Abdominal pain

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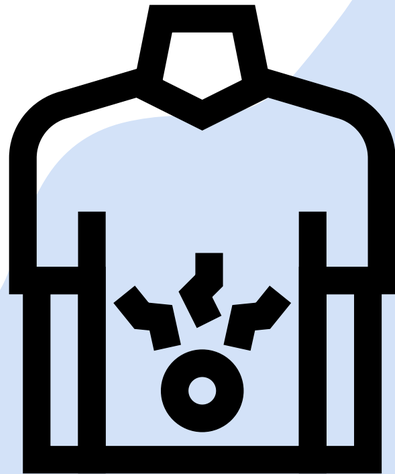
Introduction

Abdominal symptoms are a frequent cause for surgical consultation.

At frst presentation, a detailed clinical history and careful clinical examination are essential to establish a diferential diagnosis, which, in turn, leads to appropriate triage into urgent and non-urgent investigation and subsequent treatment.



Abdominal pain is divided into three neuroanatomic categories:

Visceral

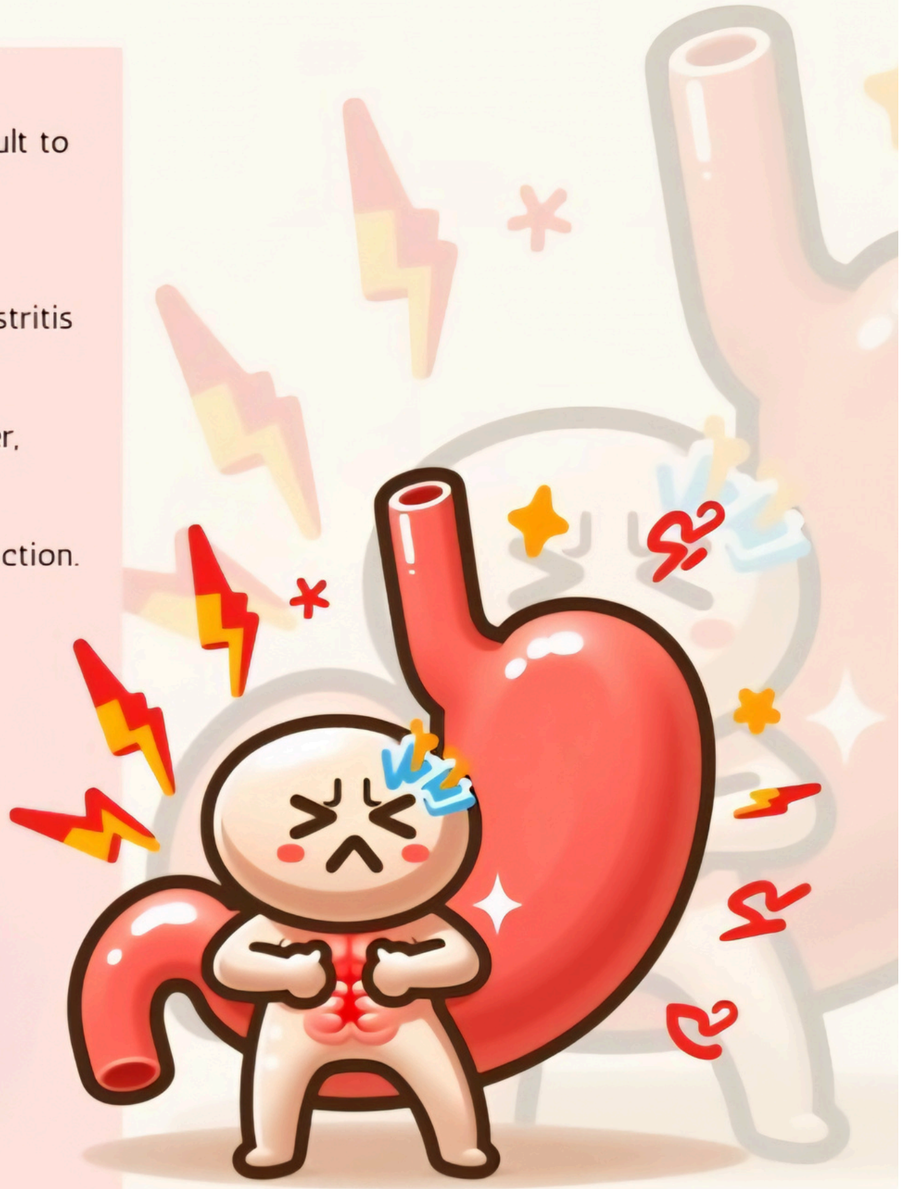
Referred

Parietal

VISCERAL PAIN

Visceral Pain: Deep, aching abdominal pain from internal organs, difficult to localize.

- **Causes:**
  - **Gastrointestinal Issues:** Conditions like gastroenteritis, IBS, gastritis causing inflammation/irritation.
  - **Organ Distension:** Pain due to stretching of organs like bladder, stomach from blockage or overeating.
  - **Ischemia:** Lack of blood flow to an organ, like in bowel obstruction.
- **Characteristics:**
  - Vague, dull, throbbing ache.
  - Diffuse and hard to pinpoint.
  - Often with nausea, bloating, bowel habit changes.
  - Triggered/worsened by stress, emotional factors.



Embryologic Origin	Involved Organs	Location of Visceral Pain
Foregut	Stomach, first/second parts of duodenum, liver, gallbladder, pancreas	Epigastric area
Midgut	Third/fourth parts of duodenum, jejunum, ileum, cecum, appendix, ascending colon, first two thirds of transverse colon	Peri umbilical area
Hindgut	Last one third of transverse colon, descending colon, sigmoid, rectum, intraperitoneal GU organs	Suprapubic area

PARIETAL PAIN

- **Parietal Pain:** Abdominal pain linked to parietal peritoneum, localized and intense.

