

**Case Report***Copyright © All rights are reserved by Hicham Kbiri*

Fat Embolism Syndrome Cerebral Form: A Case Report and Literature Review

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Fat embolism syndrome (FES) is a rare but severe complication that typically occurs after long bone fractures or orthopedic surgery. It is characterized by respiratory, neurological, and cutaneous manifestations. We report the case of a 24-year-old male with no previous medical history who sustained multiple fractures following a road traffic accident. Clinical improvement was gradual, but he remained with residual tetra paresis. After two weeks in the intensive care unit, he was transferred to the orthopedic department for further management. The diagnosis of FES remains clinical and relies on a high index of suspicion, especially in post-traumatic settings. Imaging findings on chest CT and brain MRI can support the diagnosis. Management is mainly supportive, emphasizing early fracture stabilization, adequate oxygenation, and prevention of secondary insults. This case highlights the diagnostic challenge of cerebral fat embolism, particularly in the absence of MRI. Early recognition and supportive care remain the cornerstone of management to improve outcomes in patients with multiple long bone fractures.

Keywords: Fat embolism syndrome; cerebral fat embolism; long bone fracture; trauma; case report**Introduction**

Fat embolism syndrome (FES) is a rare complication of long bone fractures [1]. It brings together all the clinical (respiratory, neurological), biological and radiological signs secondary to the obstruction of microcirculation by fatty particles. In 90% of cases, pulmonary manifestations are often the first to appear [2]. On the other hand, the isolated severe cerebral form is exceptional. The Gurd criteria are widely used for the positive diagnosis of this syndrome [3]. This work reports a particular case characterized by the neurological revelation of SEG after limb trauma.

Case Presentation

This is a 24-year-old patient, with no particular pathological history, victim of a road accident. The initial clinical examination found a conscious patient 15/15th hypotensive. 90/60 mm Hg, respiratory stable, without notion of initial loss of consciousness or vomiting. Furthermore, he presented functional impotence in both lower limbs. After stabilization by vascular filling, the patient underwent radiological assessment revealing closed fractures of the right femur and left leg, chest x-ray showed bilateral basal

alveolar syndrome, abdominal ultrasound was normal. After 48 hours of his admission, the neurological condition worsened with a Glasgow score of 7/15 and the appearance of generalized tonic clonic convulsions. Also, the clinical examination noted excessive sweating, hyperthermia at 39°C, tachycardia at 130 beats/min, and appearance of petechiae in the thoracic and conjunctival areas. The biological assessment showed anemia at 9.5 g/dl, thrombocytopenia at 74,000 mm³ and leukocytosis at 12,000 mm³. Faced with neurological worsening, mechanical ventilation was indicated with a brain CT scan which was without abnormalities. Given this clinical, biological and radiological context, a cerebral fat embolism was highly probable. Brain MRI remains the key examination to confirm this diagnosis, but its performance was impossible, given that the patient had already benefited from osteosynthesis by femoral and tibial intramedullary nailing. The rest of the treatment was purely symptomatic. The clinical evolution was favorable, the patient was awakened and gradually weaned from mechanical ventilation, and retained tetra paresis. After a 2-week stay in intensive care, the patient was transferred to the trauma department for further treatment.

Discussion

FES is a rare and serious complication in polytrauma patients, mainly with long bone fractures. In its usual presentation, FES comprises a clinical triad with respiratory failure, neurological damage and mucocutaneous damage frequently associated with biological signs, including hemolytic anemia and thrombocytopenia. These signs are described and used for diagnostic scores such as the Gurd criteria (table 2 or Schonefeld criteria [4,5]). According to

these criteria, the diagnosis must be made based on the presence of at least one major criterion and four minor criteria or two major criteria and two minor criteria. The mortality of FES is variable and reported between 14 and 87% [6]. It seems largely linked to lung damage. In our case, the patient presents several risk factors for fat embolism (closed femoral fracture polyfracture, hypovolemia, intramedullary nailing) [7]. The particularity of this case is its exclusively neurological clinical expression. Indeed, at no time during the treatment did the patient present with hypoxemia or respiratory compromise, although this was present in more than 90 cases [3]. He also did not present any mucocutaneous involvement which is found with variable frequency in the literature [2]. On the other hand, there was a fever around 39°C, without any infectious etiology as well as sinus tachycardia.

The paraclinical investigation objectify isolated thrombocytopenia and hemolytic anemia. The paraclinical abnormalities found in our patient are in agreement with those described in the literature [7]. In the case presented, if we consider the Gurd criteria the patient presents one major criterion and five minor criteria allowing a positive diagnosis and if we consider the Schönefeld criteria the patient only has 3 points and would therefore not allow the diagnosis. Our case shows a major limitation of the use of these diagnostic criteria with the isolated cerebral presentation of FES explaining the need for a more global approach. MRI is a paraclinical examination to confirm the diagnosis. Its performance was impossible, given that the patient had already benefited from osteosynthesis by intramedullary femoral and tibial nailing (Figures 1-3).

Table 1 Gurd and Wilson's criteria⁵

Major features	Minor features
Axillary or subconjunctival petechiae	Tachycardia > 110/minute
Hypoxemia PaO ₂ < 60 mmHg; FIO ₂ = 0.4	Pyrexia > 38.5
Pulmonary edema	Retinal fat or petechiae
Sudden drop in Hb level > 20%	Urinary fat globules or oligoanuria
Central nervous system depression disproportionate to hypoxemia	Sudden thrombocytopenia > 50%
	High ESR > 71 mm/hour

Abbreviation: ESR, erythrocyte sedimentation rate.

Figure 1: Gurd's major and minor criteria.



Figure 2: Standard X-ray face Closed fracture left leg.



Figure 3: Standard x-ray face Closed right femur fracture.

Conclusion

The diagnosis of FES is primarily clinical. The severe isolated cerebral form must be suspected in the face of any acute worsening

of the state of consciousness after a free interval in any patient with orthopedic trauma and in whom the initial brain CT was normal. Early brain MRI remains the key test to confirm the diagnosis.

Acknowledgement

None.

Conflict of Interest

No conflict of interest.

Reference

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