

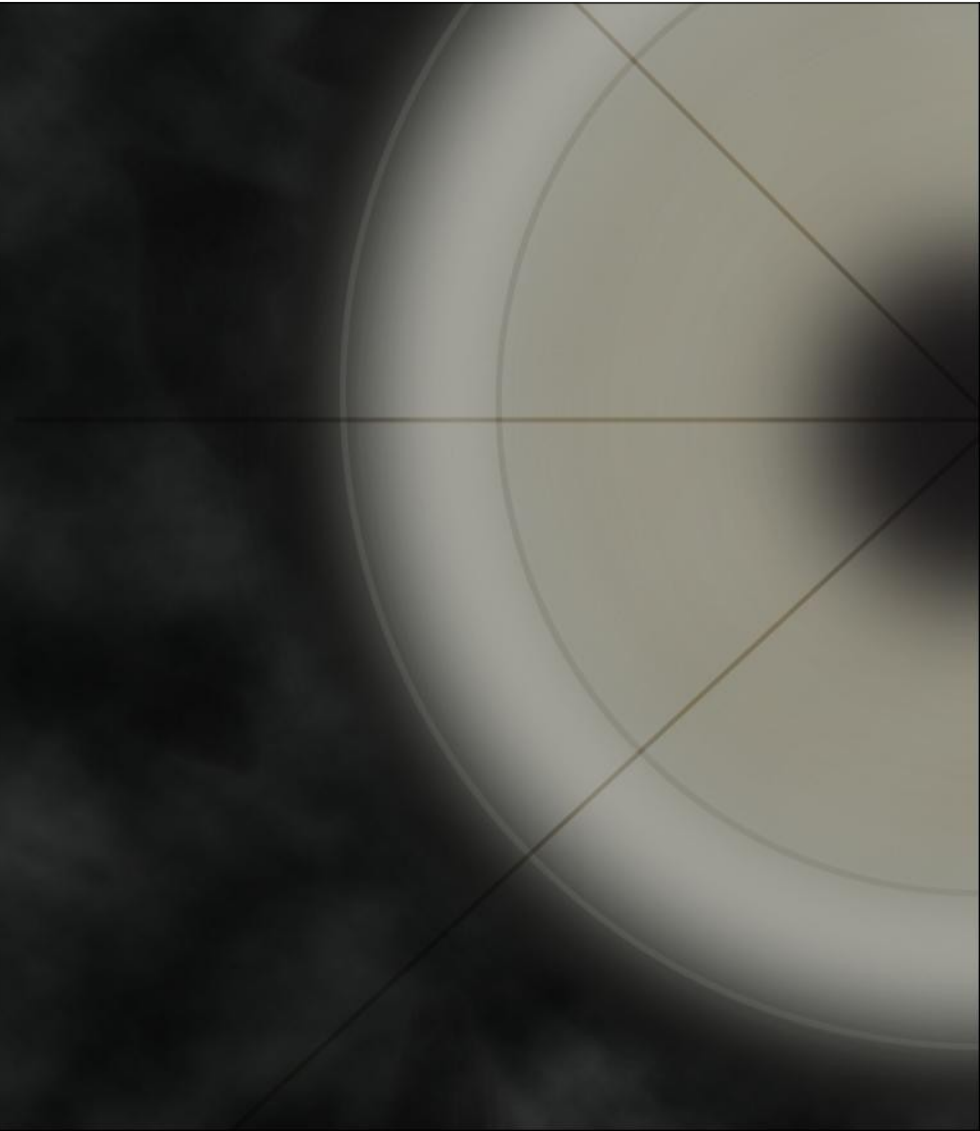
BEDSIDE ULTRASOUND IN EMERGENCY MEDICINE

ASSOC. PROF. DR. SADIK GİRİŞGİN
Necmettin Erbakan Uni. Meram Medicine School

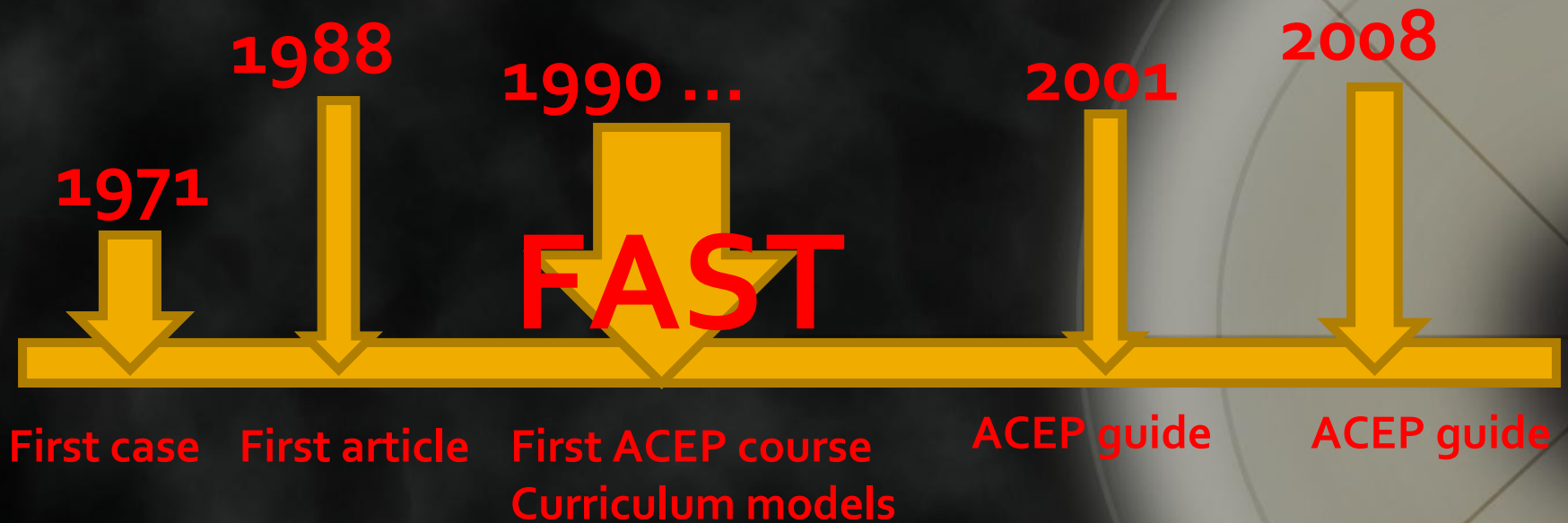


Ultrasonography

- Portable
- Probe variety
- Real time imaging
- Cheap
- No radiation
- Repeatable
- Cost effective

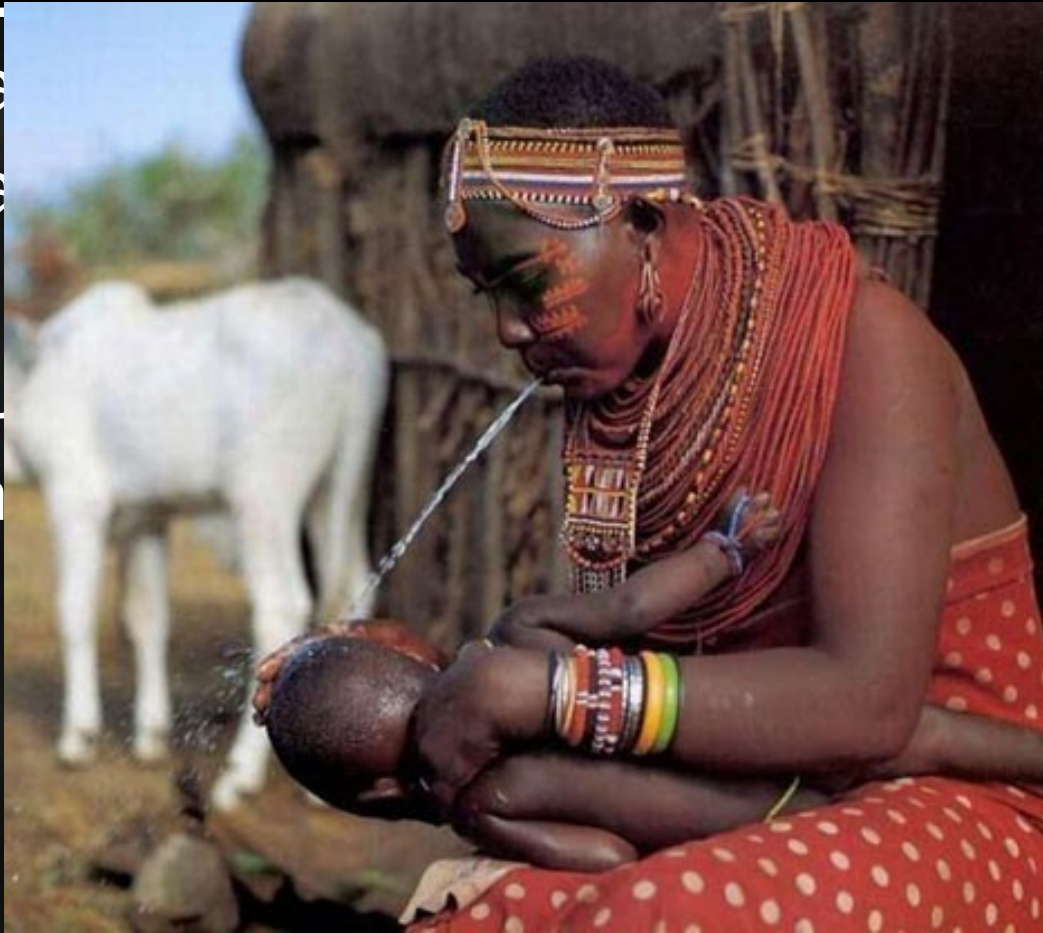


History



Education

- American
- American
(AIUM)
- Ultrasound
Physician



medicine

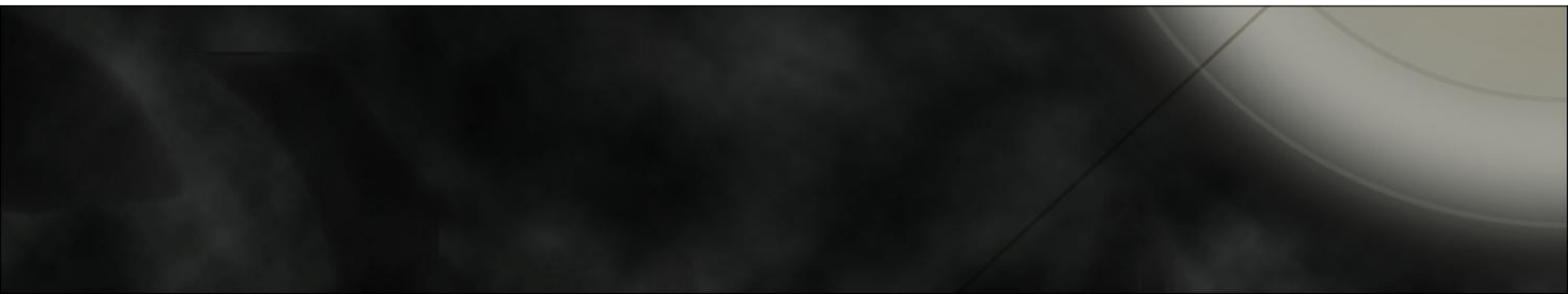
Best Education Method

TO SIT AND
PRACTICE
WITH
AN EXPERIENCED
SONOLOGIST



FAST

Focused Assessment with Sonography for Trauma



FAST

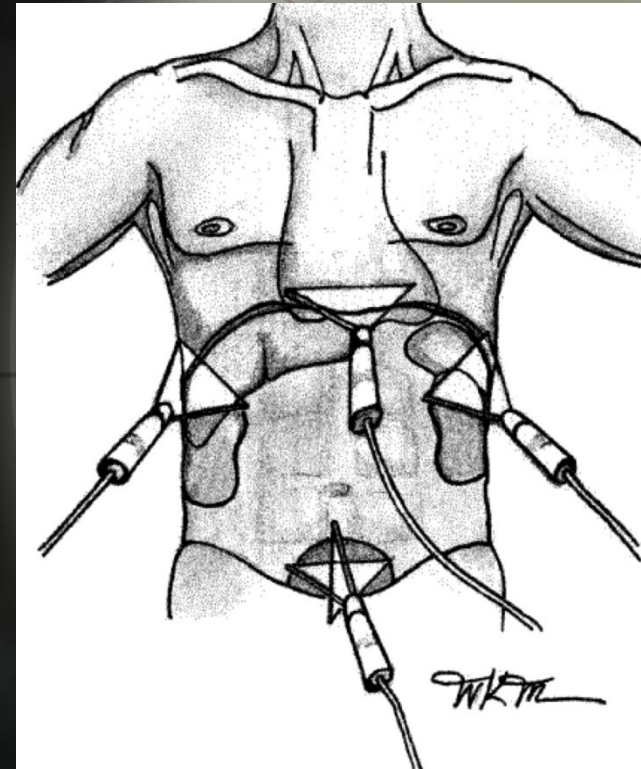
- Focused **Abdominal** Sonography for Trauma
- Focused **Assessment** with Sonography for Trauma

Target:

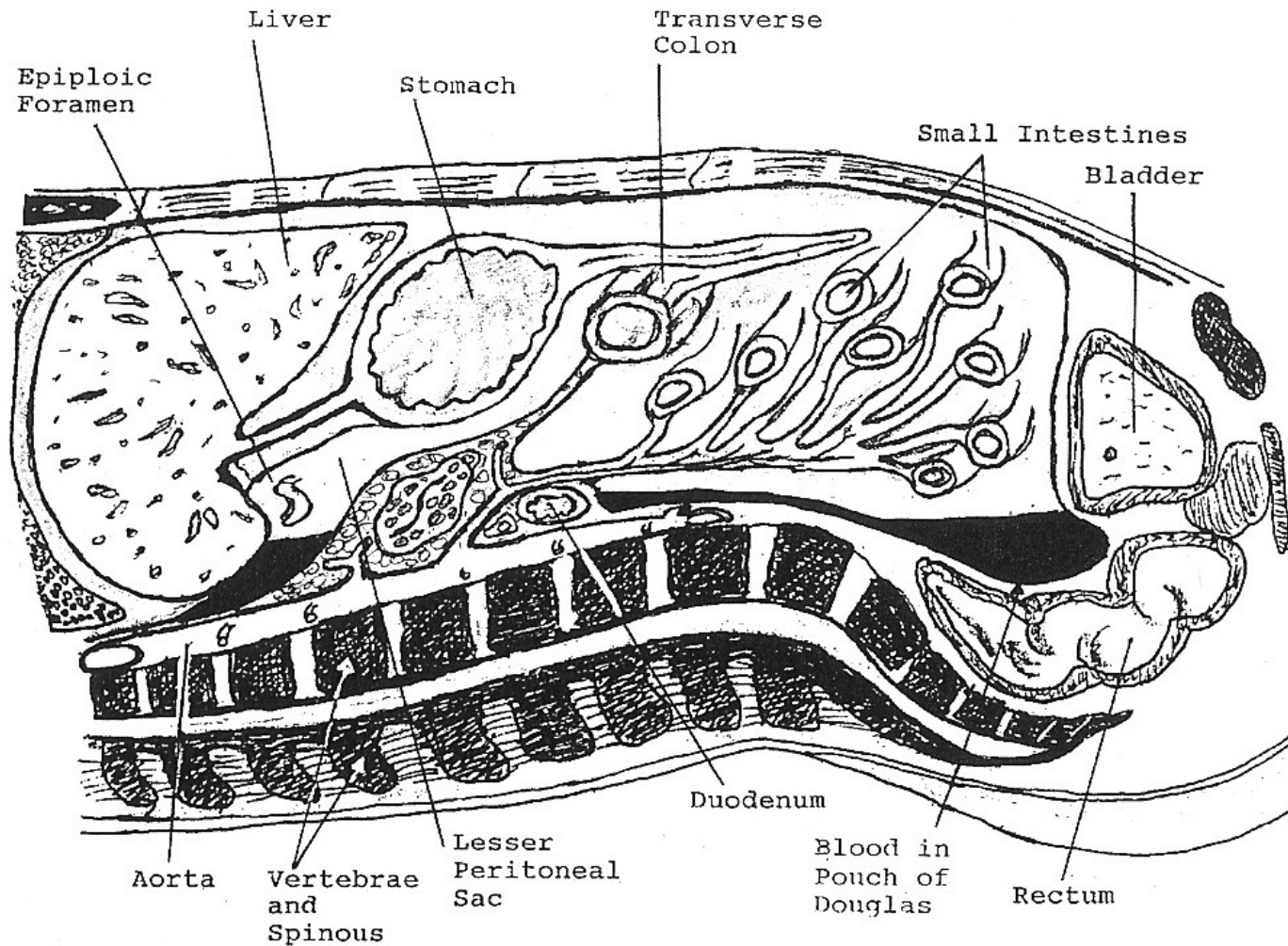
- Intraperitoneal, Intrathoracic, pericardial
free fluid existence?

FAST

- Perihepatic
- Cardiac
- Perisplenic
- Pelvic



Peritoneal / pleural / pericardial fluid?



