

Nebulous Signs: Fat Embolism Syndrome, A Life Threatening Complication of Long Bone Fracture

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Introduction

Fat embolism syndrome (FES) is a potentially life threatening complication of long bone fracture. Here we report a case of FES with significant long term morbidity as a complication of traumatic long bone fracture in an otherwise fit young adult.

Case Summary

	Details
Age	23 yr male
Time	suspected 1 hr previously
Mechanism	motorbike vs deer road traffic collision
Injuries seen or suspected	left femur, left humeral fractures
Signs or symptoms	GCS 15 normal physiology
Treatment Given	analgesia, oxygen
Onward Plan	transfer to ward environment and ORIF of left humeral fracture, i.m. nailing left femur fracture

Figure A: day 1, AT-MIST Trauma Call

	Details
Situation	sudden deterioration in physiology - pt febrile, tachycardia, hypoxic (inspired oxygen 0.7 - 0.8 with a PaO ₂ of 8-9 kPa), hypotensive
Background	peri-operative assessment at 0800 by anaesthetic consultant with normal physiology
Assessment	diagnosis of FES made concurrently between orthopaedic and anaesthetic teams
Recommendations	not stable enough for ORIF humeral fracture; transferred to ICU

Figure B: day 2, Operating Theatre during i.m. nailing, left femur fracture

Day 3, oxygenation significantly improved, the patient undergoes successful reduction and fixation of his humeral fracture. Sedation continued.