Causes:

- **Inflammation of Peritoneum:** Peritonitis from infection, injury, perforated organ.
- **Surgical Incisions:** Pain post-surgery in abdominal area.
- **Trauma/Injury:** Direct abdominal wall trauma.
- **Infection/Abscess:** Localized infections in abdominal cavity.

Characteristics:

- Sharper, more pinpointed than visceral pain.
- Worsens with movement, coughing, sneezing.
- Steady, aching sensation, localized to specific abdominal area.

REFERRED PAIN

Referred Pain: Pain felt at a location different from the source.

Causes:

- **Gallbladder Issues:** Pain in right shoulder/back.
- **Heart Conditions:** Angina/heart attack causing pain in neck, jaw, arms.
- **Kidney Problems:** Stones/infections with pain in lower abdomen/groin.
- **Lung/Diaphragm Issues:** Pain in shoulder/upper abdomen.

Characteristics:

- Experienced away from the problem source.
- Can be dull, aching, or sharp and intense.
- Misleading, not aligning with problem's actual location.

PAIN ORIGIN SITE

&

Location of referred pain in Abdominal disease

Pancreatitis, peptic ulcer

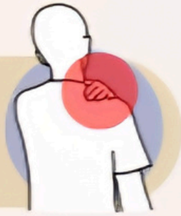
01

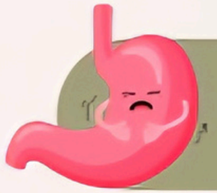
Back pain

Inflammation of gallbladder

02

Shoulder pain





Gastritis

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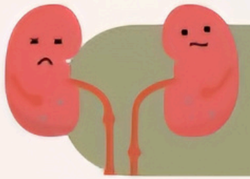
Superficial abdominal pain



Renal stone

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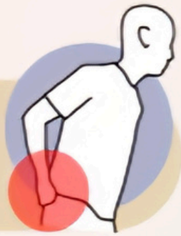
Lower back pain



CLINCAL FEATURES

To determine the urgency and method of the diagnostic approach we recommend the use of a pragmatic scheme based on :

Patient Acuity

Risk factors

PATIENT ACUITY

Is This Patient Critically Ill?

Critically ill patients need immediate stabilization. Markers of high acuity include extremes of age, severe pain of rapid onset, abnormal vital signs, dehydration, and evidence of visceral involvement (e.g., pallor, diaphoresis, vomiting).

The intensity of abdominal pain may bear no relationship to the severity of illness. Serious illness may be present even if vital signs are normal, particularly in high-risk groups such as the elderly and the immunocompromised.

Vital signs

Blood pressure

Shock that develops rapidly after the onset of acute abdominal pain is usually the consequence of intra-abdominal hemorrhage.

Systolic pressure does not drop until blood loss reaches 30% to 40% of normal blood volume.

Tachypnena

Tachypnea may indicate a cardiopulmonary process, metabolic acidosis, anxiety, or pain.

Tachycardia

Tachycardia is a useful parameter for the assessment of volume depletion, but its absence does not exclude blood/fluid loss.

Temperature

Temperature is neither sensitive nor specific for disease process or patient condition. The presence or absence of fever cannot be used to distinguish surgical from medical disease.

For critically ill patients,
blood samples should be drawn at the time of IV insertion, including, at a minimum, electrolytes, BUN and creatinine, CBC with platelets, clotting studies, and a type and antigen screen of blood. Order cross-matched blood if hemorrhage is suspected or if urgent transfusion is anticipated. A bedside US should be performed rapidly in an attempt to expedite identification of emergent causes of abdominal pain in the patient with hemodynamic collapse. The presence of an abdominal aortic aneurysm and intra-abdominal hemorrhage can be quickly discovered.Bedside US can also be used to help assess hemodynamic status by focused evaluation of heart function and inferior vena cava size and respiratory response. This information can help guide resuscitative efforts.

Resuscitation of the critically ill patient with abdominal pain includes a cardiac monitor, oxygen (2 to 4 L/min via nasal cannula or mask), large-bore IV access, and an isotonic fluid bolus adjusted for age, weight, and cardiovascular status.

RISK FACTORS

IAre There Special Conditions or Risk Factors That Affect Clinical Risk or Mask the Disease Process?

Identify pertient past medical illness (diabetes, heart disease, hypertension, liver disease, renal disease, human immunodeficiency virus status, sexually transmitted diseases), previous abdominal surgeries, menstrual history and pregnancies (deliveries, abortions, ectopic), medications (steroids, immune suppressants, acetylsalicylic acid/nonsteroidal anti-inflammatory drugs, antibiotics, laxatives, narcotics, fertility agents, intrauterine devices, chemotherapeutic agents), allergies, and any recent trauma.

Ask about previous episodes of similar abdominal pain, diagnostics, and treatments. Review previous medical records. Obtain a social history that includes habits (tobacco, alcohol, other drug use), occupation, possible toxic exposures, and living circumstances (homeless, dwelling heat source, running water, living alone, other family members ill with similar symptoms).