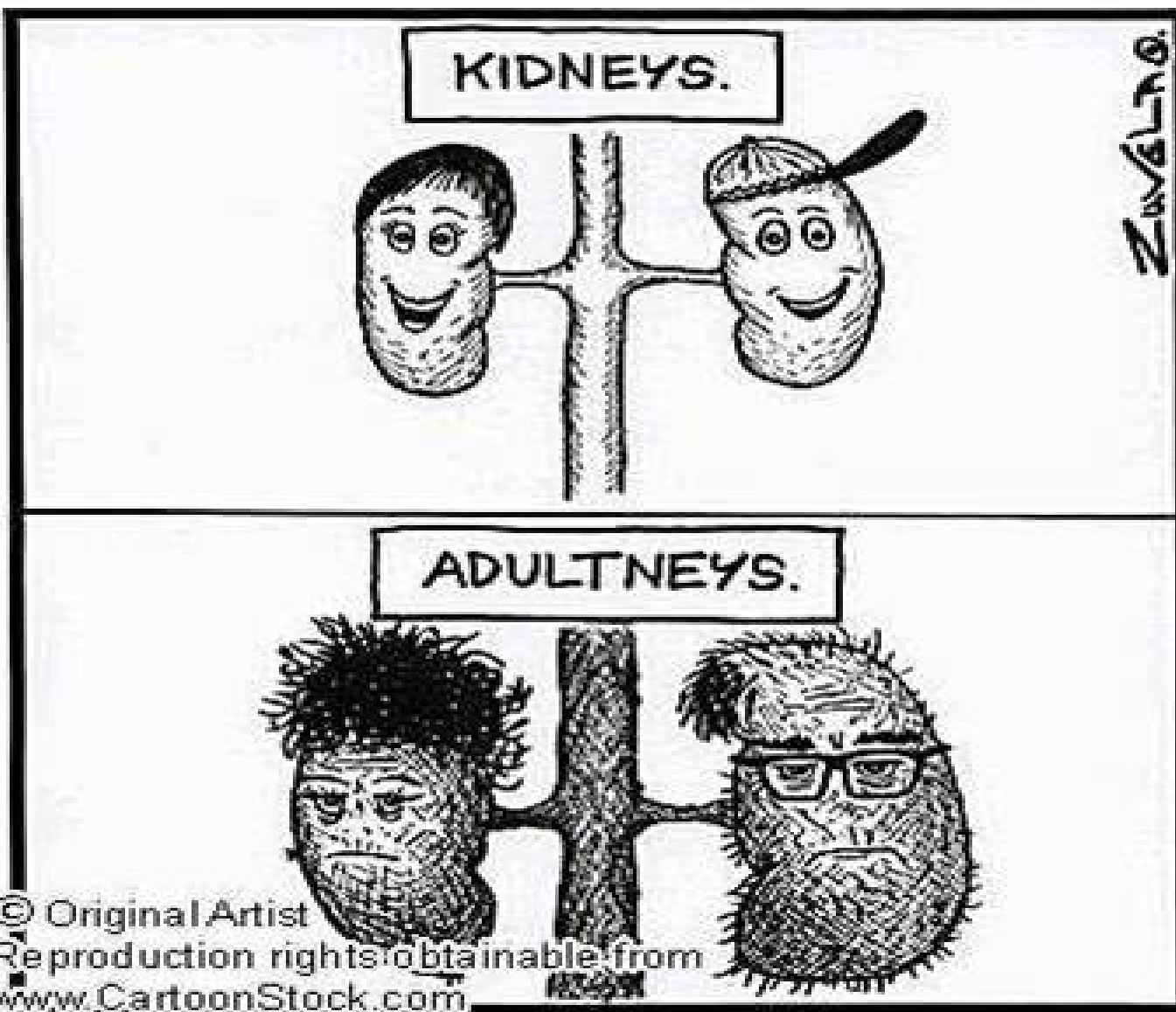
FAST - technic



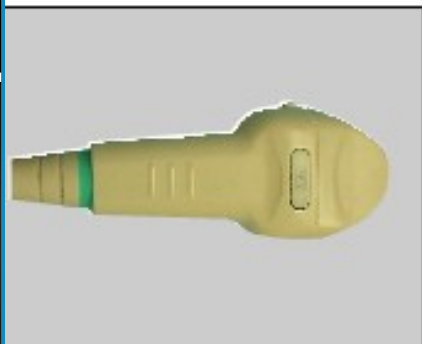
FAST - technic



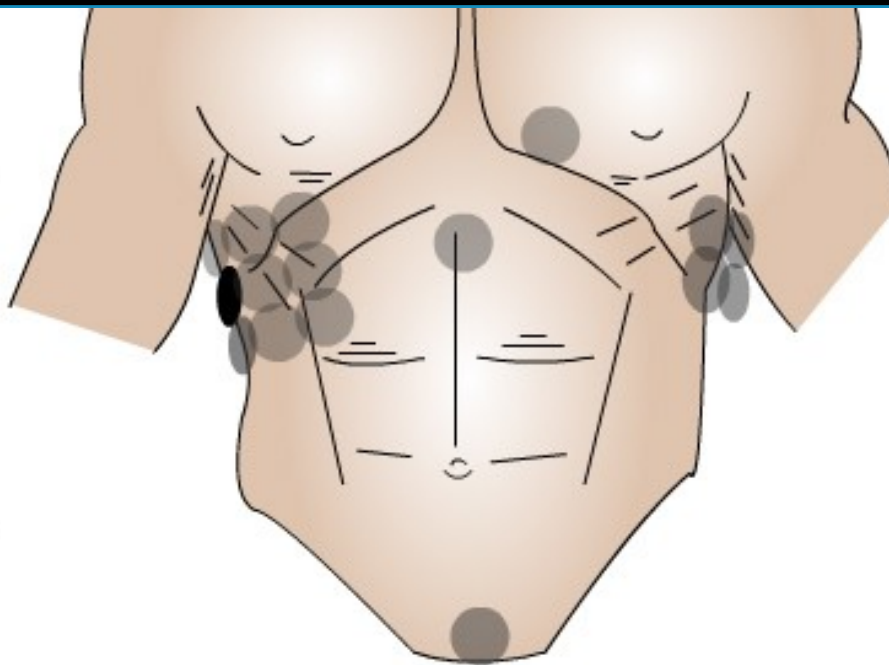
Right Upper – Perihepatic



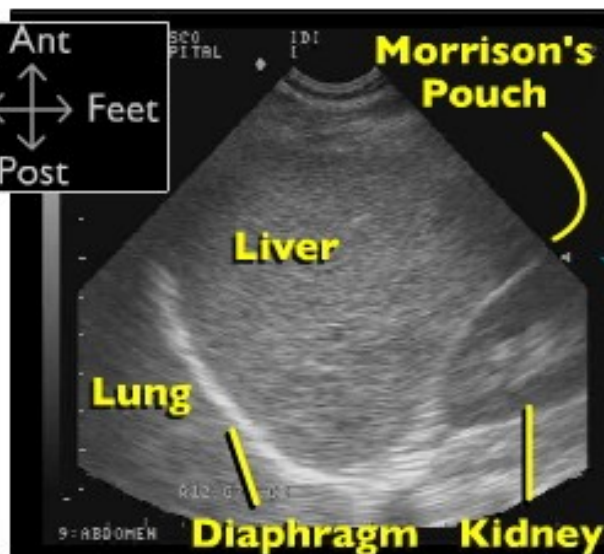
Probe Orientation



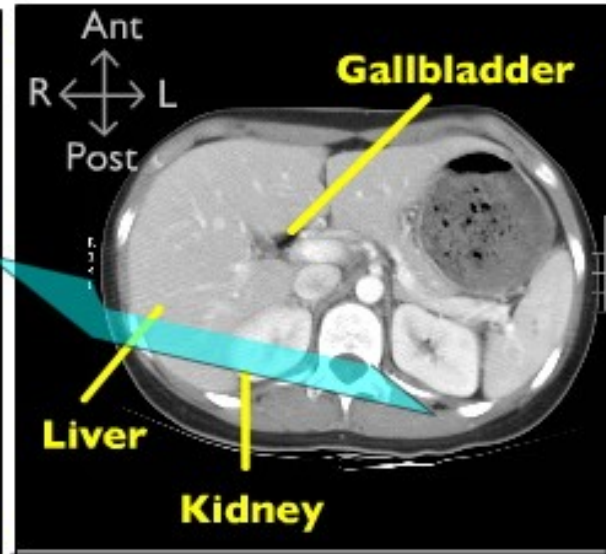
Coronal view



Actual ultrasound image



Labeled ultrasound image



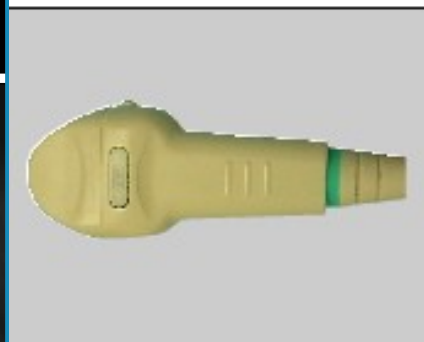
Cross-sectional CT anatomy



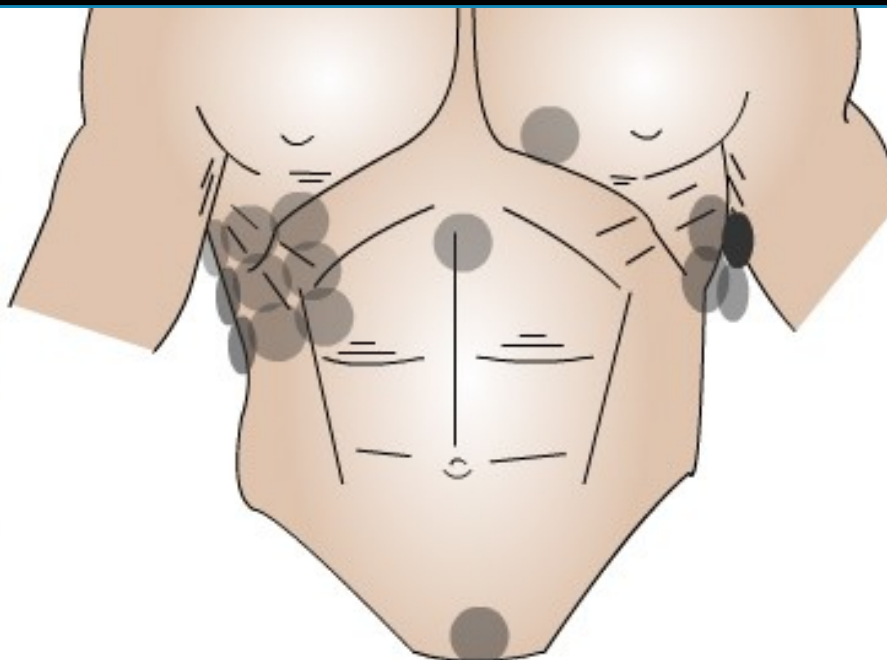
Left Upper - Perisplenic



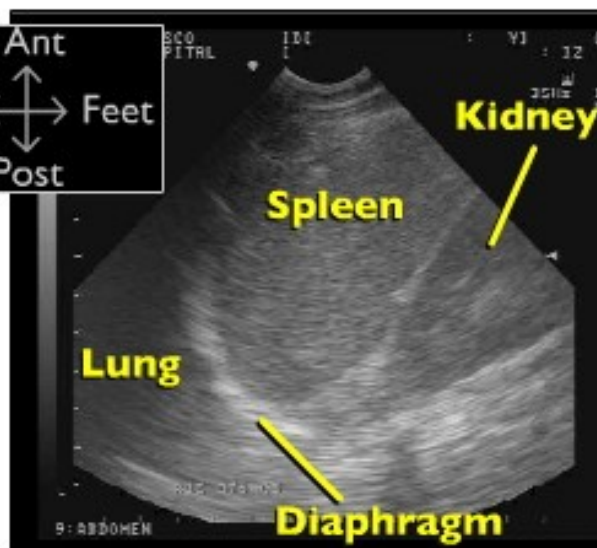
Probe Orientation



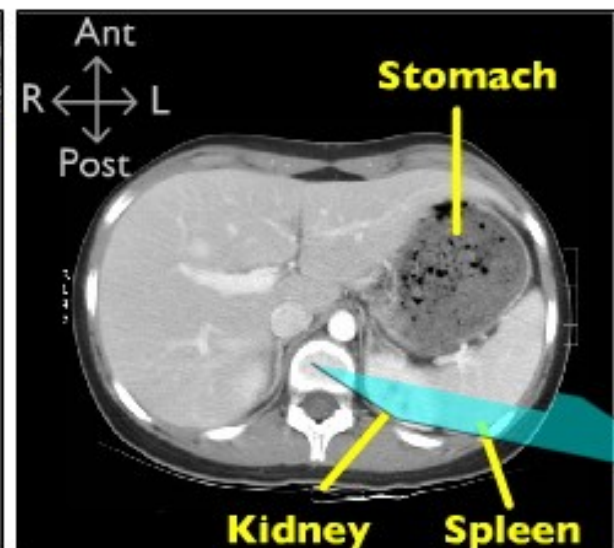
Coronal view



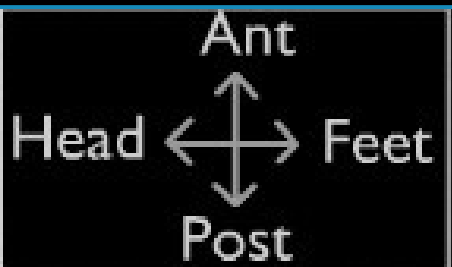
Actual ultrasound image



Labeled ultrasound image



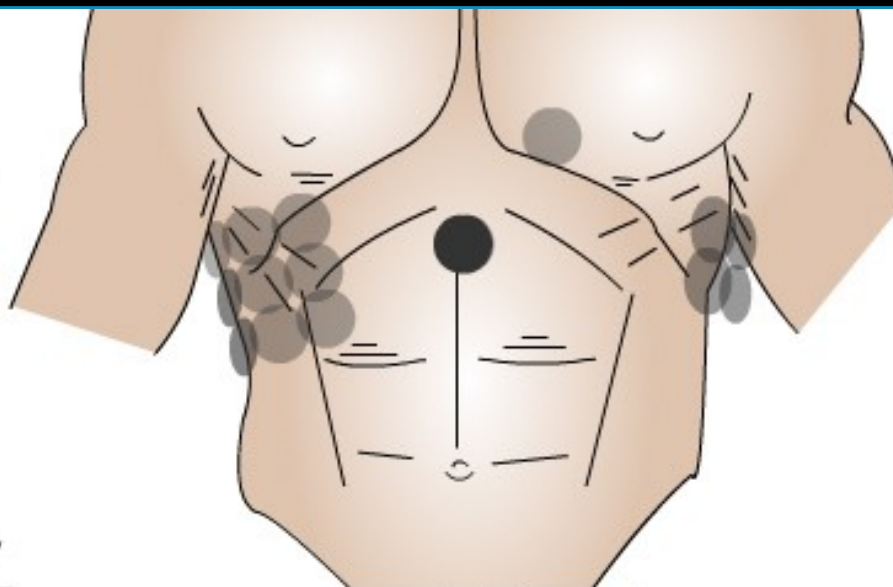
Cross-sectional CT anatomy



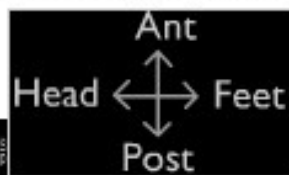
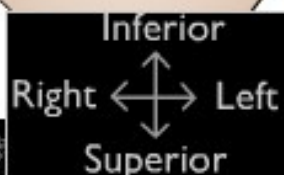
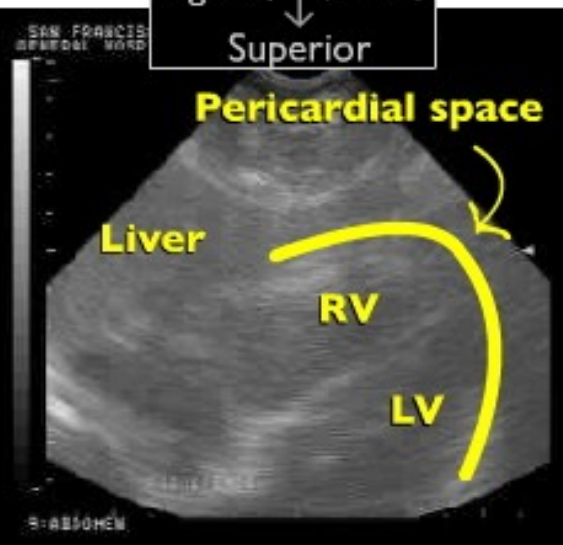
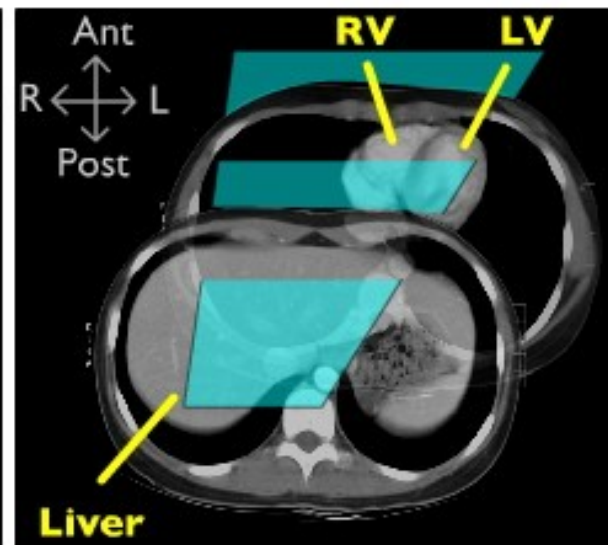
Cardiac - subxyphoid



Probe Orientation



Subcostal coronal view



Actual ultrasound image

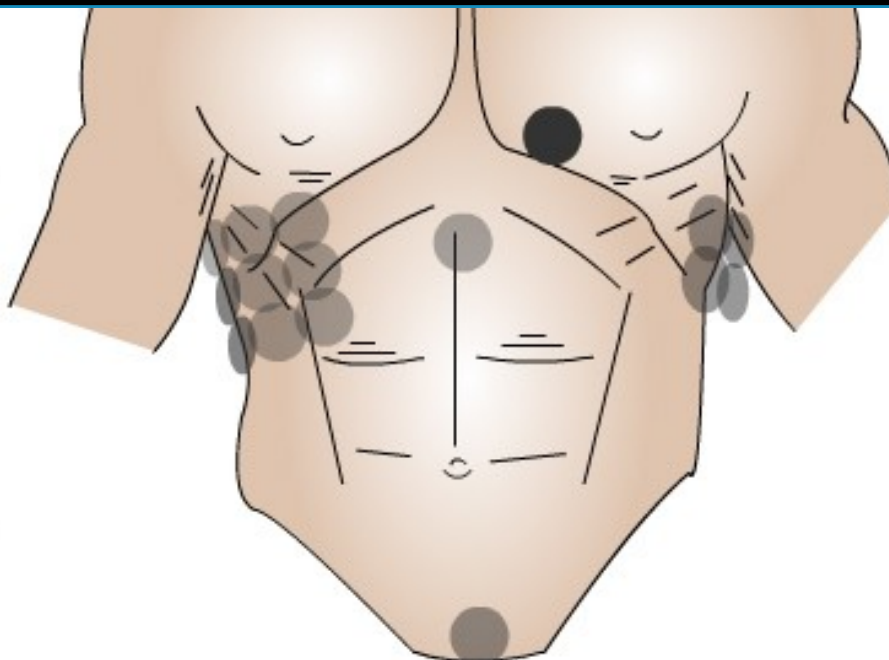
Labeled ultrasound image

Cross-sectional CT anatomy

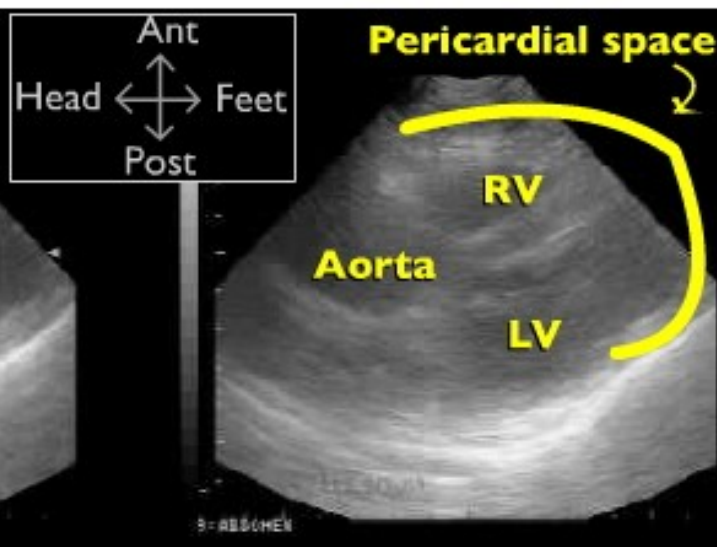
Probe Orientation



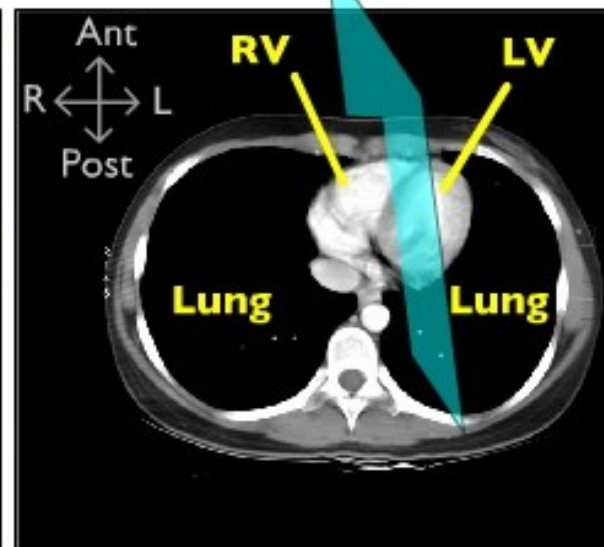
Parasternal long axis view



Actual ultrasound image



Labeled ultrasound image



Cross-sectional CT anatomy

Pelvic - Suprapubic

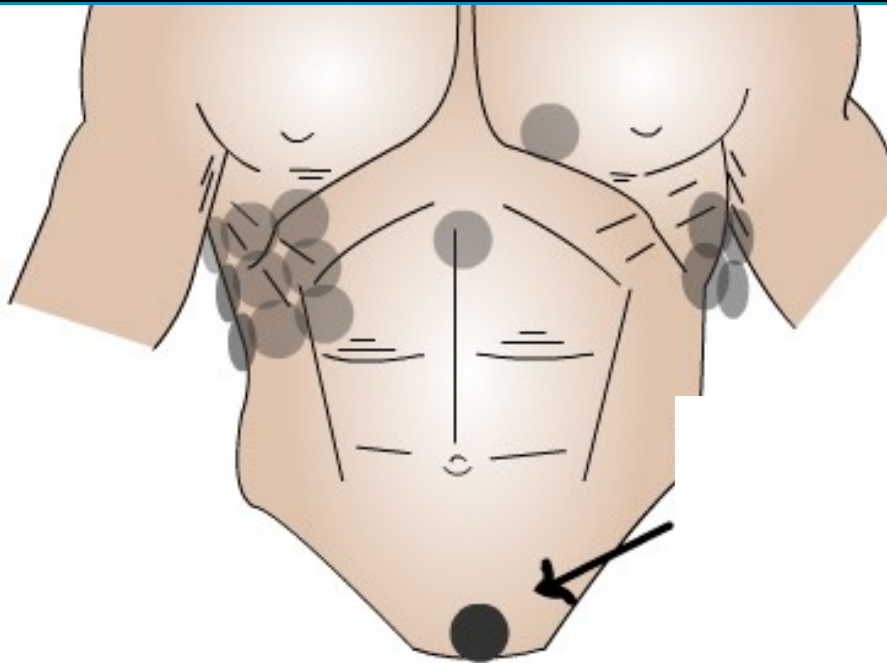
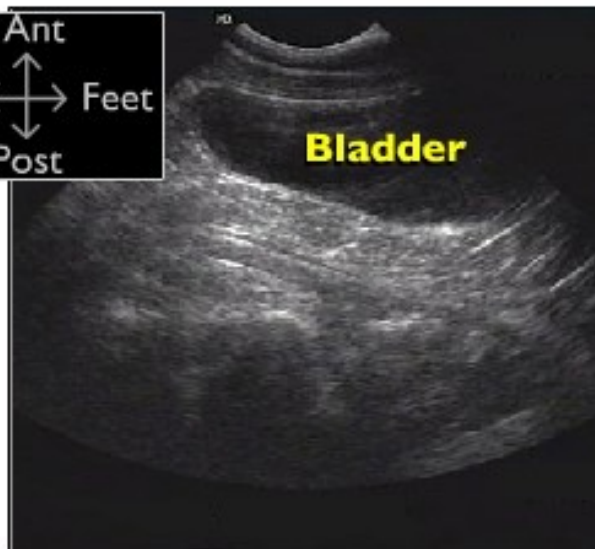


