The semiology of acute abdomen

Bazeliuc iurii

The acute abdomen may be defined generally as an intraabdominal process causing severe pain and often requiring surgical intervention.

"An acute abdomen" denotes any sudden, spontaneous, disorder whose chief manifestation is in the abdominal area and for which urgent operation may be necessary. Because there is frequently a progressive underlying intra-abdominal disorder, undue delay in diagnosis and treatment adversely affects outcome

The Epidemiology of Acute Abdominal Pain

- ***5-10%*** *of all ED visits.*
- *Among them,* ***14-40%*** *patients need surgical intervention.*
- ***Challenge for emergency physician (EP):***
  - *About* ***1/3*** *have an atypical presentation.*
  - *If misdiagnosis, mortality rate* ***2.5*** *times higher than correct diagnosis in the elderly.*

General causes of the acute abdomen may be divided into six large categories:

- a. inflammatory
- b. mechanical
- c. neoplastic
- d. vascular
- e. congenital defects
- f. traumatic

Causes of Acute Abdomen

Causes of Acute Abdomen

Appendicitis
Peritonitis
Bowel Perforation
Pancreatitis
Diverticular disease
Cholecystitis
Perforating Gastric/Duodenal ulcer
Ruptured Ectopic Pregnancy
Ruptured or hemorrhagic ovarian cyst
Pelvic Inflammatory Disease
Abdominal Aortic Aneurysm
Tubo-ovarian abscess

Most common causes

Non-specific abdominal pain (NSAP)	35%
Acute appendicitis	17%
IO	15%
Urological causes	6%
Gallstone disease	5%
Colon diverticular disease	4%
Abdominal trauma	3%
Abdominal malignancy	3%
PPU	3%
Pancreatitis	3%

Uncommon conditions (1% or less)

Exacerbation of peptic ulcer

Ruptured AAA

Gynae causes

Imflammatory bowel disease

Medical conditions

Mesenteric ischemia

Gastroenteritis

Miscellaneous

Non-specific abdominal pain
accounts for 35% of admissions

- Viral infections
- Bacterial gastroenteritis
- Worm infestation
- Irritable bowel syndrome
- Gynecological causes
- Psychosomatic
- Abdominal wall pain:
  (rib tip pain, nerve root pain, hernias, myofascial syndromes)

BJS 1987

Mortality from acute abdomen

- 30-day mortality 4%
- Perioperative mortality 8%
  - <60yr 2%
  - 60-69yr 12%
  - >80yr 20%
- Common causes of mortality
  - irresectable tumor 28%
  - Rupture AAA 23%
  - PPU 16%
  - Colonic resection 14%

N=1190

BJS 1989

The inflammatory category of causes may be divided into two subgroups:

- 1) bacterial, and 2) chemical.
- Some common examples of the bacterial causes would include acute appendicitis, diverticulitis, and some cases of pelvic inflammatory disease.
- An example of a chemical cause would be a perforation of a peptic ulcer, where spillage of acid gastric contents causes an intense peritoneal reaction.

The primary symptom of the "acute abdomen" is – Abdominal pain.

ABDOMINAL PAIN IN ACUTE ABDOMEN

Pain is the most common and predominant presenting feature of an acute abdomen. Careful consideration of the

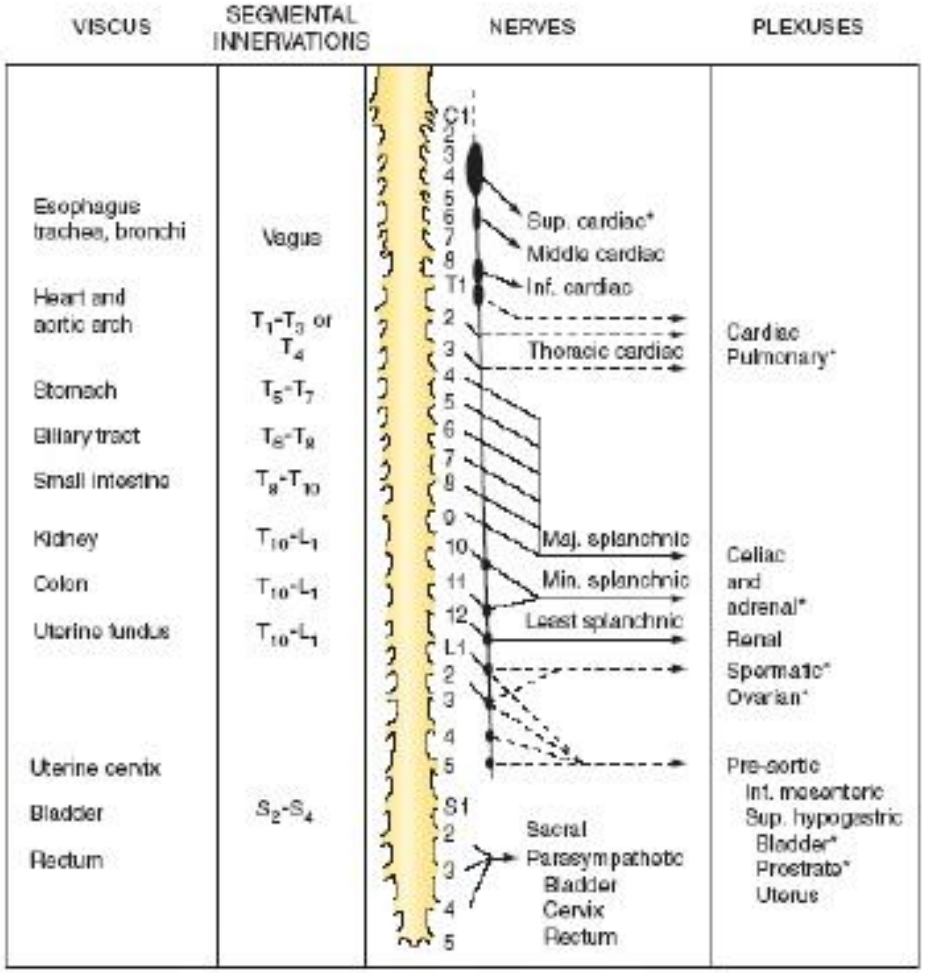
- Location,
- severity,
- mode of onset and progression,
- the character of the pain will suggest a preliminary list of diagnoses.

