
بسم الله الرحمن الرحیم

Acute abdomen

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Acute abdomen

Definition:

"An acute intra-abdominal condition of abrupt onset that is usually associated with pain due to inflammation, perforation, obstruction, infarction or rupture of abdominal organs in previously healthy person and usually requiring emergency intervention.

Called also surgical abdomen."

- General rule can be made that majority of severe abdominal pain in pts who have been previously fairly well and last **longer than 6 hours** are caused by surgical conditions

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

“The term “acute abdomen” should never be equated with the invariable need for operation.”

Acute Abdomen

- Challenge to Surgeons & Physicians
- Most common cause of surgical emergency admission
- Encompass various conditions ranging from the trivial to the life-threatening
- Clinical course can vary from minutes to hours, to weeks
- It can be an acute exacerbation of a chronic problem e.g. Chronic Pancreatitis, Vascular Insufficiency

Outline – Acute Abdominal Pain

- Intra-abdominal Diagnosis by Organ System :
  - **Gastrointestinal**
    - Appendicitis
    - Biliary Tract Disease
    - Small Ball Obstruction
    - Diverticulitis
    - Acute Pancreatitis
  - **Genitourinary**
    - Renal Colic
    - Acute Urinary Retention / UTI

Gynecologic Pain

Acute PID

Ectopic Preg

Vascular

AAA

Mesenteric Ischemia

Ischemic Colitis

OPQRST

Onset	• What were you doing when it started? • Did the pain come suddenly or gradually?
Provocation	• Does the pain move around? • Does anything lessen the pain?
Quality	• Can you describe the pain? • Is it constant? Does it come and go? • Is it sharp, dull or burning?
Radiation	• Do you feel the pain anywhere else?
Severity	• How severe on a scale of 1-10 scale?
Time	• What time did the pain come on?

Acute Abdominal Pain

- Two approaches to evaluate pts with acute abdominal pain:

  1. Classification of abd pain into systems

  2. Abdominal Topography (4 quadrants)

Classification on Abdominal Pain

- Three main categories of abdominal pain:

1. Intra-abdominal (arising from within the abd cavity / retroperitoneum) involves:
   - GI (Appendicitis, Diverticulitis, etc, etc, etc)
   - GU (Renal Colic, etc, etc, etc)
   - Gyn (Acute PID, Pregnancy, etc)
   - Vascular systems (AAA, Mesenteric Ischemia, etc)

Classification on Abdominal Pain

2. Extra-abdominal (less common) involves:
   - Cardiopulmonary (AMI, etc)
   - Abdominal wall (Hernia, Zoster etc)
   - Toxic-metabolic (DKA, OD, lead, etc)
   - Neurogenic pain (Zoster, etc)
   - Psychic (Anxiety, Depression, etc)
3. Nonspecific Abd pain – not well explained or described.

Historical features of Abd Pain

- Location, quality, severity, onset, and duration of pain, aggravating and alleviating factors
- GI symptoms (N/V/D)
- GU symptoms
- Vascular symptoms (A. fib / AMI / AAA)
- Can overlap i.e. Nausea seen in both GI / GU pathologies.

Historical features of Abd Pain

- PMH
  - Recent / current medications
  - Past hospitalizations
  - Past surgery
  - Chronic disease
  - Social history
  - Occupation / Toxic exposure (CO / lead)

Physical Examination of the Abdomen

- Note pt's general appearance. Realize that the intensity of the abdominal pain may have no relationship to severity of illness.
- One of the initial steps of the PE should be obtaining and interpreting the vitals.
- Pts with visceral pain are unable to lie still.
- Pts with peritonitis like to stay immobile.

Physical Examination of the Abdomen

- **INSPECT** for distention, scars, masses, rash.
- **AUSCULATE** for hyperactive, obstructive, absent, or normal bowel sounds.
- **PALPATION** to look for guarding, rigidity, rebound tenderness, organomegally, or hernias.
- Women should have pelvic exam (check FHR if pregnant).
- Anyone with a rectum should have rectal exam (If no rectum check the ostomy).

Laboratory Test

- CBC (limited clinical utility)

- UA / Urine culture
- Lactic acid
- LFT / Amylase / Lipase
- CE / Troponin
- HCG (quant / qual)
- Stool exam

Radiographic Test

- Plain abdominal radiographs or abdominal series has several limitations and is subject to reader interpretation.

- CT scan in conjunction with ultrasound is superior in identifying any abnormality seen on plain film.

Specific Diagnoses

- In patients above fifty years of age the top four reasons for acute abdominal pain are: Biliary Tract Disease (21%,) NSAP (16%), Appendicitis(15%), and Bowel Obstruction (12%).

- In patients under fifty years of age the top three reasons for acute abdominal pain are: NSAP (40%,) Appendicitis (32%,) and Other (13%.)

Acute Appendicitis

- Clinical features with some predictive value include:
  - Pain located in the RLQ
  - Pain migration from the periumbilical area to the RLQ
  - Rigidity
  - Pain before vomiting
  - Positive physical sign (psoas. Obturator)
  - Note: Anorexia is not a useful symptom (33% pts not anorectic preoperatively.)

Acute Appendicitis

- Ultrasound can be used for detection, but CT is preferred in adults and non-pregnant women.
- The CT scan can be with and without contrast (oral & IV.)
- A neg. CT does not exclude diagnosis, but a positive scan confirms it.

Biliary Tract Disease

- Most common diagnosis in ED of pts > 50.
  - Composed of:
    - Acute Cholecystitis (acalculus / calculus)
    - Biliary Colic
    - Common Duct Obstruction (Ascending Cholangitis – painful jundice / fever / MSΔ).
- Of those patients found to have acute cholecystitis, the majority lack fever and 40% lack leukocytosis.

Biliary Tract Disease

- Patients may complain of:
  - Diffuse pain in upper half of abdomen
  - Generalized tenderness throughout abdomen
  - RUQ or RLQ pain.

Biliary Tract Disease

- Sonography (US) is the initial test of choice for patients with suspected biliary tract disease. More sensitive than CT scan to detect CBD obstruction.

- CT scan is better in the identification of cholecystitis than in the detection of CBD obstruction.

- Cholescintigraphy (radionclide / HIDA scan) of the biliary tree is a more sensitive test than US for the diagnosis of both of these conditions.

Biliary Tract Disease

- MR cholangiography (MRCP)
  - Has good specificity and sensitivity in picking up stones and common duct obstructions.
  - Less invasive / less complications than ERCP

(ERCP can induce GI perforation, pancreatitis, biliary duct injury)

Small Bowel Obstruction

- SBO may result from previous abdominal surgeries.
- Patient may present with intermittent, colicky pain, abdominal distention, and abnormal BS.
- Only 2 historical features (previous abd surgery and intermittent / colicky pain) and 2 physical findings (abd distention and abn BS) appear to have predictive value in diagnosing SBO.

Small Bowel Obstruction

- Plain abd films has a large number of indeterminate readings and can be very limited due to the following:
  - Pt is obese
  - Pt is bedridden / contracted (limited lateral decub / upright view)
  - Technical limitations

ABDOMINAL XR

Bowel Obstruction

Small Bowel	**Large Bowel**
Central	Peripheral
Valvulae conniventes	Haustrae
Dia > 5cm	> 10cm

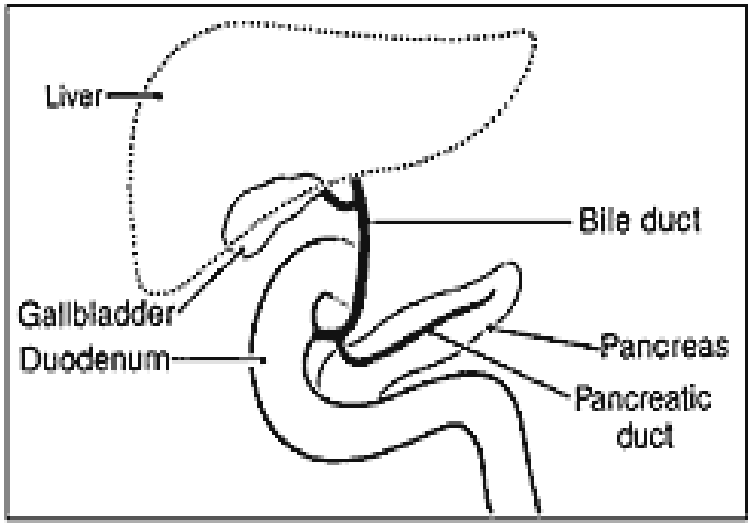
SBO

LBO

Small Bowel Obstruction

- CT scan is better than plain film in detecting high grade SBO.
- CT scan can also give more info that might not be seen on plain film (i.e. ischemic bowel)
- Low grade SBO may require small bowel follow through.

Acute Pancreatitis



- Only a minority number of pts present with pain and tenderness limited to the anatomic area of the pancrease in the upper half of the abdomen.

- 50% of pts present with c/o pain extending well beyond the upper abd to cause generalized tenderness.

Acute Pancreatitis

- The inflammatory process around the pancreas may cause other signs and symptoms such as:
  - Pleural effusion
  - Grey Turner's sign (flank discoloration)
  - Cullen's sign (discoloration around the umbilicus)
  - Ascites
  - Jaundice

Acute Pancreatitis

- Lipase testing is preferred in ED.
- Other test to consider: (CBC, Amylase, UA and CE/trop)
- The height of the pancreatic enzyme elevations do not have prognostic value
- A double contrast helical CT scan stages severity and predicts mortality sooner than Ranson's Criteria.

Acute Pancreatitis

- Should consider ICU admission for pts with high Ranson's Criteria.

- When making the diagnosis of Acute Pancreatitis, it maybe necessary to assess the pt for the following:
  1. Biliary pancreatitis
  2. Peripancreatic complications

Acute Pancreatitis

Biliary pancreatitis

-Due to CBD obstruction.

-Can lead to Ascending Cholangitis

Clinical findings: May have a fever, jaundice / icterus

Lab findings: ↑AST / ALT, ↑Total Bilirubin

Radiological std:

MRCP - Test of choice to get clear images of the pancrease and CBD.

Double contrast CT - can also be use, may have limited view of the CBD – 2nd most common test to be ordered in ED

Ultrasound – 1st most common test to be order in ED to evaluate for CBD obstruction. More sensitive than CT scan to evaluate the CBD. Its use is safer in pregnancy.

Acute Pancreatitis

Peripancreatic complications:

- Necrosis (Necrotizing Pancreatitis)
- Hemorrhage (Hemorrhagic Pancreatitis)
- Drainable fluid collections (Ruptured Pancreatic Pseudocyst)

- **Clinical findings:** May have a distended Abd, appear septic, Cullen's sign, and / or Grey Turner's Sign.

- **Lab findings:** No definite lab test will help in the diagnosis. May see decrease Hg or ↑Lactic Acid level.

- **Radiological test:** of choice to evaluate for the above complications is a double contrast CT scan.

Acute Diverticulitis

- Less than ¼ of pts present with LLQ pain.
- 1/3 of pts present with pain to the lower half of the abdomen.
- 20% of elderly pts with operatively confirmed diverticulitis lacked abdominal tenderness.
- Elderly pts are at risk for a severe and often fatal complication of diverticulitis.

  (Free perforation of the colon)

Acute Diverticulitis

- CT with contrast:
  - Test of choice for Acute Diverticulitis.
  - Can identify abscesses, other complications, and inform surgical management strategies.

