Acute abdomen

Giuseppe Nigri

UOC Chirurgia Generale

Dipartimento di Scienze Medico-Chirurgiche e Medicina Traslazionale

Sapienza Universtità di Roma

giuseppe.nigri@uniroma1.it

•72 year-old gentelman is admitted to the ER for sudden onset of sharp pain in the left lower quadrant.

•What would you ask to the patient?

•What would you ask to the nurse?

•BP 90/70, HR 105, RR 32, Sat. 98

•What would you do next?

Serum glucose 110 mg/dl (70 to 100)
Serum creatinine 1.3 mg/dL (0.5 to 1.0)
Tot Bil. 1.1 mg/dl (0.3-1.1)
Dir Bil. 0.6 mg/dl (0-0.3)
sGOT 32 UI/L (11-47)
sGPT 34 UI/L (7-53)
A.Ph. 123 UI/L (38-126)
Amilase 52 U/L
Lipase 34 U/L
Serum calcium 9.0 mg/dl (8.9-10.1)
C-reactive protein: 33 mg/L (0-10)

Hct 52% (male: 40% to 50% - women: 36% to 44%)
Hb 12.1 g/dl (13.8-17.2)
WBC 22.900/µl (3.800-9.800)
PLT 224.000/µl (140-440.000)
INR 1.0 (0.9-1.13)

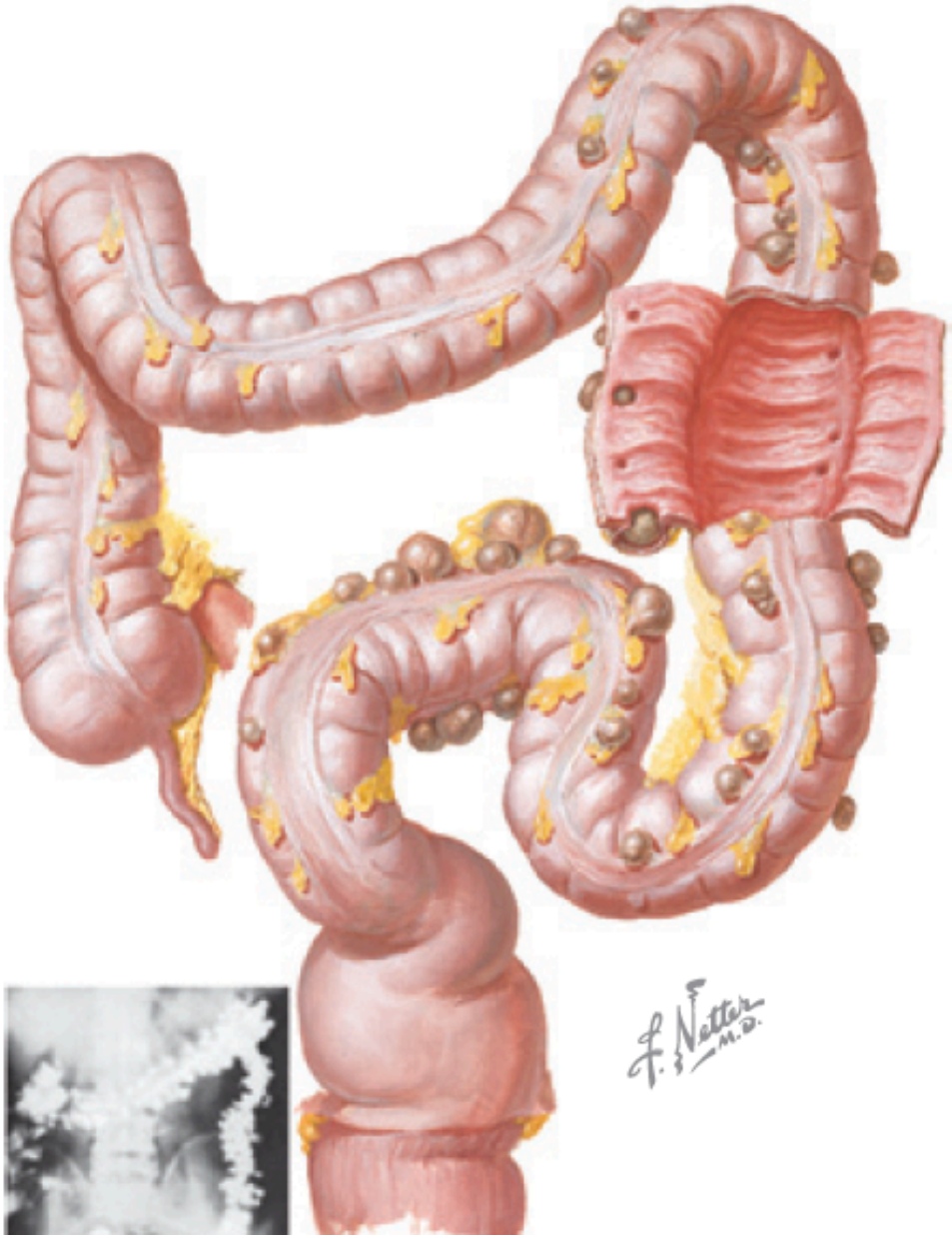
Serum lactate 1.5 Arterial blood: 0.5-1.6 mEq/L or 0.5-1.6 mmol/L
Venous blood: 0.5-2.2 mEq/L or 0.5-2.2 mMol/L

Serum glucose 110 mg/dl (70 to 100)
Serum creatinine 1.3 mg/dL (0.5 to 1.0)
Tot Bil. 1.1 mg/dl (0.3-1.1)
Dir Bil. 0.6 mg/dl (0-0.3)
sGOT 32 UI/L (11-47)
sGPT 34 UI/L (7-53)
A.Ph. 123 UI/L (38-126)
Amilase 52 U/L
Lipase 34 U/L
Serum calcium 9.0 mg/dl (8.9-10.1)
C-reactive protein: 33 mg/L (0-10)

Hct 52% (male: 40% to 50% - women: 36% to 44%)
Hb 12.1 g/dl (13.8-17.2)
WBC 22.900/µl (3.800-9.800)
PLT 224.000/µl (140-440.000)
INR 1.0 (0.9-1.13)

Serum lactate 1.5 Arterial blood: 0.5-1.6 mEq/L or 0.5-1.6 mmol/L
Venous blood: 0.5-2.2 mEq/L or 0.5-2.2 mMol/L

What would you do next?


F. Netter M.D.

ACUTE ABDOMEN

- **Acute abdomen** refers to signs and symptoms of **abdominal pain and tenderness**
- It often requires **emergency surgical therapy**
- It also requires **thorough and expeditious workup** to determine the need for operative intervention
- **Many diseases**, some of which are not surgical or even intra-abdominal, can **produce acute abdominal pain and tenderness**
- Therefore, be careful to make a **correct diagnosis**

ACUTE ABDOMEN

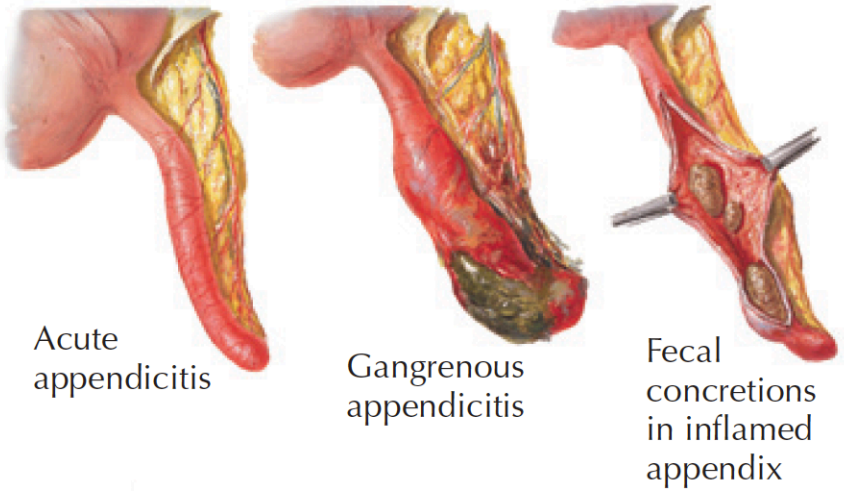
•The diagnoses vary according to **age and gender**

- **Appendicitis** is more common in younger
- **Biliary disease, bowel obstruction, intestinal ischemia and diverticulitis** are more common in older adults

•Most **surgical diseases** associated with an acute abdomen result from **infection, obstruction, ischemia, or perforation**

•**Nonsurgical causes** of an acute abdomen:

- Endocrine and metabolic
- Hematologic
- Toxins or drugs



ACUTE ABDOMEN

Endocrine and metabolic

- Uremia
- Diabetic crisis
- Addisonian crisis
- Acute intermittent porphyria
- Acute hyperlipoproteinemia
- Hereditary Mediterranean fever

Hematologic

- Sickle cells crisis
- Acute leukemia
- Other blood dyscrasias

Toxins or drugs

- Lead and other heavy metals toxins
- Narcotic withdrawal
- Black widow spider poisoning

ACUTE ABDOMEN

•The most important part of the evaluation are

- **history and careful physical examination** which guide **laboratory and imaging studies**

ACUTE ABDOMEN

SURGICAL ACUTE ABDOMEN

Hemorrhage

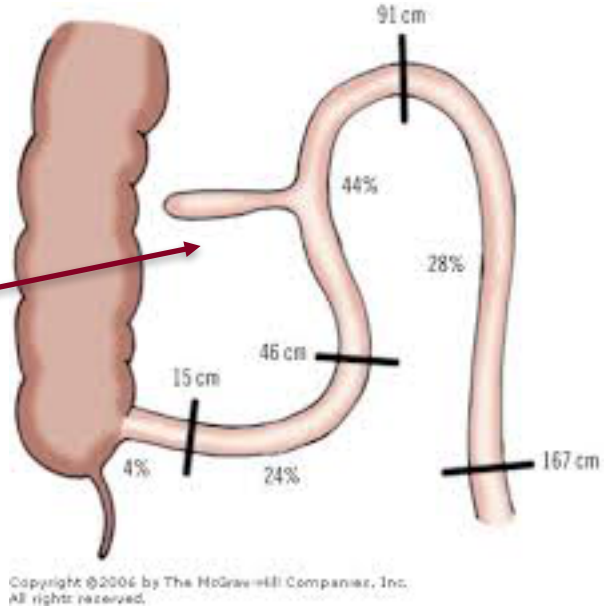
- Solid organ trauma
- Leaking or ruptured arterial aneurysm
- Ruptured ectopic pregnancy
- Bleeding of a gastrointestinal diverticulum
- Arteriovenous malformation of gastrointestinal tract
- GI ulceration
- Aortoduodenal fistula after aortic vascular graft
- Hemorrhagic pancreatitis
- Mallory-Weiss syndrome
- Spontaneous rupture of spleen

ACUTE ABDOMEN

SURGICAL ACUTE ABDOMEN

Infection

- Appendicitis
- Cholecystitis
- Meckel's diverticulitis
- Hepatic abscess
- Diverticular abscess
- Psoas abscess



Perforation

- Perforated gastrointestinal ulcer
- Perforated gastrointestinal cancer
- Boerhaave's syndrome
- Perforated diverticulum

ACUTE ABDOMEN

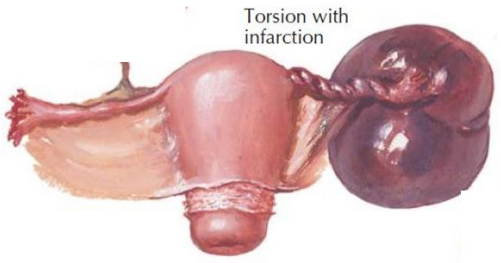
SURGICAL ACUTE ABDOMEN

Blockage/Obstruction

- Adhesions causing small/large bowel obstruction
- Sigmoid volvulus
- Cecal volvulus
- Incarcerated hernias
- Inflammatory bowel disease
- Gastrointestinal malignancy
- Intussusception

Ischemia

- Buerger's disease
- Mesenteric thrombosis/embolism
- Ovarian torsion
- Ischemic colitis
- Testicular torsion
- Strangulated hernias



ANATOMY AND PHYSIOLOGY

Abdominal pain is divided in

- **Visceral pain**, vague and poorly localized to epigastrium, periumbilical region or hypogastrium depending on its origin from the primitive foregut, midgut or hindgut
  - It is usually related to distention of an hollow viscus

- **Parietal pain** corresponds to the segmental nerve roots innervating the peritoneum and tends to be sharper and better localized

- **Referred pain** is pain perceived at a site distant from the source of stimulus (for example irritation of the diaphragm may produce pain in the shoulder)

- **Severe tenderness** to palpation, with or without **rebound tenderness,** and **guarding**

BOX 47-3

Locations and Causes of Referred Pain

Right Shoulder

Liver

Gallbladder

Right hemidiaphragm

Left Shoulder

Heart

Tail of pancreas

Spleen

Left hemidiaphragm

Scrotum and Testicles

Ureter

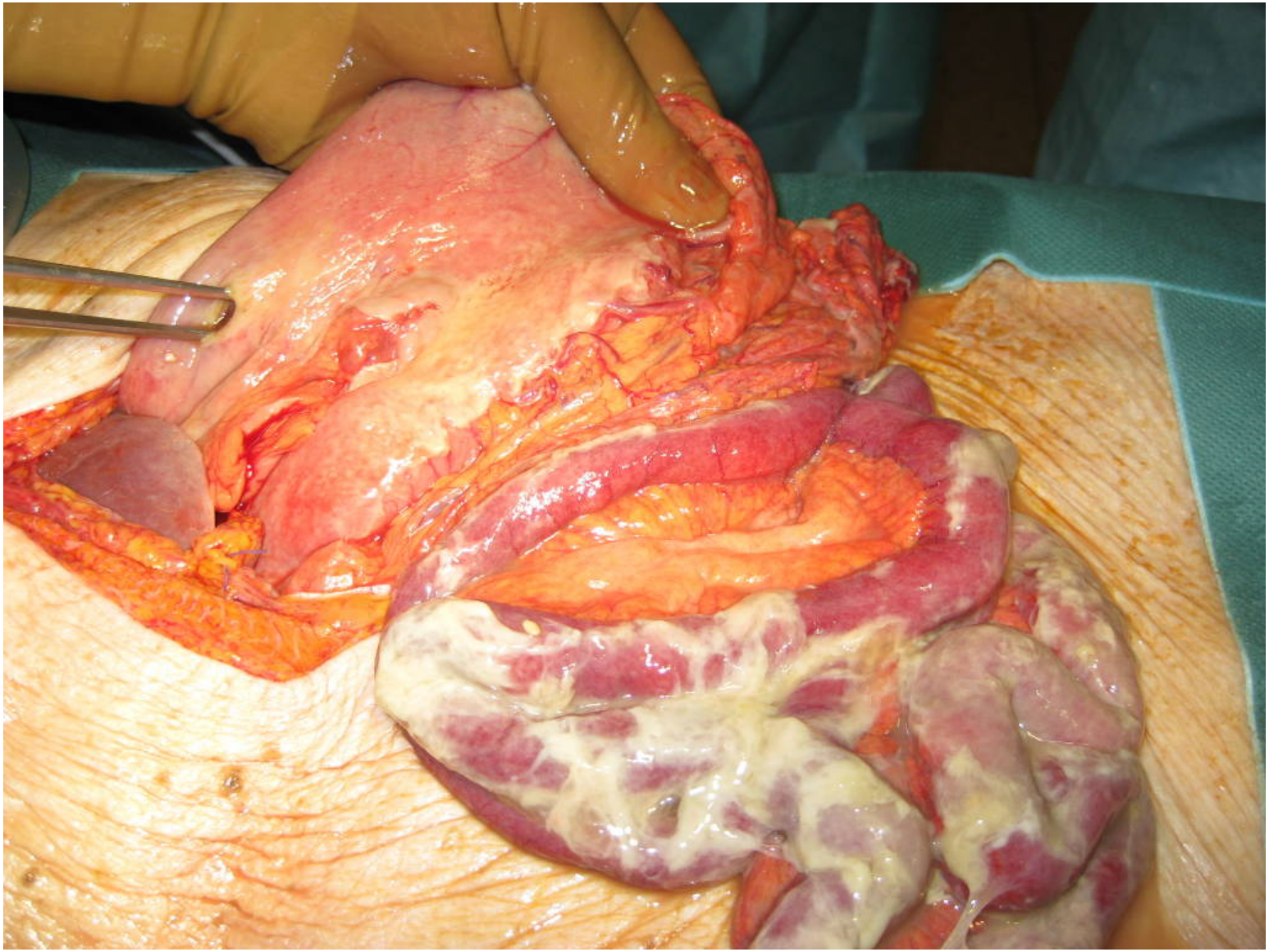
ANATOMY AND PHYSIOLOGY

- **Bacteria or irritating chemicals** → peritoneal cavity → peritoneum **↑ blood flow, ↑ permeability, and formation of a fibrinous exudate** on its surface

