

FAST

ODAKLANMIŞ

TRAVMA ULTRASONU

FAST

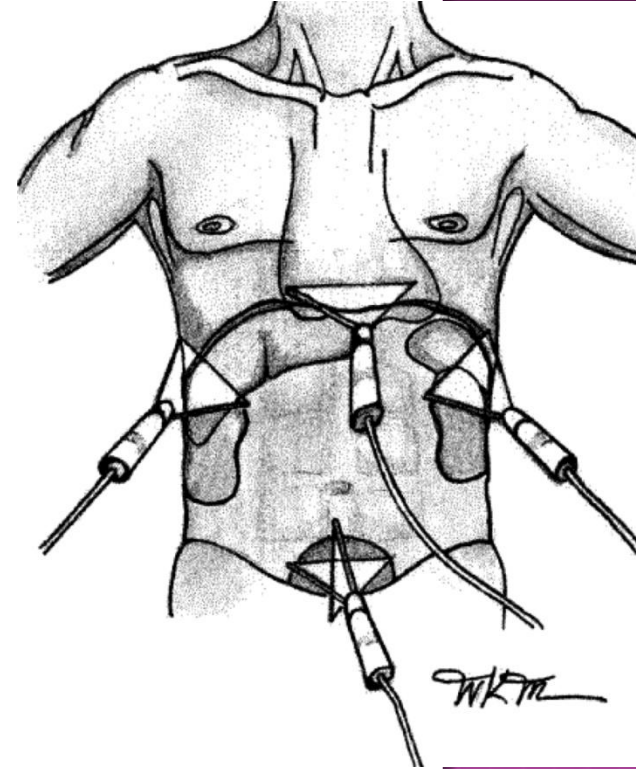
- ◉ Focused Abdominal Sonography for Trauma
- ◉ Focused Assessment with Sonography for Trauma

Hedef:

- yatakbaşı ultrasonografi kullanımıyla intraperitoneal, torasik, perikardiyal serbest sıvının saptanmasıdır

FAST

- ◉ Sağ üst kadran (perihepatik)
- ◉ Kardiyak
- ◉ Sol üst kadran (perisplenik)
- ◉ Pelvik



Peritoneal / plevral / perikardiyal sıvı ?

FAST

◎Avantajları:

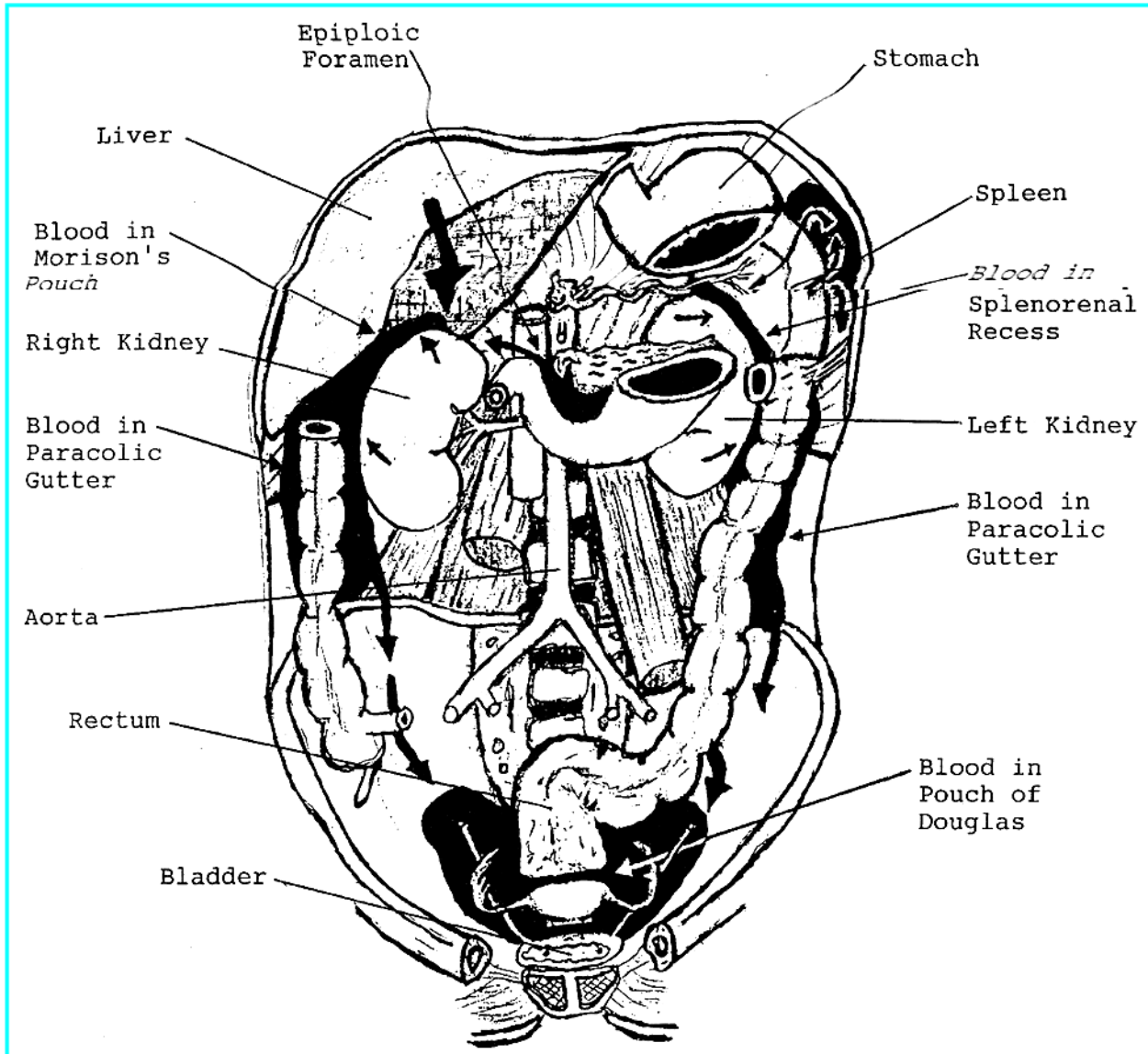
- Hızlı
- Doğru
- Non-invaziv
- Portabl
- Tekrarlanabilir
- Radyasyon veya kontrast madde kullanımı yok

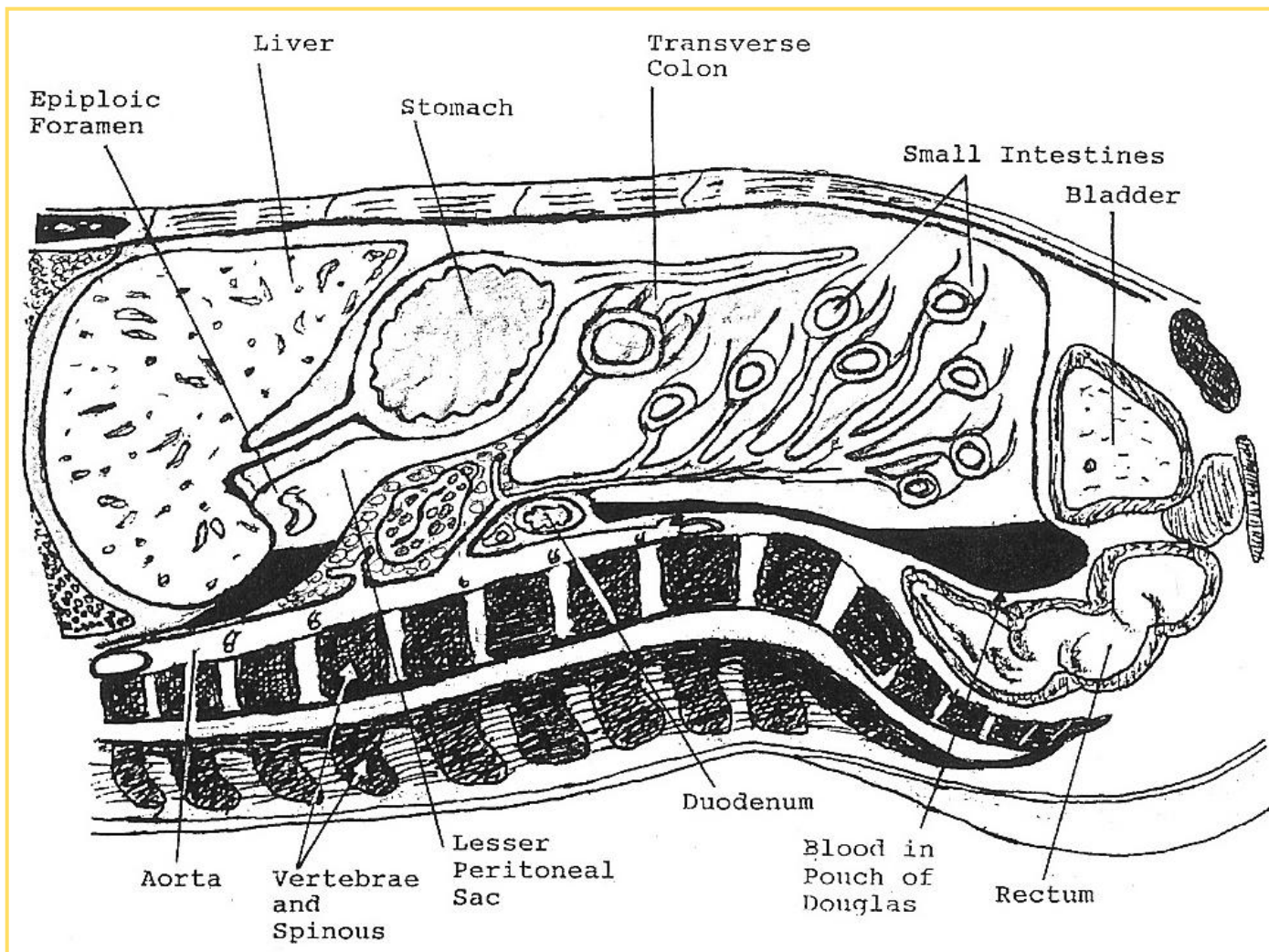
FAST

◉Dezavantajları:

- Kanama nedenini net olarak ortaya koyamaz
- Uygulayıcıya bağlı
- Hastaya bağlı (obesite, yoğun intestinal gaz,...)
- Retroperitoneal alan net değerlendirilemez

AMAÇ: SERBEST SIVININ SAPTANMASI !





