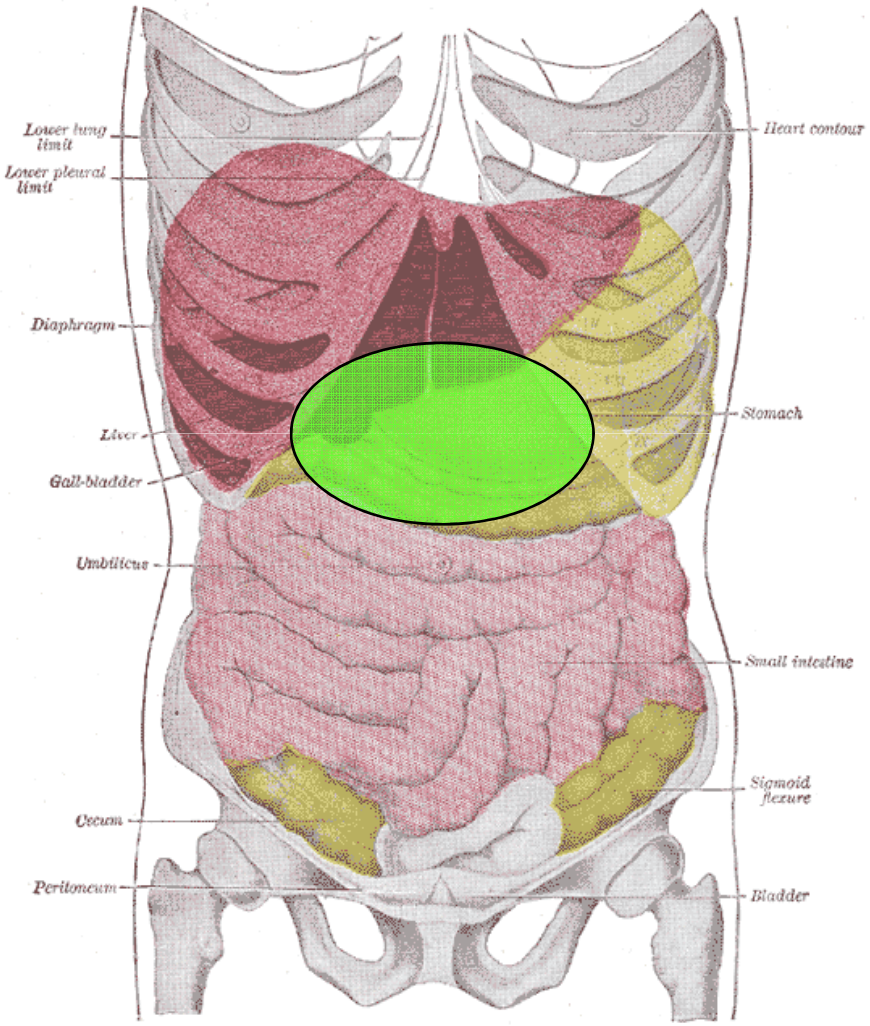
BMJ

Alvarado Scale for the Diagnosis of Appendicitis

	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

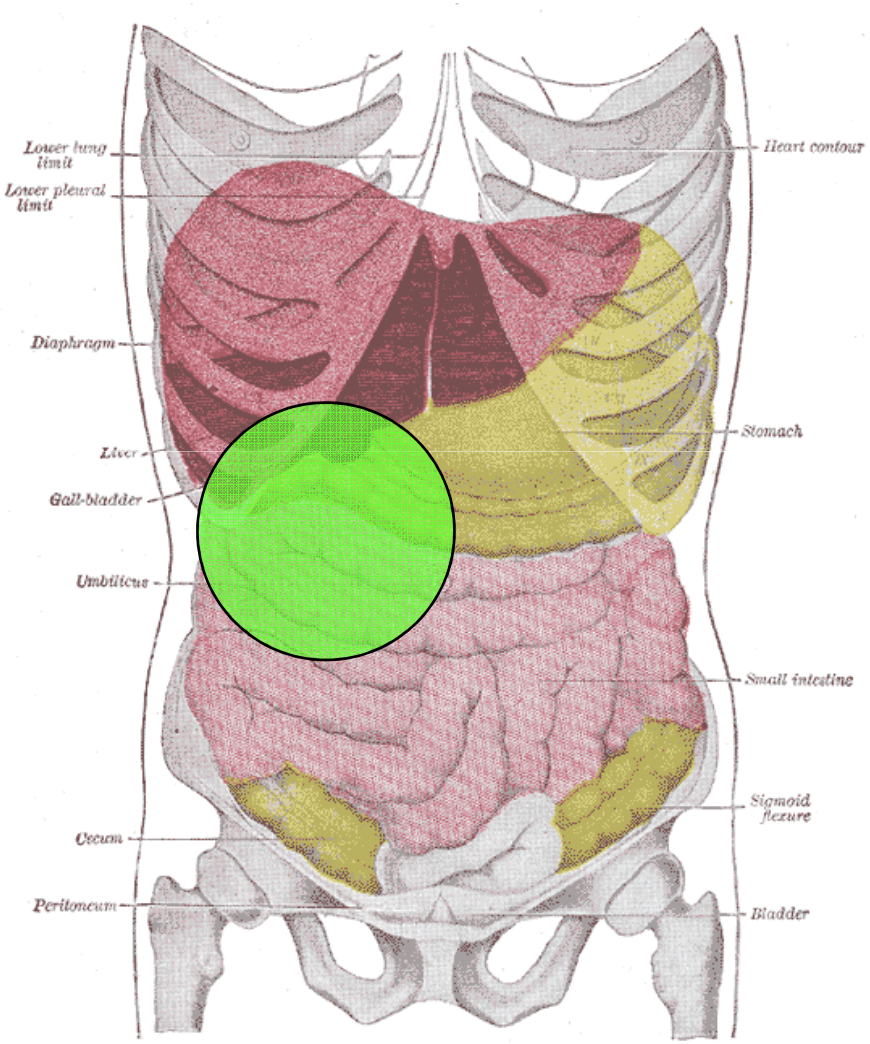
Epigastric pain

- Gastric or Duodenal Peptic Ulcer
- Oesophagitis
- Acute pancreatitis
- AAA rupture
- Gallbladder disease (deep pain)
- AMI (inferior)



