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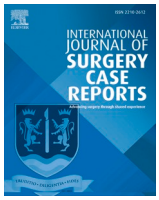
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Case report

Simultaneous traumatic bilateral femur fractures in the paediatric population: Case report

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ABSTRACT

Introduction: Paediatric femur fractures are well described. Simultaneous bilateral femur fractures are a much more rare occurrence with limited literature on their incidence, treatment protocol and outcomes. This case report outlines the radiological and clinical outcomes of bilateral femur fractures which were managed surgically in our institution.

Case report: We report a 7 year old child that sustained bilateral femur fractures subsequent to an access gate falling on him. He was managed surgically with titanium elastic nailing on the left and a proximal femur locking plate for the right.

Discussion: Bilateral femur fractures are rare and mostly due to motor vehicle accidents and falls. They can present with multiple comorbid injuries due to the high-energy accidents. The incidence and mean age of injury are unclear. The treatment of bilateral femur fractures in the paediatric population can be conservative or surgical depending on age and other factors.

Conclusion: Simultaneous traumatic bilateral femur fractures, although rare, have good clinical and radiological outcomes when treated conservatively or surgically, as is shown in our case.

1. Introduction

Femur fractures are common injuries in children. It is estimated that 1.6 % of children will sustain a femur fracture [1]. Femoral fractures are the third most common for lower limb fractures in children [1]. Femoral shaft fractures were third as a reason for admission following forearm and elbow fractures in a South African paediatric tertiary trauma unit [2]. Boys over the age of one are 4.7× more likely to fracture their femur by age 14 [3]. Falls and motor vehicle accidents account for two-thirds of all fractures [4].

Falls as the mechanism of injury predominate in young children, whereas motor vehicle accidents occur more in older children and adolescents [4]. In children less than a year old presenting with a femur fracture, a non-accidental mechanism of injury should be considered [5]. A transverse diaphyseal fracture is more suspicious of non-accidental injury than other fracture morphologies [6].

The management of femur fractures is mainly in-hospital. In most cases, the patient's age can guide the choice of management. Children below the age of six years are managed more conservatively [7]. Surgical management is the choice of management in children over seven, as it has been shown that conservative management can have poorer outcomes and prolonged hospital stays in this cohort [8]. Time to surgical fixation has been shown to have similar long-term clinical outcomes, although earlier fixation can lead to shorter hospital stays and fewer non-orthopaedics complications [9]. The purpose of this study is to report the clinical and radiological outcomes in a paediatric patient with traumatic bilateral femoral fractures who underwent successful surgical management.

2. Case report

We present a case of a 7-year-old male who presented to the trauma unit subsequent to a gate falling on him. He presents with an inability to weight bear and bilateral lower limb pain. The primary survey showed no loss of consciousness, normal vitals, and there were no signs or symptoms of non-accidental injury. Musculoskeletal injuries to his lower limbs were the only ones present.

Upon focused examination, the patient's thighs showed bilateral

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swelling without any visible wounds. There was bilateral tenderness with soft compartments, and legs were neurovascularly intact. Radiographs of his femurs showed a right displaced and shortened diaphyseal transverse fracture, a length-stable pattern, and a left intertrochanteric femur fracture, Delbet type IV. We placed him on bilateral skin traction and took radiographs (Fig. 1). Consent was obtained from his mother for operative management.

We reduced the right femur fracture and stabilised with minimally invasive retrograde Titanium Elastic Nailing System (TENS). We inserted the TENS nail 2.5 cm above the distal femur physis and advanced it to the lesser trochanter level. The left femur fracture was operated on using a direct lateral approach, and the fracture was reduced and fixated with a proximal hip locking plate and screws.

Postoperatively, surgical wounds healed without complications, and the patient was to be non-weight bearing for four weeks in a wheelchair. At four weeks post-operation, the patient started to mobilize according to the physiotherapy protocol and was able to do so with minimal discomfort. Radiographs at four weeks post-operation show excellent callus formation in four cortices (Fig. 2).

At three months, the patient is pain-free, with a visual analogue scale (VAS) of 0. The patient reports no discomfort when running and has returned to all activities of daily living. The patient exhibits a full range of motion on both hips and knees. Radiographically, the fracture site has begun remodelling (Fig. 3). The patient implants were due for removal at six months post-operation.

3. Discussion

Simultaneous bilateral femur fractures in paediatric population are an uncommon occurrence. There are two case series reported, each containing eight cases over a period of ten years. With the reported cases, boys show a higher incidence of fracturing as compared to girls [10,11]. Of the 16 reported cases in the two case series, 14 of the patients were boys [10,11]. The mean age of fracture was 8.6 years and 11 years of age in the two case series [10,11]. The annual incidence of bilateral femur fracture in children is unclear. In a ten year retrospective review of femur fractures in children six years and younger, there were seven bilateral femur fractures in a total of 207 patients (3.38 %) [12].