FAST - teknik



FAST - teknik



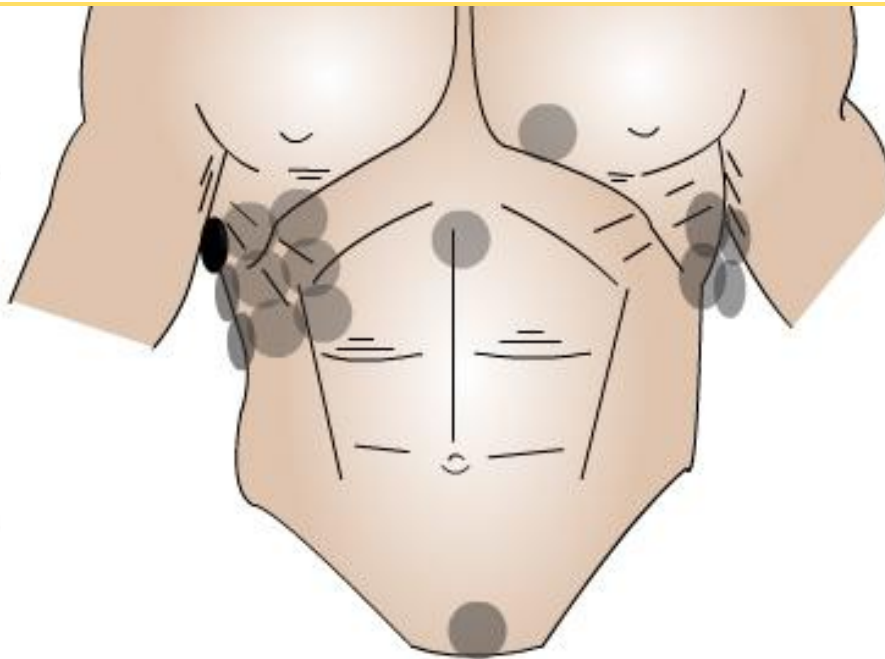
SAĞ ÜST KADRAN - PERIHEPATİK



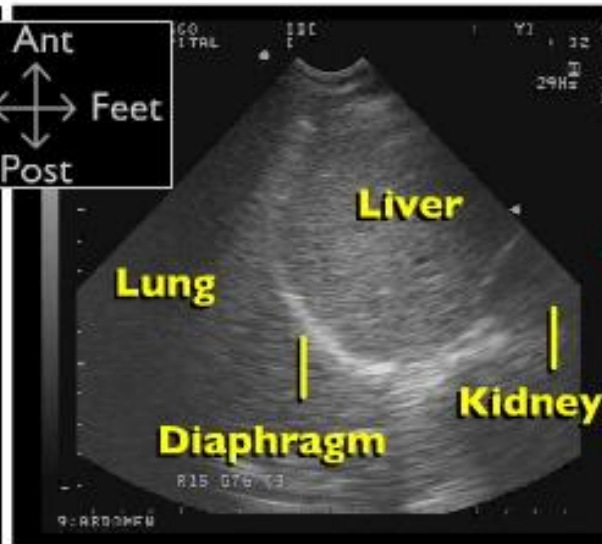
Probe Orientation



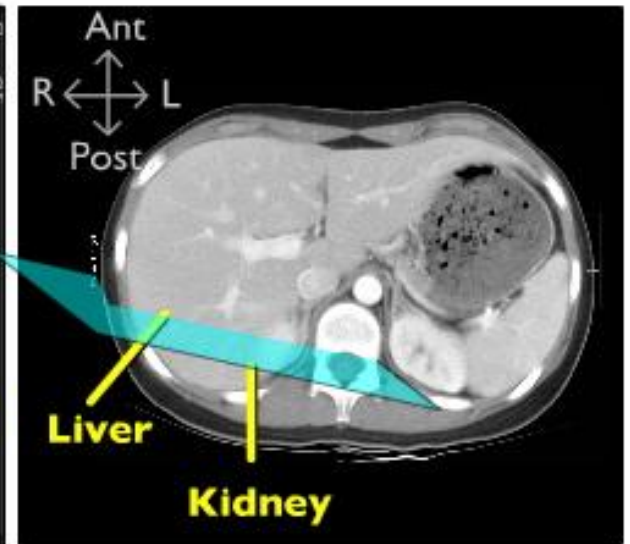
Coronal view



Actual ultrasound image



Labeled ultrasound image

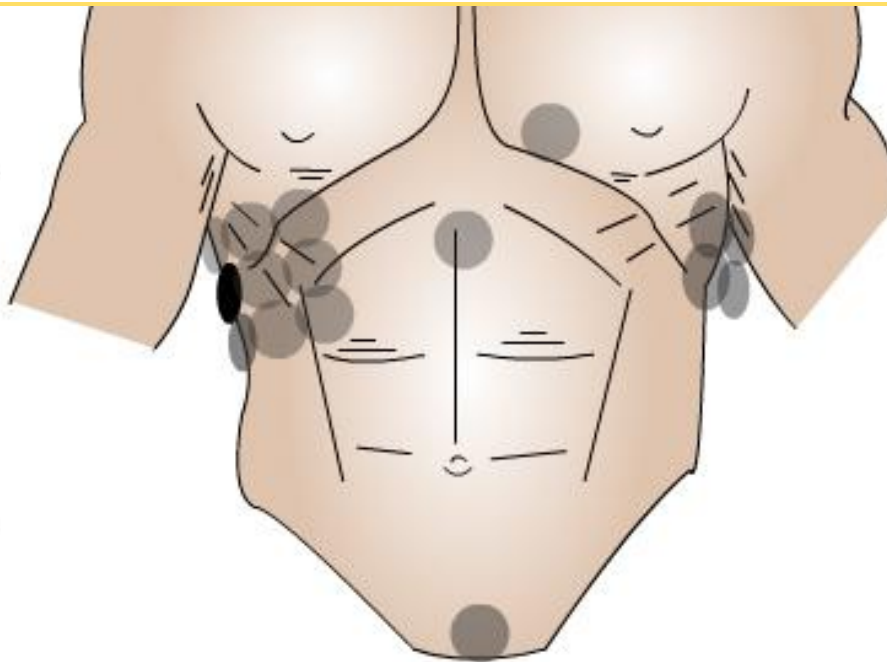


Cross-sectional CT anatomy

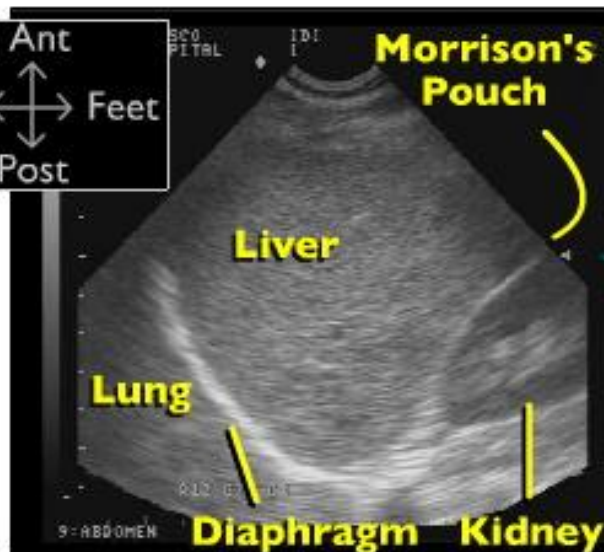
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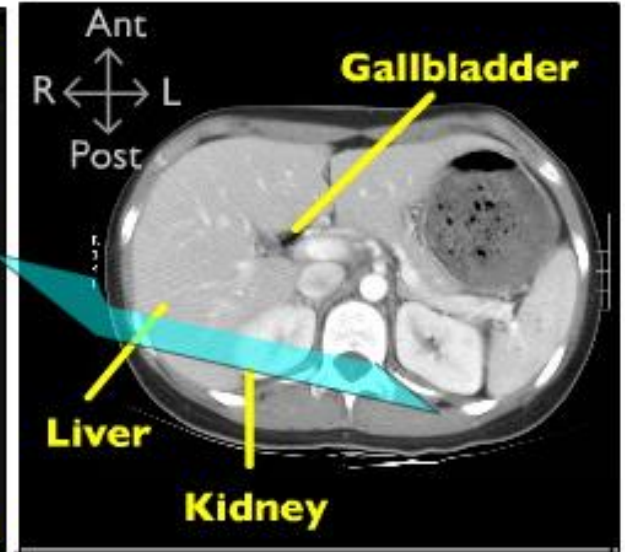
Coronal view