- US:
  - Relies on identification of an inflamed diverticulum to make the diagnosis which is often obscured in pts with complicated diverticulitis.

Renal Colic

- Pts may present with abrupt, colicky, unilateral flank pain that radiates to the groin, testicle, or labia.
- Hematuria and plain abd films can be helpful however do not provide a strong support in the diagnostic evaluation of suspected renal colic.
- Noncontrast helical CT is standard for the diagnosis. IVP has poor sensitivity and time consuming in ED setting.
- Must rule out AAA.

Acute Pelvic Inflammatory Disease

- Patient may complain of pain / tenderness in lower abdomen, adnexal or cervix.
- Most importantly patient may complain of abnormal vaginal discharge (most common finding).
- Fever, palpable mass, ↑WBC have been inconsistently associated with PID.
- The best noninvasive test is transvaginal ultrasound.

Ectopic Pregnancy

- Symptoms include abdominal pain (most common) and vaginal bleeding (maybe the only complaint).

- Female pts (child bearing age) that present with these symptoms automatically get a pregnancy test and HCG quantitative level.

Ectopic Pregnancy

- If the pt is pregnant, then order a transvaginal US to evaluate for ectopic pregnancy.
- Clear view of an IUP in 2 perpendicular views essentially excludes an ectopic pregnancy.
- If an IUP is not seen, this must be interpreted in the context of the discriminatory zone (DZ) of the quantitative HCG.

Ectopic Pregnancy

- The DZ (1500 mIU/ml) is the threshold level of serum HCG, above which a normal IUP should be seen on sonography.
- Although there is a broad range of normal variation in HCG, failure of levels to increase by about 66% within 48 h in 1st trim pregnancy suggests an abnormal gestation (either a threatened miscarriage or blighted pregnancy from an ectopic.)
- If the diagnosis is not made with US and there is still a high suspicion for ectopic than laparoscopy is indicated.

Abdominal Aortic Aneurysm

- Dissections produce chest or upper back pain that can migrates to abdomen as the dissection extend distally.
- AAA rather than dissect, it enlarge, leak, and rupture.
- <50% of pts with AAA present with hypotension, abdominal/back pain, and/or pulsatile abd mass. Can present similar to renal colic.
- Neither the presence or the absence of femoral pulse or an abdominal bruit are helpful clinically.

Abdominal Aortic Aneurysm

- Palpation is an important part of physical exam. Maybe able to detect an enlarged aorta.
- Any stable pt > 50 yrs old presenting with recent onset of abd / flank / low back pain should have a CT scan to exclude AAA from the differential diagnosis.
- Can use bedside ultrasound FAST scan, but this will not provide information about leakage or rupture.
- MRI is limited in its ability to identify fresh bleeding. It is not an appropriate emergency procedure.

Mesenteric Ischemia (MI)

- Diagnosis can be divided into the following:

1. **Arterial insufficiency**
   - Occlusive – Embolic (A. Fib) / Thrombotic
     - Embolic MI has the most abrupt onset.
   - Nonocclusive – Low flow state (AMI / Shock)
     - Usually has clinical evidence of a low flow state (acute cardiac disease)

Mesenteric Ischemia (MI)

2. **Venous – Mesenteric Venous Thrombosis**
   - Occurs in hypercoagulable states.
   - Usually is found in younger pts.
   - Has a lower mortality.
   - Can be treated with immediate anticoagulation.

Mesenteric Ischemia

- Pt is usually older, has significant co-morbidity, and with visceral type abdominal pain poorly localized without tenderness.
- Pt may have a diversion for food or weight loss.
- Elevated Lactate level may help in the diagnosis.
- Abd films may have findings of perforated viscus and / or obstruction.
- May find pneumotosis intestinalis, free fluid, dilated bowel consistent with an ileus and / or obstructive pattern on CT scan.
- Angiography is the diagnostic and initial therapeutic procedure of choice.

Ischemic Colitis

- It is a diagnosis of an older patient.
- Pain described as diffuse, lower abdominal pain in 80% of pts.
- Can be accompanied by diarrhea often mixed with blood in 60% of patients.
- Compares to mesenteric ischemia, this is not due to large vessel occlusive disease.
- Angiography is not indicated. If it is performed it is often normal.

Ischemic Colitis

- Can be seen post – Abd Aorta surgery
- The diagnosis is made by colonoscopy.
- A color doppler ultrasound can also be used.
- In most cases only segmental areas of the mucosa and submucosa are affected.
- Chronic cases can lead to colonic stricture.
- Treatment may include conservative management or if bowel necrosis occurs surgery may be needed for colectomy.

Extrabdominal Diagnoses of Acute Abdominal Pain: **Cardiopulmonary**

- Pain is usually in upper half of abdomen.
- A chest film should be done to look for pneumonia, pulmonary infarction, pleura effusion, and / or pnemothorax.
- A neg. film plus pleuritic pain could mean PE.
- If epigastric pain is present one should inquire about cardiac history, get and ECG, and consider further cardiac evaluation .

Extrabdominal Diagnoses of Acute Abdominal Pain: **Abdominal Wall**

- **Carnett's sign:** The examiner finds point of maximum abdominal tenderness on patient. Patient asked to sit up half way, and if palpation produces same or increased tenderness than test is positive for an abdominal wall syndrome.

- Abd wall syndrome overlaps with hernia, neuropathic causes of acute abdominal pain

Extrabdominal Diagnoses of Acute Abdominal Pain: **Hernias**

- Characterized by a defect through which intraabdominal contents protrude during increases in the intraabdominal pressure
- Several types exist: inguinal, incisional, periumbilical, and femoral (common in Female).
- Uncomplicated hernias can be asymptomatic, aching / uncomfortable, and reducible on exam.
- Significant pain could mean strangulation (blood supply is compromised) / incarceration (not reducible).

Toxic causes for Acute Abdominal Pain

- Pt may present with symptoms of N/V/D and/or +/- fever to suggest a gastroenteritis or enterocolitis.
- Most of these infections are confine to the mucosa of the GI tract, therefore, pts may not present with significant tenderness.
- Other Infectious etiology that can cause abd pain includes: Gp A Beta Hem. Strep Pharyngitis, Henoch-Schonlein purpura, Rocky Mountain spotted fever, Scarlet fever, early toxic shock syndrome.

Other Toxic causes for Acute Abdominal Pain

- Other toxic cause includes poisoning and OD
  - Black Widow Spider → Abd muscle spasm
  - Cocaine induced intestinal ischemia
  - Iron poisoning
  - Lead toxicity
  - Mercury salts
  - Electrical injury
  - Opoid withdrawal
  - Mushroom toxicity
  - Isopropranol induced hemorrhagic gastritis

Metabolic causes for Acute Abdominal Pain

- DKA
- AKA (ETOH)
  - Note both AKA / DKA can be a cause or a consequence of acute pancreatitis.
- Adrenal crisis
- Thyroid storm
- Hypo / hypercalcemia
- Sickle cell crisis – consider these causes for pain splenomegaly / heptomegaly, splenic infarct, cholecystitis, pancreatitis, Salmonella infect, or mesenteric venous thrombosis.

Neurogenic causes for Acute Abdominal Pain

- "Hover Sign" – the pt show signs of discomfort when the examining hand is hovering just above or is passed very lightly over the area of dysesthesia.
- Zosteriform Radiculopathy- follows dermatome distribution and is characterized by shooting or continuous burning sensation.
- May be due to diabetic neuropathic involvement of root, plexus, or nerve.

NSAP causes for Acute Abdominal Pain

- A good portion of ER patients will have nonspecific abdominal pain.
- Patients may have nausea, midepigastric pain, or RLQ tenderness.
- The lab workup is usually normal.
- WBC may be elevated.
- Diagnosis should be confirm with repeated exam.

Special Considerations

- In pts >50 you must consider mesenteric ischemia, ischemic colitis, and AAA.
- In an elderly patient symptoms do not manifest in the same manner as those younger.
- Compared to young pts, only 20% of elderly pts with abdominal pain will be diagnose with NSAP
- Assume an elderly patient has a surgical cause of pain unless proven otherwise.
- 40% of those > 65 yrs old that present to ED with abdominal pain need surgery.

VIRUS

- Enterocolitis with diarrhea and dehydration is most common cause of abdominal pain.
- CMV related large bowel perforation is possible.
- Watch for obstruction due to Kaposi Sarcoma, lymphoma, or atypical mycobacteria.
- Watch for biliary tract disease (CMV, Cryptosporidium.)

Disposition of Acute Abdominal Pain

- Indications for admissions:
  - Pts who appear ill.
  - Very young / Elderly
  - Immunocompromised
  - Unclear diagnosis
  - Intractable pain, nausea, or vomiting
  - Altered mental status
  - Those using drugs, alcohol, or that lack social support.
  - Pts with poor follow-up and/or noncompliant.

Disposition of Acute Abdominal Pain

- Non-specific abdominal pain
  - If this is the working(first) diagnosis, patients must be re-examined in 24 hours. This may be done in the outpatient setting.

Treatment of Acute Abdominal Pain

- Analgesics:
  - Though in past ER physicians did not treat acute abdominal pain with analgesics for fear of altering or obscuring the diagnosis, current literature favors the use of opoids judiciously in such patients.

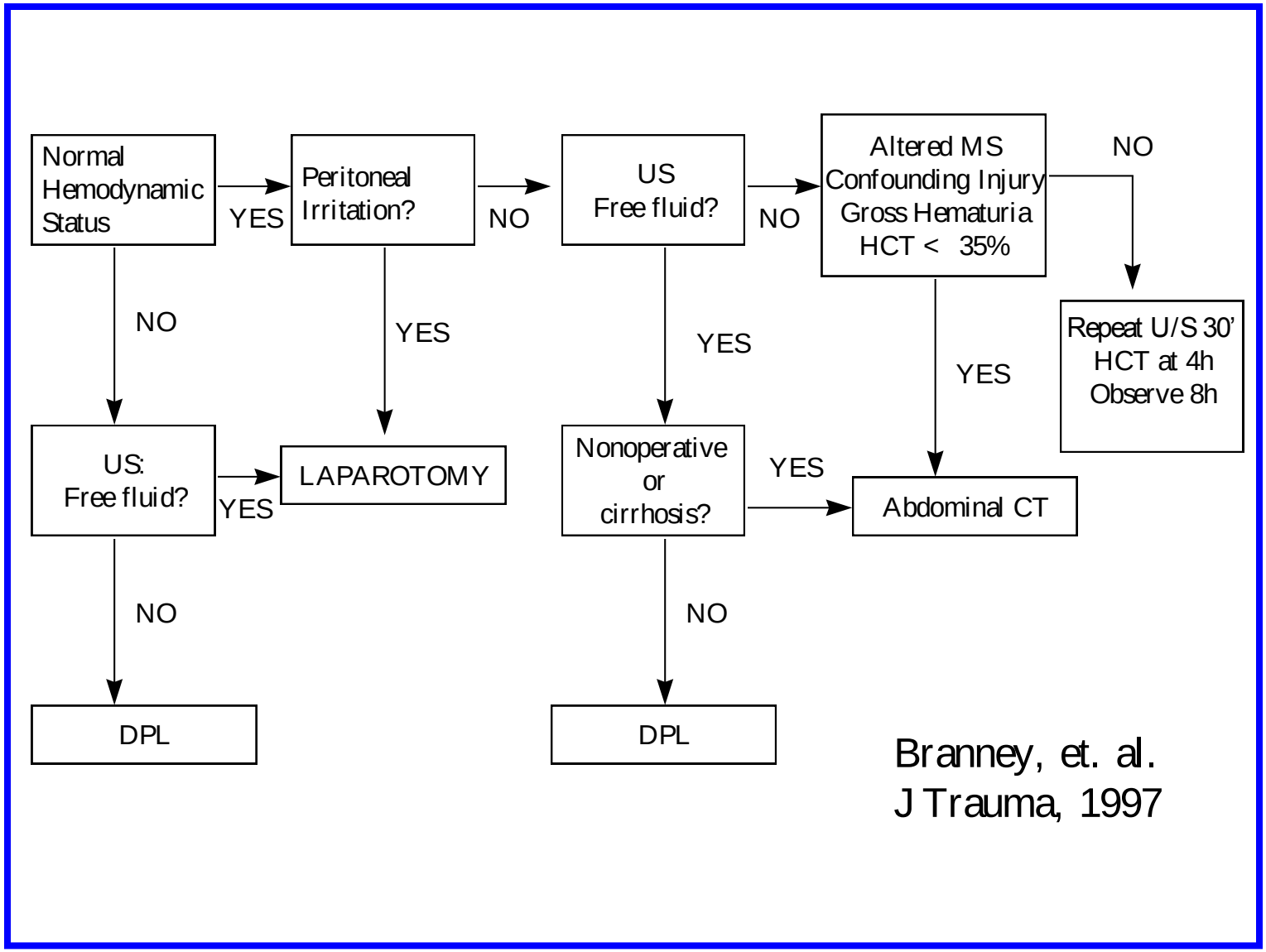
Photograph by Damilice Mansur | National Geographic Traveler Photo Contest 2014

