CASE REPORT

A traumatic case of fat embolism

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SUMMARY

A fit and healthy 47-year-old woman developed type I respiratory failure 2 days following surgical fixation for a left intertrochanteric neck of femur fracture. She presented to the acute trauma unit following a fall off a horse and had a long dynamic hip screw fixation in theatre. Postoperatively, she became confused and hypoxic. Her chest X-ray was inconclusive and her CT pulmonary angiogram showed diffuse patchy ground glass shadowing in keeping with acute respiratory distress syndrome. Following review by intensive care and respiratory physicians, a diagnosis of acute lung injury secondary to fat embolism was reached. The patient made a good recovery on the orthopaedic ward with supportive treatment.

BACKGROUND

Fat embolism syndrome is a recognised and potentially fatal complication of long bone fractures and orthopaedic lower limb surgery.¹⁻³ There is no universally accepted definition but the syndrome includes the presence of clinical signs and symptoms resulting from embolic showers.⁴ It can prove diagnostically challenging and carries a significant mortality rate.⁵ It is important for clinicians to have a high index of suspicion for fat embolism in patients with respiratory compromise postoperatively. Classically, patients present with a triad of hypoxia, neurological disturbance and a petechial rash.³⁻⁶ Treatment is supportive, but escalation to an intensive care unit may be necessary.⁷

CASE PRESENTATION

A 47-year-old woman was admitted to the acute trauma unit following a fall off a horse. Her medical history included anxiety and depression, but she was otherwise fit and well. A plain film pelvic X-ray confirmed a displaced, comminuted, intertrochanteric fracture of the left neck of femur (figure 1).

She was taken to the theatre for a long dynamic hip screw fixation of the fracture. There were no intraoperative complications and the patient returned to the orthopaedic ward following the procedure (figure 2).

Two days postoperatively she developed cerebral signs including confusion and agitation. Pulse oximetry revealed oxygen saturations dropping to 70% on room air. Five litres of oxygen via a Hudson mask maintained saturations at 95%. On clinical examination, her chest was clear to auscultation, her respiratory rate was 28 and she was able to speak in full sentences.

A chest X-ray was requested which showed ill-defined bilateral air space shadowing and an arterial

Figure 1 Initial pelvic X-ray on presentation.

blood gas confirmed type I respiratory failure (figure 3).

Arterial blood gas: pH 7.40, pCO₂ 5.1, pO₂ 8.5, bicarb 27.1, BE 3.4 (on 36% oxygen).

Given her presentation, there was a high index of suspicion that this may have been a pulmonary embolism, and therefore a CT pulmonary angiogram (CTPA) was performed. The scan was negative for pulmonary embolism, but demonstrated diffuse patchy ground glass appearance in the lobes of both lungs in keeping with acute respiratory distress syndrome (figure 4).

Figure 2 Orthopaedic pinning of left hip.

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Figure 3 Chest X-ray day 2 postoperatively.

Following review by intensive care and respiratory physicians, a diagnosis of fat embolism syndrome was reached.

The patient made a good recovery on the orthopaedic ward with supportive treatment, which included controlled oxygen therapy and intravenous fluid resuscitation. Escalation to an intensive care setting was not necessary in this case.

INVESTIGATIONS

Abnormal imaging and arterial blood gas sampling postoperatively:

- ▶ Arterial blood gas revealed type I respiratory failure.
- ▶ Chest X-ray revealed ill-defined bilateral air space shadowing.
- ▶ CT pulmonary angiogram revealed diffuse patchy ground glass shadowing within all lobes of both lungs in keeping with acute respiratory distress syndrome.

DIFFERENTIAL DIAGNOSIS

- ▶ Pulmonary embolism
- ▶ Acute respiratory distress syndrome
- ▶ Pulmonary oedema
- ▶ Atypical pneumonia

Figure 4 CT pulmonary angiogram on day 2 postoperatively.

TREATMENT

Supportive treatment with oxygen therapy, reassurance, close observation and nursing care.

OUTCOME AND FOLLOW-UP

The patient was managed on an orthopaedic ward with supportive treatment. She made a good recovery both from a respiratory and orthopaedic perspective.

DISCUSSION

Fat embolism syndrome is a rare but potentially life-threatening complication of long bone fractures and orthopaedic reaming procedures.^{1–3} It results from fat emboli entering the bloodstream following tissue damage.⁸ A high level of suspicion should be taken when patients present with hypoxia, confusion or rash following long bone fractures and/or postoperatively. Differential diagnoses include pulmonary embolism, acute respiratory distress syndrome, pulmonary oedema and atypical infections. The severity of the condition can vary, most cases are self-limiting, but mortality has been reported as high as 5–15%.⁵ The mainstay of treatment is supportive; ensuring good arterial oxygenation and maintaining good intravascular volume, as shock can exacerbate lung injury.^{9 10}

This case report exemplifies the classic features of fat embolism syndrome. It is uncertain if the source of the fat emboli originated from the fracture itself or its subsequent management. Postoperatively, the patient was managed on the orthopaedic ward by junior doctors. The junior doctors responsible for the patient's postoperative management recognised that the patient had acutely deteriorated. A full assessment prompted them to order further investigations and escalate care appropriately with early critical care outreach review.

This case is a useful learning tool for clinicians especially orthopaedic ward doctors. It demonstrates clearly how to recognise, investigate and manage fat embolism syndrome with a positive outcome. It is imperative that clinicians are aware of the key features of fat embolism syndrome, its significance in terms of potential deterioration and high mortality, and subsequent management of the syndrome.

Learning points

- ▶ Fat embolism syndrome is a clinical diagnosis based on a triad of hypoxia, neurological disturbance and a petechial rash 24–72 h after the initial insult.^{3 6}
- ▶ It is a recognised and potentially fatal complication of long bone fractures and orthopaedic reaming procedures.^{1–3}
- ▶ Fat emboli enter the bloodstream through tissue that has been disrupted by trauma.⁸
- ▶ The treatment is usually supportive, but may involve escalation to include ventilatory support.⁷
- ▶ Severity can vary, but it can be associated with a mortality rate of 5–15%.⁵

Contributors LT and JH were involved in the clinical care of the patient. LT is the main author of the case report. JH contributed by helping with the design and concept of the case report and critiquing the article to help produce a well written report.

Competing interests None.

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