Actual ultrasound image



Labeled ultrasound image

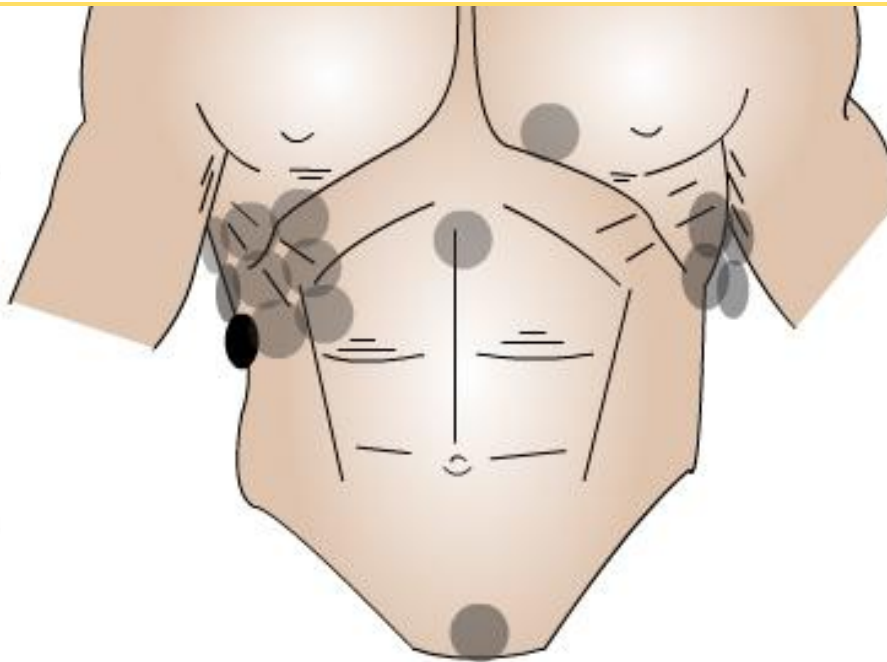


Cross-sectional CT anatomy

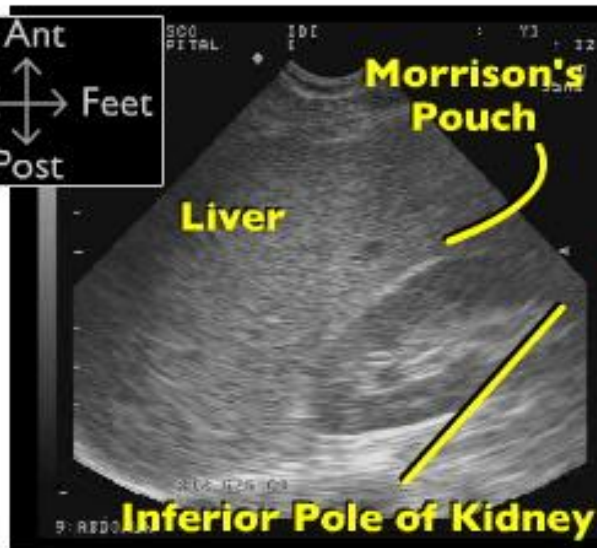
Probe Orientation



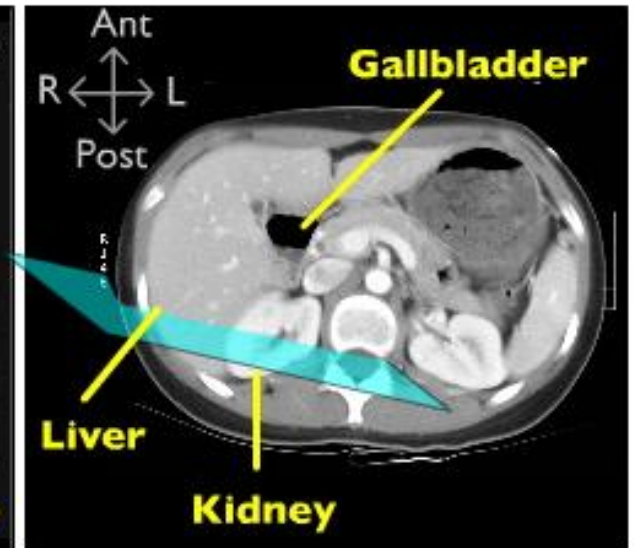
Coronal view



Actual ultrasound image

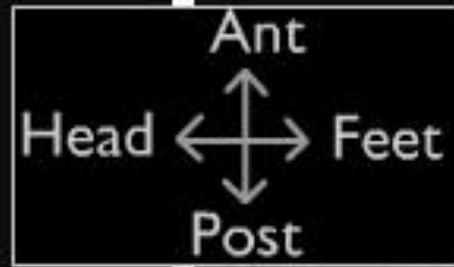


Labeled ultrasound image



Cross-sectional CT anatomy

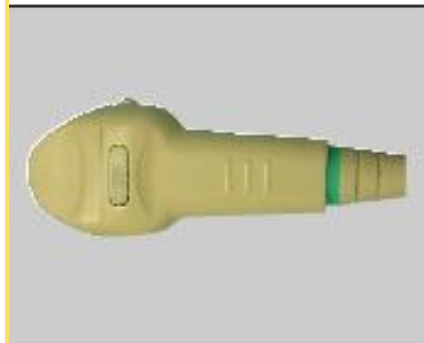




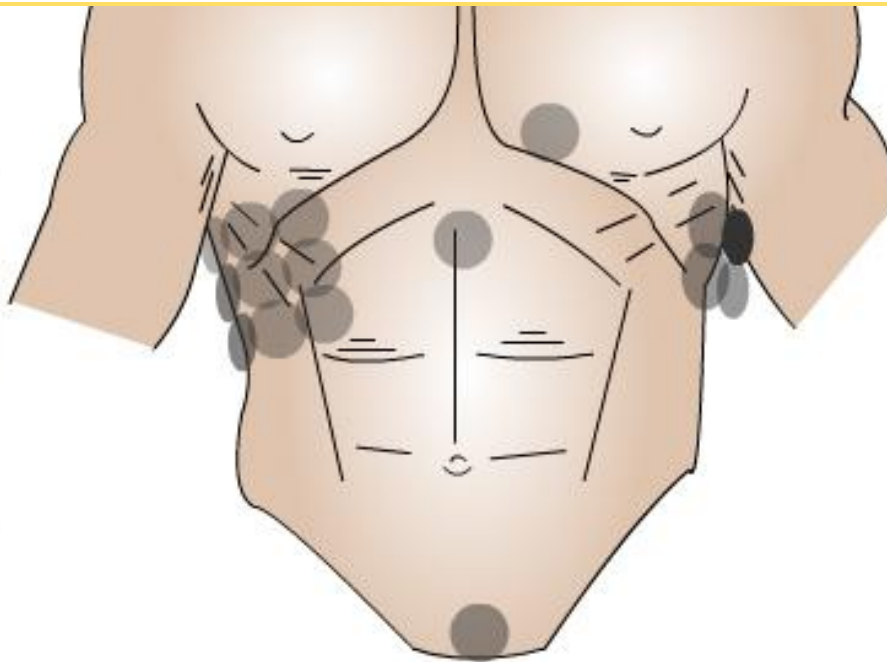
Sol üst kadranda - perisplenik



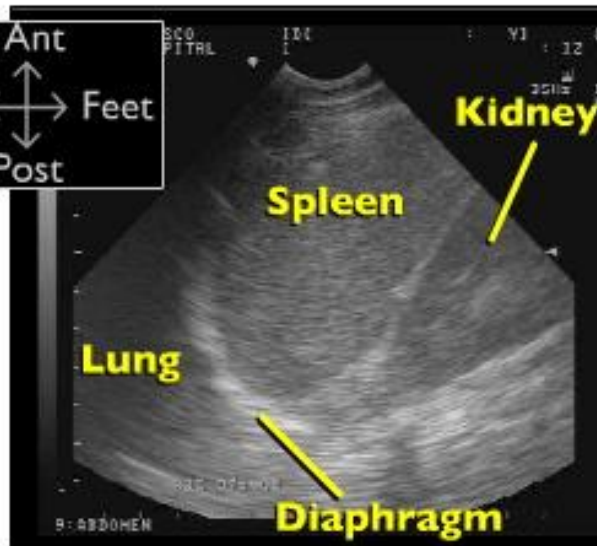
Probe Orientation



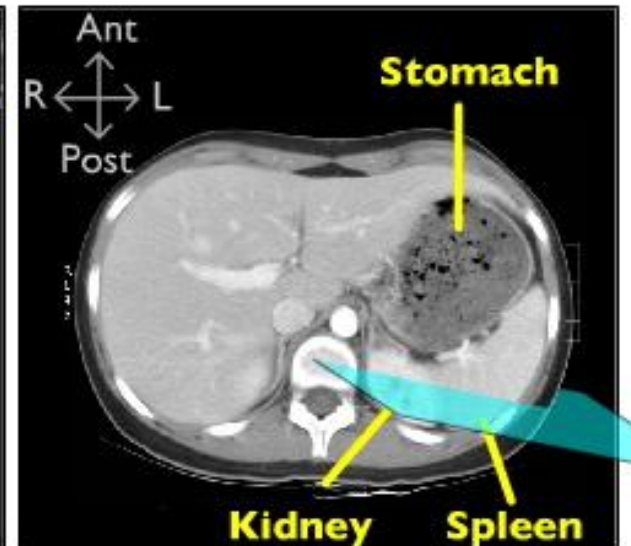
Coronal view



Actual ultrasound image

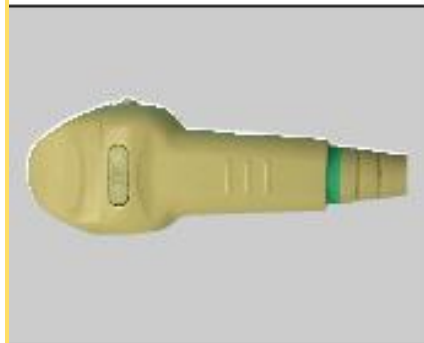


Labeled ultrasound image

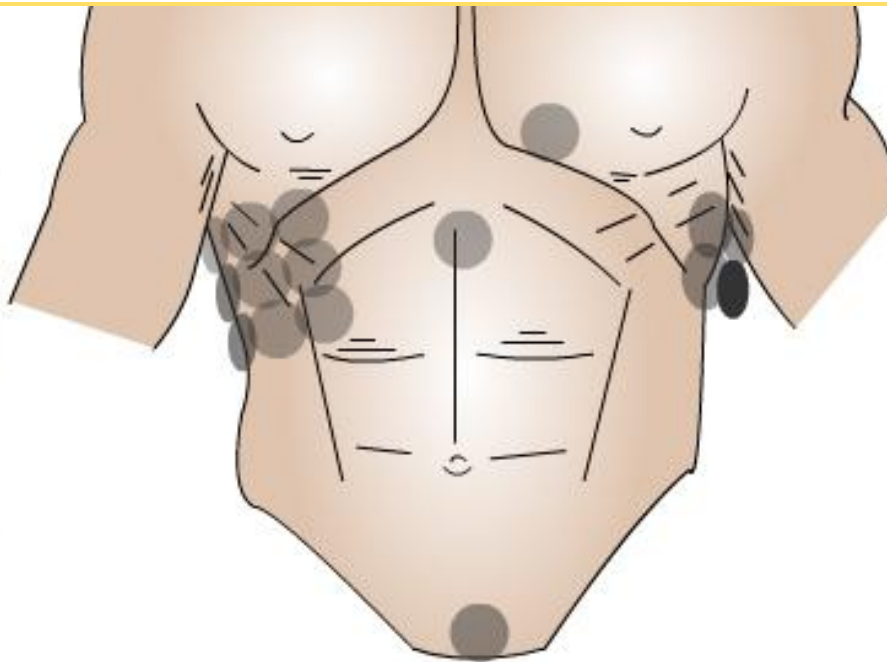


Cross-sectional CT anatomy

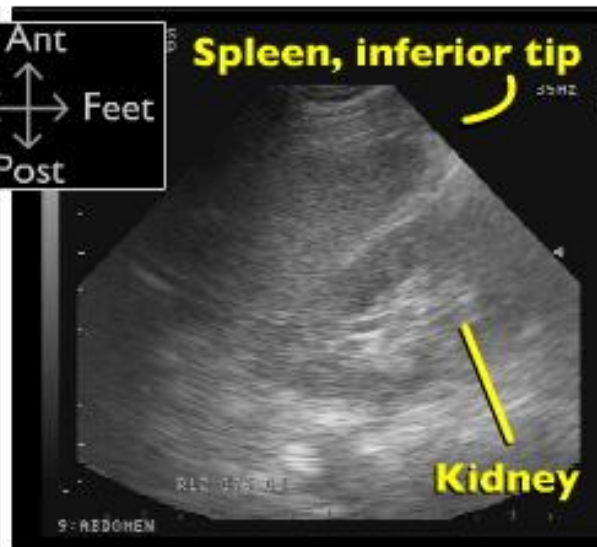
Probe Orientation



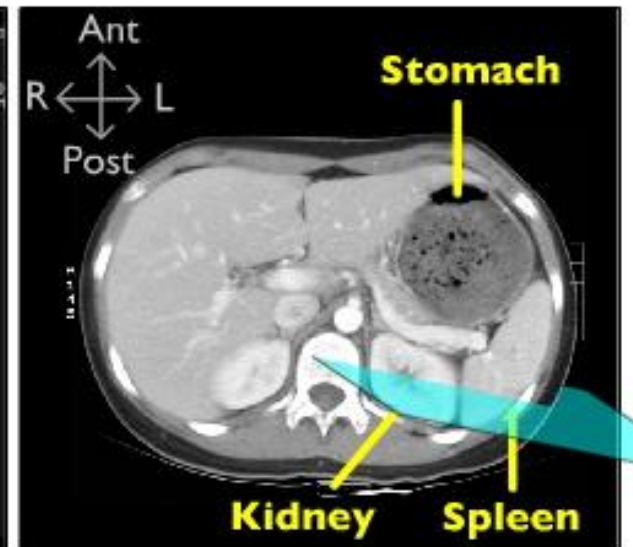
Coronal view



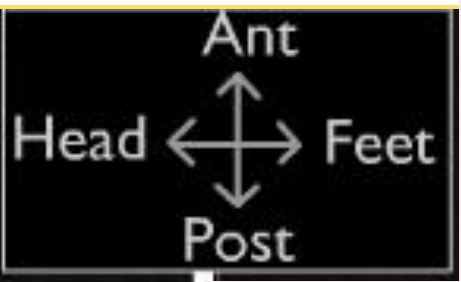
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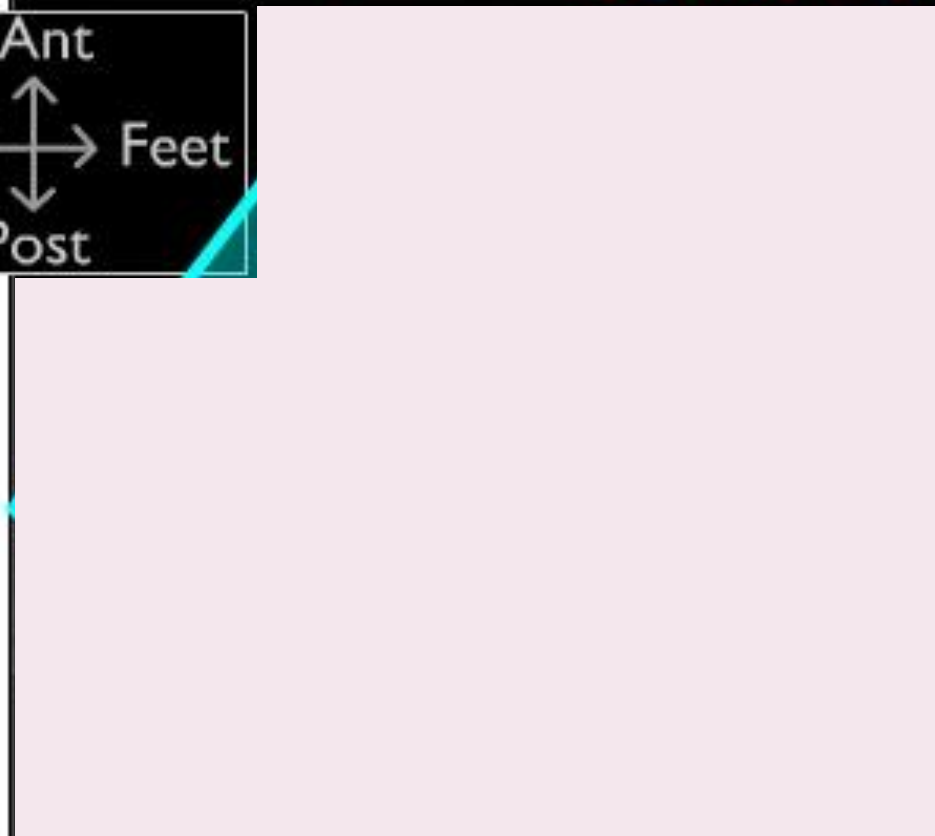


Labeled ultrasound image



Cross-sectional CT anatomy

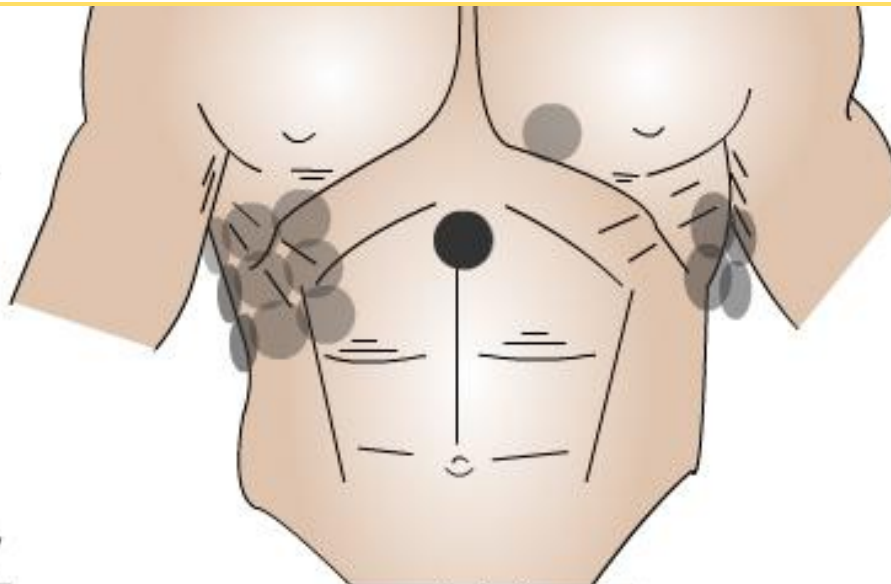




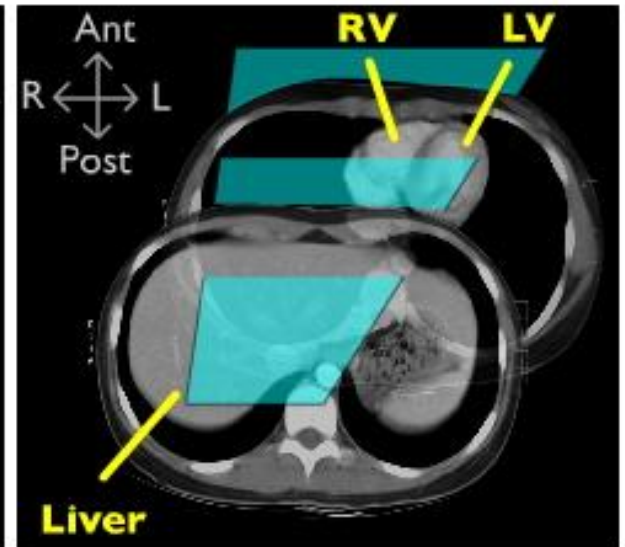
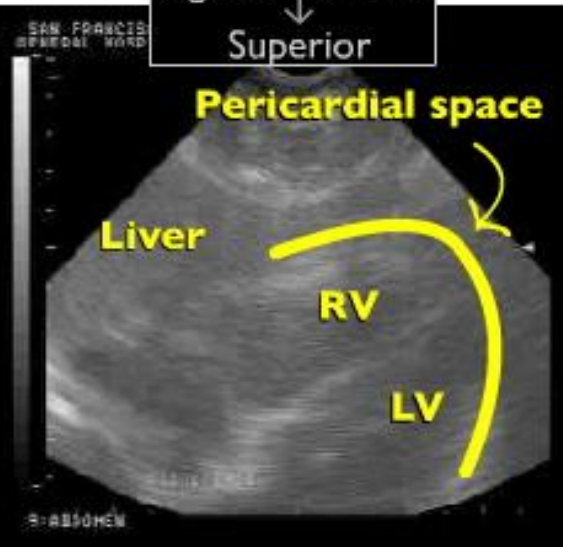
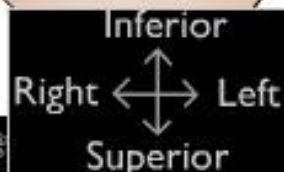
Kardiyak - subksifoid