The most commonly reported mechanism of injury is high-energy trauma due to traffic accidents, mainly pedestrian vehicle accidents, followed by motor vehicle accidents. A fall from height is the second leading cause of injury. There is one reported case where the mechanism was a non-accidental injury [12]. To our knowledge, this is the first case report where the mechanism of injury was an access gate falling on the child [11]. With the high energy transfer required, bilateral femur fractures present with more associated injuries, such as traumatic brain

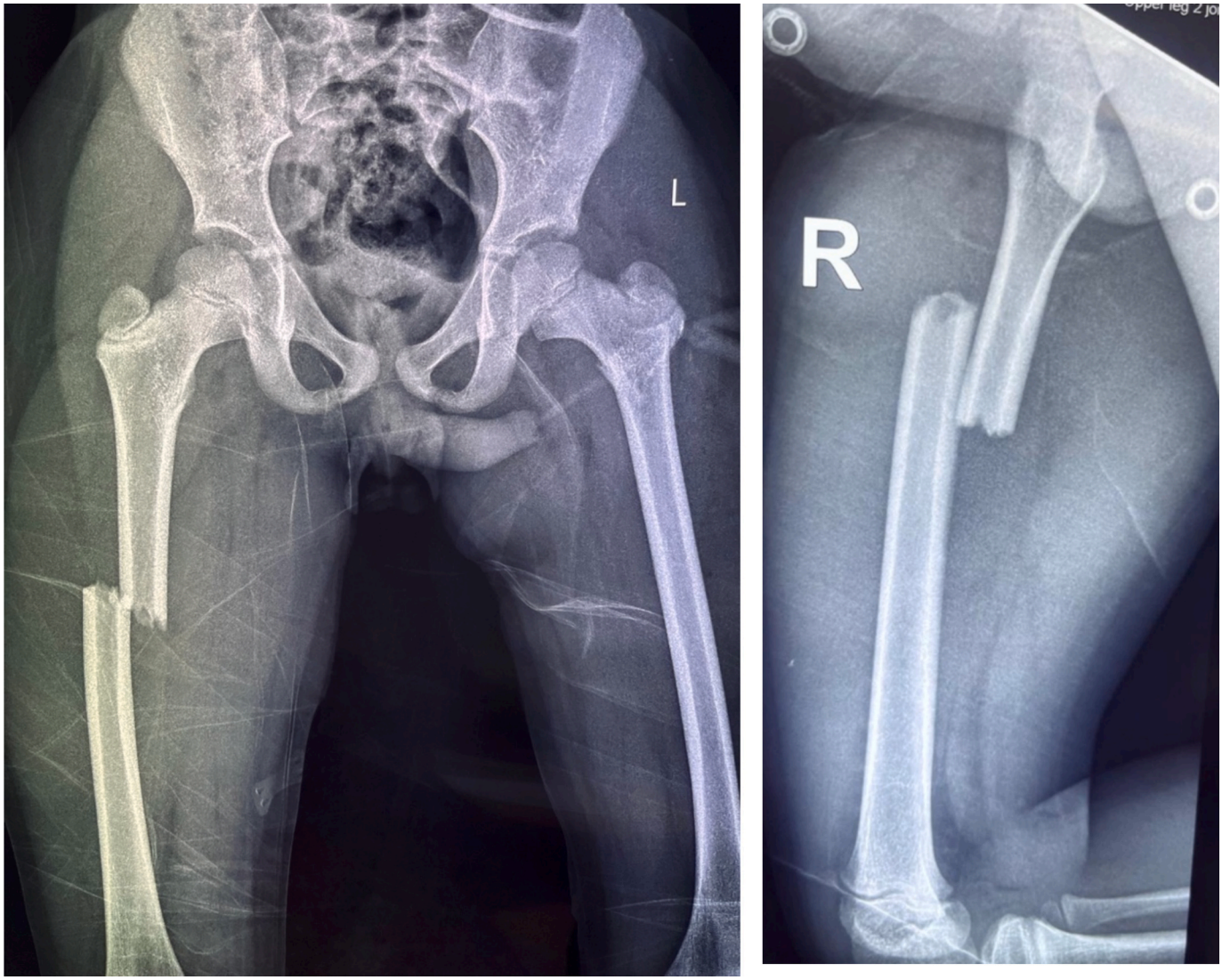


Fig. 1. Anteroposterior view of pelvis and proximal femurs showing right proximal femur fracture and left intertrochanteric femur fracture.

