

# POCUS 25

## Pneumothorax

### 2D/B-Mode

B-Lines indicate wet lung. A-Lines can indicate normal lung or Pneumothorax.

Normal A-Lines

### M-Mode

Sawtooth Sign = Normal. Barcode Sign = Pneumothorax.

Waves. Sand. Pleural Line.

## Pericardial Effusion

### Pleural vs Pericardial?

### Right Sided Collapse?

In Plax View: Is fluid above or below descending Aorta?

Classification?

Onset	Acute Subacute Chronic (> 3 months)
Size	Mild < 10 mm Moderate 10 - 20 mm Large > 20 mm
Distribution	Circumferential Localized
Composition	Transudate Exudate

Normal Fluid is 30-50ml of thin clear straw colored fluid. Large effusions may take time and the Pericardium accommodates. Moderate Effusions take days or hours, and the Pericardium hasn't adapted.

### Approaching Tamponade?

Normal RV. McConnell Sign.

E-Point Septal Separation.

PARASTERNAL LONG AXIS. M-MODE. MEASURE OPEN MITRAL VALVE.

## Lung Ultrasound

### Use of artifacts to aid diagnosis

### A-Lines

### B-Lines

Air. Wet.

## Knobology

B-mode. M-mode.

Color Doppler. Power Doppler. Spectral Doppler.

Gain. Depth.

## eFAST

### Find Free Fluid Fast & Evaluate for PTX!

LUNG ZONE 1. LUNG ZONE 5.

RUIQ. LIQ. BLADDER TRANSVERSE. BLADDER LONGITUDINAL. SURCOSTAL.

Ensure that Posterior Acoustic Artifact does not mask free fluid in the transverse bladder view.

## Focused Cardiac Ultrasound

### Fluid Status & LV FX!

### A Beside Extension of the Physical Exam

Sub. SVC. PLAX. PSAX. APV.

## LV & RV

Is it mild, moderate or severe? Do the cardiac chambers fill and then move toward each other? Measure the E-Point Septal Separation in Plax View.

Left ventricle - systolic function.

Ejection Fraction (%)

Normal	>55
Mild	40-50
Moderate	30-40
Severe	<20

Normal RV. McConnell Sign.

E-Point Septal Separation.

PARASTERNAL LONG AXIS. M-MODE. MEASURE OPEN MITRAL VALVE.

## IVC Examination

### What Is The Fluid Status?

### NORMAL

Resting. Inspiration.

### ABNORMAL

Large. Collapsed.

PE? CHF? Tamponade? Sepsis? Hypovolemia?

## Abdominal Aorta

### (Abdominal Aortic Aneurysm - AAA)

AORTIC MEASUREMENTS IN TRANSVERSE VIEW.

CELIAC AXIS. HEPATIC ARTERY. RIGHT RENAL ARTERY. SUPER MESENTERIC ARTERY. BRUNFICANT AND ILLAC VESSELS. LEFT GASTRIC ARTERY. SPLENIC ARTERY. LEFT RENAL ARTERY. ANEURYSMS OCCUR HERE. INFERIOR MESENTERIC ARTERY.

≤2.0 cm NL Aorta. 2.1-2.9 cm Eccentric Aorta. ≥3.0 cm AAA. ≥5.0-5.5 cm Consider for Elective Repair.

Aorta Transverse. Aorta Longitudinal. AAA Transverse.

Do not mistake the IVC for the Aorta. Color Doppler can be used to assess flow. Measure outside to outside.

## POCUS DVT Assessment

### (Zone 2 Point Compression)

NORMAL COMPRESSIONS WITHOUT COMPRESSION. WITH COMPRESSION. POPLITEAL VEIN WITHOUT COMPRESSION. WITH COMPRESSION.

NON-COMPRESSIBILITY INDICATES DVT.

## Pneumonia

Normal. Pleural Effusion - Spine Sign.

Mirror Artifact. Fluid. Spine.

Air Bronchogram. Note: Hyperechoic Atelectasis.

Lung collapse. Dynamic Air Bronchogram. Note: On video, Echogenic air will move with respiration.

Complex Localized Effusion. With or without septations. Exudative.

## First Trimester

### Determining Gestational Age

### Crown Rump Length (CRL)

CRL: Answers Questions About Fetal Viability.

Crown Rump Length is one of the easiest ways to date an early fetus. Be careful not to include the yolk sac in your CRL measurement.

### Biparietal Diameter (BPD)

BPD is performed later in the pregnancy than CRL.

Scan through the head, measurement is made outside to inside, take caution, as it is easy to mistake the fetal abdomen for the BPD.

## Rush Exam Protocol

### Rapid Ultrasound for Shock and Hypotension

Use the mnemonic HIMAP-ED to remember.

Heart: 1. Parasternal long cardiac view. 2. Apical 4-chamber cardiac view.

Ivc: 3. Inferior Vena Cava View.

Morison's: 4. RUQ Morison's view. 5. LUQ splenohepatic view. 6. Bladder view.

Aorta: 7. Aortic slide views.

Pulmonary: 8. Left Lung zone #1. 9. Right Lung zone #5.

Use a curvilinear array for all views. Add in a search for ectopic pregnancy and DVT depending upon clinical circumstances.

## IVC

### Assessment for Central Venous Pressure

Common Indications:

- Determine volume status.
- Determine approximate central venous pressure (CVP).
- Determine fluid therapy responsiveness in management of shock.
- Determine possible cause of shock.
- Monitor response to therapy.
- Determine collapsed or plethoric IVC.
- Part of VIEWS protocol.

M-Mode.