Emergency Ultrasound in Trauma

Diagnostic Modalities in Blunt Abdominal Trauma

- Diagnostic Peritoneal Lavage (DPL)
- CAT Scan
- Ultrasound (FAST exam)

FAST Algorithm



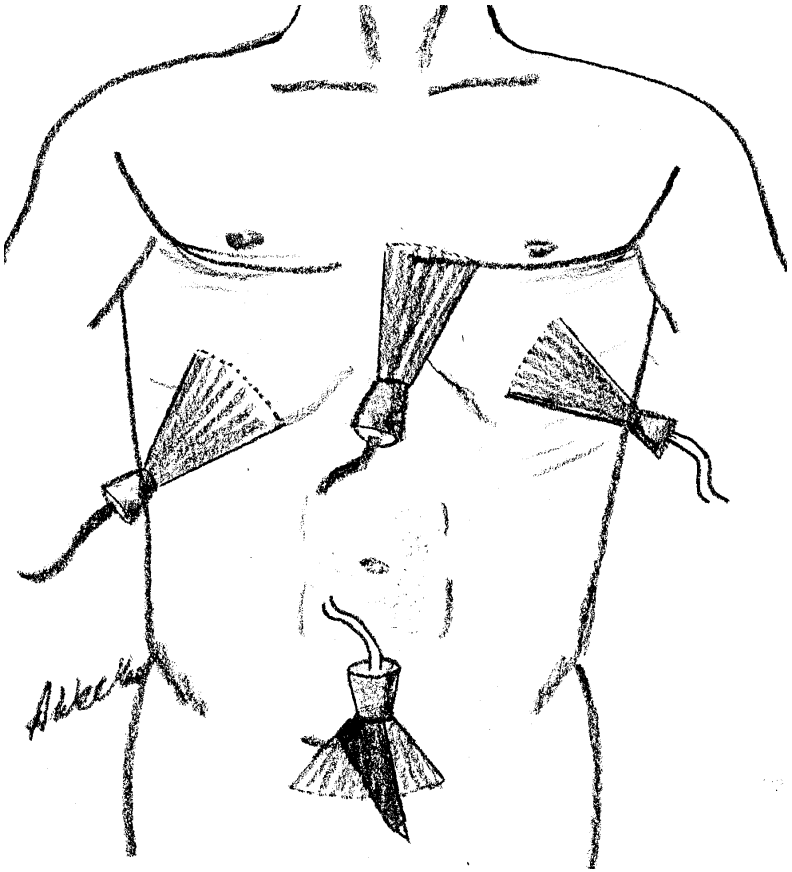
Diagnostic Peritoneal Lavage

- Advantages
  - Very sensitive for identifying intra-peritoneal blood
  - 10^6 RBC/mm^3 approx. 20 ml blood in 1L lavage fluid
  - Can be done at the bedside
  - Can be done in 10-15 minutes
- Disadvantages
  - Overly sensitive, may result in too high a laparotomy rate
  - Invasive
  - Difficult in pregnancy, or with many prior surgeries
  - Can not be repeated

CT Scan

- Advantages
  - Identifies specific injuries
  - Good for hollow viscus and retroperitoneal injury
  - High sensitivity and specificity
- Disadvantages
  - Expensive equipment
  - 30-60 minutes to complete study
  - Only for **stable** patients
  - Not for pregnant patients

Focused Abdominal Sonography in Trauma



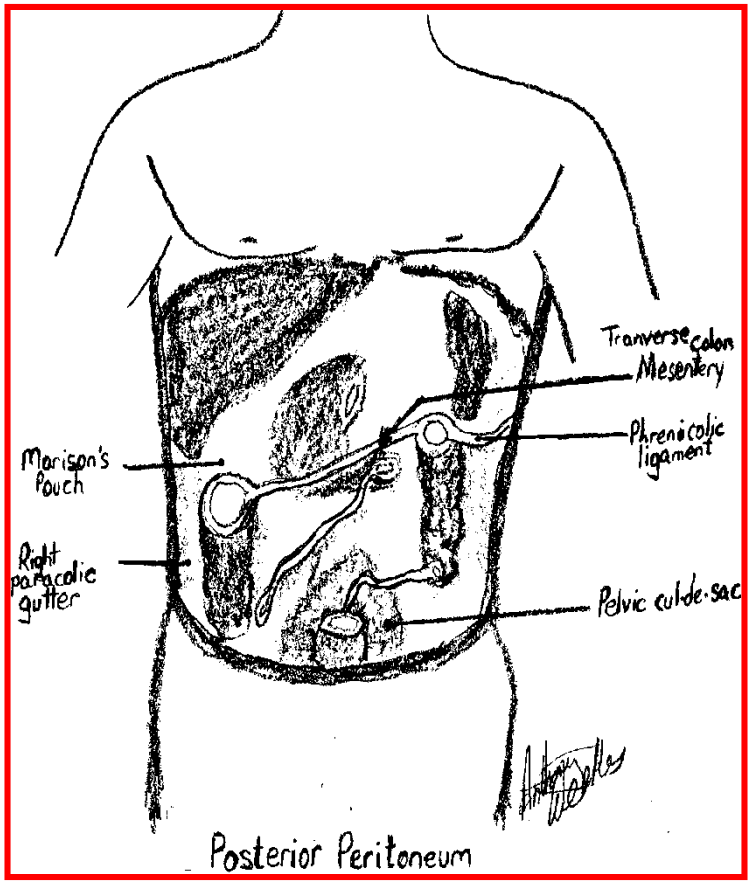
FAST

FAST

- Advantages
  - Can be performed in 5 minutes at the bedside
  - Non-invasive
  - Repeat exams
  - Sensitivity and specificity for free fluid equal to DPL and CT
- Disadvantages
  - Operator dependent
  - May not identify specific injury
  - Poor for hollow viscus or retroperitoneal injury
  - Obesity, subcutaneous air may interfere with exam

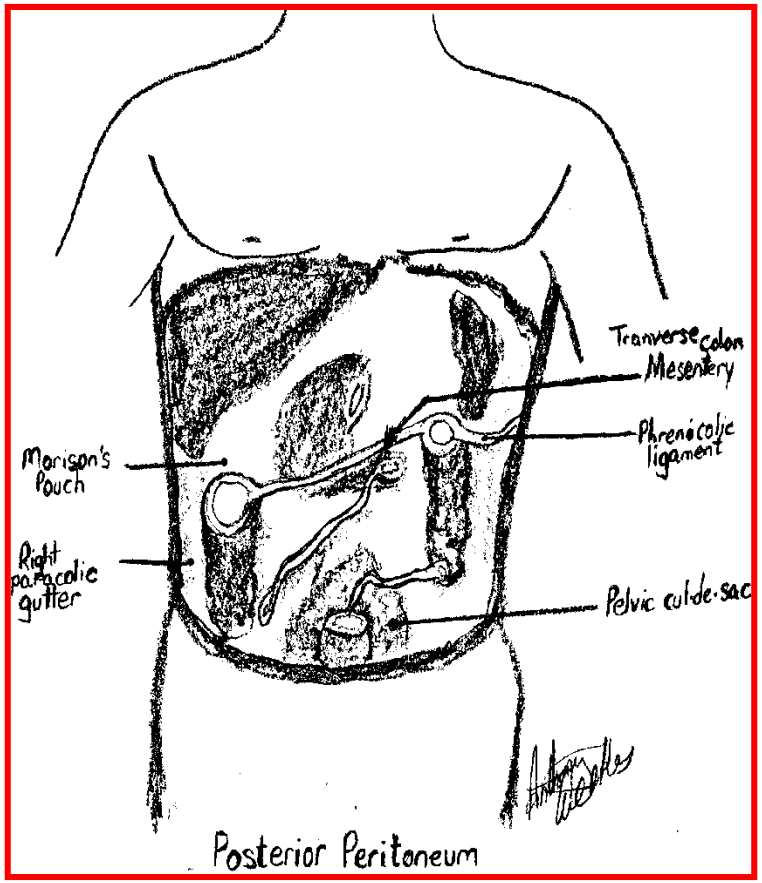
FAST Principles

- Detects free intraperitoneal fluid
- Blood/fluid pools in dependent areas
- Pelvis
  - Most dependent
- Hepatorenal fossa
  - Most dependent area in supramesocolic region



FAST Principles

- Pelvis and Supra-mesocolic areas communicate
  - Phrenicolic ligament prevents flow
- Liver/spleen injury
  - Represents 2/3 of cases of blunt abdominal trauma



