

# Open Reduction and Plate Fixation of Subtrochanteric Femoral Fractures In Children

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## ABSTRACT

**Introduction:** The treatment of subtrochanteric femoral fractures in children is controversial. Different treatment options have been used: skin traction, 90/90 skeletal traction, immediate spica casting, cast bracing, internal fixation and external fixation. Treatment choices are influenced by the child's age and size and whether the femoral fracture is an isolated injury or part of a polytrauma. The aim of the study is to evaluate the results of plate fixation of subtrochanteric femoral fractures in children.

**Materials and Methods:** This prospective study was conducted in Patna Medical College & Hospital. 10 children with closed subtrochanteric femoral fractures were included in this study. Under general anaesthesia, a posterolateral muscle splitting approach was used. In all cases, a single 3.5 mm LCP plate was used.

**Results:** All fractures united with anatomical alignment within an average of eight weeks (range, 6 to 12 weeks). At the latest follow-up there were no patients with implant failure, refracture,

heterotopic bone formation or avascular necrosis of the femoral head.

**Conclusion:** Open reduction and internal fixation with plate appears as a good treatment option for subtrochanteric femoral fractures in children.

**Keywords:** Subtrochanteric Femoral Fracture, LCP.

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## INTRODUCTION

Paediatric subtrochanteric femoral fractures are rare and have received limited attention in the literature.<sup>1</sup> The subtrochanteric femoral fracture in children is a special type which occurs 1 to 2 cm below the lesser trochanter. The proximal fragment tends to flex (ilio-psoas), abduct (abductor group) and rotate externally (short external rotators).<sup>2</sup> The treatment of subtrochanteric femoral fractures in children is controversial. Different treatment options have been used: skin traction, 90/90 skeletal traction, immediate spica casting, cast bracing, internal fixation and external fixation. Treatment choices are influenced by the child's age and size and whether the femoral fracture is an isolated injury or part of a polytrauma. Indications for operative treatment include multiple trauma, head injury, open fracture, floating knee, vascular or neurological injuries, failure of conservative treatment, older child or adolescent and social indications. Methods of internal fixation include; intramedullary nails, compression plating and external fixator. The aim of the study is to evaluate the results of plate fixation of subtrochanteric femoral fractures in children.<sup>3-5</sup>

## MATERIALS AND METHODS

This prospective study was conducted in Patna Medical College & Hospital. 10 children with closed subtrochanteric femoral fractures

were included in this study. Pathological fractures, open fractures and fractures associated with neuromuscular diseases were excluded from this study. Surgery was performed 3-7 days after injury. One unit of blood was available. Under general anaesthesia, a posterolateral muscle splitting approach was used. Minimal soft tissue dissection and periosteal elevation were done. Manual reduction and distraction was attempted for reduction, correction of angulation and restoration of length. In all cases, a single 3.5 mm LC-DCP plate was used. No patient had bone grafting. No casts were used postoperatively. Hip range of motion and quadriceps exercises were started while the patient was in the hospital, full weight bearing after six to twelve weeks. Clinical and radiological assessment of the patients included duration of healing, alignment, presence or absence of postoperative infection, hip and knee motion, and functional daily activities.

## RESULTS

The average age at the time of injury was 7.5 years (ranging from 5.5 years to 11.5 years). There were six boys (60%) and four girls (40%). The mechanism of injury included a fall from a height in eight patients (80%) and a road traffic accident in two (20%). The right femur was affected in seven patients (70%) and the left in

three (30%). Three patients (30%) had head injuries and /or multiple injuries and seven patients (70%) had isolated subtrochanteric femoral fractures.