- **Peritonitis is peritoneal inflammation of any cause; it** may affect the **entire abdominal cavity or part** of the visceral or parietal peritoneum

- **Bowel develops local or generalized paralysis**

- An **abscess** → sharply localized pain, with normal bowel sounds and gastrointestinal function, whereas a **diffuse process** (perforated duodenal ulcer) → generalized abdominal pain, with a quiet abdomen



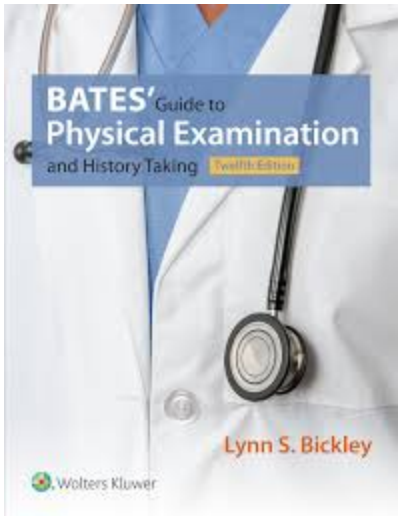
Peritonitis

ANATOMY AND PHYSIOLOGY

- Most often peritonitis is due to **a gram-negative infection with an enteric organism or anaerobe**
- But also it can be due to **noninfectious inflammation**; i.e. **pancreatitis**
- **Primary peritonitis** occurs more commonly in **children**: caused by *Pneumococcus* or hemolytic *Streptococcus* spp
- Adults with **end-stage renal disease** on peritoneal dialysis can develop **gram-positive cocci peritonitis**
- Adults with **ascites and cirrhosis** can develop peritonitis due to *Escherichia coli* and *Klebsiella* spp.

HISTORY

- **A detailed and organized history is essential**
- Questions should be **open-ended**. Ask for caractheristics of the pain
    - Onset
    - Character
    - Location
    - Duration
    - Radiation
    - Chronology
- Avoid the patient answers yes or no

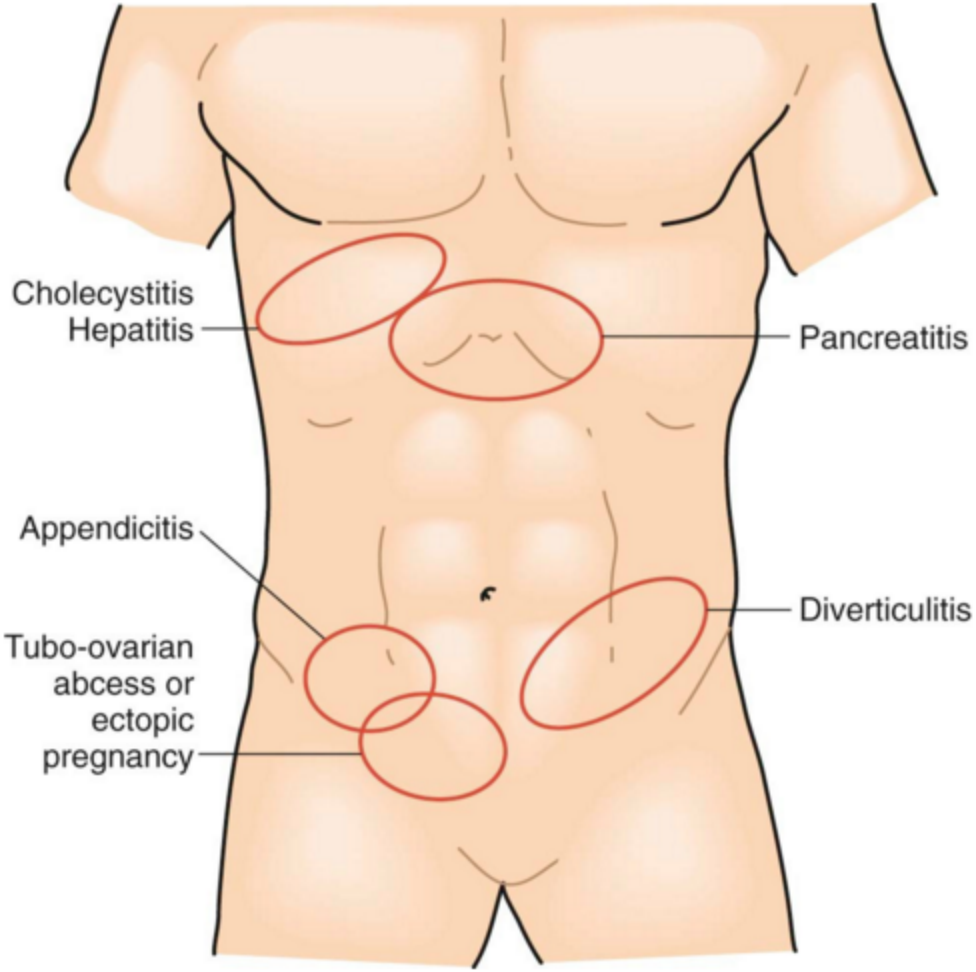


HISTORY

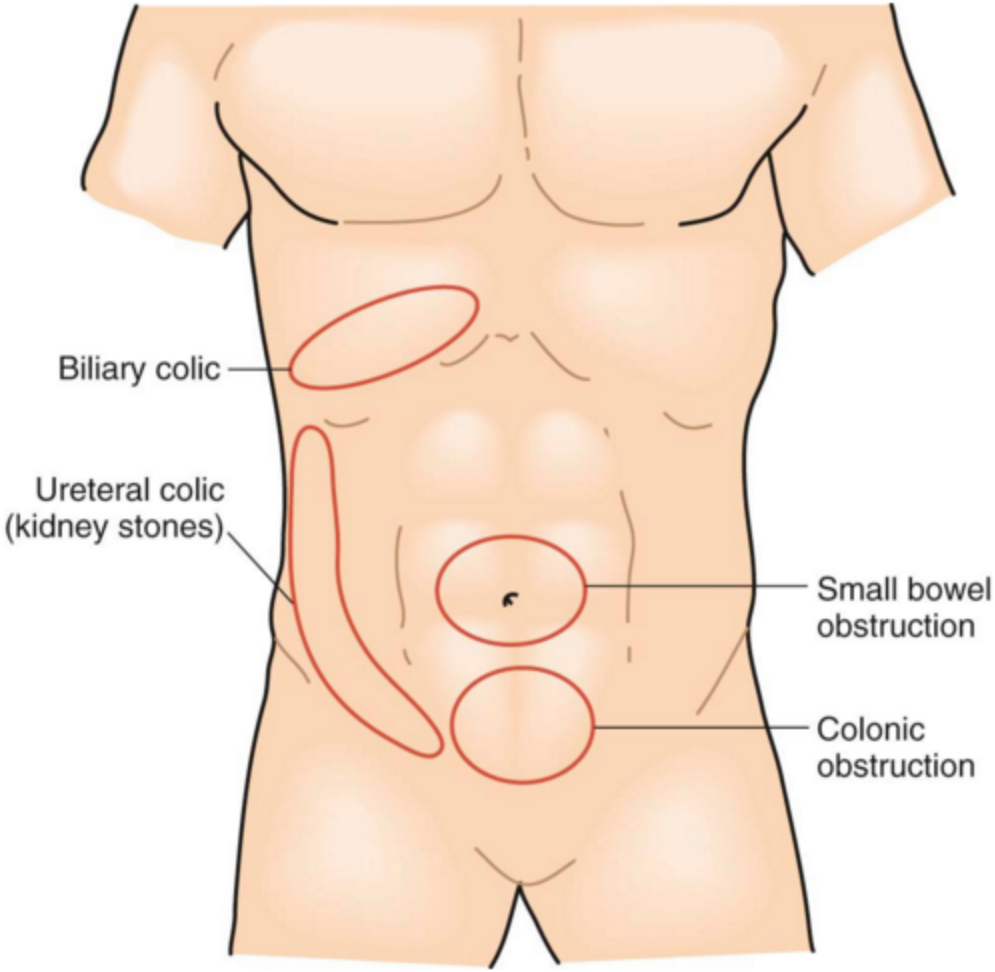
- Pain identified with **one finger** is often more localized and typical of **parietal innervation or peritoneal inflammation**

- **Sudden onset** of excruciating pain suggests **intestinal perforation** or **arterial embolization with ischemia**

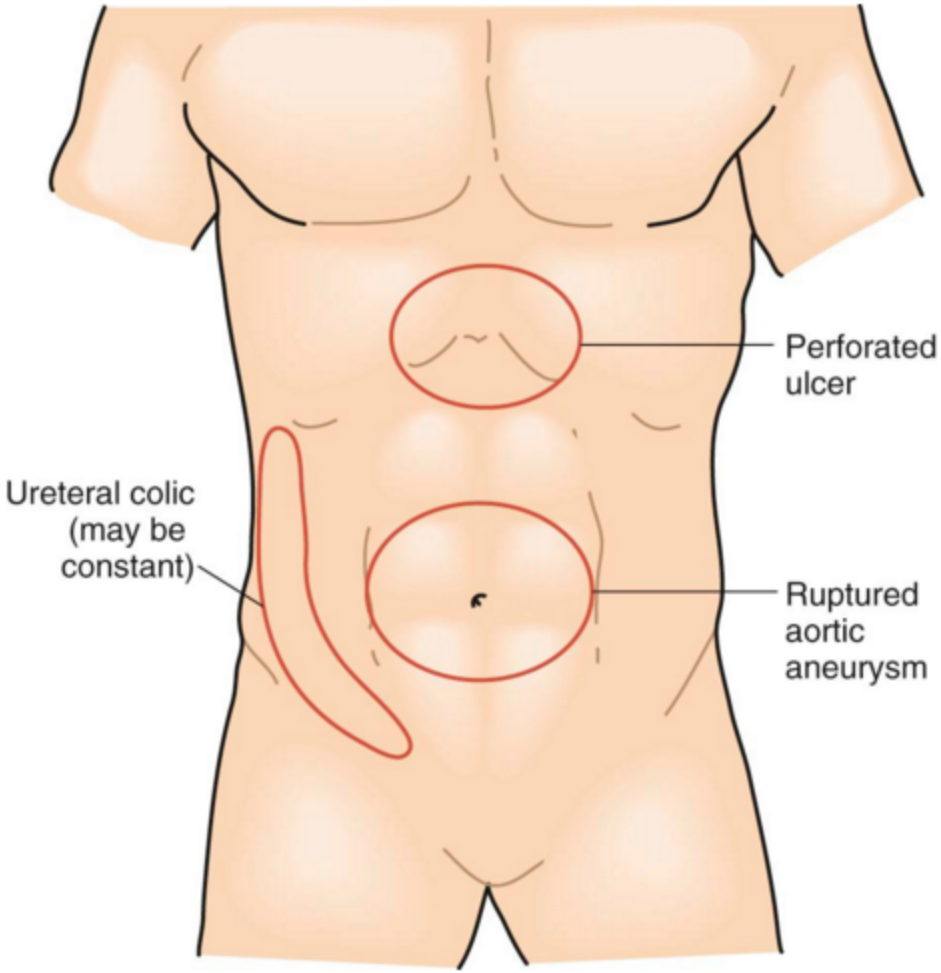
- **Pain that develops and worsens over several hours** is typical of **progressive inflammation or infection** such **as cholecystitis, colitis, and bowel obstruction**



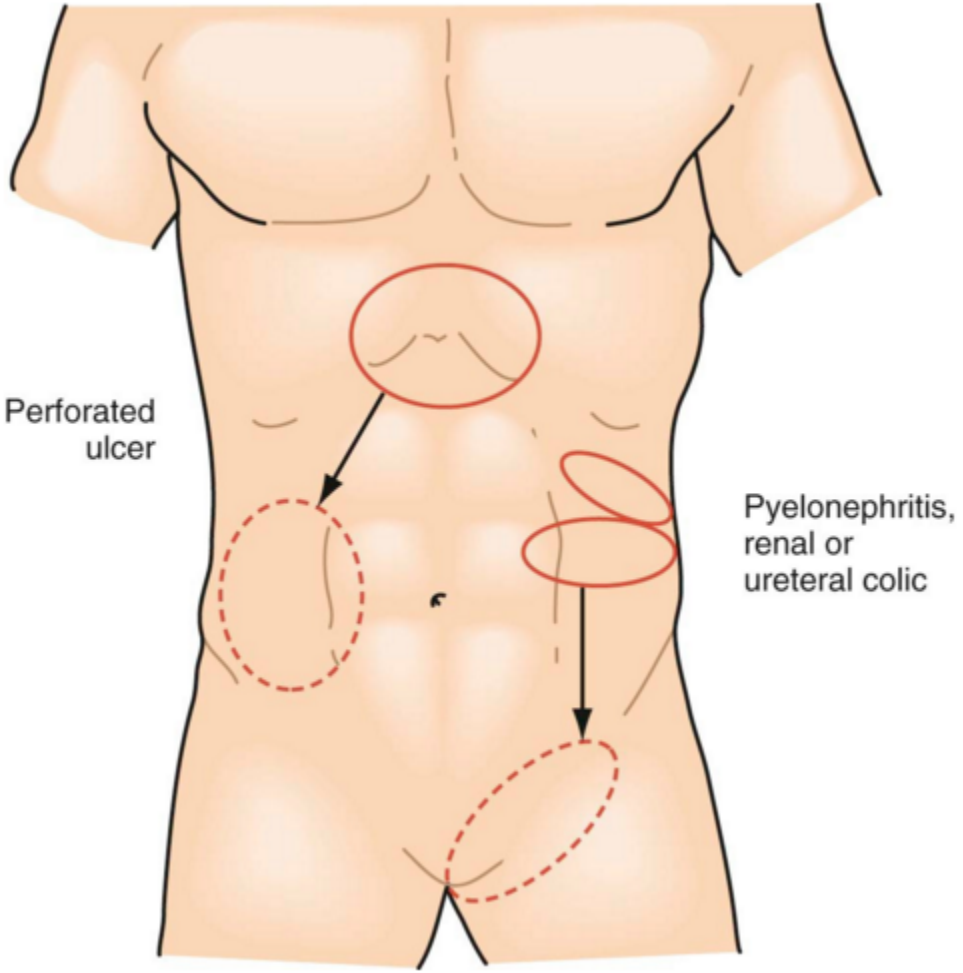
Character of pain—gradual, progressive pain



