

Case Report

Conservative management of a displaced femoral shaft fracture in an 8-year-old child with excellent functional outcome: a case report

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ABSTRACT

Flexible stable intramedullary nailing with titanium elastic nailing system (TENS) is commonly accepted as a preferred treatment in diaphyseal fractures of femur in children aged 6-12 years. However, in cases with significant anaesthetic risk due to medical comorbidities conservative management can be considered. An eight year old boy from a rural area in Kerala with an unrepaired congenital atrial septal defect sustained a displaced, closed mid-shaft fracture of the right femur following a road traffic accident. TENS was recommended for the fracture but surgical intervention was not accepted by the parents because of concerns regarding anaesthesia-related cardiac risk. Hence, the child was managed conservatively with skin traction followed by hip spica cast application. Serial radiographs were then taken which showed evidence of delayed union with progressive callus formation, attaining near-complete union by eight months, with residual angulation and approximately 2 cm limb shortening. Even though these radiological findings were present, child attained an excellent clinical outcome, with painless full weight-bearing, normal hip and knee range of motion, and the ability to squat comfortably. This case shows that conservative management of paediatric femoral shaft fractures may be appropriate in meticulously selected high-risk patients. Functional recovery and patient safety may be considered as a superior factor than radiographic perfection, especially in children with ampleremodelling potential.

Keywords: Femoral shaft fracture, Paediatric orthopaedics, Conservative management, Delayed union, Congenital heart disease, ESIN, Hip spica

INTRODUCTION

Femoral shaft fractures are common major orthopaedic injuries in children with considerable morbidity. Flexible stable intramedullary nailing (TENS) is generally considered the gold standard in children aged 6-12 years, that offers stable fixation, early mobilization, and good alignment while sub muscular plating is another option for other specific patterns.^{1,2} Conservative management with traction followed by hip spica cast application is an accepted alternative in some situations like limited access to surgical care, refusal by caretakers, or increased anaesthetic risk due to underlying medical comorbidities. Children with congenital heart disease have perioperative challenges, and the risks associated with general

anaesthesia must be carefully balanced against the benefits that are anticipated from surgical fixation. Current age-based treatment algorithms still recognize non-operative management as a feasible option in meticulously selected cases.⁴ This report describes the successful conservative management of a displaced femoral shaft fracture in an 8-year-old child with an unrepaired atrial septal defect.

CASE REPORT

An 8-year-old boy presented in July 2023 following a road traffic accident. He had a known history of congenital atrial septal defect diagnosed in early childhood which was not surgically repaired. On

examination, the child had pain, swelling, and deformity of the right thigh with no neurovascular deficits. Radiographs of the right femur (anteroposterior and lateral views) demonstrated a displaced, closed fracture

involving the mid-diaphyseal region of the femoral shaft, without intra-articular extension. The distal femoral epiphysis and knee joint alignment were intact (Figure 1).

Considering the patient's age and fracture configuration, surgical fixation with TENS was recommended to the parents. After detailed counselling regarding treatment options, risks and benefits, the parents refused surgical management due to concerns related to anaesthesia and the child's underlying cardiac condition.

Investigations

Initial radiograph



Figure 1: Radiograph of right femur anterior-posterior view showing mid diaphyseal fracture of femoral shaft without intra articular extension.

Treatment

The patient was treated conservatively with skin traction initially followed by application of a hip spica cast. Immobilization was continued until serial radiographs demonstrated progressive fracture healing. No surgical intervention was performed due to parental refusal.

Serial follow-up radiographs



Figure 2: displaced closed mid-shaft fracture of the right femur after hip spica application.



Figure 3: 2 months: minimal periosteal callus formation with a clearly visible fracture line and persistent angulation.



Figure 4: 4 months: increased callus formation with partial bridging; fracture line remained visible.



Figure 5: 6 months: maturing callus with improving cortical continuity.



Figure 6: 8 months: near-complete osseous union with residual angulation and limb shortening.

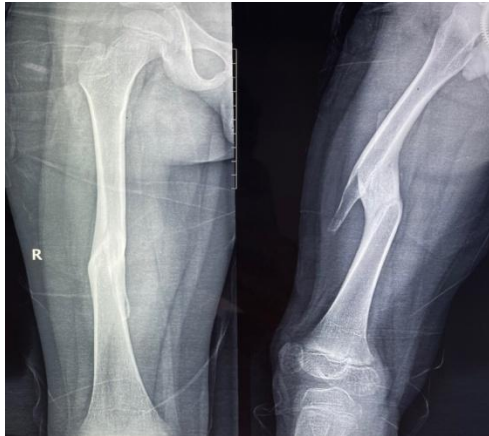


Figure 7: Radiograph (~9 months): united fracture with residual angulation and approximately 2 cm of limb shortening.

Outcome and follow-up

After eight months post-injury, the child demonstrated painless full weight-bearing and with normal hip and knee range of motion. He was able to do full squatting with heels on the ground and had returned to routine day to day activities. No clinically apparent angular or rotational deformity was noted. A true limb length discrepancy of approximately 2 cm was present which was compensated with a shoe raise.

Functional photographic assessment showed symmetrical standing posture with correction of pelvic tilt, full squatting, and a strong active straight leg raise comparable to the contralateral limb (Figures 8–10).

Radiologically, the outcome was fair due to residual angulation and limb shortening; however, clinically, the outcome was excellent. Annual follow-up for limb length monitoring was advised, and no corrective surgical intervention was planned at the time of reporting.



Figure 8: Standing clinical photograph demonstrating correction of pelvic tilt with the use of a shoe raise for limb length discrepancy.



Figure 9: Clinical photograph showing full squatting with heels on the ground, indicating preserved hip and knee range of motion.



Figure 10: Clinical photograph demonstrating active straight leg raise, indicating preserved hip flexor strength.

DISCUSSION

Elastic stable intramedullary nailing with TENS is widely regarded as the standard treatment for femoral shaft fractures in children between 6 and 12 years of age because it facilitates early mobilization and provides adequate control of alignment and limb length.^{1,2} However, conservative management remains as an alternative in children with significant medical comorbidities or contraindications to anaesthesia.

Long-term studies evaluating traction and hip spica casting have reported satisfactory functional outcomes, despite higher rates of delayed union, malunion, and limb length discrepancy compared with surgical fixation.³ Current age-based treatment algorithms emphasize that management decisions should be guided by functional recovery and remodelling potential rather than radiographic appearance alone.⁴

Excellent remodelling capacity has been documented in younger children, even in the presence of initial malalignment.^{5,6} Also, studies from resource-limited settings suggest that conservative treatment can have acceptable outcomes, although it is associated with prolonged immobilization and a higher incidence of limb shortening.⁷ In the present case, even though there is delayed radiological union and residual deformity, the child achieved excellent functional recovery.

Drawbacks of conservative management

The limitations encountered in this case are delayed radiological union, residual angulation, limb length discrepancy, prolonged immobilization and increased burden of bystanders. These drawbacks are consistent with those reported in the literature for conservatively managed paediatric femoral shaft fractures and are more commonly observed when compared with operative fixation.^{3,7}

Limitations

This report describes a single case and long-term follow-up until skeletal maturity is required to fully assess limb length discrepancy and remodelling. Larger studies focusing on paediatric patients with significant medical comorbidities are needed to further clarify treatment recommendations.

CONCLUSION

Conservative management of displaced femoral shaft fractures in children remains a valid treatment option in carefully selected high-risk patients. With appropriate counselling and vigilant follow-up, excellent functional outcomes can be achieved despite delayed radiological union and residual deformity.

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