Fig 1: Pre op X-ray



Fig 2: Post Op AP view



Fig 3: Post Op lateral view

Radiographic evaluation revealed that the most common fracture pattern was a transverse fracture (in five patients, 40%). Three patients (30%) had a short oblique fracture, two (20%) had a spiral fracture. All fractures united with anatomical alignment within an average of eight weeks (range, 6 to 12 weeks). There were no deep infections but one patient (10%) presented a superficial wound infection that responded well to antibiotic and careful wound care. Patients with head trauma and /or multiple injuries were hospitalized for a longer period than those with isolated subtrochanteric femoral fractures (average 9.5 versus 3.5 days). In this study, only three children (30%) needed blood transfusion because of the associated injuries. Clinical evaluation revealed a full range of motion at both the hip and knee joints in all patients. No patient needed a shoe-lift for limb length discrepancy. At the latest follow-up there were no patients with implant failure, refracture, heterotopic bone formation or avascular necrosis of the femoral head.

### DISCUSSION

Patient's age may be the most important single variable regarding paediatric femoral fracture treatment. The treatment for children between the ages 6-12 years is the most controversial. Treatment options include traction followed by hip spica cast, immediate spica casting, cast bracing, internal fixation and external fixation.<sup>6</sup> Several studies have documented superior results with internal fixation compared to non-operative treatment. According to Kregor et al<sup>3</sup>, the indications for operative fixation of paediatric femoral fractures were presence of associated closed head injury and/or multiple injuries, open fractures and failure of conservative treatment.

Methods of internal fixation of paediatric subtrochanteric fractures include intramedullary nails, compression plating and external fixators.<sup>4,5</sup> Awareness of the advantages and disadvantages of intramedullary nails, compression plates and external fixator and the skill to apply each method safely are requisites to the ideal management of such fractures. Good results were reported with external fixators, but the rates of pin tract infection, refracture and loss of reduction are high.<sup>6</sup>

Flexible intramedullary nailing is nowadays the treatment of choice in paediatric femoral fractures. Patients are able to partially weight bear early because a rod is a load-sharing device, there is rapid fracture healing and a low incidence of malunion and non-union.<sup>4</sup> Disadvantages of intramedullary nailing are lack of rotational control, exposure to irradiation and backing out of implants.<sup>3</sup>

Plate fixation, despite the negative report of Ziv and Rang<sup>7</sup>, has been shown to work well in the paediatric age group.<sup>3,8</sup> The disadvantage of plating are the need for plate removal, poor cosmetic appearance of the scar, blood loss associated with exposure and reduction of the fracture and reported higher degree of overgrowth induced by the plates compared with intramedullary fixation.<sup>7</sup> On the other hand, patients treated with a plate require less assistance, can walk with crutches within ten days postoperatively and return to school sooner than children treated in 90/90 skeletal traction.<sup>9</sup>

Ward et al.<sup>8</sup> reported the use of a 4.5 mm AO dynamic compression plate for the treatment of femoral shaft fractures in 25 children, 6 to 16 years of age, 22 of whom had associated fractures or multisystem injury. The primary indication for this technique was simplification of nursing care and rehabilitation of

children with an associated head injury or polytrauma. The average time to fracture union was 11 weeks. There were no infections and no angular deformities.

Ziv and Rang<sup>7</sup> reported three deep infections among five children with head injuries and with femoral shaft fractures. They believed that infections were related to the large number of tubes attached to these patients and their decreased resistance.

Eren et al.<sup>10</sup> reported one case of osteomyelitis (2.1%) which occurred in a child with polytrauma. In our study, we encountered no deep infections but one patient (10%) had superficial wound infection that responded well to antibiotic and careful wound care, no deep infection encountered in our study.

In the series of Ward et al.<sup>8</sup>, there was one broken plate postoperatively in a boy who began full weight bearing a few days postoperatively. Fyodorov et al.<sup>5</sup> reported hardware failure in 2 of 23 femoral fractures treated with dynamic compression plating. Hardware failure occurred at 6 weeks. One was treated with revision plating and the other with spica casting; both fractures healed uneventfully. No other complications were noted in their patients. In this study, implant failure did not occur in any patient.

## CONCLUSION

Open reduction and internal fixation with plate appears as a good treatment option for subtrochanteric femoral fractures in children.

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