Probe Orientation



Ibcostal coronal view



Actual ultrasound image

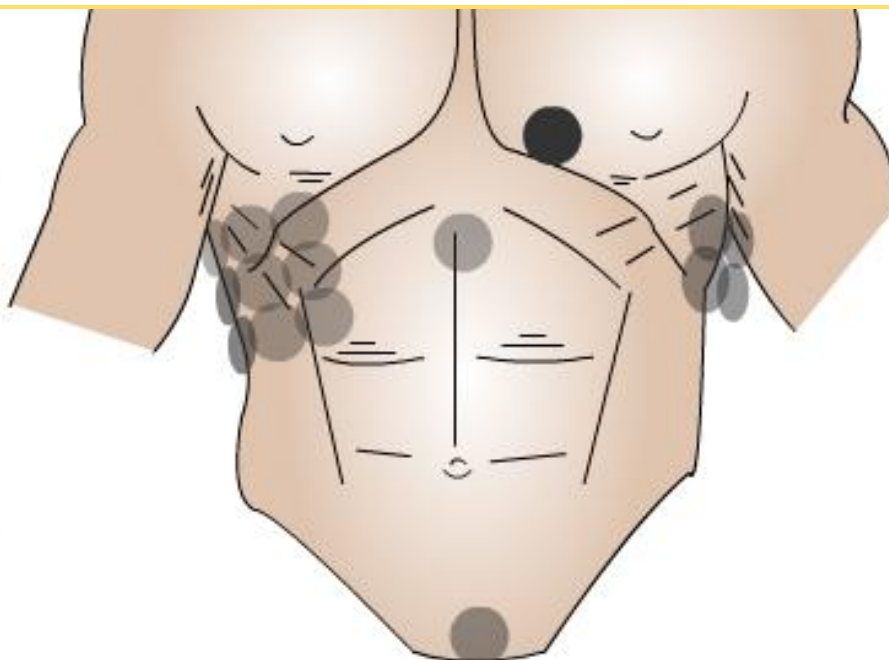
Labeled ultrasound image

Cross-sectional CT anatomy

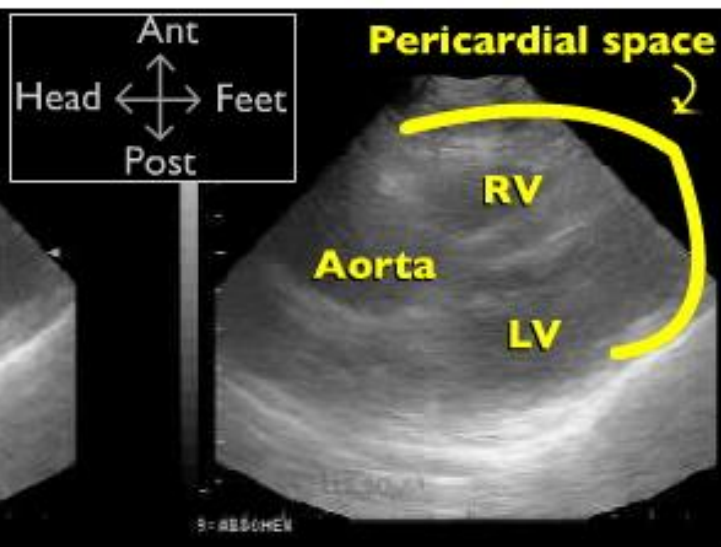
Probe Orientation



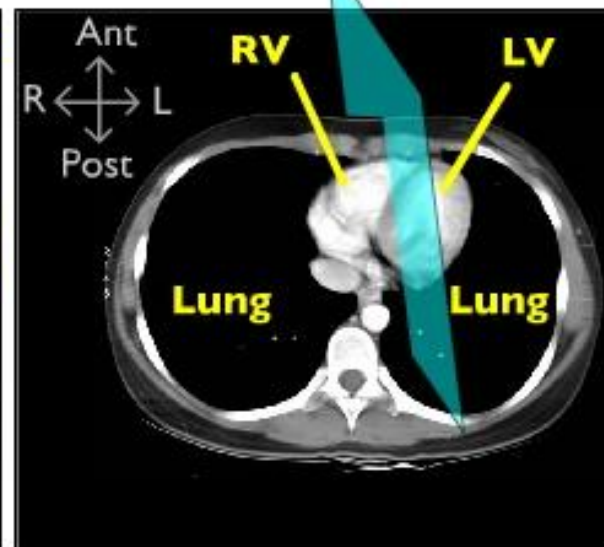
Parasternal long axis view



Actual ultrasound image



Labeled ultrasound image



Cross-sectional CT anatomy



Pelvik - suprapubik

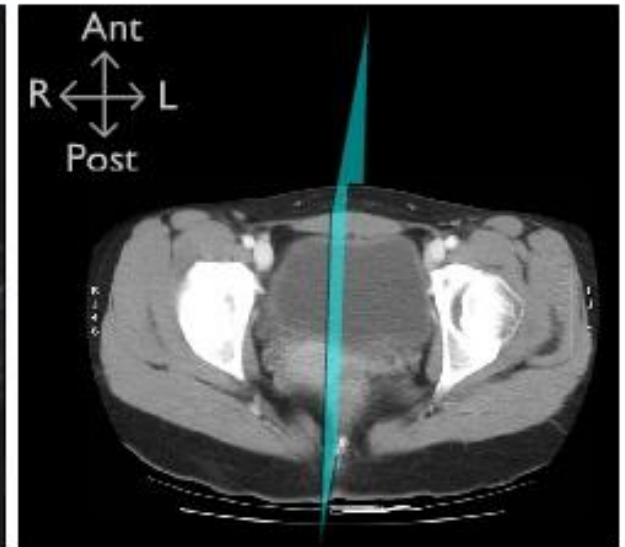
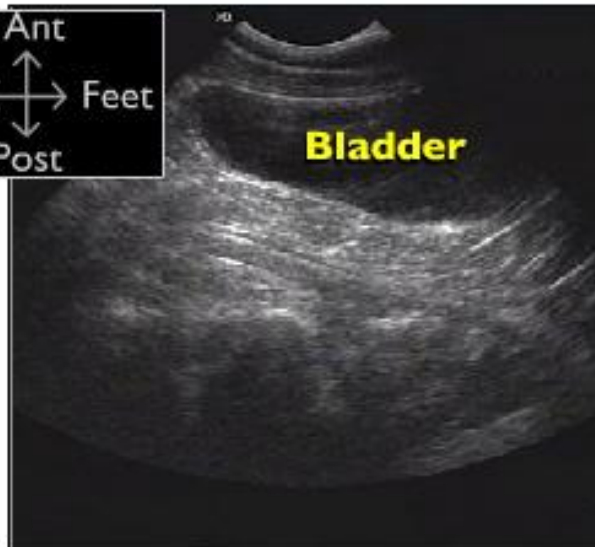
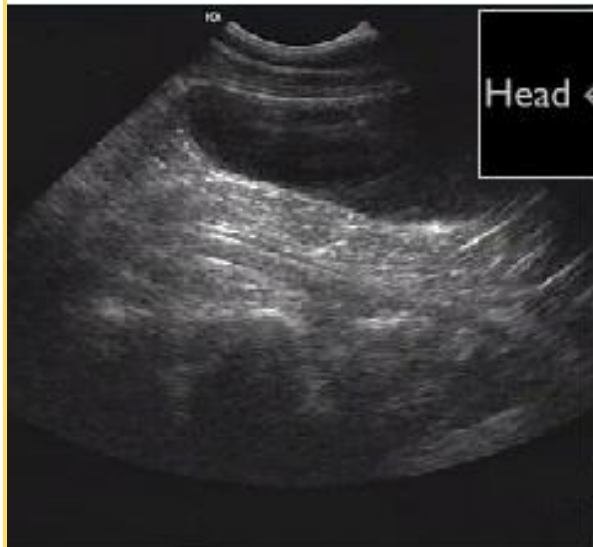
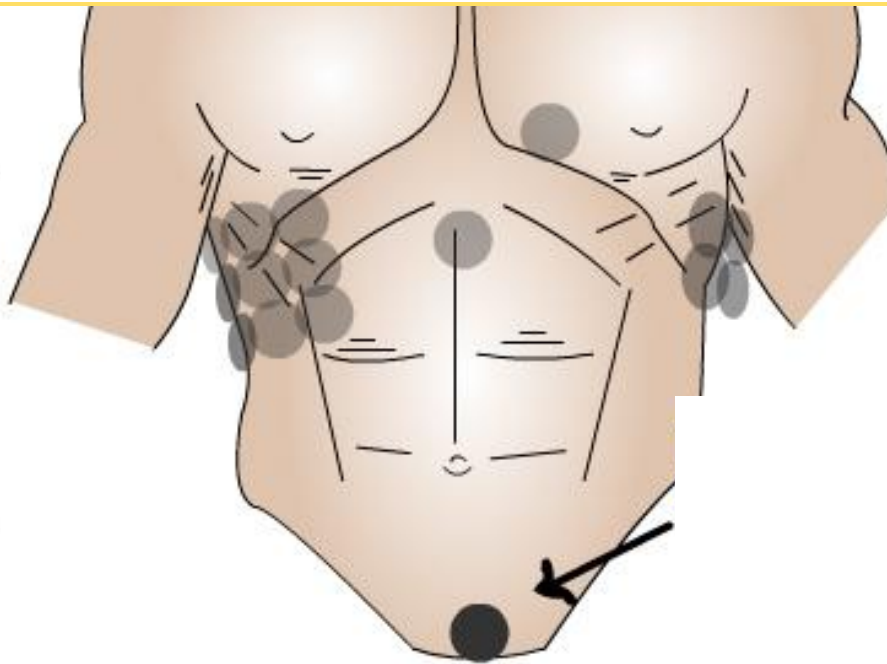