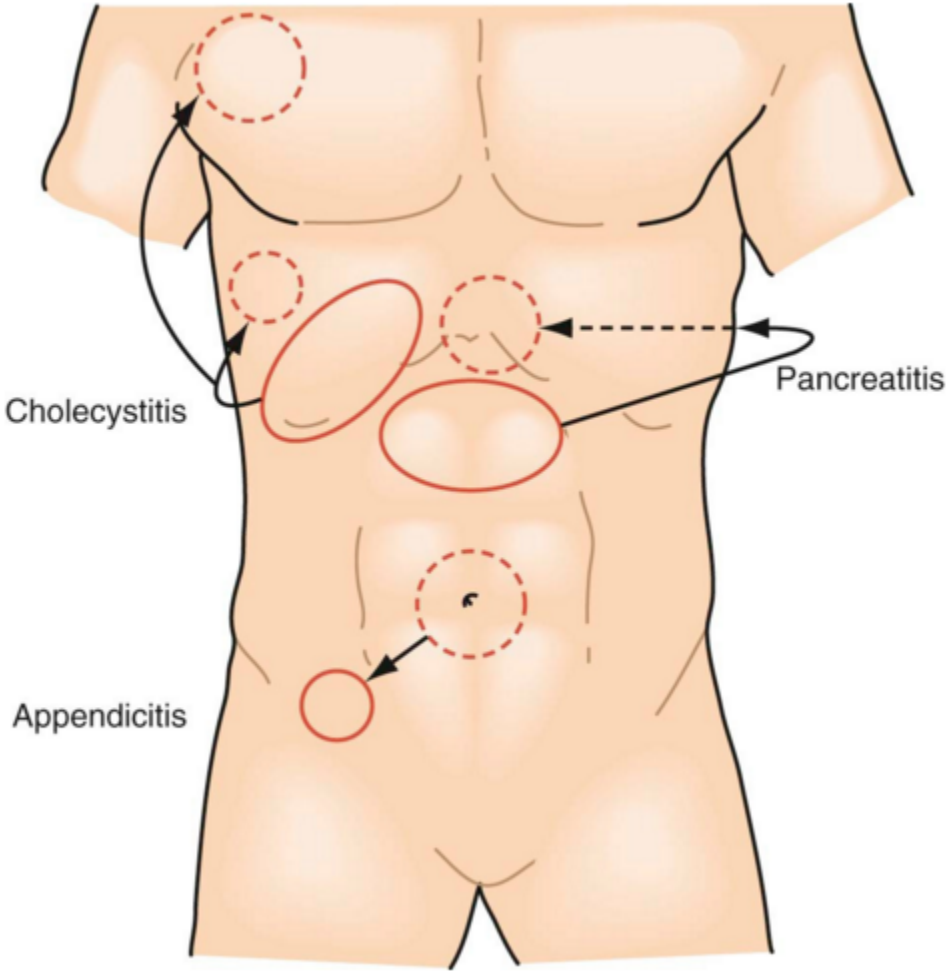
Character of pain—colicky, crampy, intermittent pain



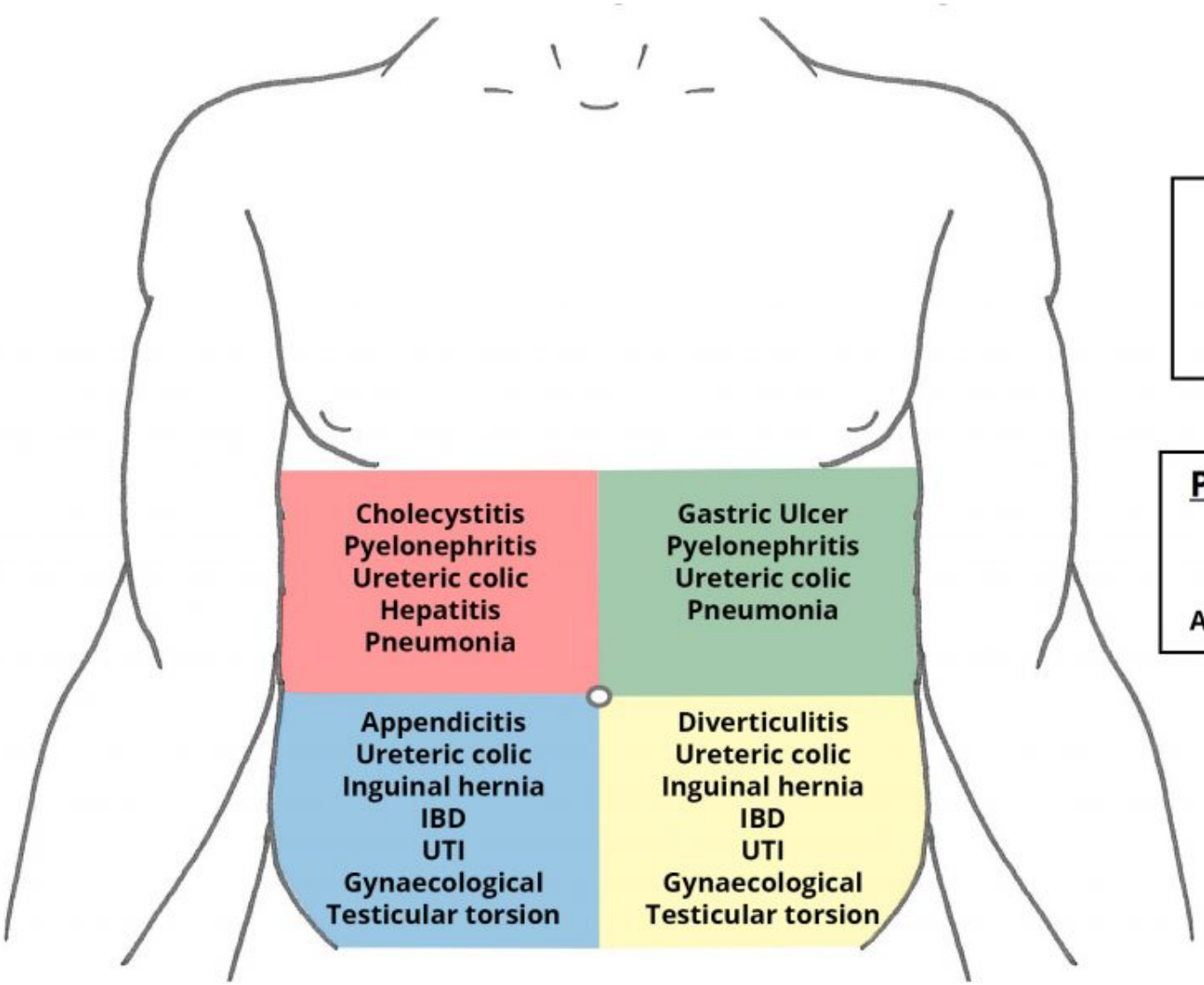
Character of pain—sudden, severe pain



Referred pain. *Solid circles* are primary or most intense



Referred pain. *Solid circles* are primary or most intense



Epigastric Region

Peptic ulcer disease
Cholecystitis
Pancreatitis
Myocardial infarction

Peri-umbilical Region

Small bowel obstruction
Large bowel obstruction
Appendicitis
Abdominal aortic aneurysm

HISTORY

Activities that **exacerbate or relieve the pain** are also important

- **Eating** will often **worsen** the pain of *bowel obstruction, biliary colic, pancreatitis, diverticulitis, or bowel perforation*

- **Food** can provide **relief** in non-perforated peptic ulcer disease or gastritis

- **Patients with peritoneal inflammation** will **avoid any activity that stretches the abdomen**
  - they describe **worsening of the pain with any sudden body movement; less pain if their knees are flexed**

HISTORY

Associated symptoms: nausea, vomiting, constipation, diarrhea, pruritis, melena, hematochezia, and/or hematuria can all be helpful symptoms

- **Vomiting** is due to abdominal pain or as a result of mechanical bowel obstruction or ileus.
  - **Vomiting** usually **precede the onset** abdominal pain, **whereas the pain** of an acute surgical abdomen **presents first**
- **Costipation:** is the patient continuing to **pass any gas or stool per rectum?**
  - A complete obstruction is often associated with **bowel ischemia or perforation** due to distention

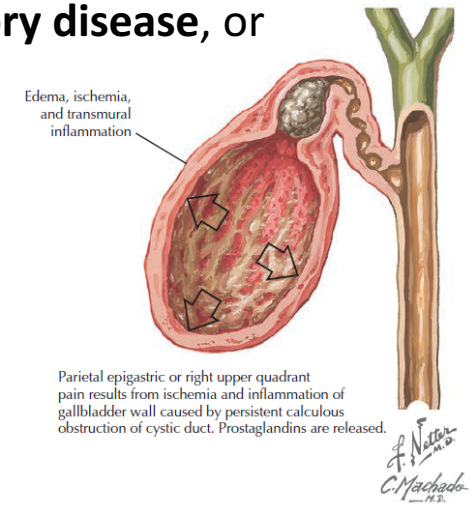
HISTORY

- **Diarrhe**a is associated with:
  - infectious enteritis,
  - inflammatory bowel disease
  - parasitic contamination

•**Bloody diarrhea** can be seen in these conditions, as well as in **colonic ischemia**

- **Past medical history**: ask for if the pt had the same pain before

- Investigate if prior history **of appendectomy**, **pelvic inflammatory disease**, or **cholecystectomy: it influences the diagnosis**



History of medications (reveal diseases/mask symptoms)

- **High-dose narcotic** interfere with bowel activity → obstruction
- **Narcotics** → spasm of the sphincter of Oddi → biliary or pancreatic pain. **↓ pain sensation** and **alter mental status**
- **Nonsteroidal anti-inflammatory drugs (NSAIDs)** → upper gastrointestinal inflammation and perforation
- **Steroids** block protective gastric mucous production and **↓** the inflammatory reaction to infection, including peritonitis
- **Immunosuppressive agents ↑** risk of **bacterial or viral infection** and also blunt the inflammatory response, decreasing the pain

HISTORY

- **Anticoagulants** may cause GI bleeds, retroperitoneal hemorrhages, or rectus sheath hematomas

- **Chronic alcoholism** is strongly associated with **coagulopathy and portal hypertension** from liver impairment. **Cocaine and methamphetamine** can create an intense **vasospastic reaction**, which can create **life-threatening hypertension** and **cardiac and intestinal ischemia**

Gynecologic history is also important

- Ask for **menstrual history and pregnancies**

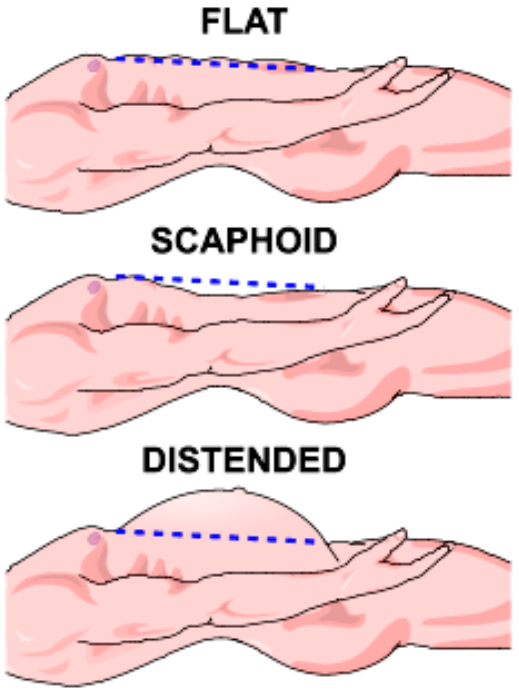
- The likelihood of **ectopic pregnancy, pelvic inflammatory disease (PID), mittelschmerz (**pain associated with ovulation**), and/or severe endometriosis** are discovered with gynecologic history

INSPECTION

- It begins with a **general inspection of the patient**, followed by **inspection of the abdomen** itself

- Patients with **peritoneal irritation** will experience **worsened pain with any activity** that moves or stretches the peritoneum

- Pts **lie very still in bed** and **maintain flexion of their knees and hips**



PHYSICAL EXAMINATION

- **Abdominal inspection**: check **contour of the abdomen** (**distended, localized mass effect?)**
    - Scars and surgical history
    - Hernias
    - **Erythema or edema** of skin may **suggest cellulitis** of the abdominal wall
    - **Ecchymosis** may suggest **deeper necrotizing infections** of the fascia or pancreas

- **AUSCULTATION**:
    - **quiet abdomen** suggests an ileus
    - **hyperactive bowel** in enteritis and early ischemic intestine

    - **Mechanical bowel obstruction** is characterized by **high-pitched tinkling sounds** that tend to come in rushes

- **Echoing sounds** are present when significant **luminal distention** exists

- **Bruits** reflect turbulent blood flow in the vascular system. Check for aneurysm or stenosis

PERCUSSION

- Assesses for **gaseous distention** of the bowel, **free intra-abdominal air**, degree of **ascites**, and/or presence of **peritoneal inflammation**

- **Hyperresonance (tympany to percussion)*:*** gas-filled loops of bowel

- **When liver dullness** is **lost** free intra-**abdominal air** should be suspected

PHYSICAL EXAMINATION

- **Ascites** is detected **by looking for fluctuance** of the abdominal cavity. **A fluid wave or ripple** can be generated by a quick firm compression of the lateral abdomen

PALPATION

- It reveals the **severity and exact location** of the **abdominal pain**, the presence of **peritonitis** and identify organomegaly or an **abnormal mass** lesion

- Palpation **should always begin gently and away from the reported area of pain**.