Abdominal pain may be

1. Visceral pain
2. Parietal Pain
3. Referred pain and shifting pain

Pathophysiology

- Visceral pain
  - Distention, inflammation or ischaemia in hollow viscous & solid organs
  - Localisation depends on the embryologic origin of the organ:
    - Forgut to epigastrium
    - Midgut to umbilicus
    - Hindgut to the hypogastric region
- Parietal pain
  - is localised to the dermatome above the site of the stimulus.
- Referred pain
  - produces symptoms, not signs e.g. tenderness



History

- Pain
  - SOCRATES
    - Site
    - Onset
    - Character
    - Radiation
    - Associated symptoms
    - Time course
    - Exacerbating/relieving factors
    - Severity

Visceral Pain

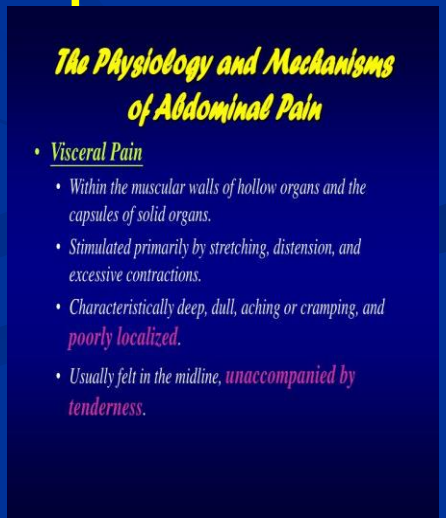
Results from stimulation of autonomic nerves in the visceral peritoneum which surrounds internal organs Stimuli may be hollow organ distension or capsular stretching of solid organs Pain is perceived from abdominal region that originated from the embryonic somatic portion

Visceral pain

– Distention, inflammation or ischemia in hollow viscous & solid organs – Localization depends on the embryologic origin of the organ: • Foregut to epigastrium • Midgut to umbilicus • Hindgut to the hypogastric region

Visceral Pain:

Distention, inflammation, ischemia or malignant infiltration of sensory nerves.
Slow in onset, dull, poorly localized.
Most often felt in the midline because of the bilateral sensory supply to the spinal cord.



Parietal Pain:

- Direct irritation parietal peritoneum by pus, bile, urine, or GI secretions.
- More acute, sharper, better localized pain.
- The cutaneous distribution of parietal pain corresponds to the T6- L1 areas.

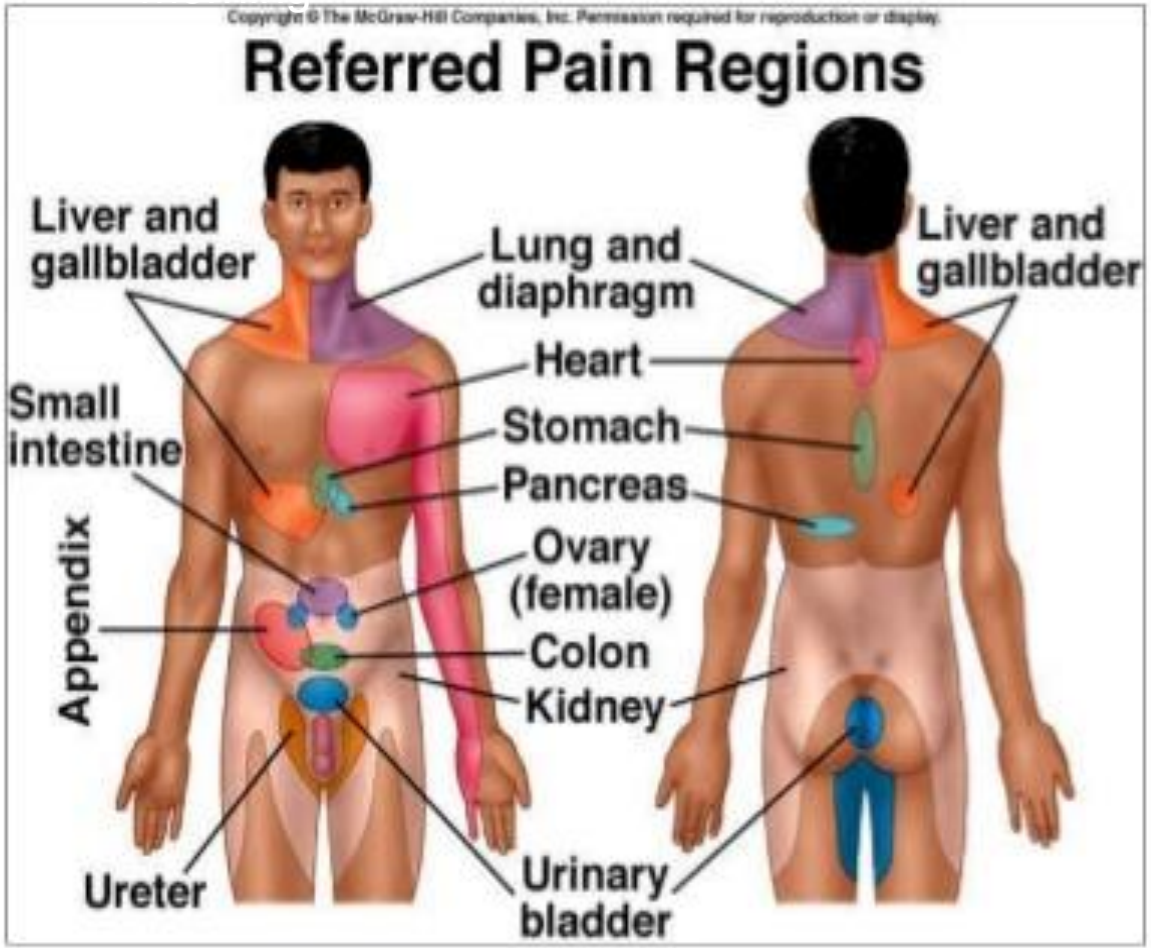
Referred pain/Radiation pain :

Extension of the pain(usually cutaneous sensations) from original site to another site with persisting pain at the originial site.

