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Multiple injuries diagnosed using full-body digital x-ray

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Abstract Missed injuries in patients with multiple trauma are primarily attributable to inadequate radiography. A case is presented that demonstrates the value of a full-body digital radiography system in diagnosing pathology in pediatric multiple trauma patients. Full-body imaging allowed the identification of a ruptured diaphragm, a pelvic fracture, and a femoral fracture on a single radiographic projection in the resuscitation room, facilitating immediate intervention.

The accurate assessment of pediatric patients with multiple trauma is difficult. Standard trauma imaging protocols, limited by radiation dose, time, and technical considerations, might result in missed injuries. This case presentation demonstrates the ability of a novel full-body digital radiography system to establish a diagnosis of pathology in children with multiple traumas.

South Africa's only dedicated trauma unit for children younger than the age of 12 is located at the Red Cross War Memorial Children's Hospital, which is a referral center for the country's Western Cape Province. Victims of motor vehicle accidents (MVAs) constitute a significant proportion of the workload of the unit. These patients often present with multiple injuries, making accurate assessment difficult, particularly if there is an associated head injury. More than 13% of diagnostic errors in the trauma setting have been attributed to failure to perform radiography [1].

A slit scanning digital x-ray unit, the StatScan (Lodox Systems, [Pty] Ltd, Sandton, South Africa), was commissioned in the resuscitation room of our trauma unit in October 2004 (Fig. 1). StatScan is able to acquire a full-body adult image in less than 13 seconds, at low radiation dose, and the digital image may be viewed on the workstation in the resuscitation room 10 seconds later [2,3]. We have recently reported on the benefits of such full-body scanning at low radiation dose in the early detection of fractures in the absence of associated clinical signs [4]. This case report further highlights the important role that quick acquisition of an anteroposterior (AP), full-body radiograph has the potential to play in pediatric multiple trauma. We present a pediatric MVA victim, in whom multiple diagnoses were made after acquisition of a single full-body digital image.

1. Case report

An 8-year-old boy, an MVA pedestrian, was admitted to the level I trauma unit of the Red Cross War Memorial Children's Hospital. The wheel of a truck had run over his trunk. He appeared to be hemodynamically stable with a blood pressure of 100/80 mm Hg and a pulse rate of

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Fig. 1 The StatScan machine.

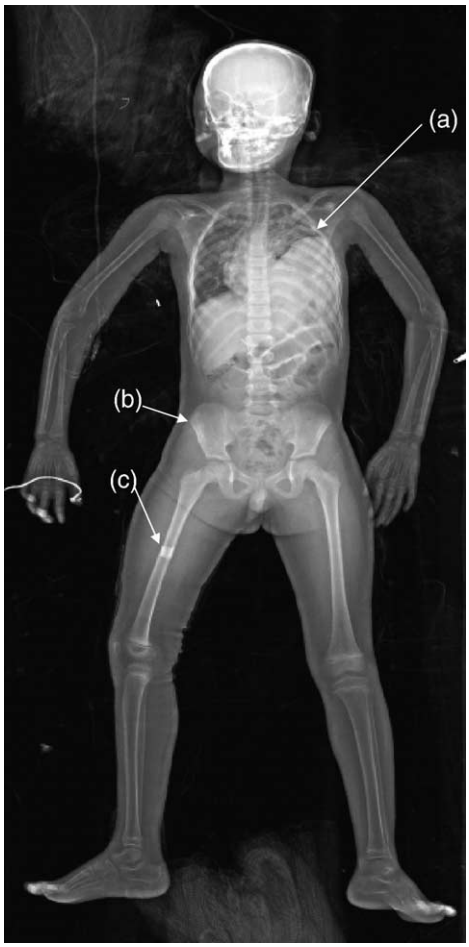

Fig. 2 The full-body image of the patient indicating signs suggestive of diaphragm rupture (a), fracture of the right iliac crest (b), and femoral fracture (c).

163 beats/min; his respiratory rate was 32 breaths/min, and his oxygen saturation was 91%. Initial assessment in the resuscitation room included a StatScan AP image (Fig. 2) that demonstrated the following:

1. Elevation of the left hemidiaphragm, compression of the left lung, mediastinal displacement to the right, and bowel gas in the left thorax, suggestive of a ruptured diaphragm (Fig. 3).
2. A fracture of the right iliac crest (Fig. 4).

Fig. 3 There is elevation of the left hemidiaphragm, compression of the left lung, and mediastinal shift to the right. Gas shadows representing bowel gas are present beneath the diaphragm in the chest cavity. Findings suggest diaphragmatic rupture.