

# ACİL SERVİSTE ULTRASONOGRAFİ KULLANIMI

DOÇ. DR. SADIK GİRİŞGİN

*Necmettin Erbakan Üniversitesi Meram Tıp Fakültesi Acil Tıp Anabilim Dalı  
Taksim Gazi Osman Paşa Eğitim Araştırma Hastanesi Acil Tıp Kliniği*

# ACİL SERVİS İÇİN EN UYGUN CİHAZI

Hayal Edelim .....



# Ultrasonography

- Portable
- Probe çeşitliliği
- Real time görüntü
- No radiation
- Tekrar edilebilir
- Cost effective .....



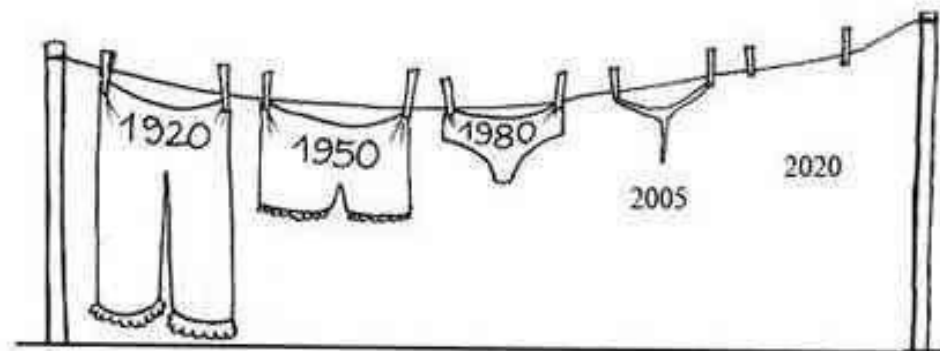




# TARİHÇE



e-yolla.com





# USG CİHAZ



# ACİLE ÖZEL CİHAZLAR





# ACİLE ÖZEL CİHAZLAR

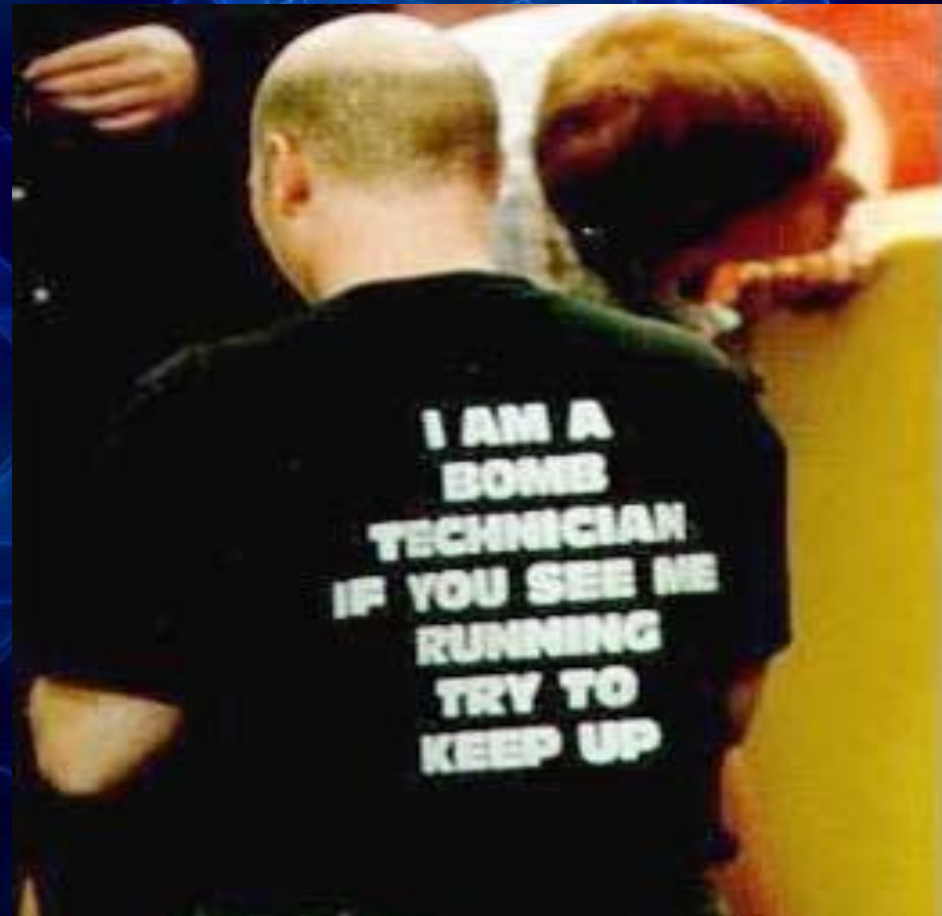


# Eğitim



# Best Education Method

TO SIT AND  
PRACTICE  
WITH  
AN EXPERIENCED  
SONOLOGIST







American College of  
Emergency Physicians®

ADVANCING EMERGENCY CARE 

# POLICY STATEMENT

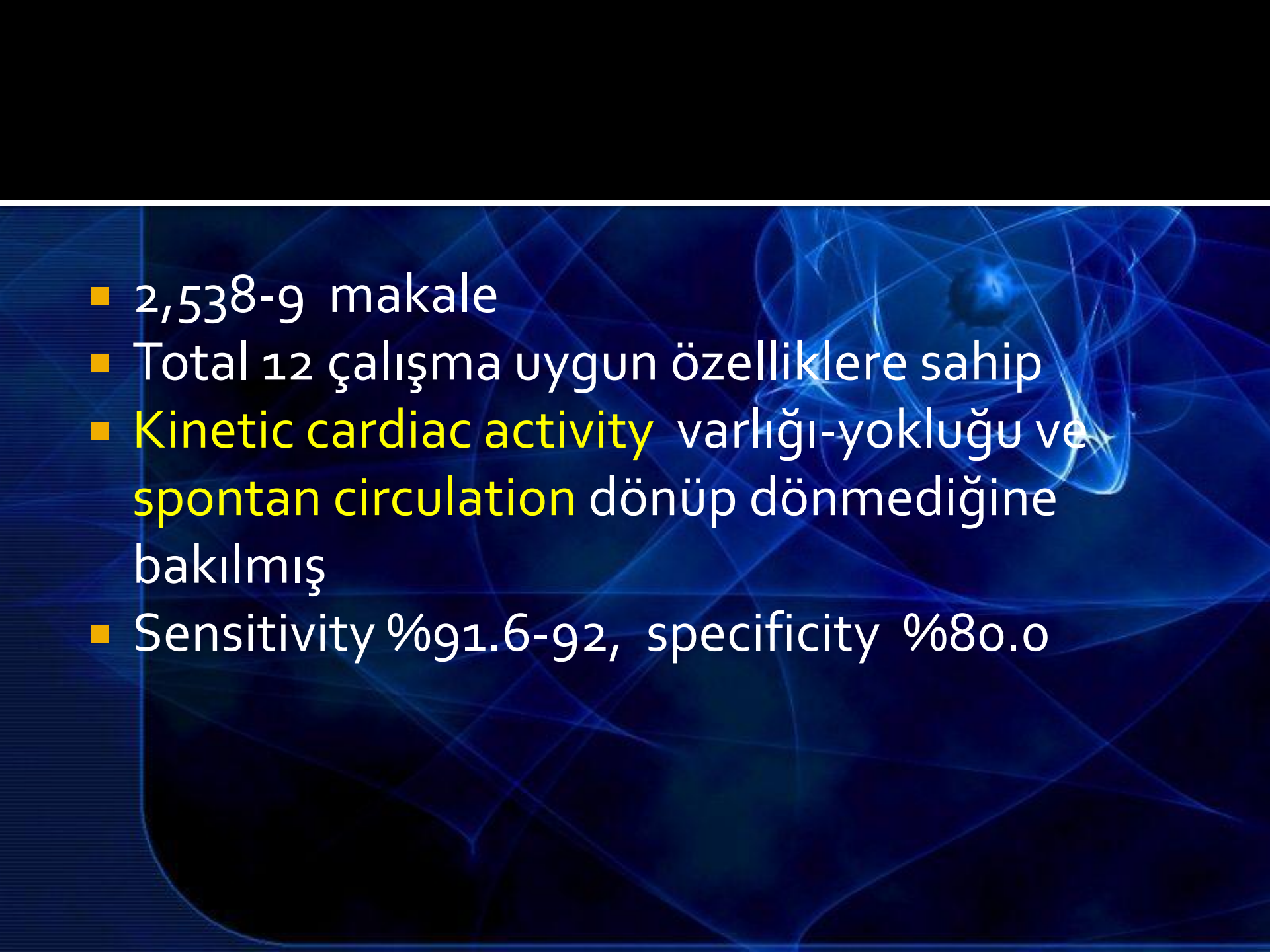
Approved October 2008

## *Emergency Ultrasound Guidelines*

Emergency ultrasound can be classified into the following functional clinical categories:

1. *Resuscitative*: ultrasound use as directly related to an acute resuscitation
2. *Diagnostic*: ultrasound utilized in an emergent diagnostic imaging capacity
3. *Symptom or sign-based*: ultrasound used in a clinical pathway based upon the patient's symptom or sign (eg, shortness of breath)
4. *Procedure guidance*: ultrasound used as an aid to guide a procedure
5. *Therapeutic and Monitoring*: ultrasound use in therapeutics or in physiological monitoring



- 
- 2,538-9 makale
  - Total 12 çalışma uygun özelliklere sahip
  - **Kinetic cardiac activity** varlığı-yokluğu ve **spontan circulation** dönüp dönmediğine bakılmış
  - Sensitivity %91.6-92, specificity %80.0

# FAST

Focused Assessment with Sonography for Trauma



# FAST

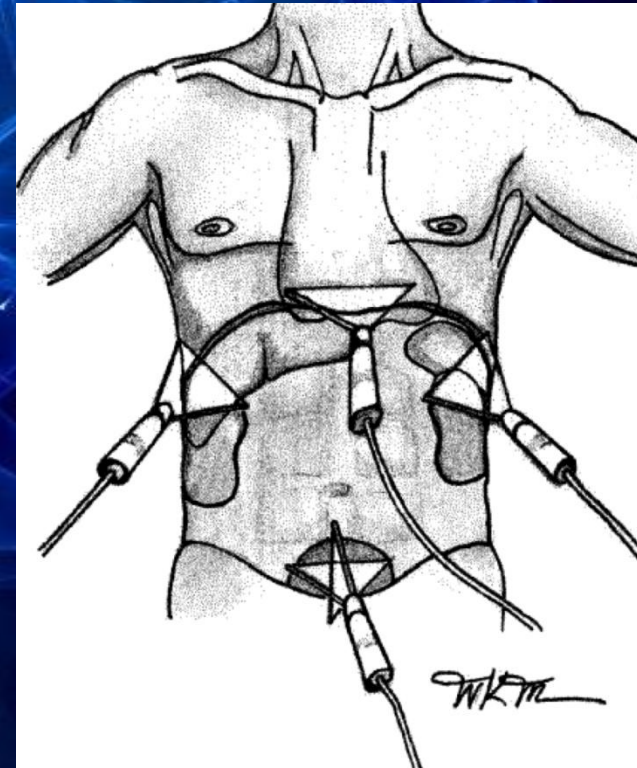
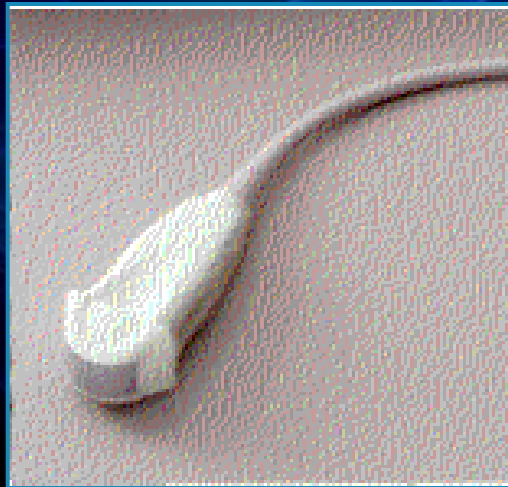
- Focused Abdominal Sonography for Trauma
- Focused **Assessment** with Sonography for Trauma

HEDEF:

- Intraperitoneal, Intrathoracic, pericardial  
SERBEST SIVI ?

# FAST

- Perihepatic
- Cardiac
- Perisplenic
- Pelvic





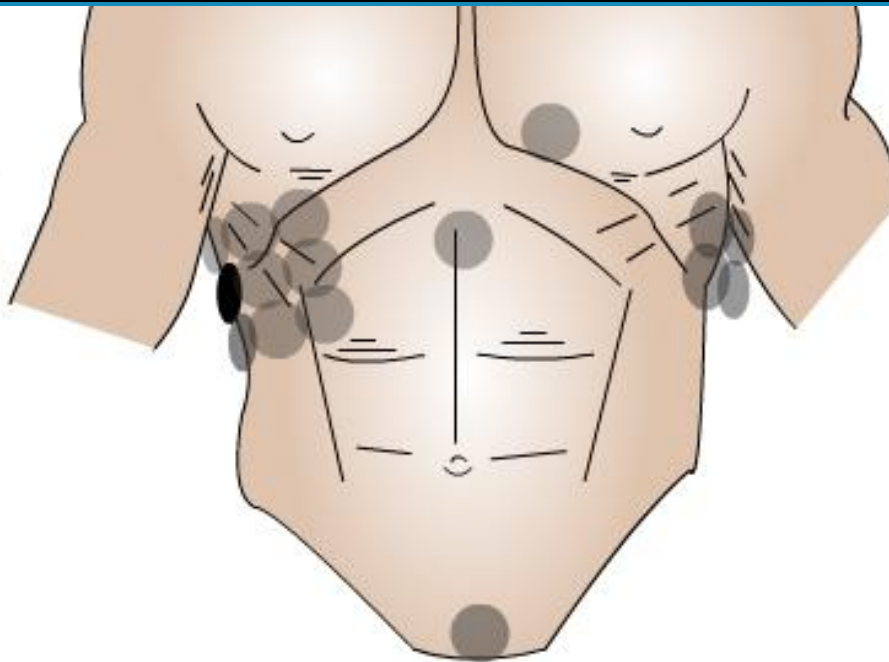
# Sağ üst – Perihepatic



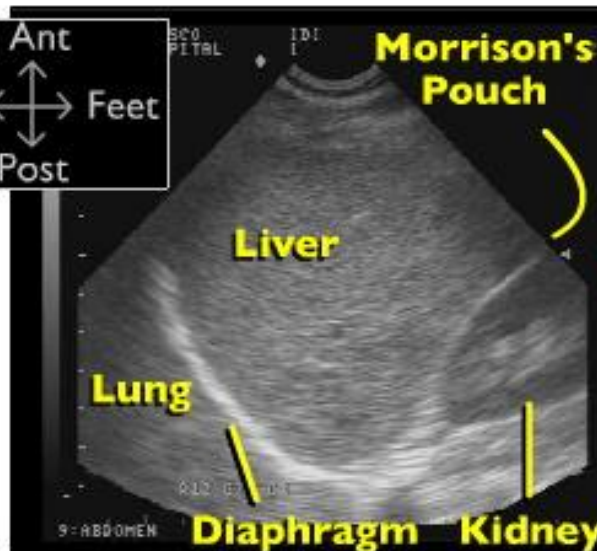
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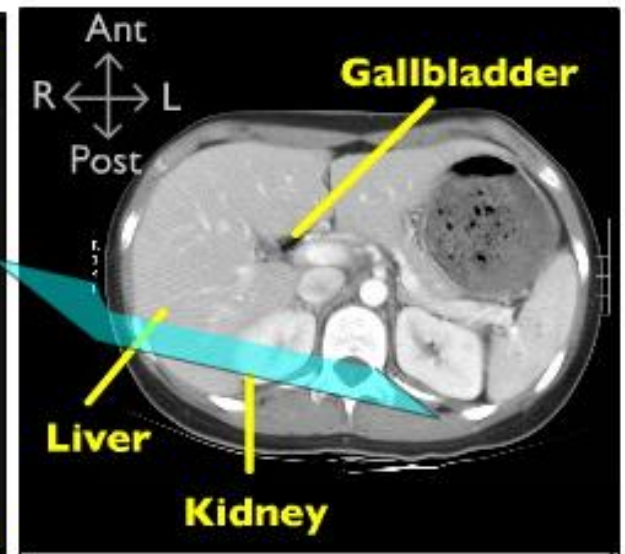
**Coronal view**