Probe Orientation



Perpendicular to skin

Sagittal view



Actual ultrasound image

Labeled ultrasound image

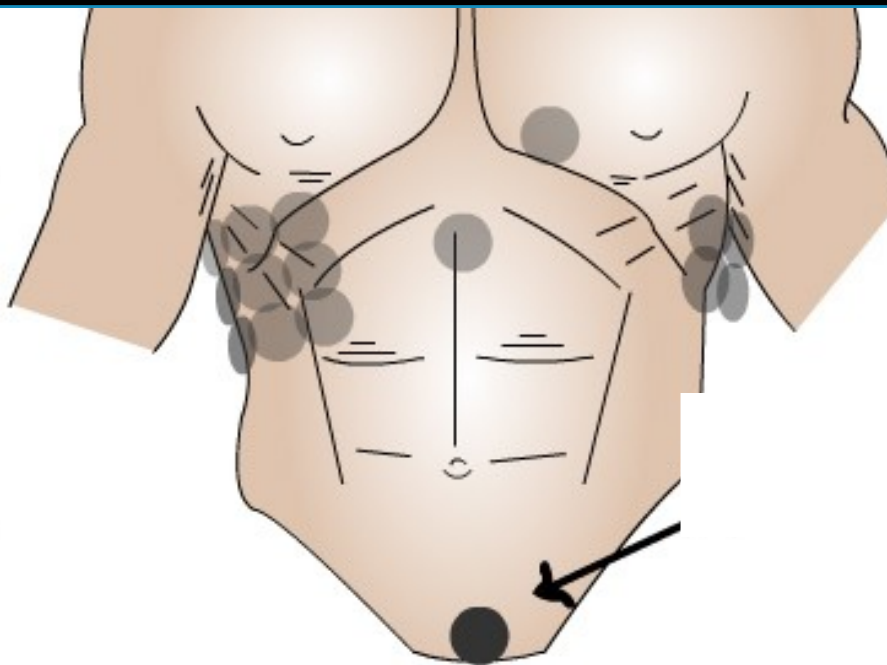
Cross-sectional CT anatomy

Probe Orientation

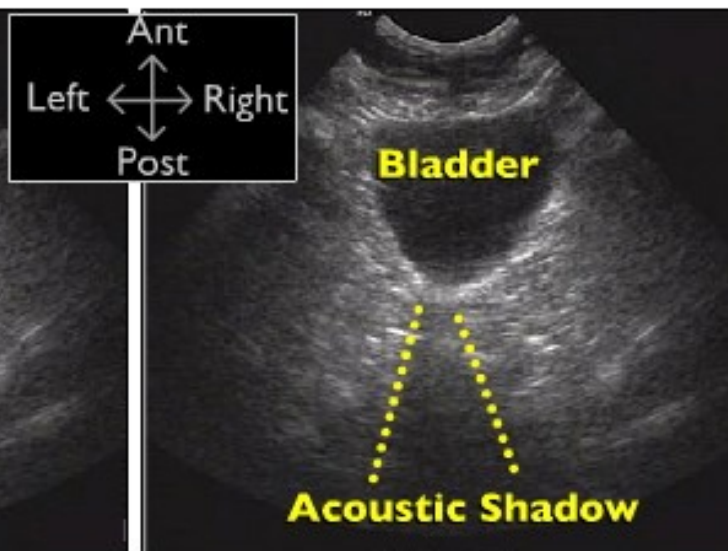


Perpendicular to skin

Transverse view



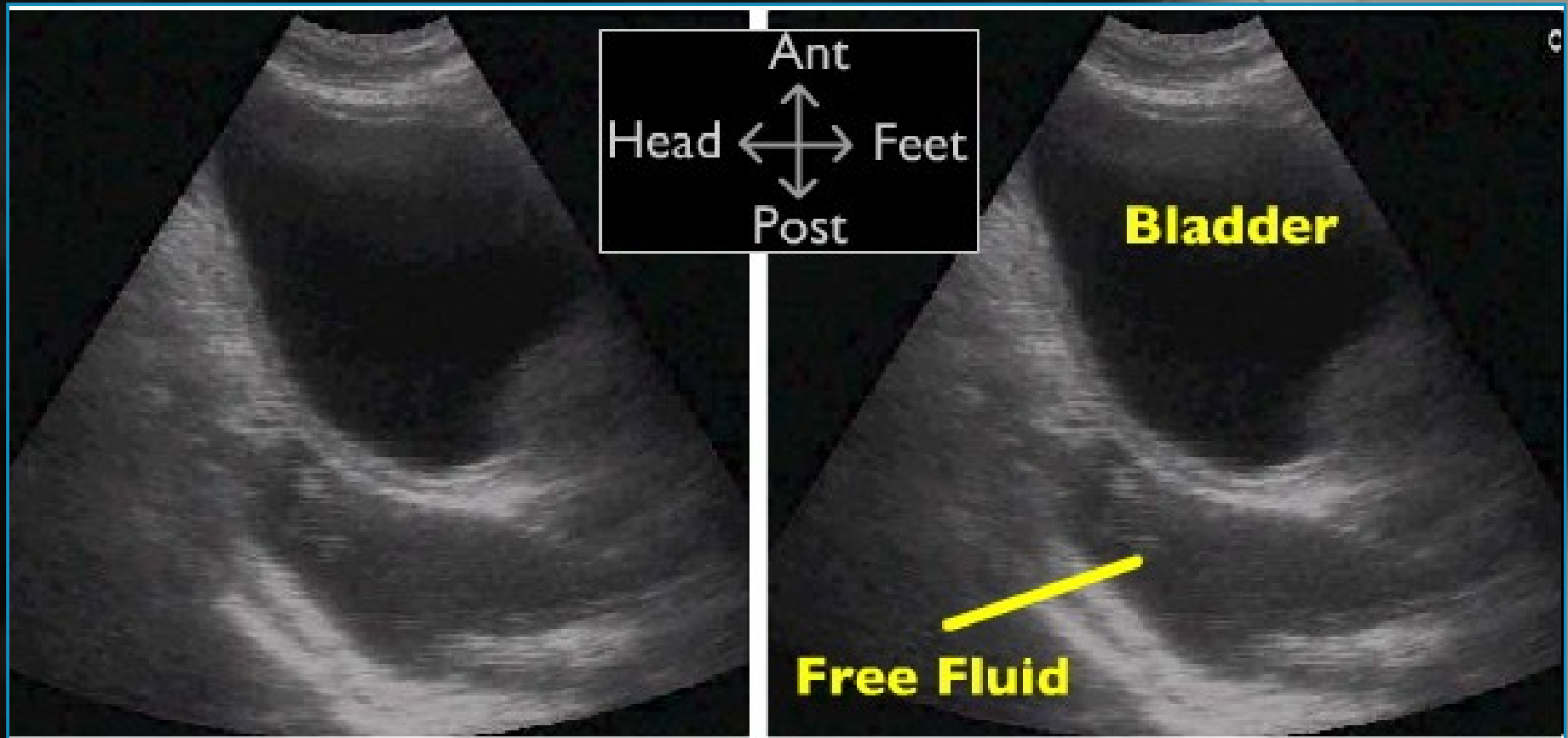
Actual ultrasound image



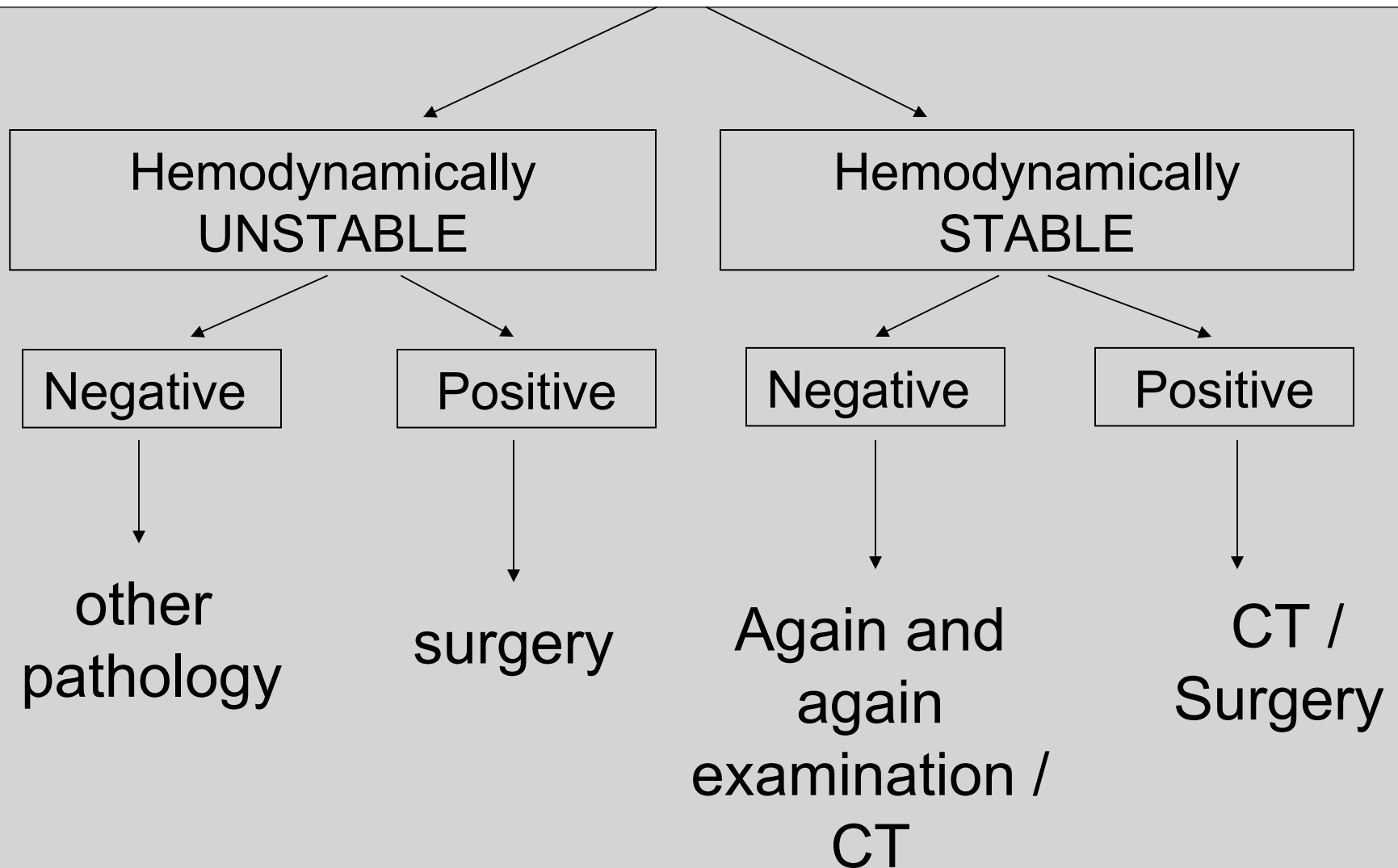
Labeled ultrasound image



Cross-sectional CT anatomy



FAST



Contraindication

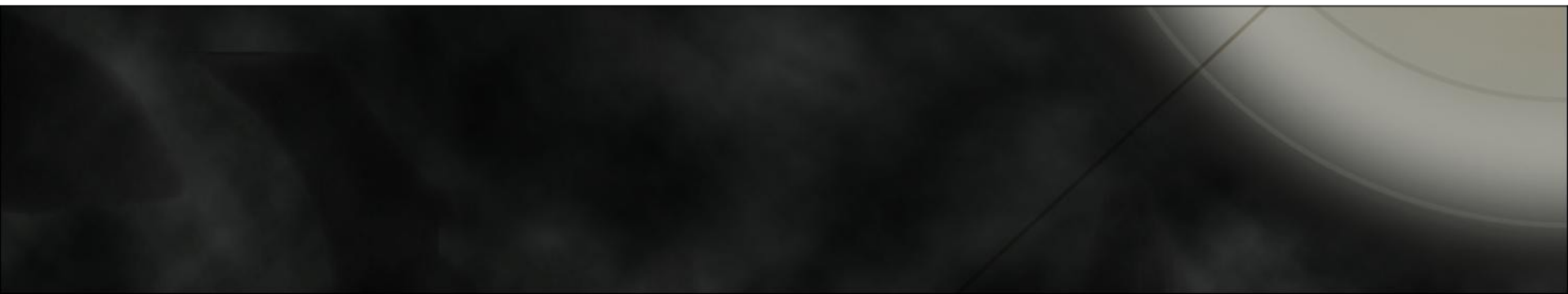
- Urgent surgery

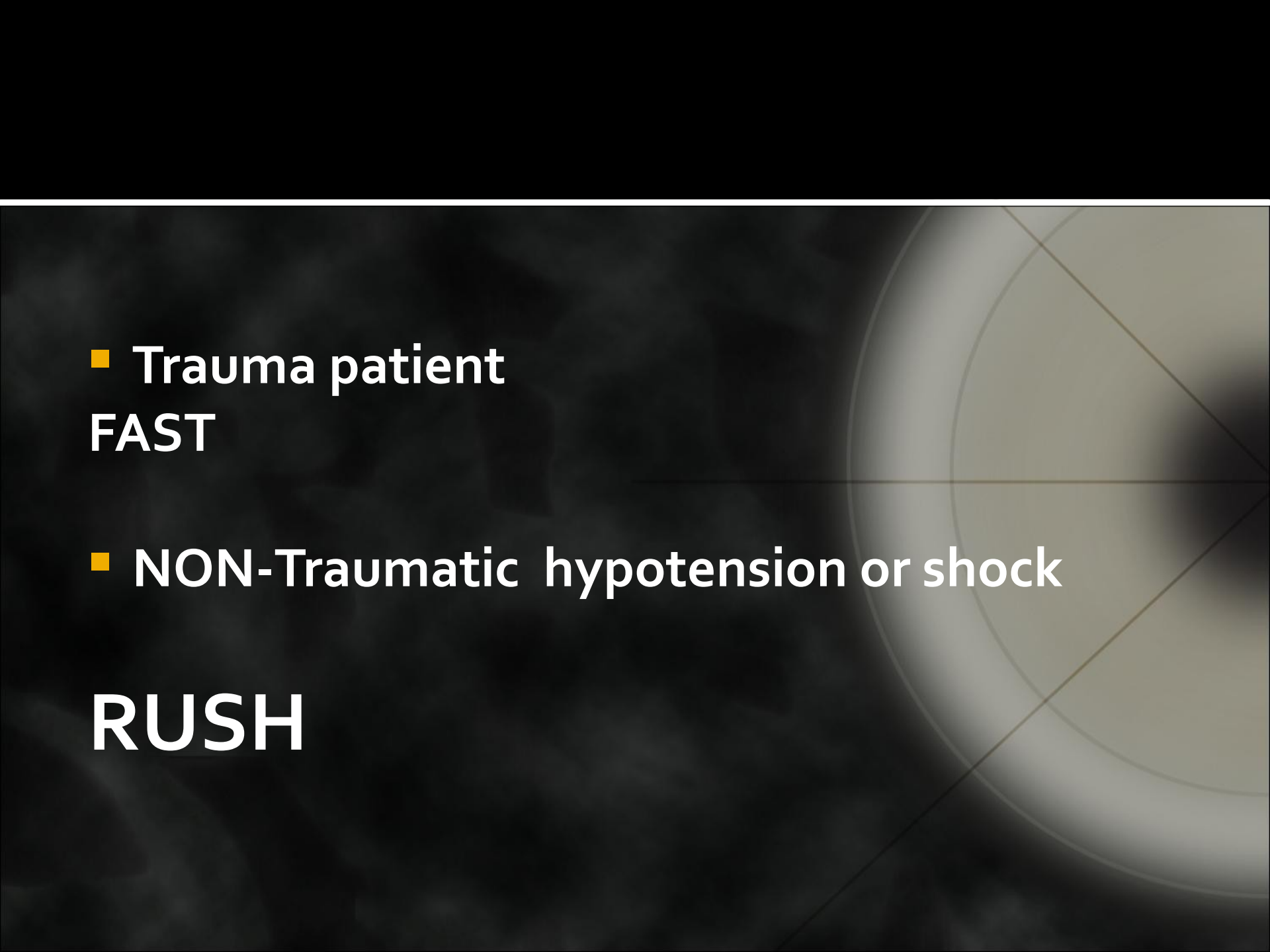
Limiting Factors :

- Some serious traumatic injuries
 - renal peduncle injury, intestinal injury, pancreas trauma, diaphragm injury, retroperitoneal injury
- Nontraumatic free fluid
- Long time after trauma
- Intraperitoneal lipid

RUSH

(Rapid Ultrasound for Shock and Hypotension)





- Trauma patient

FAST

- NON-Traumatic hypotension or shock

RUSH

RUSH

- Bedside
 - Heart
 - Inferior Vena Cava
 - Morison's/FAST, lower thorax (or abdominal thorax window)
 - Aorta
 - Pneumothorax
- These components can be recalled with the mnemonic: HI-MAP

Heart

Heart in RUSH

- Pericardial effusion/tamponade;
- Right ventricular failure (pulmonary embolism)
- Left ventricular function (parasternal long axis and the four chamber view)

Inferior Vena Cava

- Estimate fluid necessity
 - IVC diameter of <1.5 cm (complete inspiratory)
low CVP (<5)
 - IVC diameter of >2.5 cm (no inspiratory collapse)
high CVP (> 20) and fluid loading.

Morison's and The FAST Exam Views With Hemothorax Windows

- Like FAST
 - right upper quadrant,
 - left upper quadrant,
 - suprapubic area
- ectopic pregnancy,
- massive ascites,
- ruptured viscus,
- spontaneous intraabdominal bleeding,
- intraperitoneal rupture of an AAA, etc.

Aorta

AAA 4 level (Xiphoid to umbilicus)

- Near heart
 - Suprarenal
 - Infrarenal
 - Above iliac bifurcation
-
- Aorta diameter >5 cm (+ hypotension = AAA)

Pneumothorax

Think tension pnx

- Central line
- Pacemaker placement
- Thoracentesis
- Bi-hemithorax anterior 3. intercostal space (begin)
- high frequency probe
- M-mode
 - ocean/beach or seashore -- no pneumothorax
 - continuous ocean or stratosphere sign--- pneumothorax

RUSH

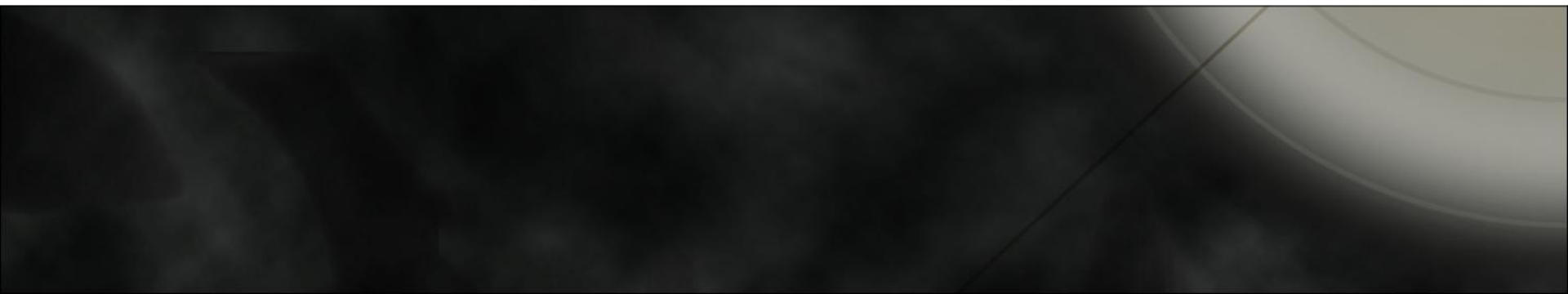
(HI-MAP)

1. **H**earst: Parasternal long and then 4 chamber cardiac views (general purpose or cardiac probe)
2. **I**VC view with the same probe
3. If not already using it, switch to general purpose abdominal probe and scan **M**orison's and splenorenal views with thorax images and then examine the bladder window.
4. Increase your depth and find the **A**orta above and below the renal artery with four views.
5. Scan both sides of the chest for **P**neumothorax. It may be beneficial to switch to a small-parts, high frequency transducer, but the general purpose probe will often supply sufficient views of the pleural interface.



BLUE

(Bedside Lung Ultrasound in Emergency)





CXR-Radiology Reading: PTX Negative

1 Ratio 20.0 Zoom 42%



CT-Large Right PTX

PTX

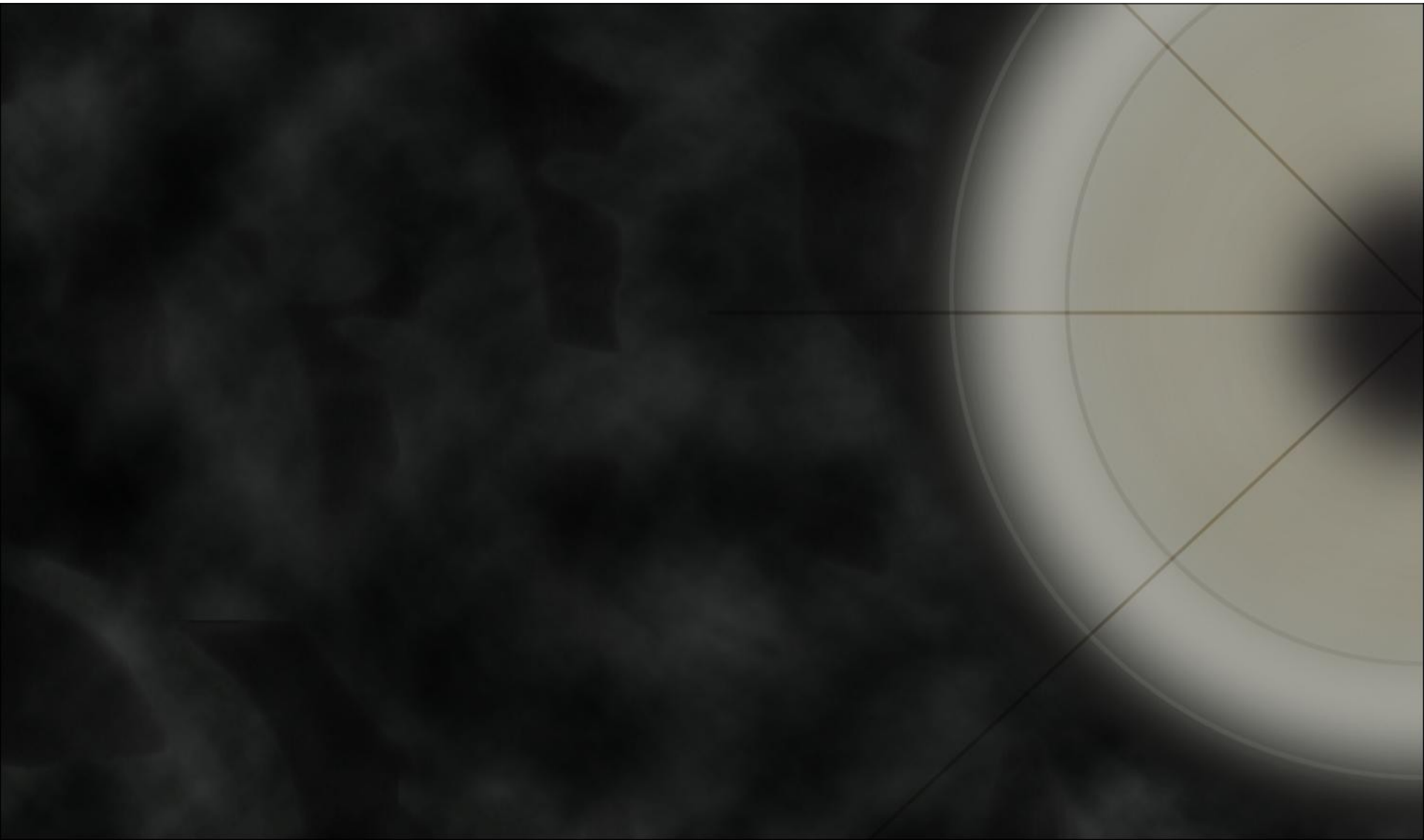


- Direct graphy specificity for pneumothorax %53
- Gold standart is “CT”