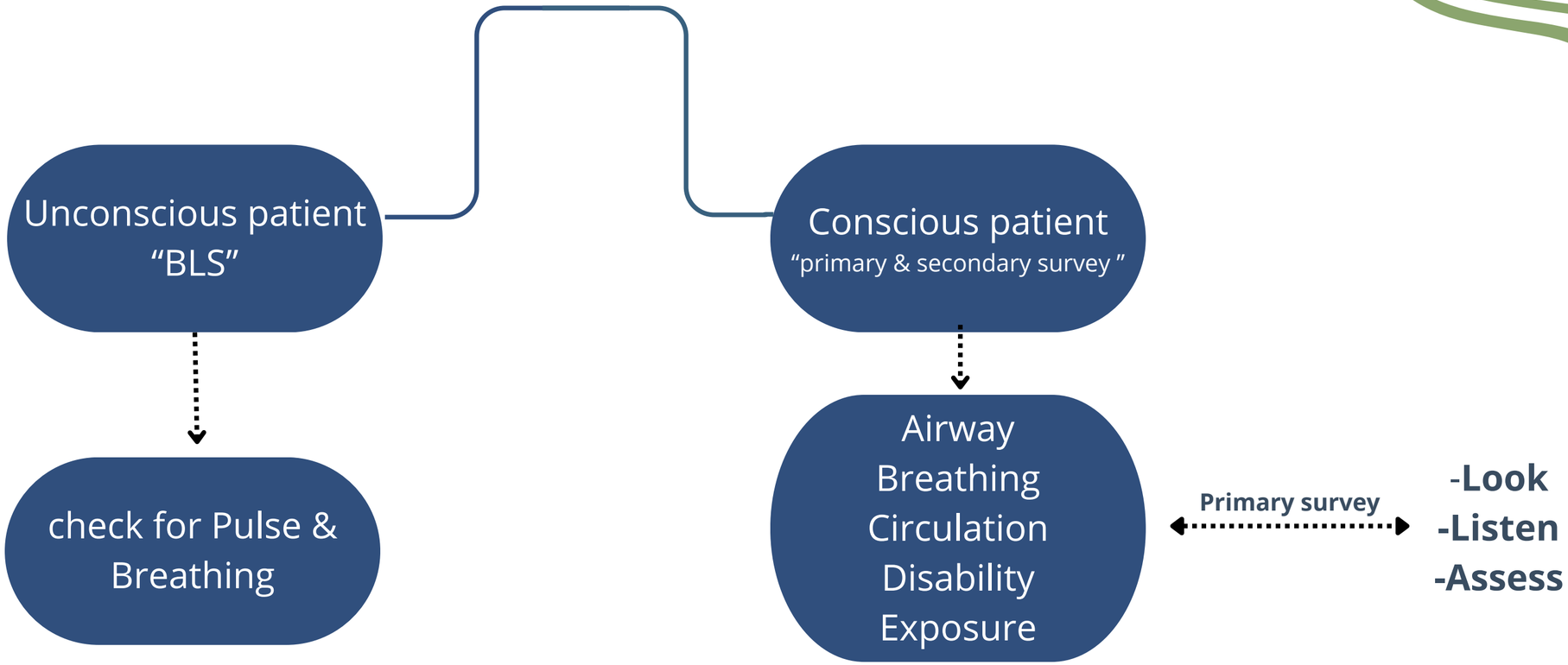
CAMOUFLAGING CONDITIONS

A number of conditions camouflage critical illness in patients with acute abdominal pain. High-risk groups include patients with :

- cognitive impairment
- patients who cannot communicate effectively
- patients in whom physical findings may be minimal (the elderly)
- or obscured (patients with spinal cord injury)
- asplenic patients
- neutropenic patients
- transplant patients
- patients whose immune systems are impaired by HIV
- chronic renal disease , diabetes, cirrhosis
- hemoglobinopathy
- malnutrition, chronic malignancy, autoimmune disease
- patients taking immune-suppressive or immune-modulating medications

History and Physical Examination: The Gateway to Diagnosing Abdominal Pain in the Emergency Department

In emergency situations, patient stability comes first



ABCDE approach is a continuous loop: if any instability is found in one step, correct it immediately and restart the survey from the beginning

Causes of the abdominal pain

Alimentary causes	Non-alimentary causes
Piptic ulcer	**MI** → Epigastric pain
Biliary colic	Respiratory causes (lower lobe pneumonia) → Upper abdominal pain
Acute pancreatitis	Torsion of testis/ovary → Lower abdominal pain
	AAA → flank or lower back pain
	Ectopic pregnancy → Suprapubic& iliac fossa pain

Brief History

S YMPTOMS

A LLERGIES

M EDICATIONS

P AST HISTORY

L AST ORAL INTAKE

E VENTS TO PRESENT

OP2QRST2
(SOCRATES)

-Tintinalli's_Emergency_Medicine 9th-

- Onset
- Pro-vocative/palliative
- Quality
- Radiation
- associated Symptoms
- Timing & what patient has taken for the pain

"Listen to your patient; he is telling you the diagnosis"

-Sir William Osler-

Before you start any physical exam, it’s important to make the patient feel comfortable and safe, through several steps

Provide privacy &
Expose only what needs to be seen

Gain the patient’s trust

Explaining what you’re going to do

Being gentle and respectful

Note the patient’s skin

look for color
check temperature
Assess turgor
Observe perfusion

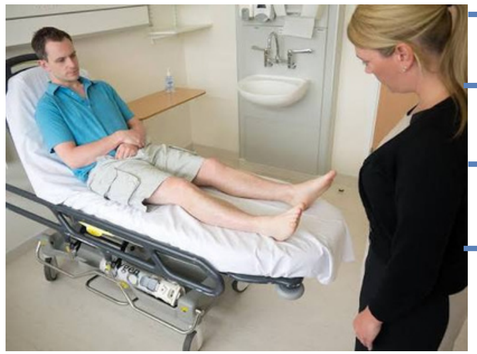
Perform targeted heart and lung examination

Listen for heart& breath sound
check the pulse

Physical examination
(secondary survey)

Inspection :

From foot of the bed

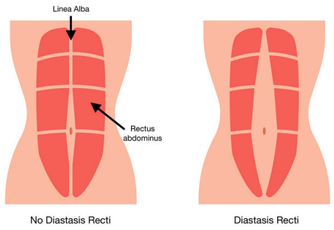


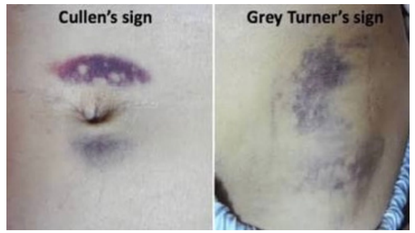
- Abdominal symmetry
- Obvious mass
- Shape of abdomen
- Umbilicus

from right of the bed

- visible pulsation & peristalsis
- Scars
- stigmata of liver disease
- visible dilated vein
- Stoma bag & Drains