**Actual ultrasound image**



**Labeled ultrasound image**



**Cross-sectional CT anatomy**





# Left Upper - Perisplenic

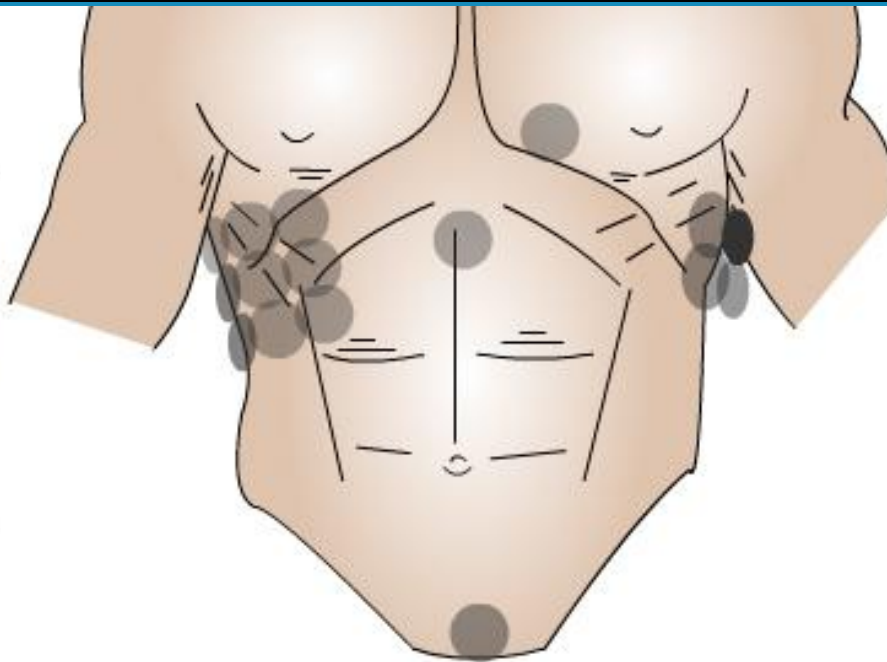




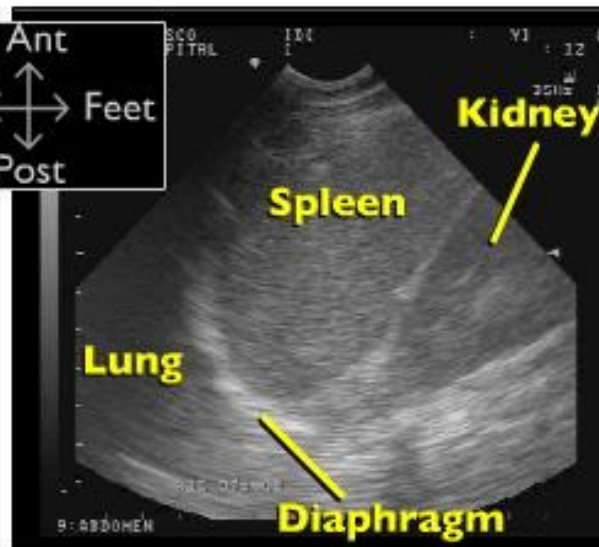
## Probe Orientation



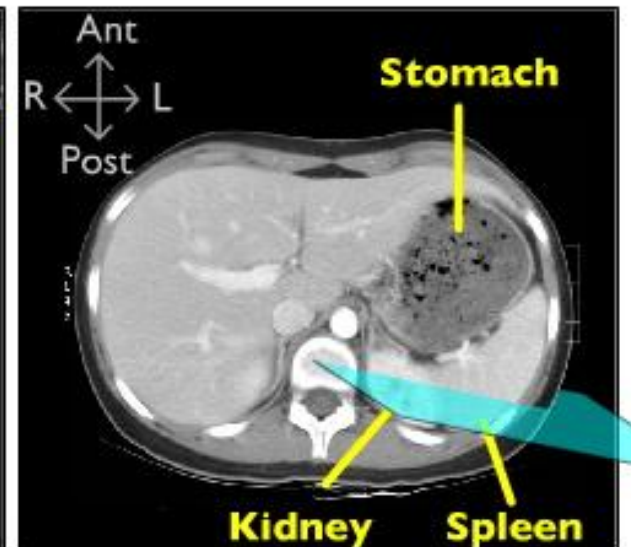
**Coronal view**



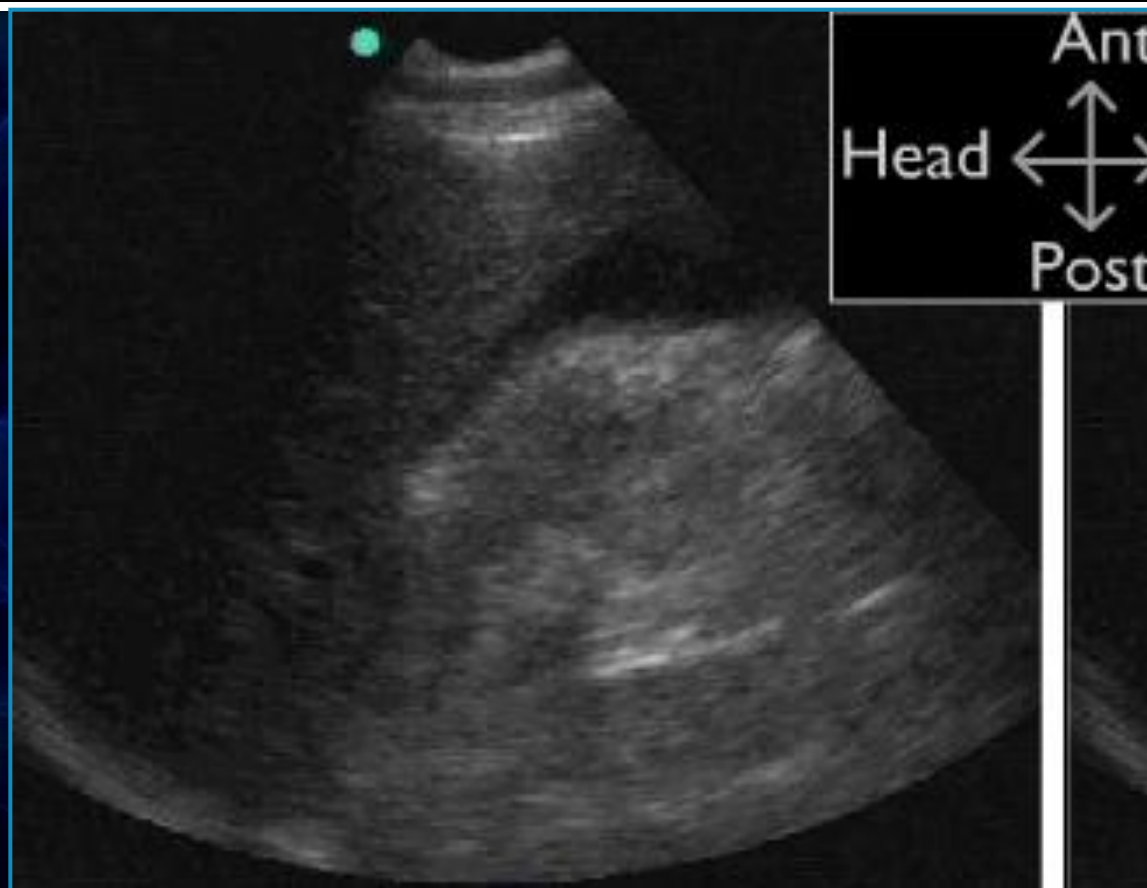
**Actual ultrasound image**



**Labeled ultrasound image**



**Cross-sectional CT anatomy**

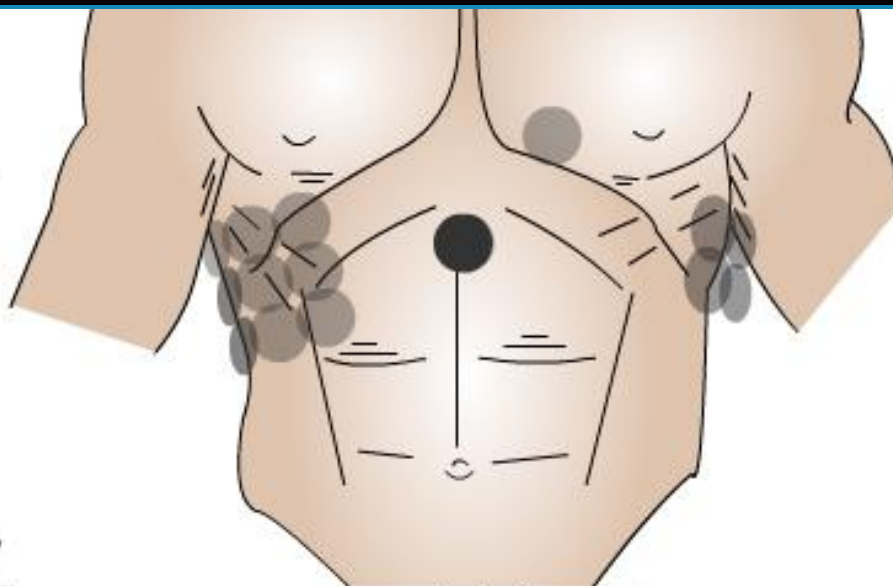


# Cardiac - subxyphoid

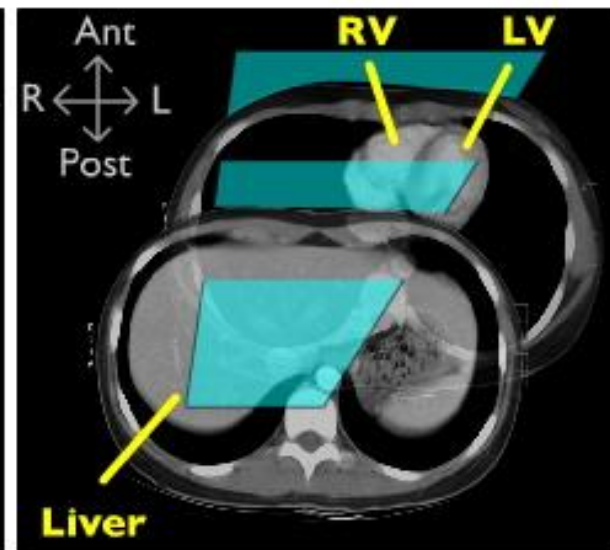
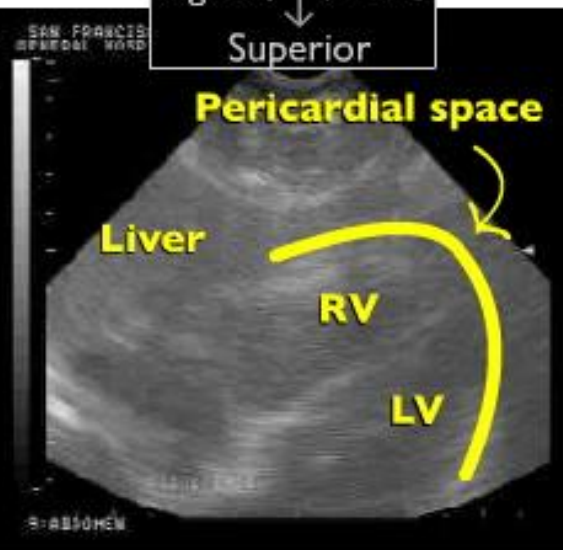
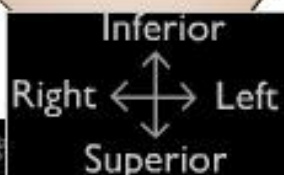