- Lung is not suitable for US
- If you don't use CT, you can use USG
- Thorax US pneumothorax sensitivity (relative CT) 92%
- US has some technical superiority
- 4-12 MHz probe



STATIC IMAGES



SLS (Sliding Lung Sign)

- Normal



A line

- Pnomothorax



B line

- Normal

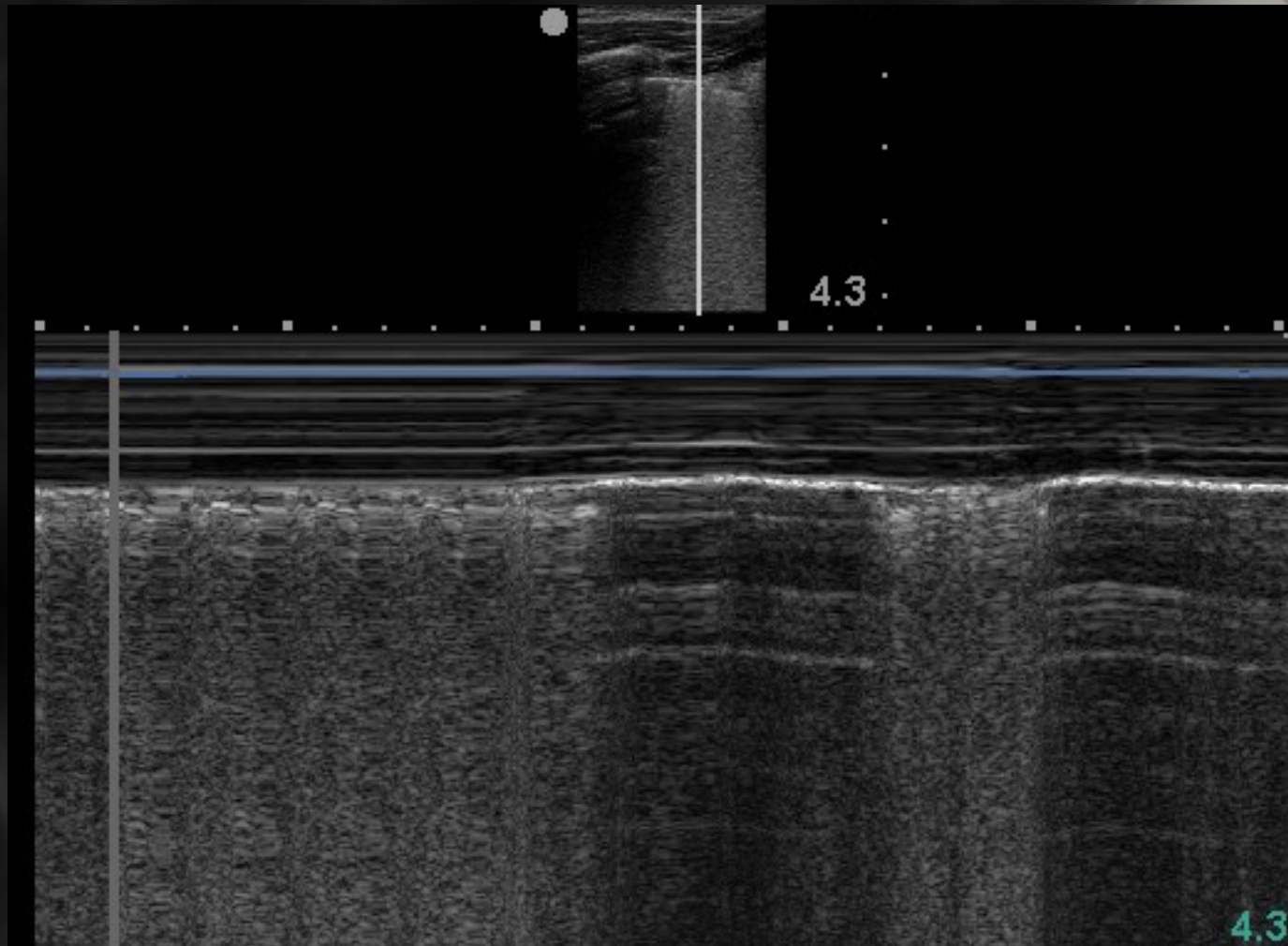




Lung point

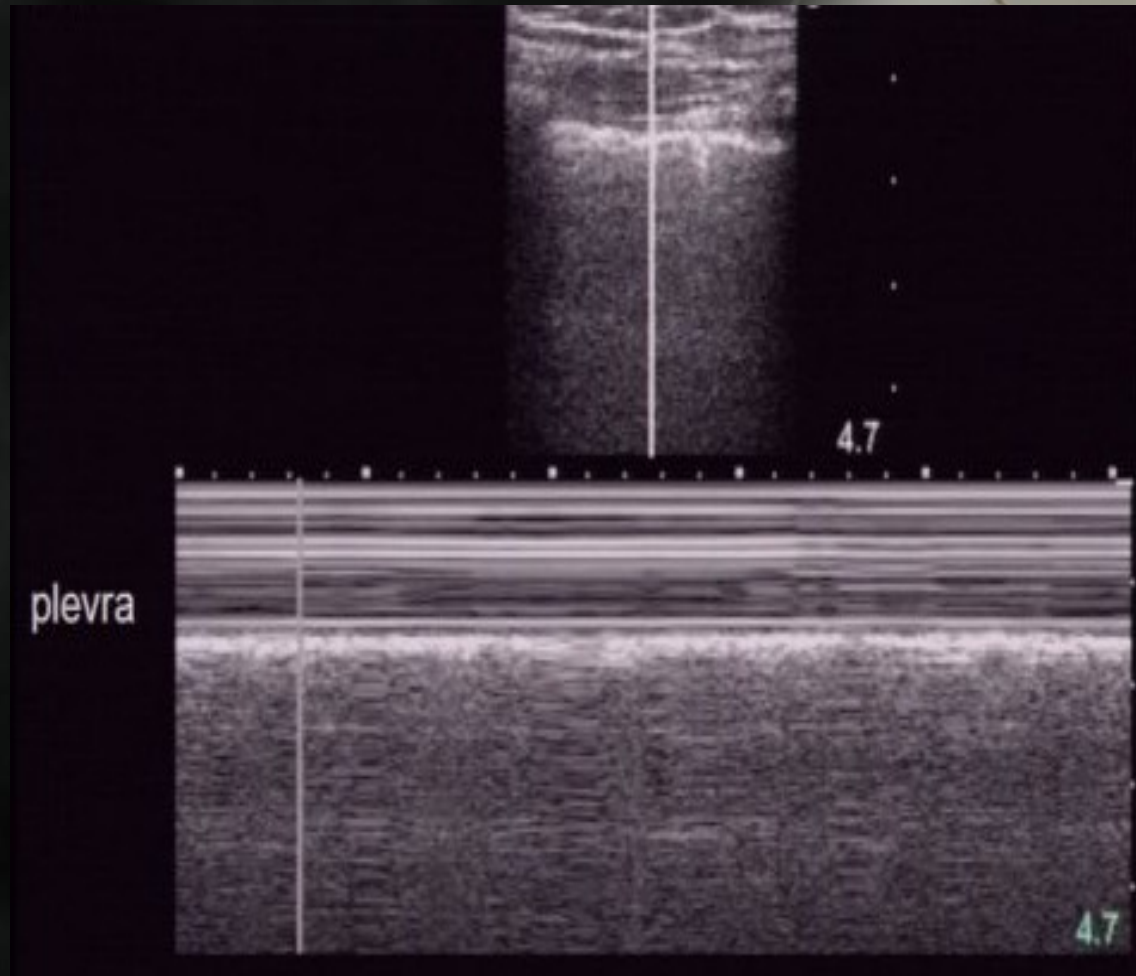


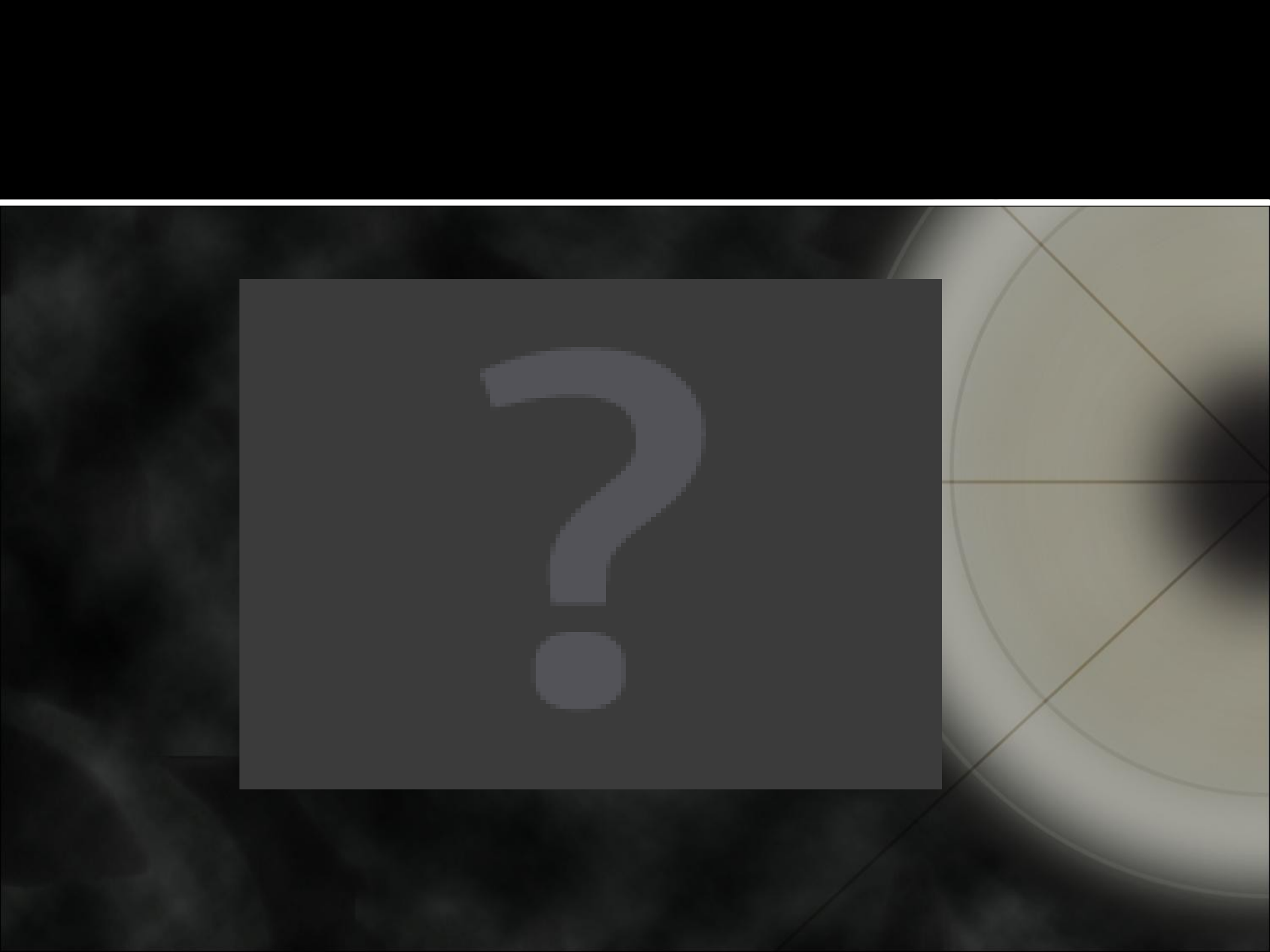
Dynamic changes



Sea shore Sign

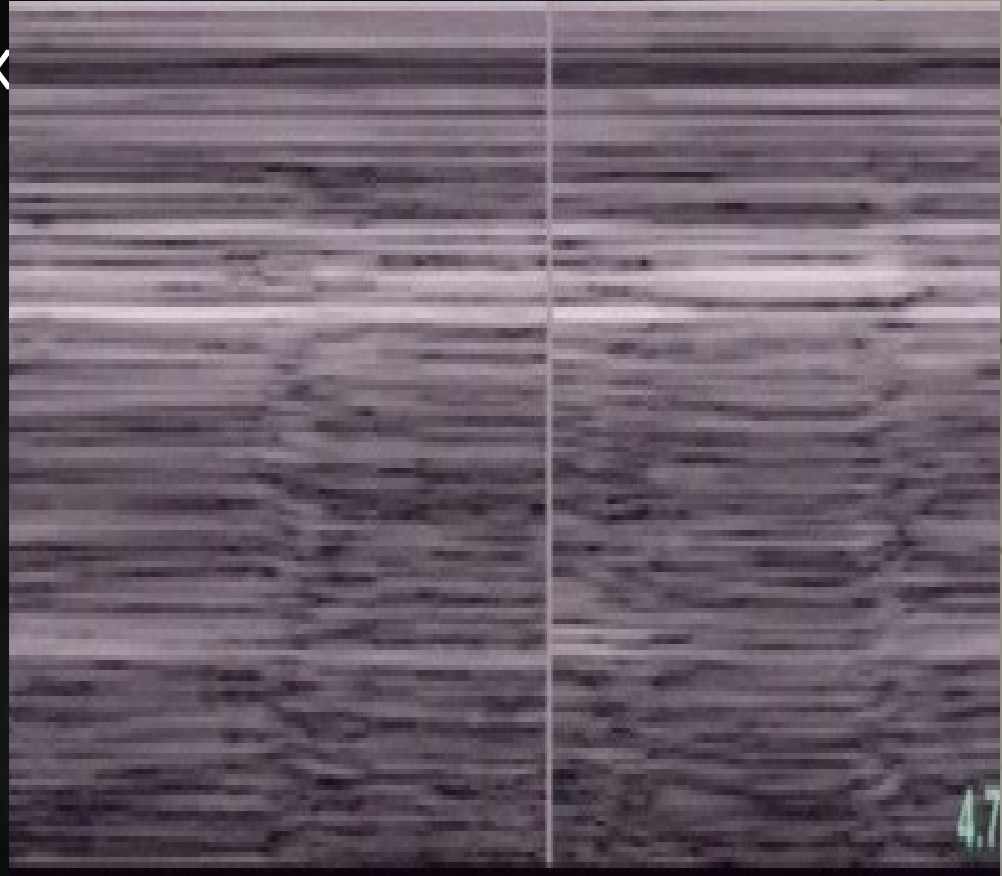
- Normal (M mode)

