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Fat embolism syndrome mimicking Covid-19 infection with concomitant Purtscher's retinopathy

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Abstract
Fat embolism syndrome (FES) is a multiple organ disorder that can appear after long bone fractures. The clinical picture includes hypoxia predominantly, accompanied by diffuse petechiae, alveolar infiltrates, altered mental status, fever, tachypnea, and tachycardia. We present a case of FES in a 35-year-old man with no prior medical history, following fracture of neck of right femur. Fifteen hours post-admission, patient developed respiratory failure with altered mental status and needed admission in the intensive care unit. The chest radiography and later chest tomography raised the suspicion of a COVID-19 disease, even if our first suspicion was FES. After being carefully investigated for COVID-19 with two negative RT-PCR SARS-CoV-2 tests, patient received treatment for FES. In the context of the SARS CoV-2 pandemic, differential diagnosis has become an increasingly challenging process.

Keywords: fat embolism syndrome, covid-19 infection

1. Introduction
Fat embolism syndrome (FES) is a multi-organ potentially lethal disorder seen in many polytrauma patients, especially in those with multiple long bone fractures. The condition was first described by Zenker in 1861 as a syndrome with neurological, cutaneous and respiratory symptoms in long bone fracture patients. It generally occurs within 12 to 72 hours after the causal event, may not always present with the typical triad of respiratory distress, petechiae and mental status change [1]. Fat embolism syndrome is sometimes associated with Purtscher's retinopathy which characterised by cotton wool spots and haemorrhages developing within one to two days of trauma [2].

2. Case report
A 35 year old male with no medical past history, was brought to the emergency room with alleged history of motor vehicular accident. Patient complained of severe pain in the right hip joint and was unable to move it. On examination, patient was neurologically and hemodynamically stable. Radiographs revealed fracture of the neck of right femur. NCCT brain and chest x-ray were normal. Patient was then admitted in Orthopaedic ward and posted next day for surgery. About 15 hours later in the ward, patient developed acute onset of breathlessness with fever (40.1°C), tachycardia (120 beats/ min), BP: 140/80 mm Hg, respiratory rate of 40, the oxygen saturation at 46% without oxygen, and at 93% with high-concentration mask. Arterial blood gas analysis showed respiratory alkalosis with hypoxemia, arterial oxygen pressure (PaO2) at 57 mmHg. Biological assessment revealed anemia, elevated levels of CRP and IL6. ECG showed sinus tachycardia. Given the current pandemic context, the patient was suspected of having a respiratory infection with SARS-CoV-2 and RTPCR nasopharyngeal swabs were sent. Repeat chest radiograph was asked for which revealed bilateral pulmonary infiltrates. An urgent CT pulmonary angiography was performed to rule out pulmonary thromboembolism. It revealed bilateral ground-glass opacities, in central as well as peripheral distribution with interspersed areas of interlobular septal thickening and bilateral minimal pleural effusion. There was no evidence of cardiomegaly or pulmonary thromboembolism. A suspicion of adult respiratory distress syndrome (non-cardiogenic pulmonary edema) v/s CORADS-5 was made based on these findings. Reverse transcription polymerase chain reaction (RT-PCR) on nasopharyngeal swab twice performed did not detect SARS-CoV-2 RNA. Patient was transferred to the intensive care unit for supportive management with oxygenation and corticosteroids. Patient became rapidly and deeply comatose in the ICU in association with cerebral oedema,

demonstrated by CT scan of the Brain. He required tracheal intubation and mechanical ventilation. By the seventh day, neurological improvement allowed removal of the endotracheal tube. At the time of admission, his fundi had been normal, but after 24-48 hours cotton-wool spots and flame shaped hemorrhages were noted within two disc diameters of the optic discs, consistent with retinopathy of fat embolism. Anterior segment was within normal limit in both the eyes. Ultimately, fat embolism diagnosis was confirmed. Patient subsequently underwent bipolar hemiarthroplasty for fractured neck of right femur. Operative procedures and recovery were uneventful. He was discharged from hospital on the 14th postoperative day with no neurological deficit and normal visual acuity in both eyes.

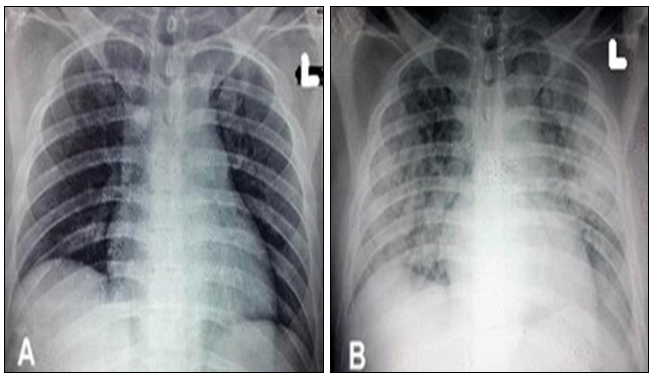
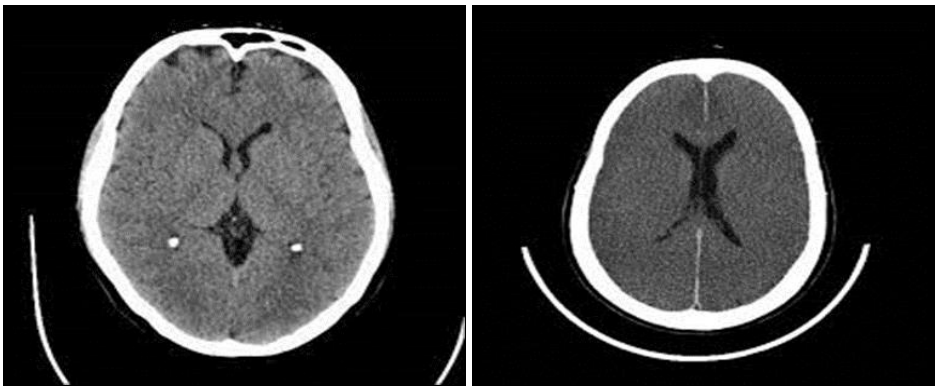