## Probe Orientation



## Subcostal coronal view



Actual ultrasound image

Labeled ultrasound image

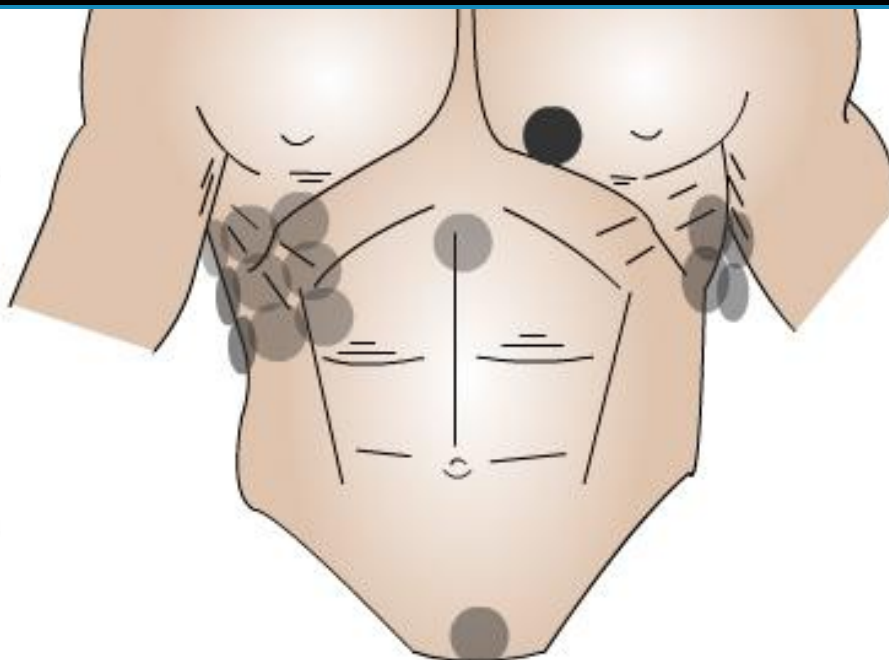
Cross-sectional CT anatomy



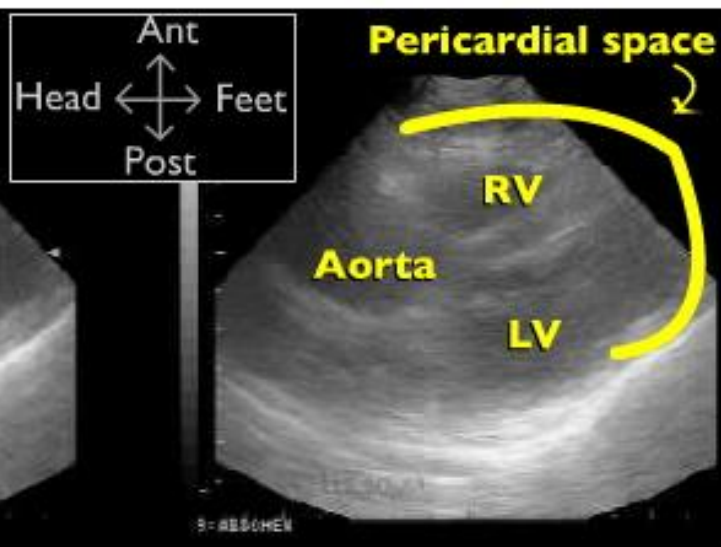
## Probe Orientation



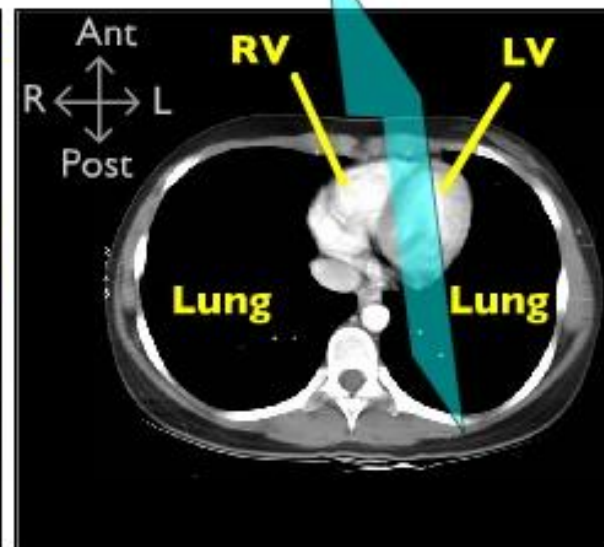
## Parasternal long axis view



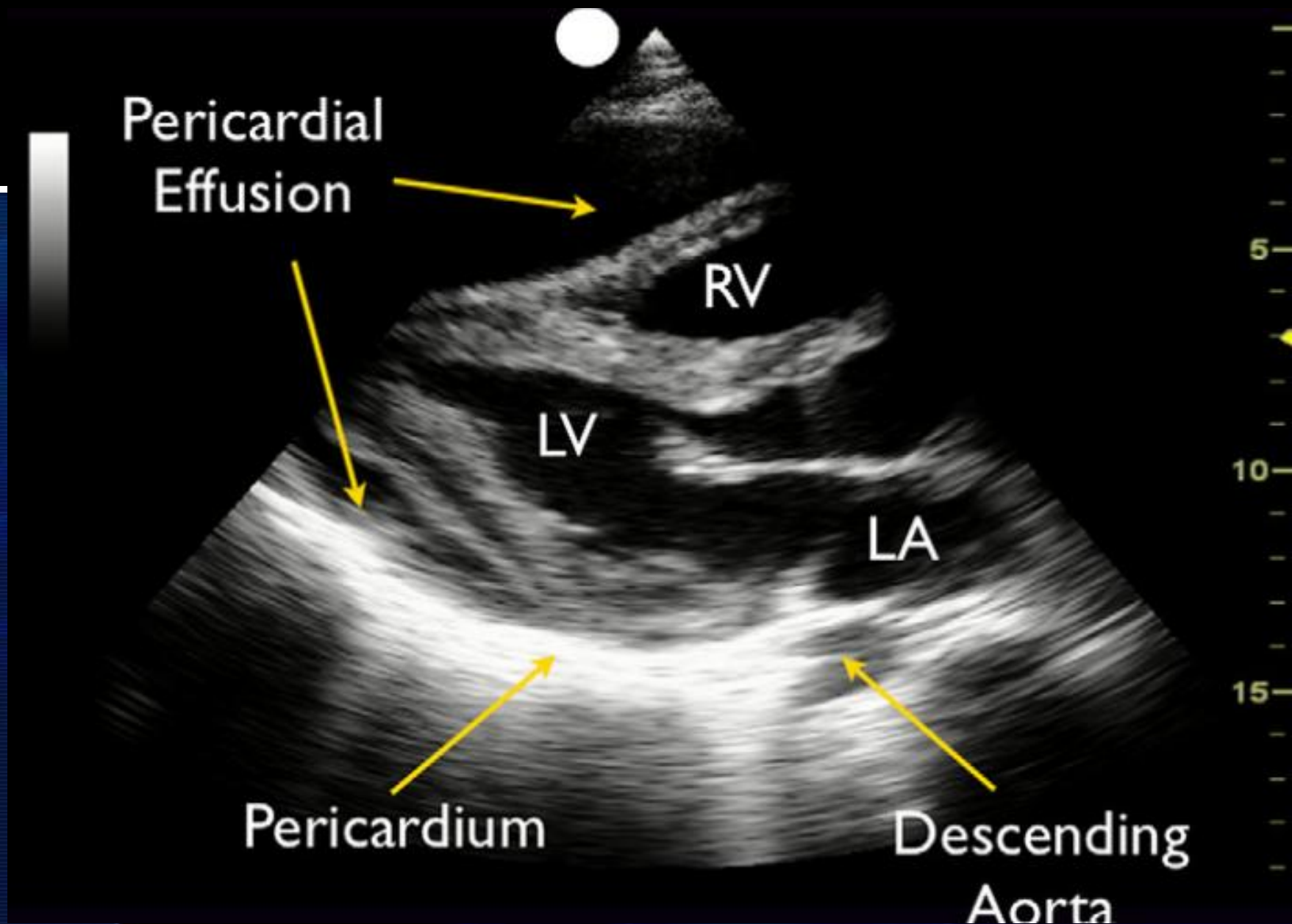
Actual ultrasound image



Labeled ultrasound image



Cross-sectional CT anatomy



# Pelvic - Suprapubic



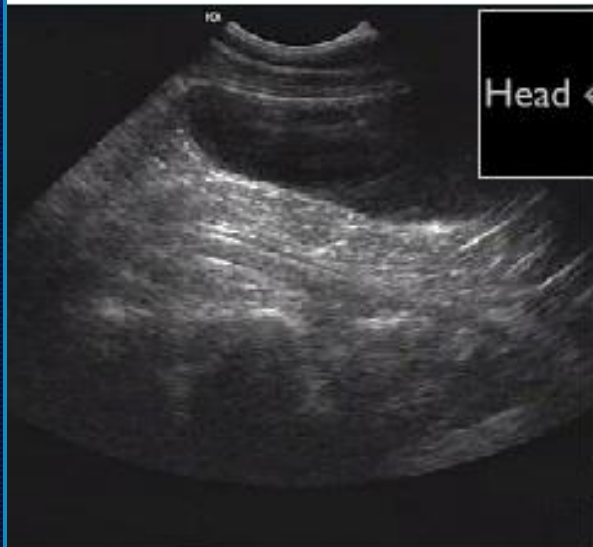
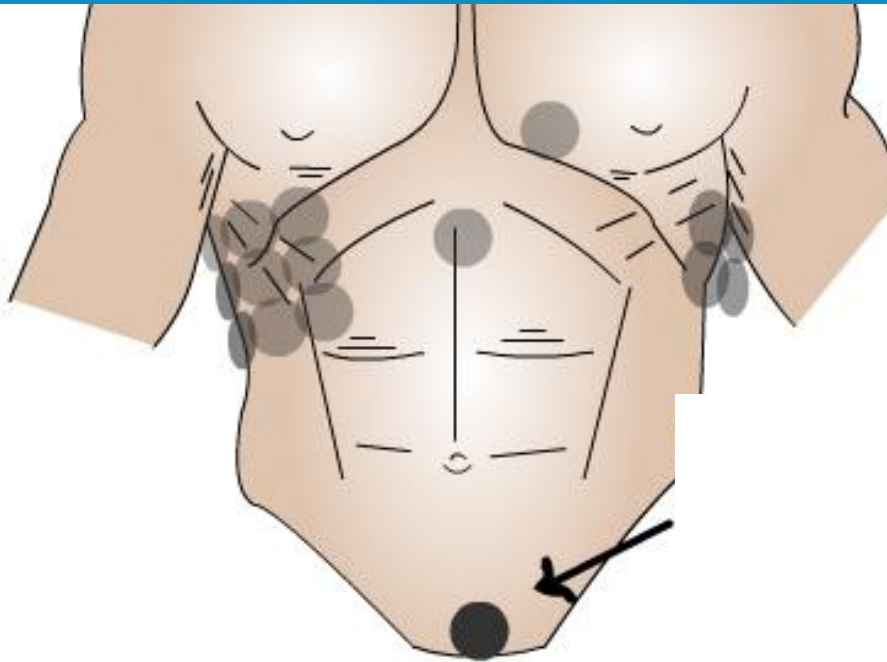


## Probe Orientation

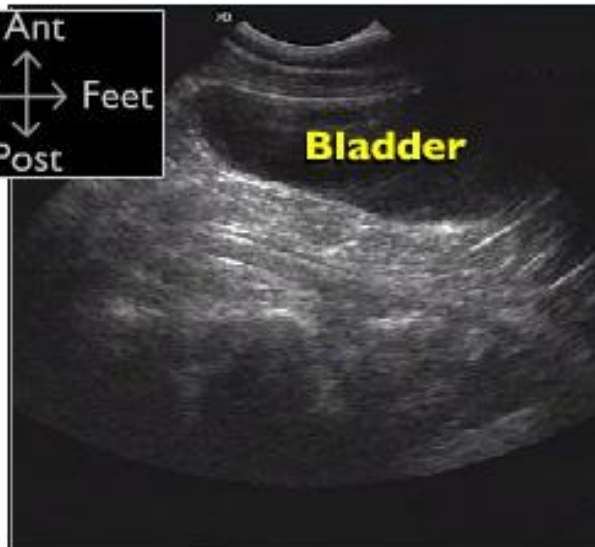


Perpendicular to skin

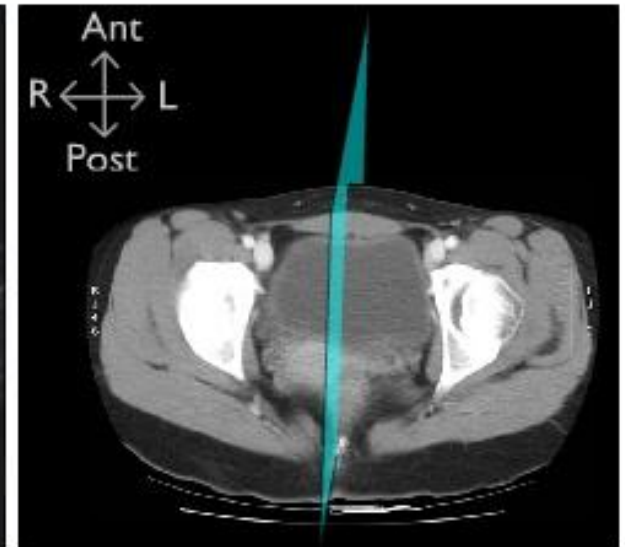
**Sagittal view**



**Actual ultrasound image**



**Labeled ultrasound image**



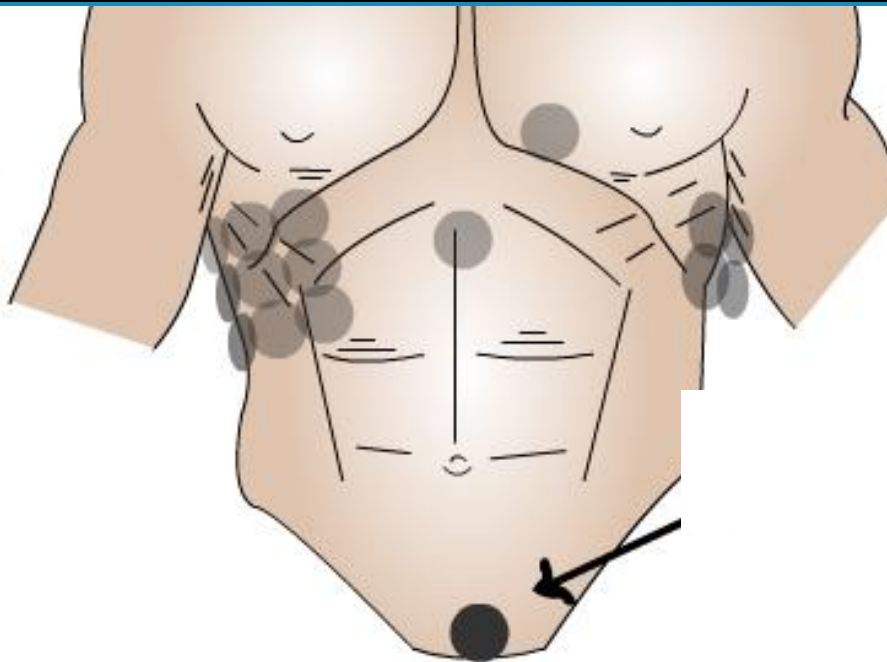
**Cross-sectional CT anatomy**

## Probe Orientation

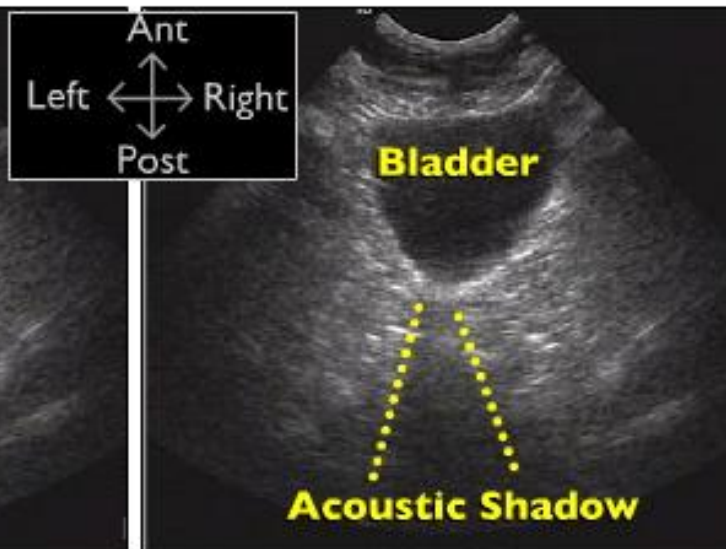


Perpendicular to skin

**Transverse view**



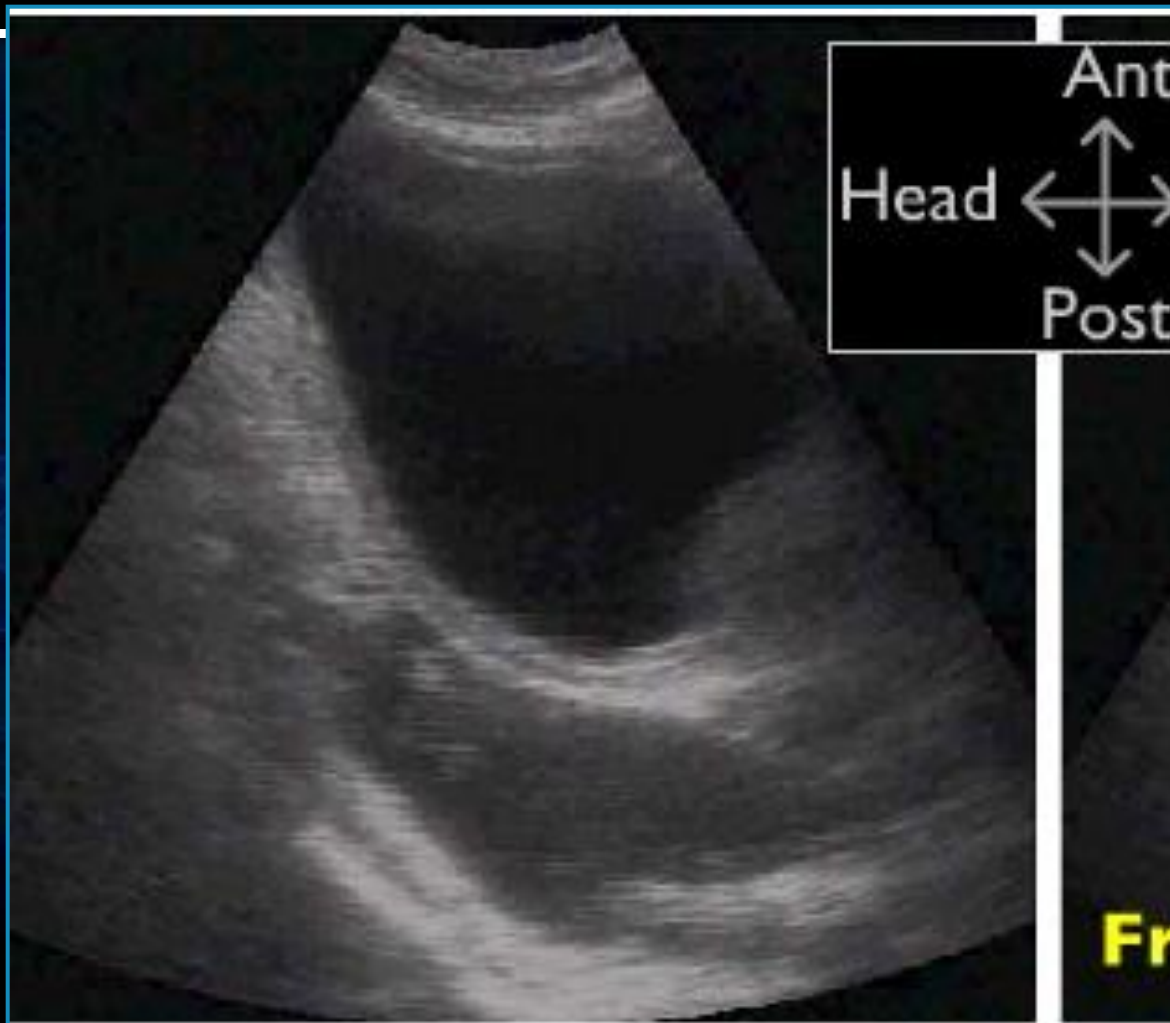
**Actual ultrasound image**



**Labeled ultrasound image**



**Cross-sectional CT anatomy**





# FAST

```
graph TD; FAST[FAST] --> UNSTABLE[Hemodynamically UNSTABLE]; FAST --> STABLE[Hemodynamically STABLE]; UNSTABLE --> UNSTABLE_Negative[Negative]; UNSTABLE --> UNSTABLE_Positive[Positive]; UNSTABLE_Negative --> UNSTABLE_Negative_Outcome[other pathology]; UNSTABLE_Positive --> UNSTABLE_Positive_Outcome[surgery]; STABLE --> STABLE_Negative[Negative]; STABLE --> STABLE_Positive[Positive]; STABLE_Negative --> STABLE_Negative_Outcome[Again and again examination / CT]; STABLE_Positive --> STABLE_Positive_Outcome[CT / Surgery];
```

Hemodynamically  
UNSTABLE

Negative

other  
pathology

Positive

surgery

Hemodynamically  
STABLE

Negative

Again and  
again  
examination /  
CT

Positive

CT /  
Surgery

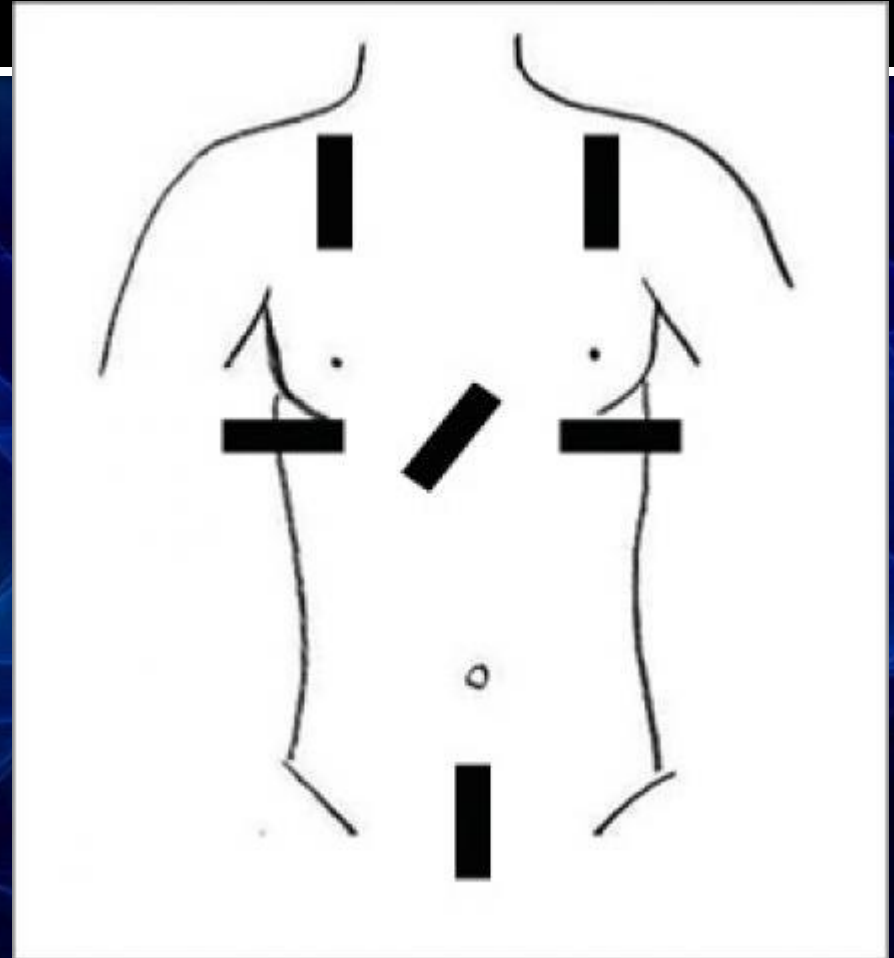
# Kontrendikasyon

- Acil cerrahi



# e-FAST

- Pnomotoraks
  - Plevral line
  - SLS
  - Sahil-Kumsal bulgusu





# RUSH

(Rapid Ultrasound for Shock and Hypotension)