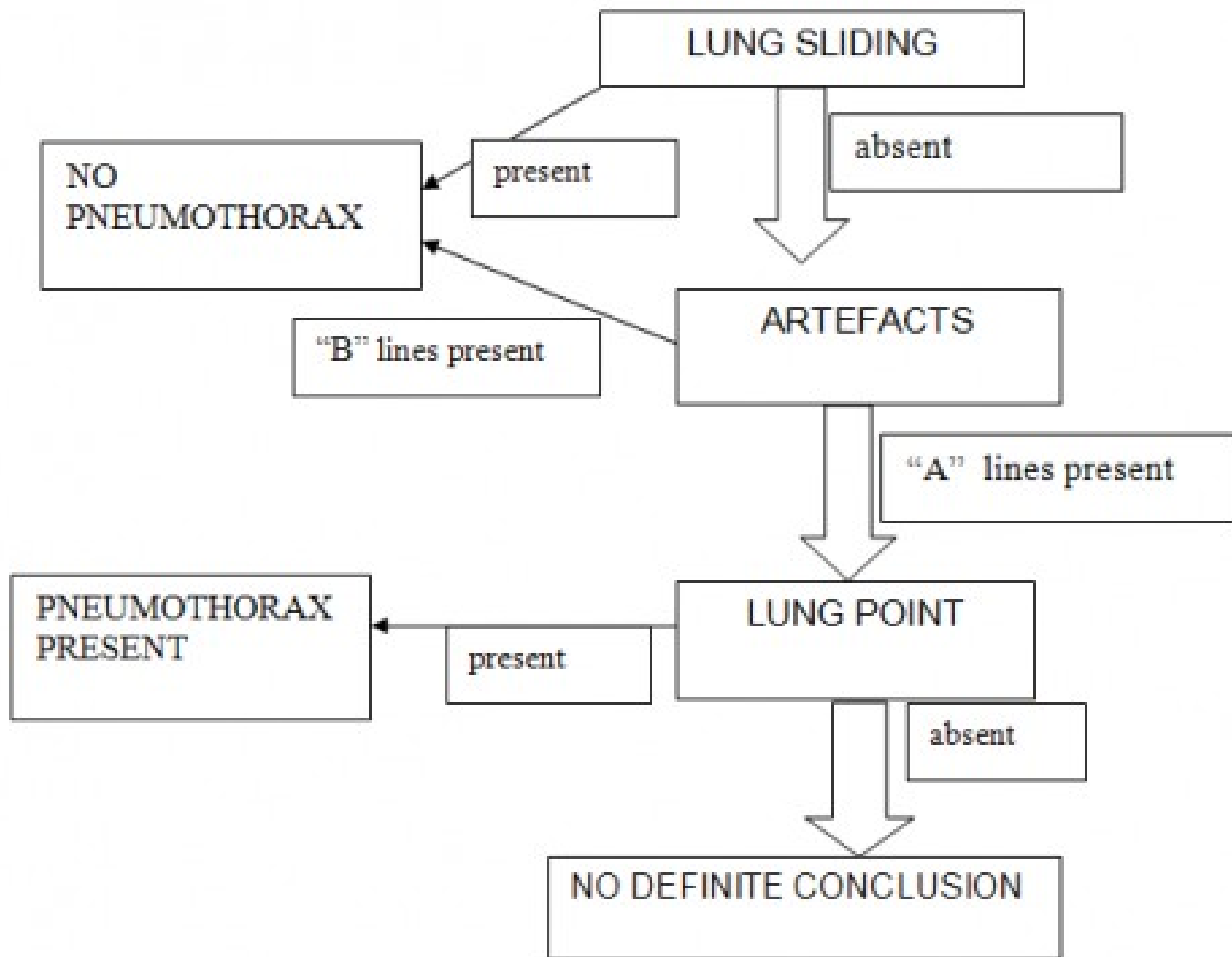




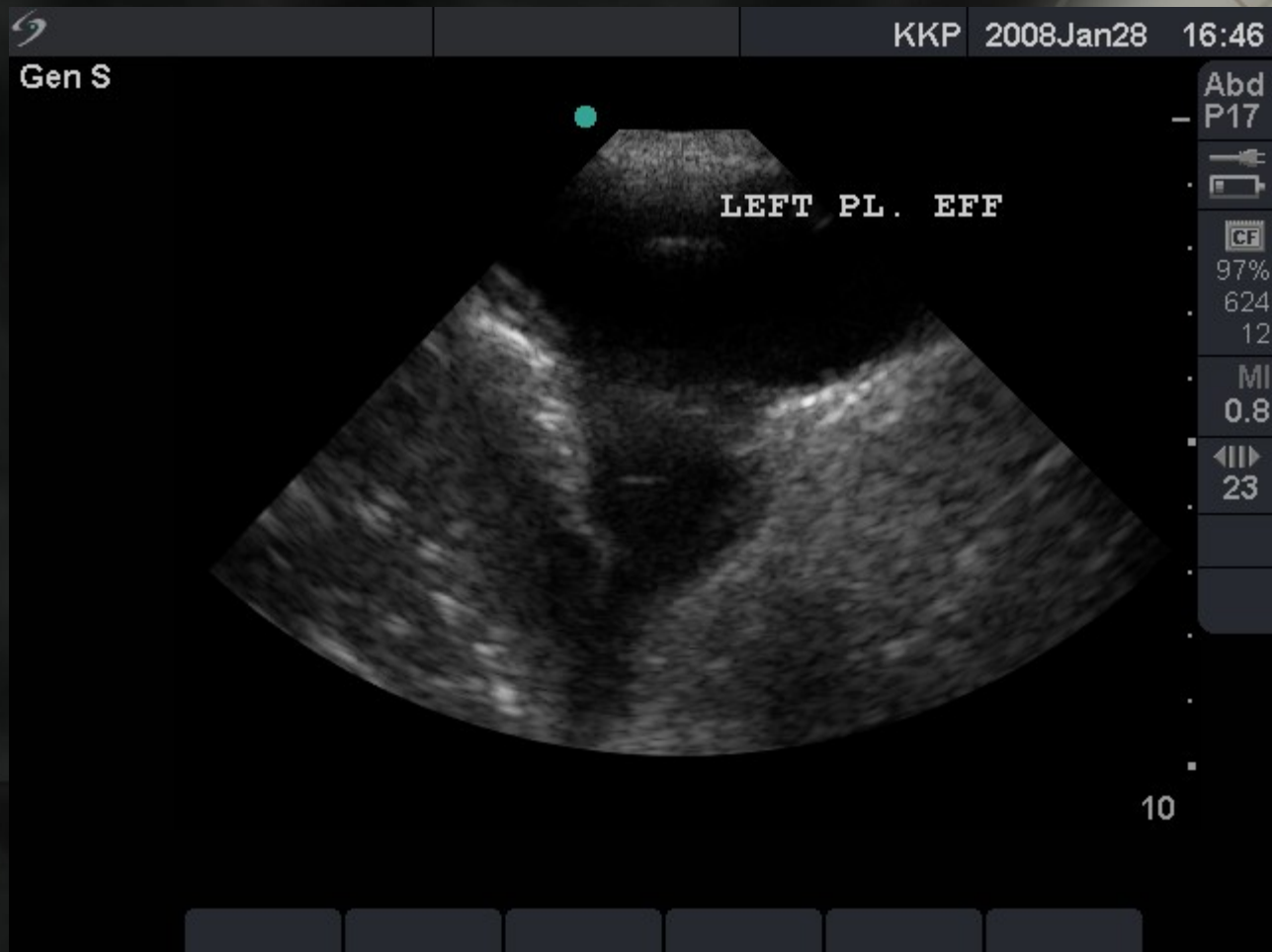
Strotospher Sign

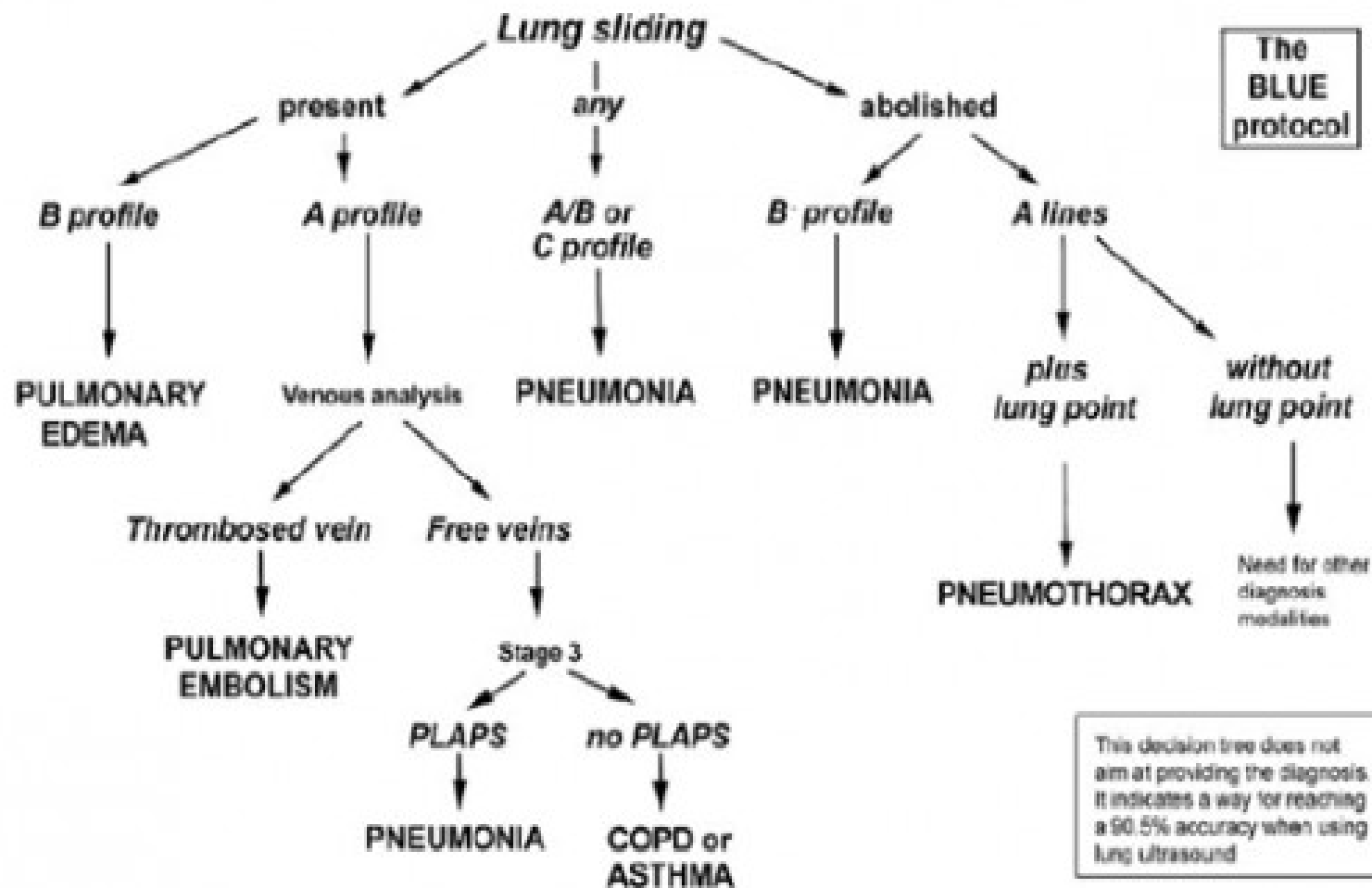
- Pneumothorax





Pleural Effusion





This decision tree does not aim at providing the diagnosis. It indicates a way for reaching a 90.5% accuracy when using lung ultrasound

A profile means predominantly A lines

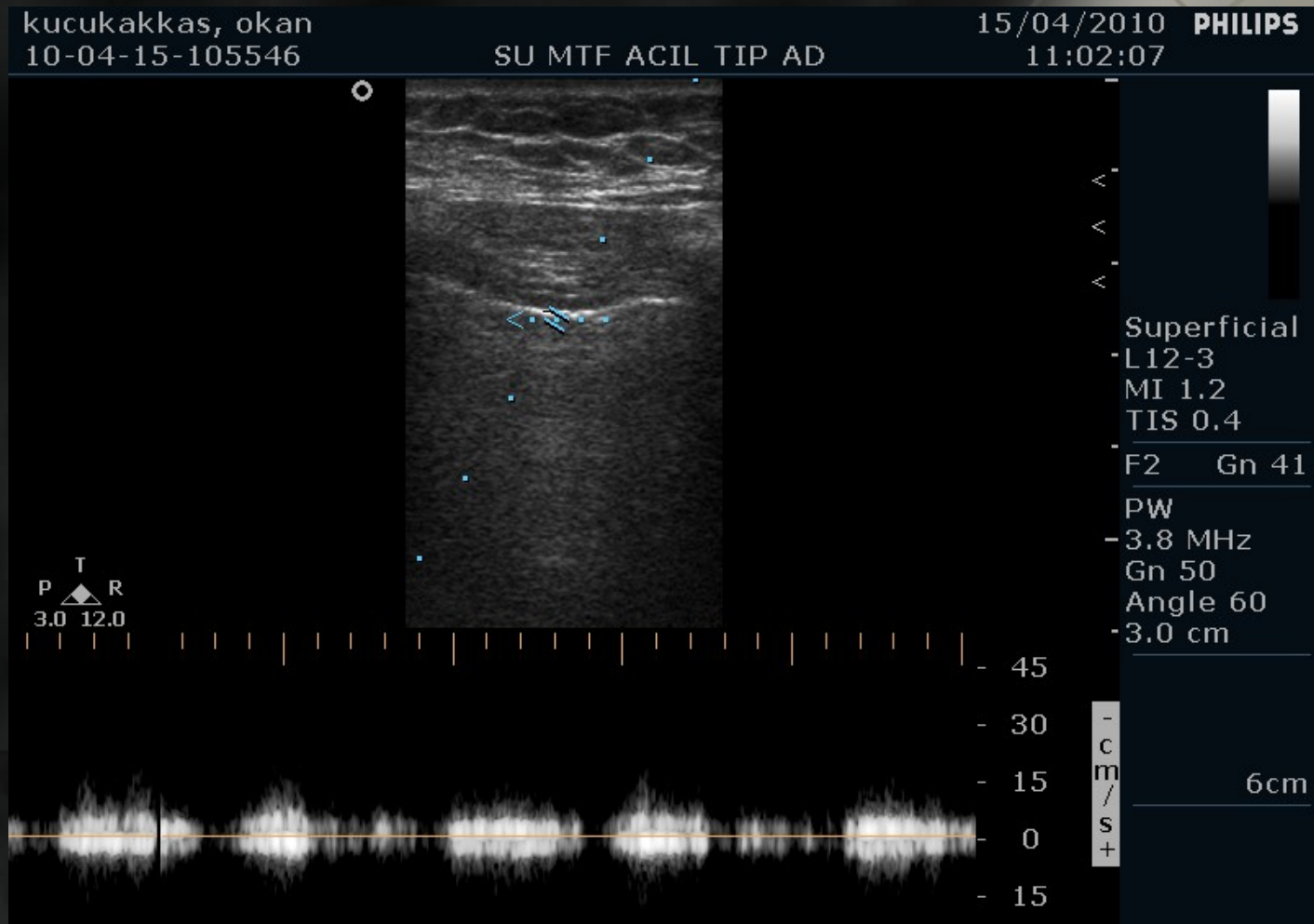
B profile means predominantly multiple anterior diffuse B lines

A / B profile means predominant A lines on one side and predominant B lines on the other side.

C profile means anterior alveolar consolidation(s)

PLAPS means *posterolateral alveolar and/or pleural syndrome* detected on a lateral sub-posterior sonological examination.

Pleural Sliding Sound (PSS)

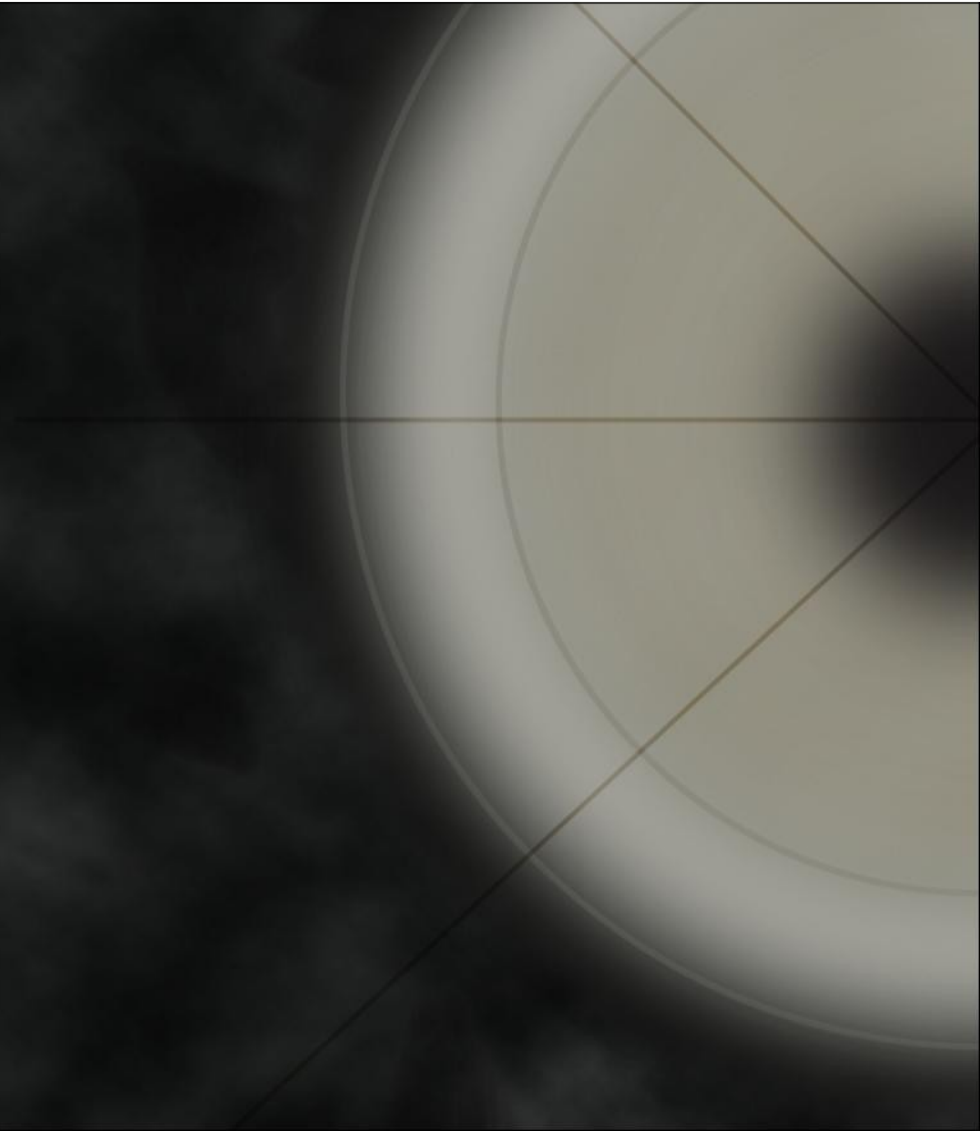


A new development in emergency department ultrasonography: Pleural Sliding Sound (PSS)

Sadik Abdullah Girisgin, Osman Karaoglan, Goknil Calik, Mehmet Ergin, Sedat Kocak, Basar Cander

Procedural

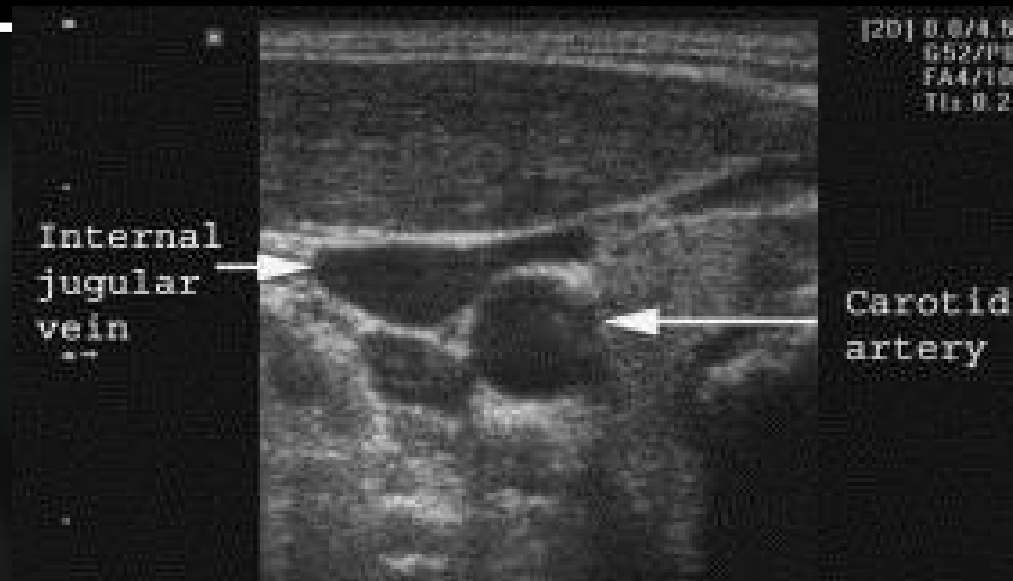
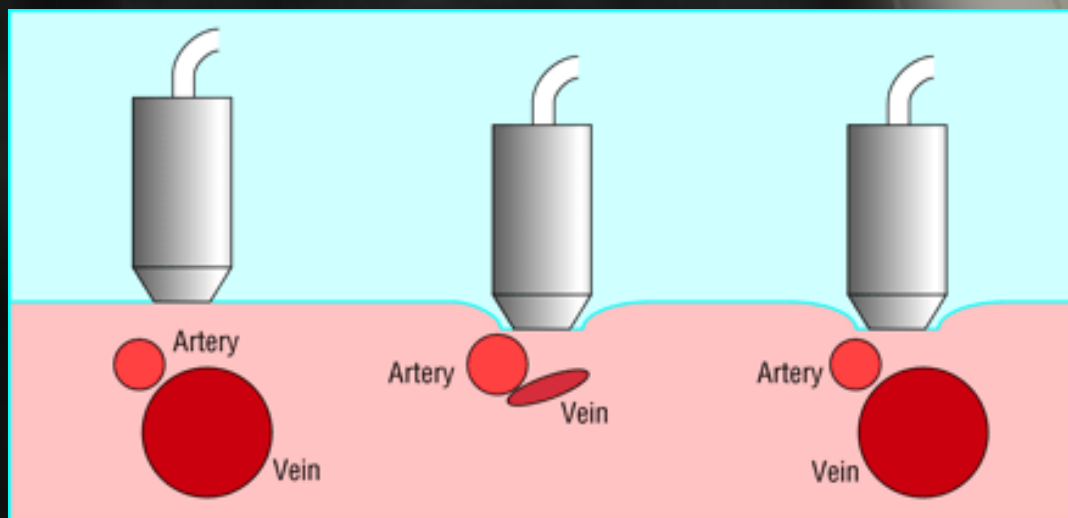
- Intravenous lines
 - Internal jugular
 - Femoral
 - Deep brachial
- Paracentesis
- Thoracentesis

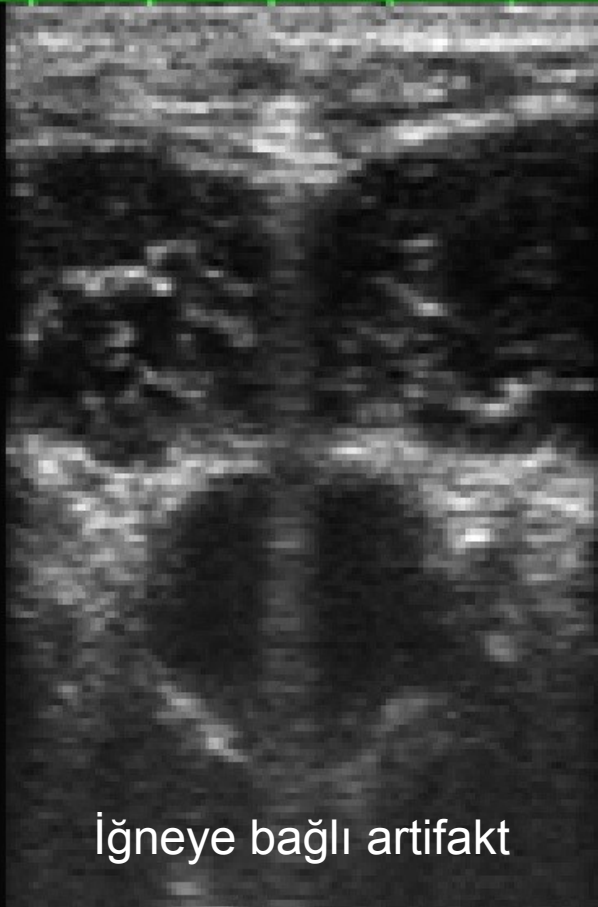


Procedural

- Bladder aspiration
- Fracture reduction
- Transvenous pacemaker
- Abscess drainage
- Foreign body
- Lumbar puncture
- Peritonsillar abscess drainage
- Arthrocentesis

CVC with US

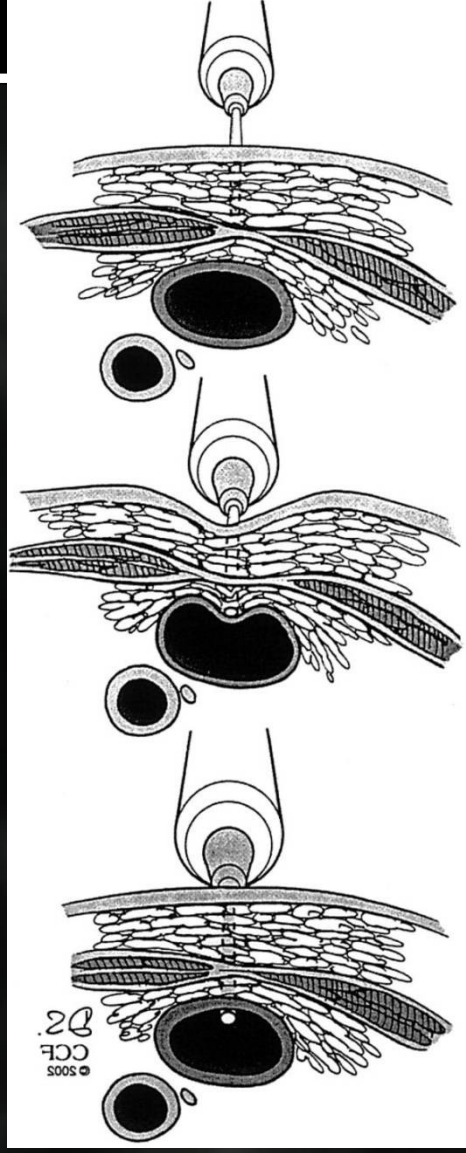
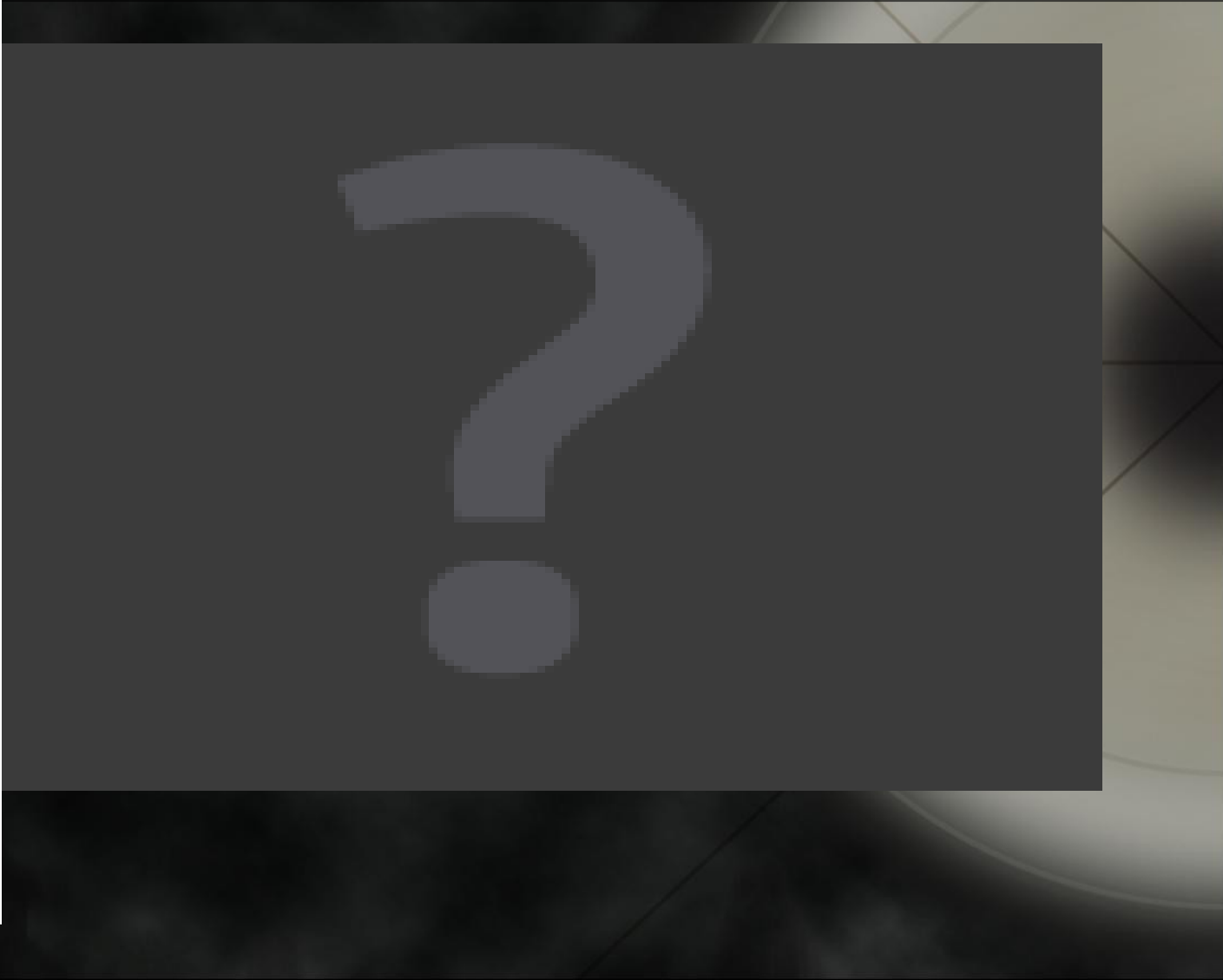