PHYSICAL EXAMINATION

PALPATION

- **Involuntary guarding**, or abdominal wall muscle spasm, is a **sign of peritonitis**

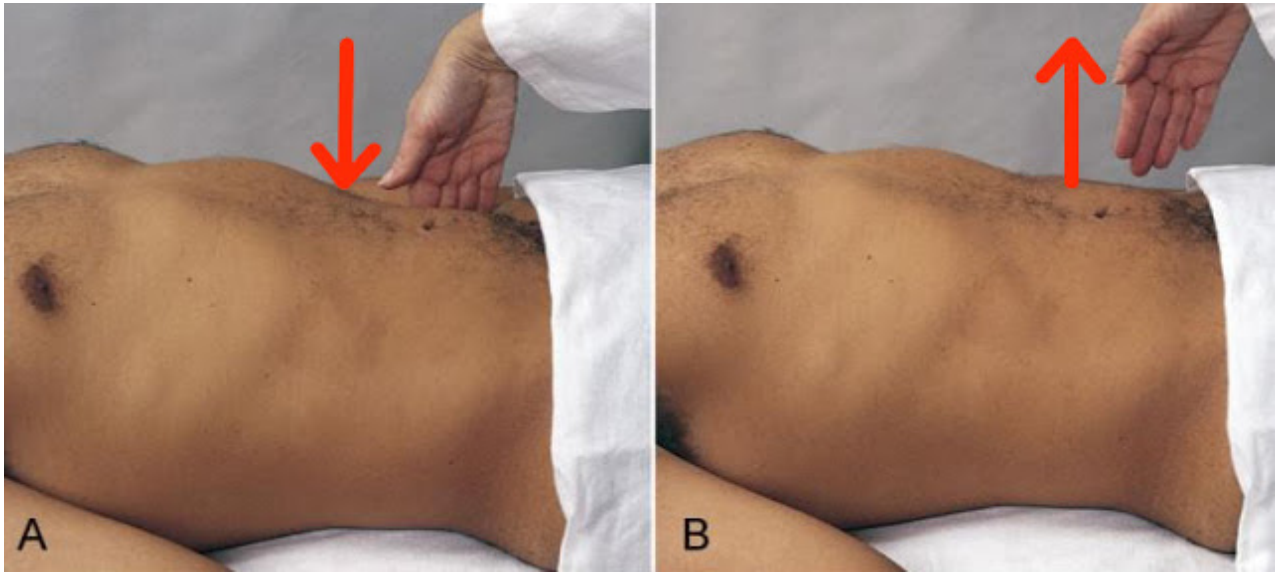
- **Apply pressure to the abdominal wall**, away from the point of maximal pain, while **asking the patient to take a slow deep breath**

  - In the setting of **voluntary guarding**, the abdominal muscles will relax **during the act of inspiration**; if involuntary, they remain spastic and tense

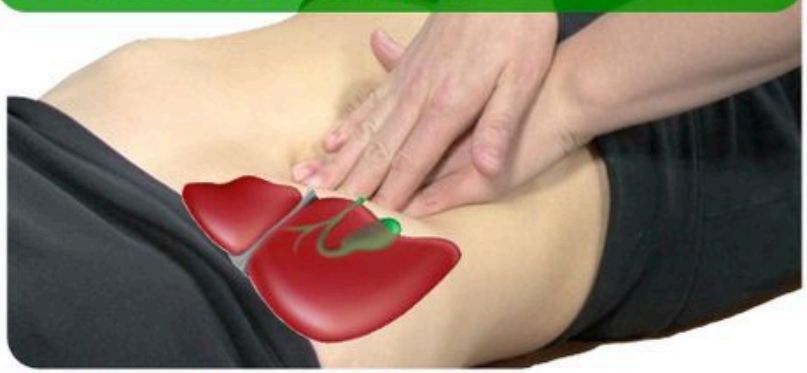
SIGN	DESCRIPTION	DIAGNOSIS OR CONDITION
Aaron	Pain or pressure in epigastrium or anterior chest with persistent firm pressure applied to McBurney's point	Acute appendicitis
Bassler	Sharp pain created by compressing appendix between abdominal wall and iliacus	Chronic appendicitis
Blumberg	Transient abdominal wall rebound tenderness	Peritoneal inflammation
Carnett	Loss of abdominal tenderness when abdominal wall muscles are contracted	Intra-abdominal source of abdominal pain
Chandelier	Extreme lower abdominal and pelvic pain with movement of cervix	Pelvic inflammatory disease
Charcot	Intermittent right upper abdominal pain, jaundice, and fever	Choledocholithiasis
Claybrook	Accentuation of breath and cardiac sounds through abdominal wall	Ruptured abdominal viscus
Courvoisier	Palpable gallbladder in presence of jaundice	Periampullary tumor
Cruveihier	Varicose veins at umbilicus (caput medusa)	Portal hypertension

Cullen	Periumbilical bruising	Hemoperitoneum
Danforth	Shoulder pain on inspiration	Hemoperitoneum
Fothergill	Abdominal wall mass that does not cross midline and remains palpable when rectus contracted	Rectus muscle hematomas
Grey Turner	Local areas of discoloration around umbilicus and flanks	Acute hemorrhagic pancreatitis
Iliopsoas	Elevation and extension of leg against resistance creates pain	Apppendicitis with retrocecal abscess
Kehr	Left shoulder pain when supine and pressure placed on left upper abdomen	Hemoperitoneum (especially from splenic origin)
Mannkopf	Increased pulse when painful abdomen palpated	Absent if malingering
Murphy	Pain caused by inspiration while applying pressure to right upper abdomen	Acute cholecystitis
Obturator	Flexion and external rotation of right thigh while supine creates hypogastric pain	Pelvic abscess or inflammatory mass in pelvis
Ransohoff	Yellow discoloration of umbilical region	Ruptured common bile duct

Rovsing	Pain at McBurney's point when compressing the left lower abdomen	Acute appendicitis
Ten Horn	Pain caused by gentle traction of right testicle	Acute appendicitis



1. Ask patient to exhale
2. Examiner places hand below costal margin on the right side at the mid-clavicular line
3. The patient is instructed to inspire

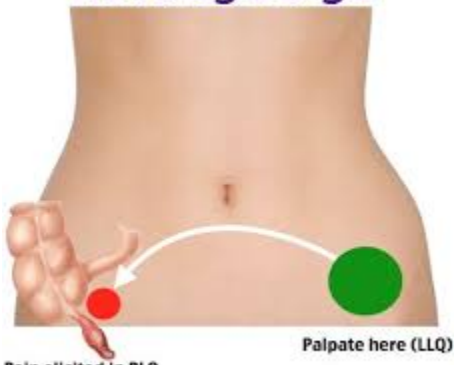


Positive Murphy's Sign [Acute cholecystitis]

The patient **stops breathing in** and **winces** with a **'catch' in breath**

(Due to the inflamed gallbladder being palpated as it descends on inspiration)

Rovsing's Sign



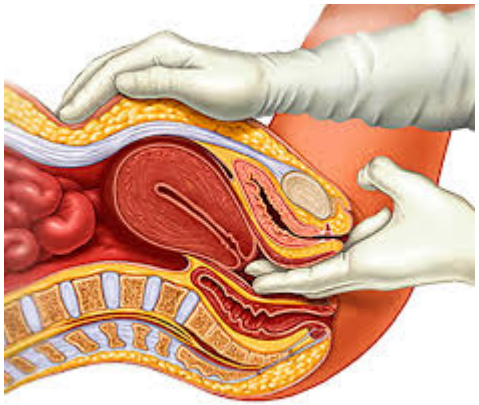
Pain elicited in RLQ

Suggestive of acute appendicitis

- A **digital rectal examination** needs to be performed in **all patients** with acute abdominal pain (check for a mass, pelvic pain, or intraluminal blood)

- A **pelvic examination** should be included for all women when evaluating pain located below the umbilicus

- **Gynecologic and adnexal processes** are best characterized by a thorough speculum and bimanual evaluation and transvaginal US



A **number of laboratory studies** confirm that inflammation or infection is present

Laboratory Studies for the Acute Abdomen

- Hemoglobin level
- White blood cell count with differential
- Electrolyte, blood urea nitrogen, creatinine levels
- Urinalysis
- Urine human chorionic gonadotropin level
- Amylase, lipase levels
- Total and direct bilirubin levels
- Alkaline phosphatase level
- Serum aminotransferase
- Serum lactate levels
- Stool for ova and parasites

And C Difficil culture and toxin assay

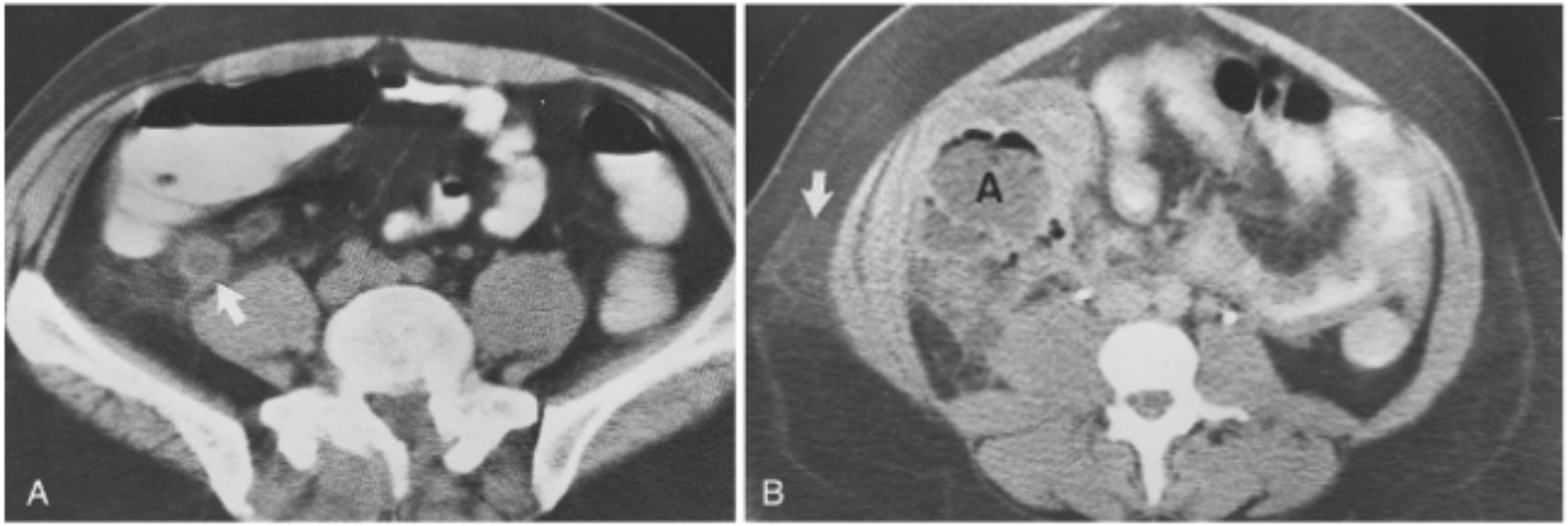
IMAGING STUDIES

CT Scan

Chest X Ray

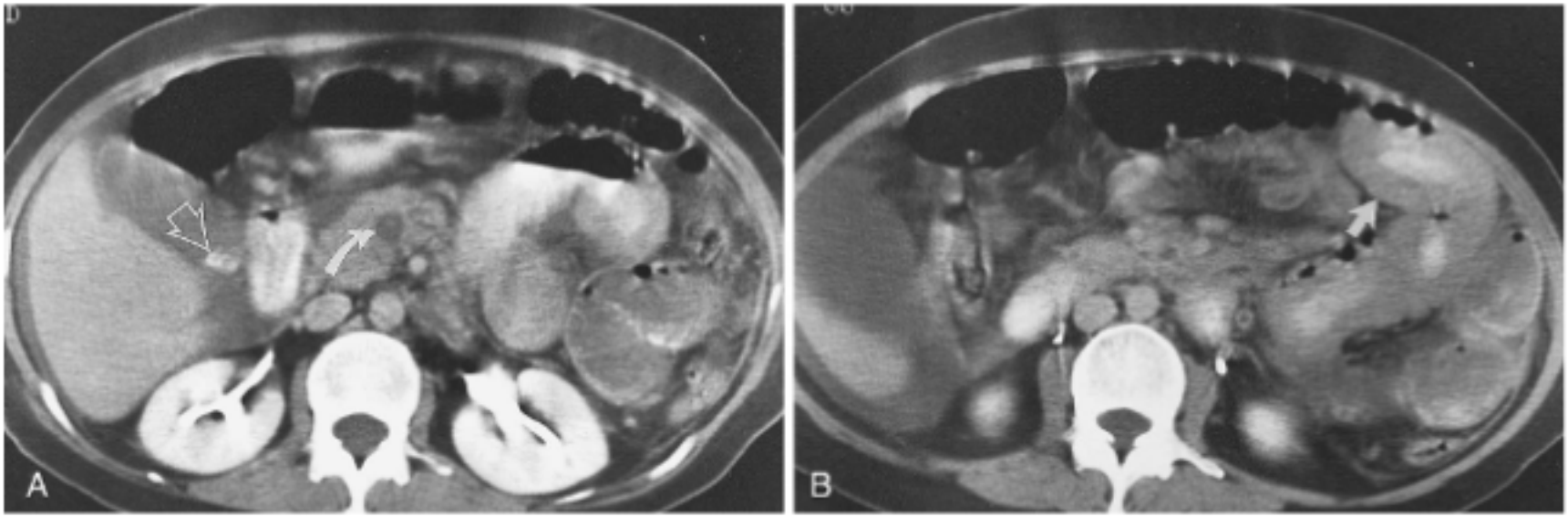
Lateral decubitus abdominal radiographs

Appendicitis. A, CT scan of uncomplicated appendicitis. A thick-walled, distended, retrocecal appendix (arrow) is seen with inflammatory change in the surrounding fat. B, CT scan of complicated appendicitis—a retrocecal appendiceal abscess (A) with an associated phlegmon posteriorly found in a 3-week postpartum, obese woman. Inflammatory change extends through the flank musculature into the subcutaneous fat (arrow)