Duchess of Camb



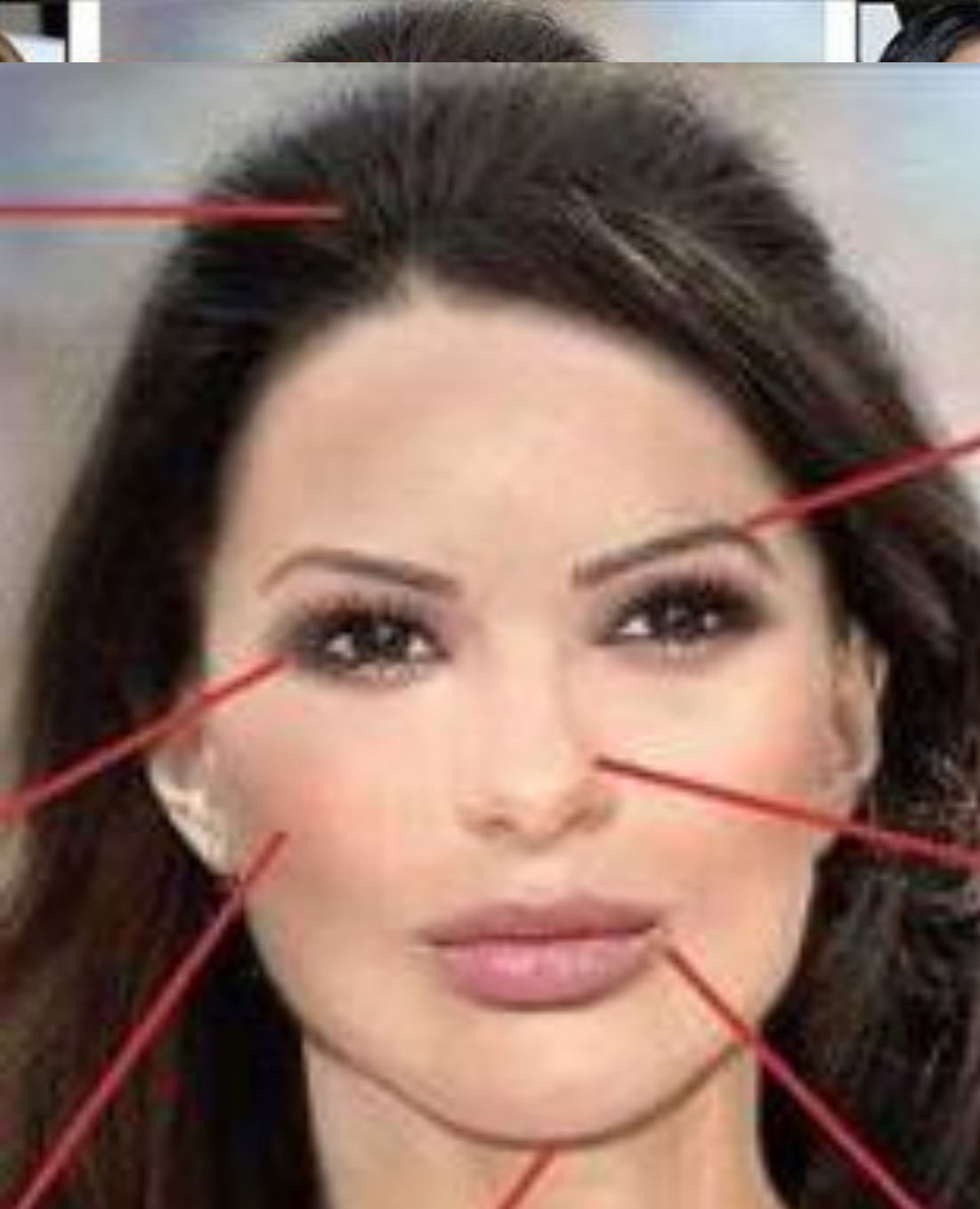
Cheryl Cole



Keira Knightley



Gwyneth Paltrow



Object of desire? Computer Image of the 'ideal woman' Kelly Brook



OK



insale



Jolie





- Trauma hastası

**FAST**

- NON-Traumatic hypotension or shock

**RUSH**



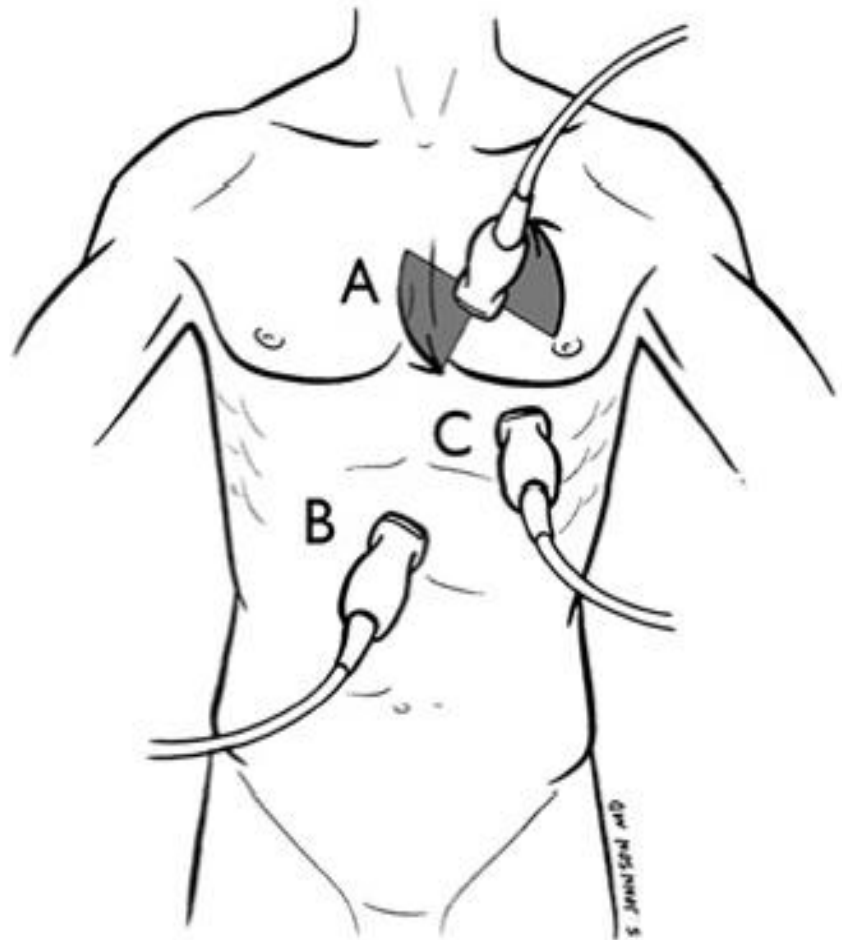
# RUSH

- Yatakbaşında
  - Heart
  - Inferior Vena Cava
  - Morison's/FAST, lower thorax ( or abdominal thorax window)
  - Aorta
  - Pneumothorax
- mnemonic: HI-MAP

# Heart

- Pericardial effusion/tamponade;
- Sağ ventricular yetmezlik (pulmonary embolism)
- Sol ventricular function. (parasternal long axis and the four chamber view)

- A) Parasternal Views  
Long / Short Axis
- B) Subxiphoid View
- C) Apical View

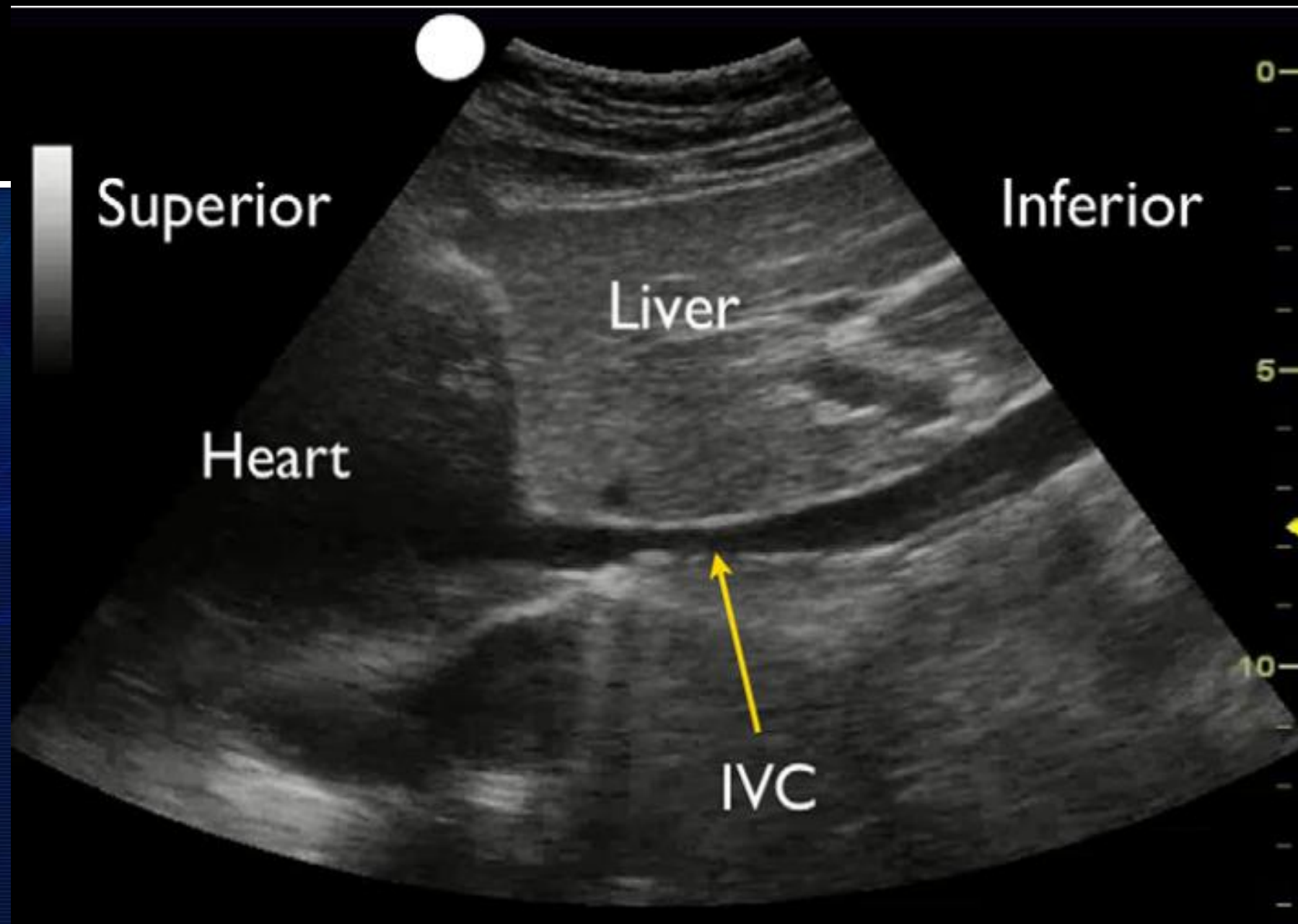


Rapid *U*ltrasound in *S*Hock (RUSH) step 1. Evaluation of the pump.

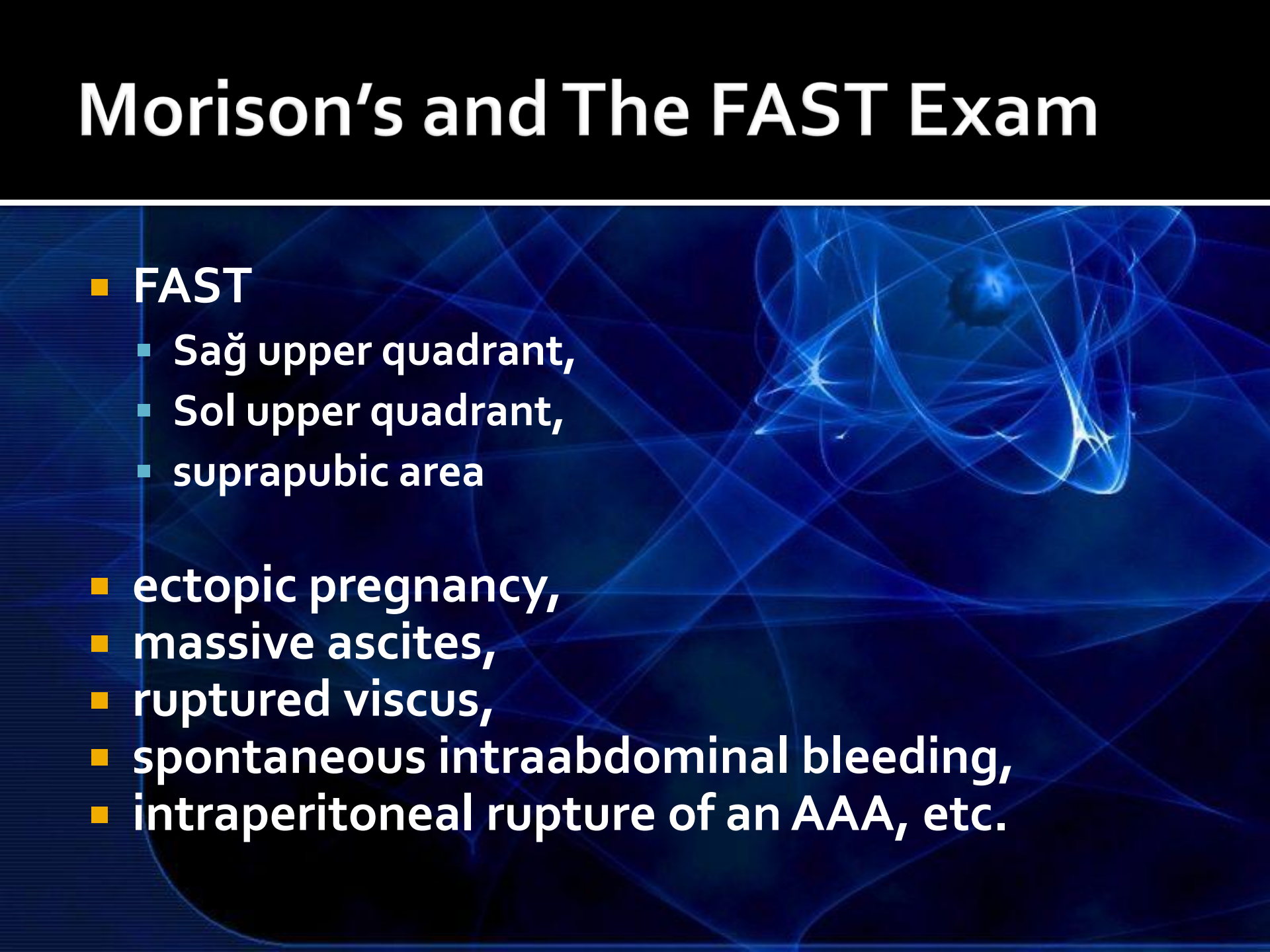


# Inferior Vena Cava

- IVC çapı  $<1.5$  cm (complete inspiratory)  
düşük CVP ( $<5$ )
- IVC çapı  $>2.5$  cm (no inspiratory collapse)  
yüksek CVP ( $> 20$ ) ve sıvı yüklenmesi.