Probe Orientation



Perpendicular to skin

Sagittal view



Actual ultrasound image

Labeled ultrasound image

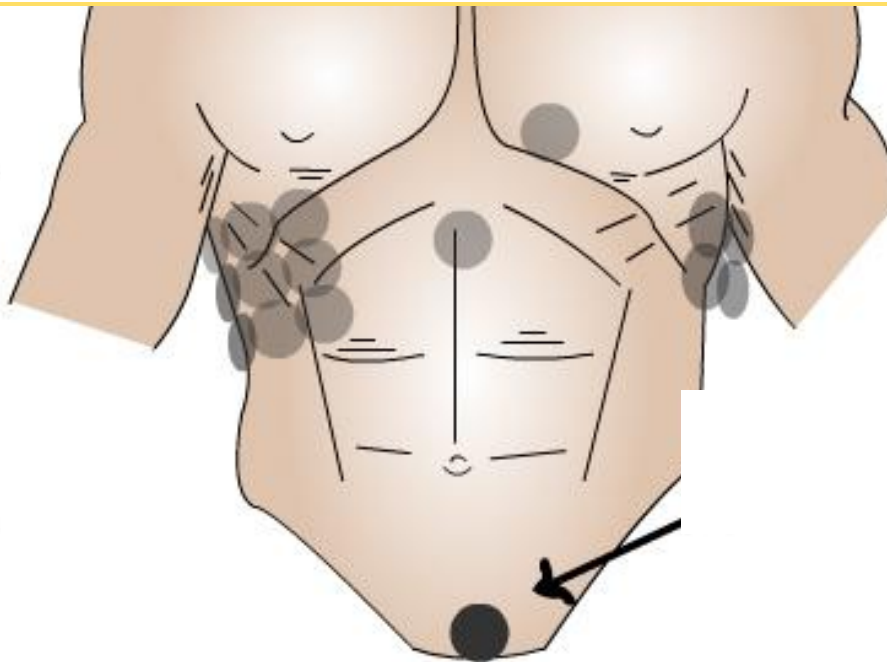
Cross-sectional CT anatomy

Probe Orientation

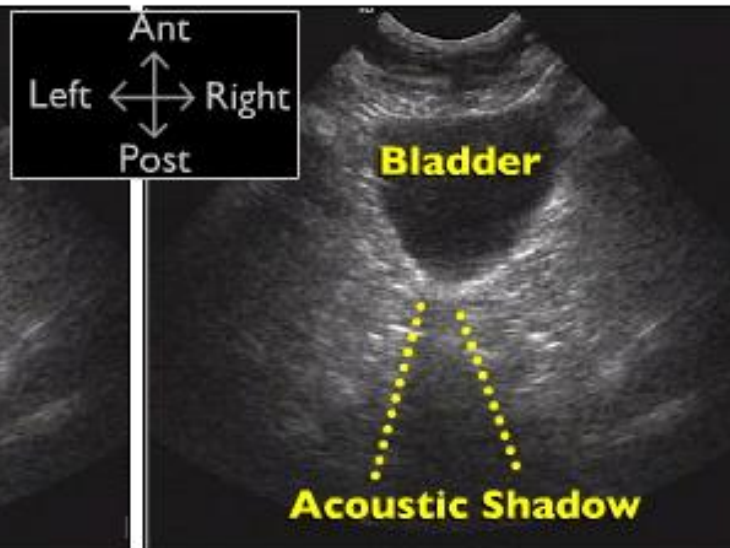


Perpendicular to skin

Transverse view



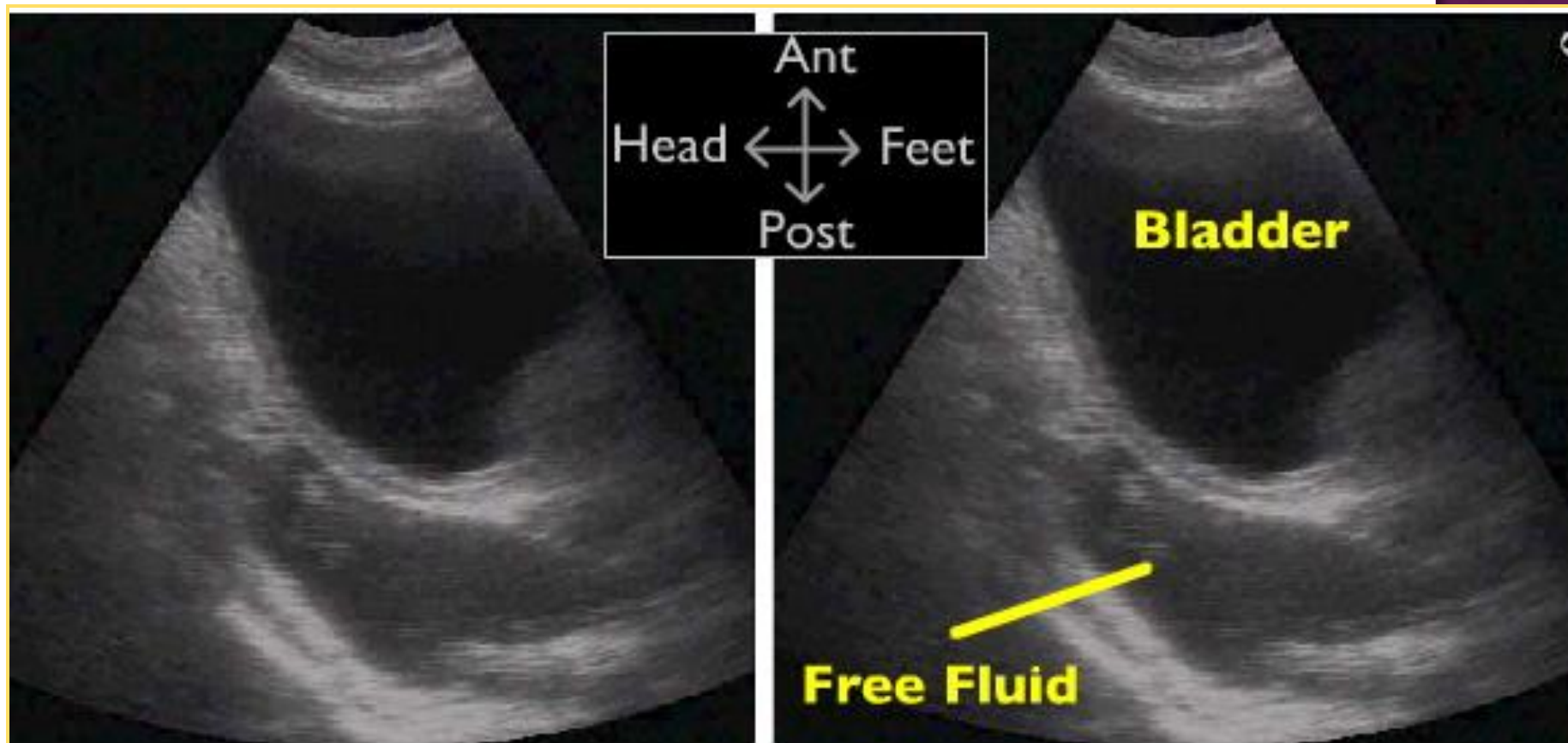
Actual ultrasound image

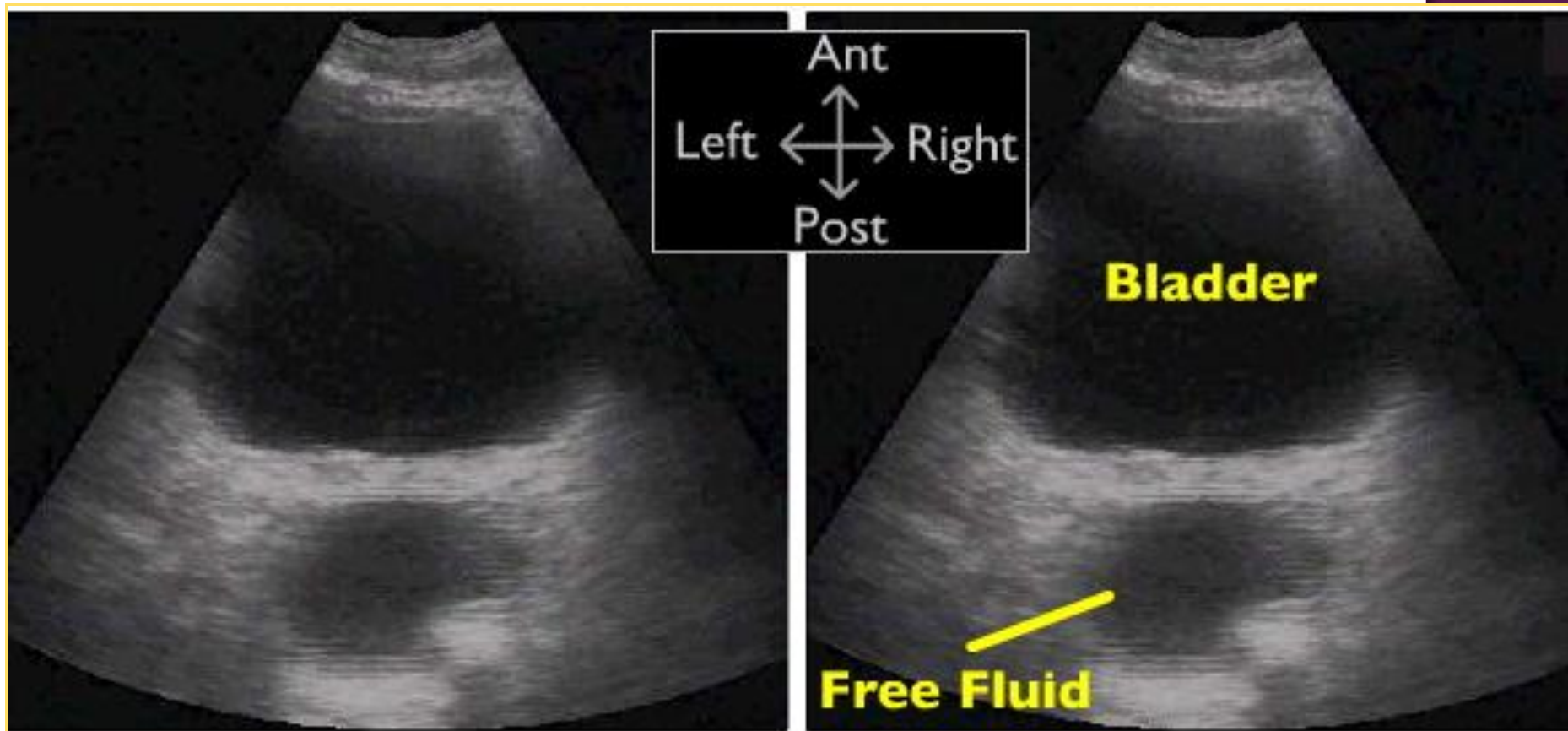


Labeled ultrasound image



Cross-sectional CT anatomy





ENDİKASYONLAR

○ Künt karın yaralanması

- Abdominal ağrı
(+/- peritoneal bulgu)
- Eksternal karın duvarı bulguları

○ Künt toraks yaralanması

- Göğüs ağrısı (+/- hemodinamik instabilite)
- Göğüs duvarı bulguları

○ Penetran yaralanmalar

- Acil cerrahi girişim endikasyonu bulunmayan

○ Travmaya eşlik eden:

- Bilinç durumunda değişiklik
- İlaç veya alkol alımı
- Paralizi
- Açıklanamayan hemorajik şok bulguları

○ Gebelikteki travmalar

○ Fraktürler:

- Pelvik
- Alt kotlar
- Lumbal / torasik vertebra

FAST

Hemodinamisi UNSTABİL

Hemodinamisi STABİL

Negatif

Pozitif

Negatif

Pozitif

Başka
patoloji ?

Ameliyat

Tekrarlayan
muayene /
BT

BT /
Ameliyat

KONTRENDİKASYON

- ⦿ Acil cerrahi girişim gerekliliği

INTRAPERITONEAL SıVı ?

- ◉ *Abrams, et al (1999):*
 - Trendelenburg ... 400 cc
 - Supin ... 700 cc
- ◉ *Jehle VKD, et al: Sensitivity in detecting free intraperitoneal fluid with the pelvic views of the FAST exam. Am J Emerg Med. 2003:*
 - Pelvik görüntü (dolu mesane) ... 100 cc
- ◉ *Ma OJ, et al.. Prospective analysis of a rapid trauma ultrasound examination performed by Emergency Physicians. J Trauma. 1995*
- ◉ *Porter RS, et al.. Use of ultrasound to determine the need for laparotomy in trauma patients. Ann Emerg Med. 1997;*
 - 4 FAST görüntüsünde ... 250-600 cc

SINIRLANDIRICI FAKTÖRLER :

◉ Bazı ciddi travmatik yaralanmalar

- renal pedikul yaralanması
- İçi boş organ yaralanması
- Barsak duvarı kontuzyonu
- Pankreatik travma
- Diyafragmatik yaralanma
- Retroperitoneal yaralanma

◉ Nontravmatik serbest sıvılar

◉ Travma sonrası geçen süreye bağlı değişiklikler

◉ İntraperitoneal yağ

RUSH

(RAPID ULTRASOUND FOR
SHOCK AND HYPOTENSION)

- ◉ Travmalı hasta

FAST

- ◉ Travma olmayan hipotansif ya da şok bulguları olan hastada

RUSH

RUSH

- Acilde hasta başında yapılır. Aşağıdaki komponentlerden oluşur.
 - Kalp (Heart)
 - İVC
 - Morison's/FAST, Toraksın abdominal penceresi
 - Aort
 - Pnomotoraks
- These components can be recalled with the mnemonic: HI-MAP

HEART

RUSH'da kalbin değerlendirilmesi

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

INFERIOR VENA CAVA

○ Hastanın sıvı (kan) volumünü tahmin edebilir.

■ 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

- ◉ **FAST gibi serbest sıvı aranır**
 - right upper quadrant,
 - left upper quadrant,
 - suprapubic area
- ◉ ectopic pregnancy,
- ◉ massive ascites,
- ◉ ruptured viscus,
- ◉ spontaneous intraabdominal bleeding,
- ◉ intraperitoneal rupture of an AAA, etc.
- ◉ Trendelenberg position is sensitive for significant intraperitoneal blood or fluid.

AORTA

AAA 4 seviyede değerlendiririz (Ksiphoid den umblicusa doğru ilerlenerek bu bölgeler görüntülenir)

- ◉ Kalpten çıktıktan hemen sonra
- ◉ Suprarenal
- ◉ Infrarenal
- ◉ Iliac bifurcation hemen üstünde
- ◉ Eğer herhangi bir düzeyde Aorta çapı > 5 cm ise hipotansif hasta aksi ispat edilene kadar AAA kabul edilir

PNEUMOTHORAX

Travma olmasa da aşağıdaki nedenlerle tansiyon px olup hipotansiyon görülebilir

- ◉ Central line
- ◉ Pacemaker placement
- ◉ Thoracentesis.