Examine for Divaricated recti: Ask patient raises the head off the bed



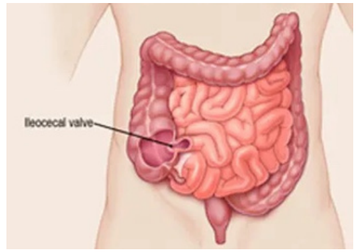


Auscultation of Bowel Sounds :

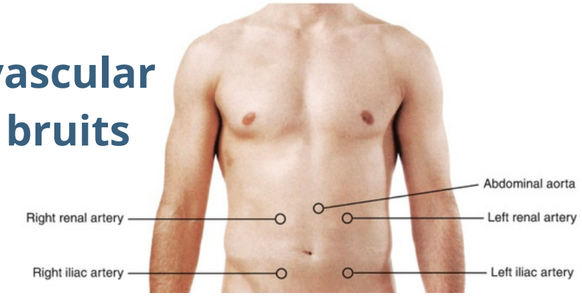
↓ paralytic ileus
mesenteric infarction
narcotic use
peritonitis

↑ Small bowel obstruction

With the patient supine, place your stethoscope diaphragm to the right of the umbilicus .and do not move it



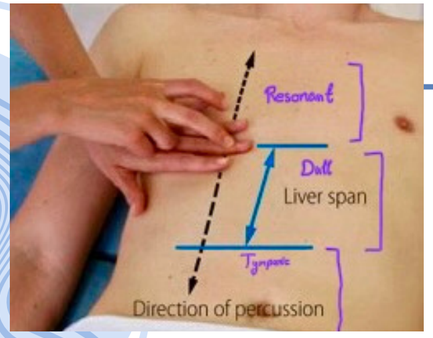
vascular bruits

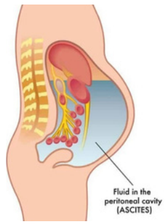


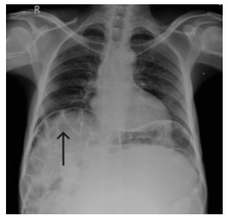
Listen for up to 2 minutes before concluding that bowel sounds are absent .They normally occur every .5–10 seconds but the frequency varies

Percussion :

Liver size can be estimated by the presence of percussion
-dullness in the midclavicular line, except in cases of severe bowel distension
A fluid wave may suggest ascites, and tympany may suggest dilated .loops of bowel

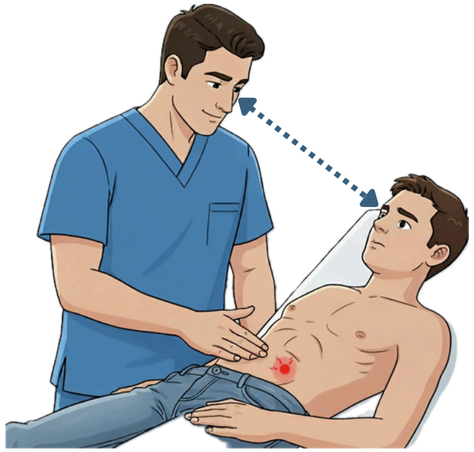




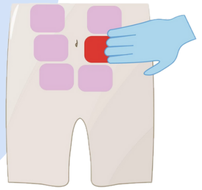
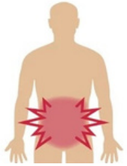
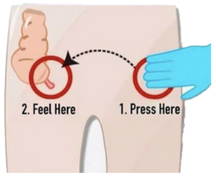
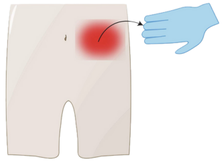


Palpation :

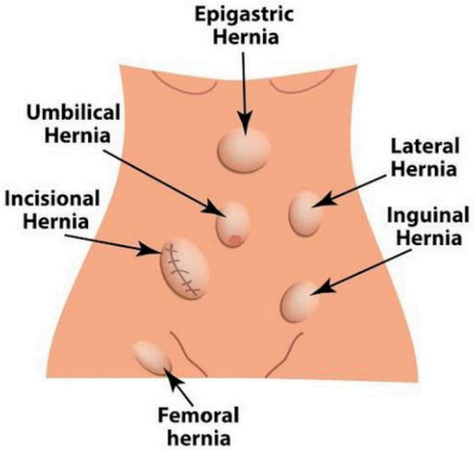
The vast majority of clinical information is acquired through gentle palpation, using the middle three fingers, and saving the painful area for last .



After checking for masses and general tenderness with superficial and deep palpation, we should also look for specific signs of peritoneal irritation — such as guarding, rigidity, referred tenderness and rebound tenderness — which help us distinguish simple discomfort from true pathological pain

	Feature/ Sing	Definition	Change with distraction / relaxation	Clinical significance
	Voluntary Guarding	Abdominal muscle contraction in anticipation of or in response to palpation	Decreases if the patient is distracted, breathes slowly, bends knees, or palpates with their own hand	Usually protective, non-specific
	Rigidity (Involuntary Guarding)	Reflex spasm of abdominal muscles due to peritoneal irritation	Persists despite relaxation or distraction	Strong indicator of peritonitis
	Referred Tenderness	Pain felt at a site different from where palpation occurs	Helps locate the true site of inflammation when palpating adjacent quadrants	Indicates peritoneal irritation — may be seen in acute appendicitis (Rovsing's sign)
	Rebound Tenderness	Pain increases when examiner quickly releases pressure	Sensitivity is low; >1/3 of appendicitis cases lack it; false positives possible; causes unnecessary patient discomfort	Traditionally a sign of peritonitis, but has limitations
	Murphy's sign	As the patient takes a deep breath in, gently palpate in the right upper quadrant of the abdomen; the acutely infamed gallbladder contacts the examiner's fingers, evoking pain with the arrest of inspiration	Persists regardless of distraction or relaxation; positive if the patient stops breathing in due to pain over the gallbladder	Acute cholecystitis

Examine hernial orifices:

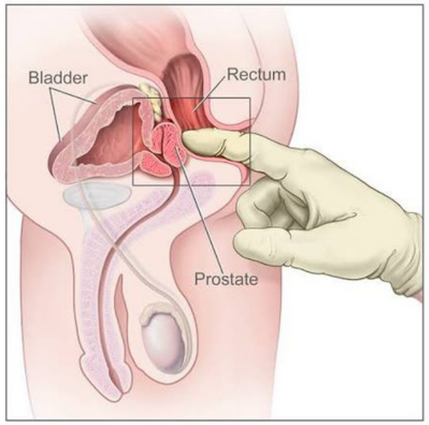


• Abnormal protrusion of an intra-abdominal contents through a defect in the abdominal wall

•Manually check for common hernia sites (inguinal, umbilical, femoral).