# Morison's and The FAST Exam

- **FAST**
    - Sağ upper quadrant,
    - Sol 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)

- Kalp çıkışı
- Suprarenal
- Infrarenal
- İliac bifurcation üzerinde
- Aorta çapı  $>5$  cm (+ hypotension =AAA)

# Pneumothorax

Tension pnx düşünülmeli

- Central line
- Pacemaker takılması
- Thoracentesis
- Her iki hemithorax anterior 3. intercostal aralıktan başlanır
- High frequency probe
- M-mode
  - ocean/beach or seashore -- no pneumothorax
  - continuous ocean or stratosphere sign--- pneumothorax

# BLUE

(Bedside Lung Ultrasound in Emergency)







# CXR-Radiology Reading: PTX Negative

1. Ratio 20.0 Zoom 41%



## CT-Large Right PTX

PTX



- 
- The background is a dark blue gradient with abstract, glowing blue lines and curves. In the upper right corner, there is a faint, glowing blue anatomical structure that resembles a human torso or a specific organ, possibly a lung or heart, with internal details visible.
- Pneumothorax direct graphy specificity %53
  - Gold standart is “CT”





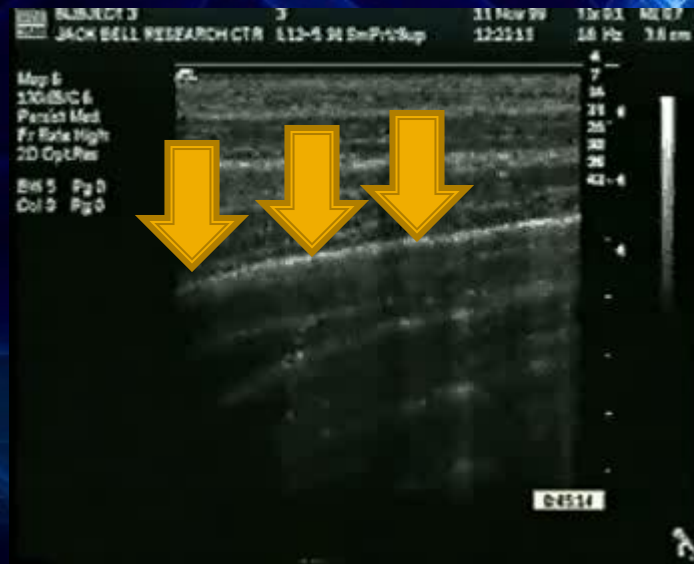
- Akciğer USG ile görüntülemeye uygun değildir
- Eğer CT kullan-a-mıyorsanız , USG kullanılabilir
- Thoraks USG pnemothorax sensitivity (CT'ye göre ) %92
- USG'nin bazı technical üstünlüğü var
- 4-12 MHz probe

# STATIC IMAGES



# SLS (Sliding Lung Sign)

- Normal





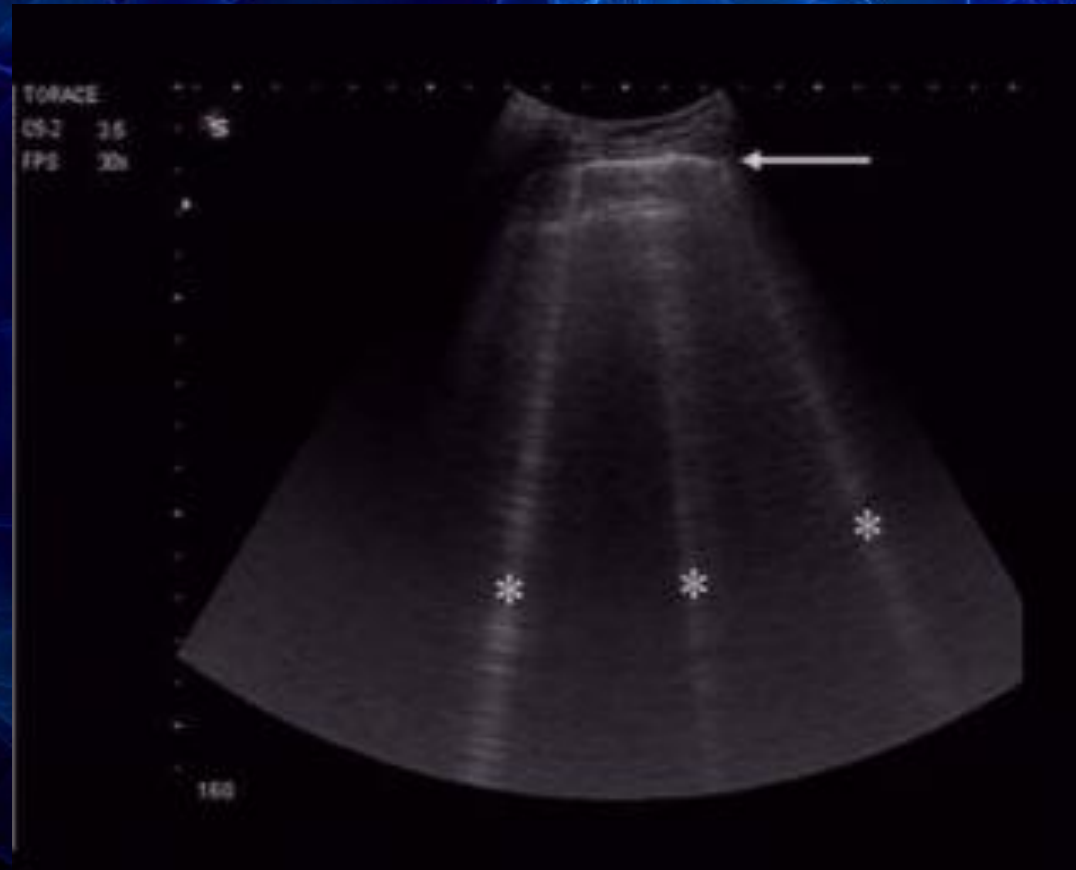
# A line

- Pneumothorax



# B line (comet tail – rocket sign)

- Normal





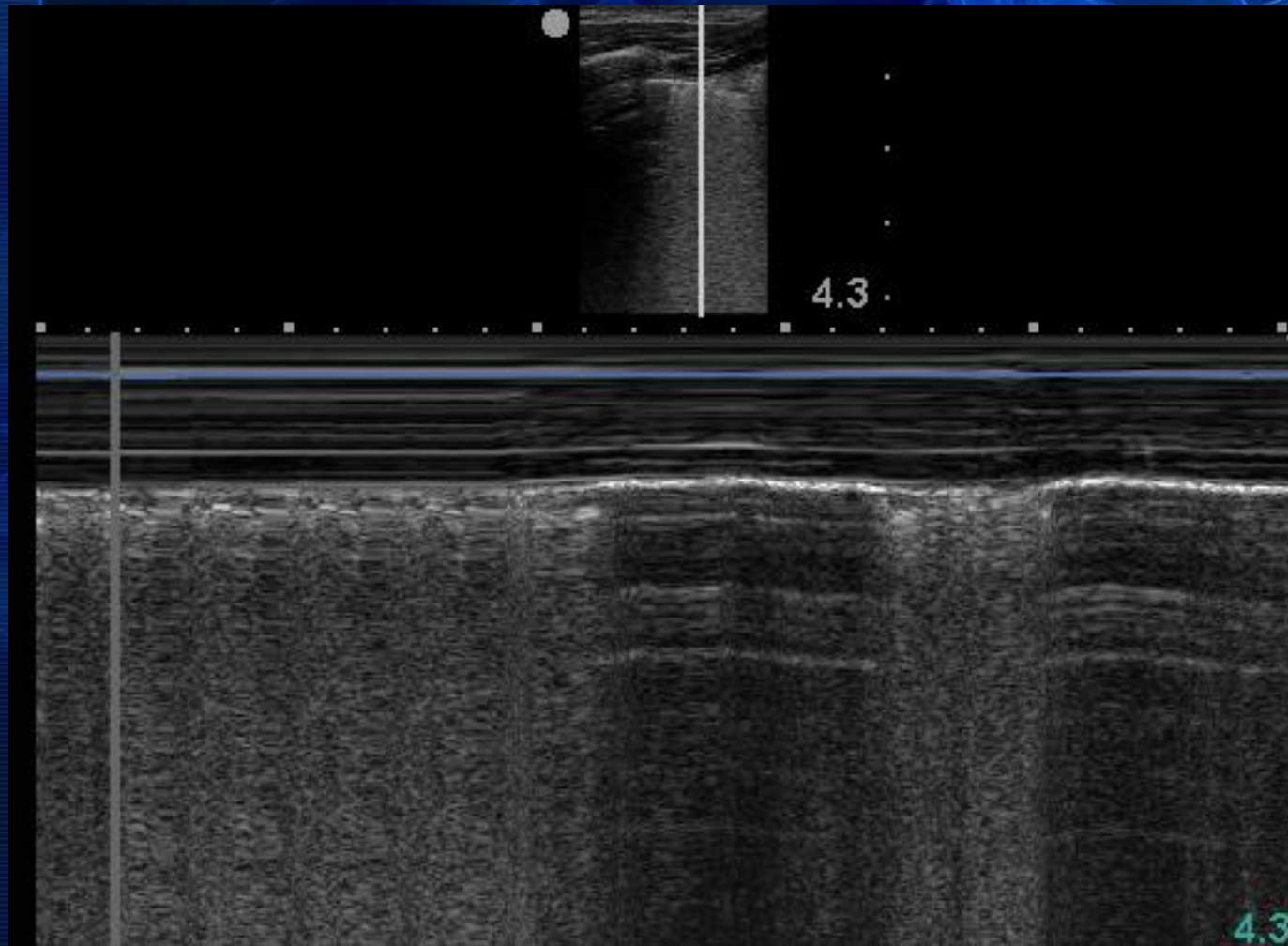




# Lung point



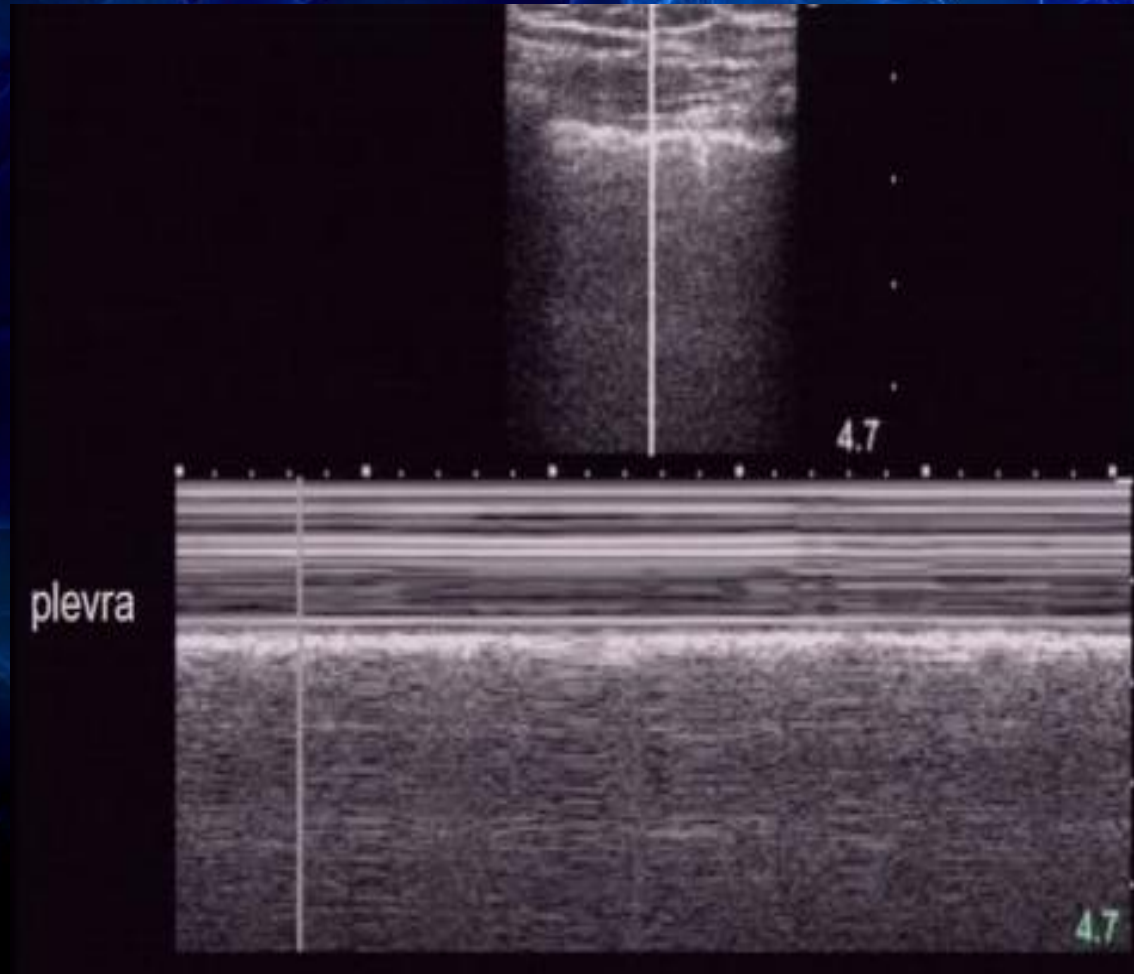
# Dynamic changes





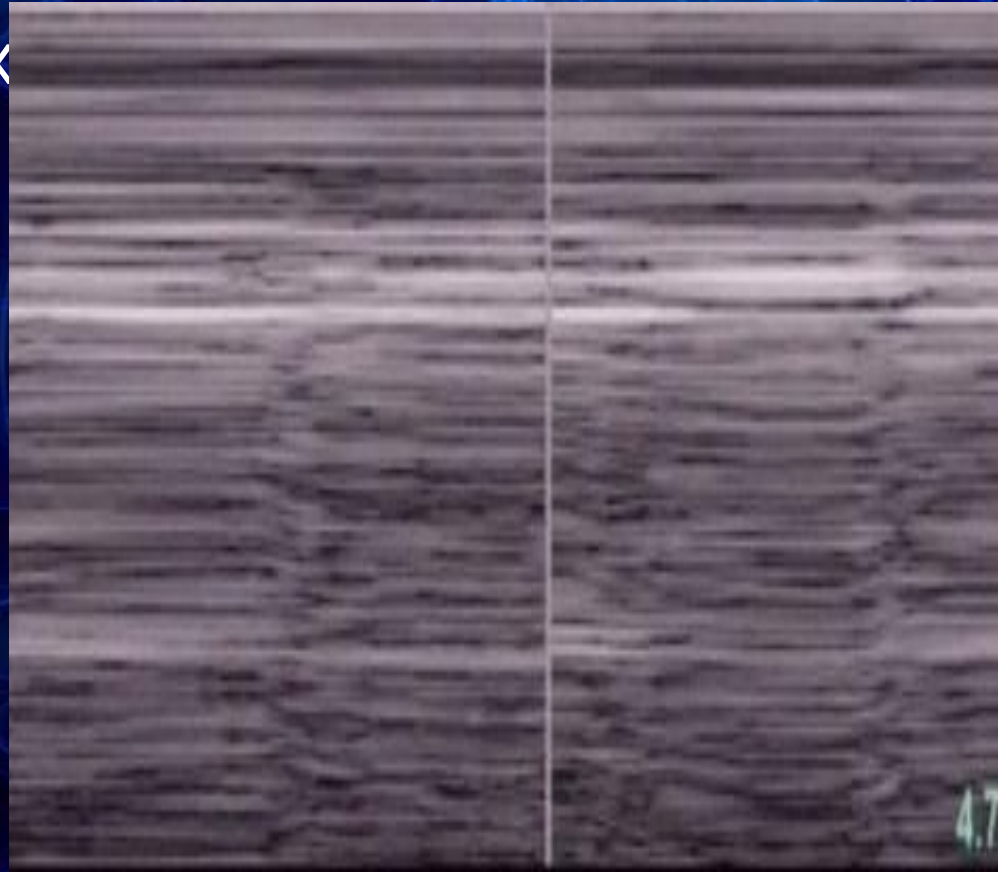
# Sea shore Sign

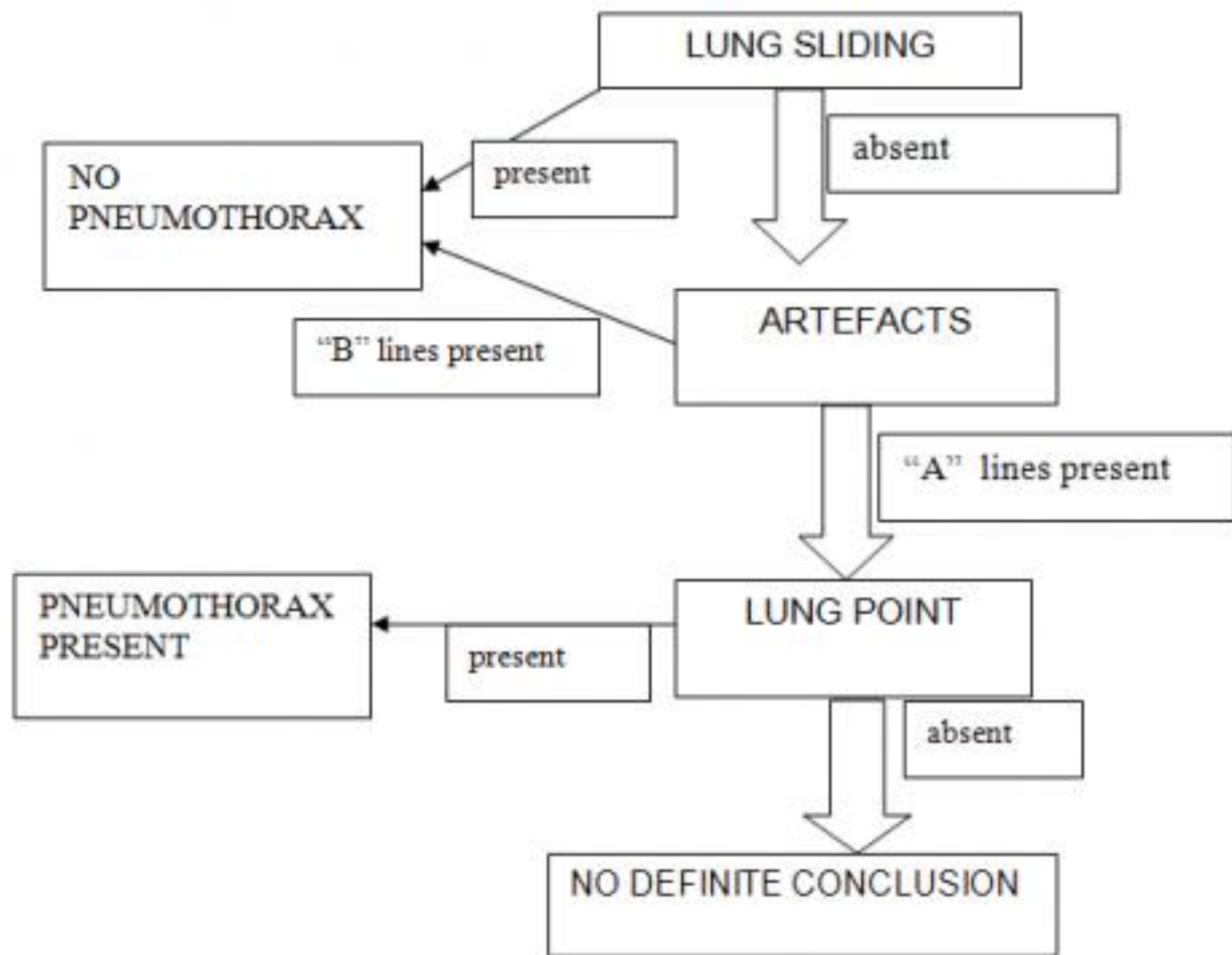
- Normal (M mode)