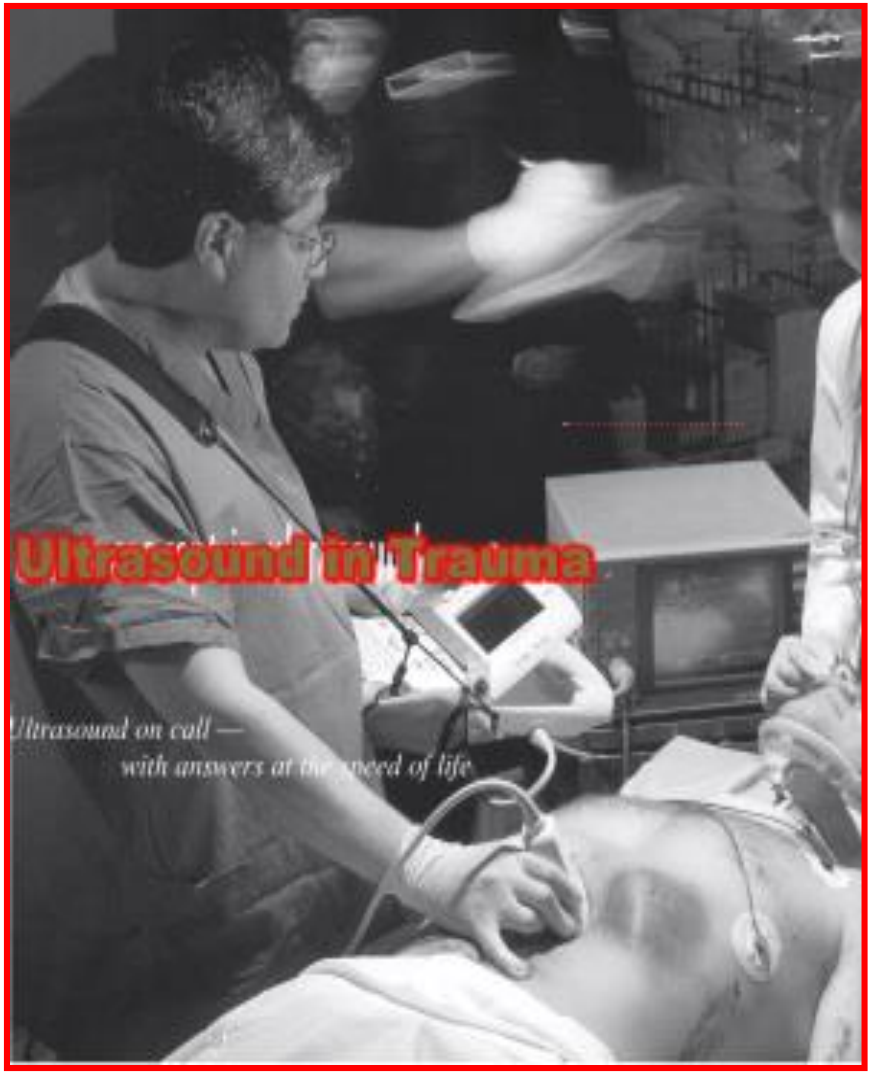
FAST- principles

- Intraperitoneal fluid may be
  - Blood
  - Preexisting ascites
  - Urine
  - Intestinal contents

FAST – limitations

- US relatively insensitive for detecting traumatic abdominal organ injury
- Fluid may pool at variable rates
  - Minimum volume for US detection
  - Multiple views at multiple sites
  - Serial exams: repeat exam if there is a change in clinical picture
- Operator dependent

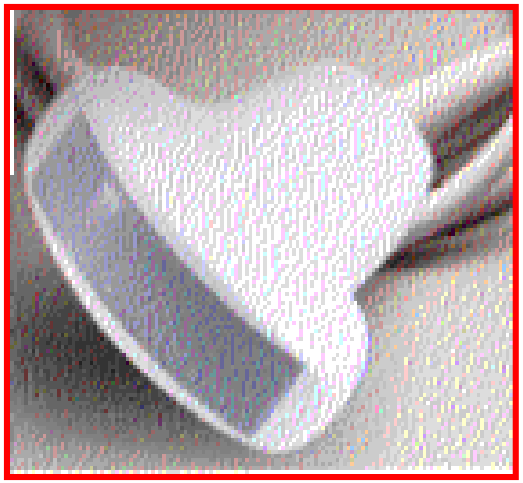
FAST

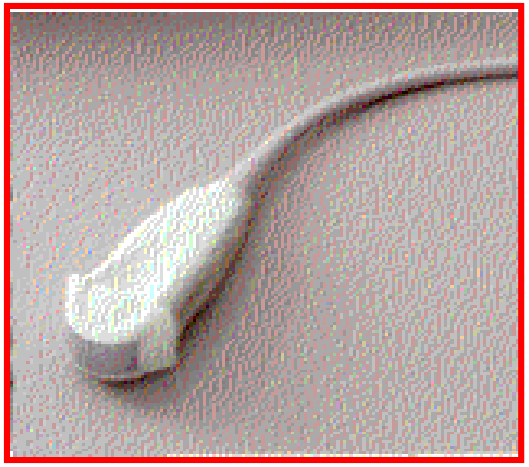


Perform during

- Resuscitation
- Physical exam
- Stabilization

Equipment





Curved array

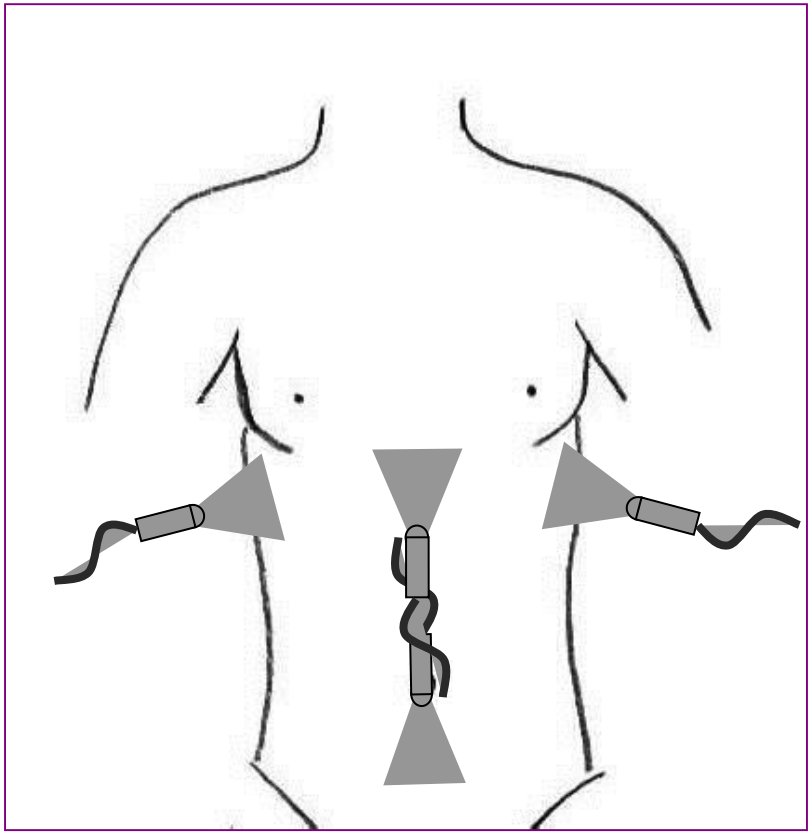
- Various “footprints”
  - Small footprint for thorax
  - Large for abdomen
- Variable frequencies
  - 5.0 MHz: thin, child
  - 3.5 MHz: versatile
  - 2.0 MHz: cardiac, large pts

Time to Complete Scan

- Each view: 30-60 seconds
- Number of views dependent on clinical question and findings on initial views
- Total exam time usually < 3-5 minutes

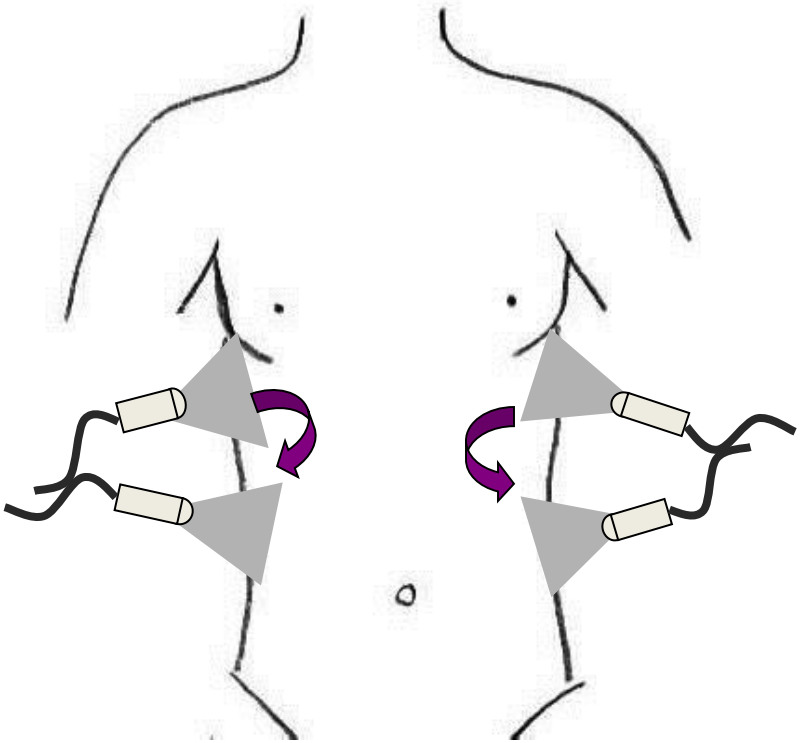
Focused Abdominal Sonography for Trauma (FAST)

- Consists of 4 views
  - Subxiphoid
  - Right Upper Quadrant
  - Left Upper Quadrant
  - Pouch of Douglas



FAST

- Increased sensitivity with increased number of views
- Will identify pleural effusions
- Reliably detects as little as 50-100cc in the thorax
- Sensitivity >96%, specificity 99-100%



Clinical experience with FAST

- Intraperitoneal fluid
  - Sensitivity 82-98%, specificity 88-100%
- Morison's pouch alone 36-82% sensitivity
- Increased sensitivity with
  - Increasing number of views
  - Trendelenberg
  - Serial examinations
- Can detect as little as 250cc of free fluid

Clinical Experience

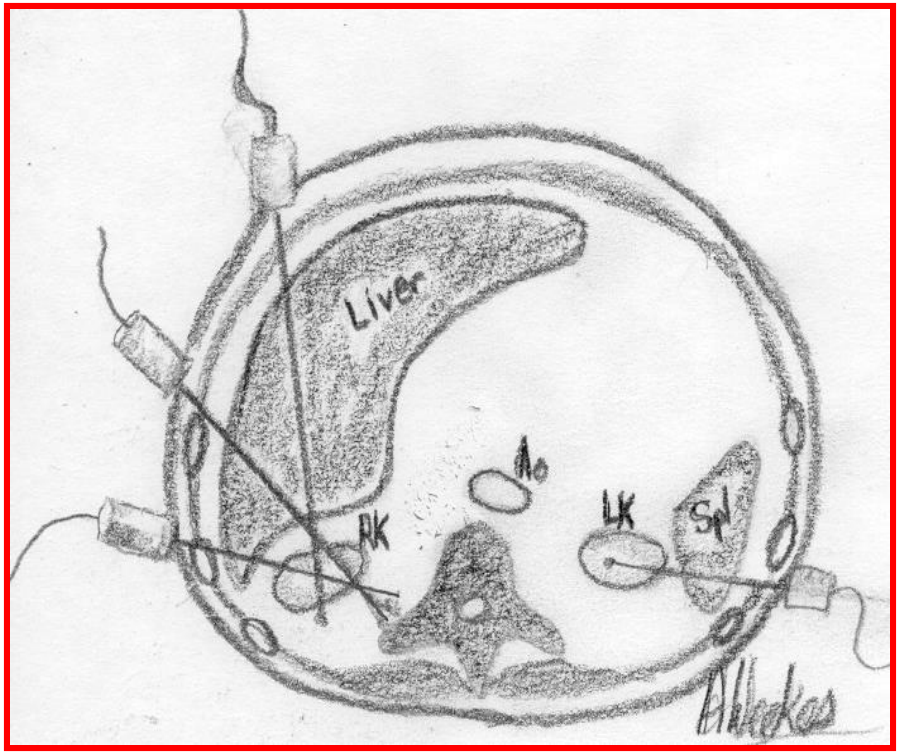
- Solid organ disruption
  - 40% sensitivity for all organs
  - 33-94% for splenic injury
- Hollow viscus injury
  - Sensitivity 57%
- Retroperitoneal injury
  - Sensitivity for identification of hemorrhage <60%