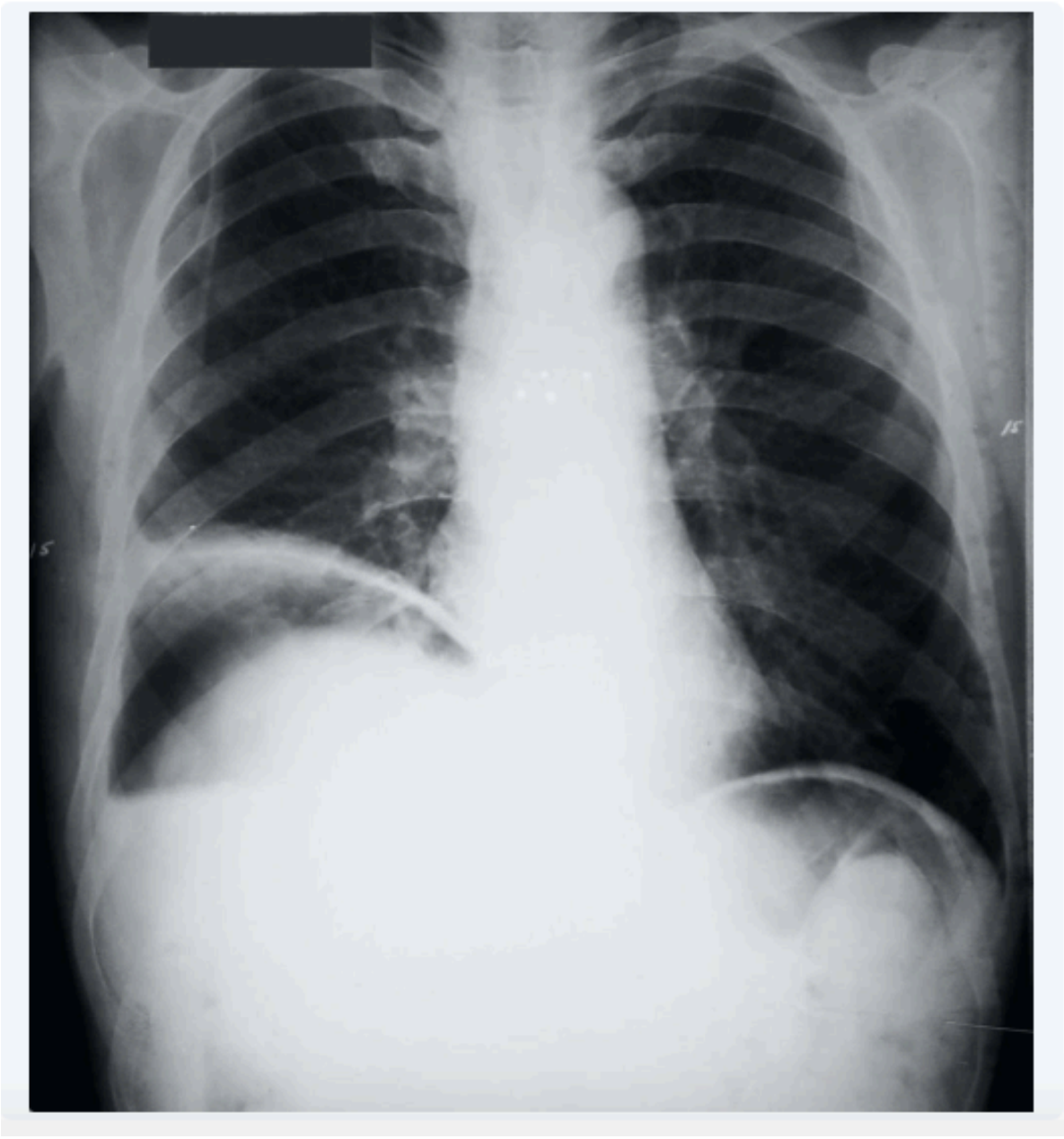


Imaging Studies

Small bowel infarction associated with mesenteric venous thrombosis. A, Note the low-density thrombosed superior mesenteric vein (solid arrow) and incidental gallstones (open arrow). B, Thickening of proximal small bowel wall (arrow) coincided with several feet of infarcting small bowel at time of operation.



Upright chest radiograph depicting moderate-sized pneumoperitoneum consistent with perforation of abdominal viscus.



IMAGING STUDIES: plain films

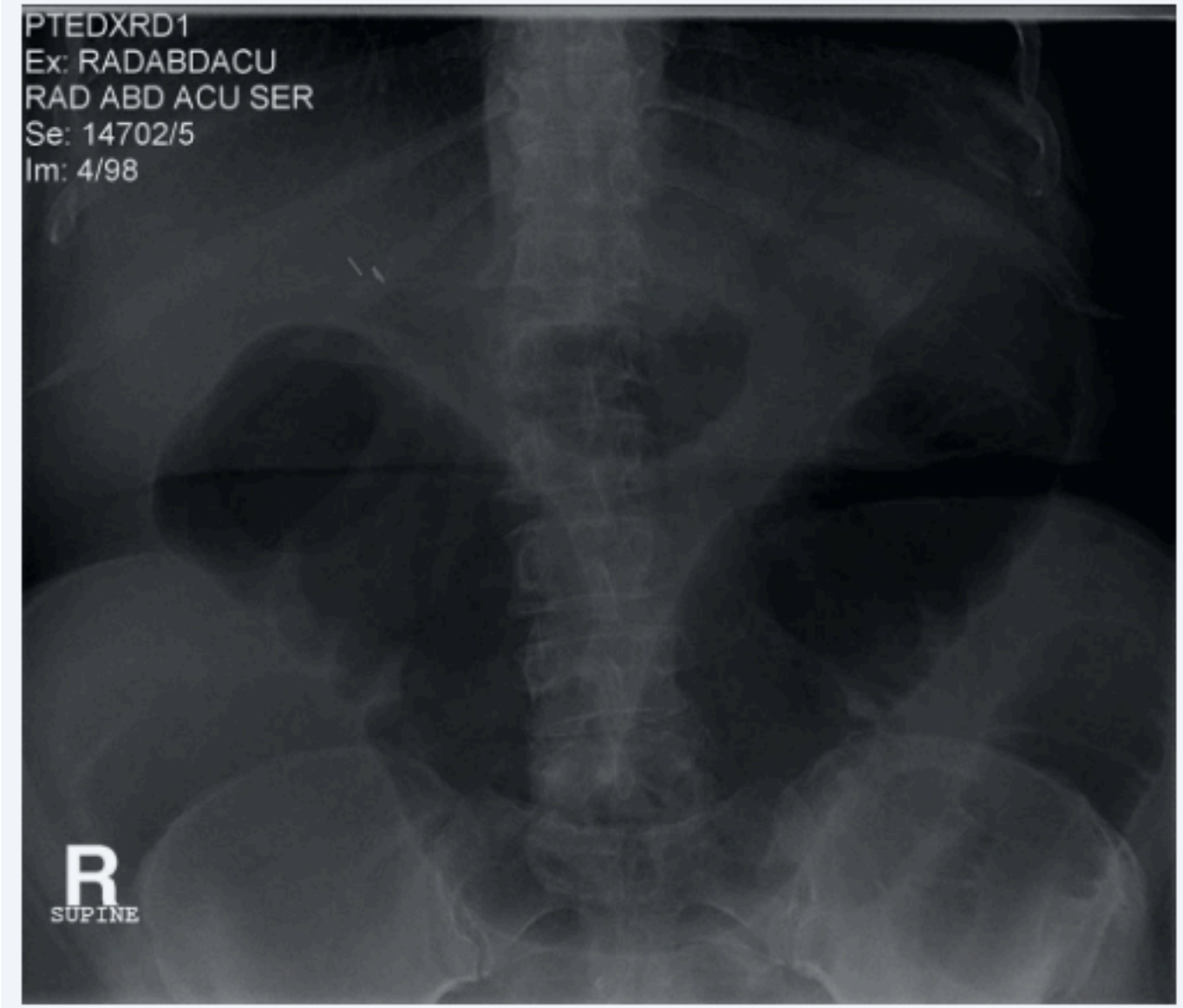
abnormal calcifications. 5% of appendicoliths, 10% of gallstones, and 90% of renal stones are radiopaque

Calcifications in pts with **chronic pancreatitis** or **abdominal aortic aneurysms**

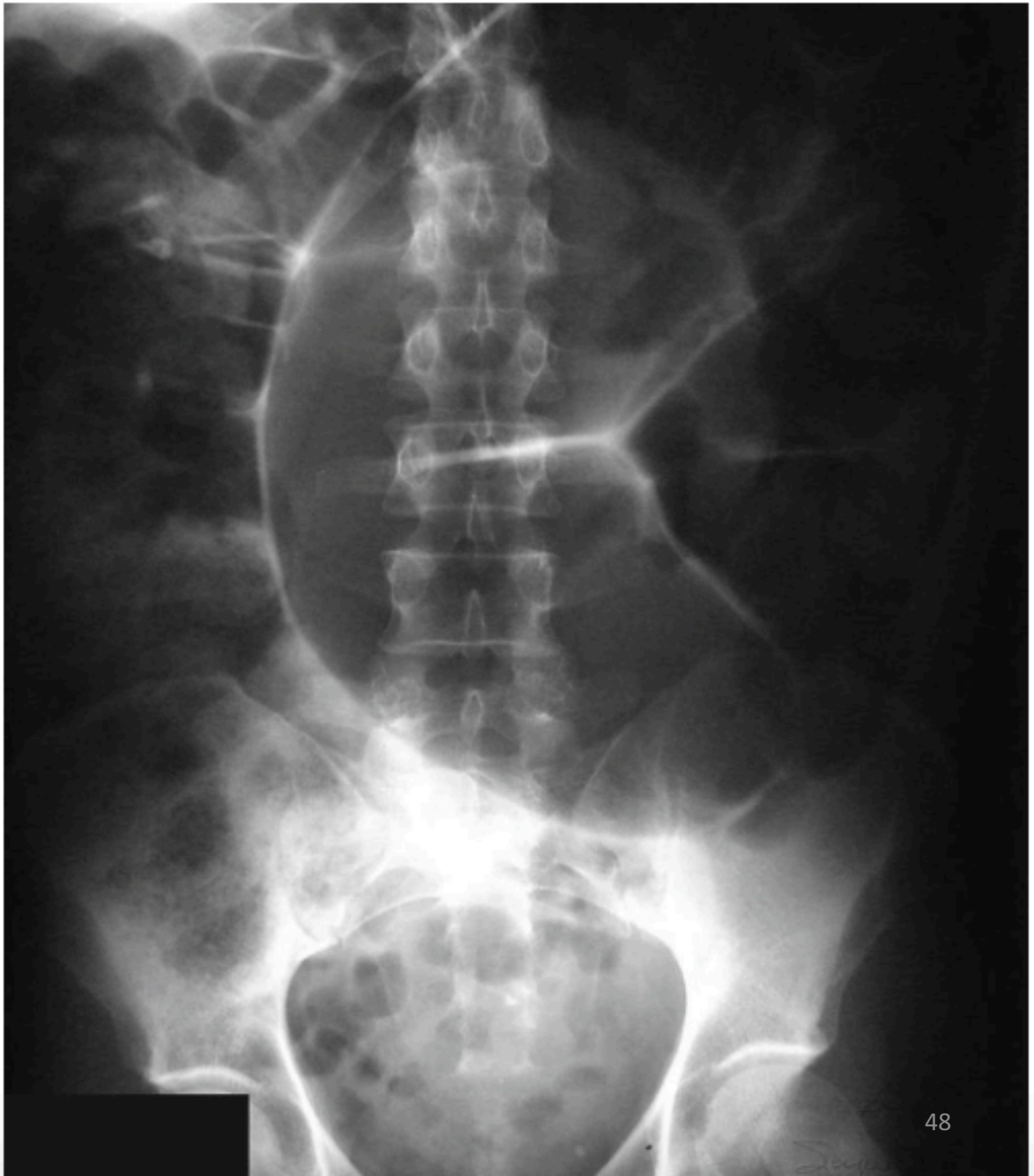
Upright and supine abdominal radiographs are helpful in identifying

- **gastric outlet obstruction, and obstruction of the proximal, mid, or distal small bowel**

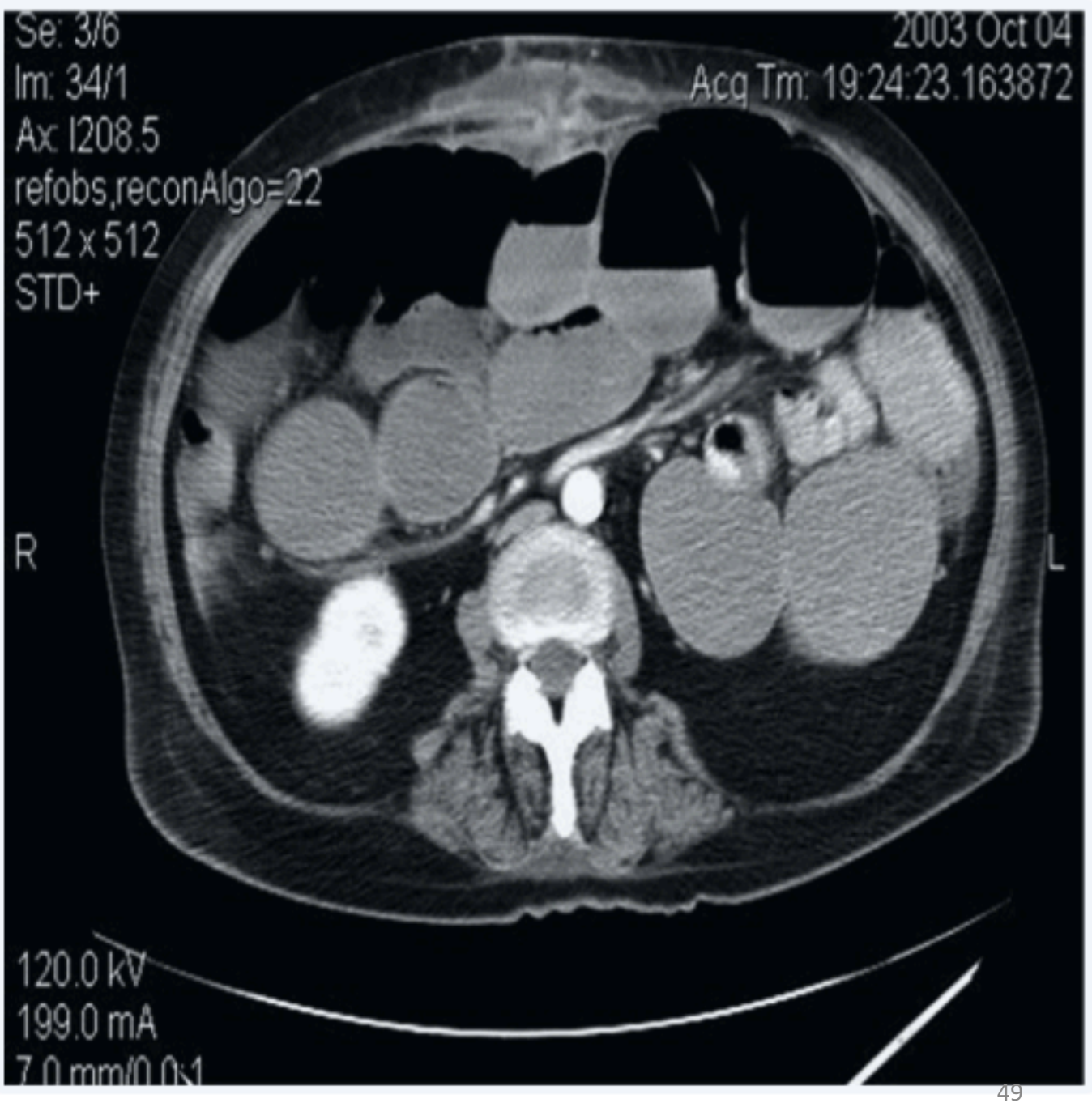
Upright abdominal x-ray in a patient with an obstructing sigmoid adenocarcinoma. Note the haustral markings on the dilated transverse colon that distinguished this from small intestine.