- ◉ Her 2 hemitoraksta anterior 3. intercostal aralıktan başlayarak high frequency probe ile bakılır
- ◉ M-mode daha kolay gösterebilir.
 - ocean/beach or seashore -- no pneumothorax
 - continuous ocean or stratosphere sign---pneumothorax

RUSH

2 dakikadan kısa sürer (HI-MAP)

1. **Heart:** Parasternal long and then 4 chamber cardiac views (**general purpose or cardiac probe**)
2. **IVC** view with the **same probe**
3. If not already using it, switch to **general purpose abdominal probe** and scan **Morison's** and splenorenal views with thorax images and then examine the bladder window.
4. Increase your depth and find the **aorta** above and below the renal artery with four views.
5. Scan both sides of the chest for **pneumothorax**. 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)

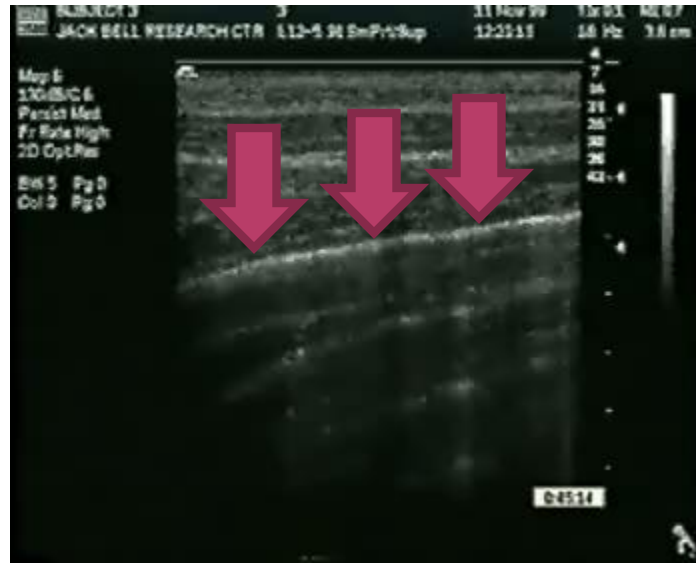
- ◉ Akciger, USG ile görüntülenebilecek bir organ değildir
- ◉ Yoğun bakımda portabl röntgeni kullanmak nisbeten ucuz ve kolay bir yöntemdir.
- ◉ Ancak hastaların derin insp. yapamamaları, supın pozisyonda kalma gereklilikleri gibi sınırlamalar vardır
- ◉ Bu durumda direk grafinin pnomotoraks için spesifitesi %53 tür
- ◉ Gold standart CT dir

- ◉ CT mümkün olmayan durumlarda toraks USG kullanılabilir
- ◉ Toraks USG nin pnomotoraksta sensitivitesi CT'ye oranla %92 dir
- ◉ USG'nin Teknik üstünleri de vardır
- ◉ 4-12 MHz probalar kullanılabilir

STATİK İMAJLAR

SLS (SLIDING LUNG SIGN)

- Normal



A HATTI

- ◉ Akciğer yüzeyinden yansıyan artefaktlar pnomotoraks tanısında kullanılmaktadır.
- ◉ Parietal plevra net ekojenik bir hat olarak görünür, viseral plevra ise artefaktlar arasında izlenemez.
- ◉ Parietal plevranın tekrarlayan yansımaları “A Hattı” olarak isimlendirilmektedir.

A HATTI (AKCIĞER ROKET BULGUSU KAYBI)

○ Pnomotoraks

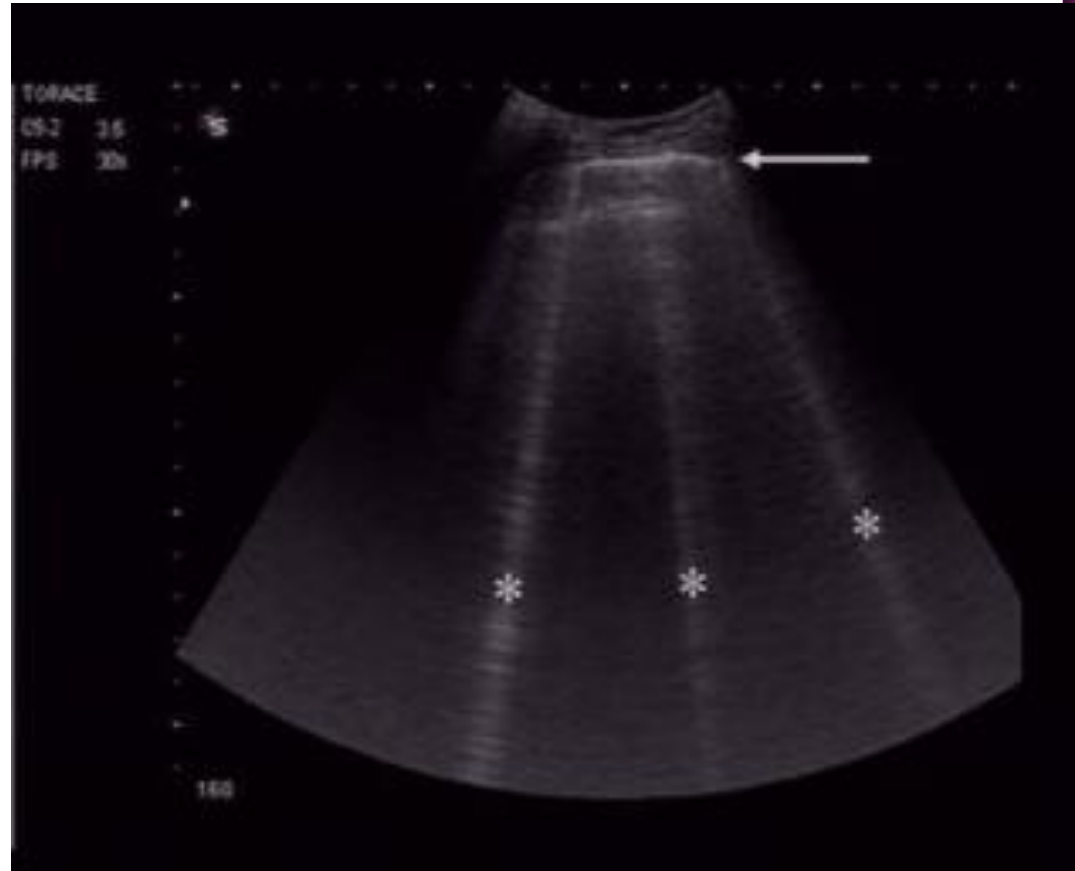


B HATTı (KUYRUKLU YILDIZ)

- Karakteristik sonografik bulgu “Kuyruklu yıldız artefaktı” ya da “B çizgisi” olarak isimlendirilen vertikal bir artefakttır.
- SLS ye bağlıdır ve A hattını siler

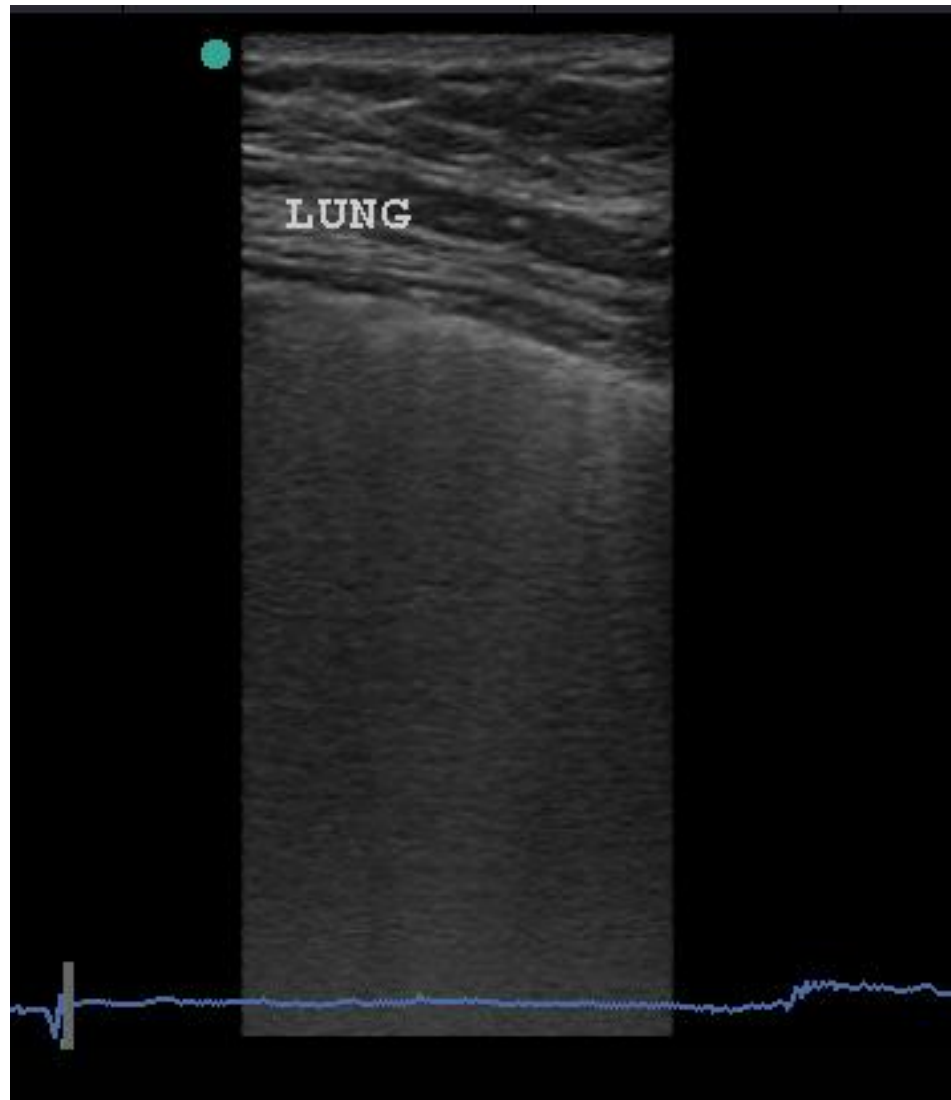
B HATTI (AKCIĞER ROKET BULGUSU)

⦿ Normal



- ◉ B-line yok ama lung sliding varsa
 - emphysema
 - hyperinflated lung states..