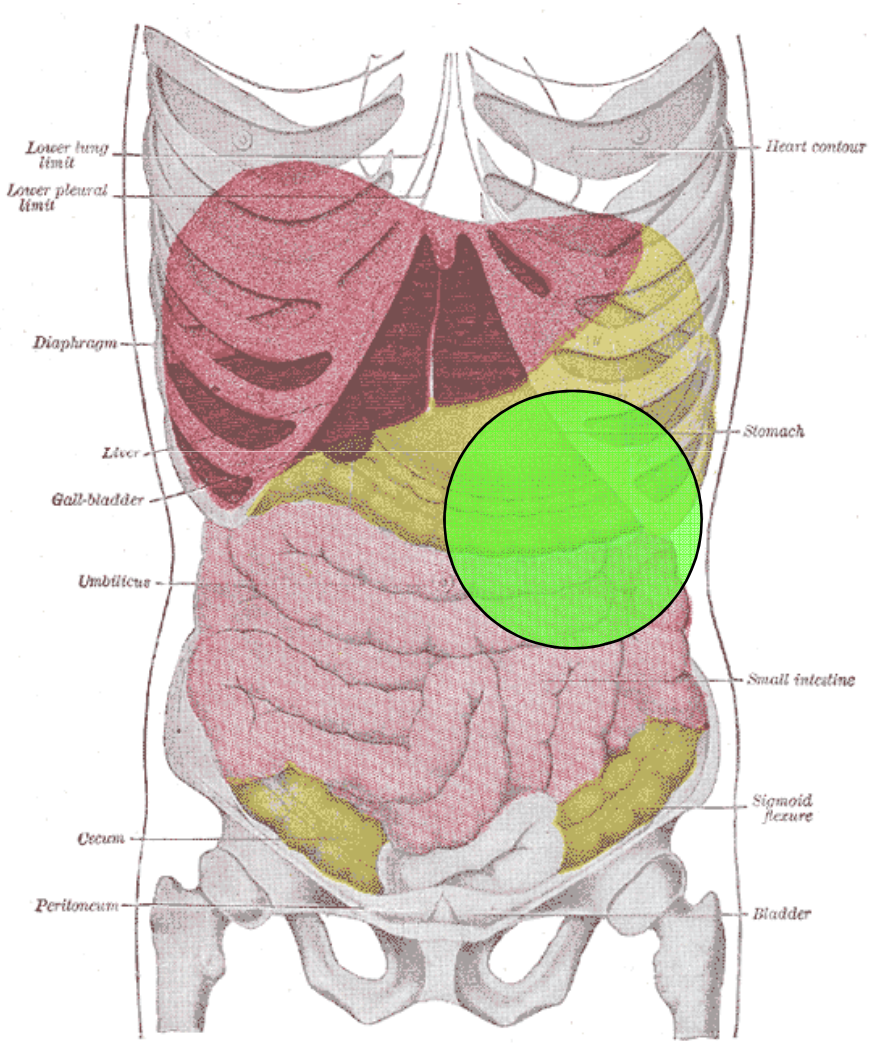
RUQ pain

- Gallbladder disease (complicated)
- Duodenal Ulcer
- Acute pancreatitis
- Pneumonia
- Renal abscess - acute perinephritis
- Sub-phrenic abscess



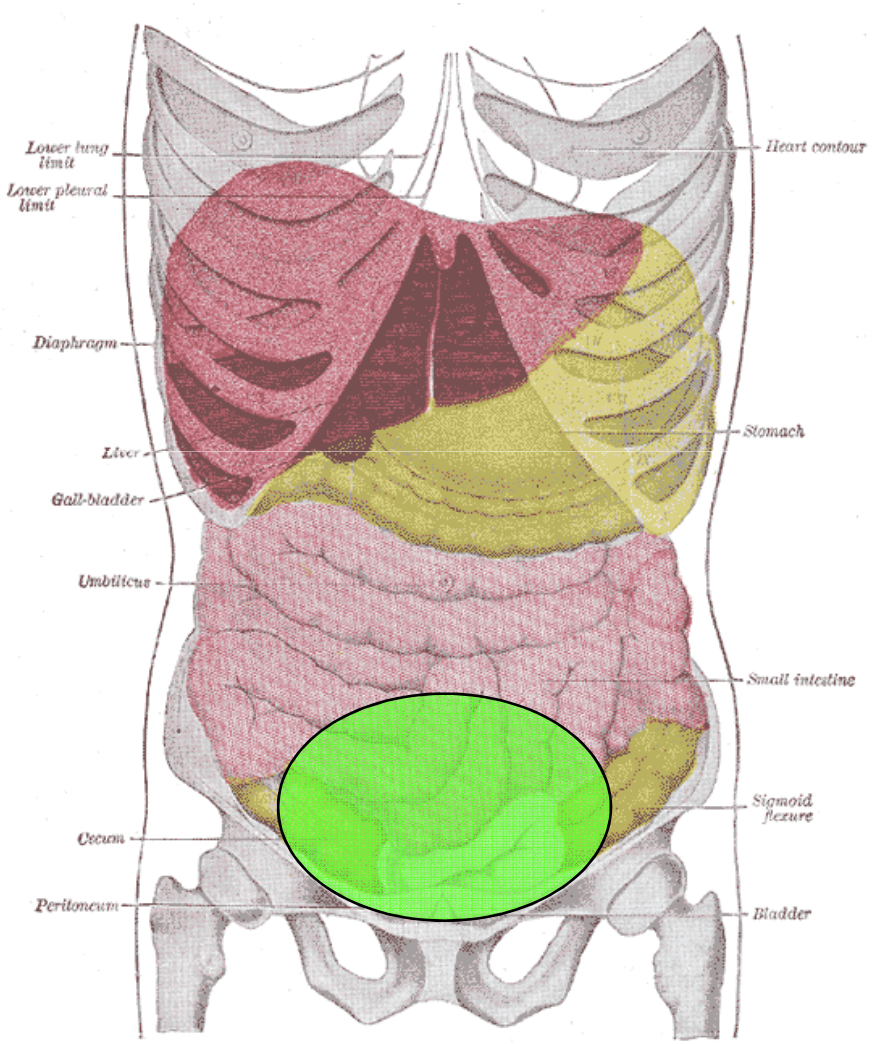
LUQ pain

- Gastric Ulcer
- Pneumonia
- Acute pancreatitis
- Spontaneous splenic rupture
- Renal abscess - acute perinephritis
- Sub-phrenic abscess



Suprapubic pain

- Acute urinary retention
- Urinary Trait Infection
- Cystitis
- Pelvic Inflammatory Disease (PID)
- Ectopic pregnancy
- Diverticulitis



Pelvic Inflammatory Disease (PID)

Pelvic inflammatory disease (PID) is a generic term for **inflammation of the uterus, fallopian tubes, and/or ovaries as it progresses to scars formation with adhesions to nearby tissues and organs.**

PID can refer to ***viral, fungal, parasitic, bacterial infections.*** PID should be classified by affected organs, the stage of the infection, and the organism(s) causing it.

Although a ***sexually transmitted infection*** is often the cause, many other routes are possible, including ***lymphatic, post-partum (abortion) or intrauterine device (IUD) related, and hematogenous spread.*** Two thirds of patients with laparoscopic evidence of previous PID were not aware they had PID.

Urinary retention

Causes of urinary retention

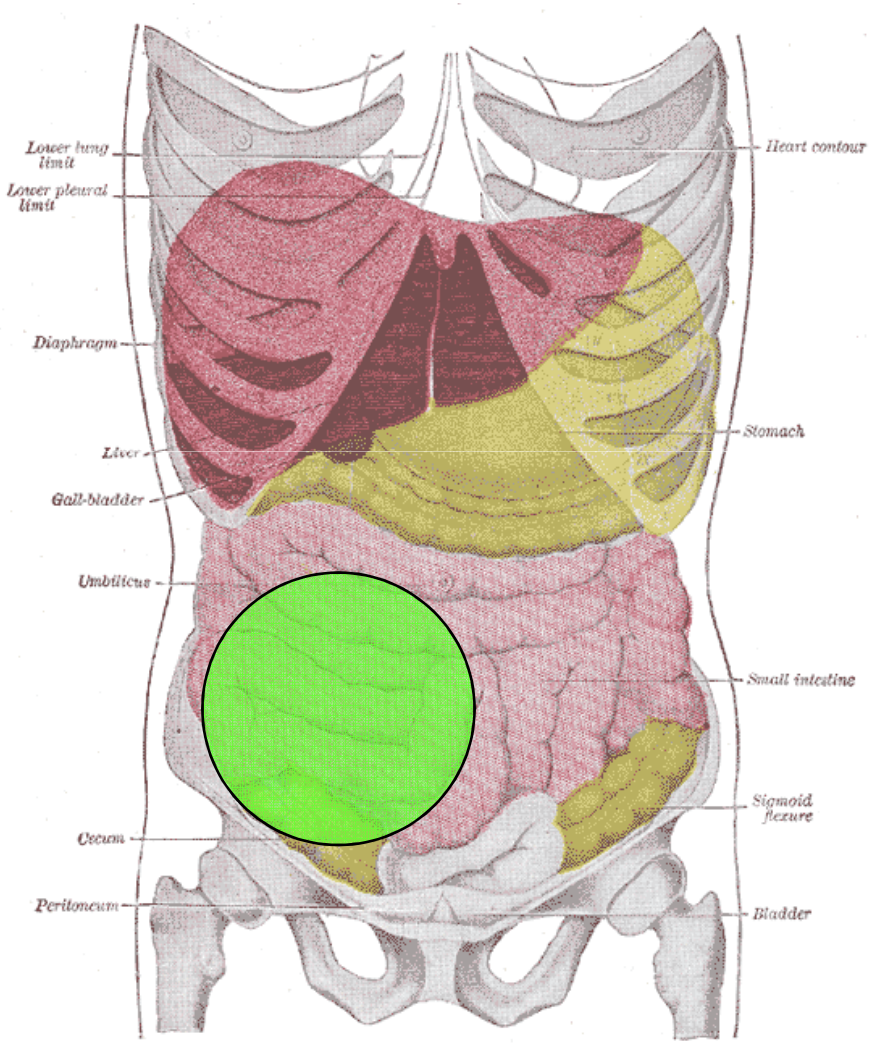
- Benign prostatic hyperplasia (BPH)
- Prostatic carcinoma
- Urethral stricture
- Pelvic mass (especially in women)
- Urinary tract infection
- Constipation
- Neurological
- Postoperative pain or immobility

