

# ULTRALJUD

T11 VT 2016

Susann J Järhult MD, PhD  
Specialistläkare Akutsjukvård



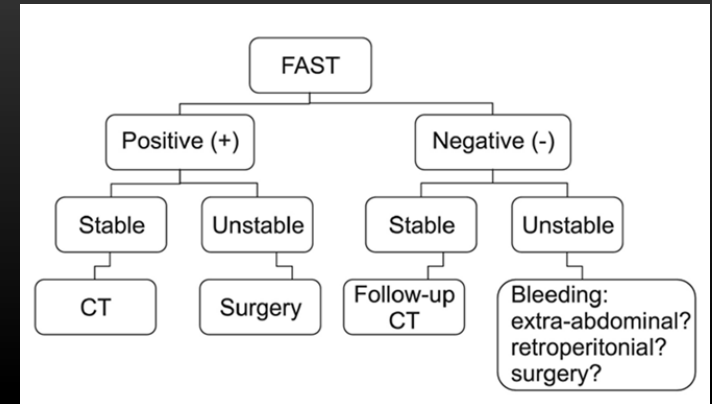


# ULTRALJUD I AKUTSJUKVÅRD

- ✓ Bärbar
  - ✓ Snabb
  - ✓ Reproducerbar
  - ✓ Icke-invasiv
  - ✓ Kostnadseffektiv
  - ✓ Många olika användningsområden
  - ☐ Mindre väletablerad
  - ☐ Evidens under utveckling
  - ☐ Användarberoende
  - ☐ Begränsad information
  - ☐ Undvik pitfalls!
-

- Positionering

- Patient
- Probe



- Extended FAST (eFAST)

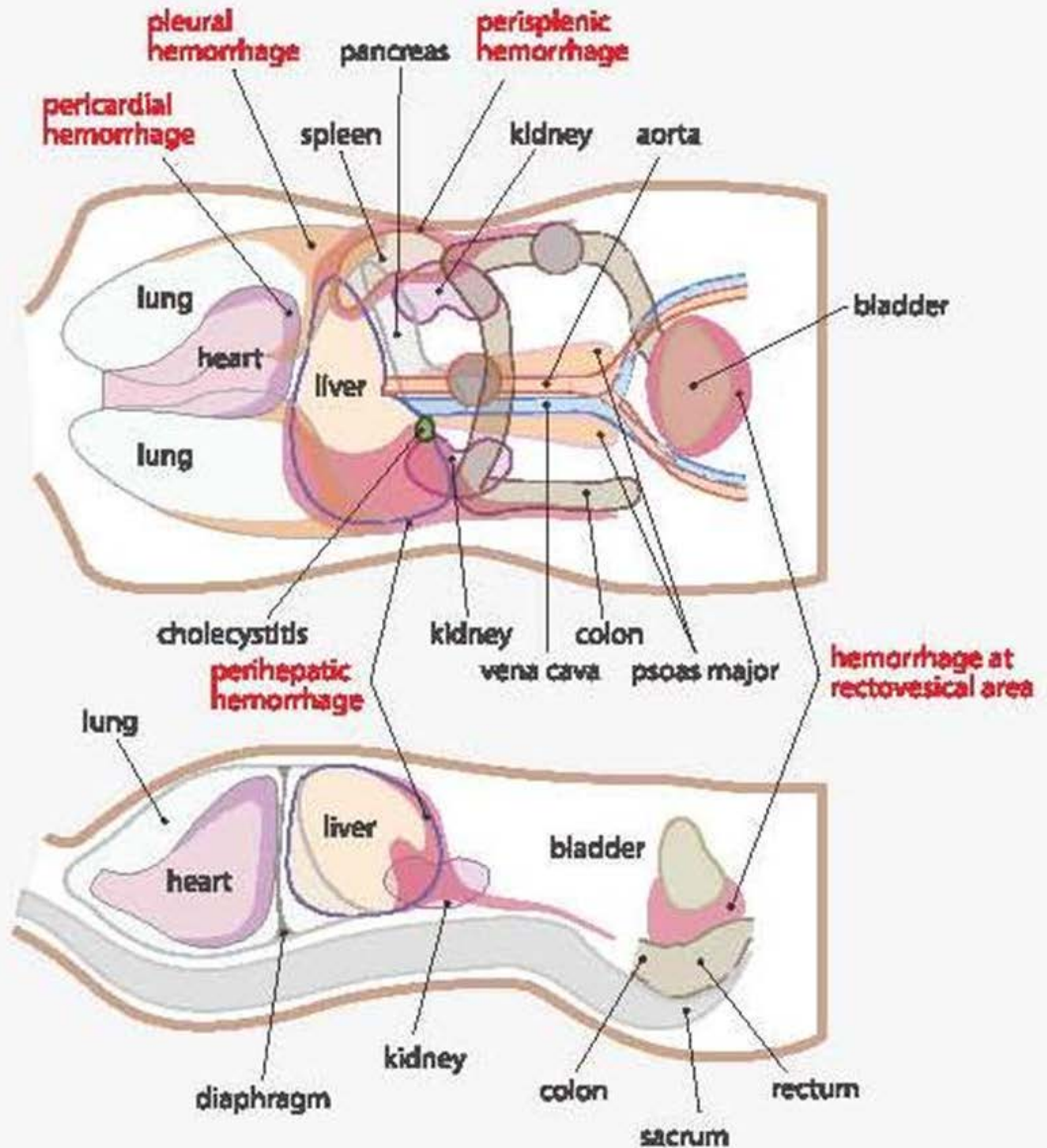
- Fri vätska i buk och thorax
- Pneumothorax