RUQ

- Probe at right thoraco-abdominal junction
- Liver : large acoustic window
- Probe marker cephalad
- Rib interference?
  - Rotate 30° counterclockwise

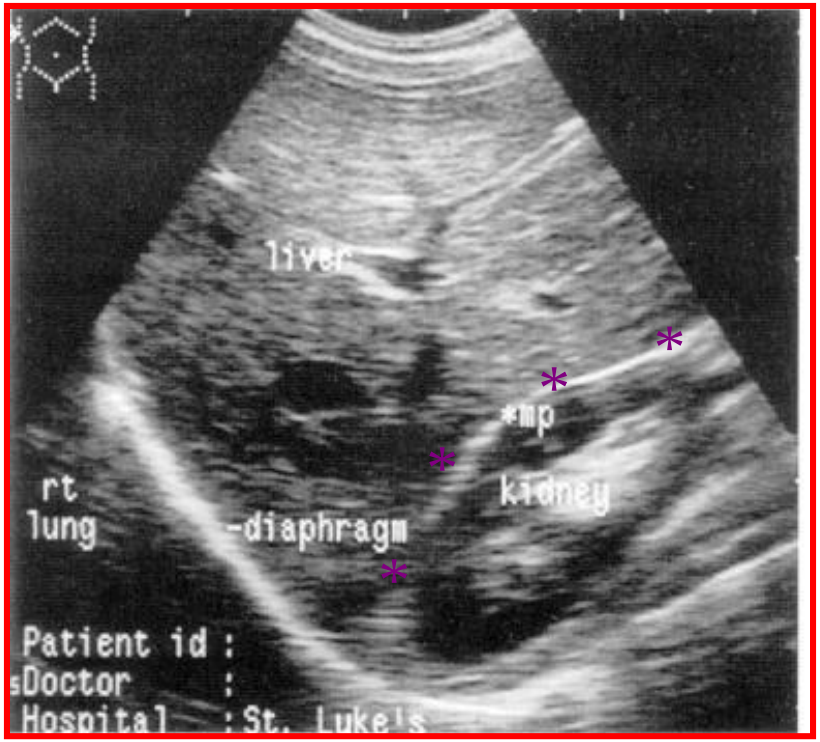
Scan Plane

- Same image if probe positioned
  - Anterior
  - Mid axillary
  - Posterior



RUQ

- Image on screen:
  - Liver cephalad
  - Kidney inferiorly
  - Morison's Pouch*: space between Glisson's capsule and Gerota's fascia

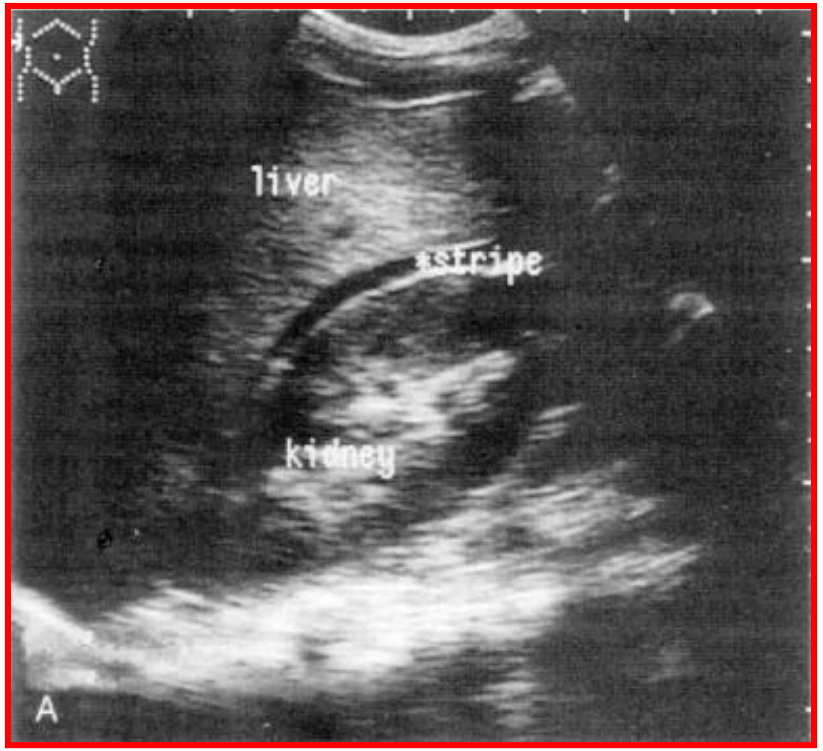


Normal RUQ

- Image kidney
  - Longitudinally
  - Transversely
- Two toned structure
  - Cortex/medulla
  - Renal sinus

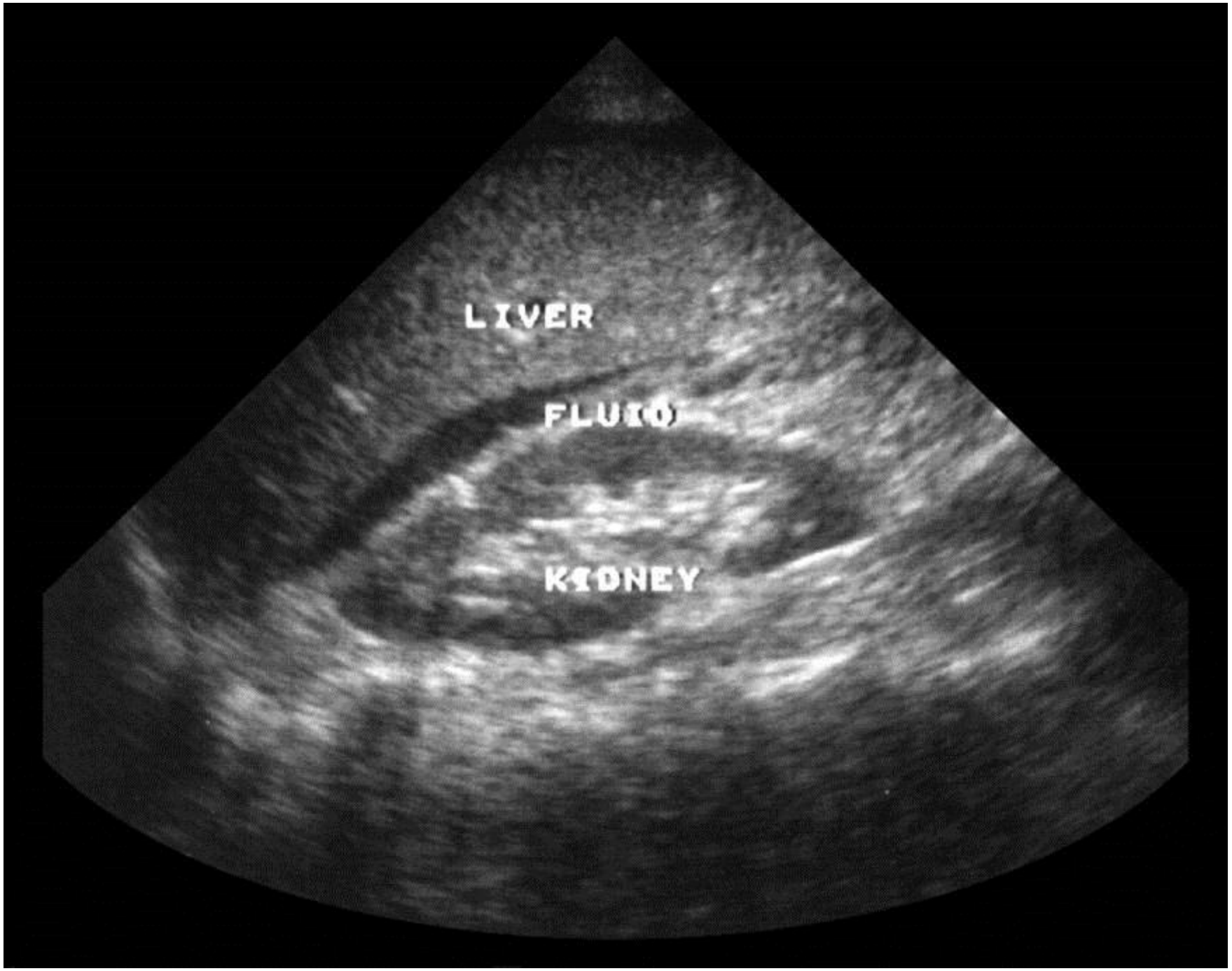
Appearance of blood

- Fresh blood
  - Anechoic (black)
- Coagulating blood
  - First hypoechoic
  - Later hyperechoic



Normal
Morison's Pouch

Free fluid in
Morison's
Pouch


LIVER
FLUID
KIDNEY

Detection of Fluid by Ultrasound

- Affected by positioning
- Location of bleed
- Rate of bleeding
- Operator Experience

- Value of sensitivity of Ultrasound:
  - Detects clinically injuries
  - Non-detection of fluid
    - May indicate self-limited bleeding

All Fluid is not Blood

- Ascites
- Ruptured Ovarian Cyst
- Lavage fluid
- Urine from ruptured bladder

Mimics of Fluid in RUQ

- Perinephric fat
  - May be hypoechoic like blood
  - Usually evenly layered along kidney
  - If in doubt, compare to left kidney
- Abdominal inflammation
  - Widened extra-renal space
  - Echogenicity of kidney becomes more like the liver parenchyma

Pitfalls

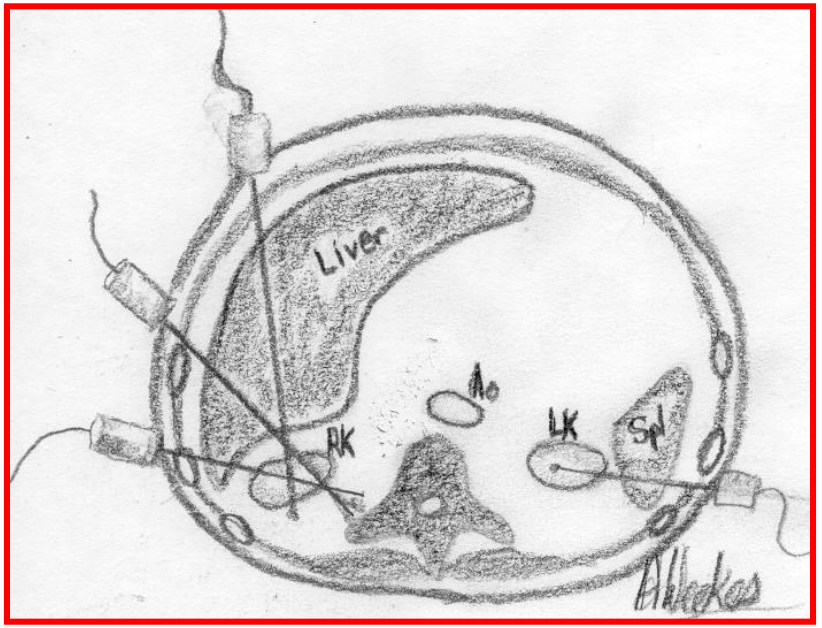
- RUQ
  - Not attempting multiple probe placements
  - Not placing the probe cephalad enough to use the acoustic window of the liver
- Scanning too soon before enough blood has accumulated
- Not repeating the scan