Rectal Examination :

- Its main value is to detect gross blood, maroon, or melanotic (black) stool , so the rectal exam isn't always essential for diagnosis, but it's useful for identifying gastrointestinal bleeding.



Specific characteristics of abdominal pain
&
SYMPTOM TREATMENT

"There are only two sorts of doctors:
those who practice with their brains, and
those who practice with their tongues."

William Osler

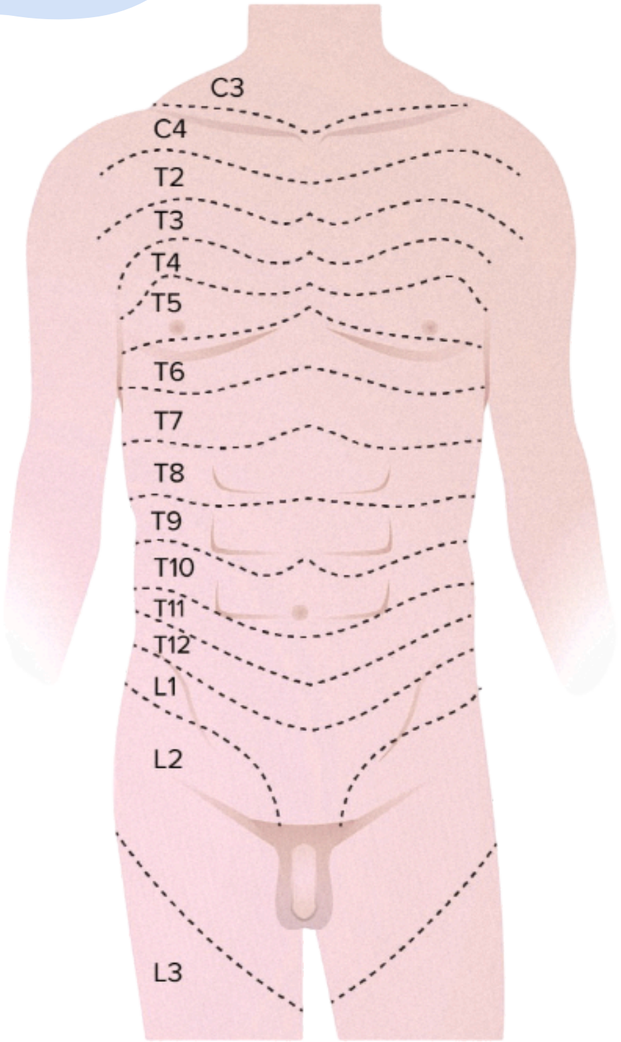
Nerves responsible for abdominal pain

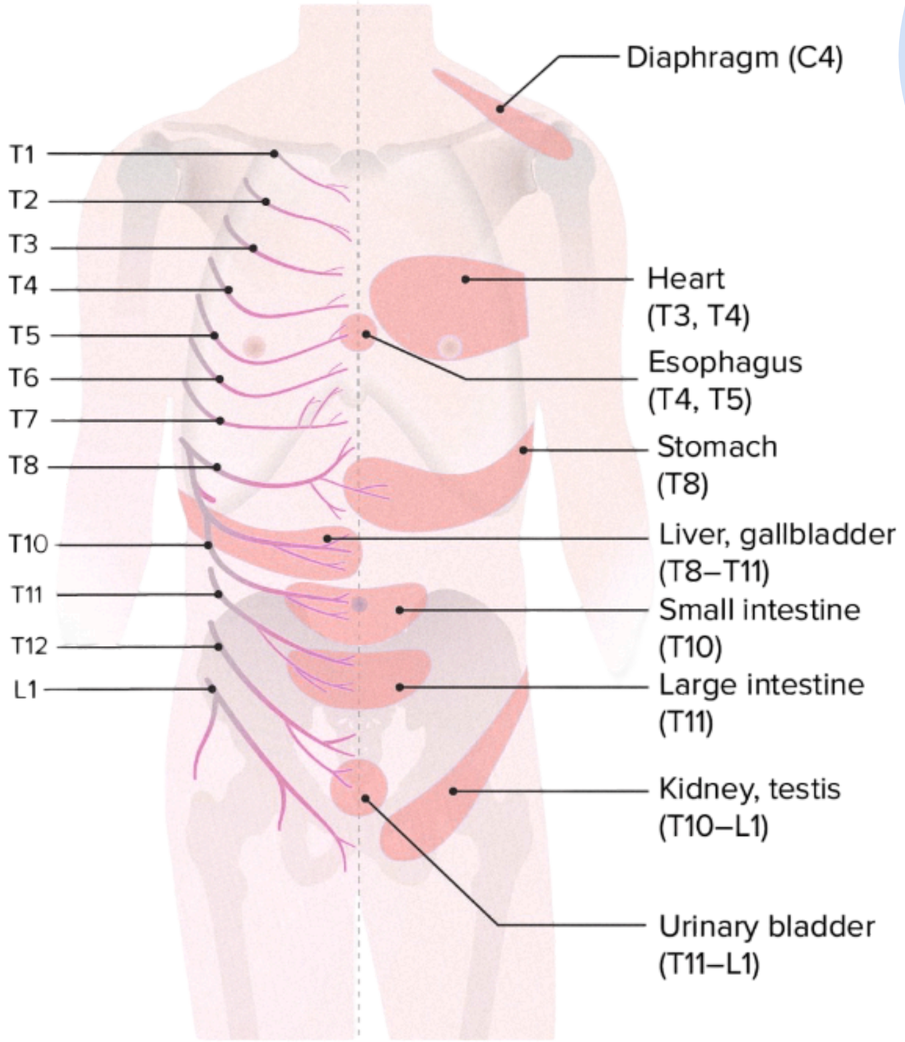
● **Abdominal wall and parietal peritoneum** are supplied by the somatic nerves

