■ CASE REPORT

Fatal pulmonary embolism following ankle fracture in a 17-year-old girl

L. Chen,
D. Soares

From Logan
Hospital,
Queensland,
Australia

We report a case of fatal pulmonary embolism following a simple ankle fracture in a 17-year-old girl. The diagnosis was confirmed at post-mortem. The risk factors for deep venous thrombosis and pulmonary embolism and their significance in orthopaedic fracture management are discussed.

Venous thromboembolism is common in patients following multiple trauma and orthopaedic operations especially lower limb arthroplasty.¹ The incidence of the deep venous thrombosis is reported as between 1% and 2% following fracture of the long bones.² Fatal pulmonary embolism in a patient with a simple fracture treated as an outpatient is very rare. We report a case of a 17-year-old girl with an ankle fracture who suffered a massive fatal pulmonary embolism which was confirmed at post-mortem. To our knowledge there has been no previous similar case report in the English literature.

Case report

A 17-year-old girl presented to the emergency department with a fracture of the left distal fibula (Danis-Weber Type B)³ with minimal displacement following a fall down a flight of stairs (Fig. 1). Her past medical history was unremarkable and there was no family history of a bleeding disorder or a coagulopathy. A below-knee back slab was applied and she was advised to take oral analgesia and to walk with the aid of a pair of crutches. After a week she was reviewed and a below-knee plaster of Paris cast was applied.

Five days later she experienced a sudden onset of severe shortness of breath and collapsed. Within half an hour she was transferred to hospital where she was unconscious on arrival and was intubated. Her Glasgow coma score⁴ was three of 15, her blood pressure was unrecordable and there was no palpable carotid pulse. Her electrocardiogram showed a complex tachycardia consistent with supraventricular tachycardia, with a rate of 180 beats per minute. She was ventilated with 100% oxygen and cardiopulmonary resuscitation was begun. The clinical diagnosis of a massive occluding pulmonary embolus was made. Despite the attempted resuscitation, she had a cardiac arrest and died.

On post mortem examination she was noted to be moderately obese at 98 kg with a height of 170 cm (body mass index 34). Thrombus was found in the deep veins of the left calf. The pulmonary arteries contained large bilateral pulmonary emboli. Additionally, thrombus was seen throughout the smaller arteries in both lungs.

Discussion

The annual incidence of venous thromboembolism in a general Western population is

■ L. Chen, MD, MB, BS,
Orthopaedic Surgeon
■ D. Soares, FRACS, Director
of Orthopaedics
Department of Orthopaedics
Logan Hospital, Cnr
Armstrong and Loganlea
Roads, Meadowbrook,
Queensland 4131, Australia.

Correspondence should be
sent to Dr L. Chen; e-mail:
leimin_chen@
health.qld.gov.au

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Fig. 1

Anteroposterior and lateral radiographs showing a left distal fibular fracture on the first day after injury.

approximately 0.1%² and is increased to between 1% and 3% in the presence of obesity. The risk of pulmonary embolism (symptomatic or asymptomatic) with proximal vein thrombosis is approximately 50%.⁵ The rate of fatal pulmonary embolism without prophylaxis after a fracture is not known, but it may be the first manifestation of venous thromboembolism.

Deep venous thrombosis following trauma and immobilisation is associated with risk factors, such as age, major surgery and a past history of venous thrombosis. Inherited conditions, such as antithrombin, protein C and protein S deficiencies, or Factor V Leiden mutation, are other major predisposing risk factors.⁶

Morbid obesity has been considered a high risk factor in the development of thromboembolism. In one study of morbidly obese patients,⁷ it was found that 0.7% (4 of 564) had proven fatal pulmonary emboli. Navarro-Sanz and Fernandez-Ortega⁸ recently reported a fatal pulmonary embolism in a 46-year-old man after arthroscopy of the knee. They did not confirm the diagnosis at post-mortem.⁷

The early detection of deep venous thrombosis in the affected limbs by Doppler⁹ and prophylaxis using warfarin has been shown to be effective in reducing the mortality from pulmonary embolism.¹⁰ Chemoprophylaxis using low-molecular-weight heparin, or warfarin, is indicated in patients with fractures who are at increased risk of deep venous thromboembolism. Early mobilisation and isometric exercises for the legs following a fracture should be

encouraged and taught to patients even those with simple fractures involving the lower limb.

Supplementary Material

A further opinion by Mr David Warwick is available with the electronic version of this article on our website at www.jbjs.org.uk

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

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