- FATE

- Basal hjärtbedömning

# Positioning

- pericardial hemorrhage
  - pleural hemorrhage
  - intra-abdominal hemorrhage
  - tumor
- \*The small intestine is also embedded.



# Abdominal quadrants and their structures

## RUQ

- Right lobe of the liver
- Gallbladder
- Pylorus
- Duodenum
- Head of the pancreas
- Hepatic flexure of the colon
- Portions of the transverse and ascending colon

## LUQ

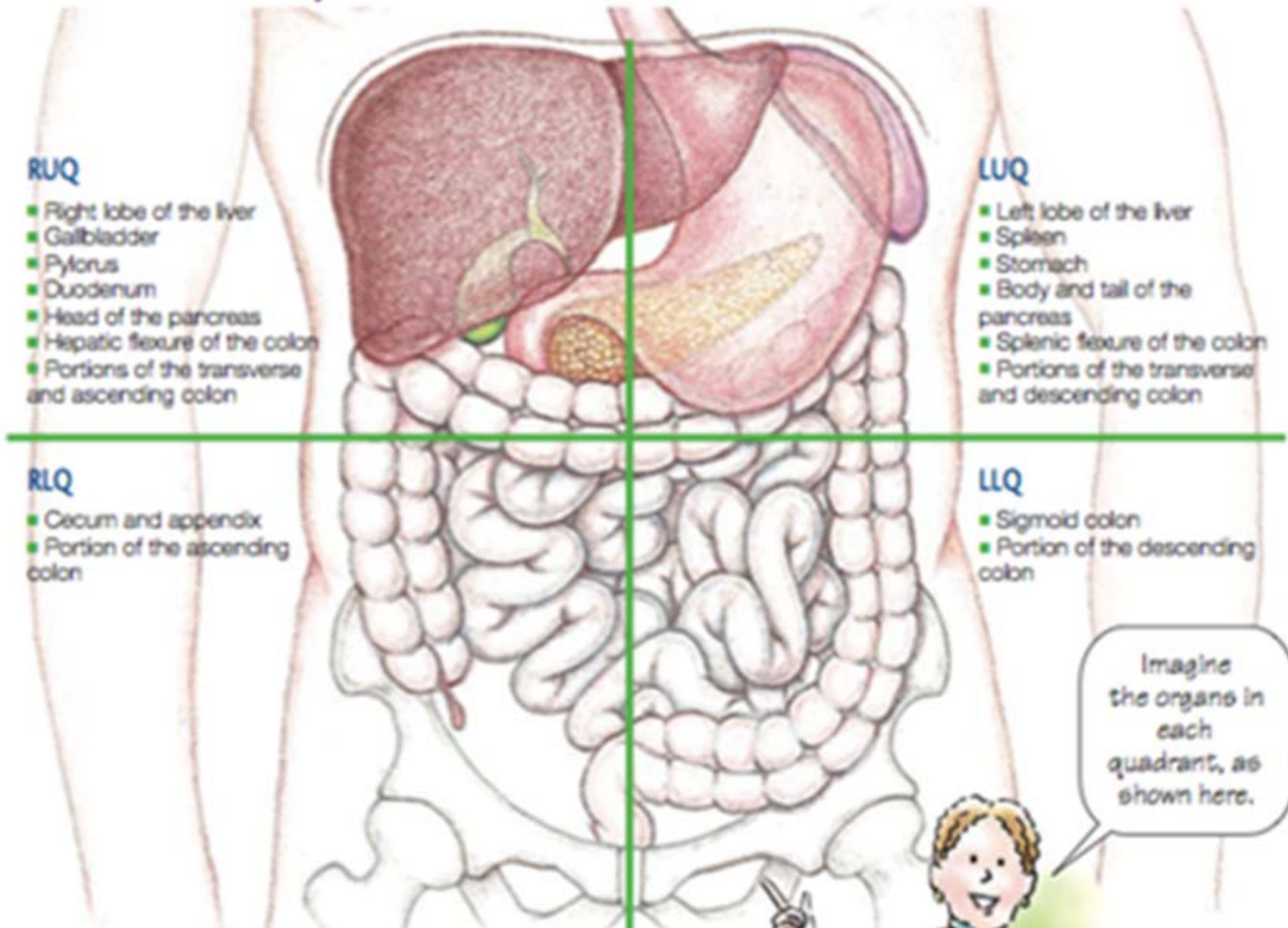
- Left lobe of the liver
- Spleen
- Stomach
- Body and tail of the pancreas
- Splenic flexure of the colon
- Portions of the transverse and descending colon