Types of Retention

can be ***acute*** or ***chronic*** or ***acute-on-chronic***

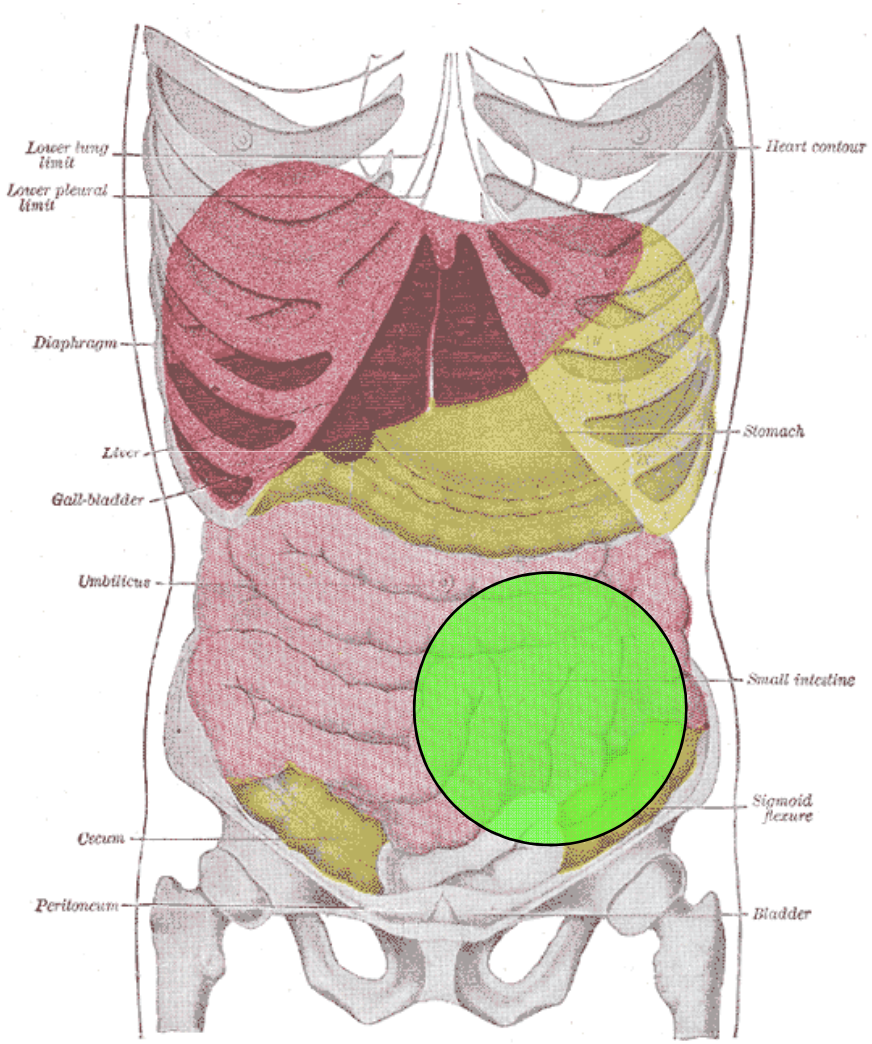
RIF pain

- Acute appendicitis
- Mesenteric adenitis (young)
- Perfored Duodenal Ulcer
- Diverticulitis
- PID
- Salpingitis – Ovarian Torsion
- Ureteric colic
- Meckel's diverticulum
- Ectopic pregnancy
- Crohn's disease
- Biliary colic (low-lying gall bladder)



LIF pain

- Diverticulitis
- Severe Constipation
- Irritable Bowel Syndrome(IBS)
- PID
- Sigma-Rectum Cancer
- Ulcerative Colitis
- Infective Enteritis
- Ectopic pregnancy
- Salpingitis – Ovarian Torsion



DIVERTICULA: CLINICAL PRESENTATION

1. **Diverticulosis:** anatomic presence of diverticula

2. **Diverticular disease:** any clinical manifestation of diverticula

3. **Painful diverticular disease:** symptomatic diverticulosis, without diverticulitis

4. **Acute diverticulitis:** symptomatic inflammation or perforation of diverticula

WR Hazard. Principles of Geriatric Medicine and Gerontology. Mc Graw Hill Ed. 4th Edition

DIVERTICULA: NUMBERS AND PATHOPHYSYOLOGY

- Up to 5%, life long, will develop complications; if considered by symptoms - up to 25%.

- 2%, life long, will need hospitalization; of them, about 50% will require surgery.

- 30% persistence of symptoms or recurrent diverticulitis in 5 years after the first attack.

Diverticolite acuta

I sintomi classici sono:

- **Dolore profondo** al quadrante inferiore di sn (70%); il dolore ha esordio acuto è persistente e peggiora nel tempo
- **Blumberg +**
- **Febbre e leucocitosi**
- **Nausea e vomito** (20-62%)
- **Addome disteso, timpanico, peristalsi ridotta**
- **Stipsi** (50%) o **Diarrea** (25-35%)
- **Sintomi urinari**: disuria, urgenza minzionale, pollachiuria (10-15%)

http://www.uptodate.com/contents/clinical-manifestations-and-diagnosis-of-colonic-diverticular-disease?