- Spreading or shifting pain: Origin of the pain is in one site later pain shifts to another site where pain at the initial site disappear.

Referred pain

Pain felt at a site other than where the cause is situated. An example is the pain from the pancreas, which is felt in the back. Pain in internal organs is often referred to sites distant from them.



The mode of onset of pain:

1. explosive (within seconds),
2. rapidly progressive (within 1-2 hours)
3. gradual (over several hours).

Character of Pain :

Character of Pain : The nature, severity, and periodicity of pain provide useful clues to the underlying ca**use**

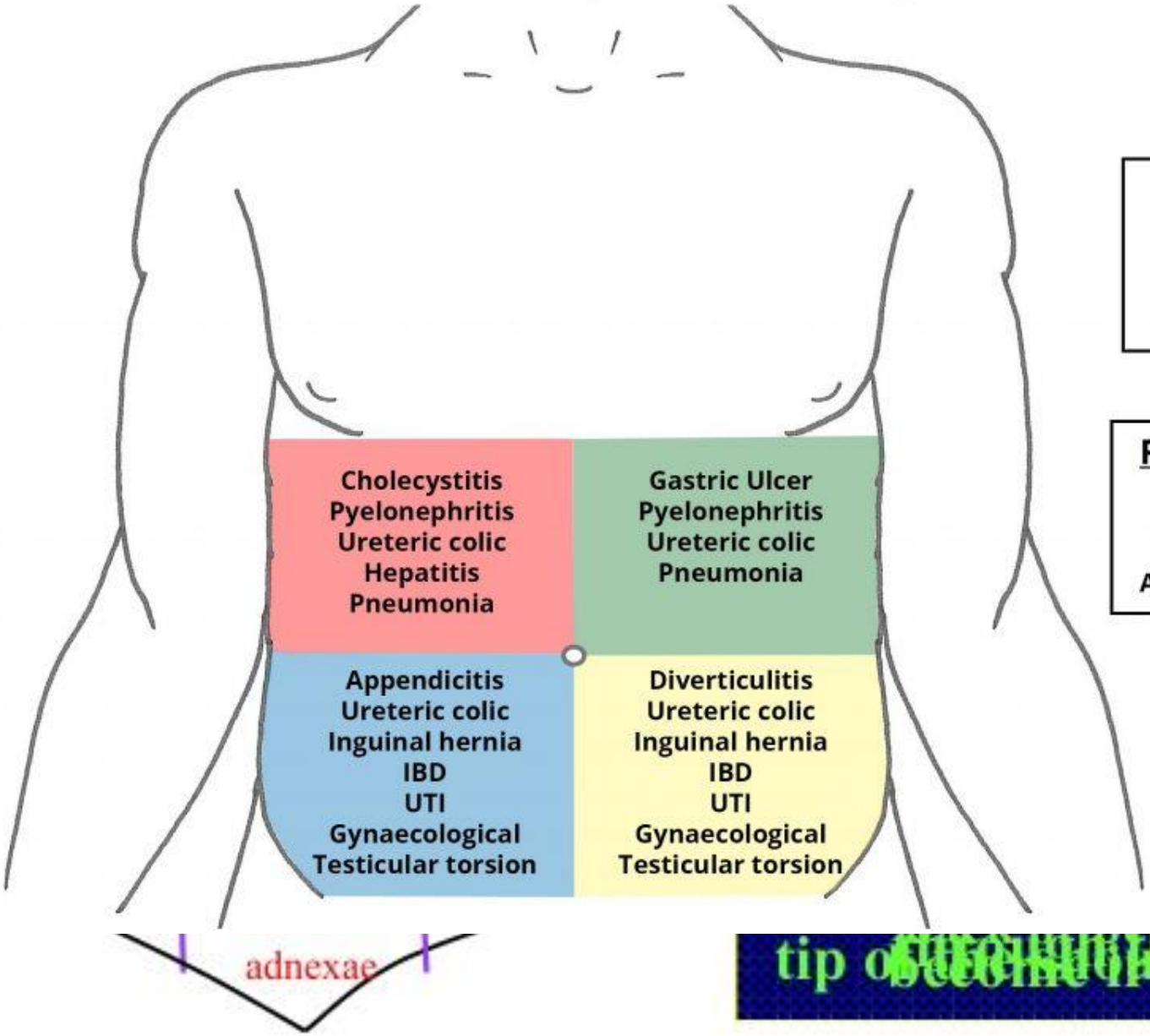
• Sharp superficial constant pain due to severe peritoneal irritation is typical of perforated ulcer or a ruptured appendix, ovarian cyst, or ectopic pregnancy

• The gripping, mounting pain of small bowel obstruction (and occasionally early pancreatitis) is usually intermittent, vague, deep-seated, and crescendo at first but soon becomes sharper, unremitting, and better localized

• Unlike the disquieting but bearable pain associated with bowel obstruction, pain caused by lesions occluding smaller conduits (bile ducts, uterine tubes, and ureters) rapidly becomes unbearably intense• colic if there are pain-free intervals that reflect intermittent smooth muscle contractions, as in ureteral colic

• "biliary colic" is a misnomer because biliary pain does not remit. The reason is that the gallbladder and bile duct, in contrast to the ureters and intestine, do not have peristaltic movements

• The "aching discomfort" of ulcer pain• the "stabbing, breathtaking" pain of acute pancreatitis and mesenteric infarction• the "searing" pain of ruptured aortic aneurysm



Epigastric Region

Peptic ulcer disease
Cholecystitis
Pancreatitis
Myocardial infarction

Peri-umbilical Region

Small bowel obstruction
Large bowel obstruction
Appendicitis
Abdominal aortic aneurysm