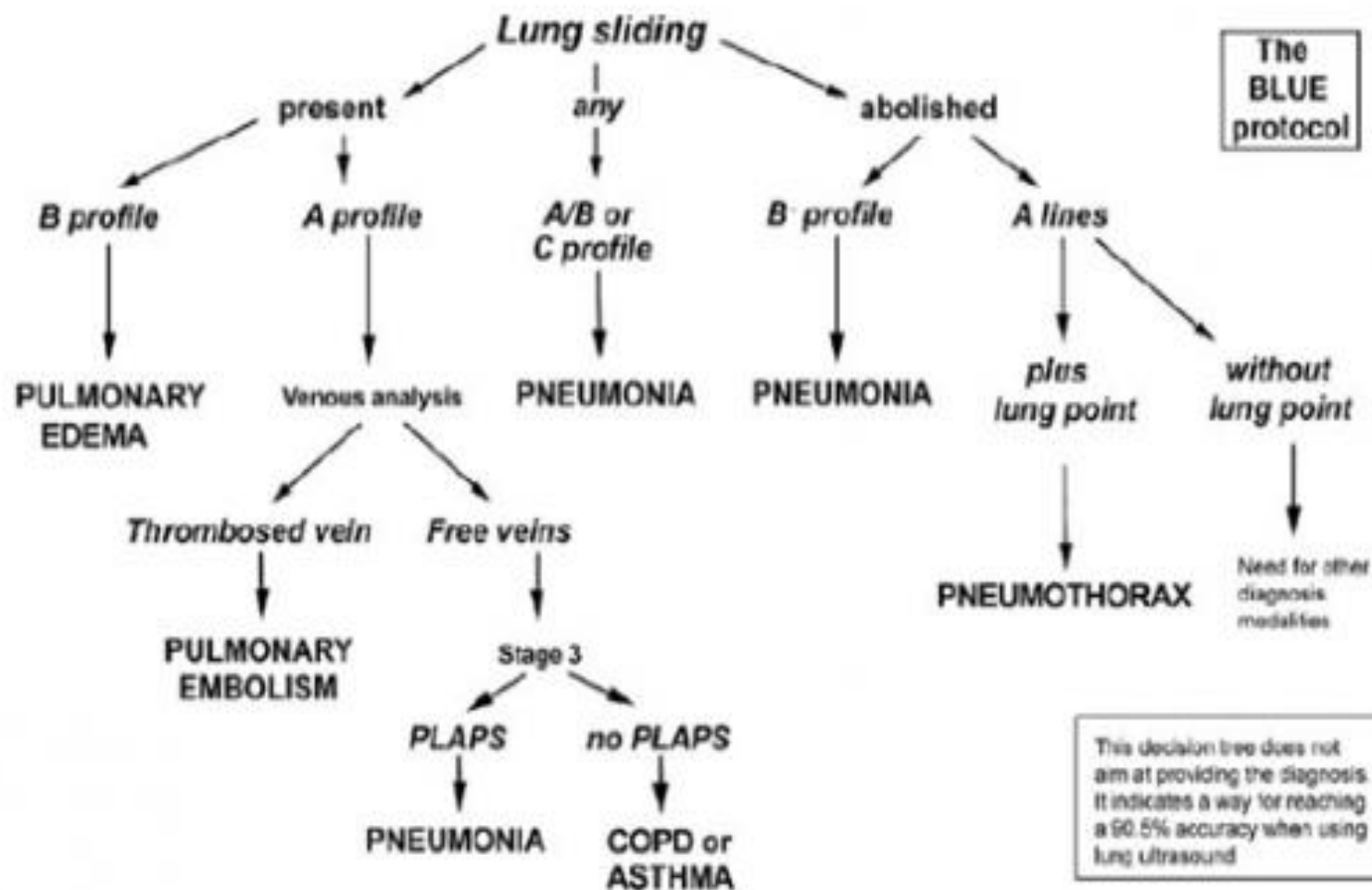
# Strotopher Sign

- Pneumothorax









**A profile** means predominantly A lines

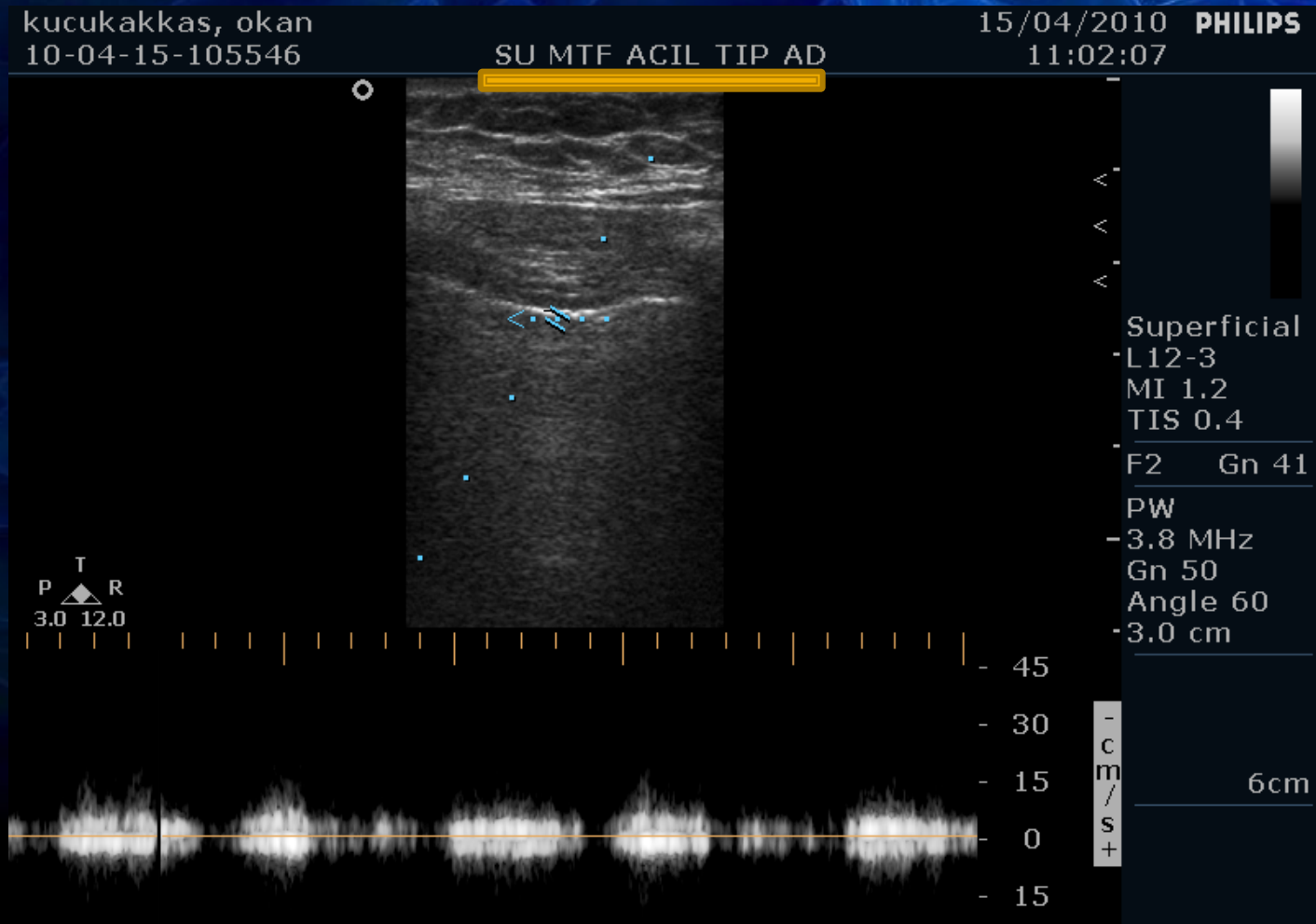
**B profile** means predominantly multiple anterior diffuse B lines

**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

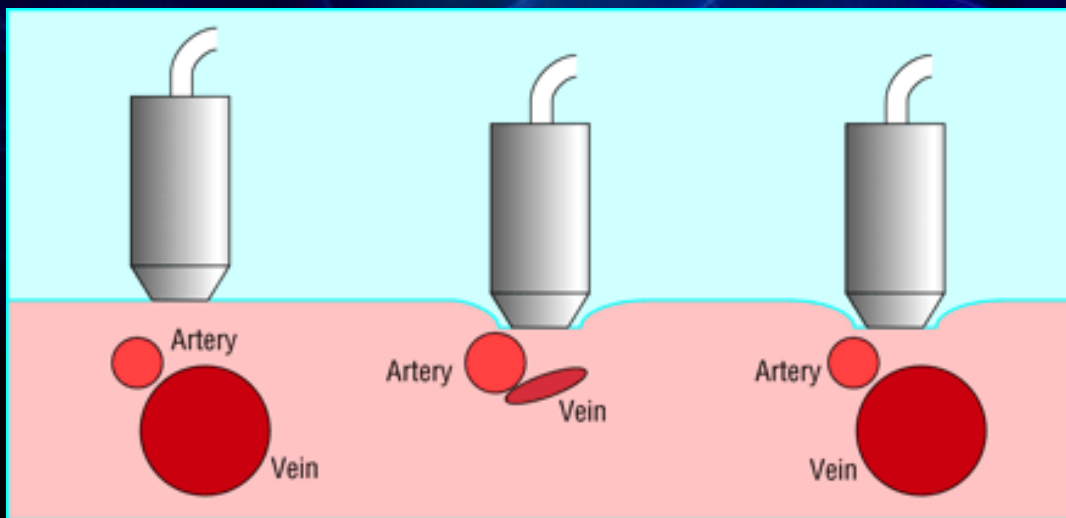
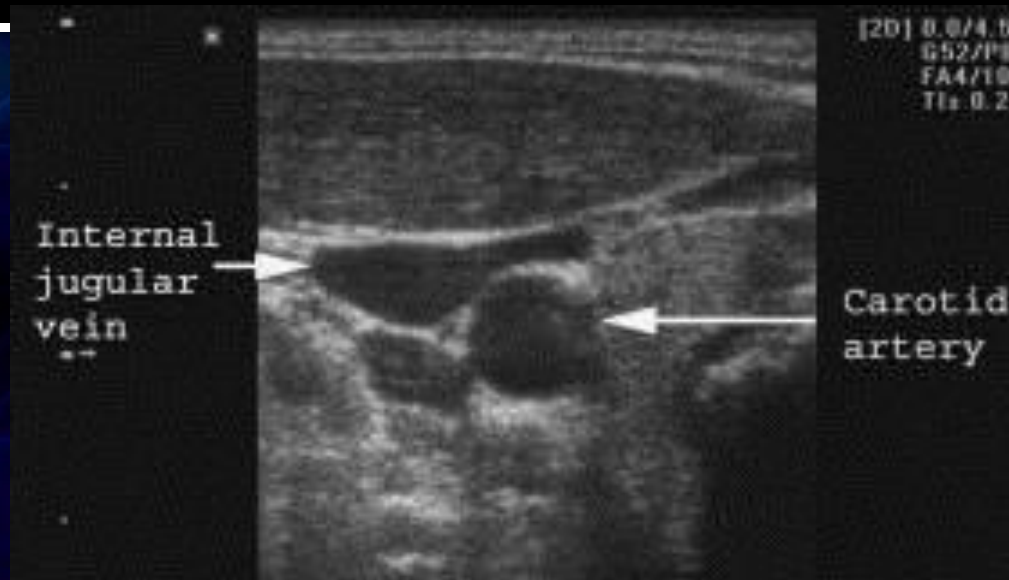


# Procedural

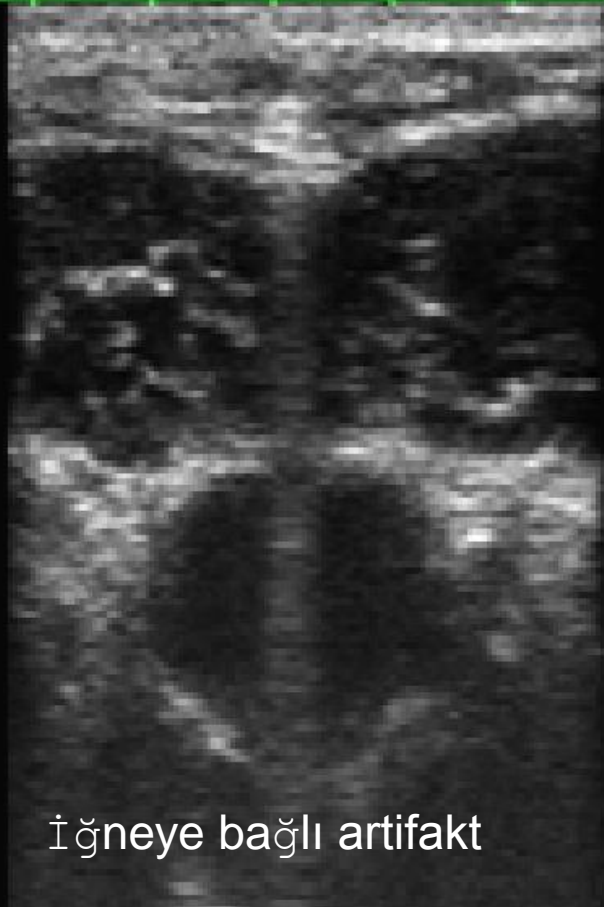
- Bladder aspiration
- Fracture reduction
- Transvenous pacemaker
- Abscess drainage
- Foreign body
- Lumbar puncture
- Peritonsillar abscess drainage
- Arthrocentesis



# USG Yardımıyla Santral Venöz Kateter







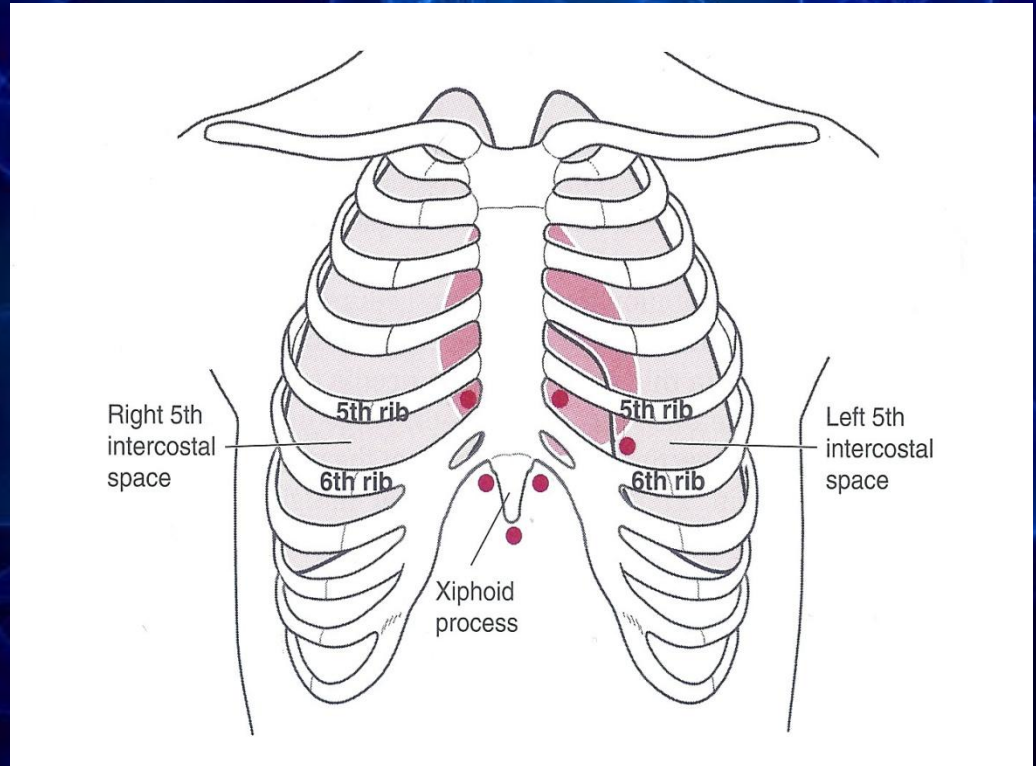
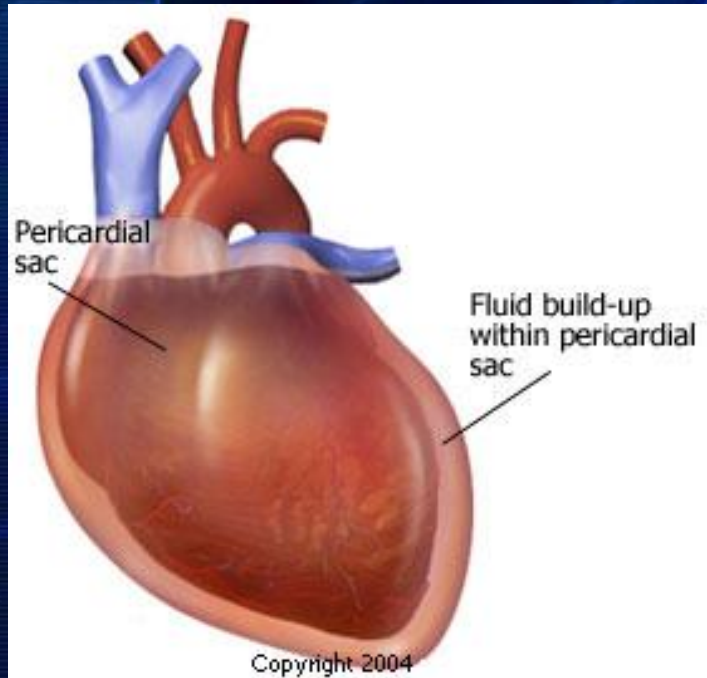
İğneye bağlı artifakt