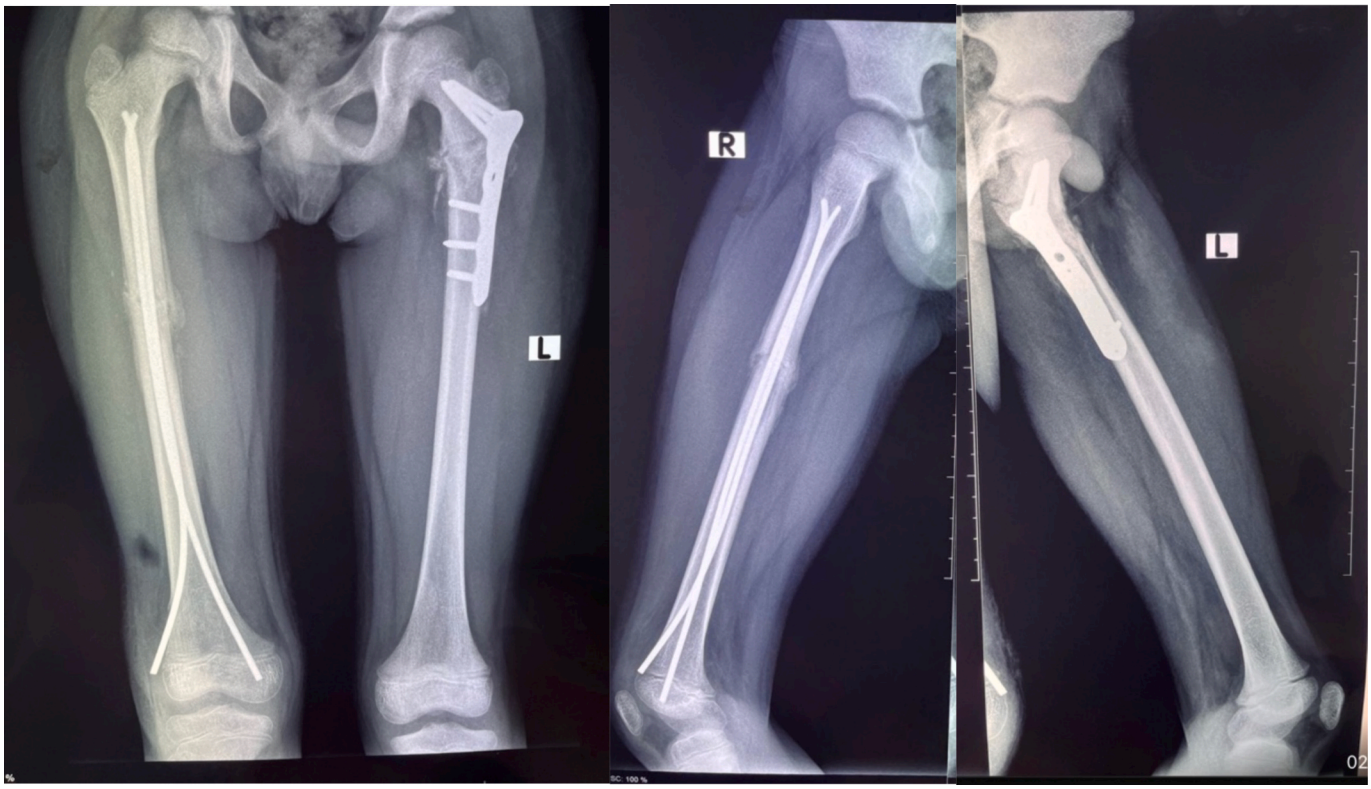


Fig. 2. Anteroposterior radiographs at four weeks post operation, with healing fractures.

injuries, hollow viscous injuries, and other associated fractures, including spine fractures [10]. Due to being polytrauma in most cases, bilateral femur fractures have higher morbidities and longer hospital stays compared to unilateral femur fractures. There have been no cases of mortality reported [10].

The method of treatment varies from country to country and institution to institution due to there being no standardized treatment protocol. Factors such as age, weight, fracture location, and morphology, as well as the resources available at the hospital, can determine the choice of management. In the low-resourced hospital described by the author, conservative management was the preferred method for five of their eight patients [11]. In contrast, in a more well-resourced hospital, all the cases in the series underwent surgical management [10]. Conservative management is preferred in younger children, whereas surgical management is the predominant choice for children over the age of seven years [7,13].

Most of the bilateral femur cases managed conservatively and surgically had good outcomes. One case of paediatric bilateral neck of femur fractures had a refracture of her femoral neck and avascular necrosis as a complication [14]. One case was reported to have knee stiffness, which affected their daily activities [11]. Femur fractures which were managed with external fixators showed a higher rate (21.6 %) of refracturing, with bilateral femur fractures being at a greater risk [15]. Our patient returned to normal activity at 14 weeks with no discomfort.