Generalized Abdominal Pain

- Perforation
- Abdominal Aortic Aneurysm
- Acute pancreatitis
- Bilateral pleurisy

Central Abdominal pain

- Early appendicitis
- Small Bowel Obstruction
- Acute gastritis
- Acute pancreatitis
- Ruptured AAA
- Acute mesenteric thrombosis

Epigastric pain

- Duodenal / gastric ulcer
- Esophagitis
- Biliary colic
- Acute pancreatitis
- AAA

Right Upper Quadrant Pain

Acute cholecystitis and biliary colic
Acute hepatitis
Perforated duodenal ulcer
Right lower lobe pneumonia
Hepatic abscess

Left Upper Quadrant Pain

Gastritis
Acute pancreaaaatitis
Splenic enlargement, rupture
Myocardial infarction
Left lower lobe pneumonia

Suprapubic pain

- Acute urinary retention
- UTIs
- Cystitis
- PID
- Ectopic pregnancy
- Diverticulitis

Right Lower Quadrant Pain

Appendicitis
Leaking Aneurysm
Ruptured ectopic pregnancy
Psoas abscess
Cecal diverticulitis

Loin pain

- Muscle strain
- UTIs
- Renal stones
- Pyelonephritis

Left Lower Quadrant Pain

Sigmoid diverticulitis
Leaking aneurysm
Ureteral calculi
PID
Incarcerated strangulated hernia

Abdominal pain onset

I. sudden(seconds)
 –A. perforation or rupture of a viscus:peptic ulcer, abdominal aortic aneurysm, esophagus, ectopic pregnancy,
–B. infarction: gut, heart, lung

Abdominal pain onset

II. rapid(minutes)
–A. colic syndromes: biliary, ureteral, small bowel obstruction(high)
–B. inflammatory processes: pancreatitis, diverticulitis, appendicitis, penetrating ulcer, cholecystitis
–C. ischemic processes: strangulation, torsion

Abdominal pain onset patterns

III. Gradual(hours)

A. inflammatory :appendicitis, cholec., pancreat., divertic., salpingitis, ¤ prostatitis, inflamm.bowel dis., intra - abdominal abscess

B. B. obstruction:distal small bowel or colon,ectopic pregnancy,urinary retention, incarcerated hernia

C. C. neoplastic:perforating or penetrating tumors (colon, stomach, small intestine)

VOMITING (OTHER ASSOCIATED SYMPTOMS)

1. Billous(green) : Intestinal obstruction, Malrotation or sepsis
2. Coffee ground : Gastritis, gastric ulcer, esophagitis.
3. Fresh blood : Esophagitis, gastritis, Gastric/duodenal ulcer, Mallory- Weiss tear
4. Food/Stomach content: Gastroenteritis, Early small intestinal obstruction.
5. Feculent: Late intestinal content.

OTHER SYMPTOMS ASSOCIATED WITH ABDOMINAL PAIN

1. Constipation : Suggest mechanical bowel obstruction.
2. Diarrhea: Suggests Pelvic abscess, blood stained suggests ischemic colitis, IBD etc
3. Fever: marker of inflammation
4. Other symptom: • Hematemesis • Hematochezia or melena a lower GI bleed or colonic ischemia and
5. • Hematuria, ureteral colic, or cystitis.

PAST MEDICAL & SURGICAL HISTORY Past Medical History:

1. Pulmonary TB
2. Cardiac Disease: AF
3. PUD
4. Biliary colic & Pancreatitis
5. IBD
6. Abdominal trauma i.e Delayed splenic bledding. Etc

Past Surgical History:

1. Previous abdominal surgery.
2. Mode of operation (laparoscopic, open, endovascular)
3. Operative notes and pathology reports should be obtained and reviewed.

OTHER RELEVANT ASPECTS OF THE HISTORY

Gynaecological History:

• 1. The menstrual history is is crucial to the diagnosis of ectopic pregnancy, mittelschmerz (due to a ruptured ovarian follicle) and endometriosis.

• 2. A history of vaginal discharge or dysmenorrhea may denote pelvic inflammatory disease.

1. Medication History: NSAIDS or aspirin, Anticoagulants or antiplatelet drug. OCP, Corticosteroid or chemotherapeutic or immunosuppressive drugs.
2. Family history: Hereditary pancreatits
3. Travel History : amebic liver abscess or hydatid cyst, malarial spleen, tuberculosis, Salmonella typhi infection of the ileocecal area, or dysentery.

Physical examination

Observation of the patients body habitus and facial expression – peritonitis :unwillingness to change posture, hip flexion with the knees drawn up, shallow breathing –colicky pain: intense movements to alleviate

PHYSICAL EXAMINATION

Appearance:

1. • Hippocratic facies
2. • Facies of dehydration

Physical examination

Appearance:

- – Bending Forward: acute Pancreatitis
- – Jaundiced: CBD obstruction
- – Dehydrated: Peritonitis, Small Bowel obstruction

Vital signs:

Important to see the hemodynamic state of the patient wither if the patient is tachycardic, tachypenic or hypotensive.

If vital signs disturped (Hypotension) they must be treated immediately to prevent patient going into shock. So if the patient in shock you have to cut the examination and go directly to resuscitate the patient by Airway, breathing and circulation(ABC), when he/she get stable now examine him/her.

Head and neck:

1/Check the eyes for jaundice. "jaundice+ fever+ abdominal pain to diagnose cholangitis_
2. JVP: in acute abdomen, patient will be hypovolemic hence the JVP will disappear
3. Mucus membrane: sings of dryness iv. Lymph node may present with lymphadenopathy
Virchow's nodes: enlarged left supraclavicular lymph nodes, usually in abdominal cancers (specially gastric cancer which is called Troisier's sign)

Chest: (because some chest problems presented with abdominal pain -e.g. Inferior MI, Lobar pneumonia-)

Pleural effusion caused by pneumonia. In lower pneumonia or lobar pneumonia you'll hear crackles and bronchial breathing.