Probu tutan el, hastada sabitleniyor

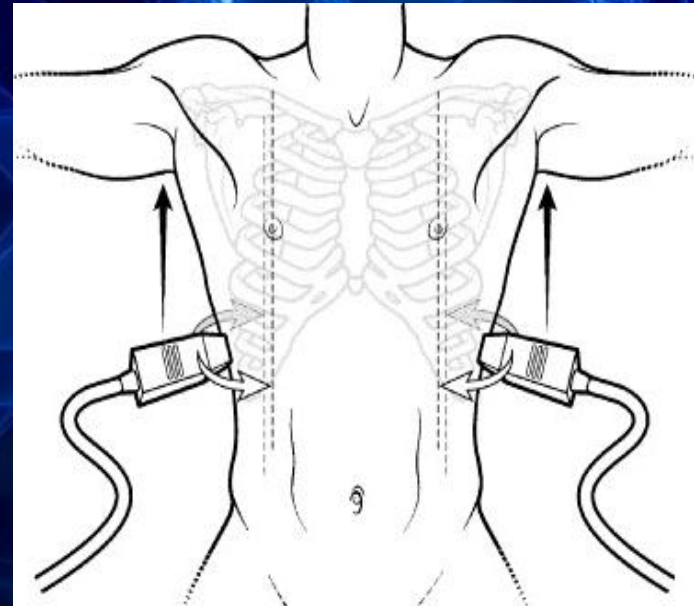


# Pericardiosynthesis

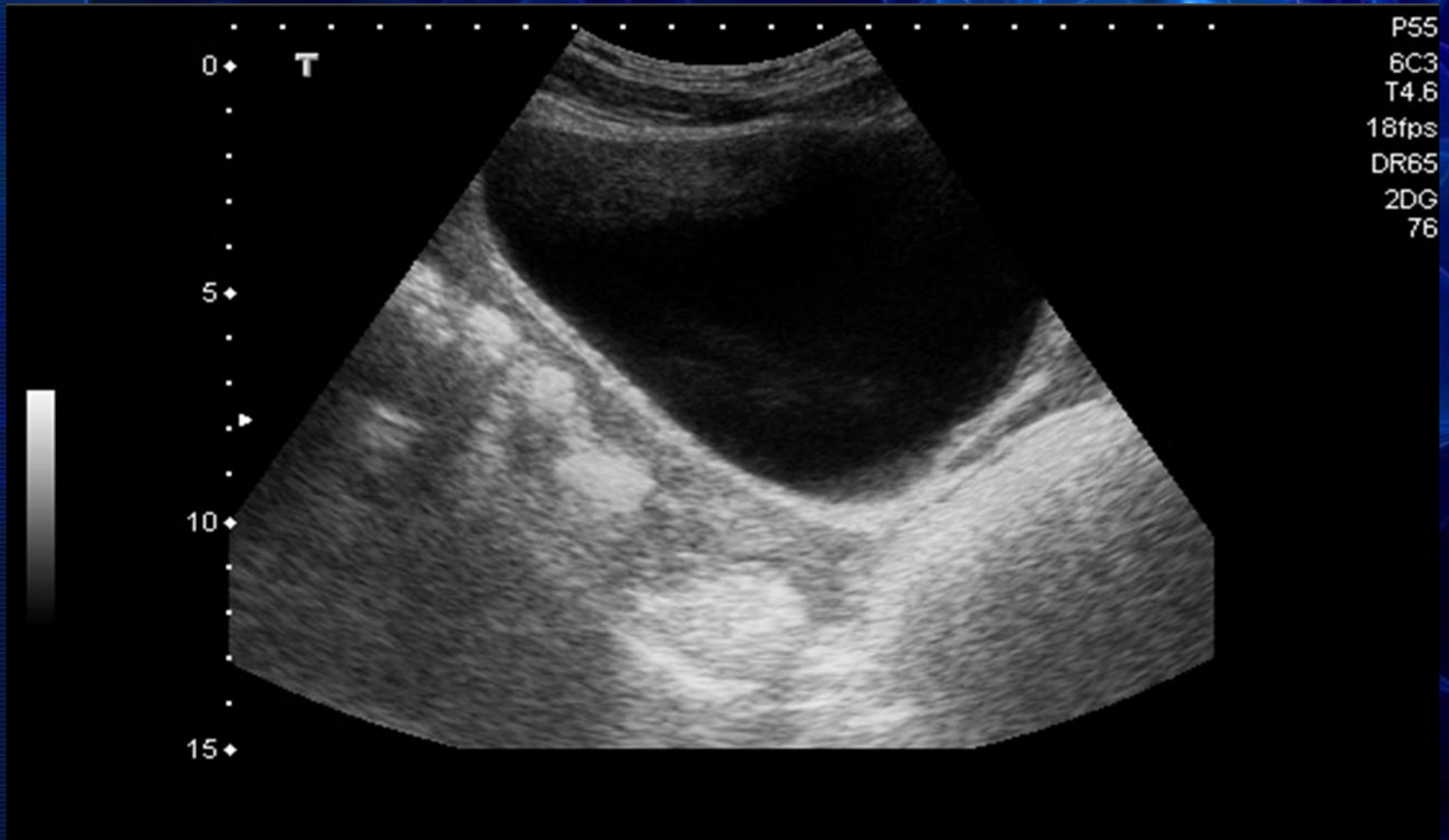


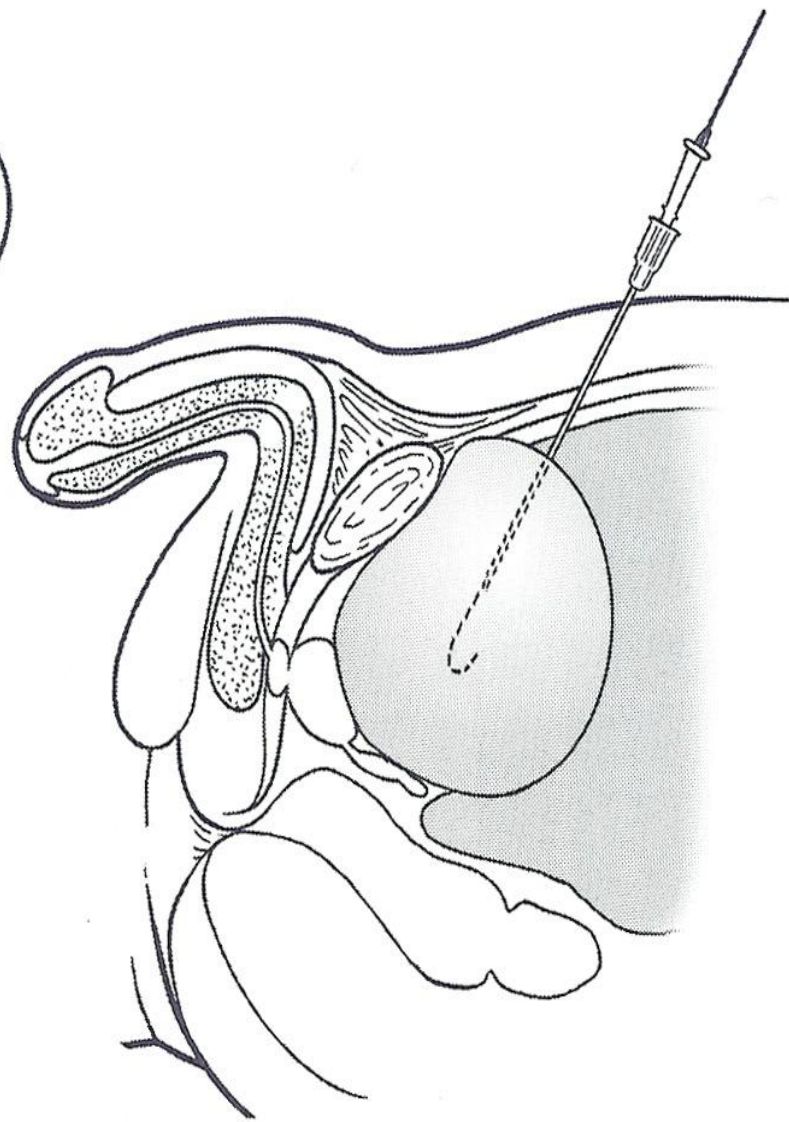
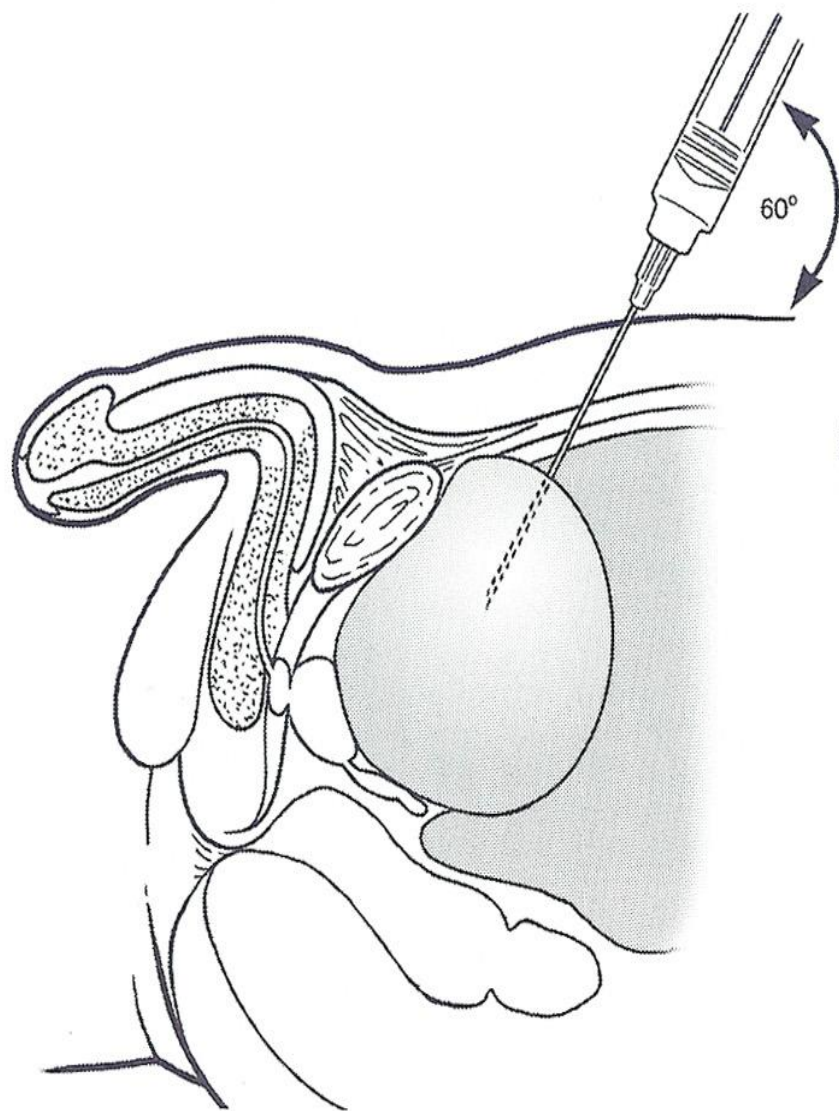


# Pleural sıvı ve Thorasynthecis



# Suprapubic Aspiration







# Yabancı Cisimler

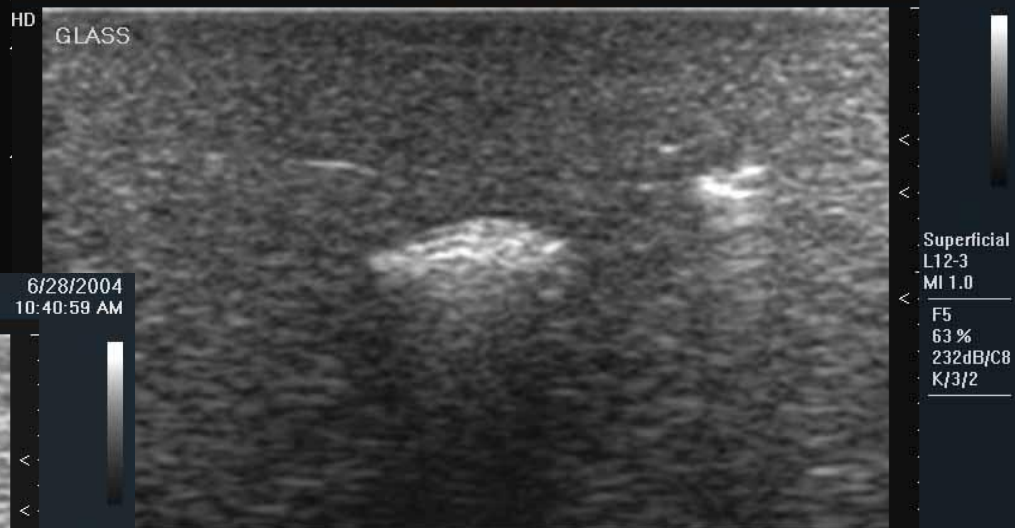
Blue Phantom Philips 6/28/2004 10:25:12 AM  
Philips Medical Systems



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

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

31 Hz  
2 cm

31 Hz  
2 cm

# Yabancı Cisimler



# 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

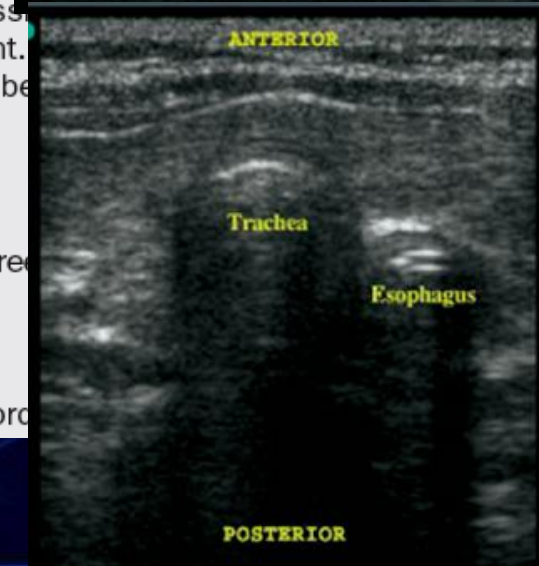
Robert A. Jones, DO, RDMS

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, 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

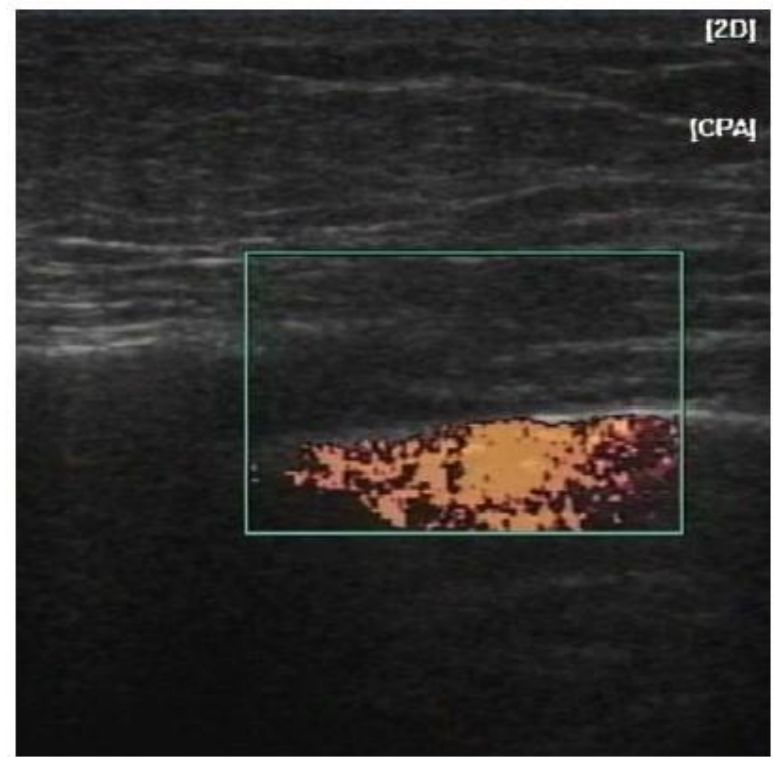
**Objectives:** To evaluate the performance of the ultrasound (US) *sliding lung sign* as a predictor of endotracheal tube (ETT) placement. Many other tools and examination findings have been used to confirm ETT placement; erroneous placement of the ETT has even been confirmed by US.