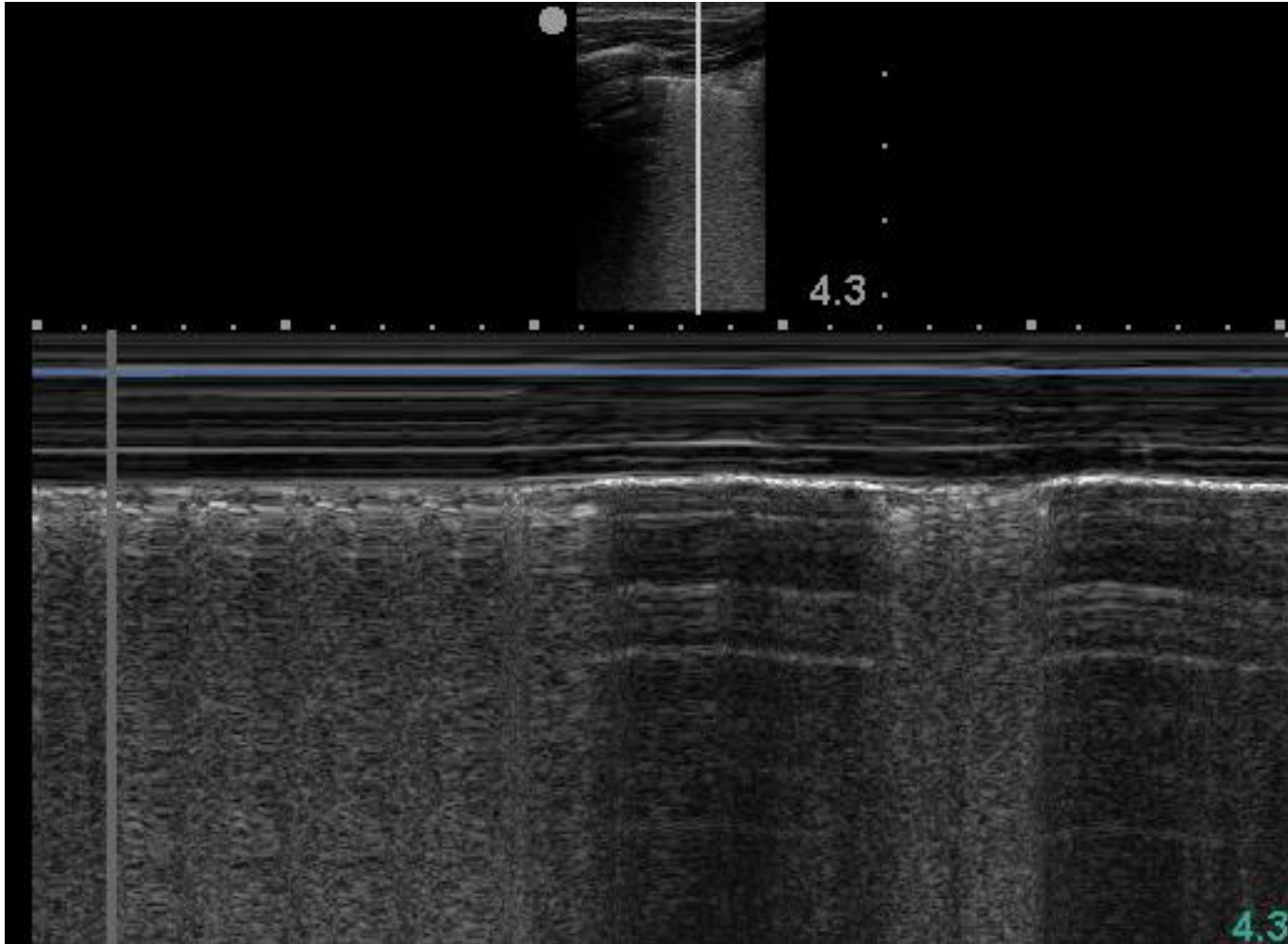
Z HATTI



E HATTI

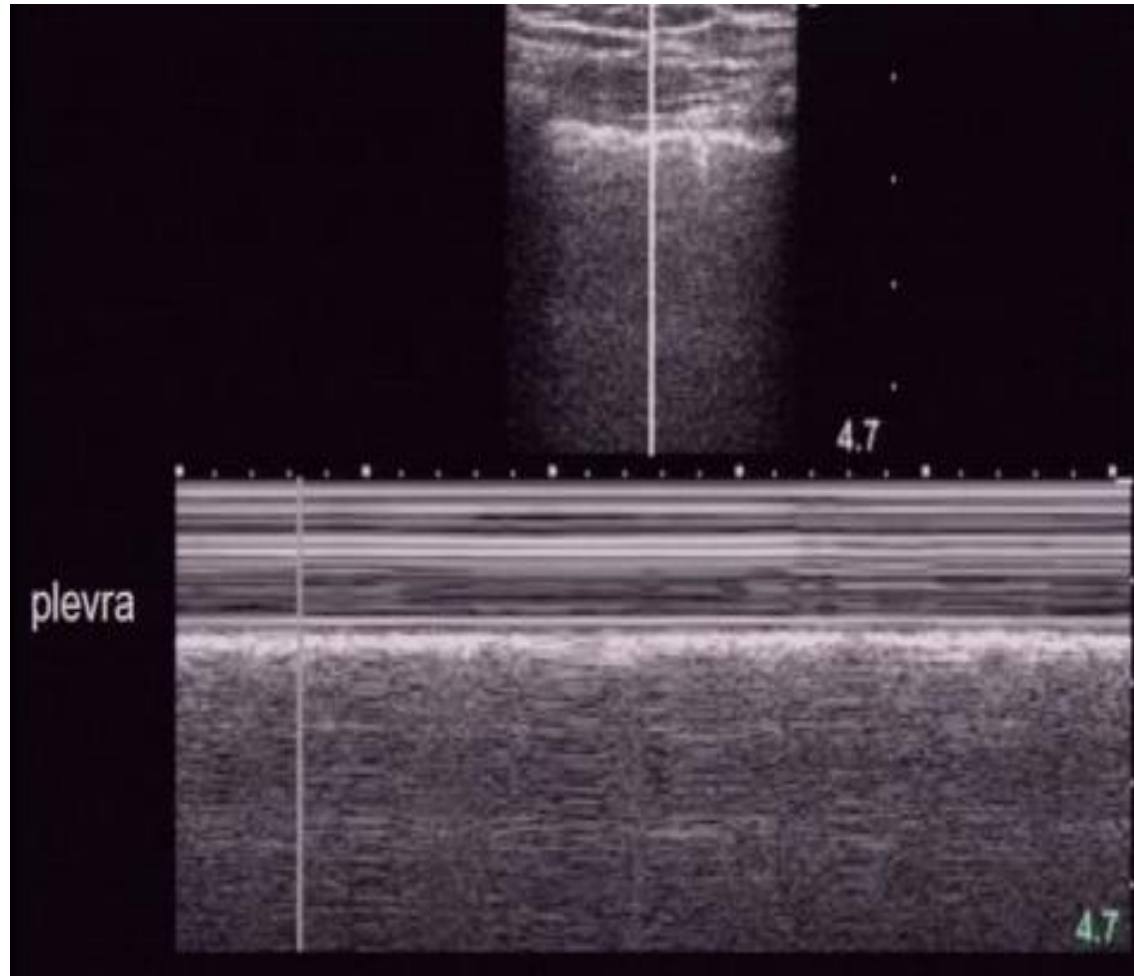
- ◉ Plevra üzerinden başlayan kuyruklu yıldız artifaktı (yabancı cisim, ateşli silah saçma parçacıkları)

