

# Emergency Ultrasound

An 80-year-old man in shock

## Case

- 80/M
- Present with chest pain
  - Found low BP 62/44 at triage → Resus. Room
  - Pulse 86
  - Temp 35.6, SpO2 95% (RA)
  - No history of drug overdose
- Past health
  - PAF, asthma, open cholecystectomy
- PE
  - GCS 15/15
  - Chest, abd exam unremarkable
  - No wound or external haemorrhage
  - PR no melena
- Management
  - High flow oxygen
  - 2 large bore IV Cath. + NS FR
  - ECG
  - CXR: clear



## ECG



- ED patient with non traumatic undifferentiated hypotension
  - Roles of Emergency USG to identify the causes

## Potential diagnoses

- Cardiogenic
  - LVF, dysrhythmia, AMI
- Hypovolumic
  - Hemoperitoneum, severe dehydration, GIB, rupture AAA, rupture HCC
- Obstructive
  - Cardiac tamponade, PE, tension pneumothorax
- Distributive
  - Septic shock, anaphylaxis
- Neurogenic

Focused, goal-directed USG in non-traumatic, undifferentiated shock

- **Aim: to find diagnoses that warrant specific treatments beyond fluid resuscitation**
- Subcostal view:
  - subcostal region of abdomen, pericardium, right ventricle diastolic collapse
- IVC view
  - IVC diameter, collapsibility with inspiration (intravascular volume status)
- Parasternal long cardiac view
  - LV function, pericardial effusion (qualitative estimate of LV function)
- Apical 4 chamber view
  - Ventricular size estimate, (qualitative estimate of LV function)
- Abdominal aorta
  - Aneurysm
- Hepatorenal recess view
  - Free intraperitoneal fluid
- Pelvis and retrovesical area
  - Fluid collections

## Right subcostal + subxiphoid view

- Free pericardial fluid or diastolic right ventricular collapse (tamponade/pericardial effusion)
- global cardiac function and chamber size
- R pleural effusion, free fluid in Morison's pouch, and free fluid in the R paracolic gutter.
- Liver mass

## IVC

- Subxiphoid view
- Size and resp. variations of proximal IVC
  - CVP and fluid status
  - Initial size and resp. variation not as helpful as the changes of these parameters in response to a fluid challenge → serial monitoring
  - Extreme: lack of respiratory variation in the IVC and hepatic veins (tamponade)

Table 6-5. Inferior Vena Cava (IVC) Estimates of Right Atrial (RA) Pressure

IVC Size, cm	Respiratory Change	RA Pressure, cm
<1.5	Total collapse	0-5
1.5-2.5	>50% collapse	5-10
1.5-2.5	<50% collapse	11-15
>2.5	<50 % collapse	16-20
>2.5	No change	>20

## Parasternal long axis

- Pericardial effusion/tamponade
- Dilated aortic root (<3.8cm) +/- intimal flap within dilated aortic root (dissection)
- Descending aorta (post to mitral valve)
- M Mode tracing → LV function



## Apical 4 chamber

- Pericardial effusion
- RA collapse during ventricular systole, RV diastolic collapse (tamponade)
- Right heart strain: RV dilatation, RV hypokinesis, TR, abnormal septal motion (PE)
- RV round in shape and larger than the left ventricle (massive PE)
- Wall motions, wall thickening

## Suprasternal window

- For the arch of aorta



## Abdominal aorta

- Transverse view >3cm
- Intraluminal thrombus

## Splenorenal recess

- left pleural effusion, free fluid in the subphrenic space and splenorenal recess, and free fluid in the left paracolic gutter

## Pelvic/retro vesicle

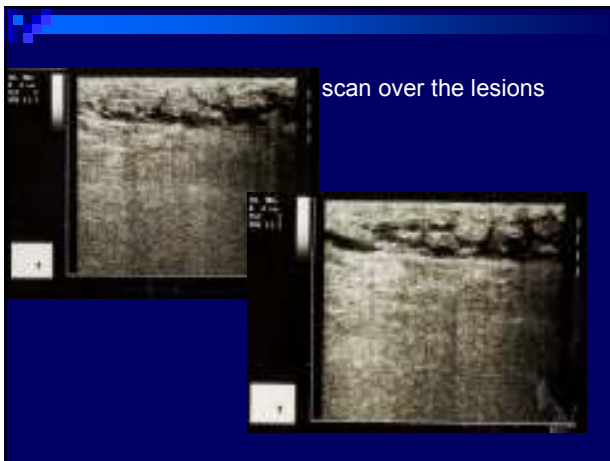
- Free fluid in the anterior pelvis or cul-de-sac (pouch of Douglas).

## What is next?

- Recheck IVC after fluid challenge  
respiratory variation still present after IV  
fluid resuscitation
- No rash or petechiae over the body
- Erythema noted over left lower ankle
- Recent minor trauma to the left ankle at  
home a few days ago – kick to wooden  
furniture

## Dusky red appearance





- ## Skin and soft tissue infection
- Focused question
    - Can NF be differentiated from cellulitis by USG findings?
  - Anatomical considerations
    - Awareness of the proximity of adjacent structures
  - Technique
    - 5–10 MHz linear array transducer
    - Transducer pressure should be kept to a minimum
    - systematically scanned in two perpendicular planes (short & long axis)
    - compared with the contralateral position on the corresponding normal limb
  - Limitation
    - limitation being when the anatomic sites are difficult to ascertain (too deep) by US



- Images of cellulitis
  - Non specific
    - Diffuse infection, accumulation of edema fluid
- Images of NF
  - Studies on the use of bedside USG in the diagnosis of NF are limited.
    - It should NOT be used to exclude the presence of NF.
  - Characteristics
    - diffuse thickening fascia
    - a layer of fluid accumulation (anechoic fluid layer) >4mm in depth along the deep fascial layer
    - Loculated abscesses can coexist