Upright abdominal x-ray in a patient with a sigmoid colon volvulus. Note the characteristic appearance of a bent inner tube, with its apex in the right upper quadrant



CT scan of a patient with a partial small bowel obstruction. Note the presence of dilated small bowel and decompressed small bowel. The decompressed bowel contains air, indicating a partial obstruction



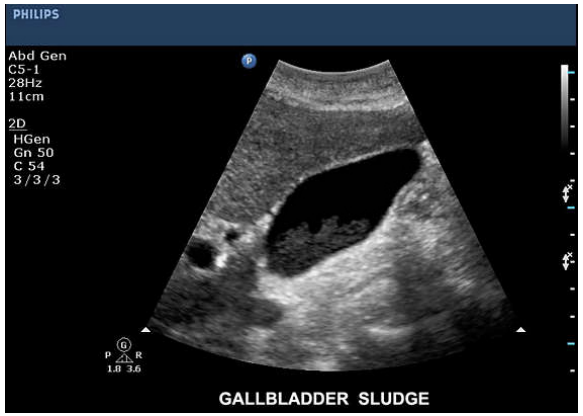
EVALUATION AND DIAGNOSIS

IMAGING STUDIES

Abdominal ultrasonography is extremely accurate for detecting **gallstones** and assessing **gallbladder wall thickness** and presence of **fluid around the gallbladder**

Abdominal and transvaginal ultrasonography can aid in the detection of abnormalities of the ovaries, adnexa, and uterus

Ultrasound can also detect intraperitoneal fluid **FAST: Focused Abdominal Sonography in Trauma**



INTRA-ABDOMINAL PRESSURE (IAP) MONITORING

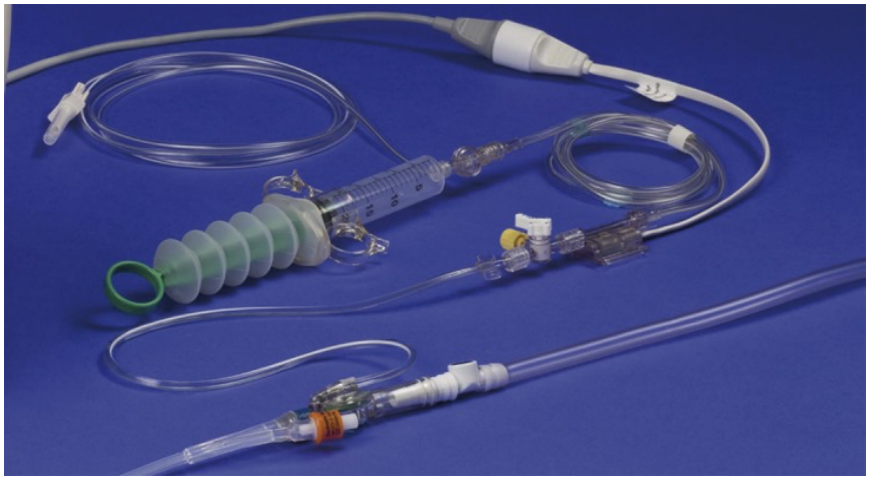
- **Acute abdominal process → ↑ intra-abdominal pressure (IAP)**
- **↑ IAP → ↓ the blood flow** to abdominal organs and **↓ venous return**
- It press upward on the diaphragm, thereby **decreasing ventilatory efficiency**
- ↑ Risk of **esophageal reflux** and **pulmonary aspiration**
- Consider **abdominal hypertension** in any patient who presents with a rigid or significantly distended abdomen

  - Normal IAP = **5 to 7 mm Hg**
  - **IAP >11 mm Hg :** abnormal (graded 1 to 4 by severity)

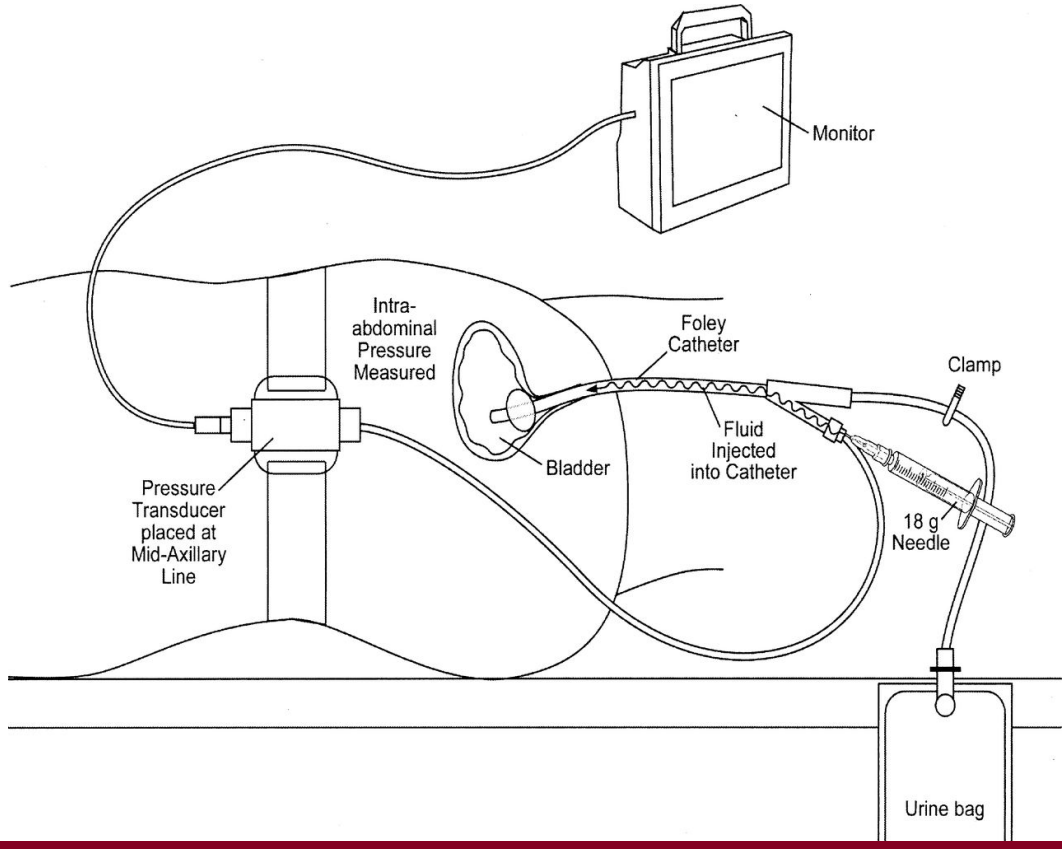
DEGREE OF HYPERTENSION	MESENTERIC PRESSURE	CO	CVP	PIP	GFR	PERFUSION	TREATMENT
Normal pressure	5-7 mm Hg	↔	↔	↔	↔	↔	None
Grade 1 hypertension	12-15 mm Hg	↔	↔, ↑	↔, ↑	↓	↓	Maintain euvolemia
Grade 2 hypertension	16-20 mm Hg	↓	↑*	↑	↓	↓	Nonsurgical decompression
Grade 3 hypertension	21-25 mm Hg	↓↓	↑↑*	↑↑	↓↓	↓↓	Surgical decompression
Grade 4 hypertension	>25 mm Hg	↓↓↓	↑↑*	↑↑	↓↓↓	↓↓↓	Surgical decompression; reexplore

CO, Cardiac output; *CVP,* central venous pressure; *GFR,* glomerular filtration rate; *PIP,* peak inspiratory pressure.

INTRA-ABDOMINAL PRESSURE MONITORING

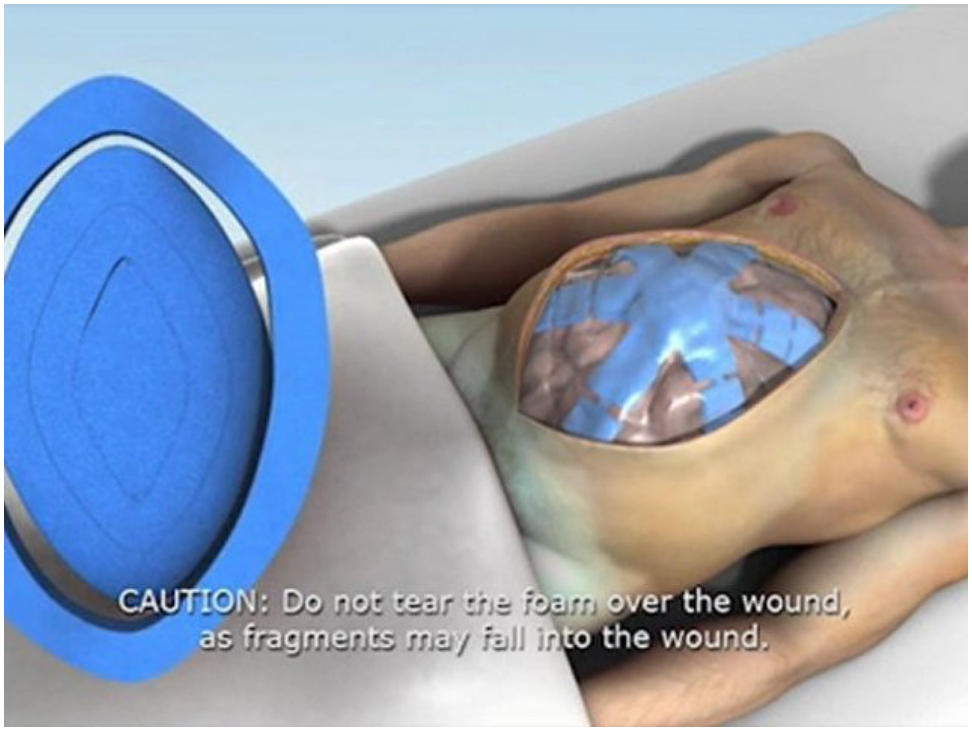


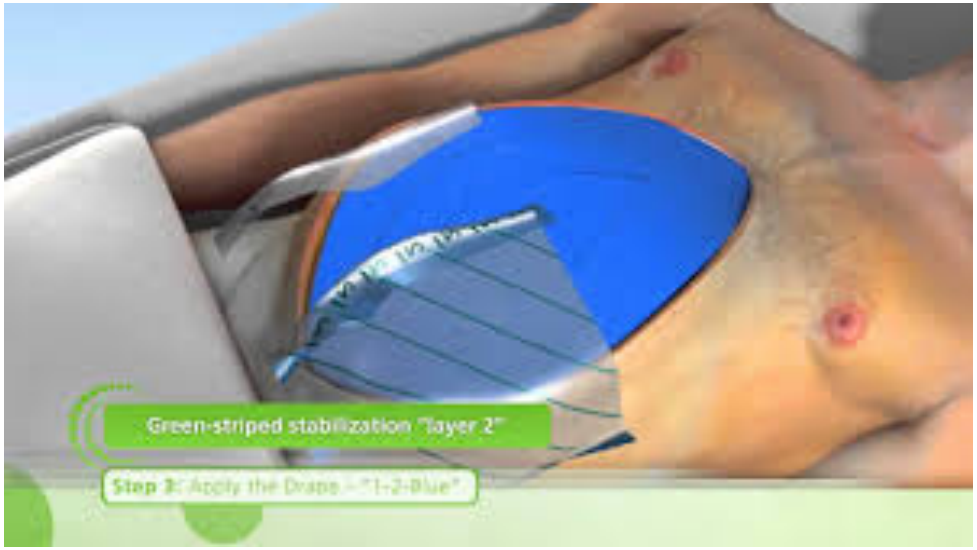
- IAP measured **via the bladder by a pressure transducer attached to a Foley catheter**
- Pressure readings are obtained **at end-expiration following instillation of 50 mL of saline** into an otherwise empty bladder
- **Morbid obesity** increases normal pressures **by 4 to 8 mm Hg**

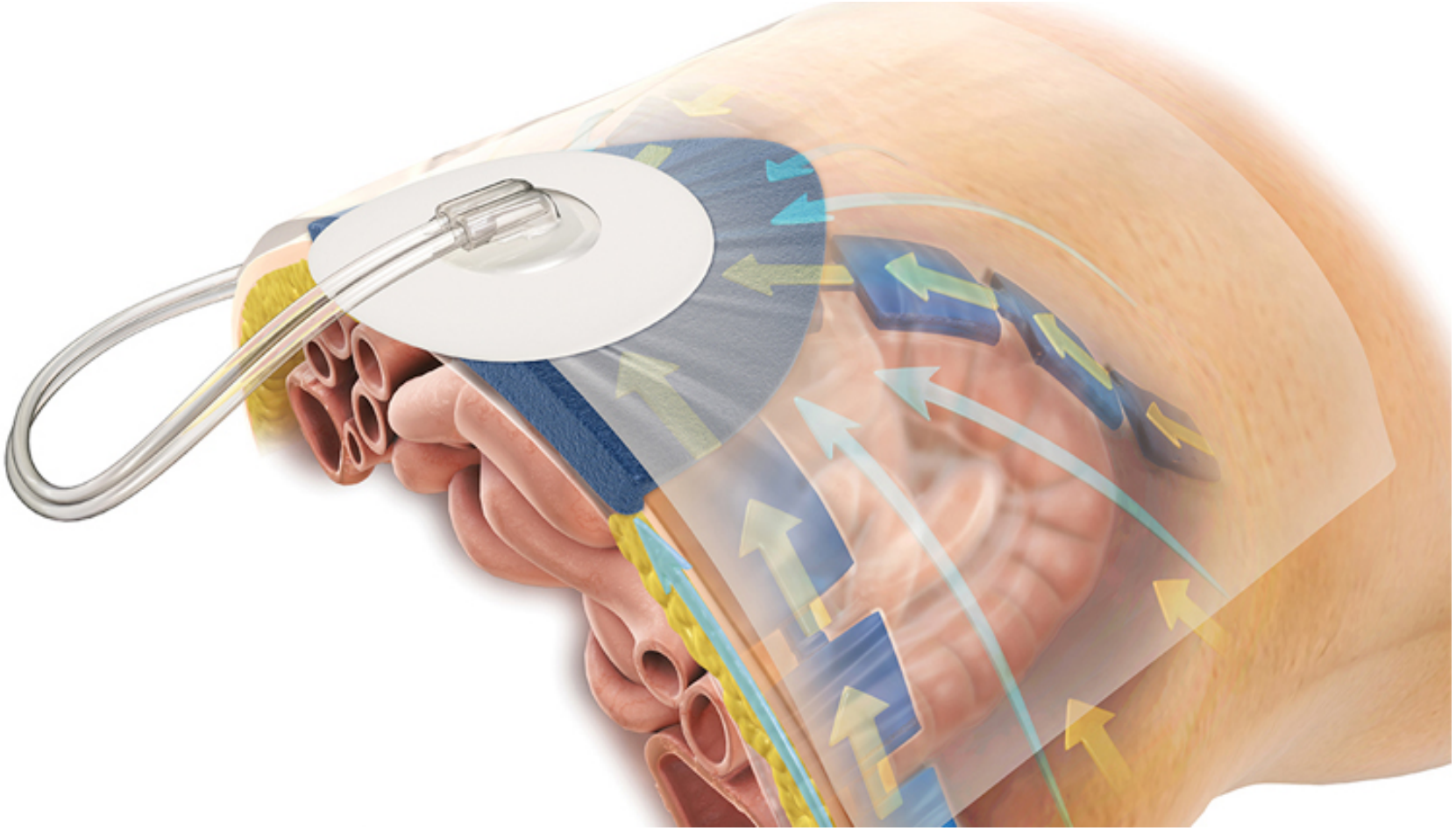


INTRA-ABDOMINAL PRESSURE MONITORING

- **Grades 1 and 2** treated by medical interventions focusing on maintaining
    - euvolemia
    - gut decompression with a nasogastric tube and/or laxatives
    - enemas
    - withholding enteral feedings
    - catheter aspiration of ascitic fluid
    - abdominal wall relaxation
    - udicious use of hypotonic IV fluids
- **Grades 3 and 4** often require **surgical decompression via laparotomy with open packing of the abdomen** if the severe hypertension and organ dysfunction do not respond promptly to aggressive medical intervention


CAUTION: Do not tear the foam over the wound,
as fragments may fall into the wound.