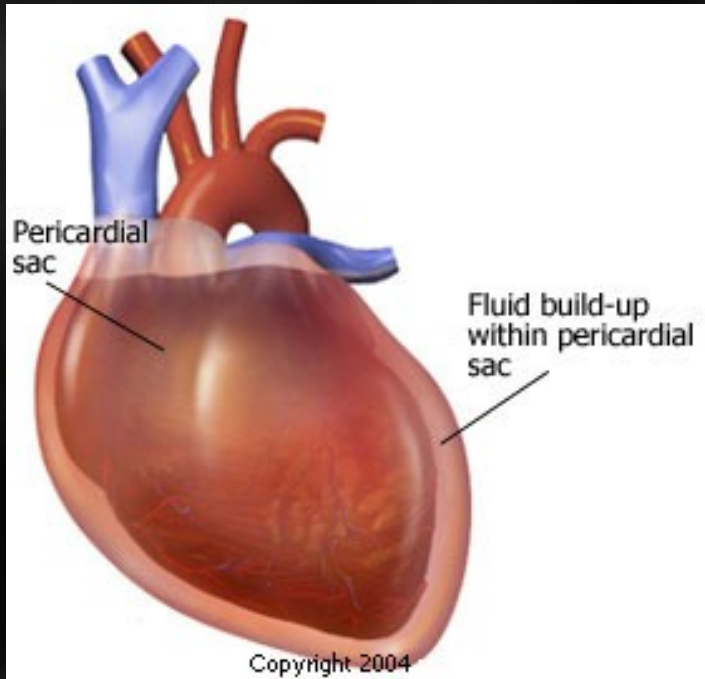
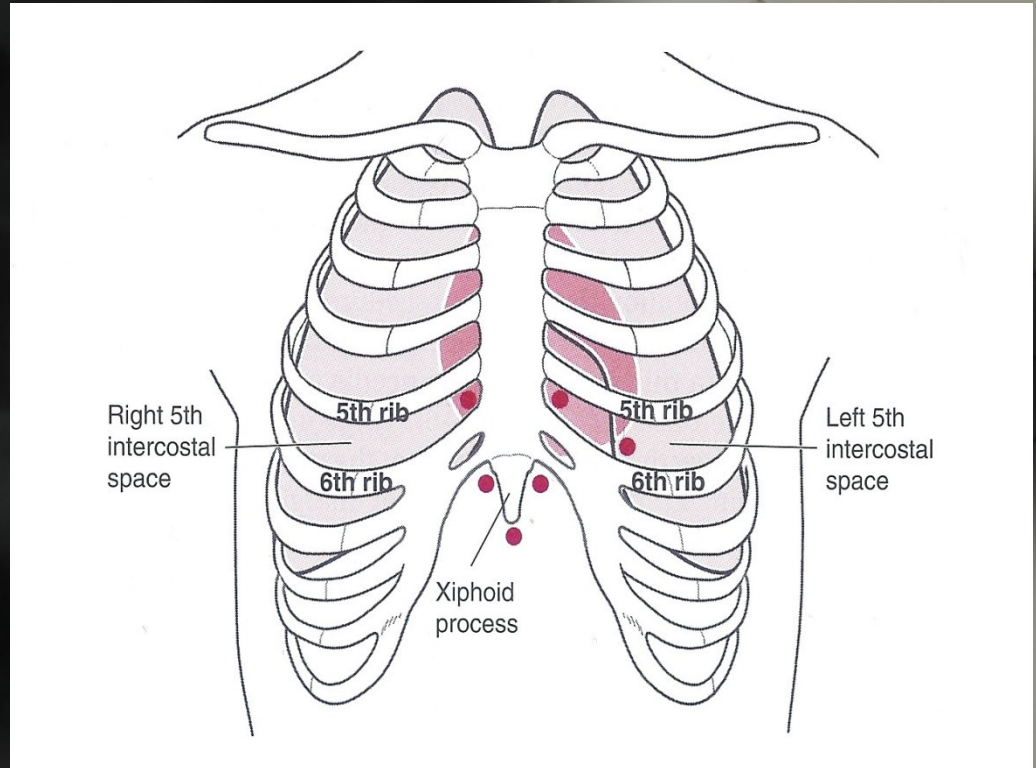
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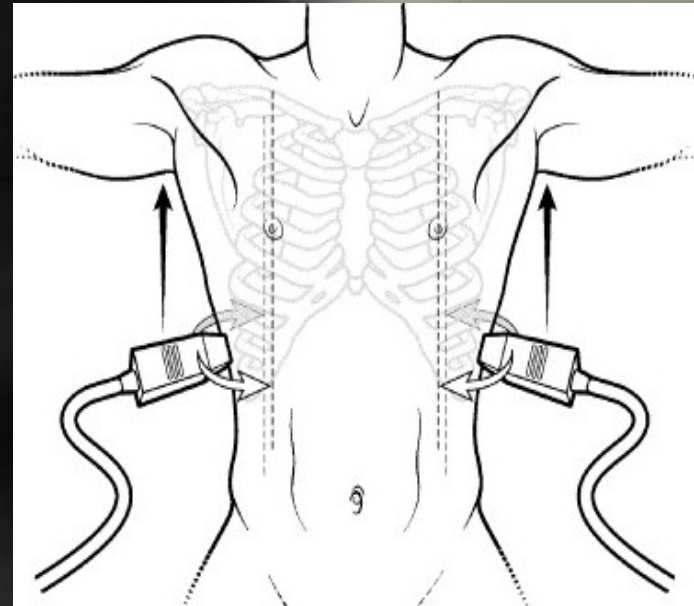
Probu tutan el, hastada sabitleniyor



Pericardiosynthesis

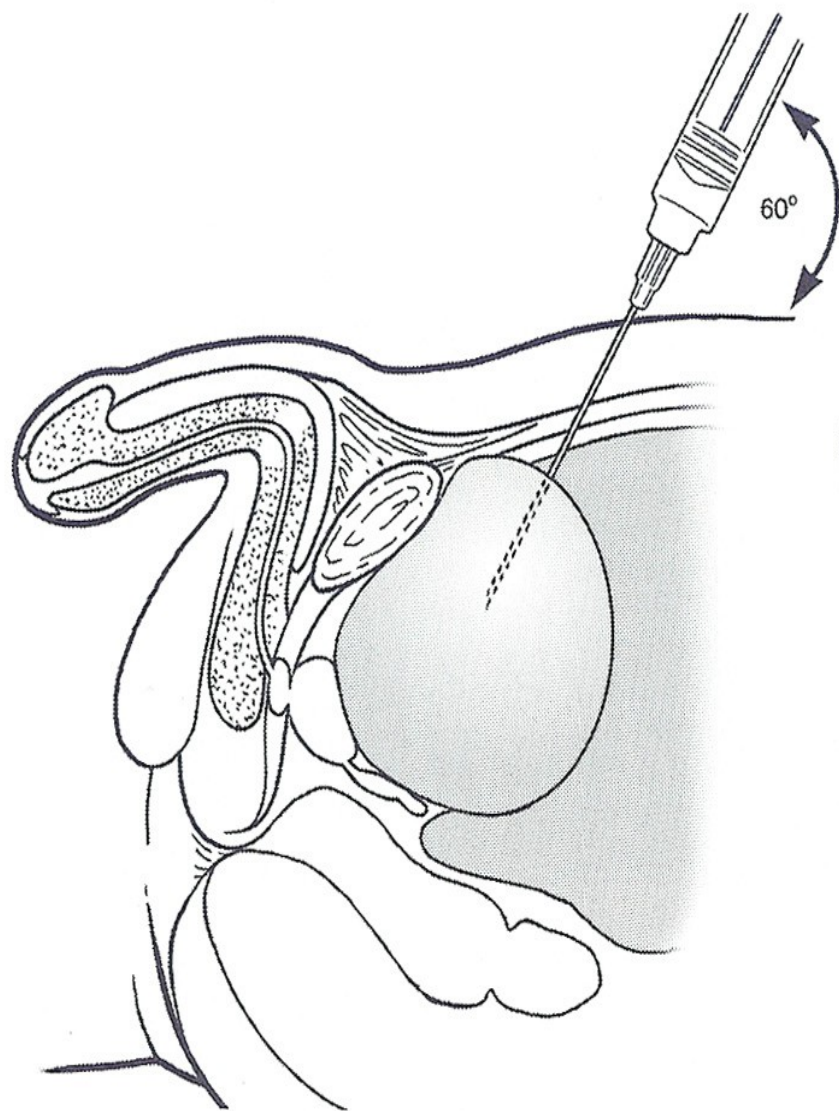
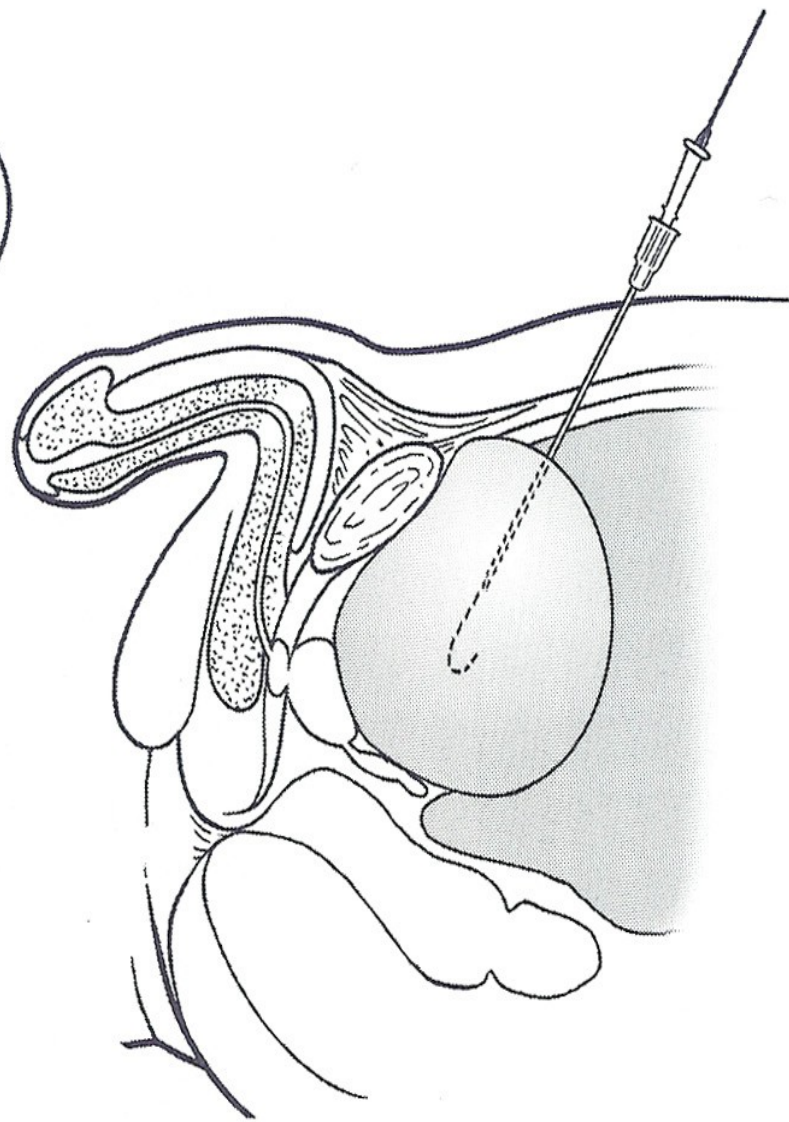


Pleural fluid and thoracentesis



Suprapubic Aspiration





Foreign Bodies

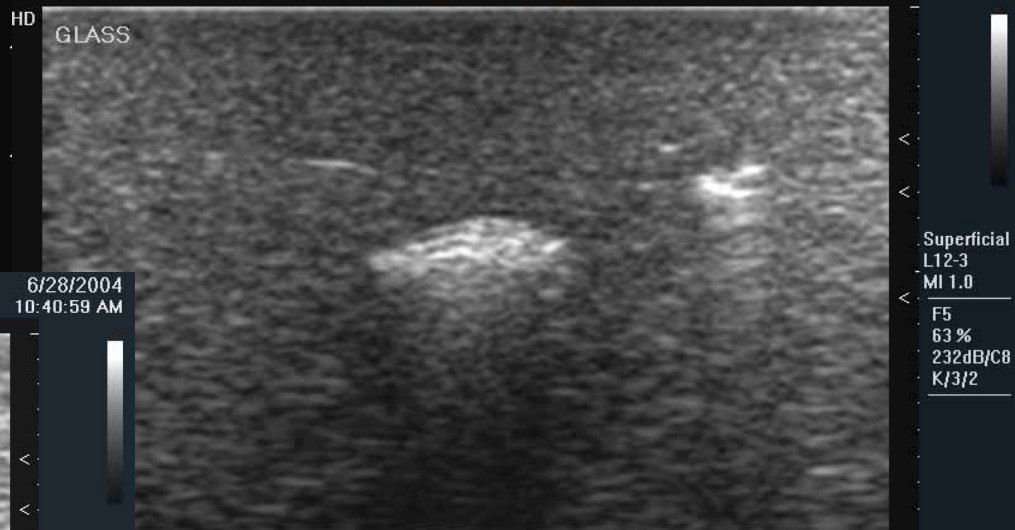
Blue Phantom Philips 6/28/2004 10:25:12 AM
Philips Medical Systems



Blue Phantom Philips 6/28/2004 10:40:59 AM
Philips Medical Systems



Blue Phantom Philips 6/28/2004 10:23:11 AM
Philips Medical Systems



Superficial
L12-3
MI 1.0
F5
63 %
232dB/C8
K/3/2

31 Hz
2 cm

Foreign Bodies



Pilot Study to Evaluate the Accuracy of Ultrasonography in Confirming Endotracheal Tube Placement

Ira L. Werner, MD, RDMS

Les E. Smith, MD

Erica R. Goldstein, MD

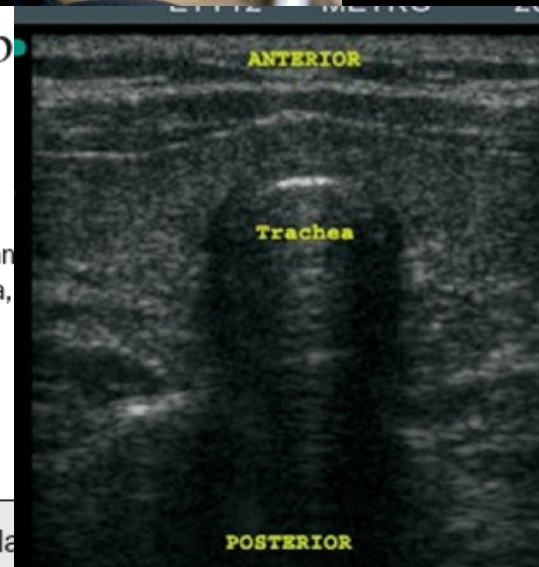
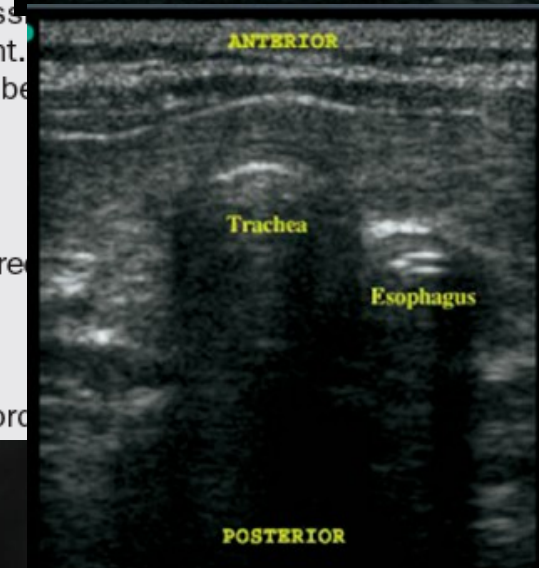
Robert A. Jones, DO, RDMS

Robert K. Cydulka, MD, MS

From the Department of Emergency Medicine, MetroHealth Medical Center/Cleveland Foundation (Werner, Goldstein, Jones, Cydulka), and the Department of Anesthesia, MetroHealth Medical Center (Smith), Cleveland, OH.

Study objective: Visualization of the vocal cords and end-tidal capnography are the usual standards in confirming endotracheal tube placement. Vocal cord visualization is, however, not always possible, and capnography is not 100% reliable and requires ventilation of the lungs to confirm placement. The goal of this study is to determine the accuracy of ultrasonography for detecting endotracheal tube placement into the trachea and esophagus in real time.

Methods: This was a prospective, randomized, controlled study. Eligible patients were adults undergoing elective surgery requiring intubation. Exclusion criteria were a history of difficult intubation, abnormal airway anatomy, aspiration risk factors, and esophageal disease. Thirty-three patients were enrolled. After induction of anesthesia and neuromuscular blockade, the anesthesiologist placed the endotracheal tube in the trachea and esophagus in random order with direct laryngoscopy. During the intubations, a high-frequency, linear transducer was placed transversely on the neck at the suprasternal notch. Two emergency physicians, blinded to the or



Confirmation of Endotracheal Tube Placement after Intubation Using the Ultrasound Sliding Lung Sign

Blake Weaver, DO, Matthew Lyon, MD, RDMS, Michael Blaivas, MD, RDMS

Abstract

Objectives: To evaluate the performance of the ultrasound (US) *sliding lung sign* as a predictor of endotracheal tube (ETT) placement. Many other tools and examination findings have been used to confirm ETT placement; erroneous placement of the ETT has even been confirmed by US.

Methods: This was a laboratory study using fresh, recently dead cadavers. Cadavers were obtained at a medical school anatomy laboratory on the basis of availability during a four-month period. Subjects who died from significant trauma or after thoracic surgery were excluded. A numerical randomization tool was used to direct where the tube would be placed on intubation. Laryngoscopy was performed, and