-Aortic dissection

-Inferior MI > referral pain in epigastrium area > examine the heart.

Systemic Examination Abdomen:

- Inspection
  - Scaphoid or flat in peptic ulcer
  - Distended in ascites or intestinal obstruction
- Visible peristalsis in a thin or malnourished patient (with obstruction)

ABDOMINAL EXAMINATION

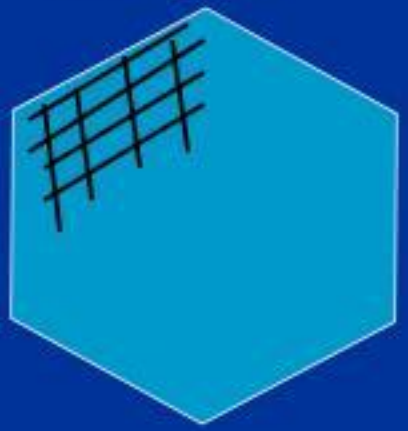
1. Inspection:
2. • Hernial Orifices
3. • Abdominal contour
4. • Respiratory Movement
5. • Peristaltic movement
6. • Visible swelling
7. • Skin condition

Physical examination Palpation :

- Check for Hernia sites
- Tenderness
- Rebound tenderness
- Guarding- involuntary spasm of muscles during palpation
- Rigidity- when abdominal muscles are tense board-like indicates peritonitis.

Peritoneal signs (early)

Localised



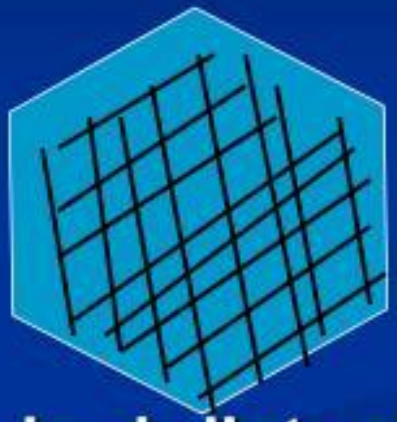
Light palpation tenderness, guarding

Percussion tenderness

Rebound tenderness

Peritoneal signs (late)

- Generalised peritonism / boardlike rigidity



- absent BS, abdominal distension due to paralytic ileus

OTHER EXAMINATION

1. Percussion:
2. • Shifting dullness – presence of free fluid
3. • Obliteration of liver dullness – pneumoperitoneum

Auscultaion :

• Silent – peritonitis

• Increase peristaaltic sound in intestinal obstruction

PR Examination:

tenderness
induration
mass
frank blood

PV Examination

Bleeding
Discharge
Cervical motion tenderness
Adnexal masses or tenderness
Uterine Size or Contour

Baseline Laboratory testing

ECG
Blood tests
Plain X-rays

May aid
Diagnosis

Preparation for
OT

Laboratory Examination

- *CBC & differential*
- *Serum electrolyte (K, Bicarbonate)*
- *Urinalysis*
- *ß-HCG – woman of childbearing age*
- *Bilirubin, Alk-p, ALT, AST, G-GT – RUQ pain, jaundice*
- *Amylase, lipase – epigastralgia*
- *PT, APTT*
- *EKG, CK – epigastralgia with aged patient*

Complete Blood Count:

A. High WBC "Leukocytosis" more than 10,000 is a suggestive of inflammatory proces.

B. Low hemoglobin indicates hemorrhage, UC, Ischemia, Ulcer, anemia.

C. Platelet count, if the patient is thrombocytopenic because sometimes thrombocytopenia can happen due to severe sepsis.

Electrolytes, BUN (Blood urea nitrogen), Creatinine:

A. In acute abdomen, there usually be loss of fluid and electrolytes will decrease. UEs are essential in patients who might be hypovolemic in order to monitor fluid replacement, particularly if surgery is being considered. B. Hypokalemia from upper GI cause (In vomiting you expect low potassium) C. Hyponatremia from lower GI cause (diarrhea) D. BUN & Creatinine elevated? In acute abdomen: hypovolemic leading to insufficient profusion to the kidney that will lead to renal failure.

Liver Function test:

A. If you suspect jaundice, biliary disease and cholangitis.
B. High bilirubin and high alkaline phosphatase are suggestive of choledocholithiasis.
C. High ALT and AST are suggestive of Hepatitis.

Serum Amylase - Lipase:

A. Amylase will be high in pancreatitis but it will go down after 2-3 days, so check lipase because it will persist high in pancreatitis. A serum amylase greater than three times the upper limit of normal is highly suggestive of acute pancreatitis. In patients with acute pancreatitis who present more than 48 hours after the onset of pain, the serum amylase may have returned to normal. In these patients, measurement of the urinary amylase may be of value

Blood glucose:

Measurement of blood glucose is important, as diabetic ketoacidosis may present with acute abdominal pain, and also because any serious illness can result in poor glycemic control, particularly in diabetic patients.

Urinalysis:

Haematuria may result from a wide range of conditions but in the context of acute abdominal pain may indicate a urinary tract tumour, infection or nephrolithiasis. Glucose or ketones in the urine indicate recent starvation or possible diabetic ketoacidosis. Protein, bilirubin or casts in the urine suggest renal or liver disease.

Important Imaging Studies for Acute Abdomen

- *Standing **CXR** and **KUB***
- ***Ultrasound**: for solid organs.*
- ***CT** of abdomen for abscess, free air, vessel, tumor and ischemia bowel.(gold standard for finding acute appendicitis)*
- ***Angiography**: Especially in non-diagnostic ischemia bowel.*

IMAGING STUDIES

A. Plain Chest X-Ray Studies:

- lower lobe pneumonia or ruptured esophagus
- An elevated hemidiaphragm or pleural effusion
- In CXR Subdiaphragmatic air(Pneumoperitoneum) more sensitive than abdominal plain films for free intraperitoneal air.

Abdominal X Ray Studies:

- Multiple air fluid level to identify intestinal obstruction.
- Pneumoperitoneum
- Calculous, Calcification, intraperitoneal and retroperitoneal collections etc.