Green-striped stabilization "layer 2"



VAC: VACUUM ASSISTED THERAPY

DIAGNOSTIC LAPAROSCOPY

- Advantages include
  - **↑sensitivity and specificity** of diagnosis
  - **↓ morbidity and mortality**
  - **↓length of stay**
  - **↓overall hospital costs**

- **Accuracy ranges from 90% to 100%**, with the **primary limitation being recognition of retroperitoneal processes**

DIFFERENTIAL DIAGNOSIS

- **The differential diagnosis for acute abdominal pain is extensive**

- Pts need to be **evaluated immediately** on presentation and **reassessed at frequent intervals** for changes in condition.

- Remember: **many causes of acute abdominal pain are medical in nature**

Findings Associated With Surgical Disease in the Setting of Acute Abdominal Pain

Physical Examination and Laboratory Findings

Abdominal compartment pressures >30 mm Hg

Worsening distention after gastric decompression

Involuntary guarding or rebound tenderness

Gastrointestinal hemorrhage requiring >4 U of blood without stabilization

Unexplained systemic sepsis

Signs of hypoperfusion (e.g., acidosis, pain out of proportion to examination findings, increasing liver function test results)

Radiographic Findings

Massive dilation of intestine

Progressive dilation of stationary loop of intestine (sentinel loop)

Pneumoperitoneum

Extravasation of contrast from bowel lumen

Vascular occlusion on angiography

Fat stranding, thickened bowel wall with systemic sepsis

Diagnostic Peritoneal Lavage (1000 mL)

>250 white blood cells/mL

>300,000 red blood cells/mL

Bilirubin level higher than plasma level (bile leak)

Particulate matter (stool)

Creatinine level higher than plasma level (urine leak)

DIFFERENTIAL DIAGNOSIS

- **Patients having emergency or life-threatening surgical disease** are taken for **immediate laparotomy**

- **Hospitalized patients who do not go urgently to the operating room** must be **reassessed frequently**, preferably by the same examiner, to recognize potentially serious changes in condition

- It must be emphasized **that a clear diagnosis will not be able to be determined in every patient**

- **Laparoscopy** has proved to be a valuable tool when the diagnosis is unclear

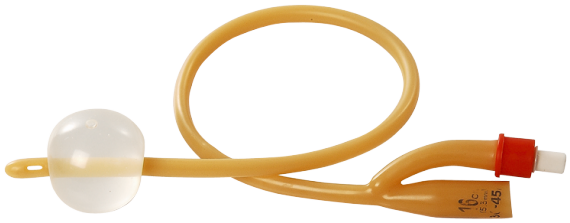
PREPARATION FOR EMERGENT OPERATION

- **IV access should be** obtained and any fluid or electrolyte abnormalities corrected

- Patients will require **antibiotic infusions**. The **gram-negative enteric organisms and anaerobes** are common

- Patients with **paralytic ileus** benefit from a **nasogastric tube** to decrease the likelihood of **vomiting and aspiration**

- **Foley catheter** to assess urine output is indicated (it allows to measure adequacy of fluid resuscitation)



PREPARATION FOR EMERGENT OPERATION

- Preoperative urine output of **0.5 mL/kg/hr**, along a with systolic blood pressure of at least **100 mm Hg** and a heart rate of **100 beats/min or less**, are indicative of an **adequate intravascular volume**

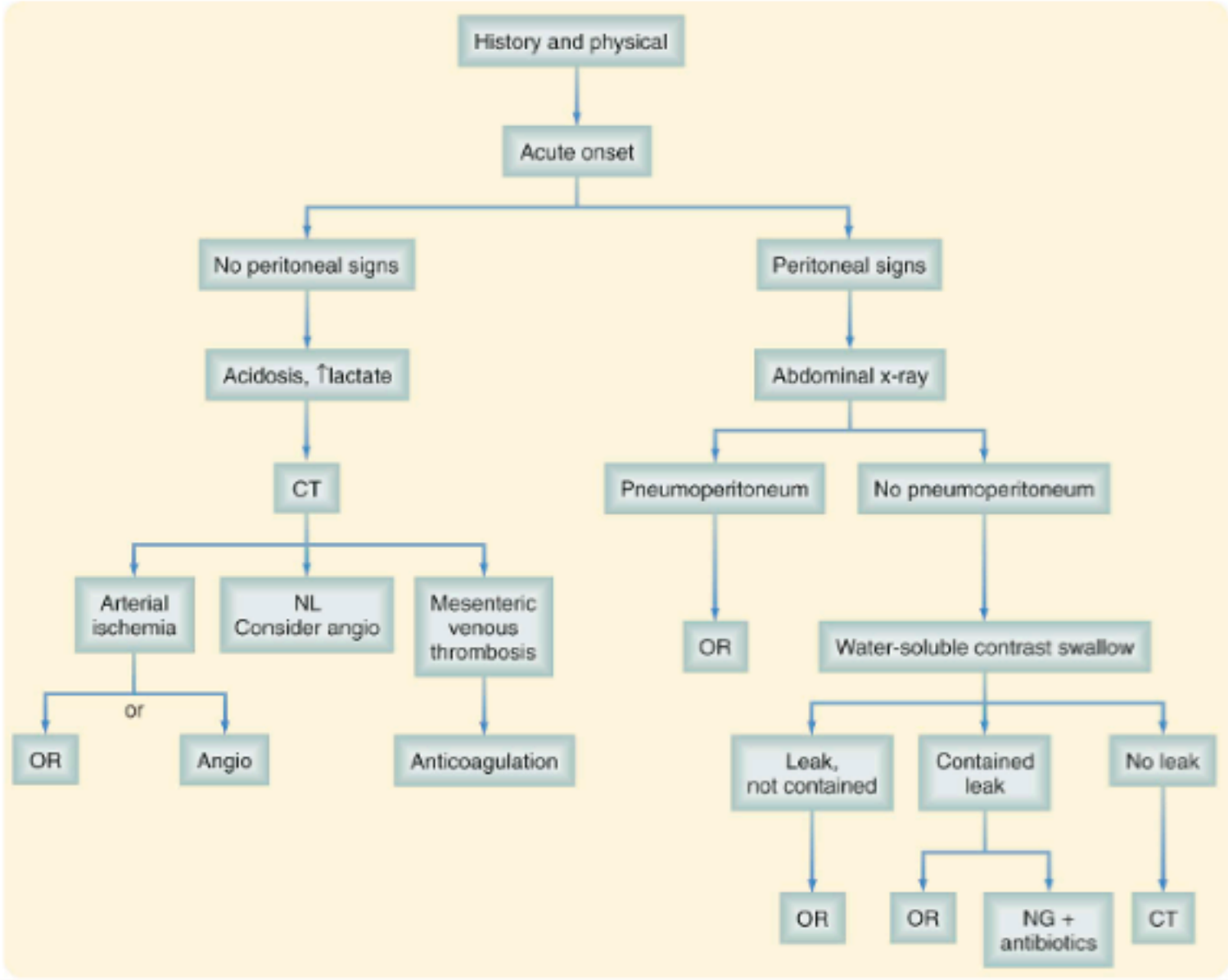
- **Hypokalemia:** if significant potassium repletion is necessary, a central venous line is required

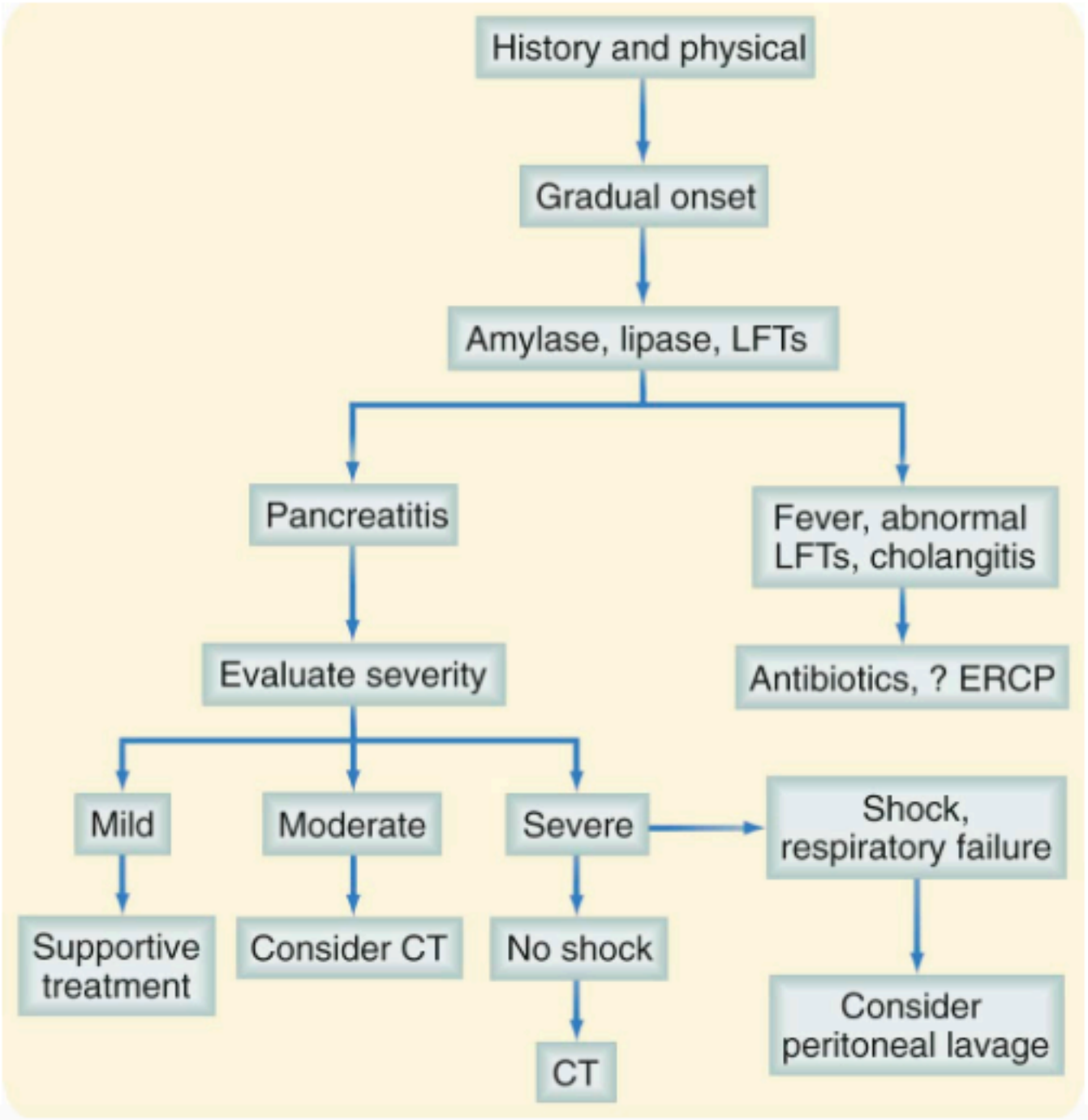
- **Pre-op acidosis** may respond to **fluid repletion and IV bicarbonate infusion** - acidosis caused by intestinal ischemia or infarction may be refractory to preoperative therapy.

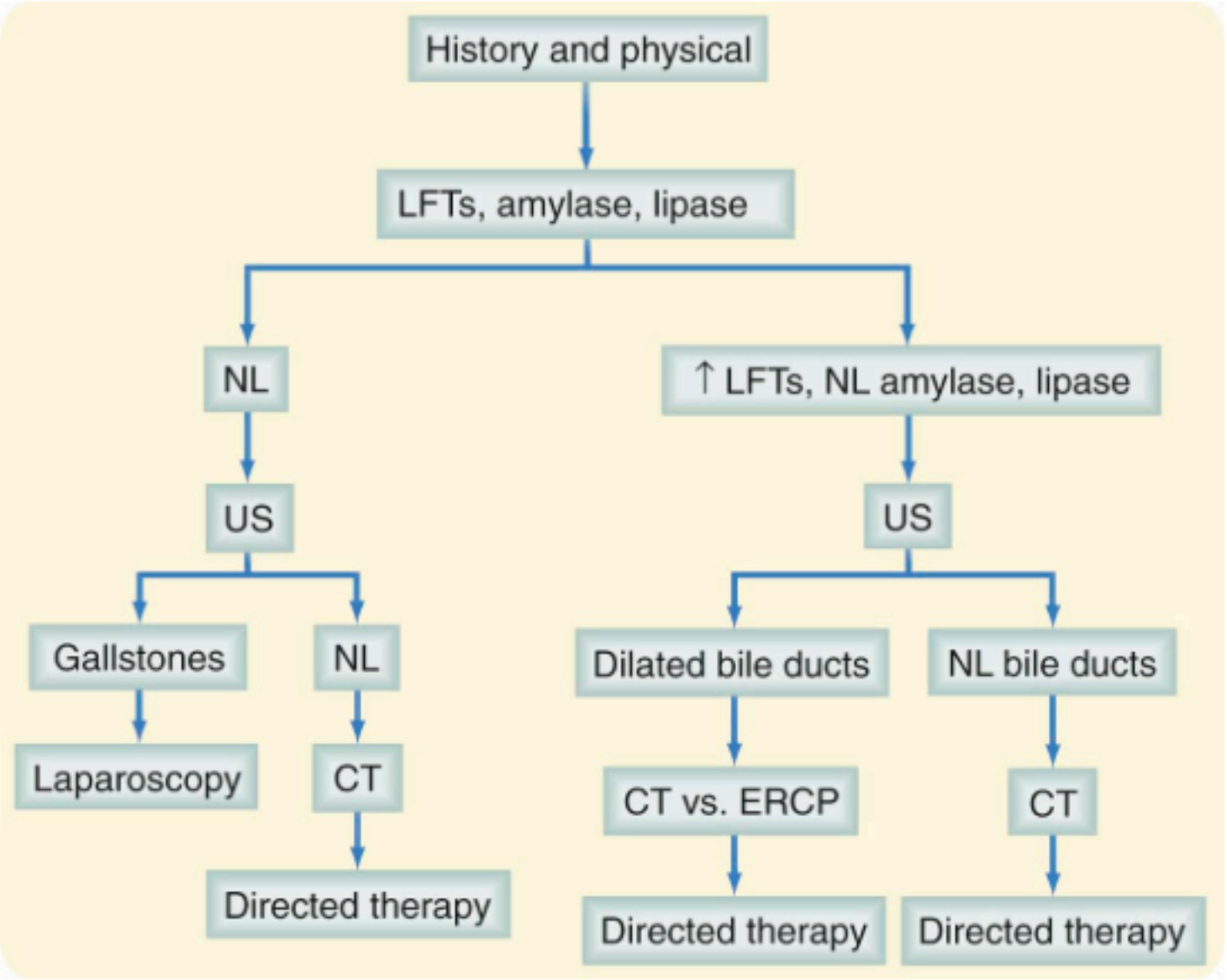
- **Significant anemia** is uncommon and preoperative blood transfusions are usually unnecessary