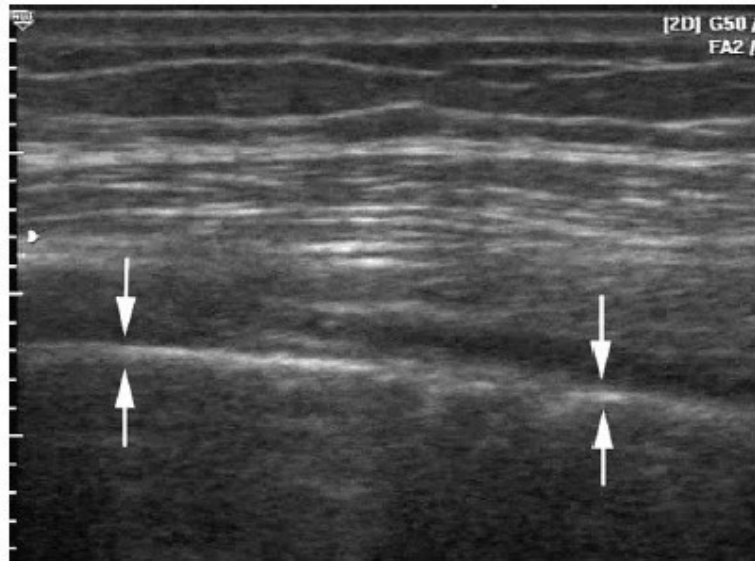
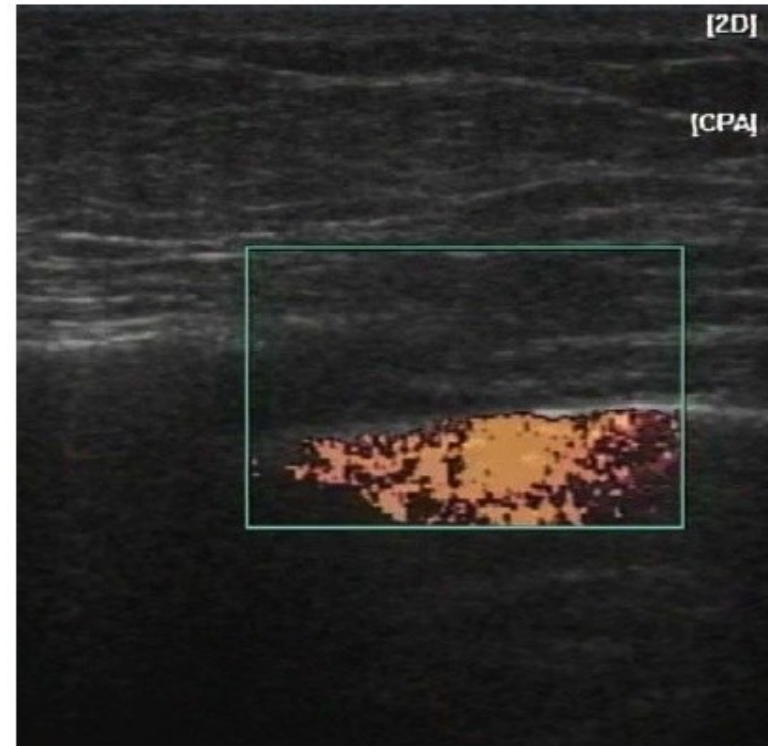
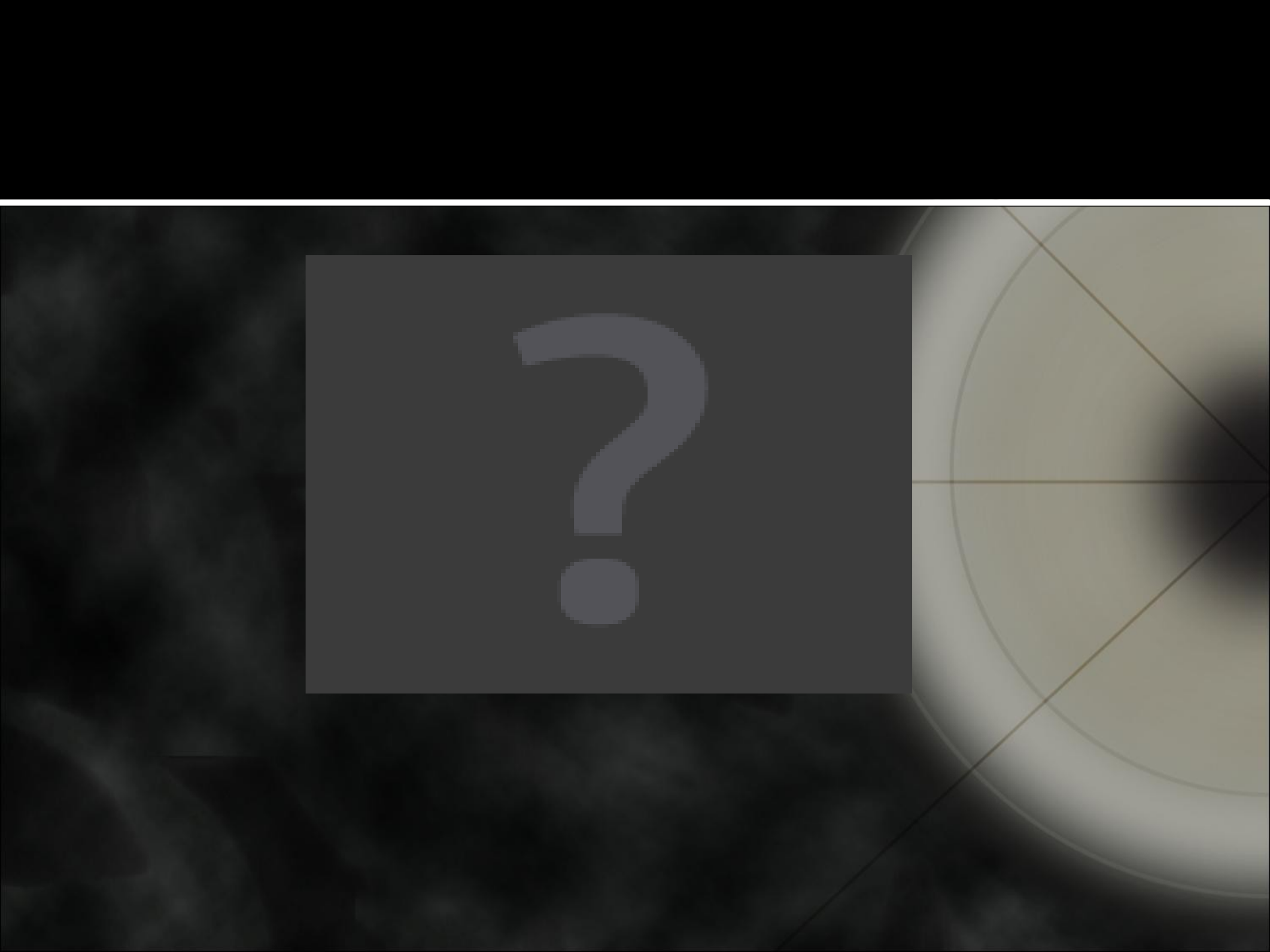


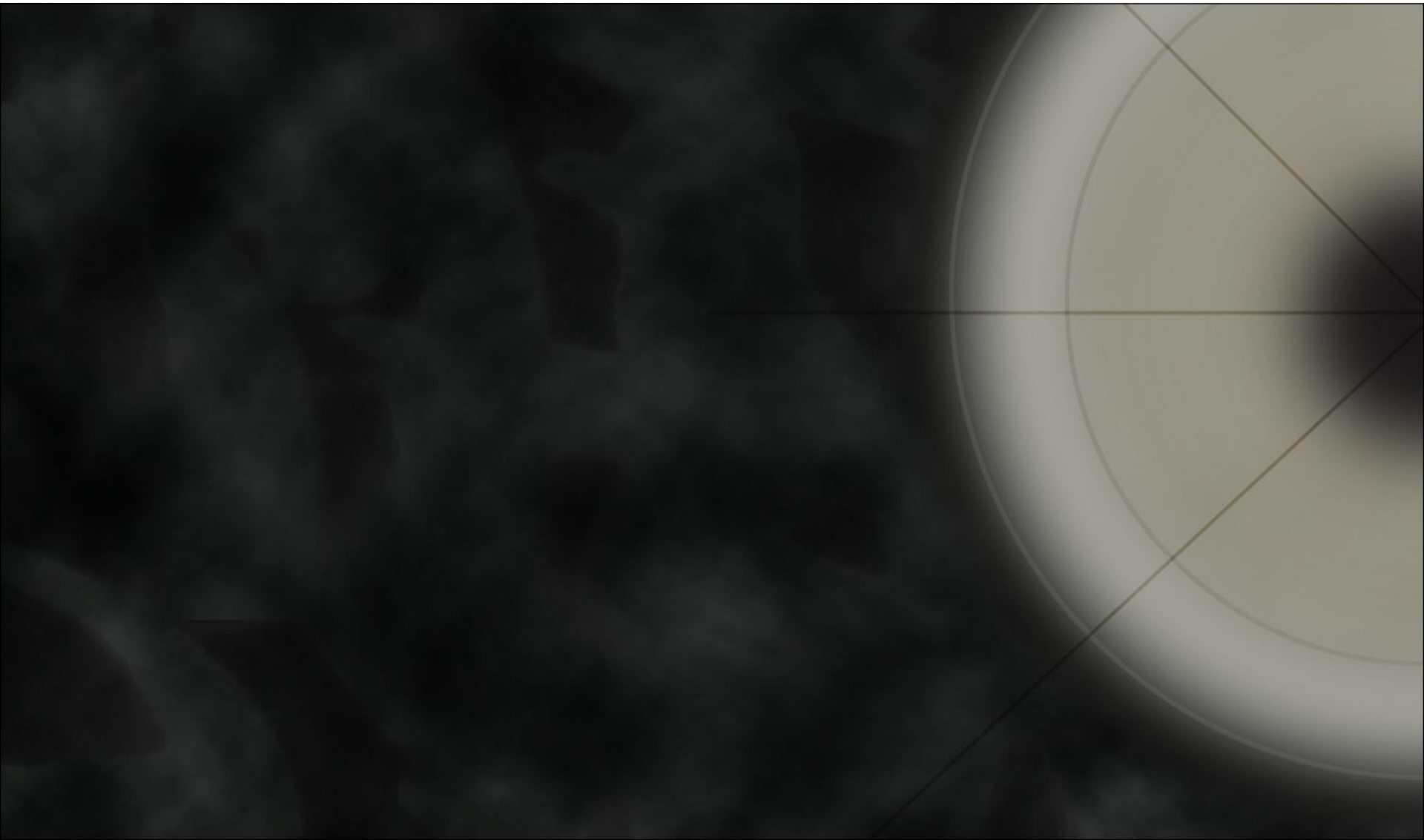
Figure 2. The bright interfaces of the parietal and visceral pleura are seen (arrows).

presence on both sides of the chest was assumed to sig-





OTHERS



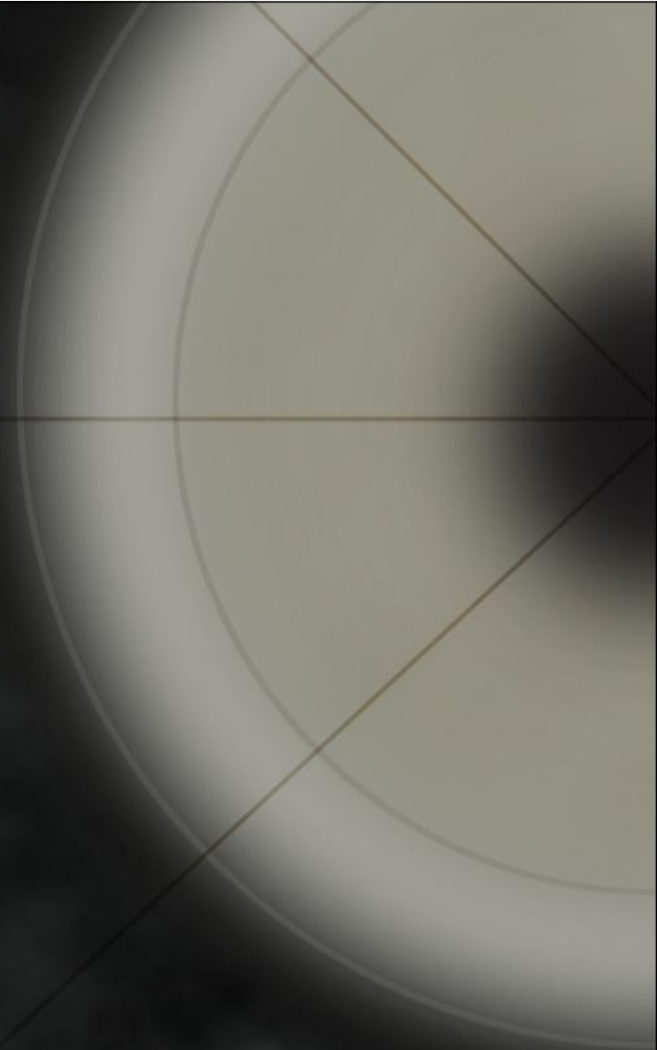
Obstetrics/Gynecology

- Abdominal pain or vaginal bleeding (important for pregnancy)
- IU pregnancy or pelvic free fluid



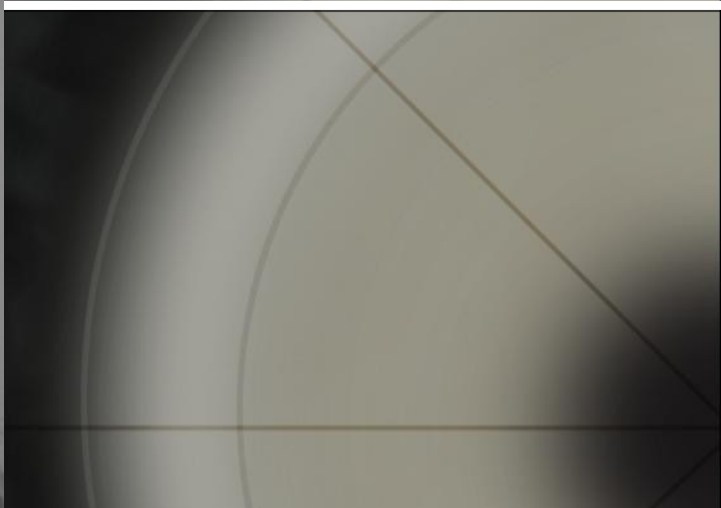
Ophthalmology

- Retinal detachment
 - Vitreous hemorrhage
 - Ocular foreign body
 - Globe penetration
 - Lens luxation
 - Retrobulbar hematoma
-
- Optik nerve sheath diameter
- May 2009 CPT Assistant (Volume 19 Issue 5)





Ophthalmology

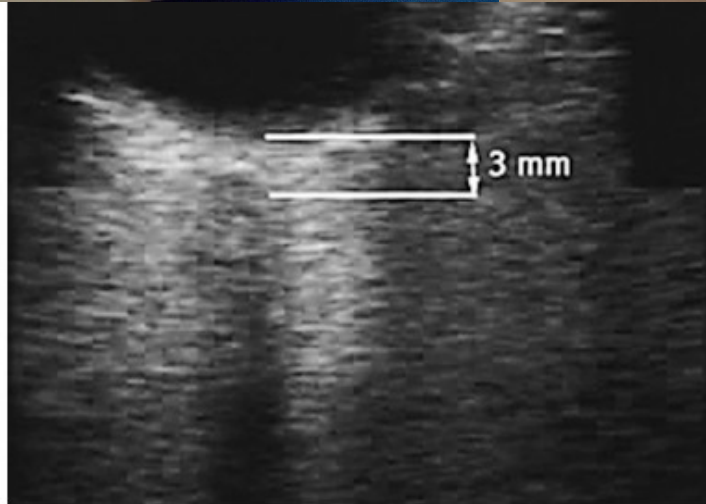
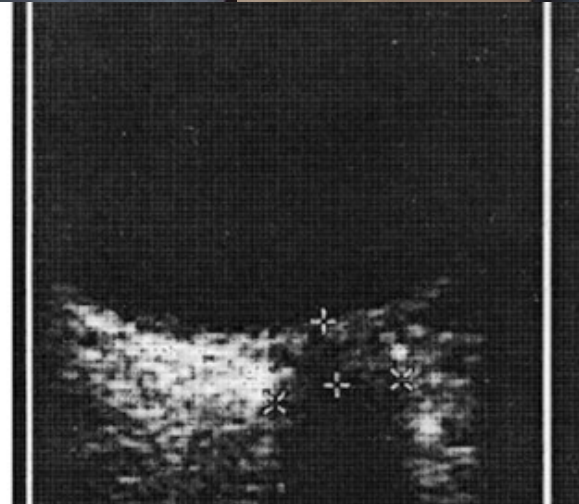




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The role of optic nerve ultrasonography in the diagnosis of elevated intracranial pressure

Abdullah Sadik Girisgin, Erdal Kalkan, Sedat Kocak, Basar Cander, Mehmet Gul, Mustafa Semiz

Emerg Med J 2007;**24**:251-254. doi: 10.1136/emj.2006.040931

Objective: To evaluate the convenience and utility of optic nerve ultrasonography (ONUS) in the evaluation of emergency patients with elevated intracranial pressure (EICP) due to traumatic or non-traumatic causes.
Methods: This study was conducted between May 2005 and December 2005 in the emergency department of



A

B



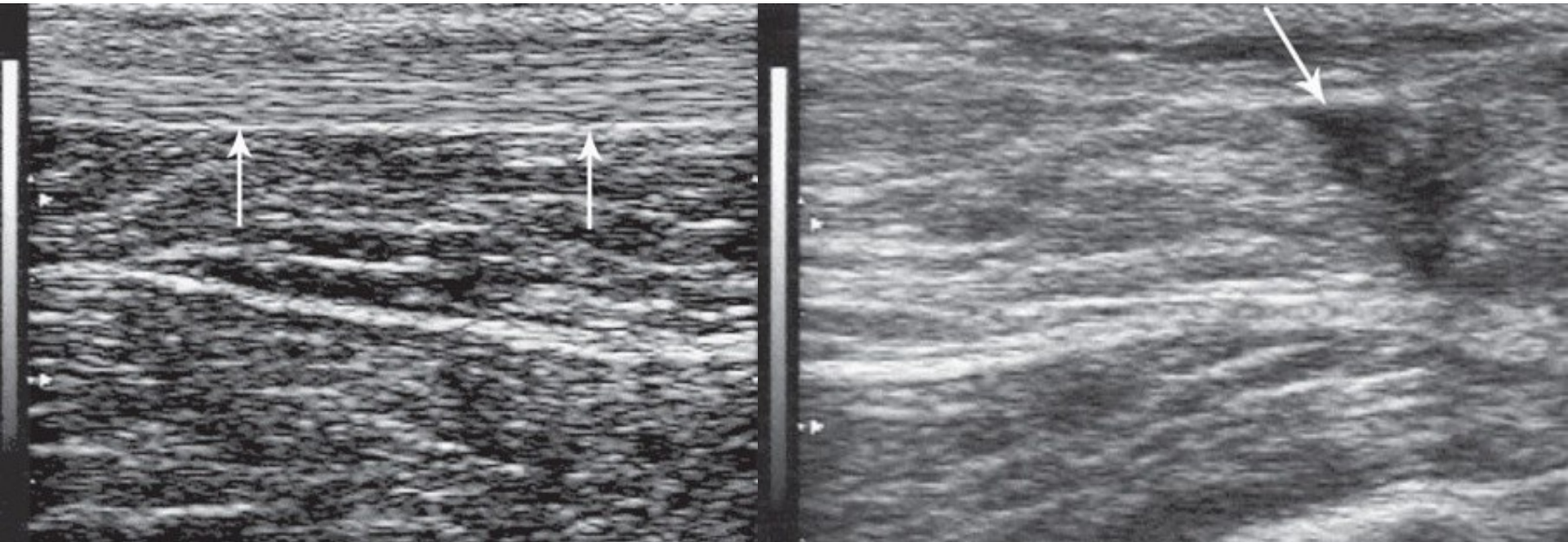
Soft tissue infection



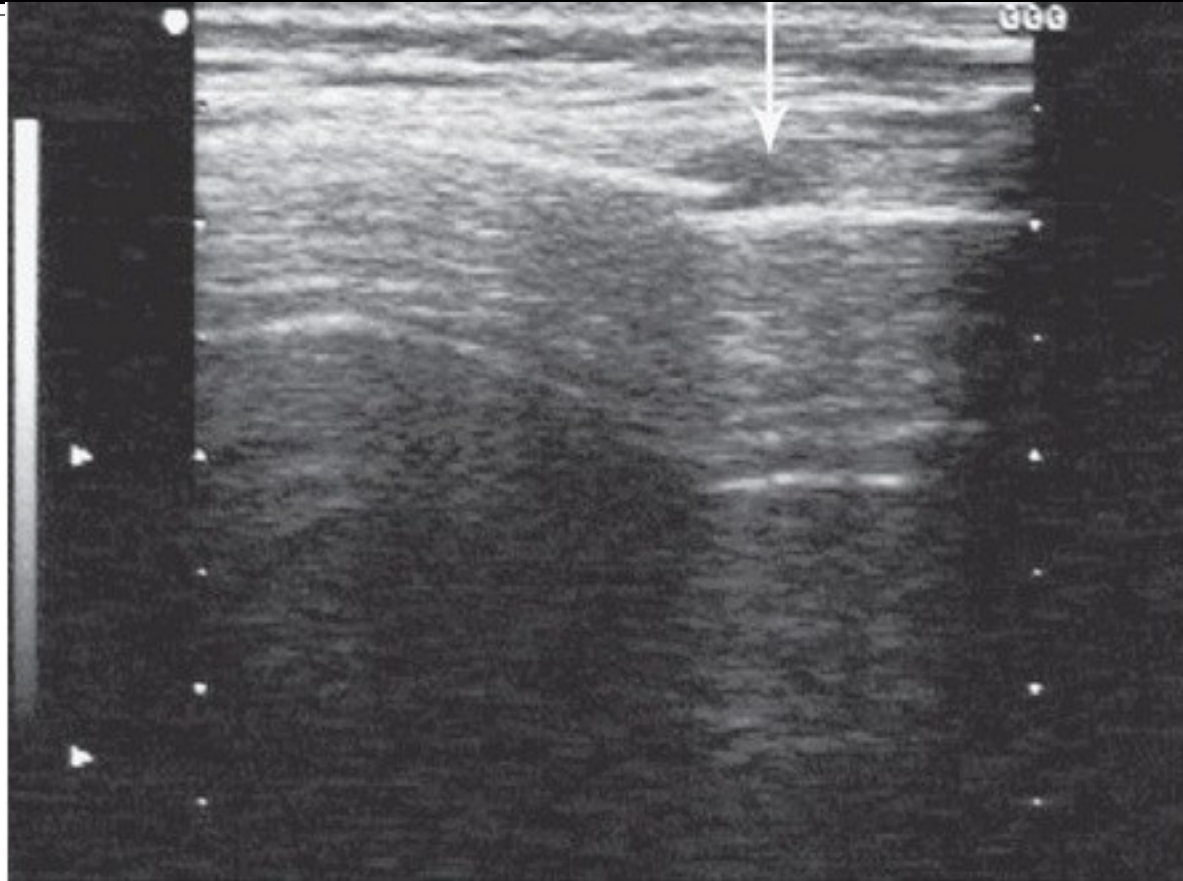
Sinusitis



Tendon Rupture

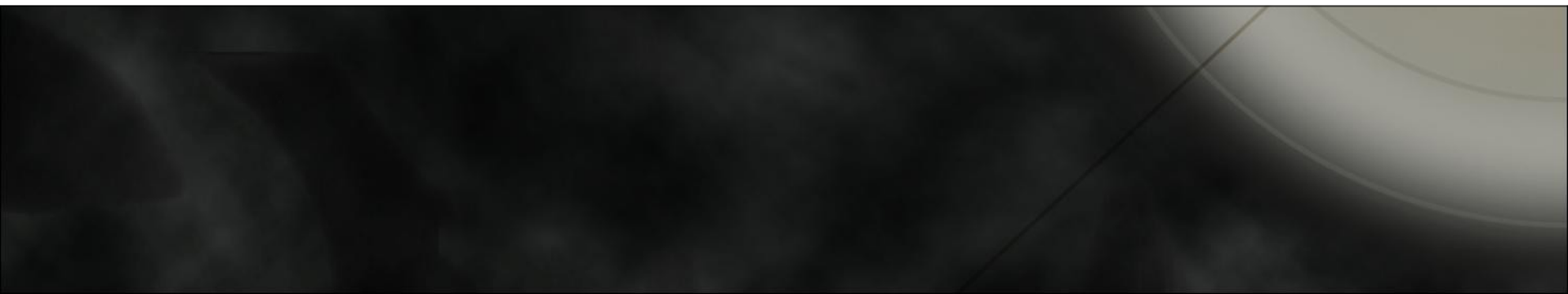


Sternum Fracture

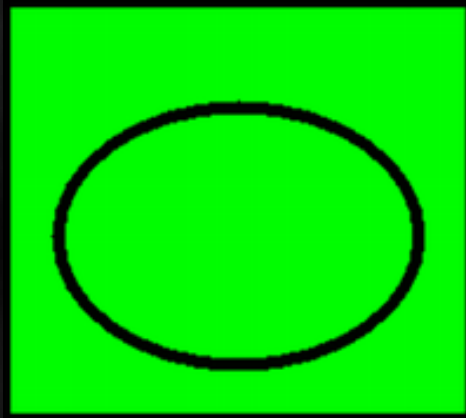
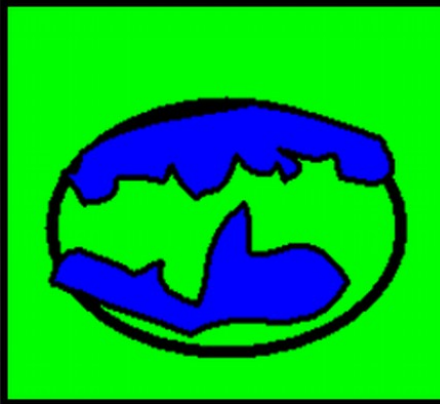
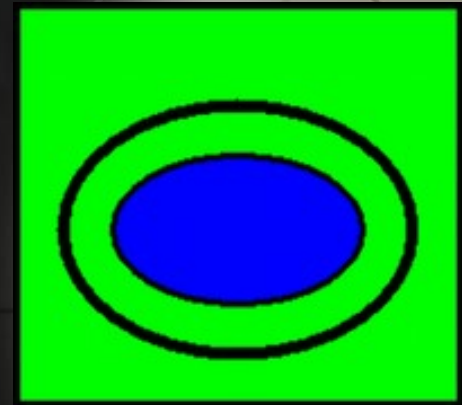
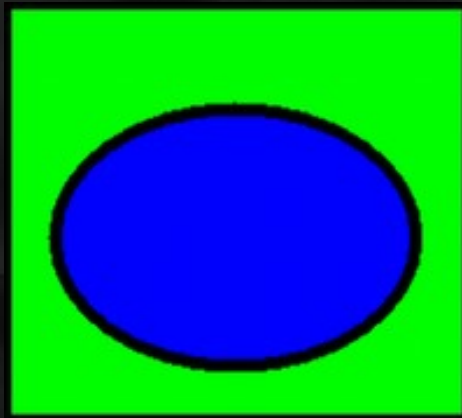
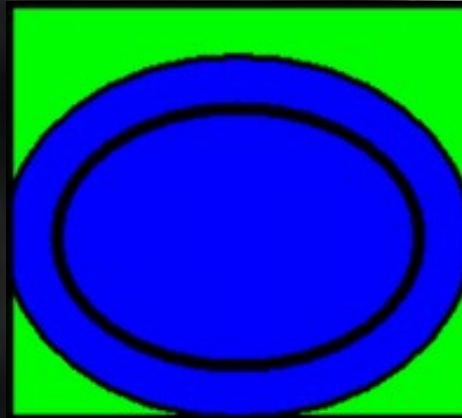




