

Early Chest Radiograph Change: Warning Sign To Fulminant Fat Embolism Syndrome

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INTRODUCTION

Fat Embolism Syndrome (FES) following long bone trauma or orthopaedic surgery is potentially a life-threatening clinical syndrome. Its clinical manifestations range from cerebral, respiratory to cutaneous involvement which may develop as early as 24 to 72 hours following the initial insult. A high index of suspicion is required to detect fat embolism syndrome. Zenker described FES during an autopsy in 1862, and was subsequently detected by Von Bergman in 1873 following a fracture of femur. Diagnosis of FES remains clinical with correlation to radiological and laboratory findings. We report an early abnormal chest radiograph finding preceding fulminant FES which is easily missed or misinterpreted.

CASE SUMMARY

A young adult presented to the emergency department following a motor vehicle accident. He sustained Grade 2 open fracture of right tibia/fibula and closed fracture of the right 3rd and 4th metacarpal bones. There was no other injury. Emergent wound debridement and backslab for tibia was performed. 24 hours after the emergent surgery, the patient developed respiratory distress (O₂ desaturation to 87% under room air), hyperpyrexia (39.5 °C), tachycardia (126 bpm,) and thrombocytopenia. Despite not fulfilling the Gurd's Criteria (Figure 1) for FES, we treated him supportively for Fat Embolism Syndrome as there is an associated abnormal chest radiograph feature (Figure 2) which warned us about FES. The thickening of the interlobular septal line was reported by an experienced radiologist. Despite adequate fracture stabilisation and optimal supportive management, the patient deteriorated and succumbed to full blown pulmonary oedema and respiratory distress.

DISCUSSION

Gurd's Criteria is commonly used to diagnose FES¹. Lindegue *et al* suggested that FES can be diagnosed on basis of respiratory status alone². Pulmonary manifestation can affect up to 75% who developed FES despite not fulfilling the other clinical symptoms based on Gurd's Criteria. Pulmonary manifestations in FES can

range from mild hypoxia to Acute Respiratory Distress Syndrome (ARDS) which usually require mechanical ventilation support. Any further manipulation over the fracture side may decompensate rapidly to respiratory failure. In our patient, despite not fulfilling Gurd's Criteria for FES in the initial stage of respiratory distress, the abnormal chest radiograph finding of thickened interlobular septal line assisted us in diagnosing FES and started initial supportive management.

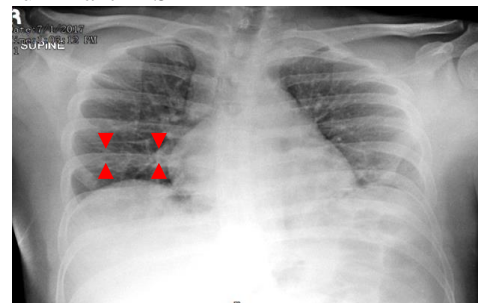
Figure 1: Gurd's Criteria

Criteria/ Signs
Major signs
Hypoxia (PaO ₂ <60 mm Hg)
Mental state changes (CNS depression)
Petechiae (cutaneous changes)
Minor signs
Tachycardia (heart rate >120 beats/min)
Thrombocytopenia (<1.5 lakh)
Unexplained anemia (decline in hematocrit)
Hyperpyrexia (>39°C)
Fat globules in fundus
Fat globules in urine

Fig 1

2 major criteria or one major criteria and four minor criteria suggest a diagnosis of FES.

Figure 2: Thickening of interlobular septal line beyond the thickness of sharpened pencil line (within red arrows) in plain chest radiograph in our patient before developing fulminant FES



Common chest radiograph feature of FES is diffuse increase in opacification which is commonly known as ground glass appearance, but this radiograph sign usually present at later stages of FES when both the lungs becomes severely affected. Thickening of interlobular septal line indicates initial increase in interstitial lung fluid which is an early sign of pulmonary oedema³⁻⁴. It is imperative that this early radiograph abnormality preceding FES is detected and adequate supportive management is provided in order to prevent further deterioration of the patient. Any increase beyond of the thickness of a pencil line should alert the attending trauma doctors to FES so that more aggressive management can be taken to prevent the progression to fulminant FES.