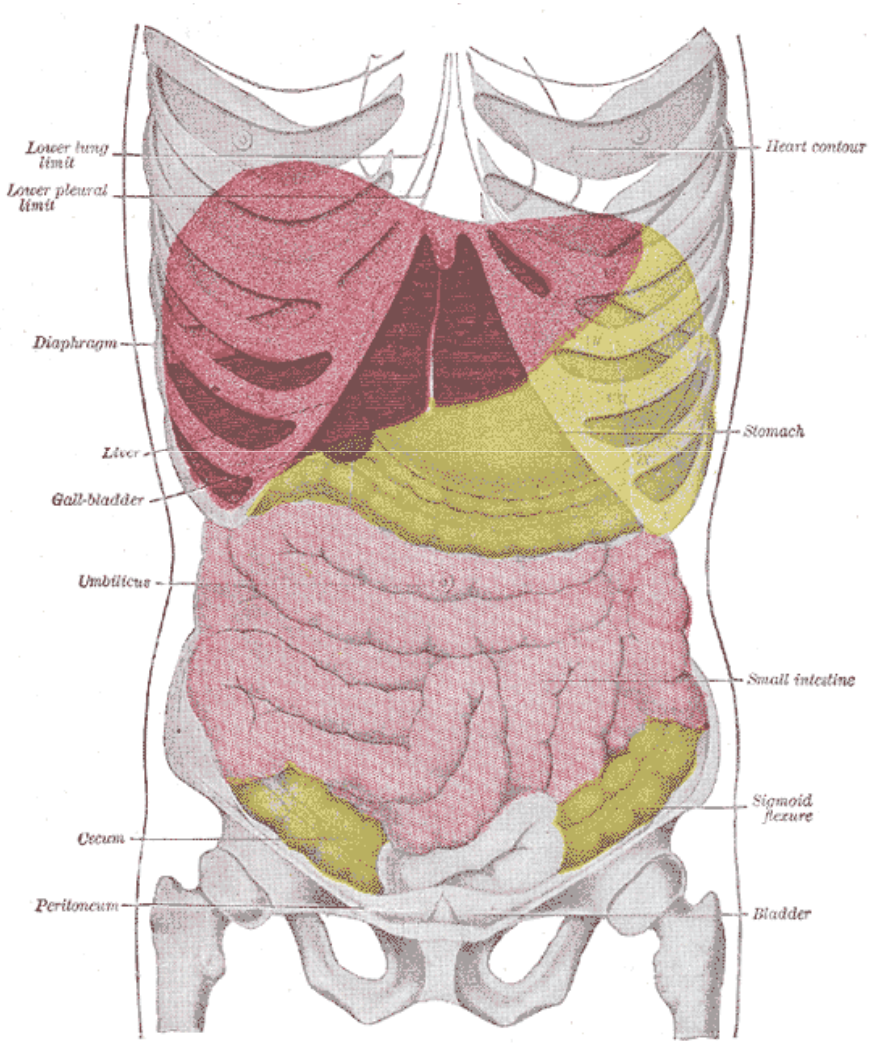
Trattamento della diverticolite

Il trattamento della patologia acuta prevede un iniziale **approccio conservativo** se si tratta di un caso **non complicato:**

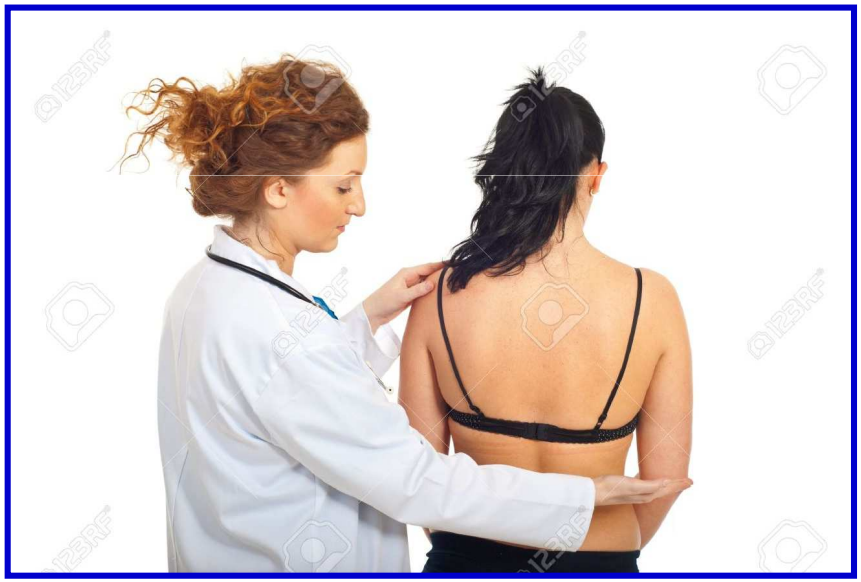
- ***Antibiotici*** ad ampio spettro con copertura di gram-negativi ed anaerobi (Cefalosporina / Chinolonico + Metronidazolo)
- ***Reidratazione*** *e* ***alimentazione liquida o nutrizione parenterale*** a seconda dei casi
- la ***Mesalazina*** sembra essere efficace nel ridurre la durata della fase acuta.

Loin pain (lumbar)

- Muscle strain
- Urinary Tract Infections
- Renal stones
- Pyelonephritis



Giordano’s sign



AAP: Limitations

- Limitations based on the relationship between:
  - Overlying tenderness
  - Underlying surgical disease
- **About 20-30% of intra-operative diagnoses are considered to have had *atypical* presentations**

Staniland, JR, Br Med J 3:393

AAP in young subject

Causes of abdominal pain by age of onset

Birth to 1 year	2–5 years	6–11 years	12–18 years
Constipation	Appendicitis	Appendicitis	Appendicitis
Gastroenteritis	Constipation	Constipation	Constipation
Hirschsprung's disease	Gastroenteritis	Functional pain	Dysmenorrhea
Incarcerated hernia	Henoch–Schönlein purpura	Gastroenteritis	Ectopic pregnancy
Infantile colic	Intussuception	Henoch–Schönlein purpura	Gastroenteritis
Intussuception	Pharyngitis	Mesenteric lymphadenitis	Mittelschmerz
UTI	Sickle cell crisis	Pharyngitis	Ovarian torsion
Volvulus	Trauma	Pneumonia	PID
	UTI	Sickle cell crisis	(Testicular torsion)
	Volvulus	Trauma	Threatened abortion
		UTI	

PID: pelvic inflammatory disease; UTI: urinary tract infection.
Adapted from Leung AKC, Sigalet DL. Acute abdominal pain in children. *Am Fam Physician* 2000;67(11).

Non surgical causes of AAP

Non-Surgical Abdomen

Metabolic Causes

- ***D-Ketoacidosis***
- ***Uremia***
- ***Adreno-cortical Insufficiency***
- ***Hypercalcemia***
- **Acute Intermittent Porphyria.**
- **Heavy Metals Poisoning**

Haematological Diseases

- ***Haemolytic Crisis of Chronic Haemolytic Anaemia.***
- **Polycythemia.**
- **Henoch- Schonelein Purpura.**
- **Lymphoma.**
- **Leukemia.**

Key points on history

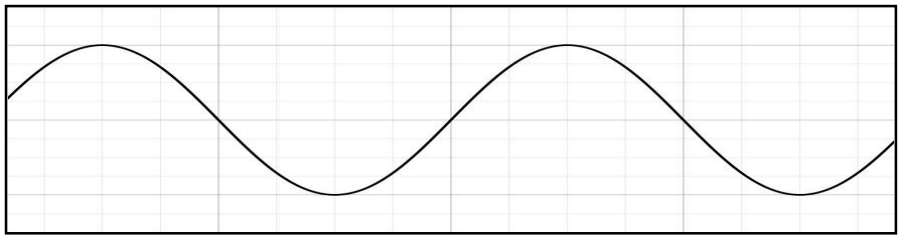
- Site of pain
- Nature and character of pain
- Duration
- Precipitating and relieving factors
- Intensity
- Associated symptoms

Classification by nature of pain

Colicky pain

- Severe abdominal pain caused by spasm, obstruction, or distention of any of the hollow viscera, such as the intestines; ***the pain comes and goes …***

- Baseline of NO pain in true colic pain …
- Irritable Bowel Syndrome (IBS)
- Bowel obstruction



Colicky pain ??