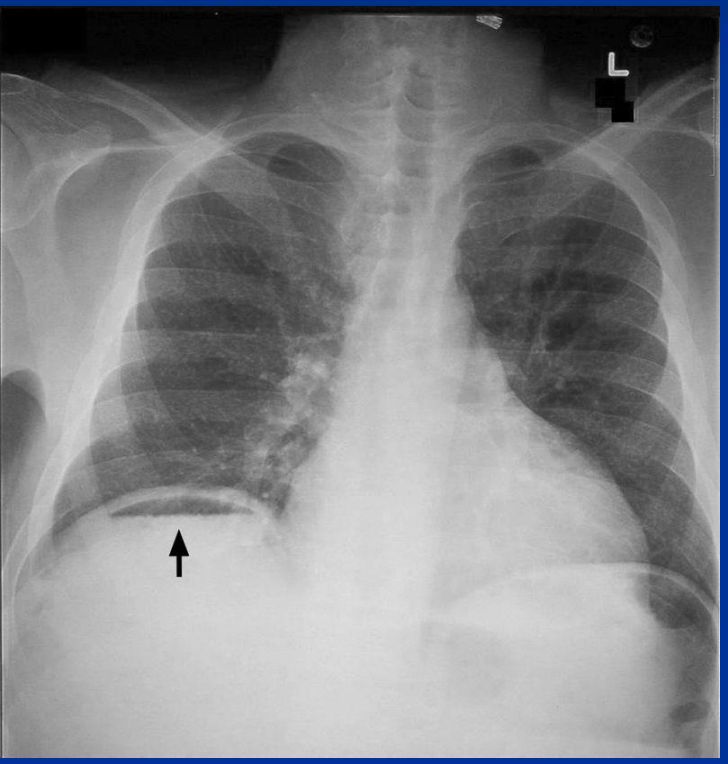
Plain Films

- ***Upright CXR***
  - *"Free" air*
- ***KUB***
  (kidney/ureter/bladder)
  - *Calcifications*
  - *Air/ Fluid levels*
  - *Reactive bowel patterns*
  - *Foreign bodies*

Lateral Decubitus Film

Plain X-rays

Sensitive for free air 90-95%



Erect CXR

Bowel obstruction- 70% sensitive

Aerobilia (RPC, GS ileus)

Supine AXR

Plain X-rays

GS 10%

Renal stones 90% radio-opaque

Normal X-rays does not exclude acute abdomen!

Ultrasound

- *Rapid, safe, low cost*
  - *Operator dependent*
- *Fluid, inflammation, air in walls, masses*
- *Liver, GB, CBD, Spleen, Pancreas, Appendix, Kidney, Ovaries, Uterus*

Imaging-Ultrasound

Good first line investigation for most intra-abdominal conditons

Non-invasive, no radiation

Cons: operator dependent

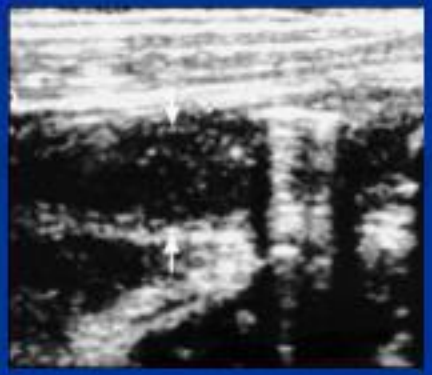
Imaging-Ultrasound

Biliary tract

Cholecystitis (95%)

Cholangitis

Appendicitis (80-90%



Vascular emergencies

AAA

Gynaecological conditions

Ovarian cysts (rupture, torsion)

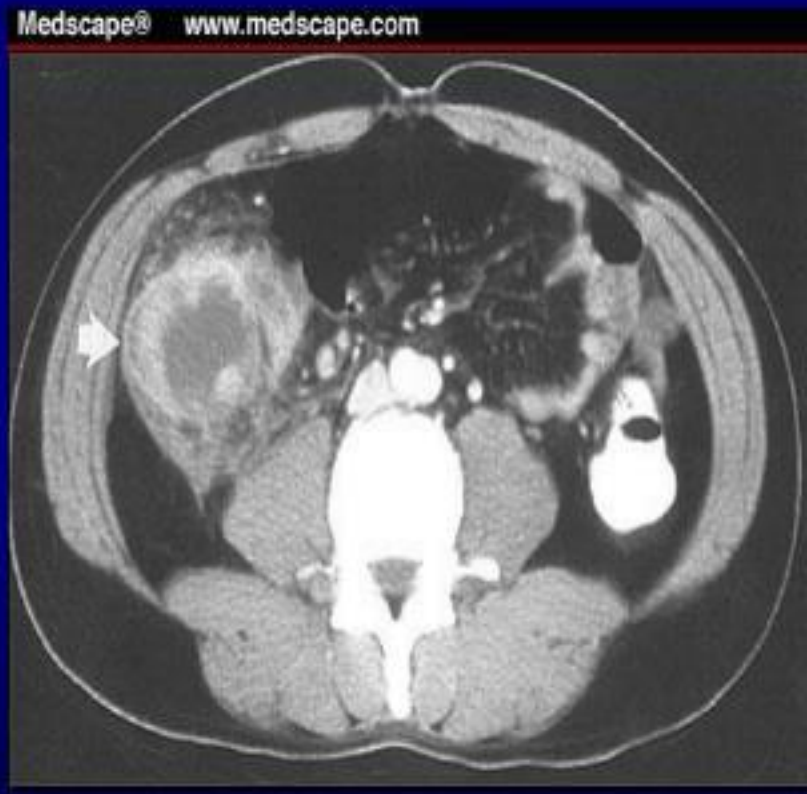
Ectopic(TVS)

Urological conditions

(renal, ureteric stones, hydronephrosis)

CT Scans

- *Better than plain films and US for evaluation of solid and hollow organs*
  - *Intravenous contrast*
  - *Oral contrast*
  - *Per rectal contrast*
- *High use in appendicitis, diverticulitis, abscess, pancreatitis*