## RLQ

- Cecum and appendix
- Portion of the ascending colon

## LLQ

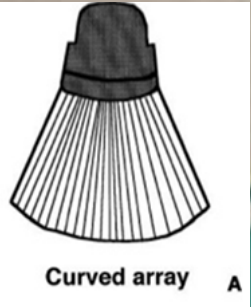
- Sigmoid colon
- Portion of the descending colon



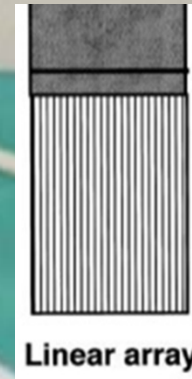
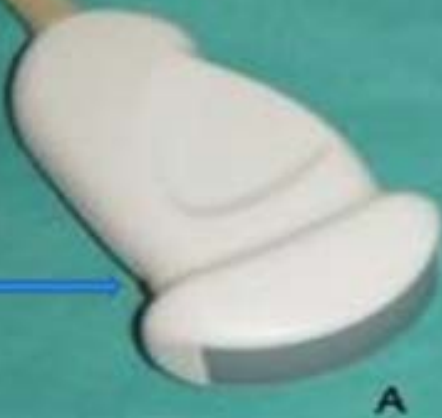
Imagine the organs in each quadrant, as shown here.