**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-



GE

Chest Wall



Lung Sliding

2

4

# DİĞERLERİ





# Obstetry/Gynecology

- Abdominal ağrı or vaginal kanama (gebelikte önemli)
- IU gebelik veya pelvik serbest sıvı



# Ophthalmology

- Retinal dekolman
- Vitreous kanaması
- Ocular yabancı cisim
- Globe penetration
- Lens luxation
- Retrobulbar hematoma
- Optik nerve çapının ölçümü
  - May 2009 CPT Assistant (Volume 19 Issue 5)







# Ophthalmology

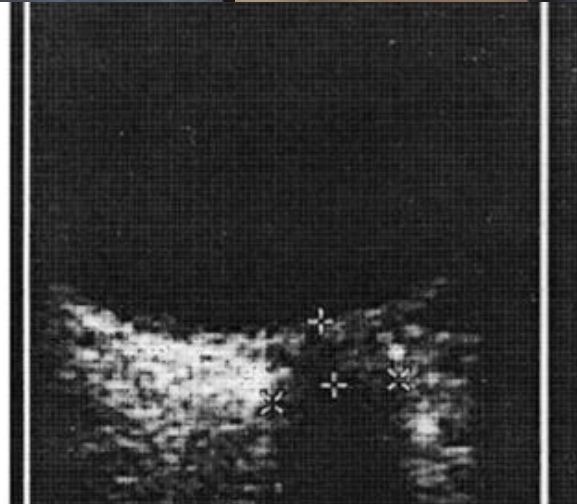
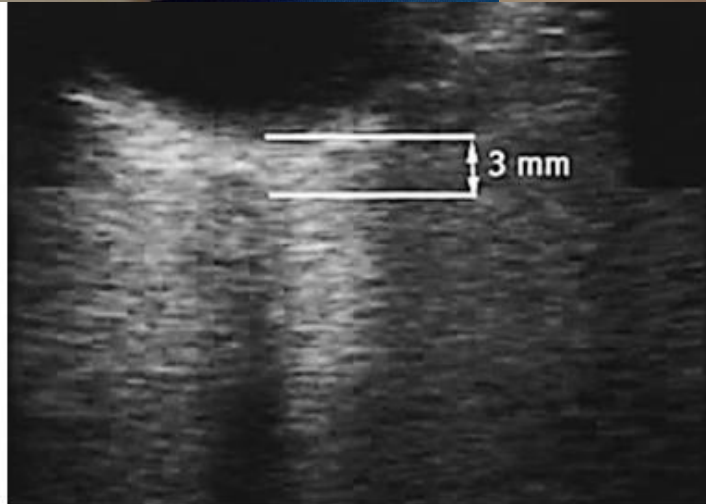




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13.7 mm

## 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

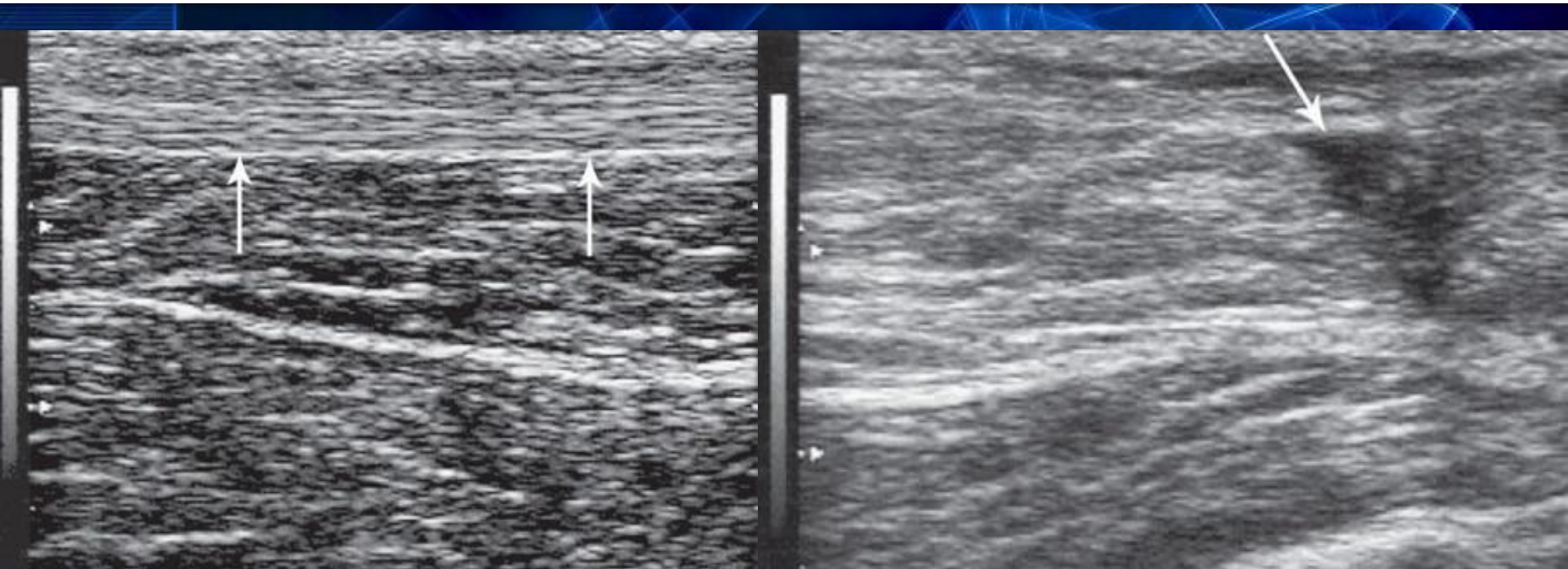


# Sinusitis

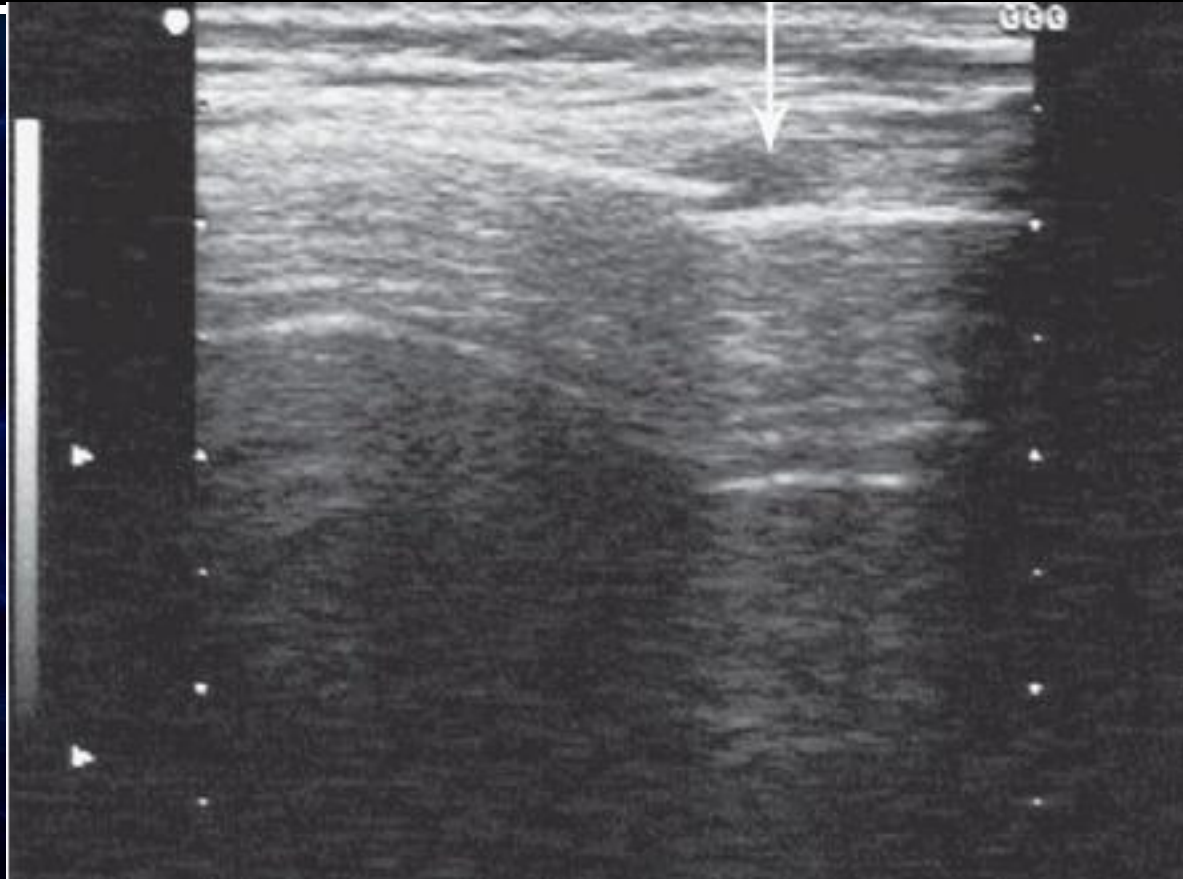




# Tendon Rupture



# Sternum Fracture




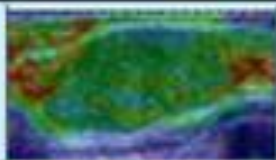

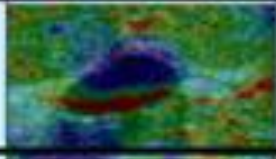

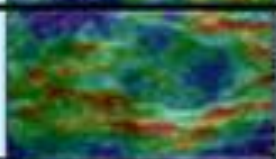
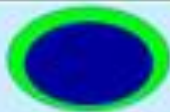
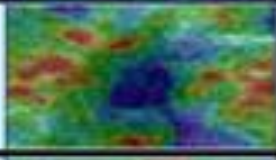

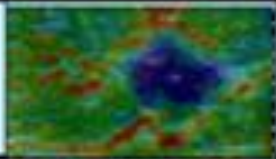

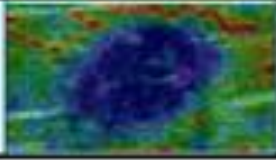




# US Elastography



PREV

	Classification Standard		Typical Image
1	Strain is seen in the entire hypoechoic area (the entire lesion is shown in green similar to the surrounding tissue)		
1*	BGR (blue-green-red) 3 layer pattern – typical artefact seen in a cystic lesion		
2	Strain is seen within most of the hypoechoic area but some areas show no strain (the lesion is a mixture of green and blue)		
3	Strain appears only in the periphery with no strain in the centre of the lesion (the centre of the lesion is shown as blue with the periphery in green)		
4	No strain is measured within the lesion (the entire lesion is shown in blue)		
5	No strain is measured within the lesion nor in the surrounding tissues (the lesion and the surrounding tissues are blue)		

PubMed

ultrasound, emergency



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- ☐ [Higher seroprevalence of hepatitis B virus antigen in patients with cystic hydatid disease than in patients referred to internal medicine clinics in Turkey.](#)

Gültepe B, Dülger AC, Gültepe I, Karadas S, Ebinç S, Esen R.  
Korean J Parasitol. 2014 Feb;52(1):47-9. doi: 10.3347/kjp.2014.52.1.47. Epub 2014 Feb 19.

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- ☐ [BET 2: The use of bedside \*\*ultrasound\*\* in diagnosing retinal detachment in \*\*emergency\*\* department.](#)

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Emerg Med J. 2014 Apr;31(4):337-9. doi: 10.1136/emmermed-2014-203646.2.

PMID: 24623730 [PubMed - in process]

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- ☐ [Pancreatic lymphoma presenting with acute pancreatitis.](#)

3. Buluş H, Yavuz A, Aydın A, Köklü S, Coşkun A.

Türk J Gastroenterol. 2013 Dec;24(5):569-71.

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- ☐ [Inflammatory bowel disease presenting with nephrotic syndrome and cholestasis.](#)

4. Güngör O, Sarsık B, Tatar E, Akarca US, Tekeşin O, Sezak M, Başcı A.

Türk J Gastroenterol. 2013 Dec;24(5):568-9.

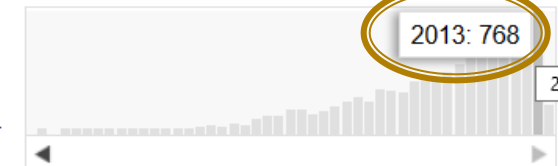
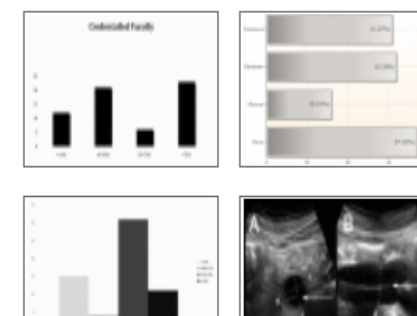
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# ÖZET



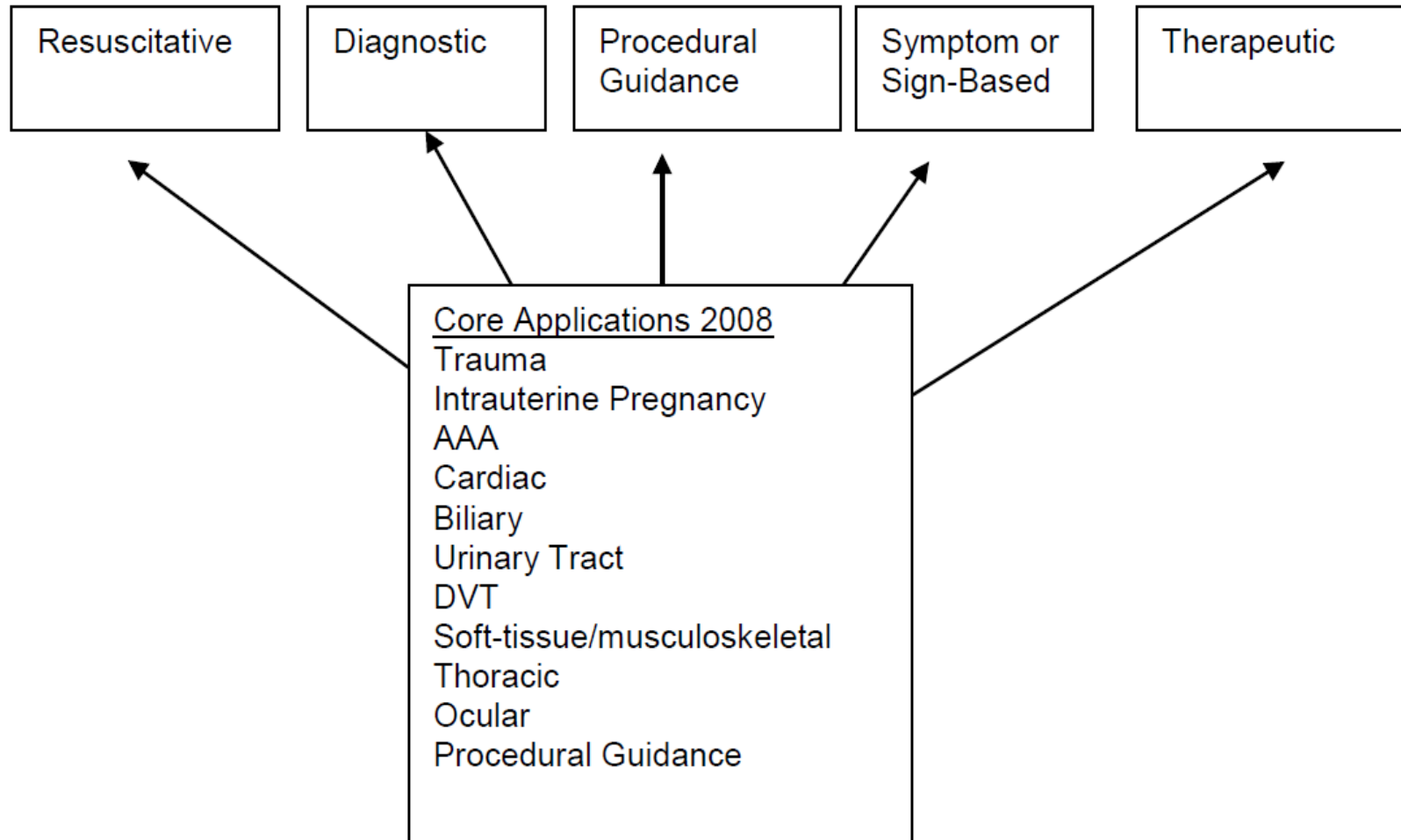
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Approved October 2008

### *Emergency Ultrasound Guidelines*



# Çalışmaların Yönü?



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#### Ordinal Score

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**SOCIETAL**

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**CLINICAL**

3

**THERAPEUTIC**

2

**DIAGNOSTIC THINKING**

1

**DIAGNOSTIC ACCURACY**

**TECHNICAL**

Future Research Efforts

Recent & Current  
Investigations:  
2000-2008

Early Research: 1980-1999

# TEŞEKKÜRLER

The background is a dark blue gradient. It features a complex pattern of glowing, translucent blue lines that intersect and curve across the frame. In the upper right quadrant, there is a bright, multi-colored nebula-like structure with shades of blue, white, and yellow. The overall effect is ethereal and futuristic.