

CLINICAL SCIENCE LETTERS

Fat Embolism Syndrome: a Condition Unfamiliar to the Dermatologist

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To the Editor:

The fat embolism syndrome was described by Zenker in 1861,¹ although the triad of confusional state, dyspnea, and petechiae had already been mentioned in the German literature by Von Bergman.² Despite being described more than 100 years ago, the diagnosis and specific treatment of this syndrome are still a subject of debate. With the 2 cases presented here, we aim to draw attention to a dermatological disorder which is widely discussed in the medical and surgical literature but which is unfamiliar to the dermatologist.

The first patient was an 18-year-old man who had suffered a motorbike accident and presented a major lung contusion and multiple long-bone fractures (Figure 1). The fractures were immobilized with plaster casts and the patient was admitted to hospital for routine surgery. He was asymptomatic for 48 hours, but before the surgical intervention, small papules a few millimeters in diameter appeared; they were of reddish color, did not blanch on pressure, and were distributed over the anterior aspect of the thorax, base of the neck, and conjunctivae, and in the axillae (Figure 2). This was followed by a rapid onset of neurological signs, consisting of temporospatial disorientation and clouding of consciousness, and acute respiratory failure. The chest radiograph showed bilateral opacities in both lung fields that were not present at the time of admission. No relevant findings except for mild thrombocytopenia were reported in the additional studies performed—complete blood count, biochemistry, coagulation, urinary sediment, and cerebral computed tomography (CT). Despite intensive supportive measures, the patient died a few hours later.

The second patient was a 27-year-old man, also victim of a motorcycle accident. He presented fractures of the right femur and left radius and ulna, and underwent surgical osteosynthesis. After being asymptomatic for 48 hours, he developed fever of up to 39°C associated with psychomotor agitation, severe acute respiratory failure, and pinpoint petechial lesions in the axillae and around the base of the neck.

The complete blood count revealed anemia of 9.5 g/dL and thrombocytopenia of $98 \times 10^9/L$; biochemistry and coagulation were normal. Lipiduria was observed in the

urinary sediment. Cerebral CT was normal and the chest radiograph showed multiple, peripheral, focal opacities in both lung fields.

The clinical course was favorable and the patient was discharged from intensive care after 10 days and from the hospital 2 weeks later.

Fat embolism occurs in patients with long-bone



Figure 1. Case 1. Diaphyseal fracture of the right femur.



Figure 2. Case 1. Petechial lesions with a typical distribution 48 hours after the injury.

fractures or during orthopedic procedures.³ Fat present in the bone marrow is released, causing embolization of the capillary vessels in the lung parenchyma and in the peripheral circulation.⁴ Fat embolism can also occur in other nontraumatic disorders such as pancreatitis and sickle cell anemia, though this is rare.³ The presence of a fat embolism is a relatively common finding and is usually asymptomatic. However, a small number of patients develop serious signs and symptoms as a result of organ dysfunction that typically involves the skin, central nervous system, and lungs; the term fat embolism syndrome is reserved for these cases. The incidence of this syndrome is estimated at 0.5% of long bone fractures, though the majority of cases are not reported, and remain undetected in the context of a complex clinical situation.^{1,5} Usually, after being asymptomatic for a period of 2 or 3 days (lucid interval), the patient develops the typical clinical triad of respiratory failure, cerebral dysfunction, and petechiae.^{3,6,7} The petechiae appear in crops and with a typical distribution in the axillas and over the base of the neck, shoulders, anterior chest wall, and conjunctivae, following the path of the arterial branches of the arch of the aorta. They almost never affect the face or posterior aspect of the body. Disseminated petechiae may be associated with more severe cerebral and pulmonary dysfunction.^{3,5,7,8} These patients can also develop fever, anemia, thrombocytopenia, renal failure, jaundice, and tachycardia.⁸

The diagnosis is clinical and requires a high degree of suspicion. Gurd, in 1970, proposed a series of diagnostic criteria (Table).⁹ This disorder often passes unnoticed due to its transitory nature and the lack of specificity of some signs.^{1,10}

The fat embolism syndrome is a serious condition that can sometimes follow a fulminant course. An

early diagnosis of the condition and the initiation of appropriate therapeutic measures can reduce the number of complications and improve the prognosis.⁸ Mortality is currently around 5%-10%.^{1,5,10}

The skin lesions can sometimes appear before other clinical manifestations. The presence of petechiae with a characteristic distribution, in an appropriate clinical context, should therefore make us think of this disorder.

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Conflicts of interest

The authors declare no conflicts of interest.

References

1. Bulger EM, Smith DG, Maier RV, Jurkovich GJ. Fat embolism syndrome: A 10-year review. *Arch Surg.* 1997;132:435-9.
2. Von Bergman EB. Ein fall tod licher fetenbolic. *Berlin Wochenschl.* 1873;10:385-7.
3. Georgopoulos D, Bouros D. Fat embolism syndrome: clinical examination is still the preferable diagnostic method. *Chest.* 2003;123:982-3.
4. Roca J, Ruiz J. Enfermedades vasculares del pulmón. In: Ferreras P, Rozman C, Editors. *Medicina Interna.* 15th ed. Madrid: Elsevier; 2005. p. 836.
5. Kaplan RP, Grant JN, Kaufman AJ. Dermatologic features of the fat embolism syndrome. *Cutis.* 1986;38:52-5.
6. McIntyre K, French S, Rose TH, Byrick R. Case report: Acute postoperative neurological impairment from fat embolism syndrome. *Can J Anaesth.* 2007;54:296-300.
7. Pollock JL. Skin signs of fat embolism. *Arch Dermatol.* 1978;114:1399-400.
8. Franks A. Alteraciones cutáneas en la enfermedad cardiopulmonar. In: Fitzpatrick T, Editor. *Dermatology in General Medicine.* 5th ed. Madrid: Panamericana; 2001. p. 2052-3.
9. Gurd A. Fat embolism: an aid to diagnosis. *J Bone Joint Surg.* 1970;52B:732-7.
10. Talbot M, Schemitsch EH. Fat embolism syndrome: history, definition, epidemiology. *Injury.* 2006;37:S3-S7.

Table. Gurd Diagnostic Criteria

<i>Major</i>
Hypoxia
Central nervous system depression
Petechiae
<i>Minor</i>
Tachycardia (>120 beats per minute)
Fever (temperature > 39°C)
Unexplained anemia
Thrombocytopenia (platelet count >15 × 10 ⁹ /L)