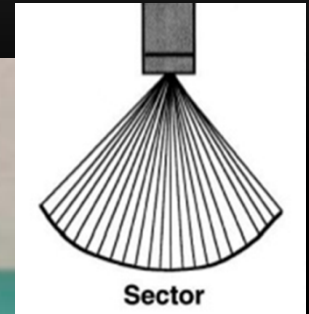
# PROBER



Abdominell



Blodkärl



Cor

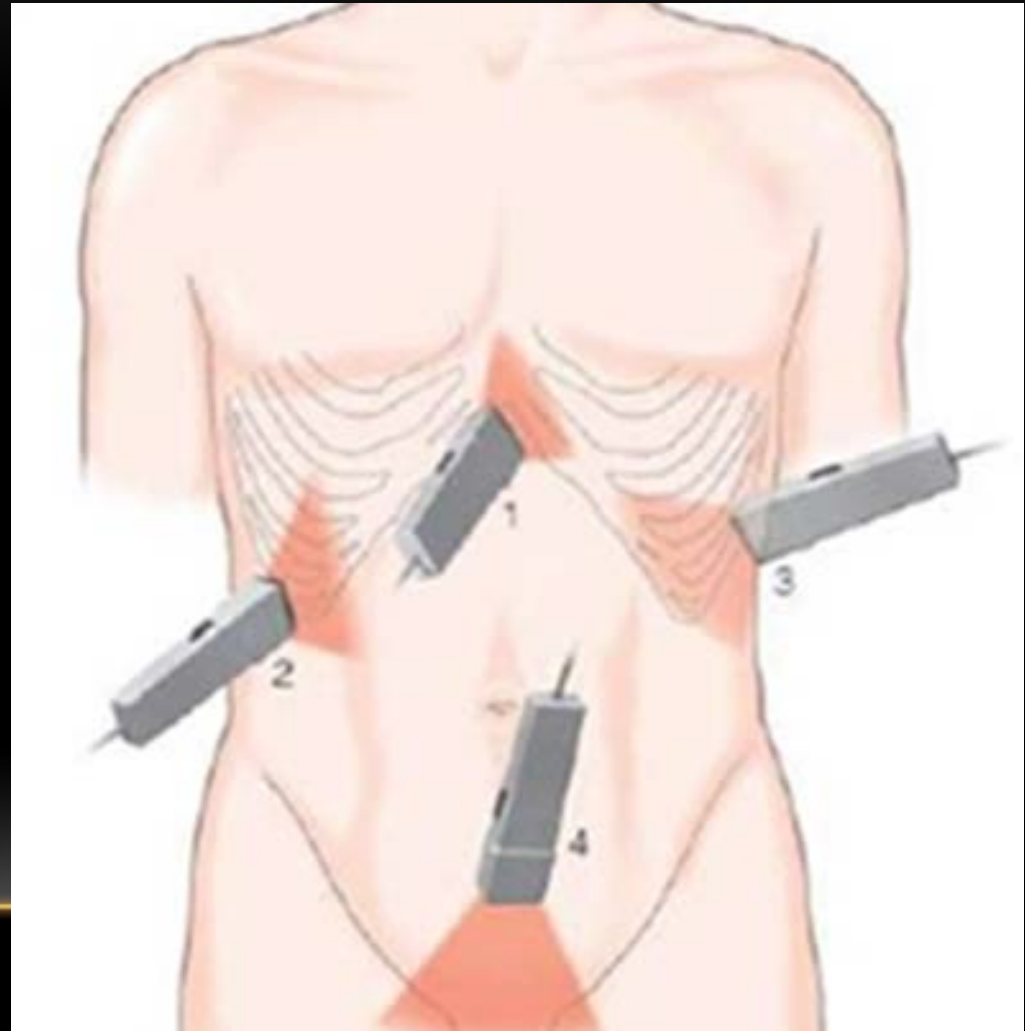


# FAST

## FOCUSED ASSESSMENT WITH SONOGRAPHY IN TRAUMA

Fri vätska/blod i  
BRÖSTKORG  
BUK

1. Subcostal
2. RUQ, Hepatorenal
3. LUQ, Splenorenal
4. Fossa Douglasi





## Free Fluid Scoring Systems

- Huang et al:
  - each '>2mm fluid pocket' score 1;
  - score  $\geq 3$  = surgery
- McKenney et al:
  - vertical height of fluid in cm added
  - score  $> 3$  =  $\uparrow$  need of surgery

## Free Fluid Scoring Systems

- Sirlin et al: fluid in each anatomic region = 1 point

Score	IAI (%)	Surgery (%)
0	1.4	0.4
1	59	13
2	85	36
3	83	63

- Conclusion: an increase in the amount of free fluid raises the likelihood of major IAI

## Sonographic Pitfalls

- Sonography is limited or unable to show certain types of injuries
  - Spinal and pelvic fractures
  - Diaphragmatic ruptures
  - Vascular injuries
  - Pancreatic injuries
  - Adrenal injuries
  - Some bowel and mesenteric injuries

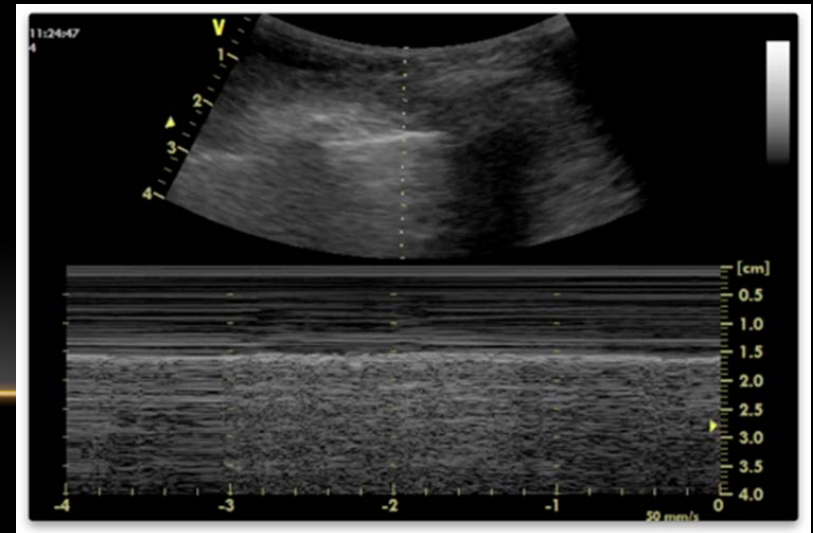
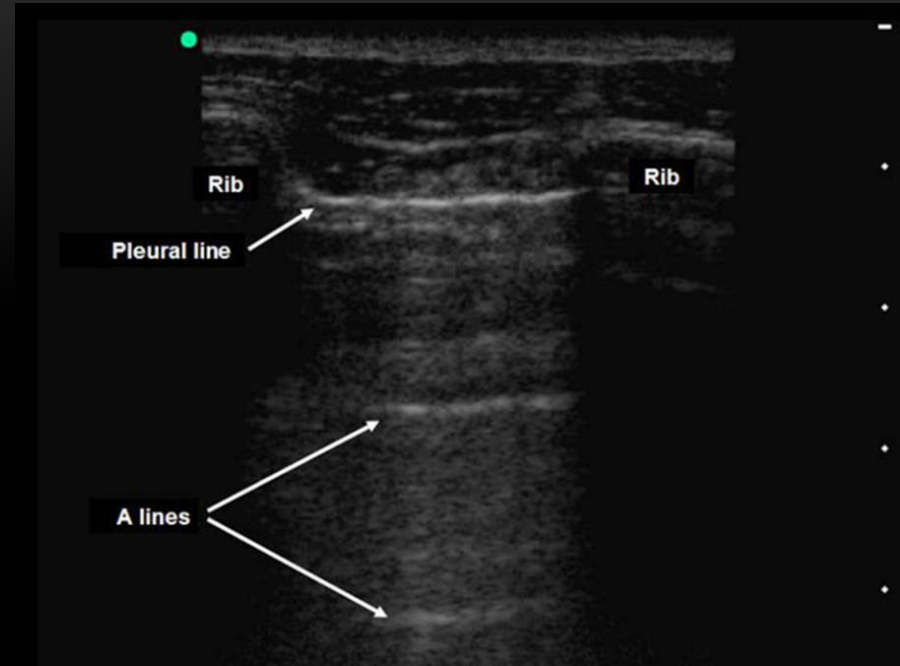