LUQ

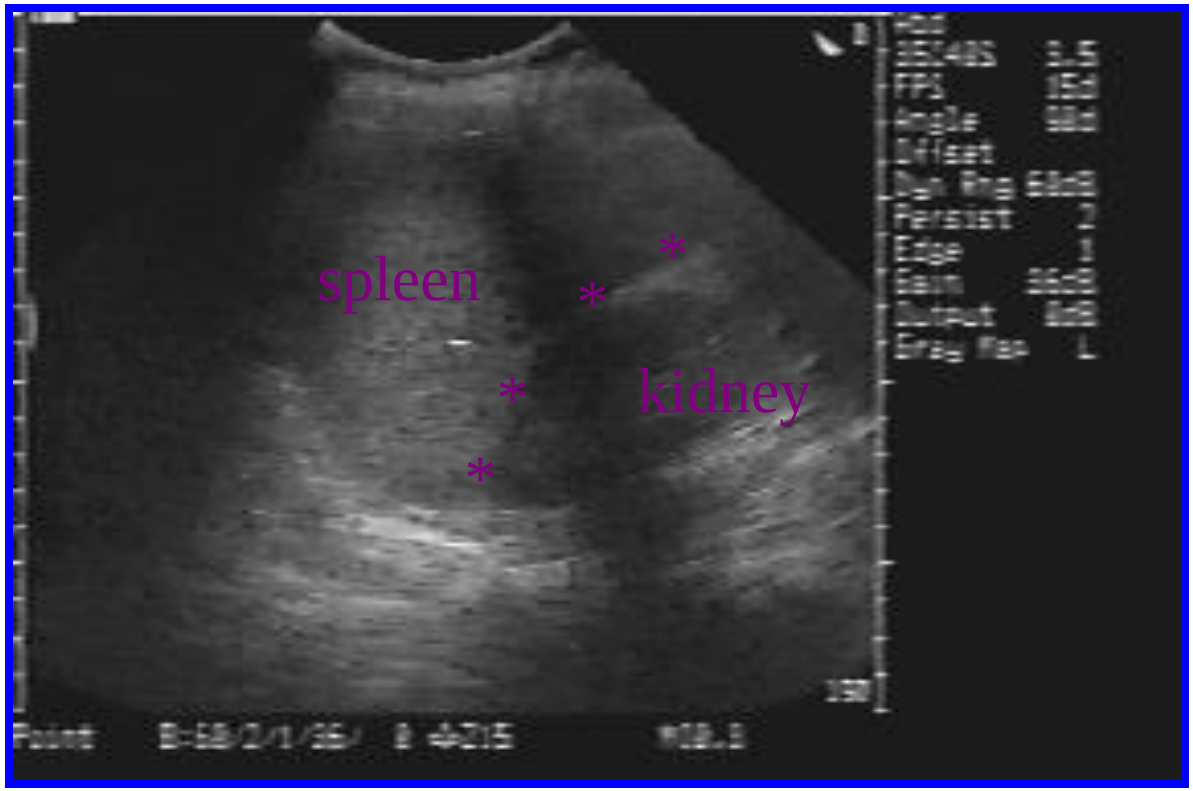
- Probe at left posterior axillary line
- Near ribs 9 and 10
- Angle probe obliquely (avoid ribs)

LUQ Scan Plane

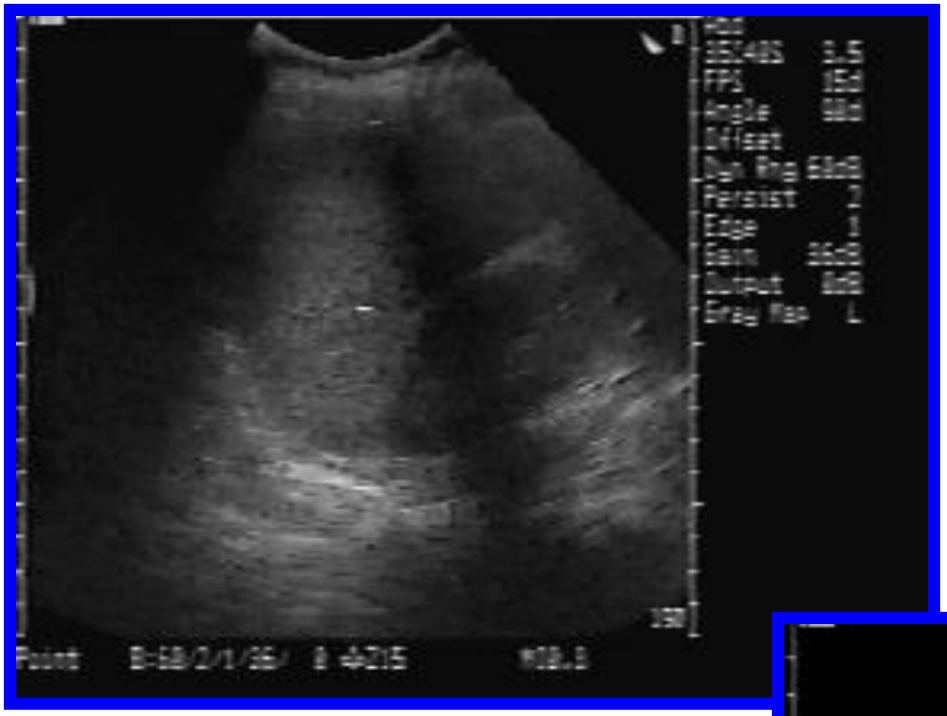
- More difficult
  - Acoustic window (spleen) is smaller than liver
  - Mild inspiration will optimize image
  - Bowel interference is common