CT scan

High accuracy in most acute abdominal conditions

- **GI**

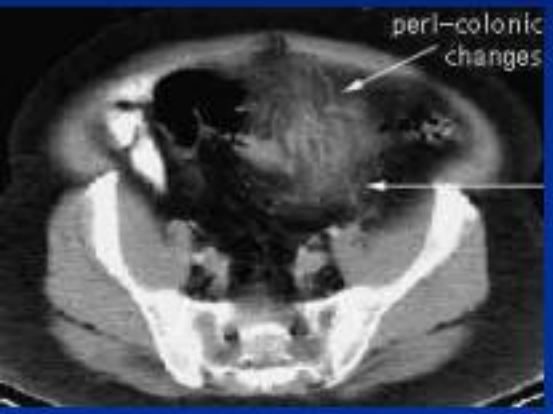
Small/ large bowel obstruction	(cut-off/tumor/staging)
Diverticulitis	(hinchey grading)

- **Vascular**

AAA (esp leaking)	retroperit haematoma
Aortic dissection	double lumen
Mesenteric ischemia	occlusion/stenosis

- **Hepatobiliary**

Biliary tract	dilatation/stones
Rupture HCC	tumor/free ip blood
Pancreatitis	oedema/ necrosis



Diverticulitis

SBO (adhesion)

LBO (sigmoid ca)

CT ANGIOGRAPHY (CTA),OR MAGNETIC RESONANCE ANGIOGRAPHY (MRA)

- Intestinal ischemia or ongoing hemorrhage.
- May identify the bleeding site in Pt with massive lower GI bleeding,
- Additionally it can be therapeutic for coiling or embolizing of bleeding vessel's

ROLE OF ENDOSCOPY IN ACUTE ABDOMEN

- Urgent ERCP may be indicated in cases of suspected cholangitis.
- Sigmoidoscopy to reducing a sigmoid volvulus • colonoscopy to locate the source of bleeding in cases of lower GI hemorrhage

ROLE OF LAPAROSCOPY IN ACUTE ABDOMEN

- Laparoscopy is a therapeutic as well as diagnostic modality
- In cases of unclear diagnosis, it guide surgical planning and avoid unneeded laparotomies.
- In young women, it may distinguish a nonsurgical problem (ruptured graafian follicle, pelvic inflammatory disease, tubo-ovarian disease) from appendicitis

The Identification of High Risk Patients with Acute Abdomen

- *Elderly > 65 y*
- *S/S of Shock*
- *Peritoneal sign (+)*
- *silent bowel sound*
- *Pulsatile mass*
- *Refractory pain post Tx*
- *The immunocompromised. (e.g. HIV)*
- *Women of childbearing age.*
- *Elevation of Band WBC*
- *Fever cause*
- *Hypothermia*
- *Acute renal failure*
- *Not post-surgical obstruction*

Emergency Department Management of Acute Abdomen

- *IV volume replacement and NG decompression*
- *Antibiotics: indicated if infection is suspected.*
- *Narcotic analgesia (?) Timing (?)*
  - ***Pro:*** *Permit a more accurate history and PE. Morphine (2-5 mg IV)*
  - ***Con:*** *Surgeon is hostile to this approach, consultation immediately.*

Resuscitation

- ABC
- Severely ill patients (ie MOF) may need ICU
- Establish iv access: may need > 1 large bore iv cannulas (bleeding 2)
- Rehydate (N/S or colloid 500mls stat)
- Monitoring (BP/PR/UO/CVP/SaO2)

evaluation and management of acute surgical abdomen

Immediate operation – these patients will die unless taken to theatre immediately

- e.g. ruptured abdominal aortic aneurysm.

Preoperative preparation and operation urgently within 6 h – elderly patients

- may present with an acute abdomen and require urgent operation;e.g. Peritonitis due to Perforated Duodenal Ulcer or perforated appendix; however,
- preoperative dehydration and electrolyte abnormalities need to be corrected
- before going to theatre.

Urgent operation (within 24 h) – certain conditions, particularly in young

- patients, may be dealt with on a routine emergency list, e.g. acute appendicitis, small bowel obstruction with no adverse symptoms (e.g. no fever, no leukocytosis, no peritonism).

evaluation and management of acute surgical abdomen

Conservative treatment

- Numerous causes of an acute abdomen only require conservative treatment, i.e. nil by mouth, antibiotics (e.g. acute cholecystitis).

Observation

- Many patients may have equivocal clinical signs but be in the early stages of a condition. Time is a great diagnostic tool and frequent re-examination may reveal evolving signs.

Discharge.

Definitive treatment

- **Conservative**

  (eg NSAP, equivical perionitis, early diverticulitis)
  (NPO, IVF, Serial examinations, Monitoring of vitals, +/- systemic antibiotics)

- **Surgery**

  - Urgent (AAA, strangulated bowel, mesenteric ischemia)
  - Semi-urgent (acute cholecystitis, acute appendicitis, noncomplicated IO)

- **Interventional radiology / Endoscopy**

  - ERCP: cholangitis
  - Colonoscopic decompression of sigmoid volvulus
  - Angiography and embolisation: rupture HCC
  - Image guided aspiration of collection/diverticular abscess

Factors determining need of SURGERY

- Peritoneal signs signifying Secondary peritonitis (perforated viscus)

  Most common cause of surgery (50%) but usually semiurgent (after adequate rescuscitation)*

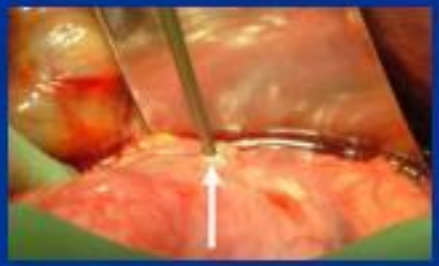
  **except unexplained sepsis and MOF*

- Vascular events
  - Rupture AAA
  - Rupture HCC (failed embolism)
  - Ischemic bowel