BILIARY AND RENAL COLIC

BY

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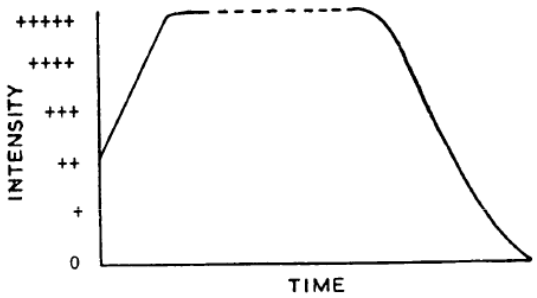


FIG. 1.—Biliary colic: 30 cases; renal colic: 17 cases.

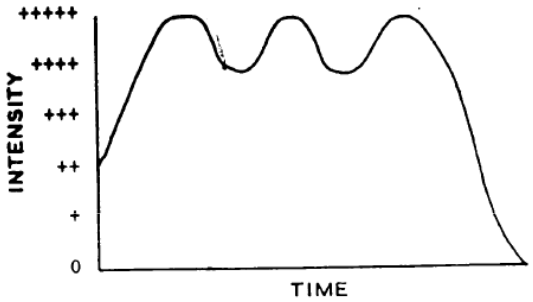


FIG. 2.—Fluctuant: biliary colic, 4 cases; renal colic, 21 cases.

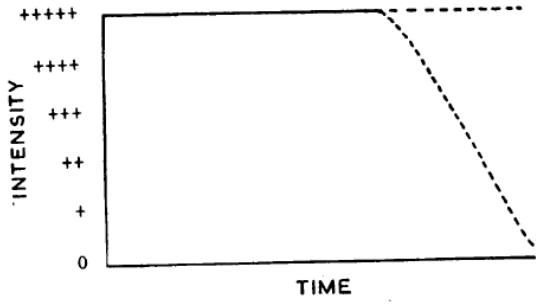


FIG. 3.—Maximum intensity at onset; sudden or gradual cessation. Biliary colic, 15 cases; renal colic, 12 cases.

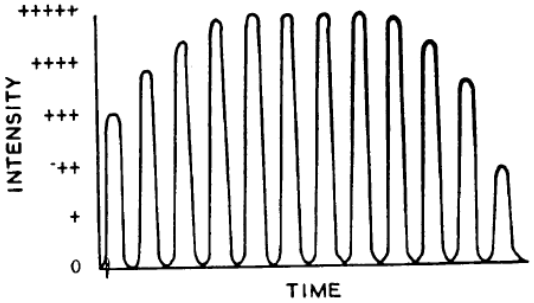


FIG. 4.—Intermittent pain—true "colic." One case of biliary colic; no case of renal colic.

Nagging & Grumblin

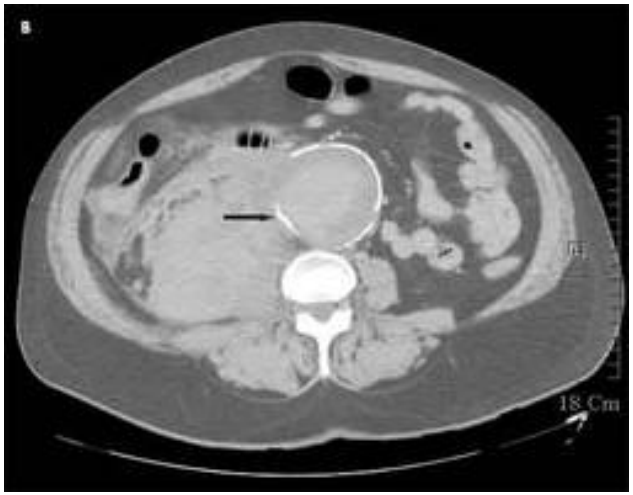
(fastidioso, lamentoso)

- Biliary colic
- Cholecystitis
- Pelvic Inflammatory Disease
- Urinary Trait Infections

Stabbing

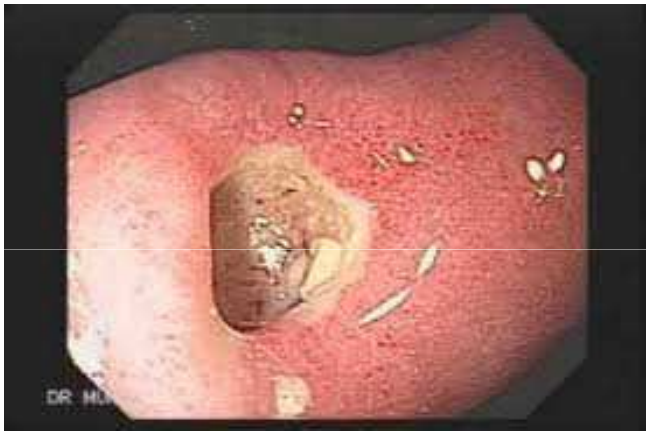
(coltellata)

- Abdominal Aortic Aneurism rupture



Burning or boring

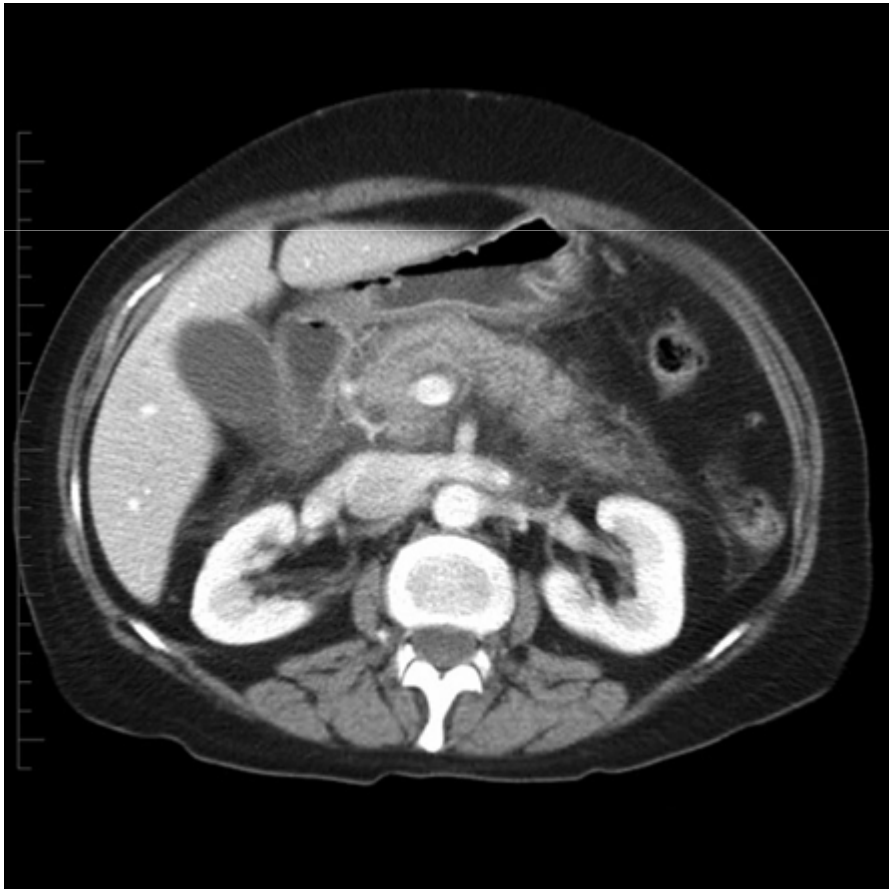
- Peptic Ulcer
- Oesophagitis



Gnawing

(sordo)

- Pancreatitis
- Pancreatic Ca



Associated symptoms

- Fever
- Genitourinary symptoms
- Gynecological symptoms
- Vascular symptoms

Past medical and surgical history

- Previous episodes of AAP
- Previous investigations
- Previous operations
- Chronic diseases
- Medications (NSAIDs)
- Immunosuppressant

