QUESTION 15 Respiratory
A 56-year-old female is an unrestrained front seat passenger in a motor vehicle accident. She suffers midshaft femoral fracture with no other significant injuries. Fourteen hours after the injury she suddenly becomes dyspnoeic, cyanosed and obtunded.

With 5cm H$_2$O of continuous positive airway pressure (CPAP) and fractional inspired oxygen concentration of 0.6 applied via a face mask, her arterial blood gases are:

- pH 7.18 [7.36-7.44]
- PaCO$_2$ 60 mmHg [35-45]
- PaO$_2$ 61 mmHg [80-100]
- base excess –6.8 [-2.0-2.0]

Her chest X-ray is shown below. An echocardiogram shows an enlarged right ventricle with calculated peak pulmonary systolic pressures of 45 mmHg. The left ventricle, left atrium and left-sided valves are all normal. The ECG is normal.

Which is the most likely diagnosis?
A. Acute respiratory distress syndrome.
B. Fat embolism.
C. Aspiration pneumonitis.
D. Cardiogenic pulmonary oedema.
E. Pulmonary thromboembolism.

Learning Issues:
Definition of ARDS
Refers to the severe end of the spectrum of “acute lung injury”
Acute lung injury is a syndrome of acute and persistent lung inflammation with increased vascular permeability
3 clinical features:
1) bilateral chest X-ray infiltrates
2) ratio of PaO2/FiO2 ratio of 201-300 regardless of level of positive end expiratory pressure
3) no clinical evidence of elevated left atrial pressure, PA pressure < 18 mm Hg
ARDS has worse hypoxia PaO2/FiO2 ratio of < 200. Acute in onset: 4 to 18 hrs and persists for days to weeks
Histological features: diffuse alveolar damage
Inhospital mortality of 39%
Risk factor for ARDS: smoking

Diagnosis:
ARDS closely resembles severe hemodynamic pulmonary edema
due to heart failure
1) Brain Natriuretic peptide
2) TTE
3) Pulmonary artery catheterization

Other conditions that are confused with ARDS
- diffuse alveolar hemorrhage
- Acute interstitial pneumonia
- Idiopathic acute eosinophilic pneumonia
- Lymphoma or acute leukemia

Causes of ARDS
1) Sepsis
2) Aspiration (pH < 2.5 – cause severe lung injury)
3) Severe trauma and surface burns
   - bilateral lung contusion
   - fat embolism (long bone #), occurs 12 – 48 hrs after injury
   - sepsis from burns/trauma (12 – 48 hrs)
   - massive traumatic tissue injury
4) Massive blood transfusion
   - > 15 units blood
5) Transfusion-related lung injury (TRALI)
6) Lung & bone marrow transplantation
   - 2-3 d post surgery, lung transplant recipients prone to primary graft failure (due to imperfect preservation of transplanted lung)
7) Drugs and alcohol
   - aspirin, cocaine, opioids, phenothiazines, TCA
   - radiologic contrast
   - alcohol has shown to increase risk but not cause ARDS

Fat Embolism Syndrome
Ass with long bone and pelvic closed #
Occurs 24-72 hrs after insult, rarely as early as 12 hrs or later than 2 weeks
Classic triad: hypoxemia, neurological abnormality and a petechial rash
   - rash occurs on the head, neck anterior thorax, subconjunctiva and axillae
   - occlusion of dermal capillaries by fat globules leading to extravasation of erythrocytes

Diagnosis:
   - presence of triad
   - Cxr: normal in majority, minority have diffuse or patchy air space consolidation
Year 2005 Paper two: Questions supplied by Ilynn

- V/Q scans: mottled pattern of subsegmental perfusion defects with normal ventilation
- CT chest: focal areas of ground glass opacification with interlobar septal thickening
- Bronchoscopy: growing evidence to detect fat droplets in alveolar macrophages
- Currently no sensitive, specific test for diagnosis

Treatment
- early immobilization
- risk further reduced by operative correction
- supportive care
- mortality 5-15%
- corticosteroid prophylaxis
- double blind study of 64 of lower extremity long bone # to receive either placebo or methyprednisolone 7.5mg/kg QID for 3 days. FES dx in 9 out of 41 placebo pts and 0 of 21 steroid treated pt. No complications from steroid treatment

Back to the Question

Is it ARDS?
According to the definition of ARDS, the pt's 3 features are:
Cxr: bilateral infiltrates which is seen on the Cxr provided
PaO2/FiO2 ratio: 61/0.6 = 100 (does not fulfil criteria)
PA pressure > 18mmHg

Does not meet the definition of ARDS. Therefore not A

Is it fat embolism?
Pt had a long bone # and therefore could have a fat embolism. Pt's Sx did occur 14 hrs after accident so it is in the right time frame. Pt is hypoxaemic and is obtunded so fits the picture so far but we don't know about whether she has a rash.

Is it aspiration pneumonitis?
Pt's risk for aspiration pneumonia is that she is obtunded. But it is most likely that the hypoxaemia has attributed to her being obtunded. The question gives a lot of information about the # which makes it less likely aspiration.

Is it cardiogenic pulmonary edema?
The Cxr, raised PA pressure points towards pulmonary edema. Although she has normal L ventricle, age of 56 makes it less likely she has cardiac failure.

Is it pulmonary thromboembolism?
Its too early for a pulmonary thromboembolism to form.

Most likely answer B

1 Up to date