# A-LINES

Normal lung

“lung sliding”

“Seashore sign”  
(M-mode)



# B-LINES

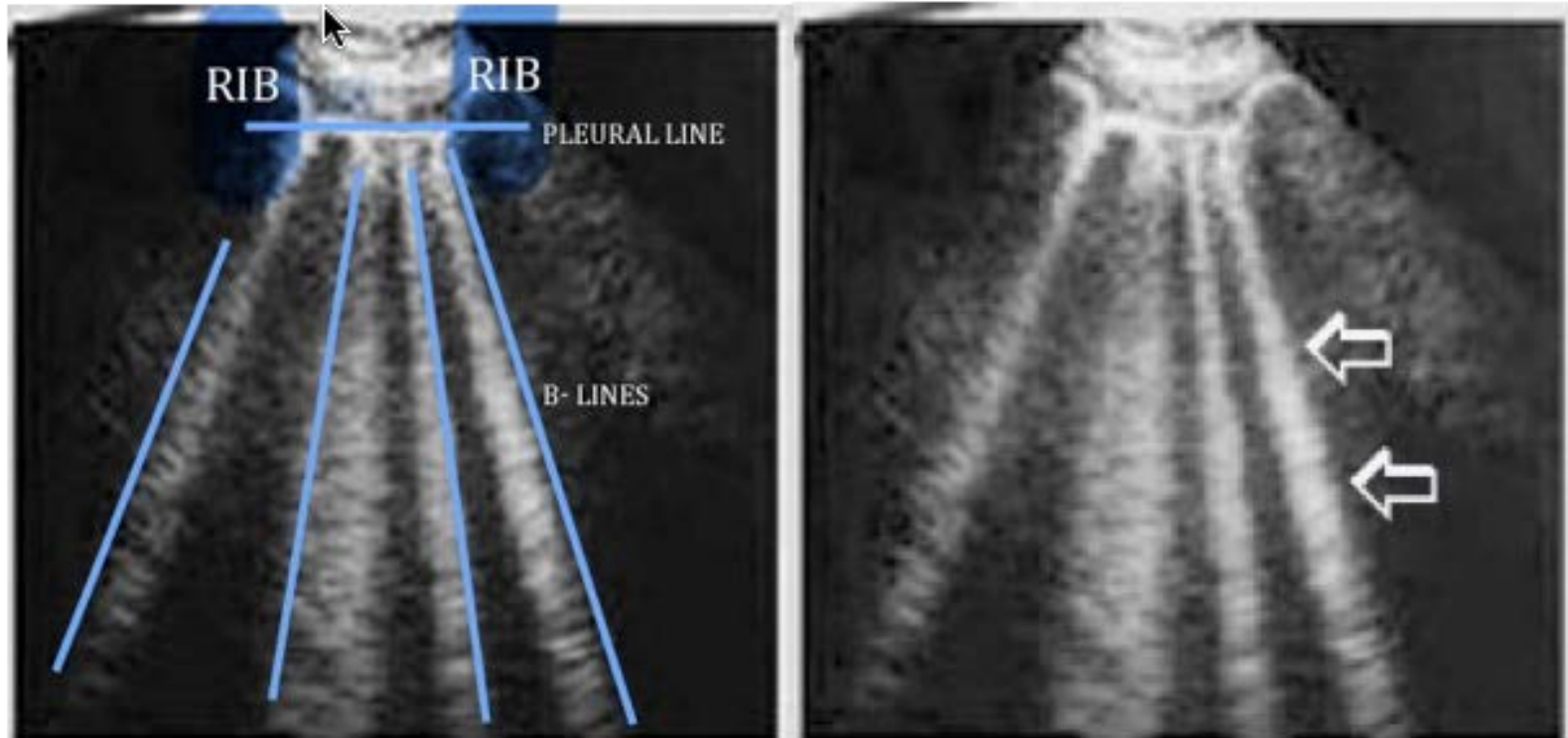
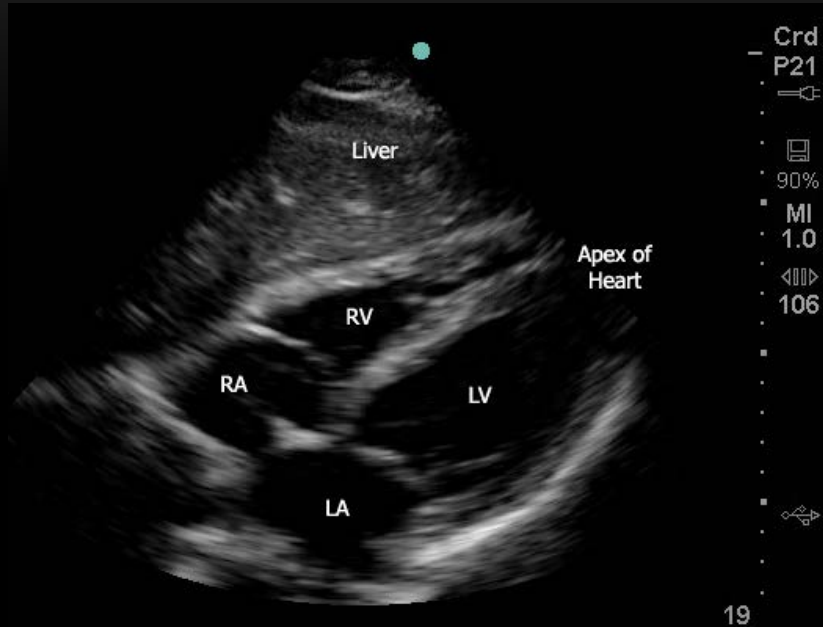