● **Skin, muscles and parietal peritoneum** are supplied by the lower six intercostal nerves, iliohypogastric and ilioinguinal nerves

● **Abdominal organs and the visceral peritoneum** are supplied by the autonomic nervous system

● **Afferent pain** fbres from the abdominal organs and visceral peritoneum travel with sympathetic nerves





Organ	Embryologic Origin	Spinal Cord Segment
Foregut (Stomach, Liver, Pancreas)	T6 - T9	**Epigastrium** (upper central abdomen)
Midgut (Small Intestine, Appendix, Proximal Colon)	T9 - T11	**Periumbilical** (around the belly button)
Hindgut (Distal Colon, Rectum)	T11 - L1	**Suprapubic** (lower central abdomen)

Specific characteristics of abdominal pain

- **Visceral pain arises** from ischaemia, muscle spasm or stretching of the visceral peritoneum

- **parietal peritoneum** pain may radiate to back or front along the dermatome

Autonomic pain deep and poorly localised, is referred to the equivalent somatic distribution of that nerve root from T1 to L2

When an infamed organ touches the parietal peritoneum, pain is then localised to the segmental dermatome of the abdominal wall

Diffuse Pain

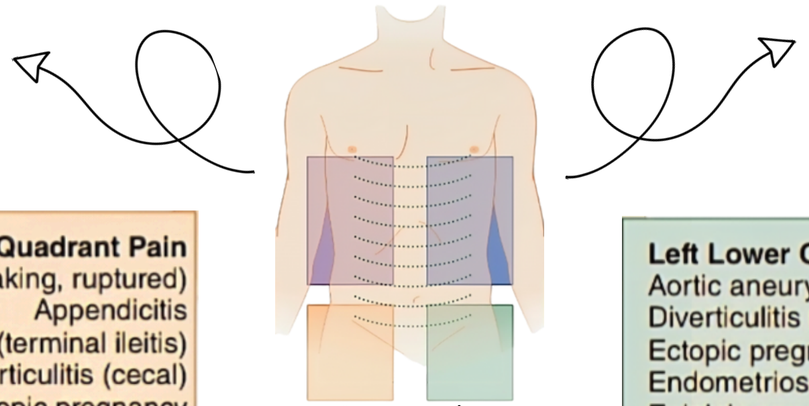
Abdominal compartment syndrome
Aortic aneurysm (leaking, ruptured)
Aortic dissection
Appendicitis (early)
Bowel obstruction
Diabetic gastric paresis
Familial Mediterranean fever
Gastroenteritis
Heavy metal poisoning
Hereditary angioedema
Malaria
Mesenteric ischemia
Metabolic disorder (Addisonian crisis, AKA, DKA, porphyria, uremia)
Narcotic withdrawal
Pancreatitis
Perforated bowel
Peritonitis (of any cause)
Sickle cell crisis
Volvulus

Right Upper Quadrant Pain

Appendicitis (retrocecal)
Biliary colic
Cholangitis
Cholecystitis
Fitz-Hugh-Curtis syndrome
Hepatitis
Hepatic abscess
Hepatic congestion
Herpes zoster
Myocardial ischemia
Perforated duodenal ulcer
Pneumonia (RLL)
Pulmonary embolism

Left Upper Quadrant Pain

Gastric ulcer
Gastritis
Herpes zoster
Myocardial ischemia
Pancreatitis
Pneumonia (LLL)
Pulmonary embolism
Splenic rupture/distention



Right Lower Quadrant Pain

Aortic aneurysm (leaking, ruptured)
Appendicitis
Crohn's disease (terminal ileitis)
Diverticulitis (cecal)
Ectopic pregnancy
Endometriosis
Epiploic appendagitis
Herpes zoster
Inguinal hernia (incarcerated, strangulated)
Ischemic colitis
Meckel's diverticulum
Mittelschmerz
Ovarian cyst (ruptured)
Ovarian torsion
Pelvic inflammatory disease
Psoas abscess
Regional enteritis
Testicular torsion
Ureteral calculi

Left Lower Quadrant Pain

Aortic aneurysm (leaking, ruptured)
Diverticulitis (sigmoid)
Ectopic pregnancy
Endometriosis
Epiploic appendagitis
Herpes zoster
Inguinal hernia (incarcerated, strangulated)
Ischemic colitis
Mittelschmerz
Ovarian cyst (ruptured)
Ovarian torsion
Pelvic inflammatory disease
Psoas abscess
Regional enteritis
Testicular torsion
Ureteral calculi

SYMPTOM TREATMENT

- Opioid
- NSAID
- Antiemitic drug
- nasogastric and urinary catheters

Do not withhold analgesia from patients with acute undifferentiated abdominal pain, provide symptomatic relief. The choice of analgesia agent is **dependent upon patient** condition, clinical situation, and provider preference

Opioid &NSAID

Opioid analgesia relieves pain and will not obscure abdominal findings, delay diagnosis, or lead to increased morbidity/mortality.5,6 The information on the safety of opioids cannot be extrapolated to NSAIDs such as parenteral ketorolac because NSAIDs are not pure analgesics and can mask early peritoneal inflammation.

Opioid medications are not benign. The practice of high-intensity opioid prescribing by EMS providers can contribute to long-term opiod use in their patients.