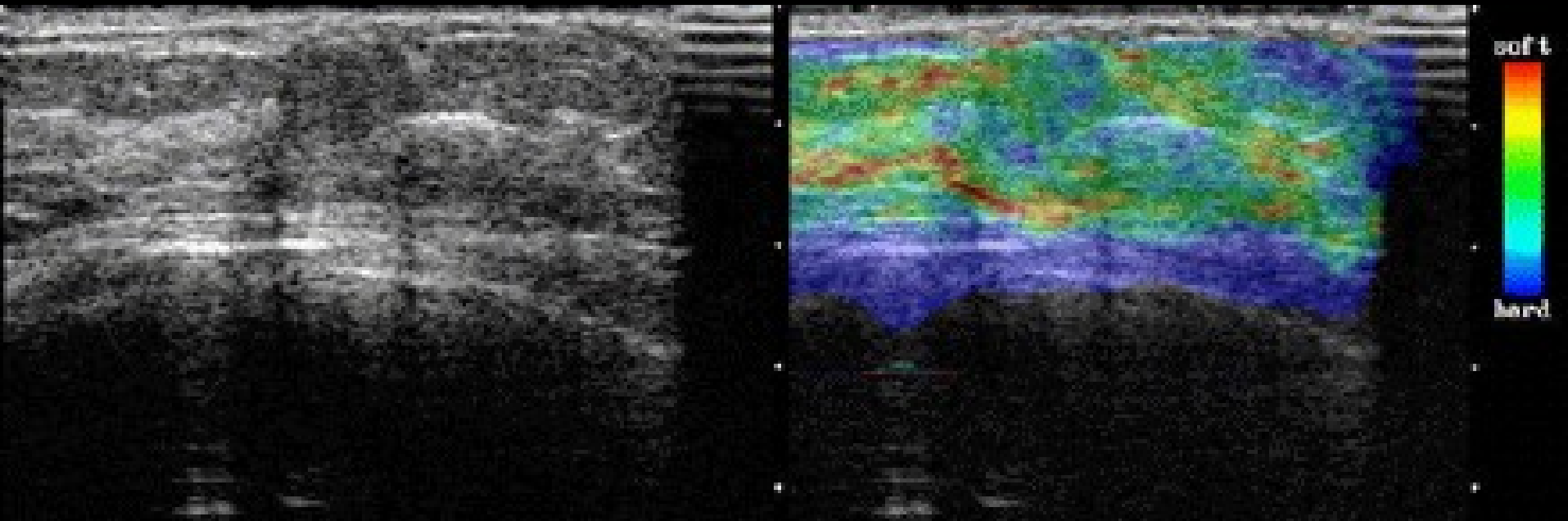
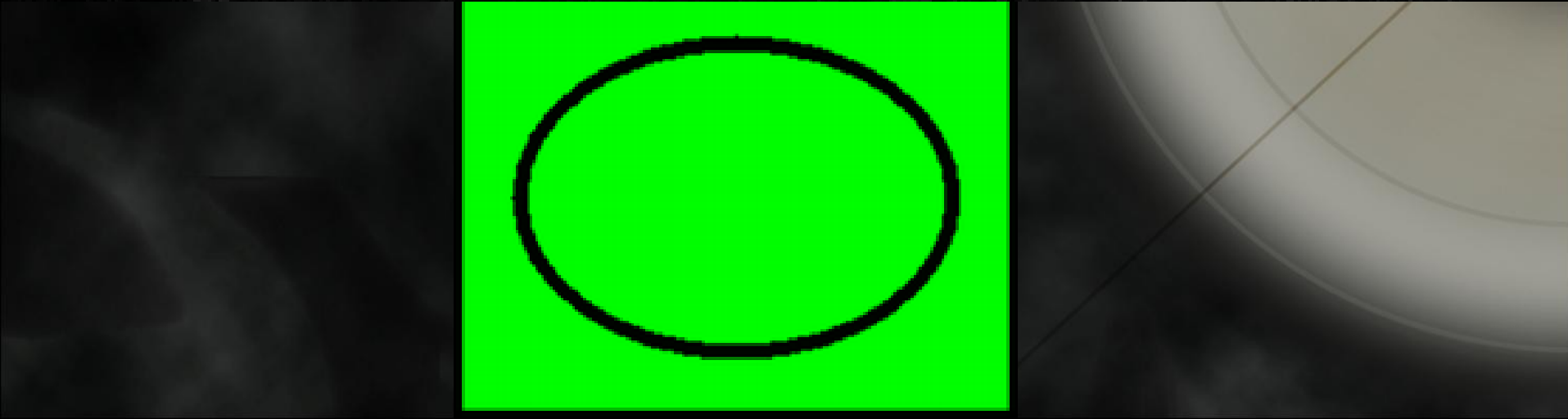
US Elastography



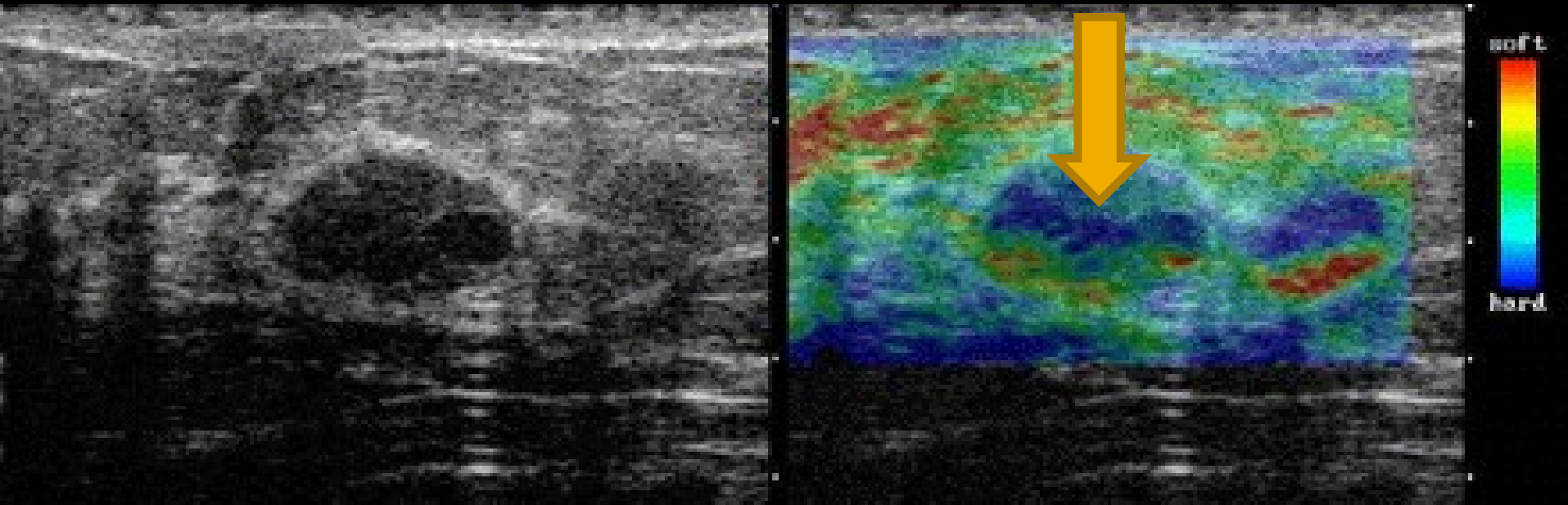
Elasticity Score



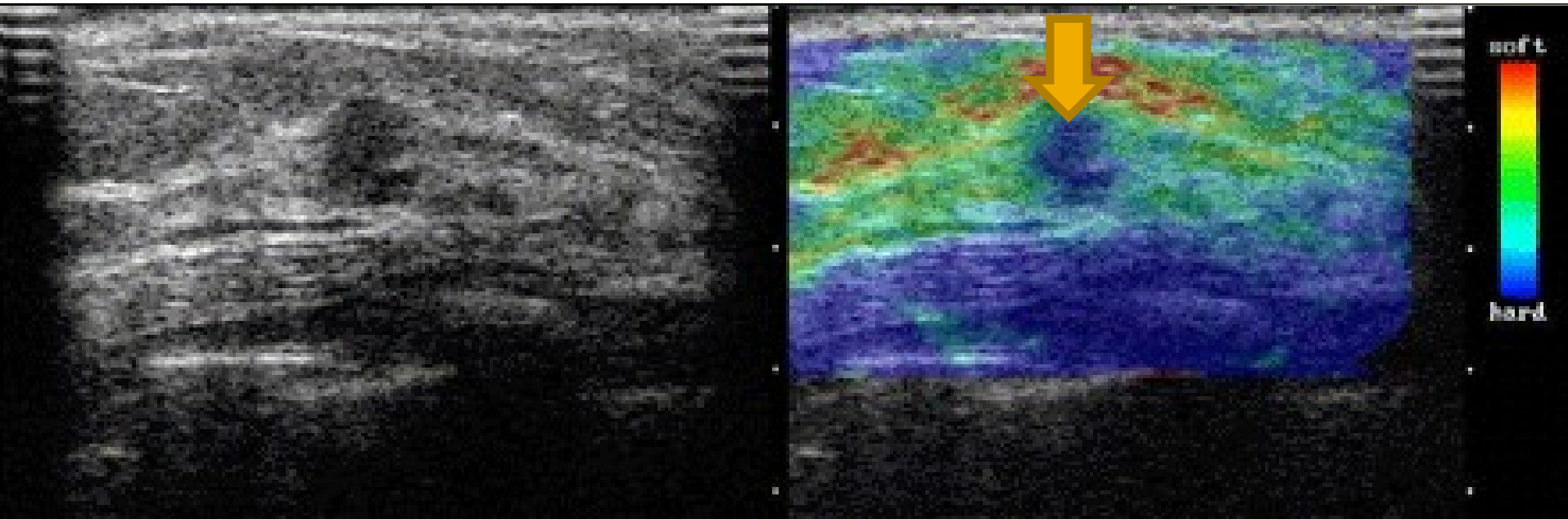
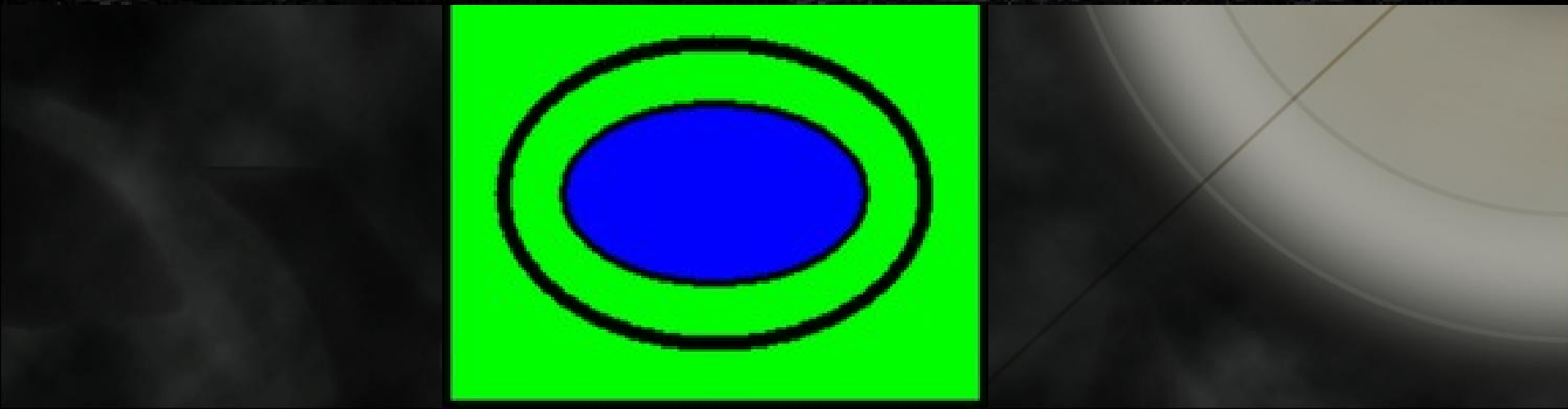
Elasticity Score 1



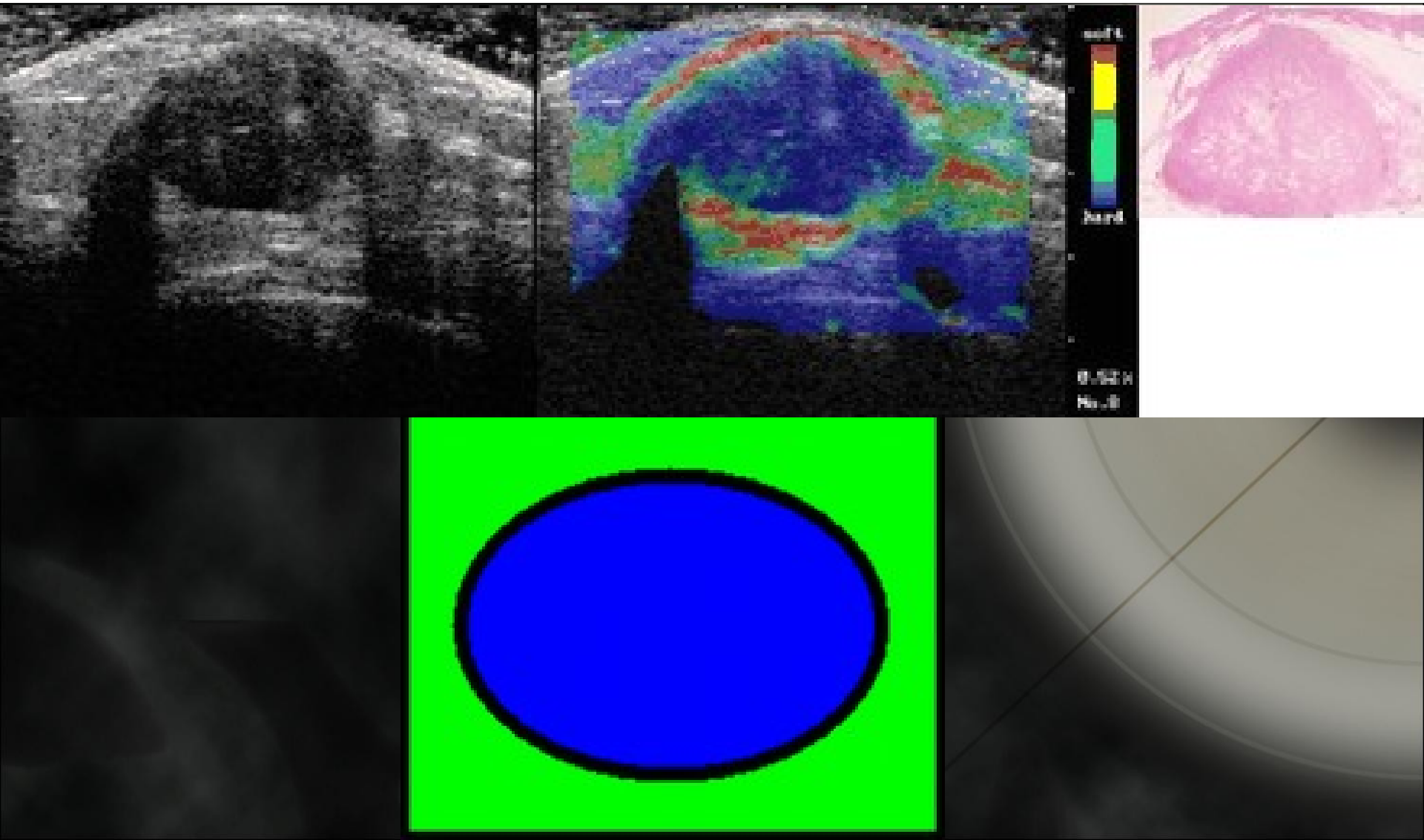
Elasticity Score 2



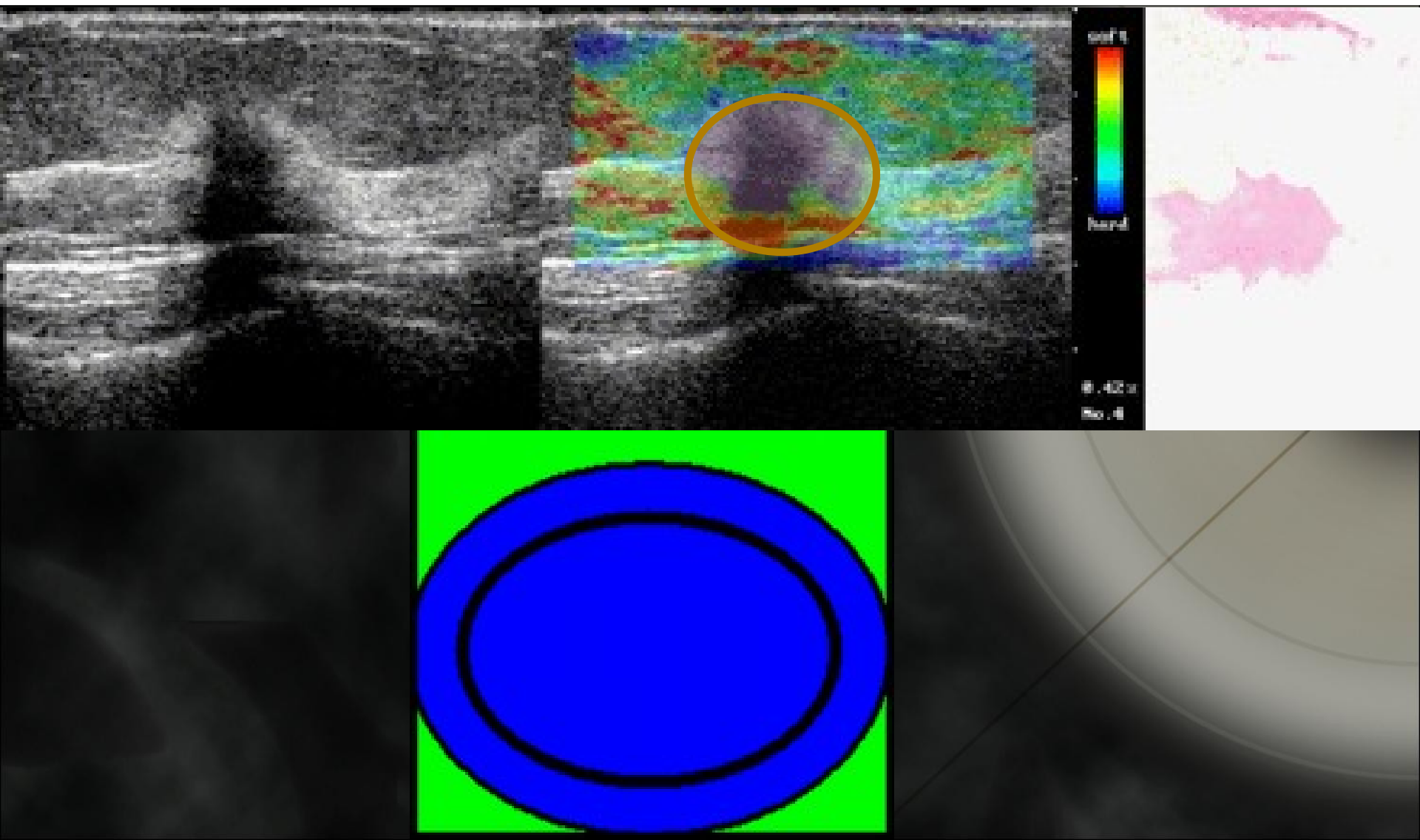
Elasticity Score 3



Elasticity Score 4



Elasticity Score 5



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