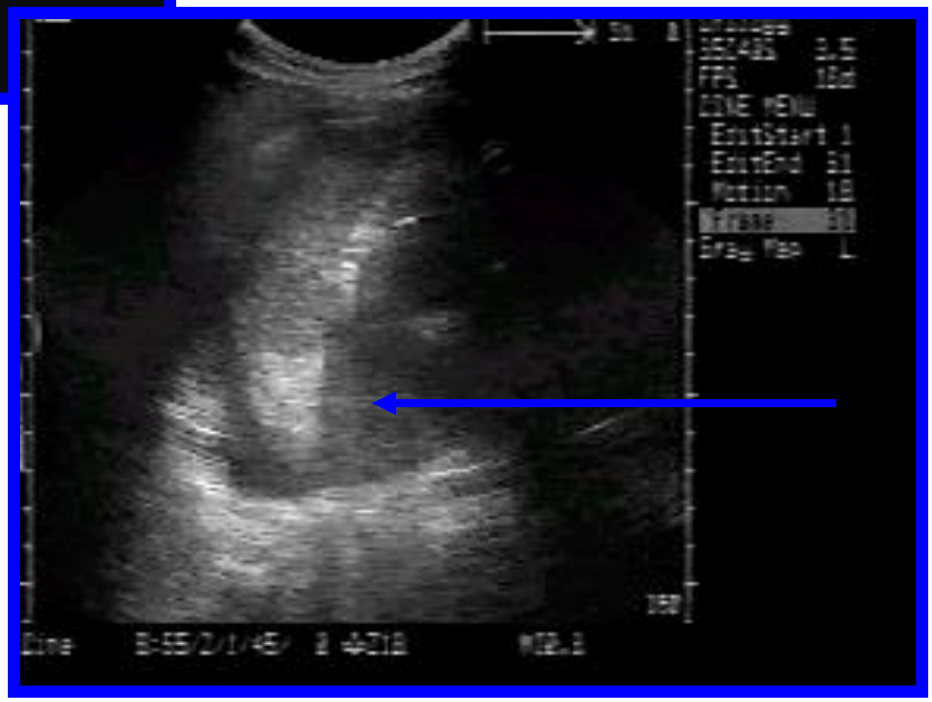
LUQ Scan



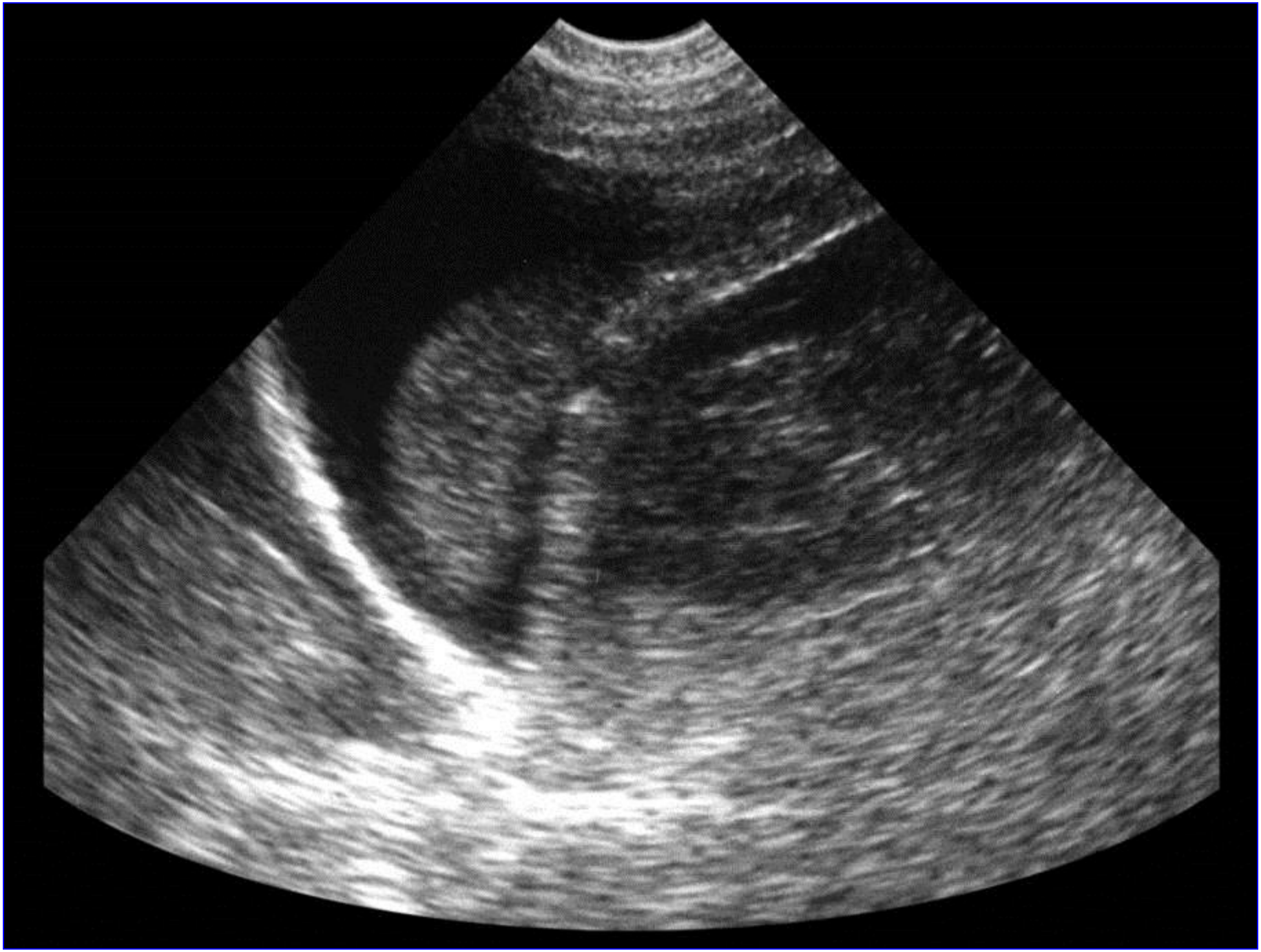
*Splenorenal fossa – a potential space

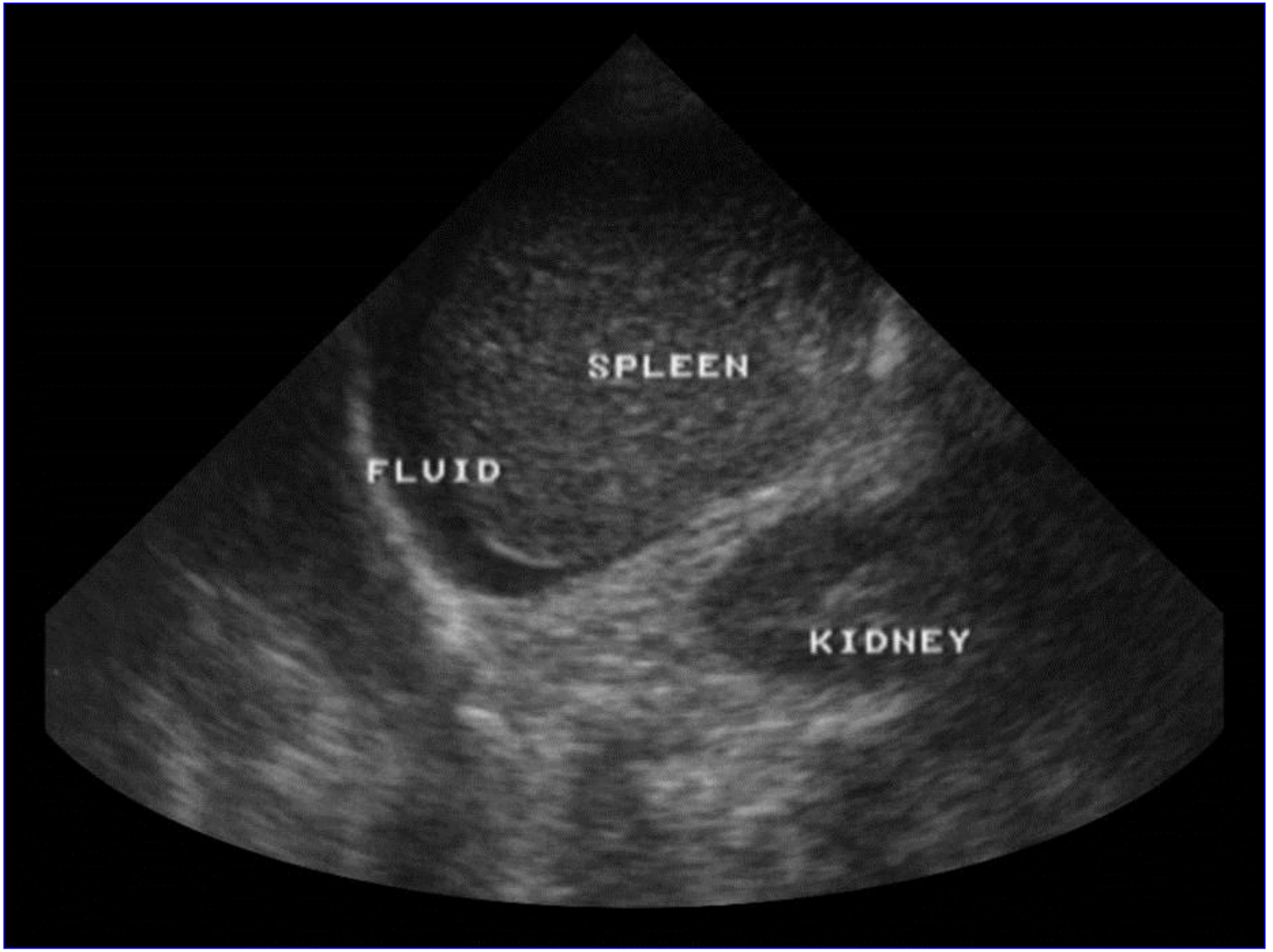


Normal
Spleno-renal
view



Free fluid
around spleen

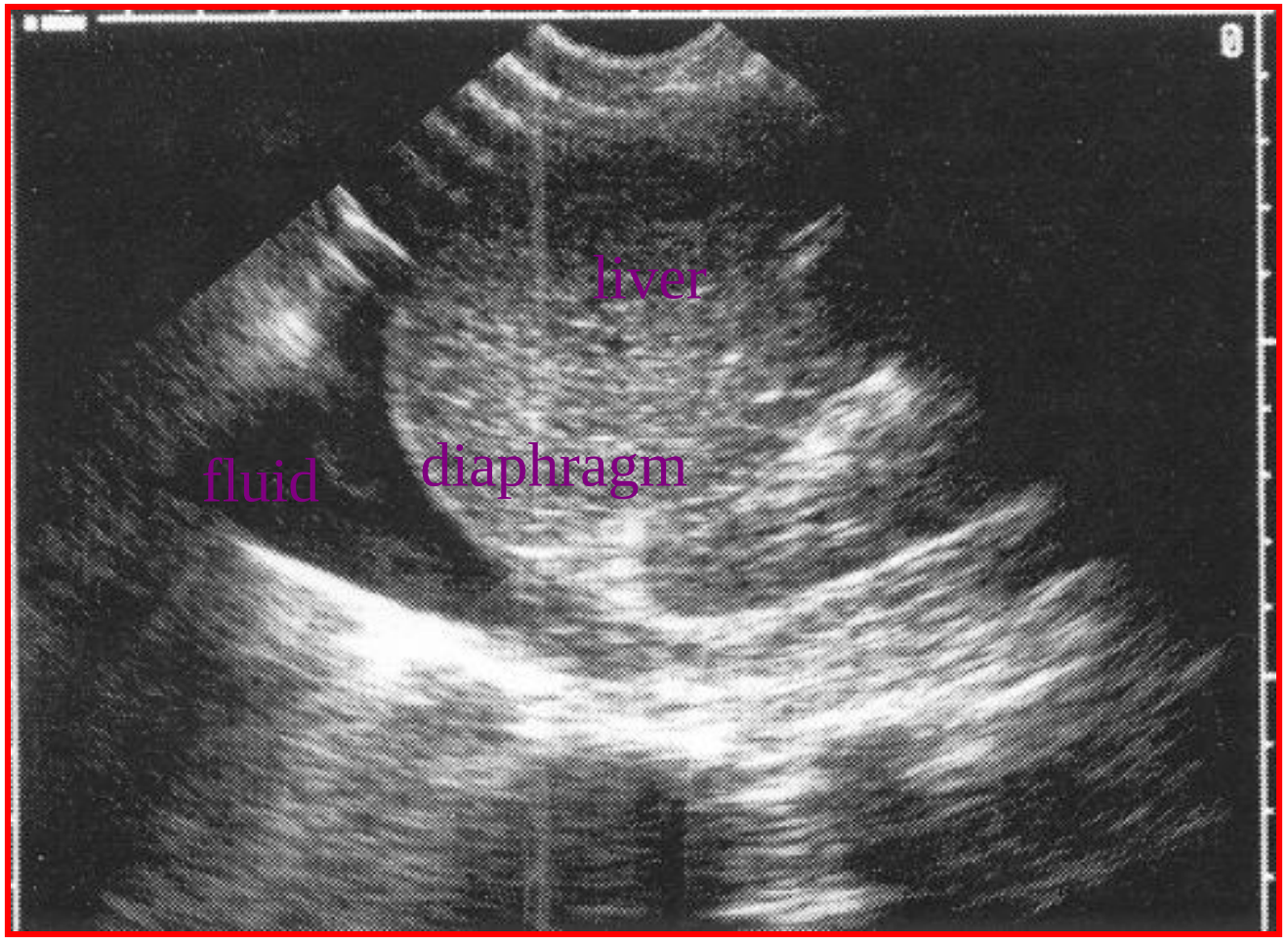



SPLEEN
FLUID
KIDNEY

To Evaluate the Thorax

- Move probe
  - cephalad
  - longitudinal
- Image

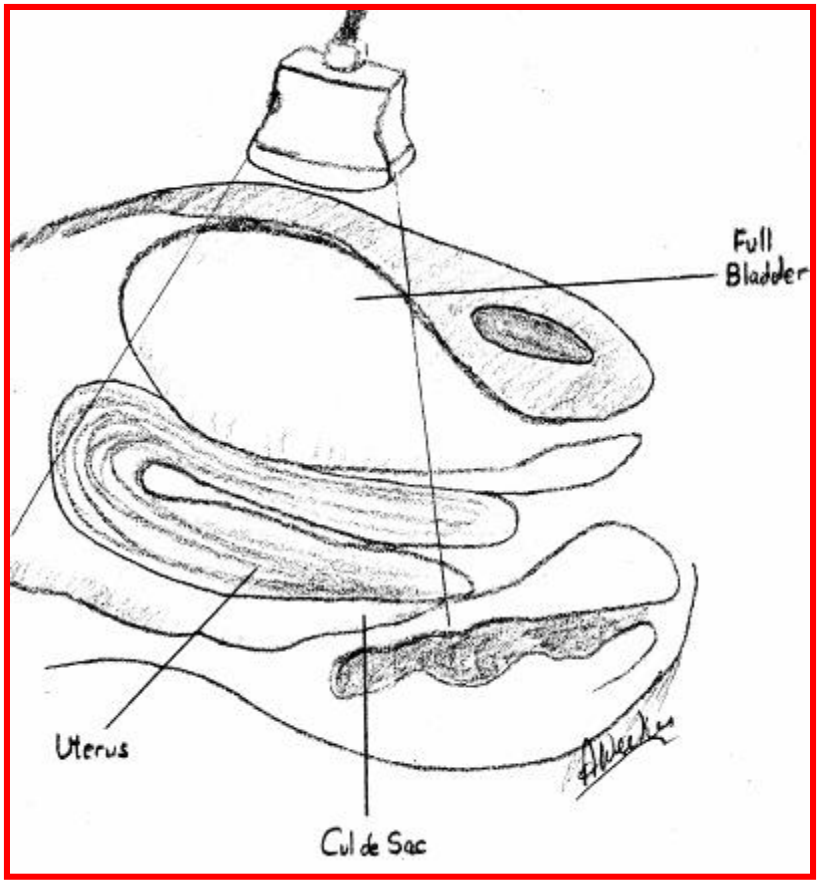
Hemothorax



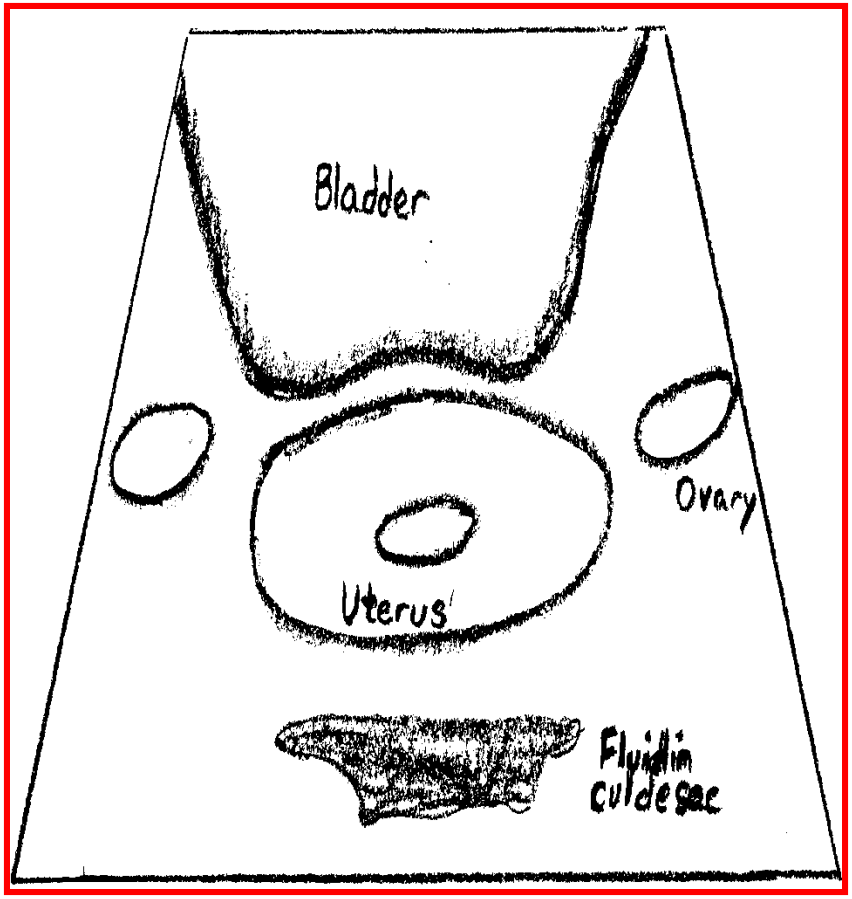
Pelvic View

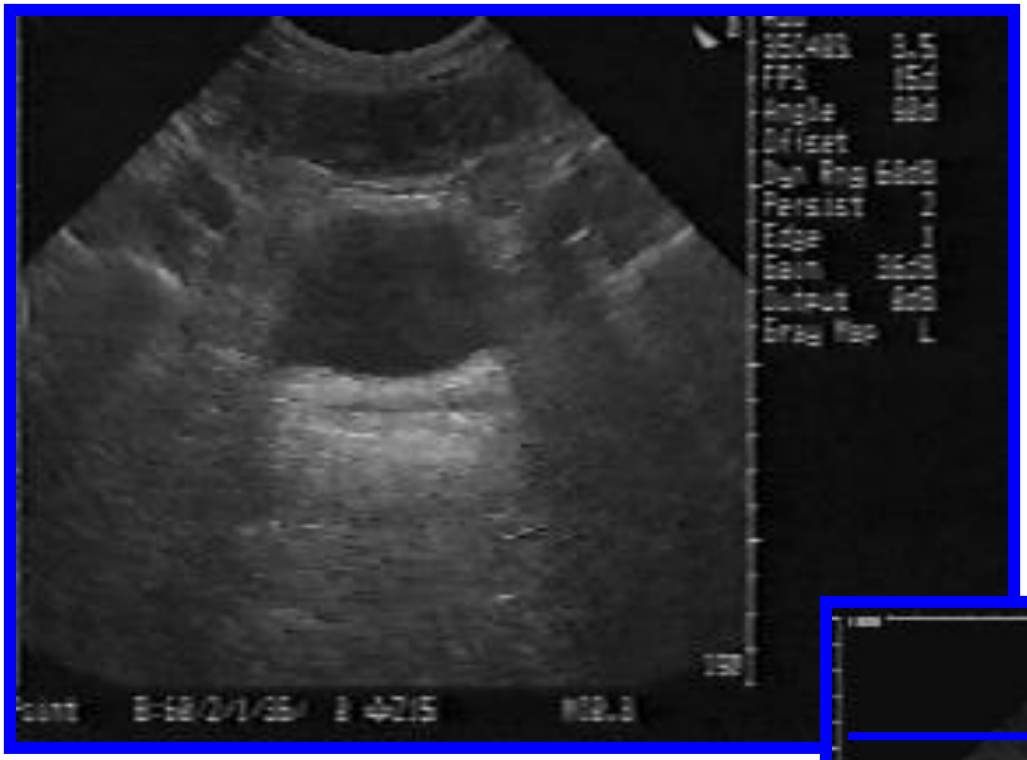