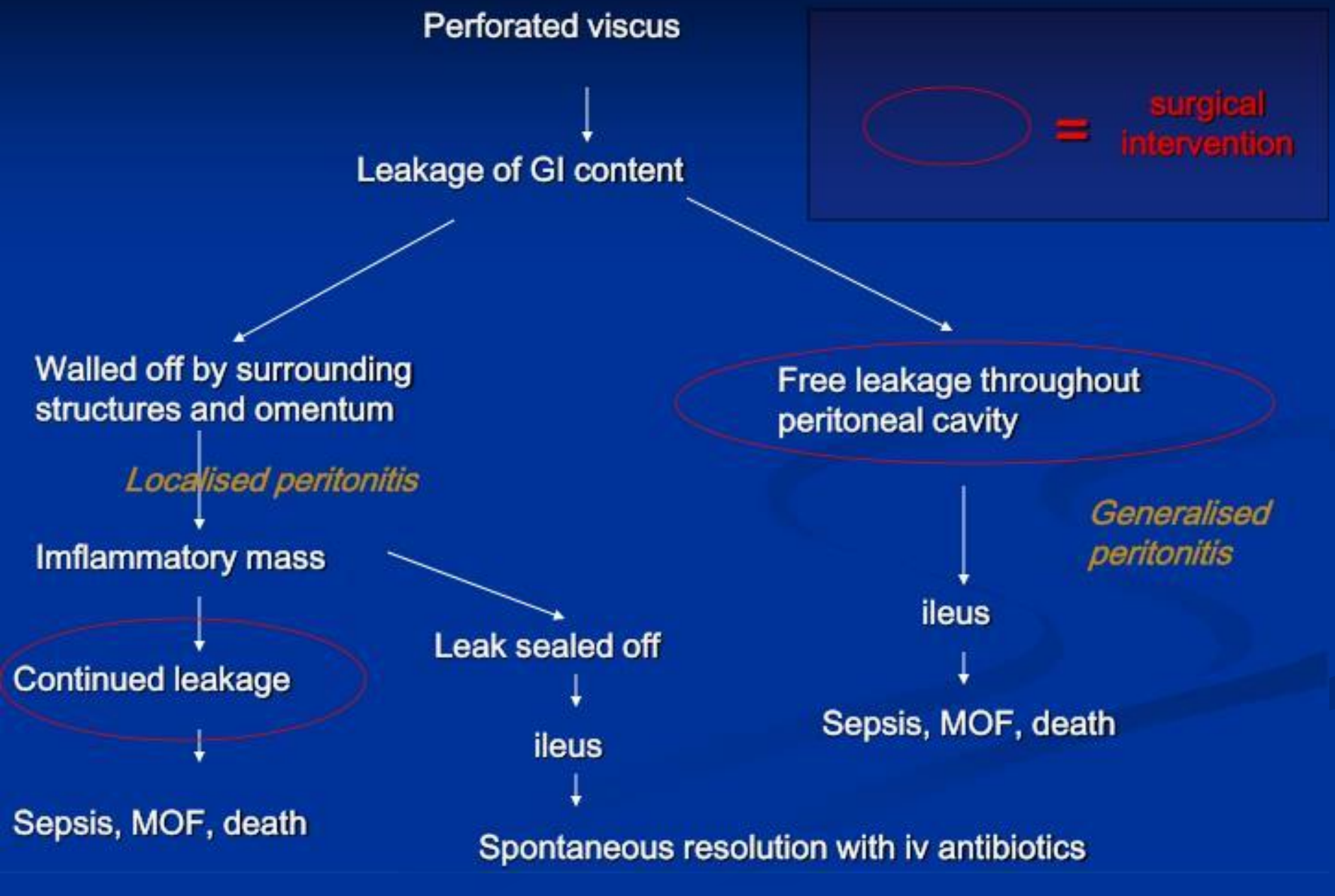
  Rare (<1%) but urgent intervention needed

Secondary peritonitis
Perforated/imflamed viscus

*majority need laparotomy or lap-assisted procedures



Natural hx of secondary peritonitis

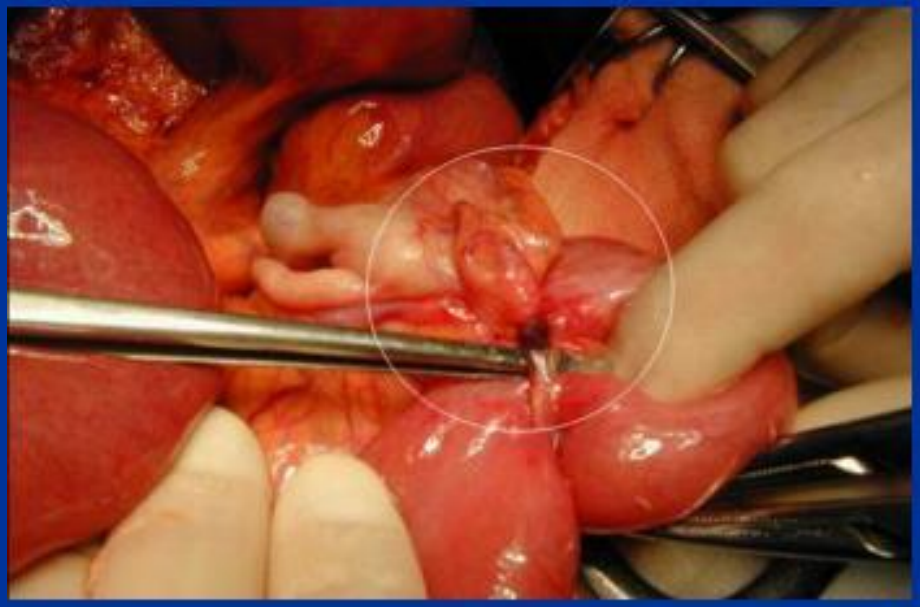


Intestinal obstruction can be urgent or nonurgent ....

Simple Mechanical Obstruction

vs

Strangulating



Can wait

Cannot wait