IVC Diameter and Variability with Respiration.

IVC Diameter (cm)	Respiratory Variance	CVP (cm H2O)
<1.5	Total collapse	0-5
1.5 - 2.5	>50%	6-10
1.5 - 2.5	<50%	11-15
>2.5	<50%	16-20
>2.5	No change	>20

## Renal POCUS

### Look For Evidence Of Hydronephrosis!

NORMAL ANATOMY: CAPSULE, CORTEX, PYRAMID, CALYCES, RENAL PELVIS.

The Renal Pelvis is hyperechoic on ultrasound.

Mild. Moderate. Severe.

Hydronephrosis.

## MSK Soft Tissue

### The soft tissue exam is used to differentiate local inflammation into 1 of 4 categories:

Cellulitis \* Abscess \* Lymph Node \* Necrotizing Fasciitis.

Cellulitis has a distinct cobblestone appearance. Abscesses have a dry appearance and a bright shadowy appearance.

Necrotizing Fasciitis: Exam. Subcutaneous Thickening. Fascial Fluid. Necrotizing Fasciitis is a surgical emergency. Symptom onset is typically within hours and patients experience much more powerful symptoms than typical cellulitis. It is rare to see all 3 STAFF findings in one picture. Air is present in only 25% of cases but is nearly 100% specific when found.

Lymph Node. Abscesses lack color flow while lymph nodes have a good vascular supply.

## The Blue Protocol

### Looks for six clinical conditions:

- Pulmonary Edema
- Pulmonary Embolism
- Pneumonia
- CPD/Asthma
- Pneumothorax
- Pleural Effusion

B-profile. A-profile. A/B or C-profile. B-profile. A-profile. without lung point. without lung point.

Pulmonary Edema. Sequential venous analysis. Pulmonary Embolism. Stage 3 PLAPS. PLAPS. no PLAPS. Pneumonia. COPD or Asthma.

## Female Pelvic Exam

\* Use Full Bladder as a Landmark. \* Place Curvilinear Probe just Superior to Pubic Bone. \* Sweep Left to Right in Longitudinal Plane. \* Sweep Inferior to Superior in Transverse Plane.

Longitudinal Uterus. Transverse Uterus.

Measure Length of Uterus. Measure Endometrial Stripe. Measure Width of Uterus. Measure Endometrial Stripe.

Measure Right Ovary. Measure Left Ovary.

Check for Free Fluid in Pouch of Douglas / Cul De Sac.

## Gall Bladder

GB Distension. Stone. Shadow. Thick Wall. Pericholecystic Fluid. Sludge. Large Gallstone. Multiple Stones.

## Pelvic Exam Pathology

Adnexal Mass. Form near the Uterus, Ovaries, Fallopian Tubes and surrounding tissues. Determine if mass is benign or has features suggestive of malignancy.

Ovarian Cyst. Benign Cyst: fluid filled without solid growth and no evidence of neovascularity. Complex Cyst: internal debris, thick irregular septations, solid appearance and increased blood flow.

Hydrosalpinx. (Fallopian Tube blockage) usually affects both Fallopian Tubes filled with fluid due to injury or infection.

Free Fluid in Pouch of Douglas. Free fluid may emanate from a ruptured or leaking Ectopic Pregnancy and/or from a ruptured Corpus Luteum.

## Testicular Exam

### For Evaluation of Suspected Testicular Torsion.

HL US Anatomy. Anatomy. Normal Color Doppler. Power Doppler. Use the more sensitive power Doppler to detect Low Flow. Epididymitis. Torsed Testicle. A Torsed Testicle may show no flow or reduced flow on Color or Power Doppler.

## Confirm Endotracheal Tube Placement

Good. Bad.

Rebreathers in the trachea allow carbon dioxide to be re-inhaled. The ET should only show tracheal movement.

Double Tact Sign! Endotracheal intubation devices with a "Tact" feature to appear.

## C.L.U.E EXAM

### Cardiopulmonary Limited Ultrasound Exam

PLAX. LEFT LUNG. RIGHT LUNG. LUNG POSTERIOR LATERAL. PLEURAL EFFUSION. SUBCOSTAL U CHAMBER. SUBCOSTAL IVC.

SITE POSITION. NORMAL. ABNORMAL.

## Pancreas

Pancreatitis. Acute Pancreatitis. Chronic Pancreatitis.

Check for Pancreatic Duct Obstruction by Galstones or CBD. Fluid. Increased Pancreas Volume. Echogenicity. Dilated Pancreatic Duct. Atrophic Pancreas with Calcifications.

Pancreatic Pseudocyst. Pancreatic Tumor.

## Shoulder MSK

5-View of Biceps Tendon. 1. LONG: Consistency of the greater tuberosity. 2. Top of Bicipital Groove. 3. Lesser tuberosity of the humerus.

Long View of Biceps Tendon Spin. 1. Disrupts the cortical margin of the tuberosity. 2. Side transducer and now flip probe into long view.

5-View of the Supraspinatus Tendon. 1. At the broad consistency of the humeral head. 2. At the black anechoic layer of the supraspinatus tendon wraps the humeral consistency of the humeral consistency. 3. At sub deltoid bursa. 4. The lesser tuberosity is superficial to the related bursa.

Long View of the Tendon. Attachment of the Greater Tuberosity of the Humerus. 1. Note the flat slope of the humeral head. 2. Consistency of the humeral head.

5-View of the Posterior Glenohumeral Joint. 1. At the broad consistency of the humeral head. 2. Note the deep portion of the apex of the humeral head. 3. Note the posterior margin of the second Ligamentum Epicondylare.