Hereditary periodic fever syndromes and related conditions		Gene/chromosome	Protein
FMF	MIM 294100	*MEFV* (16p13)	Pyrin/marenostrin
HIDS	MIM 260920	*MVK* (12q24)	Mevalonate kinase
TRAPS (FHF)	MIM 142680	*TNFRSF1A* (12p13)	TNF receptor 1
FCU/FCAS	MIM 120100	*CIAS1/NALP3/PYPAF1* (1q44)	Cryopyrin/NALP3/PYPAF1
MWS	MIM 191900	*CIAS1/NALP3/PYPAF1* (1q44)	Cryopyrin/NALP3/PYPAF1
CINCA/NOMID	MIM 607115	*CIAS1/NALP3/PYPAF1* (1q44)	Cryopyrin/NALP3/PYPAF1
PAPA	MIM 604416	*CD2BP1* (15q24)	CD2-binding protein 1
Granulomatous disorders			
Crohn's disease (IBD)	MIM 266600	*NOD2* (16q12)	Nucleotide-binding oligomerization domain 2
Blau syndrome	MIM 186580	*NOD2* (16q12)	Nucleotide-binding oligomerization domain 2

FMF, familial Mediterranean fever; HIDS, hyperimmunoglobulinaemia D with periodic fever syndrome; TRAPS, tumour necrosis factor receptor-associated periodic syndrome; FHF, familial Hibernian fever ; FCU, familial cold urticaria; FCAS, familial cold autoinflammatory syndrome; *CIAS1*, cold-induced autoinflammatory syndrome 1 gene; NALP3, NACHT, LRR and PYD-containing protein 3; PYPAF1, pyrin-containing Apaf1-like protein 1; MWS, Muckle-Wells syndrome; CINCA, chronic infantile neurologic cutaneous and articular syndrome; NOMID, neonatal-onset multisystem inflammatory disease; PAPA, pyogenic sterile arthritis, pyoderma gangrenosum, and acne; CD2BP1, CD2-binding protein 1; IBD, inflammatory bowel disease; Blau syndrome, chronic granulomatous synovitis with uveitis and cranial neuropathy; NOD2, nucleotide-binding oligomerization domain 2; TNF, tumour necrosis factor.

Clinical Feature	FMF	TRAPS	HIDS	FCAS	MWS	NOMID/CINCA
Usual ethnicity	Turkish, Armenian, Arab, Jewish, Italian	Any ethnicity	Dutch, other Northern European	Mostly European	Mostly European	Any ethnicity
Duration of attacks	12-72 hours	Days to weeks	3-7 days	12-24 hours	2-3 days	Continuous, with flares
Abdominal	Sterile peritonitis, constipation	Peritonitis, diarrhea or constipation	Severe pain, vomiting, diarrhea, rarely peritonitis	Nausea	Abdominal pain	Not common
Pleural	Common	Common	Rare	Not seen	Rare	Rare
Arthropathy	Monoarthritis, rarely protracted arthritis in knee or hip	Arthritis in large joints, arthralgia	Arthralgia, symmetric polyarthritis			
Polyarthralgia	Polyarthralgia, oligoarthritis, clubbing	Epiphyseal overgrowth, contractures, intermittent or chronic arthritis, clubbing				
Cutaneous	Erysipeloid erythema on lower leg, ankle, foot	Migratory rash, underlying myalgia	Diffuse maculopapular rash, urticaria	Cold-induced urticarial rash	Urticaria-like rash	Urticaria-like rash
Ocular	Rare	Conjunctivitis, periorbital edema	Uncommon	Conjunctivitis	Conjunctivitis, episcleritis	Uveitis, conjunctivitis, progressive vision loss
Neurologic	Rarely aseptic meningitis	Controversial	Headache	Headache	Sensorineural deafness	Sensorineural deafness, chronic aseptic meningitis, mental retardation, headache
Lymphatic	Splenomegaly, occasional lymphadenopathy	Splenomegaly, occasional lympadenopathy	Cervical adenopathy in children	Not seen	Rare	Hepatosplenomegaly, adenopathy
Vasculitis	Henoch-Schönlein purpura (HSP), polyarteritis nodosa	HSP, lymphocytic vasculitis	Cutaneous vasculitis common, rarely HSP	Not seen	Not seen	Occasional
Systemic amyloidosis	Risk depends on *MEFV* and *SAA* genotypes; more common in Middle East	Occurs in ~10%; risk increased with cysteine mutations	Rare	Rare	Occurs in ~25%	May develop in some patients, usually in adulthood

Physical examination

- OBS are important
- Observation
  - Bending Forward: Chronic Pancreatitis
  - Jaundiced: CBD obstruction
  - Dehydrated: Peritonitis, Small Bowel obstruction (third space)

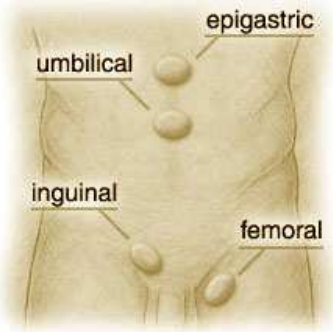
Systemic Examination

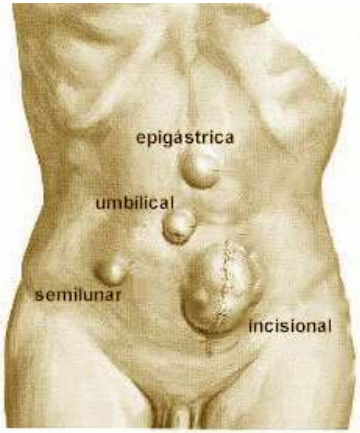
Inspection:

- Flat in peptic ulcer
- Distended in ascites or intestinal obstruction
- Visible peristalsis in thin or malnourished patients with bowel obstruction

Systemic Examination

Palpation:





- ***Check for hernia sites !***
- Tenderness
- Rebound tenderness (***Blumberg***)
- Involuntary spasm of muscles during palpation
- Rigidity: when abdominal muscles are tense and board-like - peritonitis.

Systemic Examination

- Local Right Iliac Fossa tenderness:
  - Acute appendicitis
  - Acute Salpingitis in females
- Low grade, poorly localized tenderness:
  - Intestinal Obstruction
- Tenderness out of proportion to examination:
  - Mesenteric Ischemia
  - Acute Pancreatitis
- Flank Tenderness:
  - Perinephric Abscess
  - Retrocaecal Appendicitis

Signs in Patients with Abdominal Pain

Sign	Finding	Association
Cullen's sign	Bluish periumbilical discoloration	Retroperitoneal haemorrhage
Kehr's sign	Severe left shoulder pain	Splenic rupture Ectopic pregnancy rupture
McBurney's sign	Tenderness located 2/3 distance from anterior iliac spine to umbilicus on right side	Appendicitis
Murphy's sign	Abrupt interruption of inspiration on palpation of right upper quadrant	Acute cholecystitis
Ileopsoas sign	Hyperextension of right hip causing abdominal pain	Appendicitis
Obturator's sign	Internal rotation of flexed right hip causing abdominal pain	Appendicitis
Grey-Turner's sign	Discoloration of the flank	Retroperitoneal haemorrhage
Chandelier sign	Manipulation of cervix causes patient to lift buttocks off table	Pelvic inflammatory disease
Rovsing's sign	Right lower quadrant pain with palpation of the left lower quadrant	Appendicitis