4. Conclusion

Access gate-related simultaneous traumatic bilateral femur fractures in children are uncommon. Surgical treatment of simultaneous bilateral femoral fractures in children has demonstrated favourable clinical and radiological results. We recommend parental oversight at home and on pedestrian routes at all times for children.

Author contribution

LG: Conceptualization, Methodology, investigation, data collection, draft preparation, Review and Editing. CSN: Conceptualization, supervision, draft preparation, Review and Editing.

Consent

Written informed consent was obtained from the patient's parents/legal guardian for publication and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Ethical approval

Ethical approval for this study was provided by the Ethical Committee Human research ethics committee (medical).

Guarantor

Senior author: CSN.

Research registration number

N/A.

Methods

This work has been reported in line with the SCARE criteria [16].

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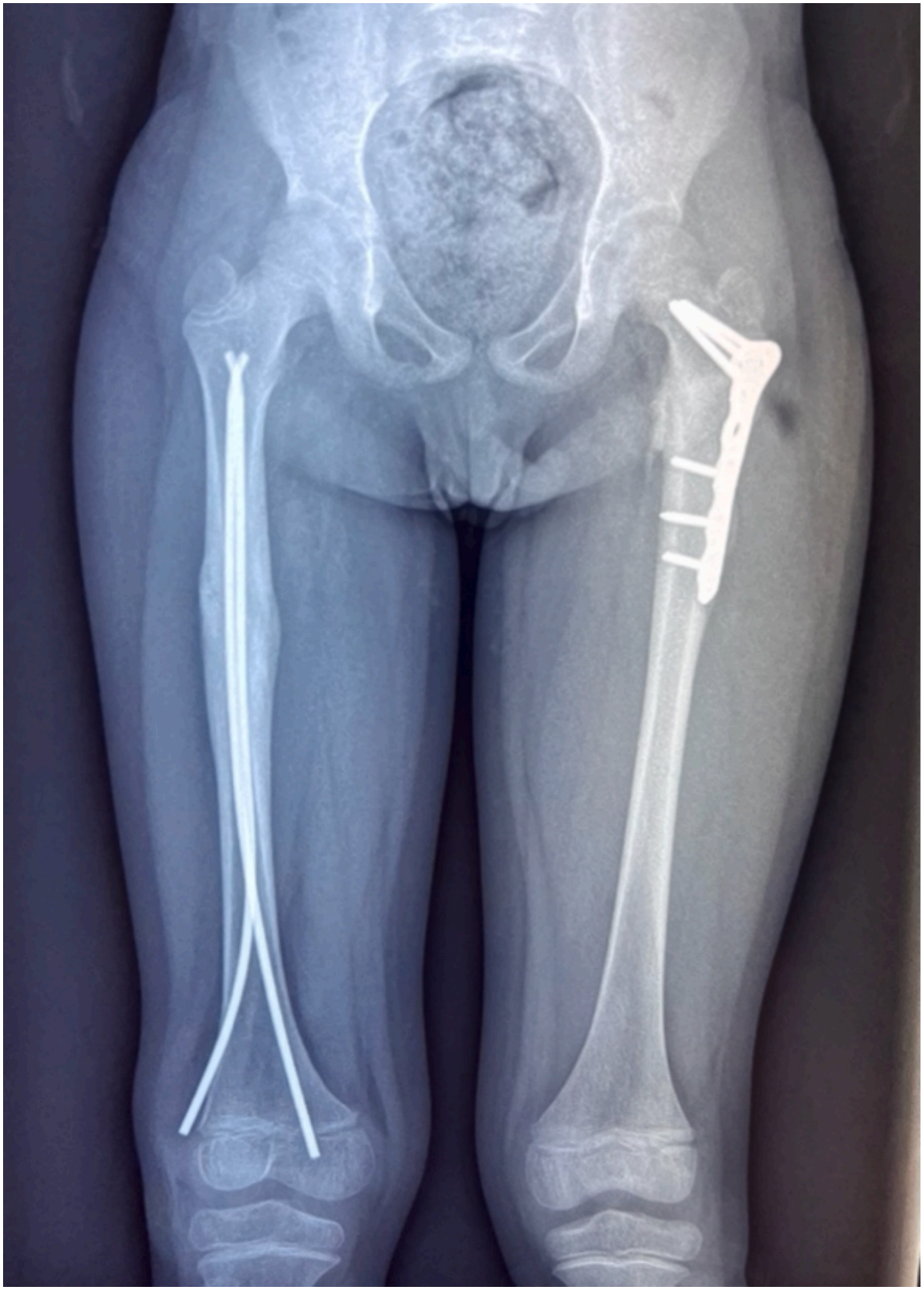


Fig. 3. Anteroposterior radiographs of whole femurs three months post operation, with healed fractures.

Conflict of interest statement

The authors declare that they have no conflict of interest.

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