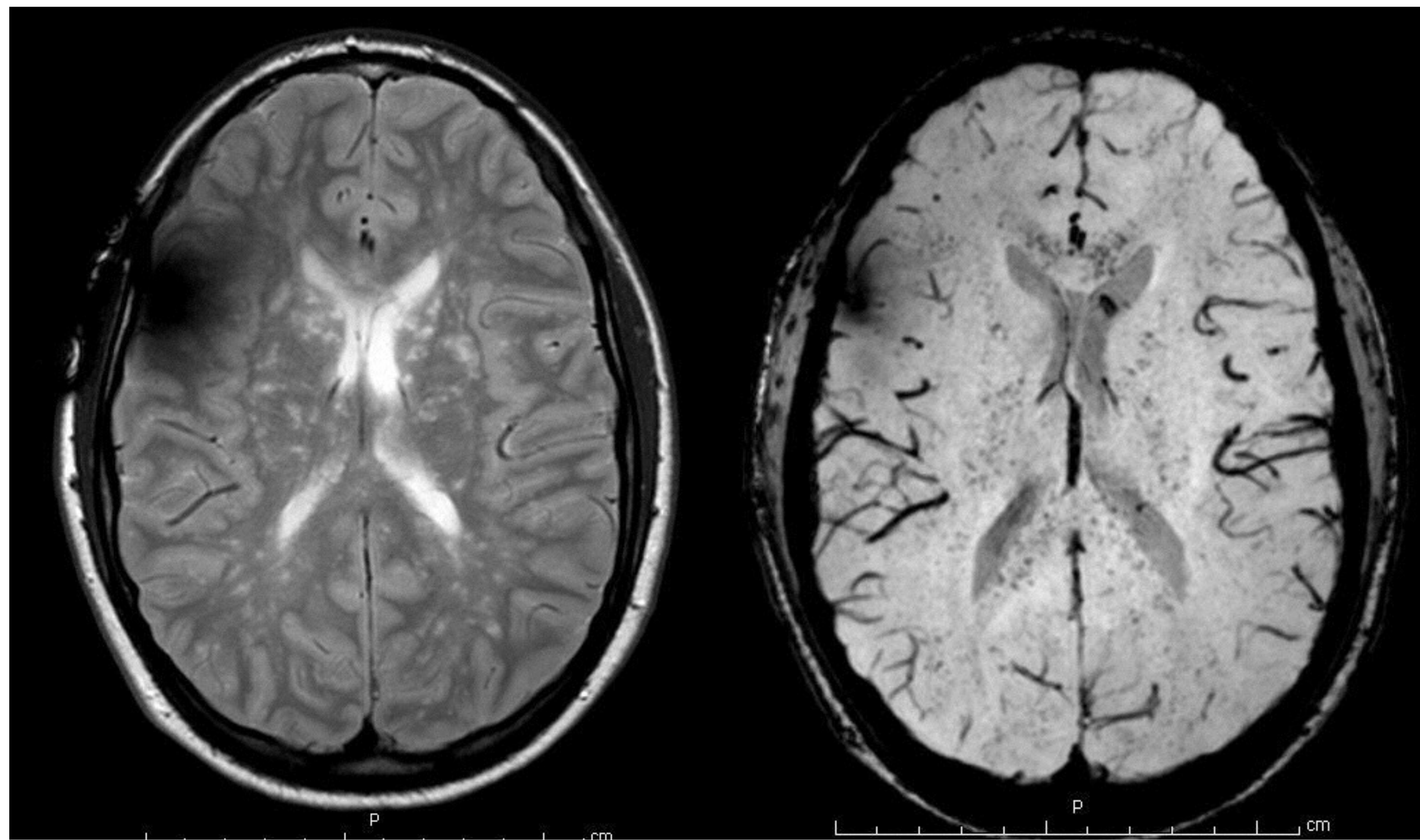


Figure C, day 4, MR head: having stopped sedation, patient fails to quickly regain consciousness. Scan showing a myriad of scattered foci of high T2 signal in the deep white matter, corpus callosum, thalami, basal ganglia, subcortical white matter, brain stem and cerebellar hemispheres and middle cerebellar peduncles, consistent with a diagnosis of fat embolism (panel A, left), and a so-called star-field pattern on diffusion weighted images (panel B, right).

The patient underwent a course of antibiotics for chest sepsis, tracheostomy and eventually weaned from ventilatory support. He subsequently (day 14) stepped down to level 1 care, before undergoing onward care for further neuro- rehabilitation out of region.

Discussion

- Histological fat deposition in the pulmonary capillaries occurs in all patients who have long bone and pelvic fractures
- Only 1-2% of these patients develop a respiratory and/or neurological syndrome known as the fat embolisation syndrome¹.
- FES is caused by perivascular haemorrhage and oedema following the accumulation of fat in the pulmonary, cerebral or dermal microvasculature and local liberation of free fatty acids (FFAs) via the action of lipoprotein lipase on fat in the pulmonary or systemic capillary network. FFAs are toxic locally, causing platelet aggregation, a mild disseminated intravascular coagulation and disruption of the pulmonary and cerebral capillary walls.
- Classically, FES is characterised by an asymptomatic period of 12-72 h following bony injury or manipulation of the fracture site and a symptomatic period which includes respiratory effects (95%), cerebral effects (60%) and petechiae (33%).
- There is no specific treatment for FES. Heparin, aspirin, alcohol, hypertonic glucose with insulin, surfactant, clofibrate, alpha-blockers, corticosteroids, albumin, dextran and apportion have not been shown to reduce its morbidity or mortality².
- Treatment is supportive; the fat embolism syndrome is a self-limiting condition, with a mortality of 10%-20%, relating to the degree of respiratory failure³.

This case report details a potentially life threatening complication of long bone fracture. FES is an important diagnosis not to miss, especially so given the sometimes subtle multi-system nature of this pathological process.

¹ Muller C, Rath BA, Pfister U, Meining RP. The incidence, pathogenesis, diagnosis, and treatment of fat embolisation. *Orthop Rev* 1994; 23:107-117.

² Worthley LJG, Fisher M McD. The fat embolism syndrome treated with oxygen, diuretics, sodium restriction and spontaneous ventilation. *Anaesth Intensive Care* 1979; 7:136-142.

³ Peffer LT. Fat embolism: a current concept. *Collin Orthop* 1969; 66: 241-253.