Blumberg's sign

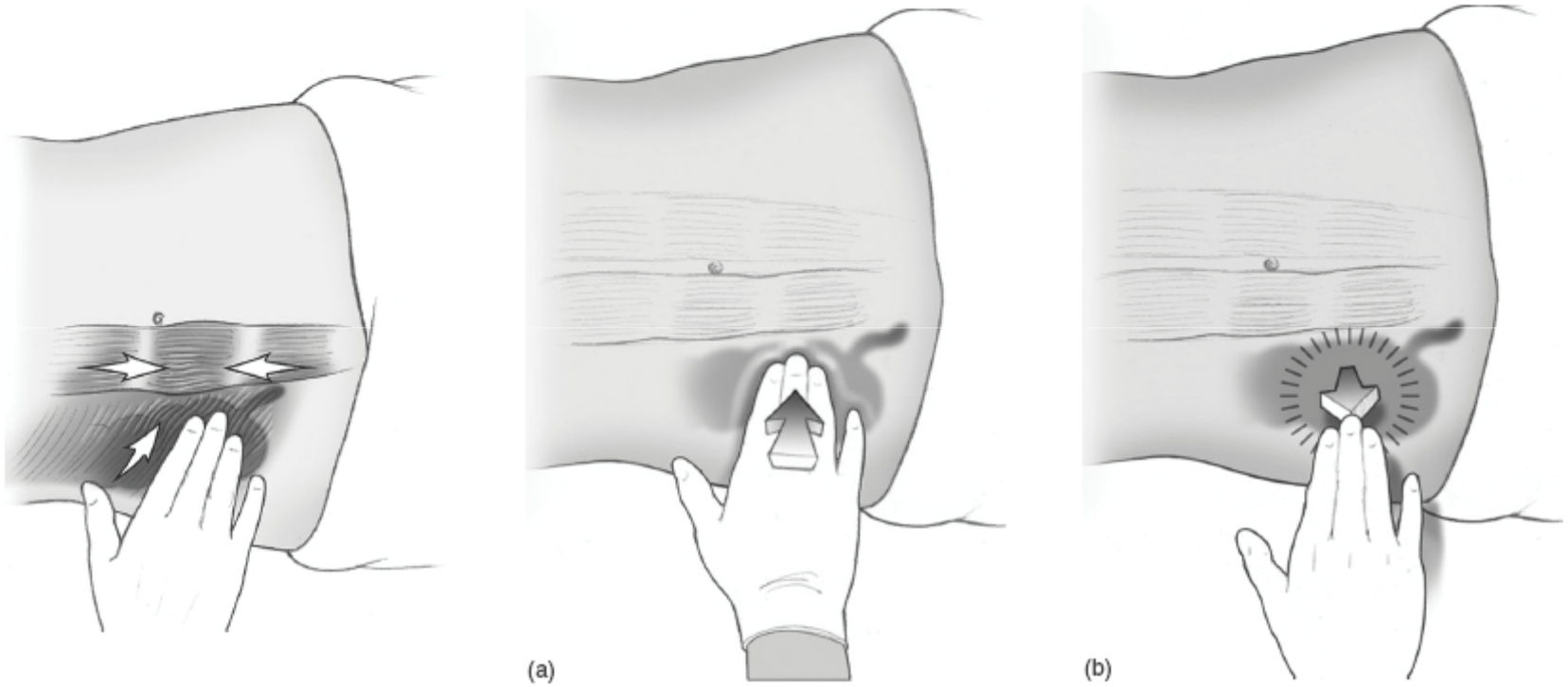
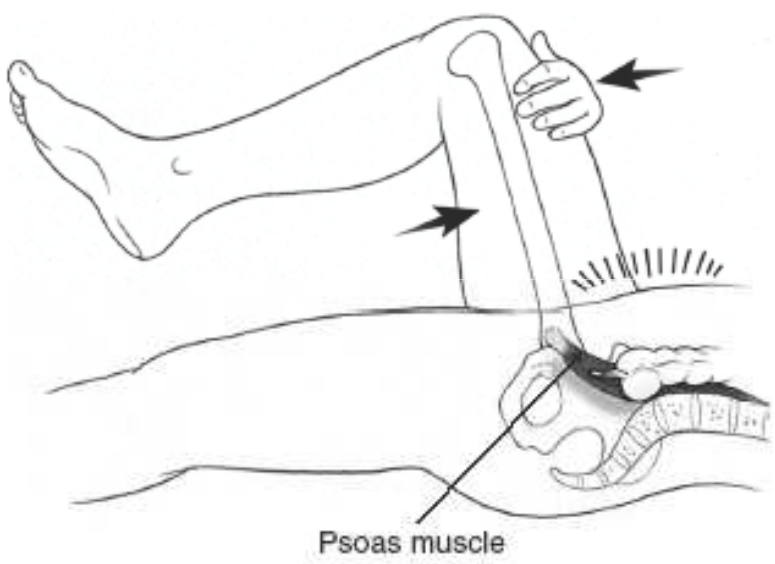


Figure 9.3
Rebound (a) hand down (b) hand up.

Psoas sign



Hyperextension of right hip causing abdominal pain

Obturator sign

Internal rotation of flexed right hip causing abdominal pain

Physical examination

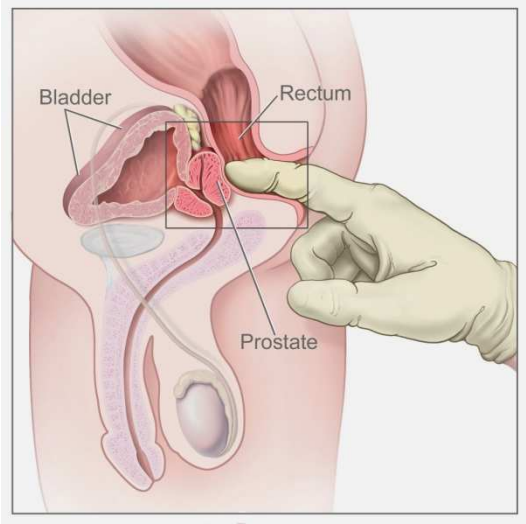
Auscultation

- Boul Sounds
- > 1 min to confirm it is absent (!)
- High pitched, hyperactive or tinkling
- Bruit in epigastrium

Systemic Examination

Per Rectal Examination:

- tenderness
- indurations
- mass
- frank blood, melena



Systemic Examination

Per Vaginal Examination:

- Bleeding
- Discharge
- Cervical motion tenderness
- Annexal masses or tenderness
- Uterine size or contour

Initial managementof APP

- In the first minutes, there are 3 only diagnoses:
  - Very ill:
    - Going to die?
    - ABC
  - Simply ill:
    - Stable for at least 2 h ?
    - Urgent investigations, initial diagnosis and management
  - Reasonably well:
    - Investigate as appropriate
    - Formulate a diagnosis

Investigations

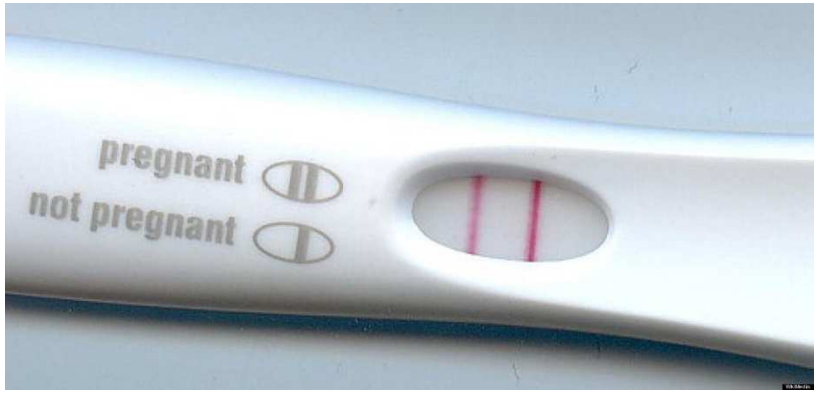
- FBC (Hb and WCC), CRP
- Amylase, Lipase
- Urea, electrolytes, Liver Function Tests
- Clotting (acute pancreatitis, sepsis, CID, liver disease)
- Glucose
- ABG
- EKG
- Cardiac enzymes (when appropriate)