Opioids have adverse side effects and potential for abuse. A recent trend toward a decrease in EMS provider prescribing of opioids may reflect increased public awareness of the disadvantages of these medications.

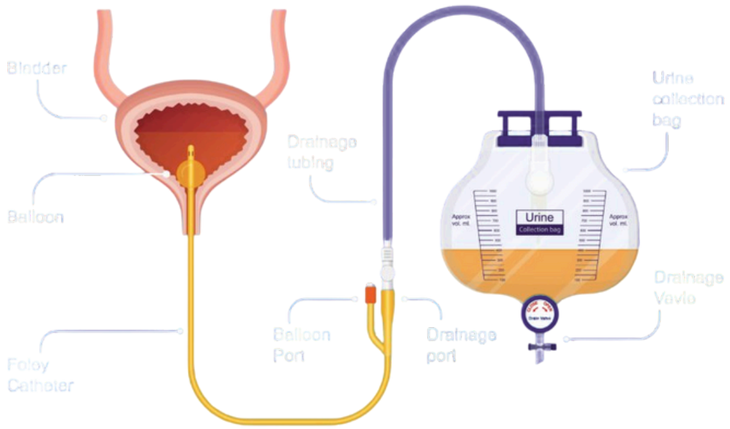
Antiemetic

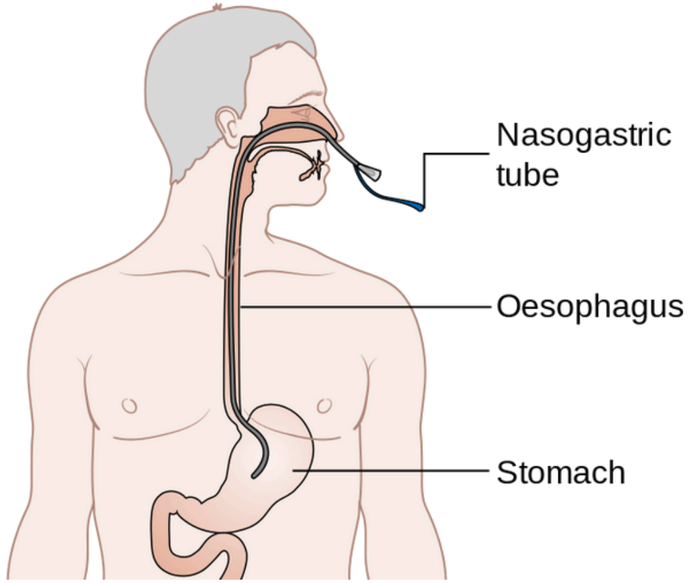
Administer antiemetics as needed. A Cochrane review reported that ondansetron and metoclopramide reduced postoperative nausea and vomiting.

Both drugs had equivalent effects. The dosage of IV ondansetron is 4 or 8 milligrams (0.45 milligram/kg total daily) to a maximum of 32 milligrams daily. Headache is a reported side effect. The dosage of IV metoclopramide is 10 milligrams, given slowly to minimize extrapyramidal side effects. Sometimes, 25 to 50 milligrams of IV diphenhydramine are administered as prophylaxis against dystonia. Patients with akathisia or dystonic reactions from metoclopramide cannot tolerate any other agents of the same class and should be given ondansetron. Such reactions are extremely rare from ondansetron

nasogastric and urinary catheters

Consider placement of nasogastric and urinary catheters. Nasogastric aspirate may confirm upper GI bleeding, and nasogastric suction may be used to decompress a bowel obstruction. A urinary catheter will relieve bladder obstruction, and hourly urine output helps to gauge renal perfusion.





Laboratory testing

- Laboratory testing does not take the place of a conscientious history and physical examination.

- Information obtained by laboratory testing should help refine the differential diagnosis or alter the plan of treatment.

TABLE: Suggested Laboratory studies for Goal-Directed Clinical Testing in Aute Abdominal Pain

Laboratory Test	Clinical Suspicion
Lipase	Pancreatitis
Amlase (if lipase not available)	Pancreatitis
B-human chorionic gonadotropin serum or urine Qualitative or quantitative	Pregnancy Ectopic or molar pregnancy

Laboratory Test	Clinical Suspicion
Coagulation studies (prothrombin time/ partial thromboplastin time)	GI bleeding End-stage liver disease Coagulopathy
Electrolytes	Dehydrate Endocrine or metabolic disorder
Glucose	Diabetic ketoacidosis Pancreatitis
Platelets	GI bleeding

Laboratory Test	Clinical Suspicion
Gonococcal/ chlamydia testing	Cervicitis/ urethritis Pelvic inflammatory disease
Hemoglobin	GI bleeding
Lactate	Mesenteric ischemia Sepsis
ECG	Myocardial ischemia or infarction

Laboratory Test	Clinical Suspicion
Liver function tests	Cholecystitis cholelithiasis Hepatitis
Renal function tests	Dehydration Renal insufficiency Acute renal failure
Urinalysis	Urinary tract infection Pyelonephritis Nephrolithiasis

Limitations of laboratory studies:

1. Complete Blood Count (CBC) has limitations in diagnosing serious conditions:

The CBC test does not provide strong enough likelihood ratios to confirm or rule out diseases.

In a study of adult patients with appendicitis, only 65% had an elevated white blood cell count (WBC ≥ 12,000/mm³).
Even very high WBC levels were not associated with a higher chance of perforation (rupture of the appendix).

2. Normal lab results should not be reassuring:

It's better to focus only on very high values (e.g., WBC > 20,000/mm³).
but you should not feel reassured by a "normal" WBC result.

A single WBC test cannot rule out serious or surgical conditions.

3. Serum lactate is not always reliable:

In cases of acute mesenteric ischemia, up to 25% of patients had normal lactate levels when they first arrived at the emergency department.

The usefulness of lactate testing is limited due to variations in the time between symptom onset and hospital presentation.

Note: obtain an ECG for patients with upper abdominal pain, especially in elderly patients.