Fig 1(A): Chest radiograph on admission was normal. (B) Chest radiograph on day 2 of admission showed bilateral diffuse air space opacities



A B

Fig 2(A): Normal CT brain at admission. (B) CT brain with diffuse cerebral edema on day 2 of admission with effacement of cortical sulci and gyri in both cerebral hemispheres

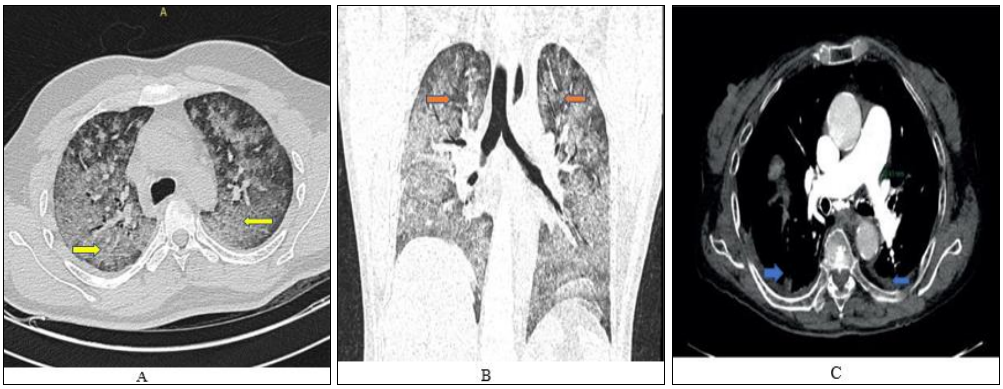
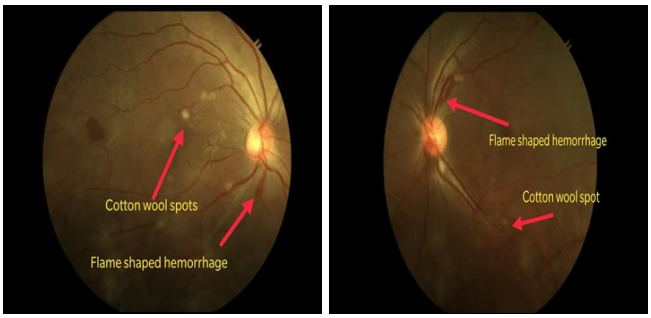


Fig 3: CT pulmonary angiogram in lung window setting at axial (A) and coronal (B) sections showing diffuse ground-glass opacities (yellow arrows) with smooth septal thickenings (orange arrows) bilaterally. Axial (C) section reveals normal pulmonary angiography and bilateral minimal pleural effusion (blue arrows).



Right Left

Fig 4: A fundus photograph taken 48 hours after admission to hospital showing areas of cotton-wool spots with adjacent intraretinal hemorrhages

3. Discussion

In the COVID-19 pandemic, every respiratory syndrome must raise the suspicion of infection with the SARS-CoV-2 virus. SARS-CoV-2 Virus causes severe bilateral pneumonia and acute respiratory distress syndrome (ARDS) requiring mechanical ventilation and intensive care unit management [3].

Fat embolism syndrome (FES) occurs following a traumatic injury, when bone marrow fat enters the bloodstream resulting in a cascade of inflammatory response, hyper-coagulation, and an array of symptoms that generally begin within 12 to 72 hours. Fat embolism syndrome is a differential diagnosis that needs consideration in a patient with long bone fracture presenting with respiratory distress [4].

The CT imaging features of COVID-19 include bilateral multifocal predominantly peripheral ground glass opacities with or without consolidation, with interlobular septal thickening [5]. The radiological findings in FES are similar to those in COVID-19.

Purtscher's retinopathy is clinically described by presence of cotton wool spots and multiple retinal haemorrhages which occur one to two days after extra ocular trauma. Purtscher's retinopathy can coexist with Fat Embolism syndrome.

According to Schonfeld's Fat Embolism Score Index, our patient had 11 points out of 16 and raised the suspicion of FES. A score of 5 points or more in the first days of hospitalization indicates a FES [4].

Table 1: Schonfeld's Fat Embolism Score Index

Signs and symptoms	Points
Diffuse petechiae	5
Alveolar infiltrates	4
Hypoxemia	3
Confusion	1
Fever (>38 degree Celsius)	1
Heart rate (>120bpm)	1
Respiratory rate (>30)	1

Treatment of fat embolism is largely supportive including fluid resuscitation, oxygenation or mechanical ventilation. Symptoms are often transient with good prognosis. Complete recovery results with adequate supportive care.

4. Conclusion

Fat embolism syndrome (FES) should be suspected in all patients with acute respiratory distress following long bone fractures. This case report depicts diagnostic dilemma in patients with fever and respiratory distress amidst the COVID 19 pandemic.

5. References

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