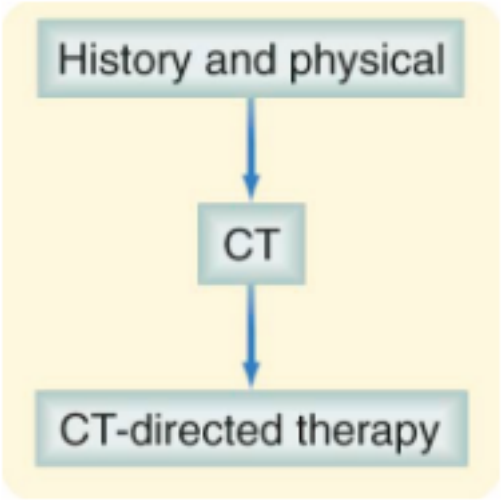
PREPARATION FOR EMERGENT OPERATION

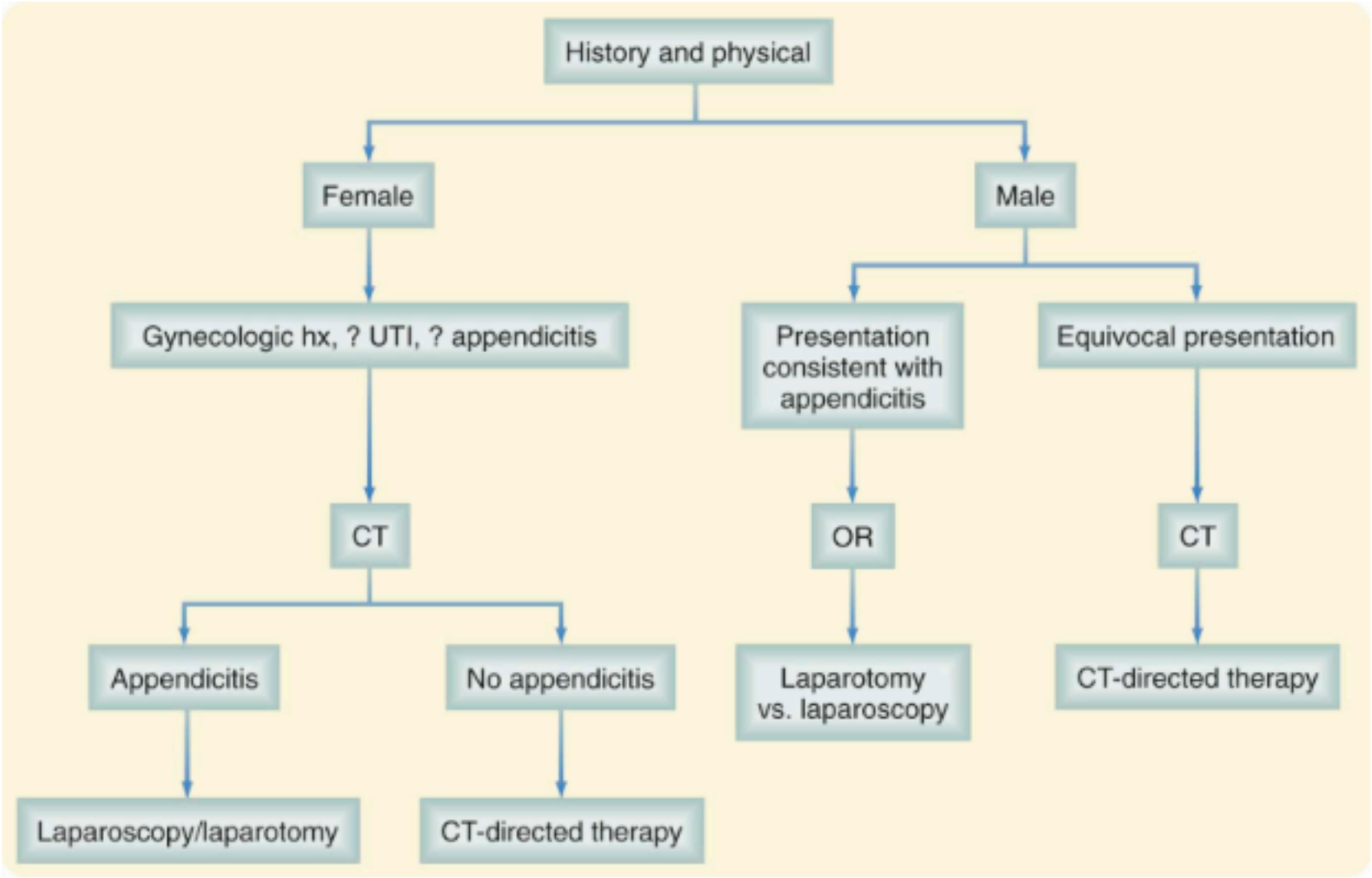
- However, **pts should have their blood typed, cross-matched**
- The need for **pre-op stabilization** must be weighed against the **increased morbidity and mortality associated with delay**
  - **i.e.: infarcted bowel**, may require **surgical correction before stabilization** of the patient
- **Good surgical judgment is paramount**

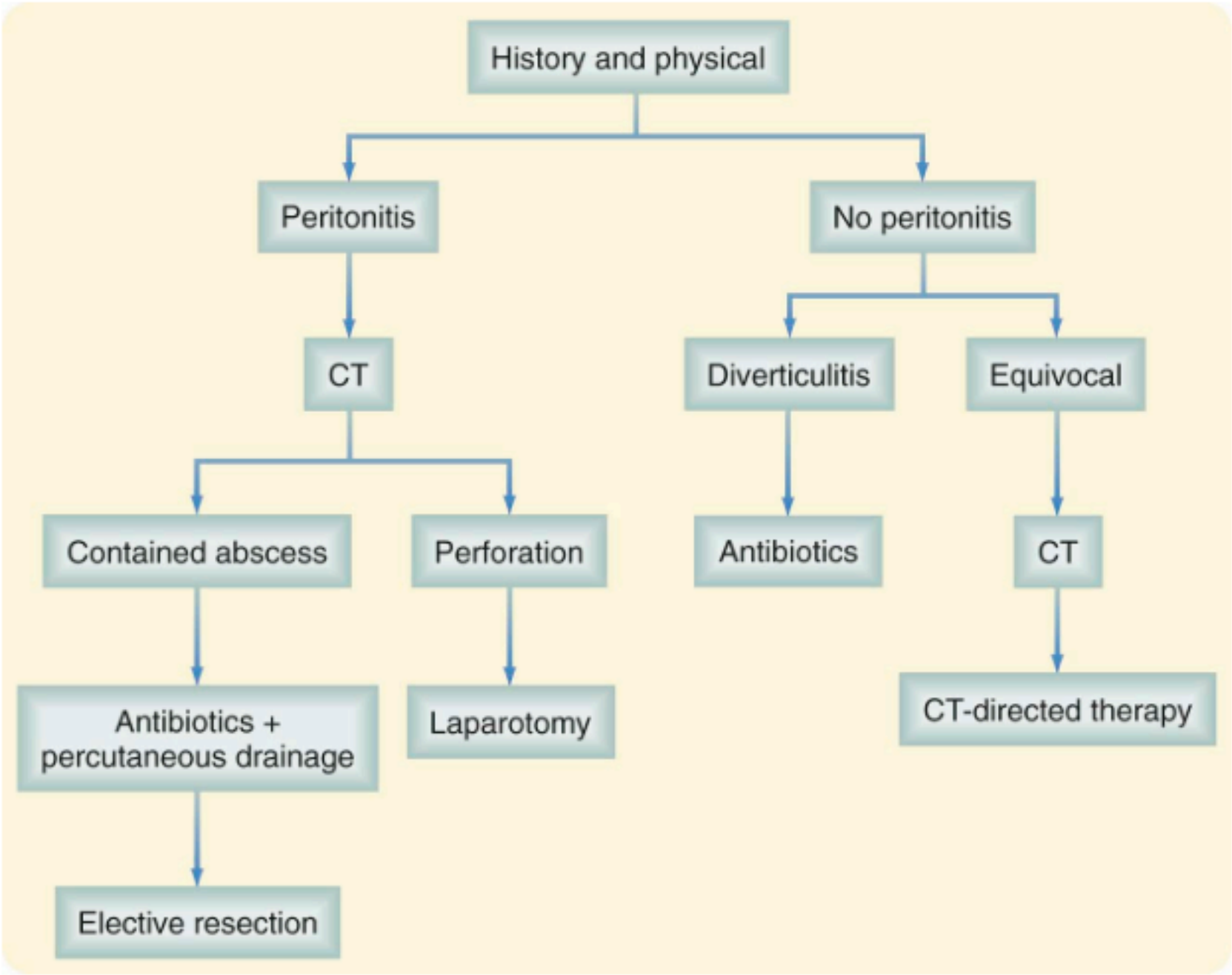

History and physical
Acute onset
No peritoneal signs
Peritoneal signs
Acidosis, ↑lactate
Abdominal x-ray
CT
Pneumoperitoneum
No pneumoperitoneum
Arterial ischemia
NL Consider angio
Mesenteric venous thrombosis
OR
Water-soluble contrast swallow
or
OR
Angio
Anticoagulation
Leak, not contained
Contained leak
No leak
OR
OR
NG + antibiotics
CT


History and physical
Gradual onset
Amylase, lipase, LFTs
Pancreatitis
Fever, abnormal LFTs, cholangitis
Evaluate severity
Antibiotics, ? ERCP
Mild
Moderate
Severe
Shock, respiratory failure
Supportive treatment
Consider CT
No shock
Consider peritoneal lavage
CT


History and physical
LFTs, amylase, lipase
NL
↑ LFTs, NL amylase, lipase
US
US
Gallstones
NL
Dilated bile ducts
NL bile ducts
Laparoscopy
CT
CT vs. ERCP
CT
Directed therapy
Directed therapy
Directed therapy

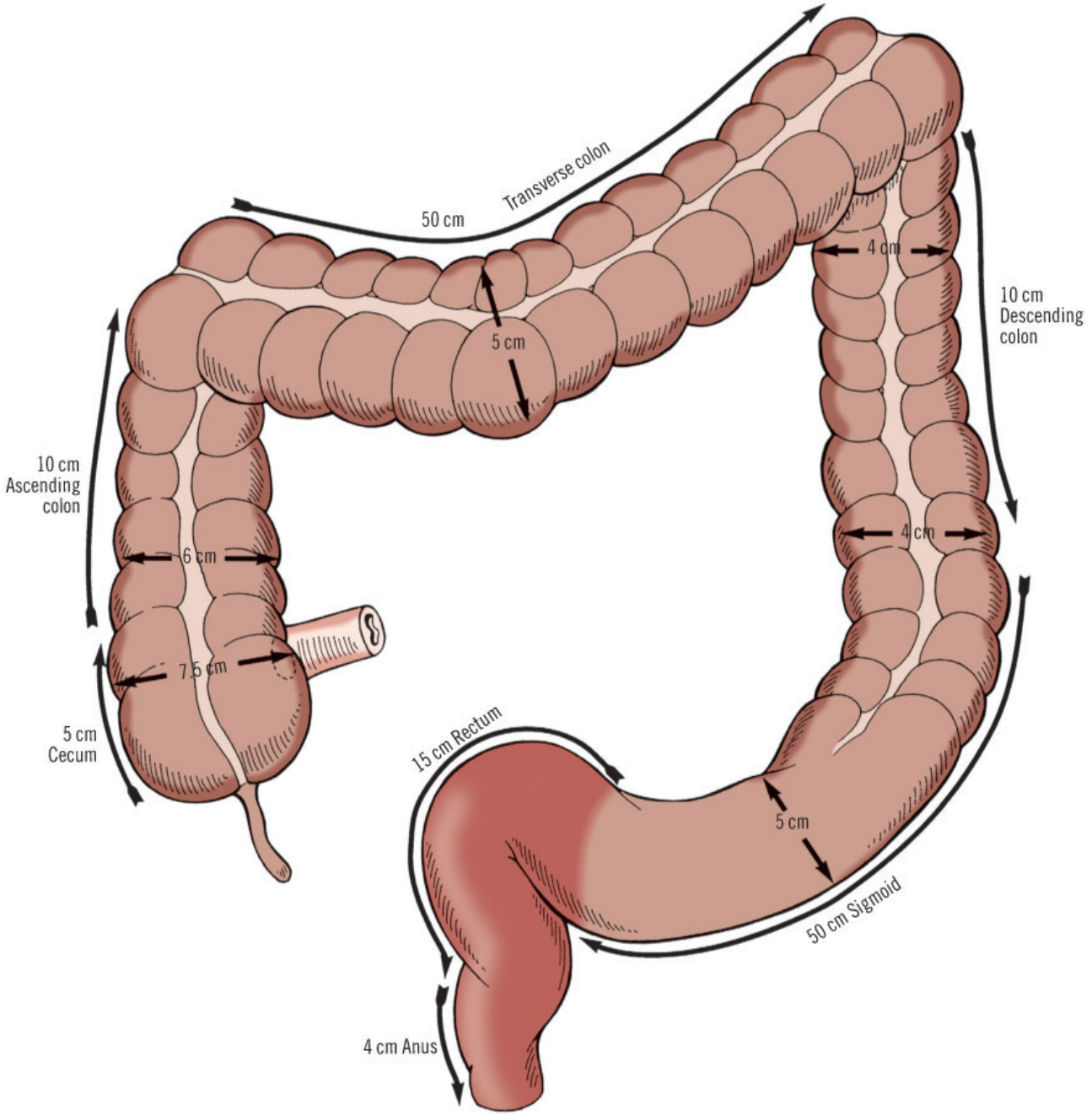

History and physical
CT
CT-directed therapy


History and physical
Female
Male
Gynecologic hx, ? UTI, ? appendicitis
Presentation consistent with appendicitis
Equivocal presentation
CT
OR
CT
Appendicitis
No appendicitis
Laparotomy vs. laparoscopy
CT-directed therapy
Laparoscopy/laparotomy
CT-directed therapy


History and physical
Peritonitis
No peritonitis
CT
Diverticulitis
Equivocal
Contained abscess
Perforation
Antibiotics
CT
Antibiotics + percutaneous drainage
Laparotomy
CT-directed therapy
Elective resection

SAPIENZA
UNIVERSITÀ DI ROMA

giuseppe.nigri@uniroma1.it


Transverse colon
50 cm
5 cm
4 cm
10 cm
Descending
colon
10 cm
Ascending
colon
6 cm
7.5 cm
5 cm
Cecum
4 cm
15 cm Rectum
5 cm
50 cm Sigmoid
4 cm Anus