DINAMİK DEĞİŞİKLİKLER



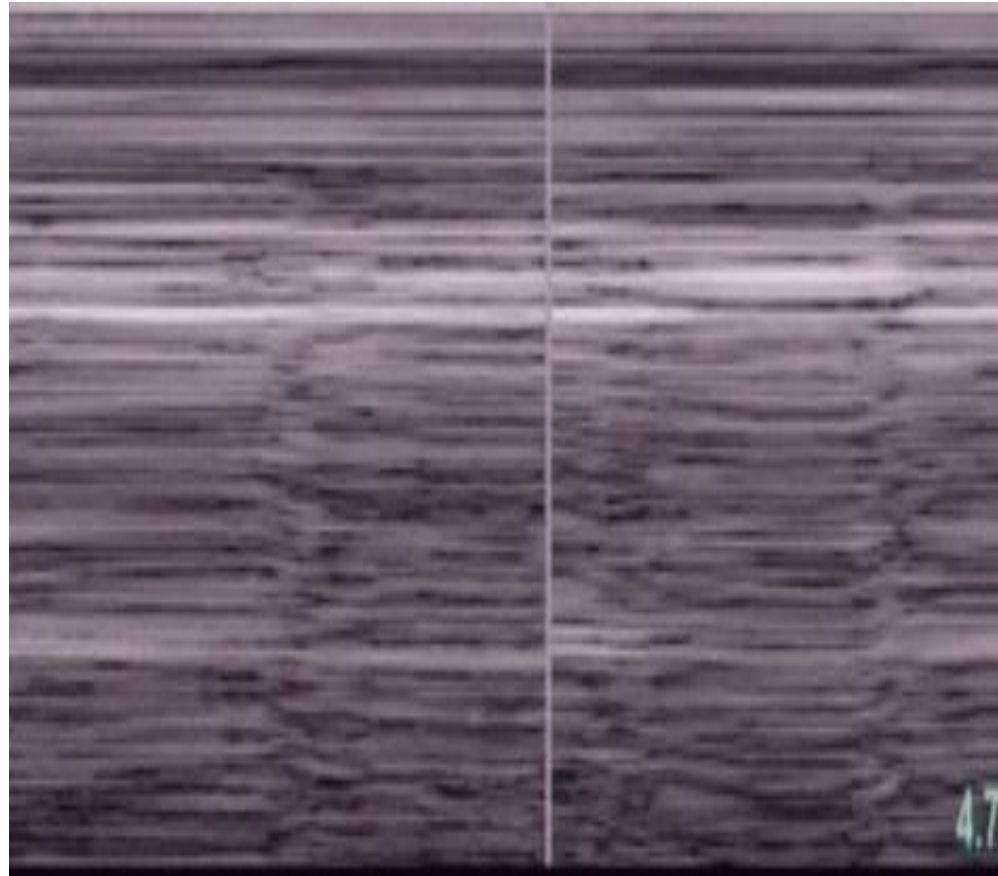
SAHIL-KUMSAL

⦿ Normal

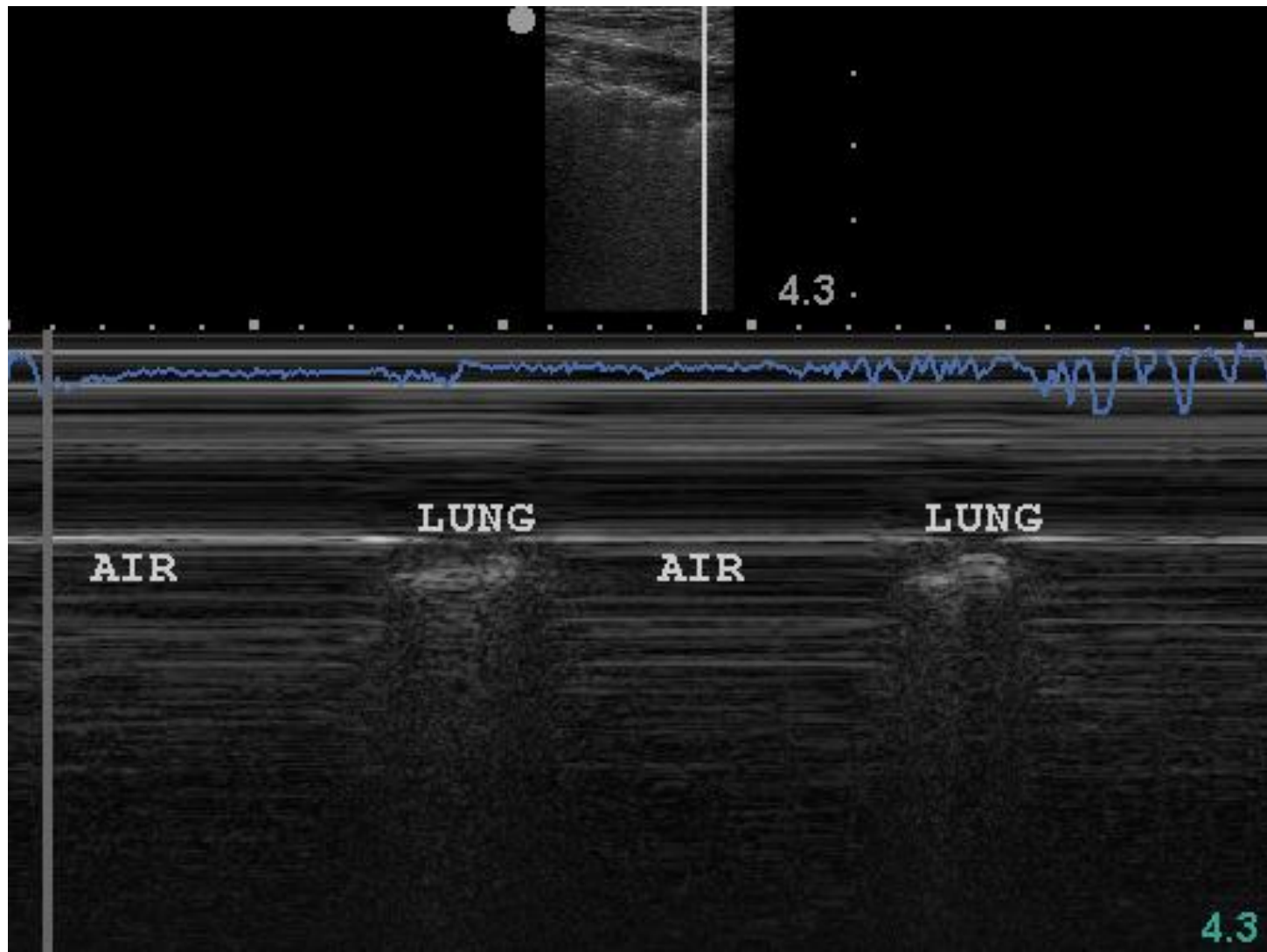


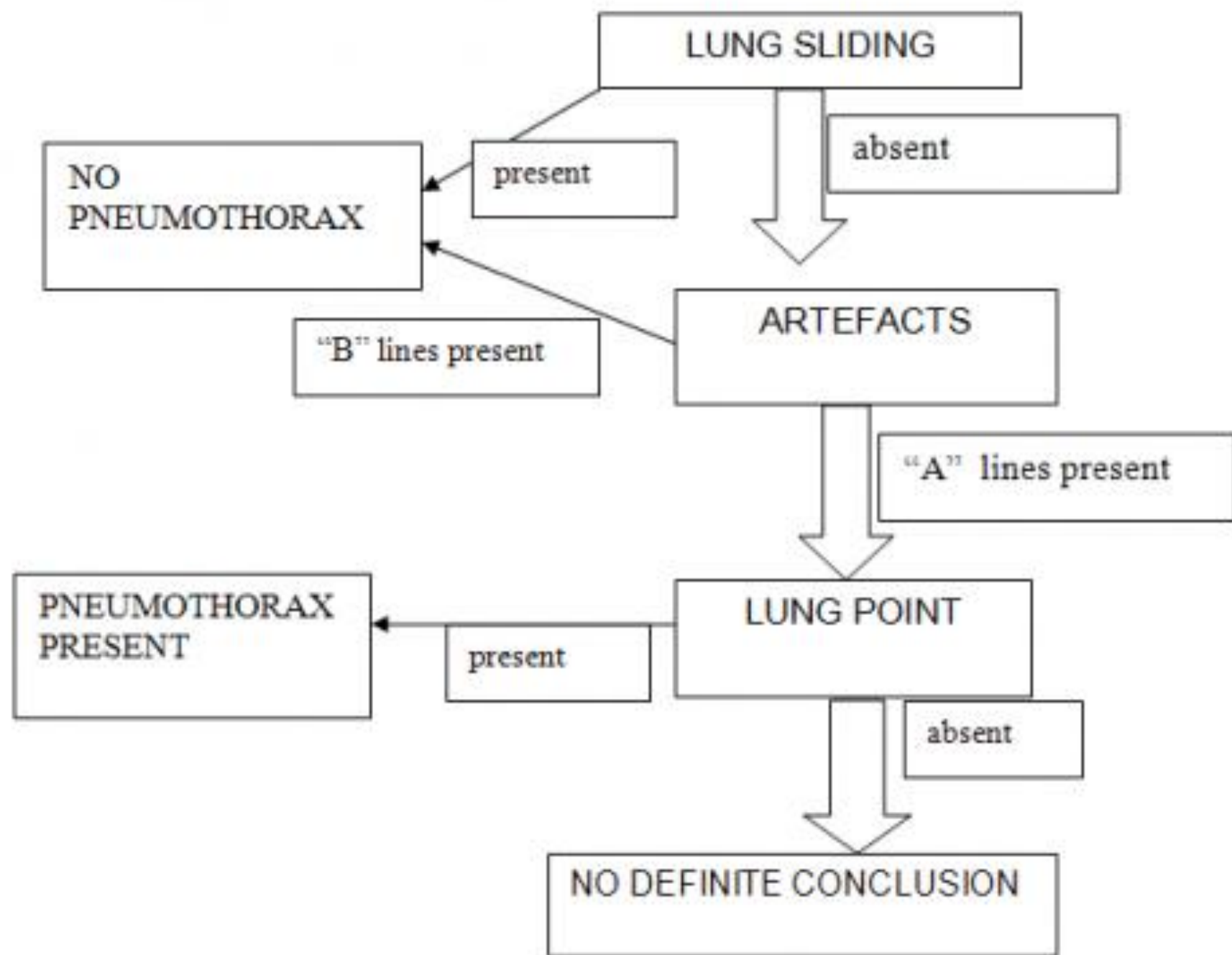
STROTOSFER BULGUSU

⦿ Pnomotoraks

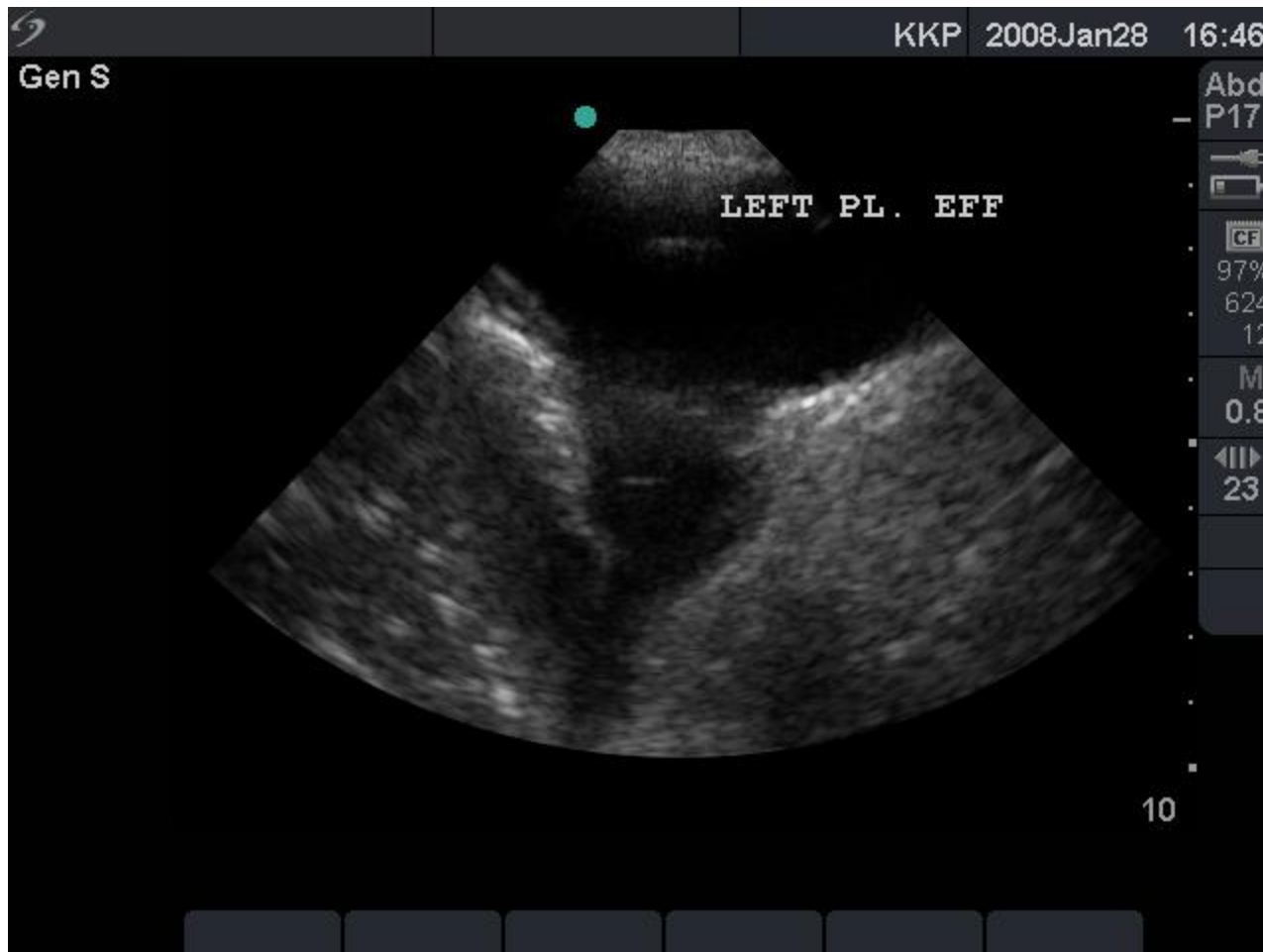


LUNG POINT





PLEURAL EFFUSION



PLEURAL EFFUSION

- ◉ Hasta başı USG ile kolaylıkla görülebilir
- ◉ Hipoekoik (siyah) alan şeklinde görülür
- ◉ Hem insp hem de eksp da görülür

PLEURAL EFFUSION

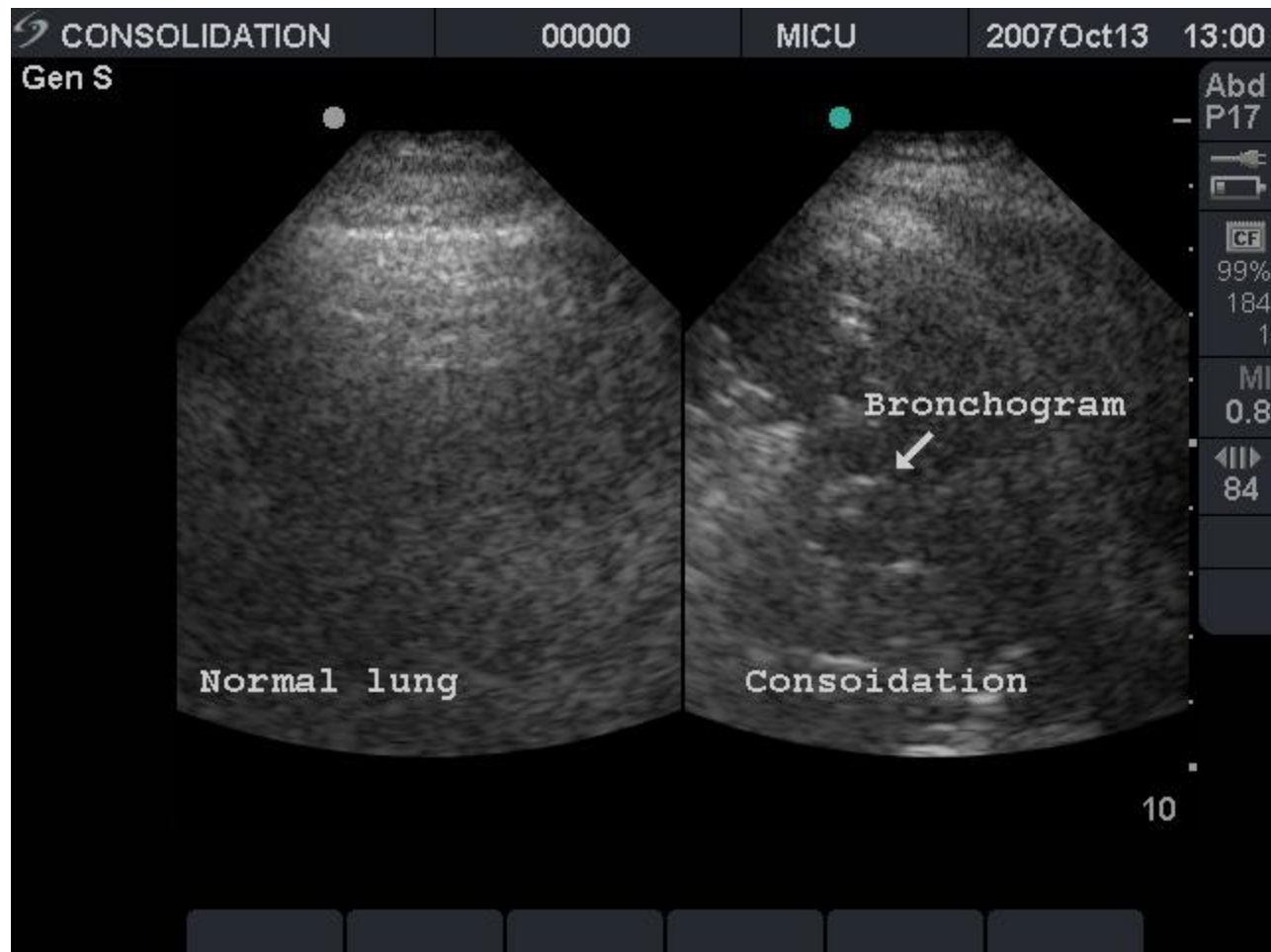
◉ Pleural Effusion diyebilmemiz için

- a.image anatomic olmalı(not artefactual)
- b.diaphragm üzerinde olmalı
- c.Image superficial parietal pleurada kotlar arasında $> 0.5\text{cm}$ derinlikte olmalı
- d.Image the visceral pleura ile sınırlanmalı

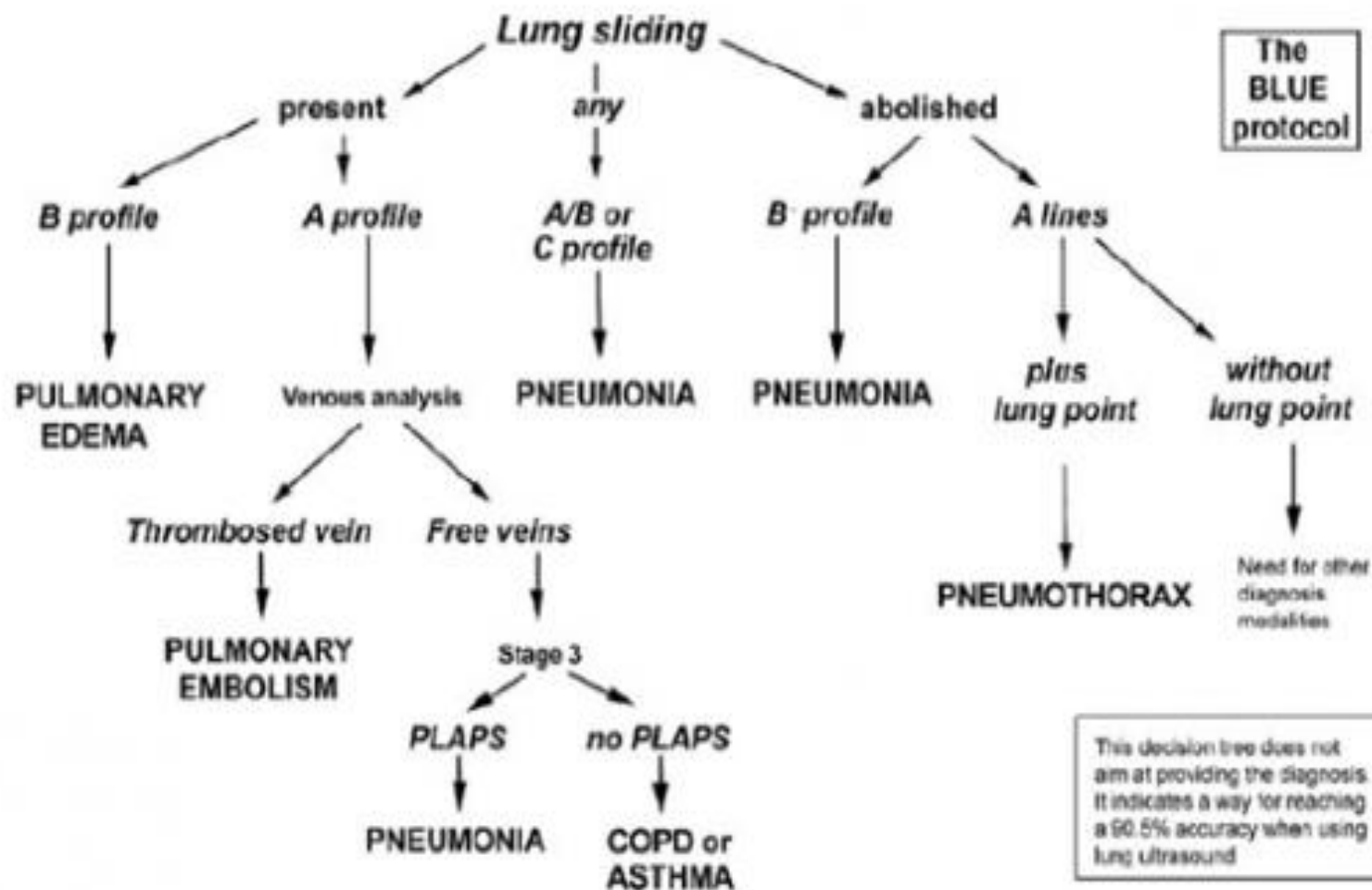
- ◉ USG ile pleural fluid volumünü ölçmek zordur. 5cm'den derin ise sıvı 500ml'den çoktur
- ◉ İnterpleural aralık 15mm den az ise torasentez risklidir.

CONSOLIDATION

- ◉ A standard ultrasound probe is used to image consolidations.
- ◉ Su iyi bir iletkenidir. Alveolar konsolidasyonda da su artar.
- ◉ Normalde hipoekoik görünen akciğer, kollaps ve konsolide alanın bulunduğu bölgede hipoekoik görünmez.







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.

TEŞEKKÜRLER