Figure C: B lines, Lichtenstein et al.

# Subkostal vy

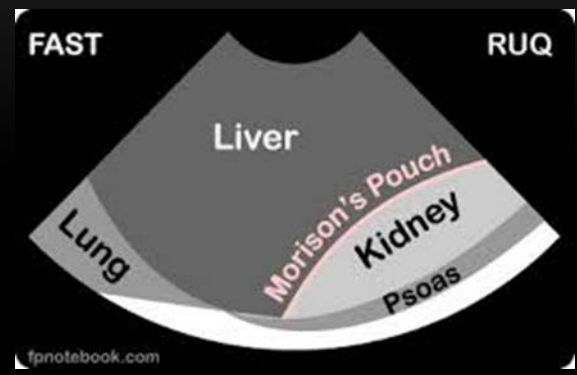


Subxiphoid View of the Heart

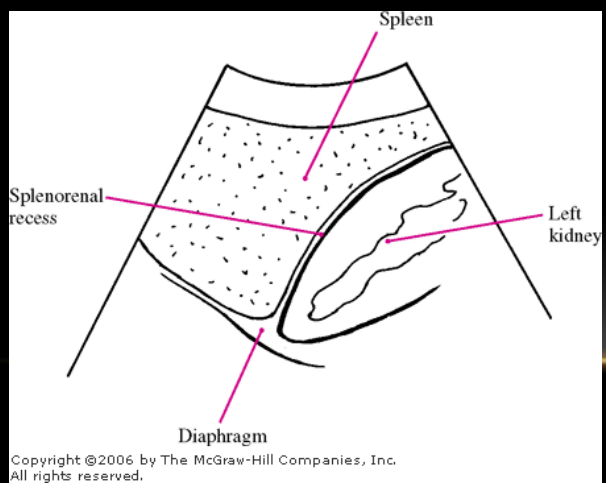


Subcostal 4 Chamber with Effusion & RA Collapse

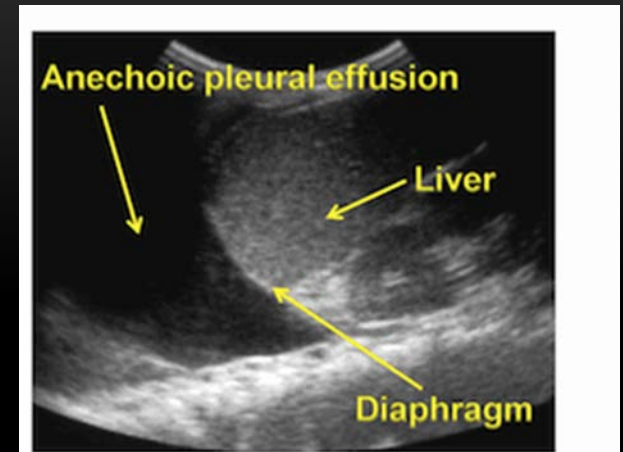
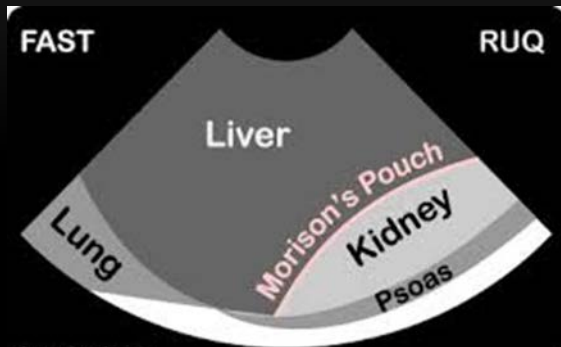
# RUQ Hepatorenalt (Morrison's pouch)