Diagnostic imaging

X-ray

US

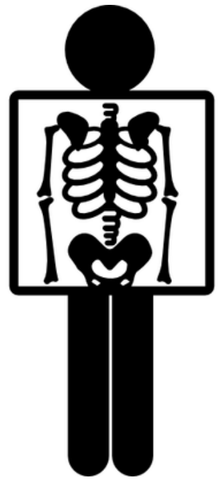
POCUS

CT scan

1. Plain Radiographs (X-rays):

- Upright abdominal X-rays.
- Upright chest X-rays.
- Supine (lying down) abdominal X-rays only.

Each type provides different diagnostic information, such as air-fluid levels or free air under the diaphragm.



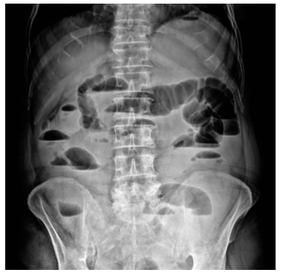
- **Importance of Upright Abdominal X-ray:**

— Helps detect incarcerated hernias, where part of the intestine is trapped and may lose blood supply.

— Upright positioning reveals air-fluid levels that are key indicators of obstruction.

- **Small Bowel Obstruction (SBO):**

may appear on X-rays 6 to 12 hours before symptoms develop. However, up to 50% of cases may show no signs on imaging.



- **Appropriate Uses of Plain Radiographs:**

— Bowel obstruction: Shows dilated loops and air-fluid levels.

— Sigmoid volvulus: Twisting of the colon, visible as a large, distended loop.

— Perforation: Free air under the diaphragm.

— Severe constipation: Shows large amounts of stool in the colon.

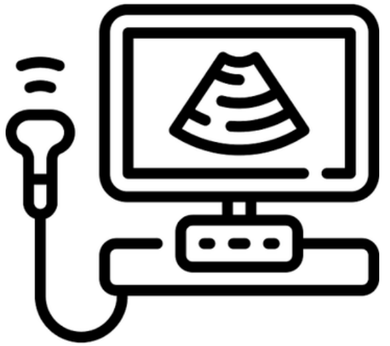
2. Ultrasound (US)

Abdominal ultrasound can clearly visualize several important internal organs, including: gallbladder, pancreas, kidneys and ureters, urinary bladder, aorta

- Ideal Uses of Ultrasound:

  The best use of ultrasound is in evaluating biliary tract diseases, such as:
  -Cholecystitis (inflammation of the gallbladder)
  - Gallstones in the bile ducts

Note: When acute cholecystitis or biliary dyskinesia is strongly suspected but the US is normal, cholescintigraphy .(nuclear medicine scan of the gallbladder) is recommended



3. Point-of-Care Ultrasound (POCUS)

Types of Abdominal POCUS Applications:

- **Resuscitative Abdominal POCUS, USED in:**

1. FAST Exam (Focused Assessment with Sonography for Trauma)

A rapid ultrasound scan used to detect free fluid in the abdominal cavity, which may indicate internal bleeding due to trauma.

2. Abdominal Aortic Aneurysm (AAA)

POCUS helps identify dilation of the abdominal aorta, which could signal a potentially fatal aneurysm or risk of rupture.

3. Cardiac and Inferior Vena Cava (IVC) Assessment

Evaluates heart function and IVC size to determine fluid status, shock severity, or need for resuscitation.
Useful in guiding fluid therapy and understanding the patient's hemodynamic condition.

- ## Diagnostic Abdominal POCUS,USED in:

1. Urinary Tract Evaluation

Assesses for urinary retention, kidney stones, or obstruction in the ureters.

2. Biliary System Evaluation

Helps detect gallstones, cholecystitis (gallbladder inflammation), or bile duct obstruction.

4. Abdominal-Pelvic CT scanning:

CT scans can be performed with different types of contrast depending on the clinical question:

1. Non-contrast CT:

No contrast used.

Ideal for:

- **Kidney and ureteral stones**

- **Free air detection**

- Has high specificity (~97%) for appendicitis in most patients, except those with low BMI (<25 kg/m²)

2. Oral Contrast (PO)

Taken by mouth to opacify the bowel.

Controversial in ED settings due to (disadvantages) :

- **Vomiting**
- **Delayed transit time to the distal colon (can take hours)**
- **Gastric emptying time (delayed induction of anesthesia, several hours)**
- **Incomplete bowel opacification**
- **Prolonged ED throughput time**

Still preferred in some institutions for:

- **GI abscess**
- **Perforation**
- **Fistula detection**

3. Rectal Contrast (PR)

Administered via the rectum.

Useful for: Distal large bowel obstruction

4. Intravenous Contrast (IV)

Enhances visibility of:

- Bowel mucosa
- Visceral organs
- Blood vessels

Essential for:

- Mesenteric ischemia
- Abdominal aortic aneurysm rupture
- Bowel obstruction and transition point

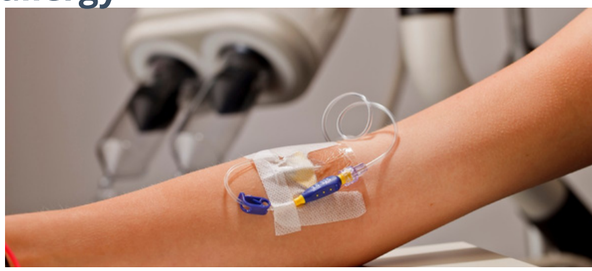
Risks of IV contrast:

-Nephrotoxicity
-Allergic reactions

IV contrast Not recommended in:

Serum creatinine >1.5 mg/dL
Or GFR <60 mL/min (except in life-threatening situations)

History of contrast or iodine allergy



THANK YOU

دَواؤُكَ فيكَ وَما تُبصِرُ

وَدَاؤُكَ مِنكَ وَما تَشعُرُ

أَتَزعُمُ أَنَّكَ جُرمٌ صَغير

وَفيكَ اِنطَوى العالَمُ الأَكبَرُ

علي بن أبي طالب