



## CLINICAL IMAGES

## Femur fractures in infants

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The Trauma Unit of the Red Cross War Memorial Children's Hospital annually manages approximately 10 000 children under the age of 12 years. Approximately 500 (5%) present with non-accidental injuries (NAIs) which can further be categorised as resulting from sexual abuse (approximately 150 – 1.5%) and physical abuse (approximately 350 – 3.5%). We recently admitted 5 infants under 1 year, all with femur fractures, in 1 week. Practitioners should be alert for the possibility of NAI and abuse in infants presenting with any type of femur fracture, and investigate, manage and refer appropriately to ensure optimal patient care and outcome.

## Case reports

## Case 1

This 2-month-old girl was allegedly dropped by her inebriated father. She cried, especially when moving the left lower limb. Her left knee was tender and radiographs demonstrated a distal femur metaphyseal fracture (Fig. 1).



Fig. 1. Case 1: Metaphyseal fracture, distal femur.

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## Case 2

This 4-month-old boy was allegedly dropped by his inebriated father. The child was not fully extending his right leg and kept the knee flexed at approximately 110°. Radiographs demonstrated a transverse fracture of the proximal femur shaft (Fig. 2). A computed tomography (CT) brain scan showed focal left frontal atrophy, in keeping with a past intracranial insult.

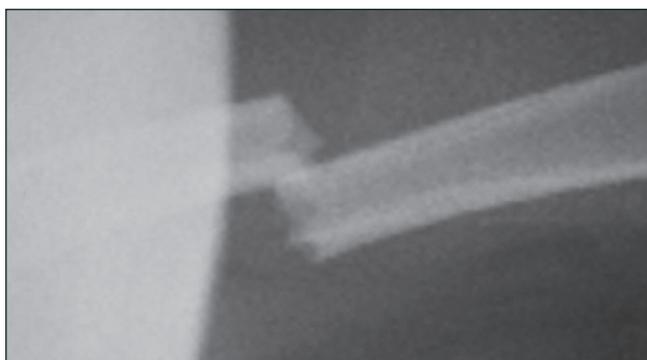


Fig. 2. Case 2: Transverse femur shaft fracture.

## Case 3

The 5-month-old girl allegedly fell from her bed. She did not move her right leg and was in pain. The right knee was tender, and radiographs demonstrated a fracture of the distal femur, through the distal femoral epiphysis (Fig. 3).

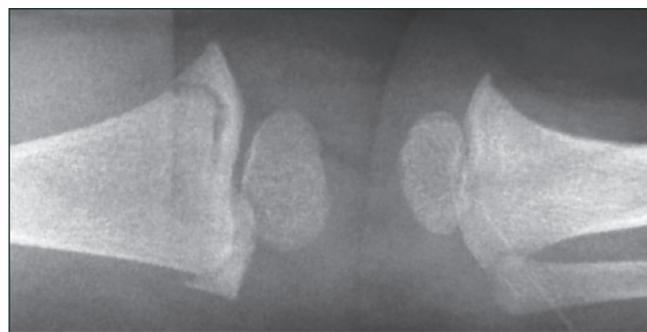


Fig. 3. Case 3: 'Bucket-handle' distal femur fracture.

## Case 4

This 5-month-old girl had a history of falling off the bed while at her mother's side, but further questioning revealed that she had allegedly been dropped by the neighbour's 17-year-



old daughter. She presented with a tender, swollen left thigh. Radiographs demonstrated a distal metaphyseal femur fracture (Fig. 4).

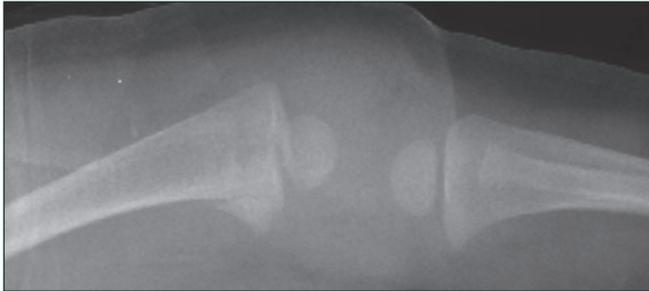


Fig. 4. Case 4: Metaphyseal femur fracture.

## Case 5

This 7-month-old boy allegedly fell off his bed while his mother was outside doing the washing. The left leg was swollen and tender. Radiographs demonstrated a mid-shaft oblique femur fracture (Fig. 5).



Fig. 5. Case 5: Oblique femur shaft fracture.

## Discussion

The diagnosis of child abuse can be difficult to establish. Non-accidental injury is commonly regarded as a diagnosis, but is simply a description of the mechanism of injury. Infants are at higher risk of severe NAI than older children,<sup>1</sup> but the occurrence of fractures in infants can also be due to non-abuse causes such as osteogenesis imperfecta.<sup>2</sup> However,

there is general agreement in the literature that the majority of fractures in infants are due to child abuse. Consequently, a higher degree of suspicion of abuse should exist when seeing femur fractures in children who are not yet walking.<sup>3</sup>

Our cases illustrate the spectrum of, and variety in, femur fractures that can occur as a result of abuse: 2 metaphyseal, 1 transverse shaft fracture, 1 oblique shaft fracture, and 1 'bucket-handle' fracture.

While the head is the most common target for abuse, with over half the external wounds found on the surface of the head,<sup>4,5</sup> fractures are the second most common presentation in NAI.

Earlier publications on child abuse have focused on shaken baby syndrome<sup>6</sup> and intracranial haemorrhage attributed to sudden deceleration.<sup>7</sup> Studies have also attempted to determine factors distinguishing child abuse from accidents.<sup>8</sup> Since fractures in small children are often not adequately assessed and investigated, we stress the importance of taking a proper social history, examining the entire body, and performing appropriate screening investigations, including:

- skeletal surveys looking for old/healing injuries, especially in the pre-toddler and toddler groups
- CT scanning of the head, looking for intracranial haemorrhage
- ocular examination and retinoscopy, looking for retinal haemorrhage (65 - 95% specific for abuse).

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