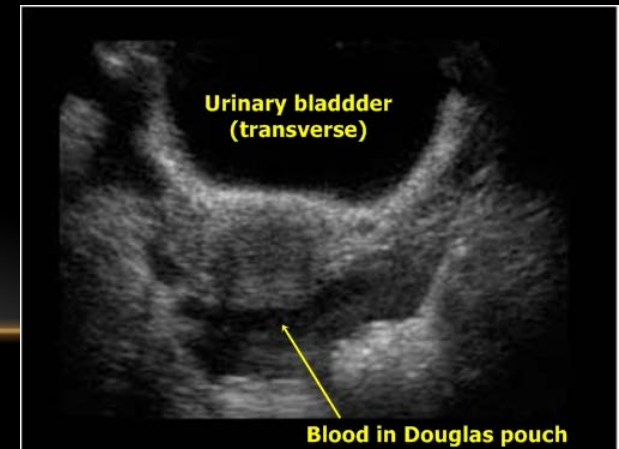
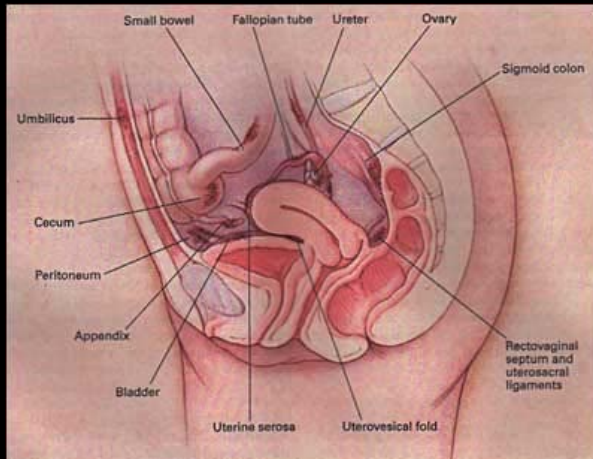
# LUQ Splenorenalt



# Pleura



# Rektovesikulärt (Fossa Douglasi)



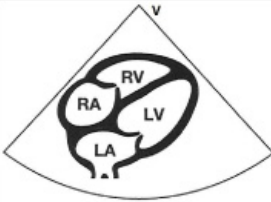
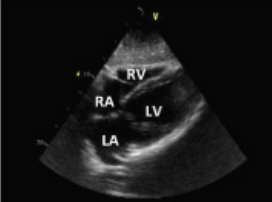
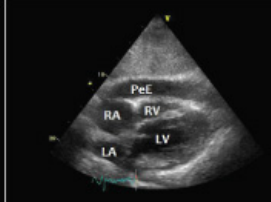
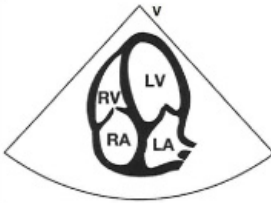
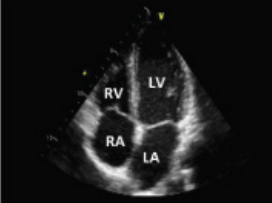
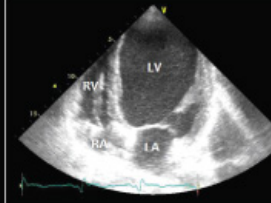
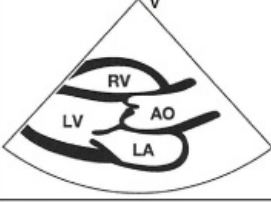
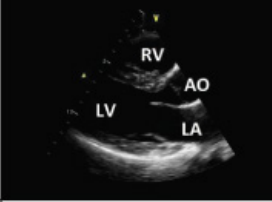
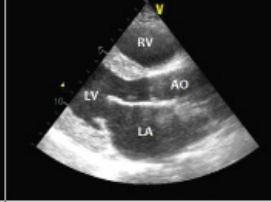
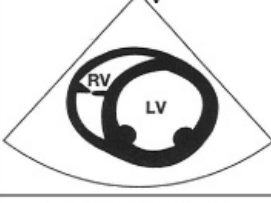

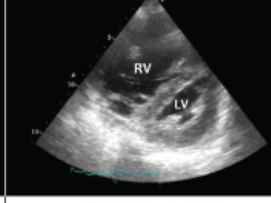
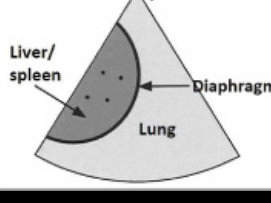




# FATE

Focused Assessment of Transthoracic  
Echocardiography

Riktat hjärtultraljud  
Basal hjärtbedömning .