Investigations

Urinalysis

- Cheap
- Simple and readily available test
- High yield when results fit with the clinical scenario
- Mid Stream Urine

- **Pregnancy test !**



Investigations

Radiology

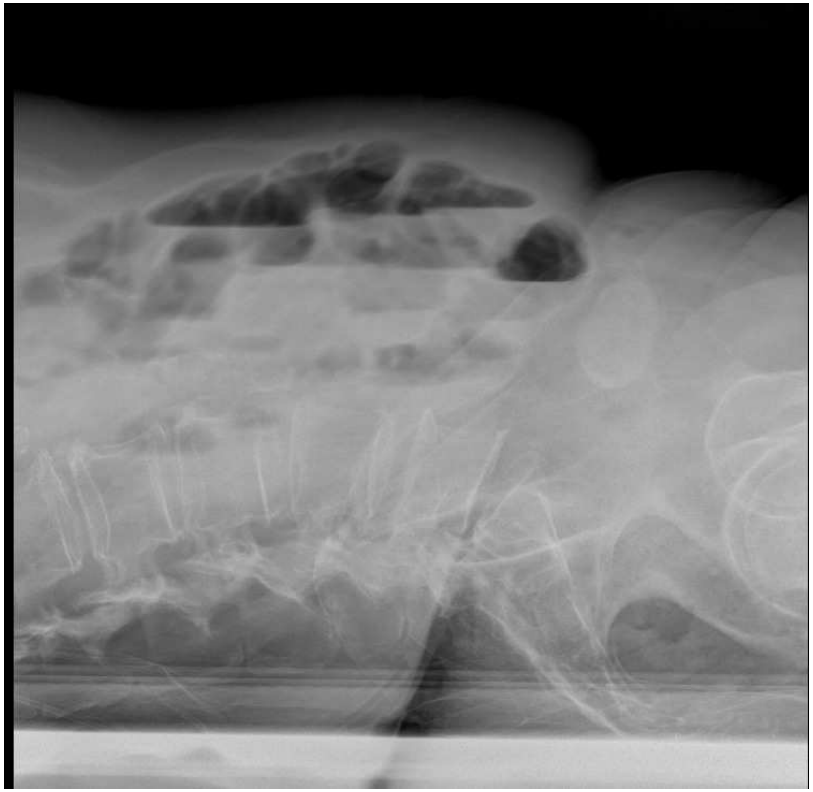
- Erect Chest XR
- Supine Abdomen XR
- Ultra Sounds (gynae pathology)
- Intra Venous Urography (renal/ureteric colic)

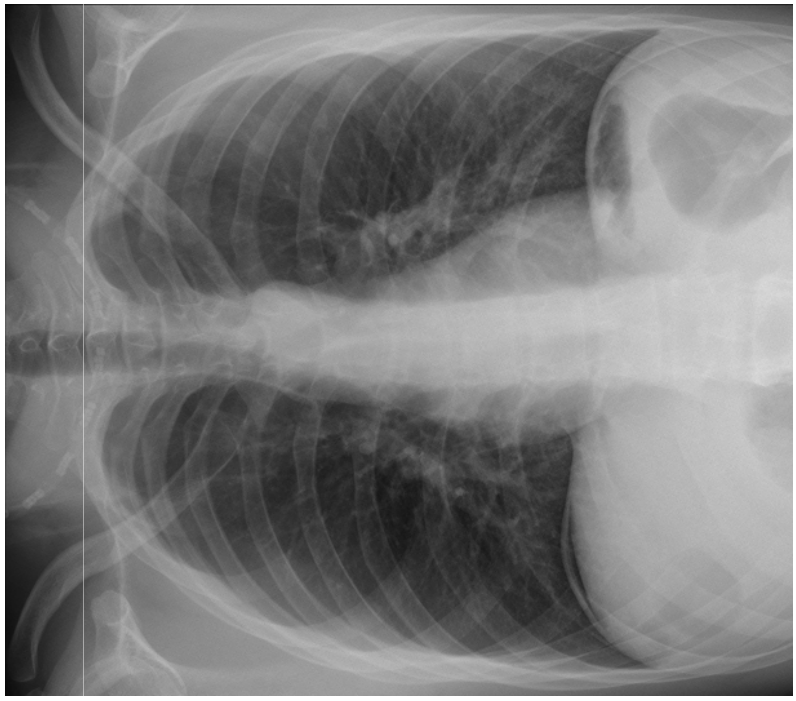
Investigations

Plain X-rays have limited utility in the evaluation of AAP:

- Low diagnostic yield
- High incidence of misleading incidental findings
- Lack of impact on management
- Exception: Bowel obstruction or perforation

Investigations: X-ray





CT scanning

- No significant advantage in DD of AAP
- Delay of necessary treatment
- Routine use not justified
- Hist. taking & physical examination are the basis of correct diagnosis

- Hist., physical examination & Lab investigations are often non-specific
- **CT is now 1st-line imaging modality in pts with AAP.**
- MDCT is now faster with thinner slices
- **High diagnostic accuracy**

Keeman JN, New diagnostic imaging technology offten offers no advantage in the differential diagnosis of acute abdomen. Ned Tijdschr Geneeskd.

Leschka et al,Multi-detector computer tomography of acute abdomen. Eur Radiol.

Laparoscopy

- Early ***diagnostic laparoscopy*** may result in:
  - *accurate*
  - *prompt*
  - *efficient management of AAP*
- Reduces the rate of unnecessary laparotomy
- Increases the diagnostic accuracy
- May be a key to solving the diagnostic dilemma of Acute non specific acute pain.

Golash and Willson. Early laparoscopy as a routine procedure in the management of acute abdominal pain: a review of 1320 patients. Surg Endosc.
Keller et al. Diagnostic laparoscopy in acute abdomen. Chirurg.

- Rebound tenderness, considered the clinical indicator of peritonitis, has a **25% false rate**

- Administration of analgesics prior to surgical consultation ***does not obscure*** the diagnosis, but improves accuracy

Liddington, MI and Thomson, WH, Br J :795, 1991
Bennett, DH Br Med J 308:1336, 1994
Manimaran, N et al. Ann Roy Col Surg Engl 86:292 2004
Brewster, GS et al. 2000 West J Med 172:209

- Do not restrict the diagnosis solely by the **location** of the pain.
- Consider **appendicitis** in all patients with abdominal pain and an appendix, especially in patients with the presumed diagnosis of gastroenteritis, PID or UTI.
- Do not use the presence or absence of **fever** to distinguish between surgical and medical causes of abdominal pain.
- The **WBC count** is of little clinical value in the patient with possible appendicitis.
- Any woman with childbearing potential and abdominal pain has an **ectopic pregnancy** until her pregnancy test comes back negative.
- **Pain medications** reduce pain and suffering without compromising diagnostic accuracy.
- An **elderly patient** with abdominal pain has a high likelihood of surgical disease.
- Obtain an **EKG in elderly** patients and those with cardiac risk factors presenting with abdominal pain.
- A patient with **appendicitis** by history and physical examination does not need a CT scan to confirm the diagnosis.
- The use of abdominal ultrasound or CT may help evaluate patients over the age of 50 with unexplained abdominal or flank pain for the presence of AAA.