- Probe should be placed in the suprapubic position
- Either can be transverse or longitudinal
- Helpful to image before placement of a Foley catheter

Pelvis (Long View)

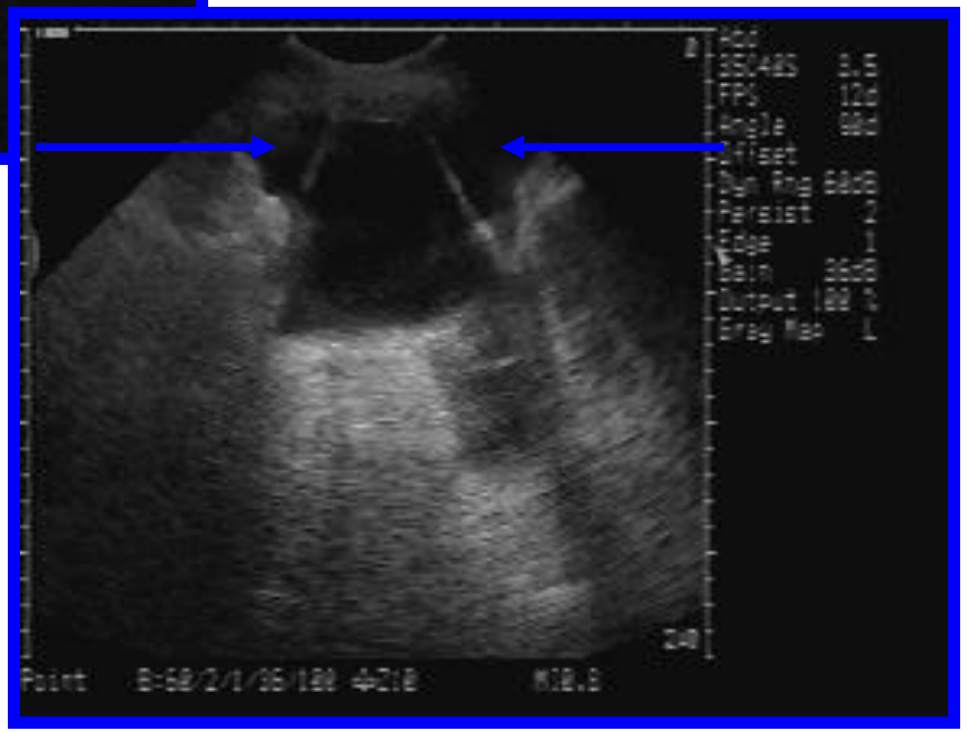


Pelvis: Transverse





Normal Transverse pelvic



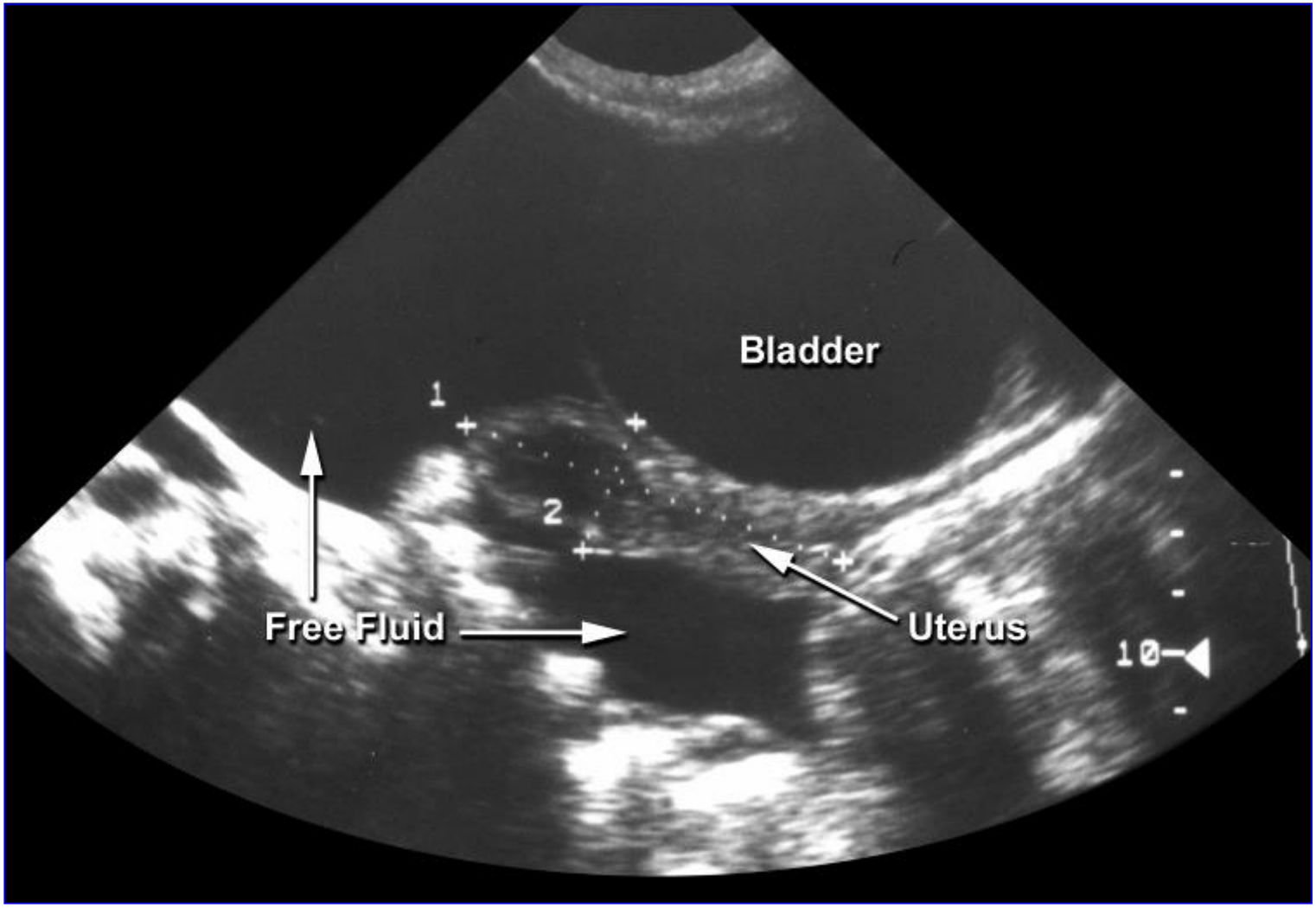
Fluid in pelvis

Pelvic View – Sagittal

- Fluid in front of the bladder
- If bladder is empty or Foley already placed:

  Trick of trade
  - IV bag on abdomen
  - Scan through bag

Blood in the Pelvis



Subcostal View

Subcostal View