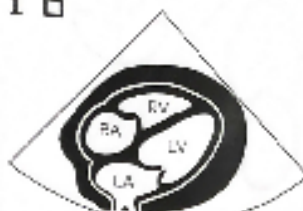
Syftet är att bedöma  
hjärtats funktion för att  
rikta behandling och  
optimera funktion.

	Normal basic FATE views	Normal basic FATE views	Examples of important pathology
	Normal basic FATE view	Normal basic FATE view	Pericardial effusion
Pos 1: Subcostal 4-chamber			
Pos 2: Apical 4-chamber			
Pos 3: Parasternal long axis			
Pos 3: Parasternal short axis			
Pos 4: Pleural scanning			



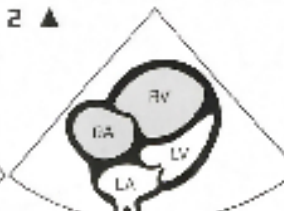
## Important pathology

1 ◻



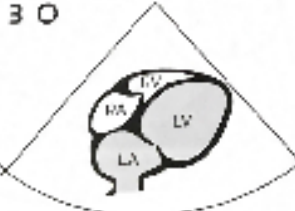
Pos 1: Pericardial effusion

2 ▲



Pos 1: Dilated RA+RV

3 ○



Pos 1: Dilated LA+LV

4 ◻



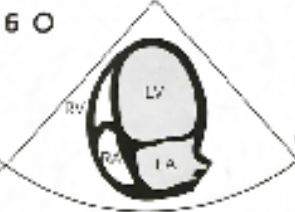
Pos 2: Pericardial effusion

5 ▲



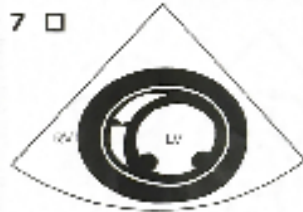
Pos 2: Dilated RA+RV

6 ○



Pos 2: Dilated LA+LV

7 ◻



Pos 3: Pericardial effusion

8 ▲



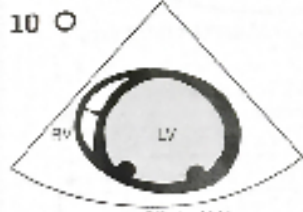
Pos 3: Dilated RV

9 ○



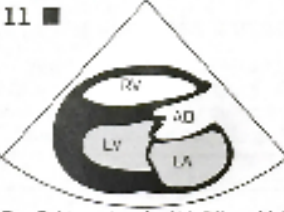
Pos 3: Dilated LV+LA

10 ○



Pos 3: Dilated LV

11 ■



Pos 3: Hypertrophy LV-Dilated LA

12 ■



Pos 3: Hypertrophy LV

### PATHOLOGY TO BE CONSIDERED IN PARTICULAR:

- ◻ post-OP cardiac surgery, following cardiac catheterisation, trauma, renal failure, infection.
- ▲ Pulmonary embolus, RV infarction, pulmonary hypertension, volume overload.
- Ischemic heart disease, dilated cardiomyopathy, sepsis, volume overload, aortic insufficiency.
- Aortic stenosis, arterial hypertension, LV outflow tract obstruction, hypertrophic cardiomyopathy, myocardial deposit diseases.

# Pitfalls include:

Overreliance on ultrasound: Ultrasound cannot evaluate the retroperitoneum and cannot distinguish solid organ injury.

Delaying transport to operating room: When immediate surgical intervention is clearly indicated (e.g., eviscerating injury), skip the eFAST.

Failing to scan the inferior pole of the kidney: Free fluid will first accumulate close to the inferior pole of the kidneys.

Failing to recognize clotted blood: Patients with delayed presentations after thoracoabdominal trauma may not have classic sonographic findings. Clotted blood has variable echogenicity

Failure to understand other limitations of eFAST: Morbidly obese patients and those with massive subcutaneous emphysema are challenging to image with ultrasound. Also, EFAST cannot distinguish fluid type and cannot differentiate ascites from blood.

For best results, repeat the ultrasound procedure

**Ultrasound –A colorful future in black and white**

